WebSphere MQ

Intercommunication

SC34-6059-03

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix E, "Notices", on page 767.

Fourth edition (March 2003)

This edition applies to the following product:
- WebSphere MQ for z/OS V5.3.1

It also applies to the following WebSphere MQ V5.3 products:
- WebSphere MQ for AIX
- WebSphere MQ for HP-UX
- WebSphere MQ for iSeries
- WebSphere MQ for Linux for Intel
- WebSphere MQ for Linux for zSeries
- WebSphere MQ for Solaris
- WebSphere MQ for Windows

Unless otherwise stated, the information also applies to these products:
- MQSeries for AT&T GIS UNIX V2.2.1
- MQSeries for Compaq NonStop Kernel V5.1
- MQSeries for Compaq OpenVMS Alpha V5.1
- MQSeries for Compaq OpenVMS VAX V2.2.1
- MQSeries for Compaq Tru64 UNIX, V5.1
- MQSeries for OS/2 Warp V5.1
- MQSeries for SINIX and DC/OSx V2.2.1
- MQSeries for Sun Solaris, Intel Platform Edition, V5.1

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About this book

This book describes intercommunication between WebSphere® MQ products. It introduces the concepts of intercommunication; transmission queues, message channel agent programs, and communication links, that are brought together to form message channels. It describes how geographically separated queue managers are linked together by message channels to form a network of queue managers. It discusses the distributed-queuing management (DQM) facility of IBM® WebSphere MQ, which provides the services that enable applications to communicate using queue managers.

DQM provides communications that conform to the WebSphere MQ Message Channel Protocol. Each WebSphere MQ product has its own implementation of this specification, and this book is concerned with these implementations.

WebSphere MQ for z/OS™ for the WebSphere Application Server user

WebSphere MQ for z/OS Version 5 Release 3.1 provides JMS support for WebSphere Application Server asynchronous ***embedded messaging*** as part of the WebSphere JMS provider. For complete information on installing, configuring, managing, and using the WebSphere JMS provider, see the WebSphere Application Server InfoCenter.

Embedded messaging is implemented by WebSphere Application Server using either the supplied WebSphere MQ for z/OS Version 5 Release 3.1 reduced function queue manager, or a WebSphere MQ for z/OS Version 5 Release 3.1 full function queue manager.

Channels other than server-connection channels are not available in the reduced function form of WebSphere MQ for z/OS supplied with WebSphere Application Server, so much of the information in this book does not apply in that environment.

For information on what reduced function means refer to *WebSphere MQ for z/OS Concepts and Planning Guide*. For this book, the list below summarizes functions that are not available in the reduced function form of WebSphere MQ:

- Queue sharing groups
- Clusters
- TCP types other than OESOCKET
- LU62 communications
- Events

Who this book is for

This book is for anyone needing a description of DQM. In addition, the following readers are specifically addressed:

- Network planners responsible for designing the overall queue manager network.
- Local channel planners responsible for implementing the network plan on one node.

- Application programmers responsible for designing applications that include processes, queues, and channels, perhaps without the assistance of a systems administrator.
- Systems administrators responsible for monitoring the local system, controlling exception situations, and implementing some of the planning details.
- System programmers with responsibility for designing and programming the user exits.

What you need to know to understand this book

To use and control DQM you need to have a good knowledge of WebSphere MQ in general. You also need to understand the WebSphere MQ products for the specific platforms you will be using, and the communications protocols that will be used on those platforms.

How to use this book

This book has the following parts:

Part 1, "Introduction", on page 1

Introduces the concepts of WebSphere MQ intercommunication.

This part of the book introduces WebSphere MQ intercommunication. The description in this part is general, and is not restricted to a particular platform or system.

Note: Some references are made to individual WebSphere MQ products. Details are given only for the products that this edition of the book applies to (see the edition notice for information about which WebSphere MQ products these are).

Part 2, "How intercommunication works", on page 33

Describes the functions performed by the distributed-queuing management (DQM) facilities. Read this part to understand DQM's role in the context of WebSphere MQ.

Part 3, "DQM in WebSphere MQ for UNIX and Windows systems, and MQSeries for Compaq OpenVMS Alpha, Compaq NonStop Kernel, and OS/2 Warp", on page 105

Is specific to WebSphere MQ products on distributed platforms. It helps you to install and customize DQM on these platforms. It explains how to establish message channels to other systems and how to manage and control them.

Part 4, "DQM in WebSphere MQ for z/OS", on page 381

Is specific to WebSphere MQ for z/OS. It helps you to install and customize DQM. It explains how to establish message channels to other systems and how to manage and control them.

Part 5, "DQM in WebSphere MQ for iSeries", on page 527

Is specific to WebSphere MQ for iSeries™. It helps you to install and customize DQM. It explains how to establish message channels to other systems and how to manage and control them.

Part 6, "DQM in MQSeries for VSE/ESA", on page 593

Is specific to WebSphere MQ for VSE/ESA™. It contains an example of how to set up communication to other systems.

Part 7, "Further intercommunication considerations", on page 615

Tells you about channel exit programs, which are an optional feature of DQM that allow you to add your own facilities to distributed queuing. It gives some guidance on the problems you may experience, how to recognize these problems, and what to do about them.

The Appendixes

contain extra information that is pertinent to DQM:

Appendix A, "Channel planning form" gives an explanation of one suggested method of planning and maintaining DQM objects and channels.

Appendix B, "Constants for channels and exits" gives the values of named constants that apply to the channels and exits in the MQI that are discussed in this book.

Appendix C, "Queue name resolution" provides a detailed description of name resolution by queue managers. You need to understand this process in order to take full advantage of DQM.

Appendix D, “Configuration file stanzas for distributed queuing” gives information about the configuration file stanzas that relate to distributed queuing.

Appearance of text in this book

This book uses the following type styles:

CompCode
Example of the name of a parameter of a call

Terms used in this book

The term *UNIX® systems* denotes the following UNIX operating systems:

- AIX®
- AT&T GIS UNIX (NCR UNIX)
- Compaq Tru64 UNIX
- DC/OSx
- HP-UX
- Linux
- SINIX
- Solaris
- Sun Solaris, Intel Platform Edition

The term *Linux* denotes:

- Linux for Intel
- Linux for zSeries

The term *WebSphere MQ for Linux* denotes the following WebSphere MQ products:

- WebSphere MQ for Linux for Intel
- WebSphere MQ for Linux for zSeries

The term *Windows®* denotes the following Windows operating systems:

- Windows NT®
- Windows XP
- Windows 2000

The term *z/OS* means any release of z/OS or OS/390® supported by the current version of WebSphere MQ for z/OS.

The term *CICS®* means CICS Transaction Server for z/OS (CICS/Enterprise Systems Architecture). Note that, unlike other WebSphere MQ books, this book does not use the term generically to include other CICS products such as CICS for VSE/ESA.

The term OS/2® means OS/2 Warp.

The variable *mqmtop* represents the name of the base directory where WebSphere MQ is installed on UNIX systems.

- On AIX, the actual name of the directory is **/usr/mqm**
- On other UNIX systems, the actual name of the directory is **/opt/mqm**

Summary of changes

This section describes changes in this edition of *WebSphere MQ Intercommunication*. Changes since the previous edition of the book are marked by vertical lines to the left of the changes.

Changes for this edition (SC34–6059–03)

The changes to this edition of *WebSphere MQ Intercommunication* include:

- The addition of information for users of WebSphere Application Server Version 5, as explained in “WebSphere MQ for z/OS™ for the WebSphere Application Server user” on page xvii.
- Documentation for RCVTIME and RCVTMIN Channel initiator parameters.
- Miscellaneous editorial improvements, corrections, and clarifications.

Changes for the previous edition (SC34-6059-02)

This edition provides additions and clarifications for users of Version 5.1 of MQSeries® for Compaq NonStop Kernel, MQSeries for Compaq OpenVMS Alpha, and MQSeries for Compaq Tru64 UNIX.

Changes for the earlier editions (SC34-6059-00 and -01)

The changes to the first two editions of *WebSphere MQ Intercommunication* include:

- Changes throughout the book to reflect the rebranding of MQSeries to WebSphere MQ.
- Adding the platforms Windows XP, Linux for zSeries, and Linux for Intel.
- Documentation for:
  - The WebSphere MQ Secure Sockets Layer (SSL) support
  - New channel attributes
- A new chapter entitled, “Example configuration - IBM WebSphere MQ for Linux”, which is integrated with the example configurations for other WebSphere MQ and MQSeries products
- Improvements to Part 4, “DQM in WebSphere MQ for z/OS”
- Miscellaneous editorial improvements, corrections, and clarifications.

Changes

Part 1. Introduction

Chapter 1. Concepts of intercommunication

This chapter introduces the concepts of intercommunication in WebSphere MQ.

- The basic concepts of intercommunication are explained in "What is intercommunication?"
- The objects that you need for intercommunication are described in "Distributed queuing components" on page 7.

This chapter goes on to introduce:

- "Dead-letter queues" on page 13
- "Remote queue definitions" on page 14
- "How to get to the remote queue manager" on page 14

What is intercommunication?

In WebSphere MQ, intercommunication means sending messages from one queue manager to another. The receiving queue manager could be on the same machine or another; nearby or on the other side of the world. It could be running on the same platform as the local queue manager, or could be on any of the platforms supported by WebSphere MQ. This is called a *distributed* environment. WebSphere MQ handles communication in a distributed environment such as this using Distributed Queue Management (DQM).

The local queue manager is sometimes called the *source queue manager* and the remote queue manager is sometimes called the *target queue manager* or the *partner queue manager*.

How does distributed queuing work?

Figure 1 on page 4 shows an overview of the components of distributed queuing.

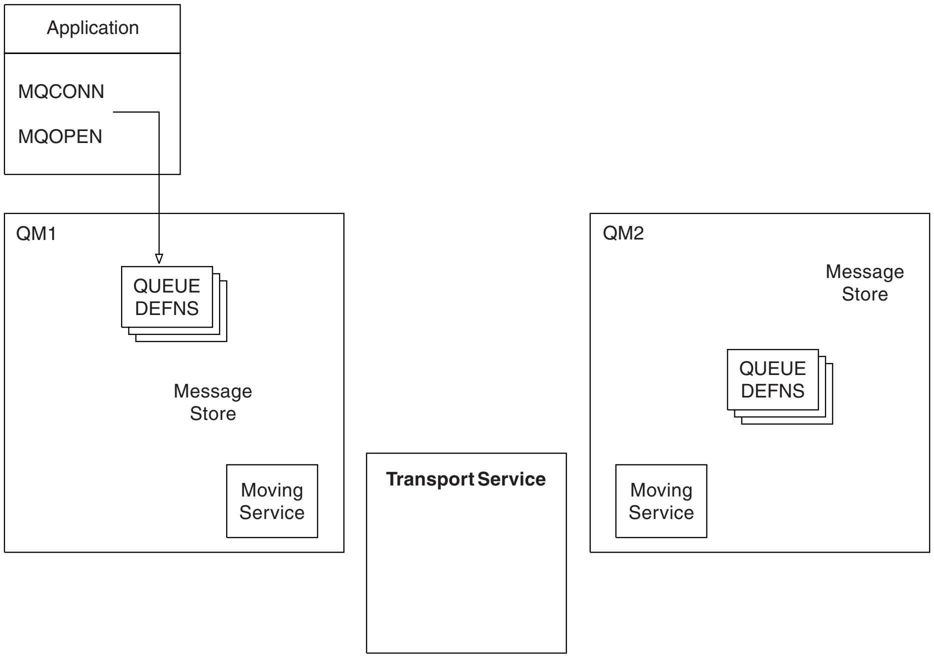

Figure 1. Overview of the components of distributed queuing

1. An application uses the MQCONN call to connect to a queue manager.
2. The application then uses the MQOPEN call to open a queue so that it can put messages on it.
3. A queue manager has a definition for each of its queues, specifying information such as the maximum number of messages allowed on the queue.
4. If the messages are destined for a queue on a remote system, the local queue manager holds them in a message store until it is ready to forward them to the remote queue manager. This can be transparent to the application.
5. Each queue manager contains communications software called the *moving service* component; through this, the queue manager can communicate with other queue managers.
6. The *transport service* is independent of the queue manager and can be any one of the following (depending on the platform):
   - Systems Network Architecture Advanced Program-to Program Communication (SNA APPC)
   - Transmission Control Protocol/Internet Protocol (TCP/IP)
   - Network Basic Input/Output System (NetBIOS)
   - Sequenced Packet Exchange (SPX)
   - User-Datagram Protocol (UDP)

What do we call the components?

1. WebSphere MQ applications can put messages onto a local queue, that is, a queue on the queue manager the application is connected to.
2. A queue manager has a definition for each of its queues. It can also have definitions for queues that are owned by other queue managers. These are called *remote queue definitions*. WebSphere MQ applications can also put messages targeted at these remote queues.
3. If the messages are destined for a remote queue manager, the local queue manager stores them on a *transmission queue* until it is ready to send them to the remote queue manager. A transmission queue is a special type of local

queue on which messages are stored until they can be successfully transmitted and stored at the remote queue manager.

4. The software that handles the sending and receiving of messages is called the *Message Channel Agent* (MCA).
5. Messages are transmitted between queue managers on a *channel*. A channel is a one-way communication link between two queue managers. It can carry messages destined for any number of queues at the remote queue manager.

Components needed to send a message

If a message is to be sent to a remote queue manager, the local queue manager needs definitions for a transmission queue and a channel.

Each end of a channel has a separate definition, defining it, for example, as the sending end or the receiving end. A simple channel consists of a *sender* channel definition at the local queue manager and a *receiver* channel definition at the remote queue manager. These two definitions must have the same name, and together constitute one channel.

There is also a *message channel agent* (MCA) at each end of a channel.

Each queue manager should have a *dead-letter queue* (also known as the *undelivered message queue*). Messages are put on this queue if they cannot be delivered to their destination.

Figure 2 shows the relationship between queue managers, transmission queues, channels, and MCAs.

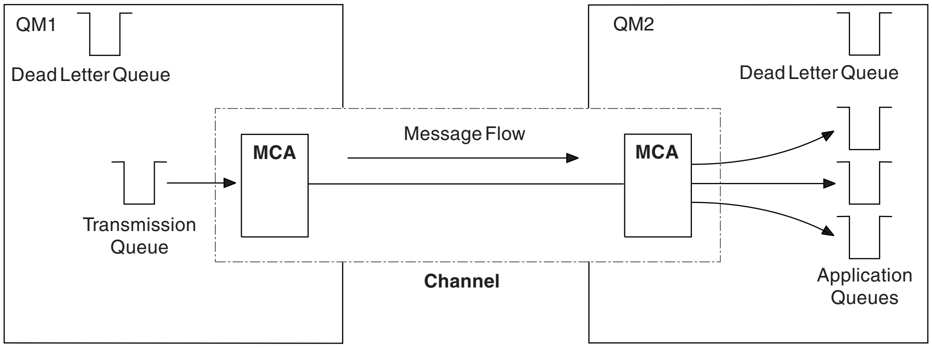

Figure 2. Sending messages

Components needed to return a message

If your application requires messages to be returned from the remote queue manager, you need to define another channel, to run in the opposite direction between the queue managers, as shown in Figure 3 on page 6.

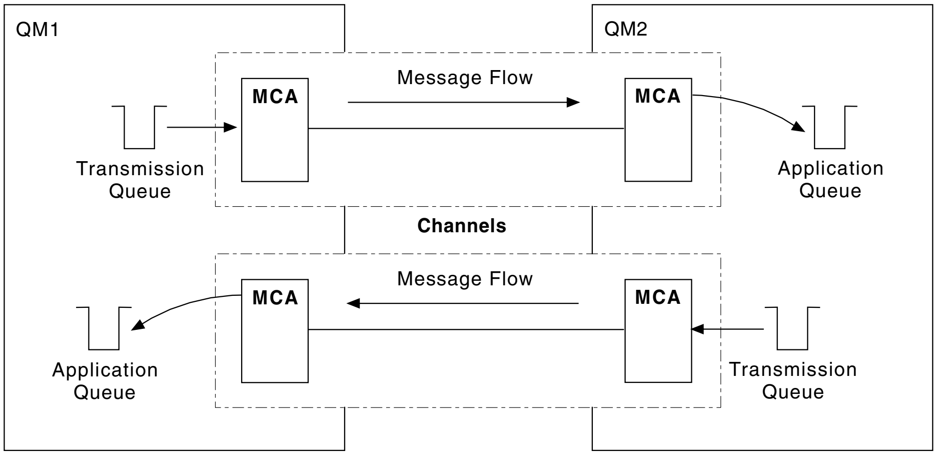

Figure 3. Sending messages in both directions

Cluster components

An alternative to the traditional WebSphere MQ network is the use of clusters. Clusters are supported on WebSphere MQ for AIX, iSeries, HP-UX, Solaris, z/OS, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp only.

A cluster is a network of queue managers that are logically associated in some way. You can group queue managers in a cluster so that queue managers can make the queues that they host available to every other queue manager in the cluster. Assuming you have the necessary network infrastructure in place, any queue manager can send a message to any other queue manager in the same cluster without the need for explicit channel definitions, remote-queue definitions, or transmission queues for each destination. Every queue manager in a cluster has a single transmission queue that transmits messages to any other queue manager in the cluster. Each queue manager needs to define only one cluster-receiver channel and one cluster-sender channel.

Figure 4 on page 7 shows the components of a cluster called CLUSTER:

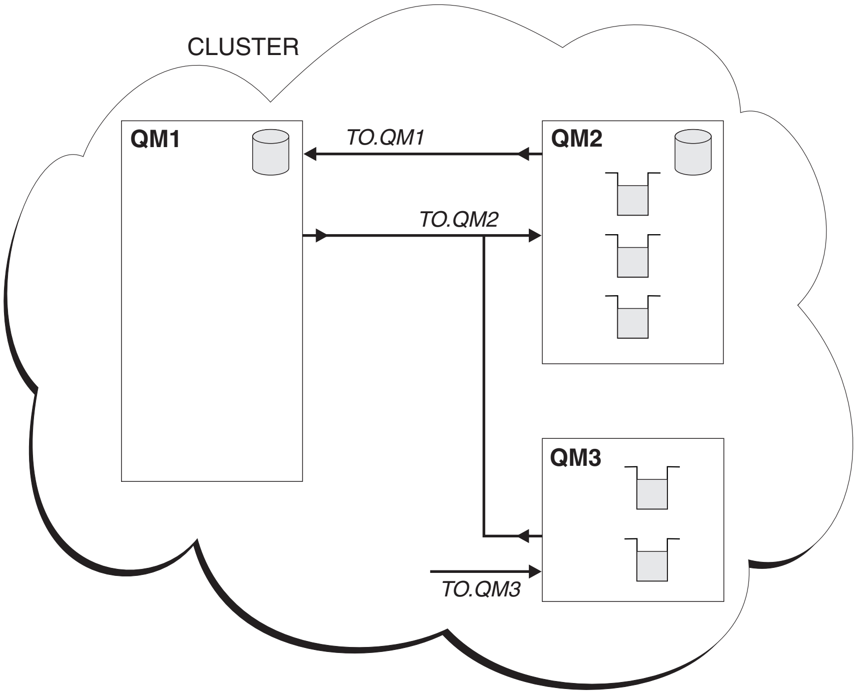

Figure 4. A cluster of queue managers

- CLUSTER contains three queue managers, QM1, QM2, and QM3.
- QM1 and QM2 host full repositories of information about the queue managers and queues in the cluster.
- QM2 and QM3 host some cluster queues, that is, queues that are accessible to any other queue manager in the cluster.
- Each queue manager has a cluster-receiver channel called TO.qmgr on which it can receive messages.
- Each queue manager also has a cluster-sender channel on which it can send information to one of the repository queue managers.
- QM1 and QM3 send to the repository at QM2 and QM2 sends to the repository at QM1.

As with distributed queuing, you use the MQPUT call to put a message to a queue at any queue manager. You use the MQGET call to retrieve messages from a local queue.

For further information about clusters, see the *WebSphere MQ Queue Manager Clusters* book.

Distributed queuing components

This section describes the components of distributed queuing. These are:
- Message channels
- Message channel agents
- Transmission queues
- Channel initiators and listeners
- Channel-exit programs

Message channels

Message channels are the channels that carry messages from one queue manager to another.

Do not confuse message channels with MQI channels. There are two types of MQI channel, server-connection and client-connection. These are discussed in the *WebSphere MQ Clients* book.

The definition of each end of a message channel can be one of the following types:
- Sender
- Receiver
- Server
- Requester
- Cluster sender
- Cluster receiver

A message channel is defined using one of these types defined at one end, and a compatible type at the other end. Possible combinations are:
- Sender-receiver
- Requester-server
- Requester-sender (callback)
- Server-receiver
- Cluster sender-cluster receiver

Sender-receiver channels

A sender in one system starts the channel so that it can send messages to the other system. The sender requests the receiver at the other end of the channel to start. The sender sends messages from its transmission queue to the receiver. The receiver puts the messages on the destination queue. Figure 5 illustrates this.

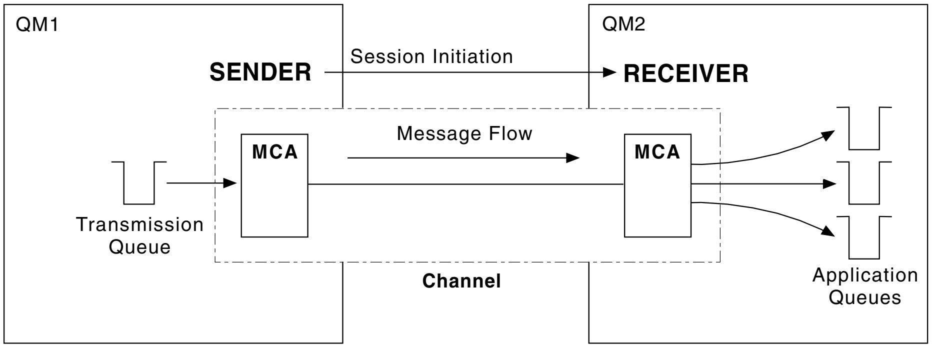

Figure 5. A sender-receiver channel

Requester-server channel

A requester in one system starts the channel so that it can receive messages from the other system. The requester requests the server at the other end of the channel to start. The server sends messages to the requester from the transmission queue defined in its channel definition.

A server channel can also initiate the communication and send messages to a requester, but this applies only to *fully qualified* servers, that is server channels that have the connection name of the partner specified in the channel definition. A fully qualified server can either be started by a requester, or can initiate a communication with a requester.

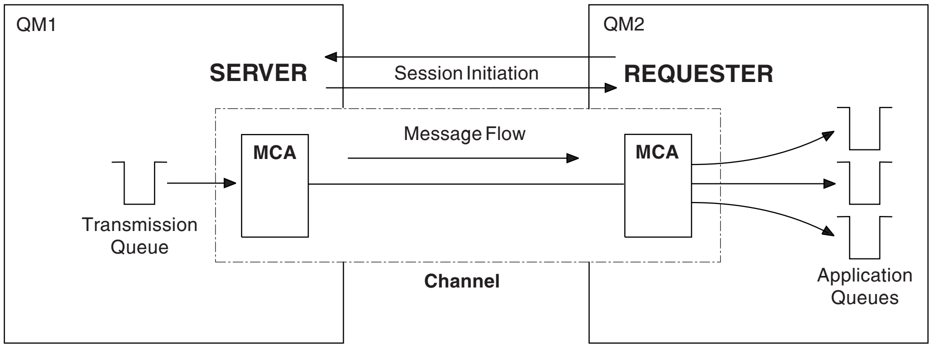

Figure 6. A requester-server channel

Requester-sender channel

The requester starts the channel and the sender terminates the call. The sender then restarts the communication according to information in its channel definition (this is known as *callback*). It sends messages from the transmission queue to the requester.

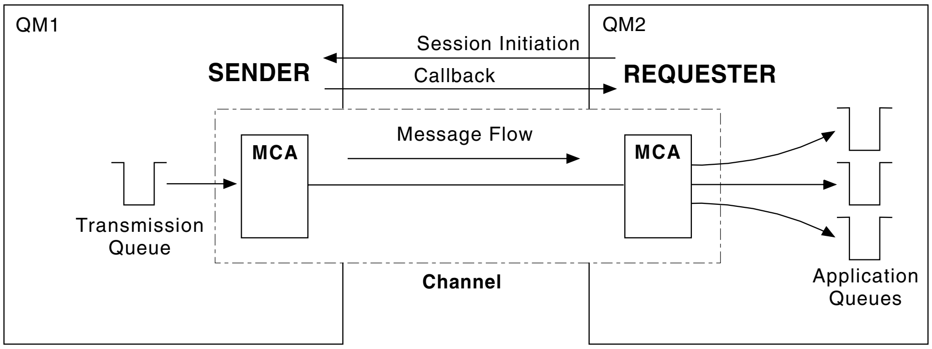

Figure 7. A requester-sender channel

Server-receiver channel

This is similar to sender-receiver but applies only to *fully qualified* servers, that is server channels that have the connection name of the partner specified in the channel definition. Channel startup must be initiated at the server end of the link. The illustration of this is similar to the illustration in Figure 5 on page 8.

Cluster-sender channels

In a cluster, each queue manager has a cluster-sender channel on which it can send cluster information to one of the full repository queue managers. Queue managers can also send messages to other queue managers on cluster-sender channels.

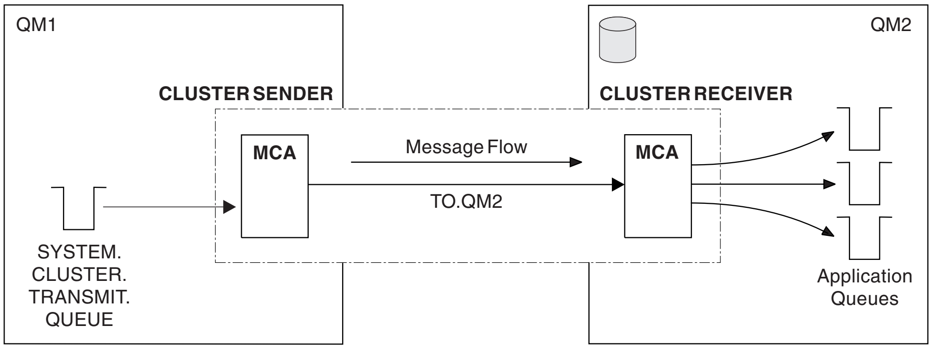

Figure 8. A cluster-sender channel

Cluster-receiver channels

In a cluster, each queue manager has a cluster-receiver channel on which it can receive messages and information about the cluster. The illustration of this is similar to the illustration in Figure 8.

Message channel agents

A *message channel agent* (MCA) is a program that controls the sending and receiving of messages. There is one message channel agent at each end of a channel. One MCA takes messages from the transmission queue and puts them on the communication link. The other MCA receives messages and delivers them onto a queue on the remote queue manager.

A message channel agent is called a *caller MCA* if it initiated the communication, otherwise it is called a *responder MCA*. A caller MCA may be associated with a sender, cluster-sender, server (fully qualified), or requester channel. A responder MCA may be associated with any type of message channel, except a cluster sender.

Transmission queues

A *transmission queue* is a special type of local queue used to store messages before they are transmitted by the MCA to the remote queue manager. In a distributed-queuing environment, you need to define one transmission queue for each sending MCA, unless you are using WebSphere MQ Queue Manager clusters.

You specify the name of the transmission queue in a *remote queue definition*, (see “Remote queue definitions” on page 14). If you do not specify the name, the queue manager looks for a transmission queue with the same name as the remote queue manager.

You can specify the name of a default transmission queue for the queue manager. This is used if you do not specify the name of the transmission queue, and a transmission queue with the same name as the remote queue manager does not exist.

Channel initiators and listeners

A *channel initiator* acts as a *trigger monitor* for sender channels, because a transmission queue may be defined as a triggered queue. When a message arrives on a transmission queue that satisfies the triggering criteria for that queue, a message is sent to the initiation queue, triggering the channel initiator to start the appropriate sender channel. You can also start server channels in this way if you specified the connection name of the partner in the channel definition. This means that channels can be started automatically, based upon messages arriving on the appropriate transmission queue.

You need a *channel listener* program to start receiving (responder) MCAs. Responder MCAs are started in response to a startup request from the caller MCA; the channel listener detects incoming network requests and starts the associated channel.

Figure 9 shows how channel initiators and channel listeners are used.

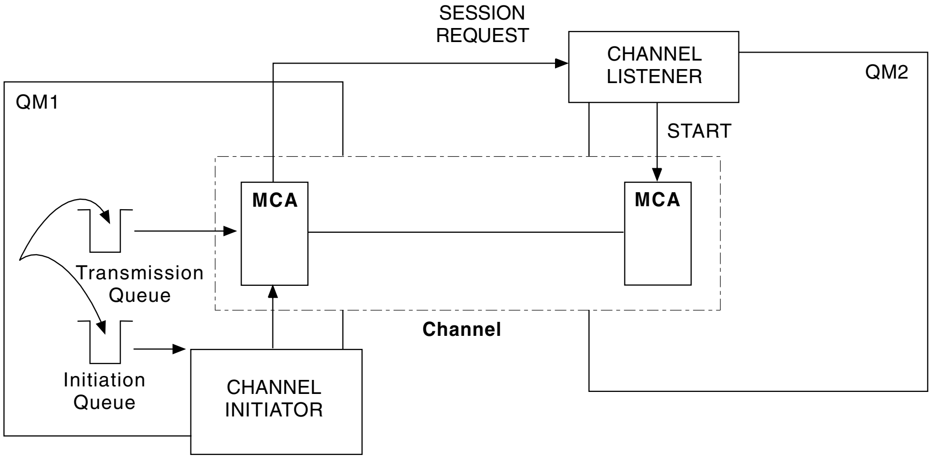

Figure 9. Channel initiators and listeners

The implementation of channel initiators is platform specific.

- In z/OS native distributed queuing, there is one channel initiator for each queue manager and it runs as a separate address space. You start it using the WebSphere MQ command START CHINIT, which you would normally issue as part of your queue manager startup. It monitors the system-defined queue SYSTEM.CHANNEL.INITQ, which is the initiation queue that is recommended for all the transmission queues.
- On z/OS, if you are using CICS for distributed queuing, there is no channel initiator. To implement triggering, use the CICS trigger monitor transaction, CKTI, to monitor the initiation queue.
- On other platforms, you can start as many channel initiators as you like, specifying a name for the initiation queue for each one. Normally you need only one initiator. WebSphere MQ for AIX, iSeries, HP-UX, Solaris and Windows systems, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp allow you to start up to three channel initiators (the default value), but you can change this value. On platforms that support clustering, when you start a queue manager, a channel initiator also is automatically started.

The channel initiator is also required for other functions. These are discussed later in this book.

The implementation of channel listeners is platform specific.

- Use the channel listener programs provided by WebSphere MQ if you are using z/OS native distributed queuing, MQSeries for Compaq (DIGITAL) Open VMS, and Compaq NonStop Kernel.

Note: On z/OS, The TCP/IP listener can be started many times with different combinations of port number and address to listen on. For more information, see "Listeners" on page 483.

- If you are using CICS for distributed queuing on z/OS, you do not need a channel listener because CICS provides this function.
- On OS/400®, use the channel listener program provided by WebSphere MQ if you are using TCP/IP. If you are using SNA, you do not need a listener program. SNA starts the channel by invoking the receiver program on the remote system.
- On OS/2 and Windows systems, you can use either the channel listener program provided by WebSphere MQ, or the facilities provided by the 'operating system' (for example, Attach manager for LU 6.2 communications on OS/2). If performance is important in your environment and if the environment is stable, you can choose to run the WebSphere MQ listener as a trusted application as described in "Running channels and listeners as trusted applications" on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.
- On UNIX systems, use the channel listener program provided by WebSphere MQ or the facilities provided by the 'operating system' (for example, inetd for TCP/IP communications).

Channel-exit programs

If you want to do some additional processing (for example, encryption or data compression) you can write your own channel-exit programs, or sometimes use SupportPacs. The Transaction Processing SupportPacs library for WebSphere MQ is available on the Internet at URL:

```
http://www.software.ibm.com/mqseries/txppacs/txpsumm.html
```

WebSphere MQ calls channel-exit programs at defined places in the processing carried out by the MCA. There are six types of channel exit:

Security exit
Used for security checking, such as authentication of the partner.

Message exit
Used for operations on the message, for example, encryption prior to transmission.

Send and receive exits
Used for operations on split messages, for example, data compression and decompression.

Message-retry exit
Used when there is a problem putting the message to the destination.

Channel auto-definition exit
Used to modify the supplied default definition for an automatically defined receiver or server-connection channel.

Transport-retry exit
Used to suspend data being sent on a channel when communication is not possible.

The sequence of processing is as follows:

1. The security exits are called after the initial data negotiation between both ends of the channel. These must end successfully for the startup phase to complete and to allow messages to be transferred.

2. The message exit is called by the sending MCA, and then the send exit is called for each part of the message that is transmitted to the receiving MCA.
3. The receiving MCA calls the receive exit when it receives each part of the message, and then calls the message exit when the whole message has been received.

This is illustrated in Figure 10.

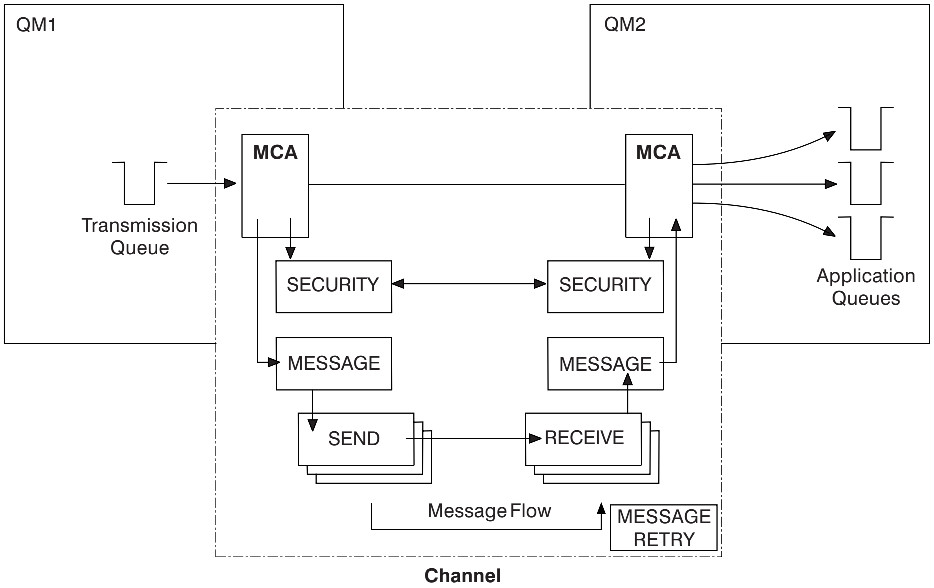

Figure 10. Sequence in which channel exit programs are called

The *message-retry exit* is used to determine how many times the receiving MCA will attempt to put a message to the destination queue before taking alternative action. It is not supported on WebSphere MQ for z/OS.

For more information about channel exits, see Chapter 46, “Channel-exit programs” , on page 619.

Dead-letter queues

The *dead-letter queue* (or undelivered-message queue) is the queue to which messages are sent if they cannot be routed to their correct destination. Messages are put on this queue when they cannot be put on the destination queue for some reason (for example, because the queue does not exist, or because it is full). Dead-letter queues are also used at the sending end of a channel, for data-conversion errors.

We recommend that you define a dead-letter queue for each queue manager. If you do not, and the MCA is unable to put a message, it is left on the transmission queue and the channel is stopped.

Also, if fast, non-persistent messages (see “Fast, nonpersistent messages” on page 22) cannot be delivered and no DLQ exists on the target system, these messages are discarded.

However, using dead-letter queues can affect the sequence in which messages are delivered, and so you may choose not to use them.

Remote queue definitions

Whereas applications can retrieve messages only from local queues, they can put messages on local queues or remote queues. Therefore, as well as a definition for each of its local queues, a queue manager may have *remote queue definitions*. These are definitions for queues that are owned by another queue manager. The advantage of remote queue definitions is that they enable an application to put a message to a remote queue without having to specify the name of the remote queue or the remote queue manager, or the name of the transmission queue. This gives you location independence.

There are other uses for remote queue definitions, which will be described later.

How to get to the remote queue manager

You may not always have one channel between each source and target queue manager. Consider these alternative possibilities.

Multi-hopping

If there is no direct communication link between the source queue manager and the target queue manager, it is possible to pass through one or more *intermediate queue managers* on the way to the target queue manager. This is known as a *multi-hop*.

You need to define channels between all the queue managers, and transmission queues on the intermediate queue managers. This is shown in Figure 11.

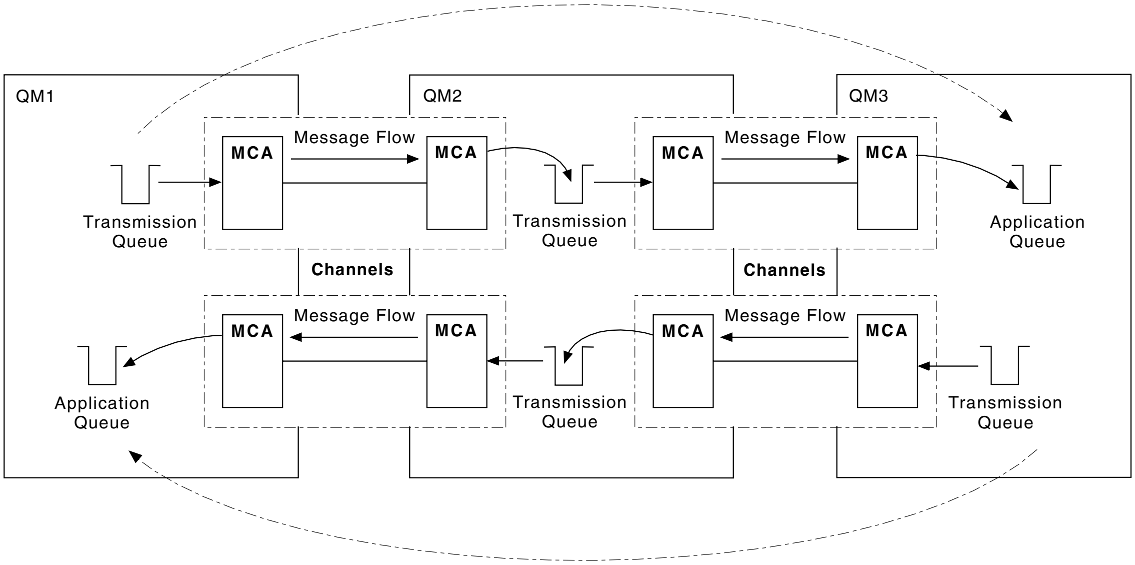

Figure 11. Passing through intermediate queue managers

Sharing channels

As an application designer, you have the choice of forcing your applications to specify the remote queue manager name along with the queue name, or creating a *remote queue definition* for each remote queue. This definition holds the remote queue manager name, the queue name, and the name of the transmission queue. Either way, all messages from all applications addressing queues at the same remote location have their messages sent through the same transmission queue. This is shown in Figure 12.

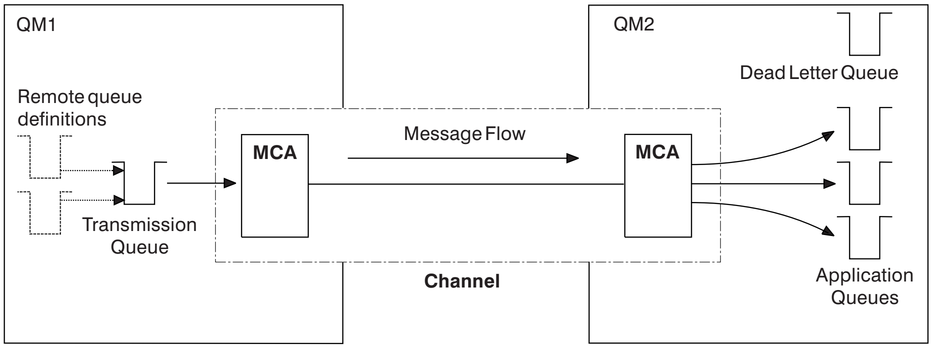

Figure 12. Sharing a transmission queue

Figure 12 illustrates that messages from multiple applications to multiple remote queues can use the same channel.

Using different channels

If you have messages of different types to send between two queue managers, you can define more than one channel between the two. There are times when you need alternative channels, perhaps for security purposes, or to trade off delivery speed against sheer bulk of message traffic.

To set up a second channel you need to define another channel and another transmission queue, and create a remote queue definition specifying the location and the transmission queue name. Your applications can then use either channel but the messages will still be delivered to the same target queues. This is shown in Figure 13.

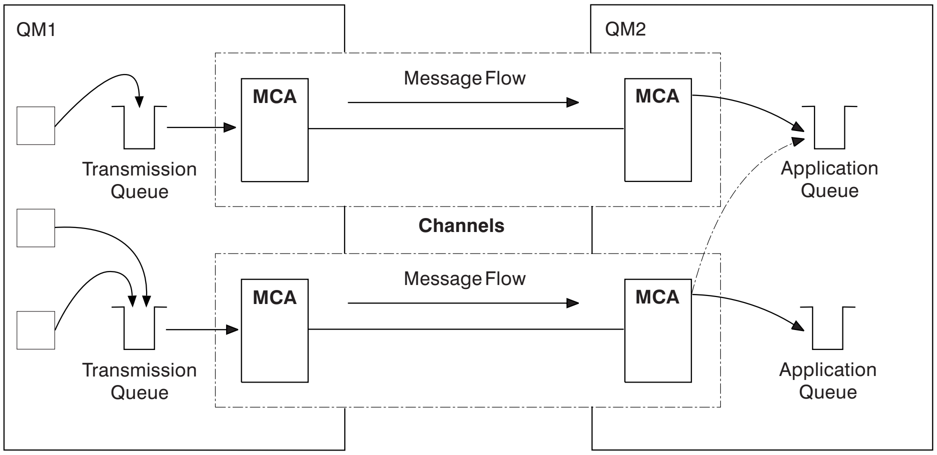

Figure 13. Using multiple channels

When you use remote queue definitions to specify a transmission queue, your applications must ***not*** specify the location (that is, the destination queue manager) themselves. If they do, the queue manager will not make use of the remote queue definitions. Remote queue definitions make the location of queues and the transmission queue transparent to applications. Applications can put messages to a *logical* queue without knowing where the queue is located and you can alter the *physical* queue without having to change your applications.

Using clustering

Every queue manager within a cluster defines a cluster-receiver channel. When another queue manager wants to send a message to that queue manager, it defines the corresponding cluster-sender channel automatically. For example, if there is more than one instance of a queue in a cluster, the cluster-sender channel could be defined to any of the queue managers that host the queue. WebSphere MQ uses a workload management algorithm that uses a round-robin routine to select an available queue manager to route a message to. For more information see the *WebSphere MQ Queue Manager Clusters* book.

Chapter 2. Making your applications communicate

This chapter provides more detailed information about intercommunication between WebSphere MQ products. Before reading this chapter it is helpful to have an understanding of channels, queues, and the other concepts introduced in Chapter 1, "Concepts of intercommunication", on page 3.

This chapter covers the following topics:
- "How to send a message to another queue manager"
- "Triggering channels" on page 20
- "Safety of messages" on page 22

How to send a message to another queue manager

This section describes the simplest way to send a message from one queue manager to another.

Before you do this you need to do the following:
1. Check that your chosen communication protocol is available.
2. Start the queue managers.
3. Start the channel initiators.
4. Start the listeners.

You also need to have the correct WebSphere MQ security authorization to create the objects required.

To send messages from one queue manager to another:
- Define the following objects on the source queue manager:
  - Sender channel
  - Remote queue definition
  - Initiation queue (required on z/OS, otherwise optional)
  - Transmission queue
  - Dead-letter queue (recommended)
- Define the following objects on the target queue manager:
  - Receiver channel
  - Target queue
  - Dead-letter queue (recommended)

You can use several different methods to define these objects, depending on your WebSphere MQ platform:

z/OS or MVS/ESA™

If you are using z/OS native distributed queuing, you can use the Operation and Control panels (see the *WebSphere MQ System Administration Guide* for more information) WebSphere MQ script commands (MQSC). See the *WebSphere MQ Script (MQSC) Command Reference* for more information. If you are using z/OS distributed queuing with CICS, you must use the supplied CICS transaction CKMC for channels.

OS/400

You can use the panel interface, the WebSphere MQ script commands described in the *WebSphere MQ Script (MQSC) Command Reference* book, or the programmable command format (PCF) commands described in the *WebSphere MQ Programmable Command Formats and Administration Interface* book.

OS/2, Windows systems, UNIX systems, and Compaq OpenVMS Alpha
You can use the WebSphere MQ commands described in the *WebSphere MQ Script (MQSC) Command Reference* book, or the PCF commands described in the *WebSphere MQ Programmable Command Formats and Administration Interface* book. On Windows systems only, you can also use the graphical user interfaces, the WebSphere MQ explorer and the WebSphere MQ Web Administration.

Compaq NonStop Kernel
You can use MQSC commands, PCF commands, or the Message Queue Management facility. See the *MQSeries for Compaq NonStop Kernel System Administration* for more information about the control commands and the Message Queue Management facility.

VSE/ESA
You can use the panel interface as described in the *MQSeries for VSE/ESA System Management Guide*.

The different methods are described in more detail in the platform-specific parts of this book.

Defining the channels

To send messages from one queue manager to another, you need to define two channels; one on the source queue manager and one on the target queue manager.

On the source queue manager
Define a channel with a channel type of SENDER. You need to specify the following:

- The name of the transmission queue to be used (the XMITQ attribute).
- The connection name of the partner system (the CONNAME attribute).
- The name of the communication protocol you are using (the TRPTYPE attribute). On AIX, OS/400, Compaq Tru64 UNIX, HP-UX, OS/2 Warp, Solaris, and Windows, you do not have to specify this. You can leave it to pick up the value from your default channel definition. On MQSeries for VSE/ESA, the protocol must be TCP or LU 6.2; you can choose T or L accordingly on the **Maintain Channel Definition** menu. On WebSphere MQ for z/OS, the protocol must be TCP or LU6.2.

Details of all the channel attributes are given in Chapter 6, “Channel attributes”, on page 77.

On the target queue manager
Define a channel with a channel type of RECEIVER, and the **same** name as the sender channel.

Specify the name of the communication protocol you are using (the TRPTYPE attribute). For WebSphere MQ for AIX, iSeries, HP-UX, Solaris and Windows, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp, you do not have to specify this. You can leave it to pick up the value from your default channel definition. If you are using CICS to define a channel, you cannot specify TRPTYPE. Instead you should accept the defaults provided. On MQSeries for VSE/ESA, you can choose T (TCP) or L (LU 6.2) on the **Maintain Channel Definition** menu. On WebSphere MQ for z/OS, the protocol must be TCP or LU6.2.

Note that receiver channel definitions can be generic. This means that if you have several queue managers communicating with the same receiver, the sending channels can all specify the same name for the receiver, and one receiver definition will apply to them all.

When you have defined the channel, you can test it using the PING CHANNEL command. This command sends a special message from the sender channel to the receiver channel and checks that it is returned.

Defining the queues

To send messages from one queue manager to another, you need to define up to six queues; four on the source queue manager and two on the target queue manager.

On the source queue manager

- Remote queue definition

  In this definition you specify the following:

  Remote queue manager name
  The name of the target queue manager.

  Remote queue name
  The name of the target queue on the target queue manager.

  Transmission queue name
  The name of the transmission queue. You do not have to specify this. If you do not, a transmission queue with the same name as the target queue manager is used, or, if this does not exist, the default transmission queue is used. You are advised to give the transmission queue the same name as the target queue manager so that the queue is found by default.
- Initiation queue definition

  Required on z/OS, and optional on other platforms. On z/OS you must use the initiation queue called SYSTEM.CHANNEL.INITQ and you are recommended to do so on other platforms also.
- Transmission queue definition

  A local queue with the USAGE attribute set to XMITQ. If you are using the WebSphere MQ for iSeries native interface, the USAGE attribute is *TMQ.
- Dead-letter queue definition—recommended

  Define a dead-letter queue to which undelivered messages can be written.

On the target queue manager

- Local queue definition

  The target queue. The name of this queue must be the same as that specified in the remote queue name field of the remote queue definition on the source queue manager.
- Dead-letter queue definition—recommended

  Define a dead-letter queue to which undelivered messages can be written.

Sending the messages

When you put messages on the remote queue defined at the source queue manager, they are stored on the transmission queue until the channel is started. When the channel has been started, the messages are delivered to the target queue on the remote queue manager.

Starting the channel

Start the channel on the sending queue manager using the START CHANNEL command. When you start the sending channel, the receiving channel is started automatically (by the listener) and the messages are sent to the target queue. Both ends of the message channel must be running for messages to be transferred.

Because the two ends of the channel are on different queue managers, they could have been defined with different attributes. To resolve any differences, there is an initial data negotiation between the two ends when the channel starts. In general, the two ends of the channel agree to operate with the attributes needing the fewer resources, thus enabling larger systems to accommodate the lesser resources of smaller systems at the other end of the message channel.

The sending MCA splits large messages before sending them across the channel. They are reassembled at the remote queue manager. This is transparent to the user.

An MCA can transfer messages using multiple threads. This process, called *pipelining* enables the MCA to transfer messages more efficiently, with fewer wait states. This improves channel performance.

Triggering channels

This explanation is intended as an overview of triggering concepts. You can find a complete description in the *WebSphere MQ Application Programming Guide*.

For platform-specific information see the following:
- For OS/2, Windows systems, UNIX systems, Compaq OpenVMS Alpha, and Compaq NonStop Kernel, “Triggering channels” on page 123
- For z/OS native distributed queuing, “Defining WebSphere MQ objects” on page 401
- For z/OS distributed queuing with CICS, “How to trigger channels” on page 434
- For OS/400, “Triggering channels” on page 549

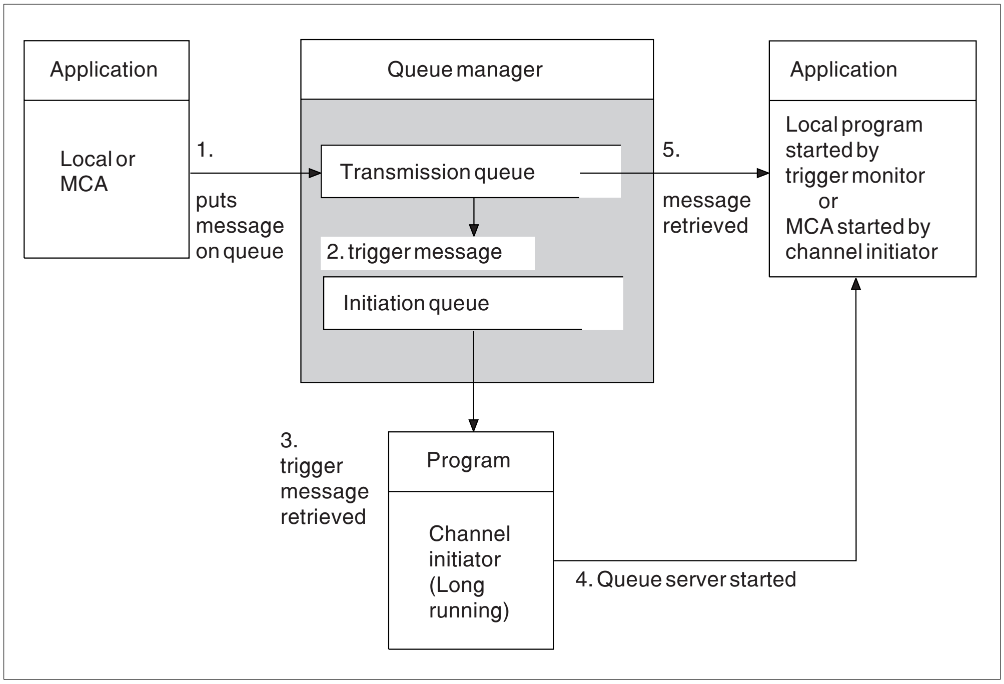

Figure 14. The concepts of triggering

The objects required for triggering are shown in Figure 14. It shows the following sequence of events:

1. The local queue manager places a message from an application or from a message channel agent (MCA) on the transmission queue.
2. When the triggering conditions are fulfilled, the local queue manager places a trigger message on the initiation queue.
3. The long-running channel initiator program monitors the initiation queue, and retrieves messages as they appear.
4. The channel initiator processes the trigger messages according to information contained in them. This information may include the channel name, in which case the corresponding MCA is started.
5. The local application or the MCA, having been triggered, retrieves the messages from the transmission queue.

To set up this scenario, you need to:

- Create the transmission queue with the name of the initiation queue (that is, SYSTEM.CHANNEL.INITQ) in the corresponding attribute.
- Ensure that the initiation queue (SYSTEM.CHANNEL.INITQ) exists.
- Ensure that the channel initiator program is available and running. The channel initiator program must be provided with the name of the initiation queue in its start command. On z/OS native distributed queuing, the name of the initiation queue is fixed, so is not used on the start command.
- Create the process definition for the triggering, if it does not exist, and ensure that its `UserData` field contains the name of the channel it serves. For WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris and Windows systems, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp, the process definition is optional (it is not supported on MQSeries for VSE/ESA). Instead, you can specify the channel name in the `TriggerData` attribute of the transmission queue. WebSphere MQ for AIX, iSeries, Linux, HP-UX, Solaris and Windows systems,

and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp allow the channel name to be specified as blank, in which case the first available channel definition with this transmission queue is used.

- Ensure that the transmission queue definition contains the name of the process definition to serve it, (if applicable), the initiation queue name, and the triggering characteristics you feel are most suitable. The trigger control attribute allows triggering to be enabled, or not, as necessary.

Notes:

1. The channel initiator program acts as a ’trigger monitor’ monitoring the initiation queue used to start channels.
2. An initiation queue and trigger process can be used to trigger any number of channels.
3. Any number of initiation queues and trigger processes can be defined.
4. A trigger type of FIRST is recommended, to avoid flooding the system with channel starts.

Safety of messages

In addition to the usual recovery features of WebSphere MQ, distributed queue management ensures that messages are delivered properly by using a syncpoint procedure coordinated between the two ends of the message channel. If this procedure detects an error, it closes the channel to allow you to investigate the problem, and keeps the messages safely in the transmission queue until the channel is restarted.

The syncpoint procedure has an added benefit in that it attempts to recover an *in-doubt* situation when the channel starts up. (*In-doubt* is the status of a unit of recovery for which a syncpoint has been requested but the outcome of the request is not yet known.) Also associated with this facility are the two functions:

1. Resolve with commit or backout
2. Reset the sequence number

The use of these functions occurs only in exceptional circumstances because the channel recovers automatically in most cases.

Fast, nonpersistent messages

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, the nonpersistent message speed (NPMSPEED) channel attribute can be used to specify that any nonpersistent messages on the channel are to be delivered more quickly. For more information about this attribute, see “Nonpersistent message speed (NPMSPEED)” on page 93.

If a channel terminates while fast, nonpersistent messages are in transit, the messages may be lost and it is up to the application to arrange for their recovery if required.

If the receiving channel cannot put the message to its destination queue then it is placed on the dead letter queue, if one has been defined. If not, the message is discarded.

In MQSeries for Compaq OpenVMS Alpha fast messages are enabled differently. For channels of type sender, server, receiver or requester, set the description field at both ends of the channel as follows:

```
DESCR('>>> description') +
```

Specifying >>> as the first characters in the channel description defines the channel as fast for nonpersistent messages.

Note: If the other end of the channel does not support the option, the channel runs at normal speed.

Undelivered messages

For information about what happens when a message cannot be delivered, see "What happens when a message cannot be delivered?" on page 72.

Chapter 3. More about intercommunication

This chapter mentions three aliases:
- Remote queue definition
- Queue manager alias definition
- Reply-to queue alias definition

These are all based on the *remote queue definition* object introduced in “Remote queue definitions” on page 14.

This discussion does not apply to *alias queues*. These are described in the *WebSphere MQ Application Programming Guide*.

This chapter also discusses “Networks” on page 29.

Addressing information

In a single-queue-manager environment, the address of a destination queue is established when an application opens a queue for putting messages to. Because the destination queue is on the same queue manager, there is no need for any addressing information.

In a distributed environment the queue manager needs to know not only the destination queue name, but also the location of that queue (that is, the queue manager name), and the route to that remote location (that is, the transmission queue). When an application puts messages that are destined for a remote queue manager, the local queue manager adds a transmission header to them before placing them on the transmission queue. The transmission header contains the name of the destination queue and queue manager, that is, the *addressing information*. The receiving channel removes the transmission header and uses the information in it to locate the destination queue.

You can avoid the need for your applications to specify the name of the destination queue manager if you use a remote queue definition. This definition specifies the name of the remote queue, the name of the remote queue manager to which messages are destined, and the name of the transmission queue used to transport the messages.

What are aliases?

Aliases are used to provide a quality of service for messages. The queue manager alias enables a system administrator to alter the name of a target queue manager without causing you to have to change your applications. It also enables the system administrator to alter the route to a destination queue manager, or to set up a route that involves passing through a number of other queue managers (multi-hopping). The reply-to queue alias provides a quality of service for replies.

Queue manager aliases and reply-to queue aliases are created using a remote-queue definition that has a blank RNAME. These definitions do not define real queues; they are used by the queue manager to resolve physical queue names, queue manager names, and transmission queues.

Alias definitions are characterized by having a blank RNAME.

Queue name resolution

Queue name resolution occurs at every queue manager each time a queue is opened. Its purpose is to identify the target queue, the target queue manager (which may be local), and the route to that queue manager (which may be null). The resolved name has three parts: the queue manager name, the queue name, and, if the queue manager is remote, the transmission queue.

When a remote queue definition exists, no alias definitions are referenced. The queue name supplied by the application is resolved to the name of the destination queue, the remote queue manager, and the transmission queue specified in the remote queue definition. For more detailed information about queue name resolution, see Appendix C, "Queue name resolution", on page 759.

If there is no remote queue definition and a queue manager name is specified, or resolved by the name service, the queue manager looks to see if there is a queue manager alias definition that matches the supplied queue manager name. If there is, the information in it is used to resolve the queue manager name to the name of the destination queue manager. The queue manager alias definition can also be used to determine the transmission queue to the destination queue manager.

If the resolved queue name is not a local queue, both the queue manager name and the queue name are included in the transmission header of each message put by the application to the transmission queue.

The transmission queue used usually has the same name as the resolved queue manager, unless changed by a remote queue definition or a queue manager alias definition. If you have not defined such a transmission queue but you have defined a default transmission queue, then this is used.

Note: Names of queue managers running on z/OS are limited to four characters.

Queue manager alias definitions

Queue manager alias definitions apply when an application that opens a queue to put a message, specifies the queue name **and** the queue manager name.

Queue manager alias definitions have three uses:
- When sending messages, remapping the queue manager name
- When sending messages, altering or specifying the transmission queue
- When receiving messages, determining whether the local queue manager is the intended destination for those messages

Outbound messages - remapping the queue manager name

Queue manager alias definitions can be used to remap the queue manager name specified in an MQOPEN call. For example, an MQOPEN call specifies a queue name of THISQ and a queue manager name of YOURQM. At the local queue manager there is a queue manager alias definition like this:

```
DEFINE QREMOTE (YOURQM) RQMNAME(REALQM)
```

This shows that the real queue manager to be used, when an application puts messages to queue manager YOURQM, is REALQM. If the local queue manager is REALQM, it puts the messages to the queue THISQ, which is a local queue. If the local queue manager is not called REALQM, it routes the message to a transmission queue called REALQM. The queue manager changes the transmission header to say REALQM instead of YOURQM.

Outbound messages - altering or specifying the transmission queue

Figure 15 shows a scenario where messages arrive at queue manager ‘QM1’ with transmission headers showing queue names at queue manager ‘QM3’. In this scenario, ‘QM3’ is reachable by multi-hopping through ‘QM2’.

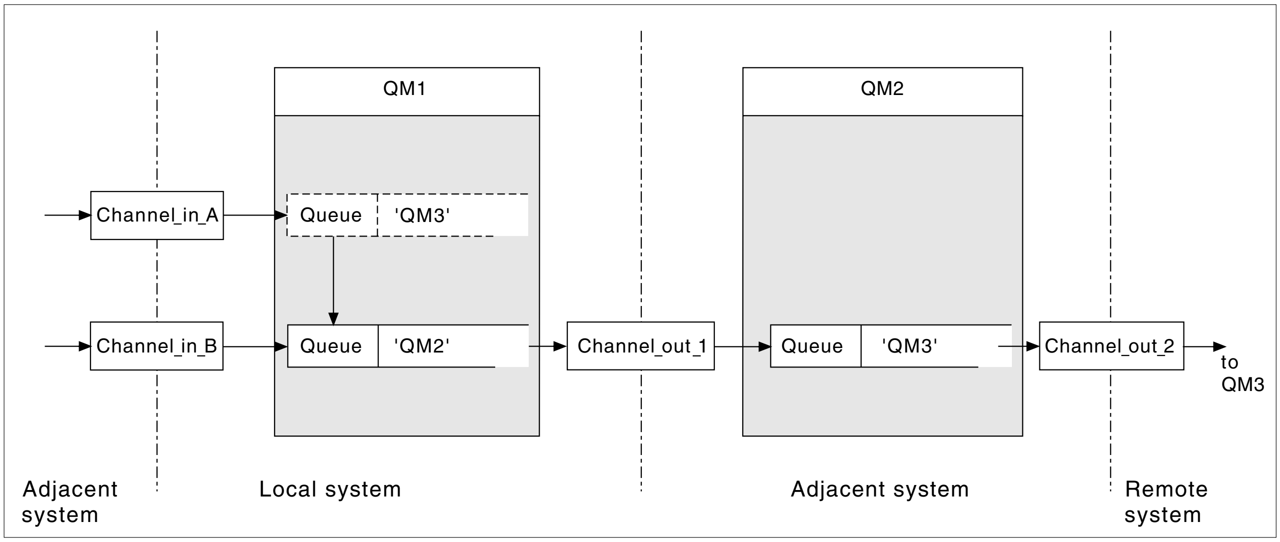

Figure 15. Queue manager alias

All messages for ‘QM3’ are captured at ‘QM1’ with a queue manager alias. The queue manager alias is named ‘QM3’ and contains the definition ‘QM3 via transmission queue QM2’. The definition looks like this:

```
DEFINE QREMOTE (QM3) RNAME() RQMNAME(QM3) XMITQ(QM2)
```

The queue manager puts the messages on transmission queue ‘QM2’ but does not make any alteration to the transmission queue header because the name of the destination queue manager, ‘QM3’, does not alter.

All messages arriving at ‘QM1’ and showing a transmission header containing a queue name at ‘QM2’ are also put on the ‘QM2’ transmission queue. In this way, messages with different destinations are collected onto a common transmission queue to an appropriate adjacent system, for onward transmission to their destinations.

Inbound messages - determining the destination

A receiving MCA opens the queue referenced in the transmission header. If a queue manager alias definition exists with the same name as the queue manager referenced, then the queue manager name received in the transmission header is replaced with the RQMNAME from that definition.

This has two uses:
- Directing messages to another queue manager
- Altering the queue manager name to be the same as the local queue manager

Reply-to queue alias definitions

When an application needs to reply to a message it may look at the data in the *message descriptor* of the message it received to find out the name of the queue to which it should reply. It is up to the sending application to suggest where replies should be sent and to attach this information to its messages. This has to be coordinated as part of your application design.

What is a reply-to queue alias definition?

A reply-to queue alias definition specifies alternative names for the reply information in the message descriptor. The advantage of this is that you can alter the name of a queue or queue manager without having to alter your applications. Queue name resolution takes place at the sending end, before the message is put to a queue.

Note: This is an unusual use of queue-name resolution. It is the only situation in which name resolution takes place at a time when a queue is not being opened.

Normally an application specifies a reply-to queue and leaves the reply-to queue manager name blank. The queue manager fills in its own name at put time. This works well except when you want an alternate channel to be used for replies, for example, a channel that uses transmission queue ’QM1_relief’ instead of the default return channel which uses transmission queue ’QM1’. In this situation, the queue manager names specified in transmission-queue headers do not match “real” queue manager names but are re-specified using queue manager alias definitions. In order to return replies along alternate routes, it is necessary to map reply-to queue data as well, using reply-to queue alias definitions.

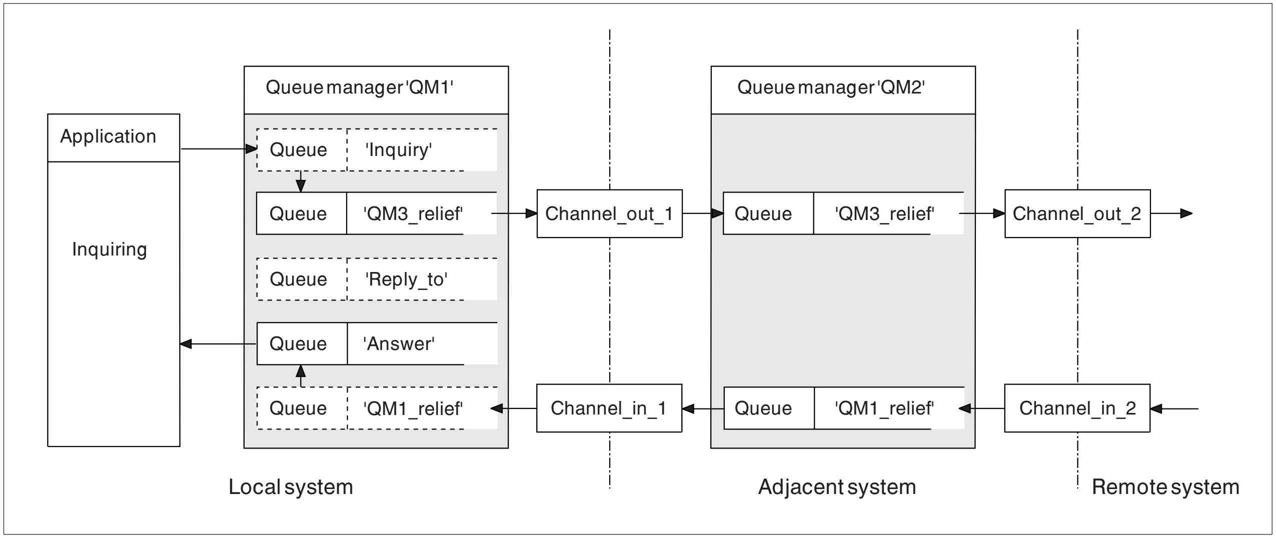

Figure 16. Reply-to queue alias used for changing reply location

In the example in Figure 16:

1. The application puts a message using the MQPUT call and specifying the following in the message descriptor:

```
ReplyToQ='Reply_to'
ReplyToQMgr=''
```

Note that ReplyToQMgr must be blank in order for the reply-to queue alias to be used.

2. You create a reply-to queue alias definition called 'Reply_to', which contains the name 'Answer', and the queue manager name 'QM1_relief'.

   ```
   DEFINE QREMOTE ('Reply_to') RNAME ('Answer')
          RQMNAME ('QM1_relief')
   ```
3. The messages are sent with a message descriptor showing ReplyToQ='Answer' and ReplyToQMgr='QM1_relief'.
4. The application specification must include the information that replies are to be found in queue 'Answer' rather than 'Reply_to'.

To prepare for the replies you have to create the parallel return channel. This involves defining:

- At QM2, the transmission queue named 'QM1_relief'

  ```
  DEFINE QLOCAL ('QM1_relief') USAGE(XMITQ)
  ```
- At QM1, the queue manager alias QM1_relief'

  ```
  DEFINE QREMOTE ('QM1_relief') RNAME() RQMNAME(QM1)
  ```

  This queue manager alias terminates the chain of parallel return channels and captures the messages for QM1.

If you think you might want to do this at sometime in the future, arrange for your applications to use the alias name from the start. For now this is a normal queue alias to the reply-to queue, but later it can be changed to a queue manager alias.

Reply-to queue name

Care is needed with naming reply-to queues. The reason that an application puts a reply-to queue name in the message is that it can specify the queue to which its replies will be sent. But when you create a reply-to queue alias definition with this name, you cannot have the actual reply-to queue (that is, a local queue definition) with the same name. Therefore, the reply-to queue alias definition must contain a new queue name as well as the queue manager name, and the application specification must include the information that its replies will be found in this other queue.

The applications now have to retrieve the messages from a different queue from the one they named as the reply-to queue when they put the original message.

Networks

So far this book has covered creating channels between your system and any other system with which you need to have communications, and creating multi-hop channels to systems where you have no direct connections. The message channel connections described in the scenarios are shown as a network diagram in Figure 17 on page 30.

Channel and transmission queue names

You can give transmission queues any name you like, but to avoid confusion, you can give them the same names as the destination queue manager names, or queue manager alias names, as appropriate, to associate them with the route they use. This gives a clear overview of parallel routes that you create through intermediate (multi-hopped) queue managers.

This is not quite so clear-cut for channel names. The channel names in Figure 17 for QM2, for example, must be different for incoming and outgoing channels. All channel names may still contain their transmission queue names, but they must be qualified to make them unique.

For example, at QM2, there is a QM3 channel coming from QM1, and a QM3 channel going to QM3. To make the names unique, the first one may be named 'QM3_from_QM1', and the second may be named 'QM3_from_QM2'. In this way, the channel names show the transmission queue name in the first part of the name, and the direction and adjacent queue manager name in the second part of the name.

A table of suggested channel names for Figure 17 is given in Table 1.

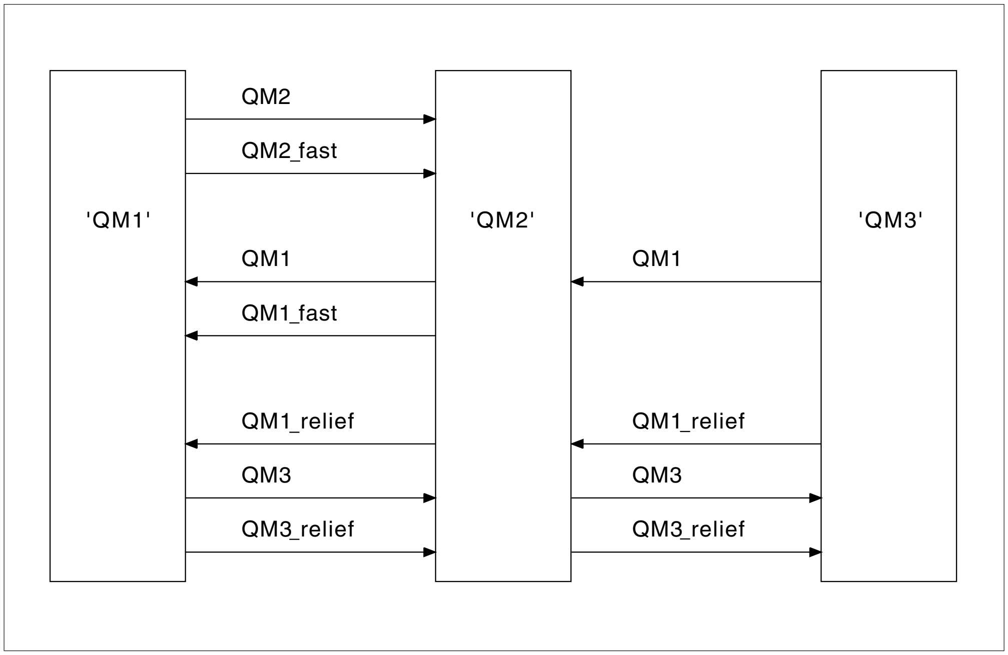

Figure 17. Network diagram showing all channels

Table 1. Example of channel names

Route name	Queue managers hosting channel	Transmission queue name	Suggested channel name
QM1	QM1 & QM2	QM1 (at QM2)	QM1.from.QM2
QM1	QM2 & QM3	QM1 (at QM3)	QM1.from.QM3
QM1_fast	QM1 & QM2	QM1_fast (at QM2)	QM1_fast.from.QM2
QM1_relief	QM1 & QM2	QM1_relief (at QM2)	QM1_relief.from.QM2
QM1_relief	QM2 & QM3	QM1_relief (at QM3)	QM1_relief.from.QM3
QM2	QM1 & QM2	QM2 (at QM1)	QM2.from.QM1
QM2_fast	QM1 & QM2	QM2_fast (at QM1)	QM2_fast.from.QM1
QM3	QM1 & QM2	QM3 (at QM1)	QM3.from.QM1
QM3	QM2 & QM3	QM3 (at QM2)	QM3.from.QM2
QM3_relief	QM1 & QM2	QM3_relief (at QM1)	QM3_relief.from.QM1
QM3_relief	QM2 & QM3	QM3_relief (at QM2)	QM3_relief.from.QM2

Notes:

1. On WebSphere MQ for z/OS, queue manager names are limited to 4 characters.

2. You are strongly recommended to name all the channels in your network uniquely. As shown in Table 1 on page 30, including the source and target queue manager names in the channel name is a good way to do this.

Network planner

This chapter has discussed application designer, systems administrator, and channel planner functions. Creating a network assumes that there is another, higher level function of *network planner* whose plans are implemented by the other members of the team.

If an application is used widely, it is more economical to think in terms of local access sites for the concentration of message traffic, using wide-band links between the local access sites, as shown in Figure 18.

In this example there are two main systems and a number of satellite systems (The actual configuration would depend on business considerations.) There are two concentrator queue managers located at convenient centers. Each QM-concentrator has message channels to the local queue managers:

- QM-concentrator 1 has message channels to each of the three local queue managers, QM1, QM2, and QM3. The applications using these queue managers can communicate with each other through the QM-concentrators.
- QM-concentrator 2 has message channels to each of the three local queue managers, QM4, QM5, and QM6. The applications using these queue managers can communicate with each other through the QM-concentrators.
- The QM-concentrators have message channels between themselves thus allowing any application at a queue manager to exchange messages with any other application at another queue manager.

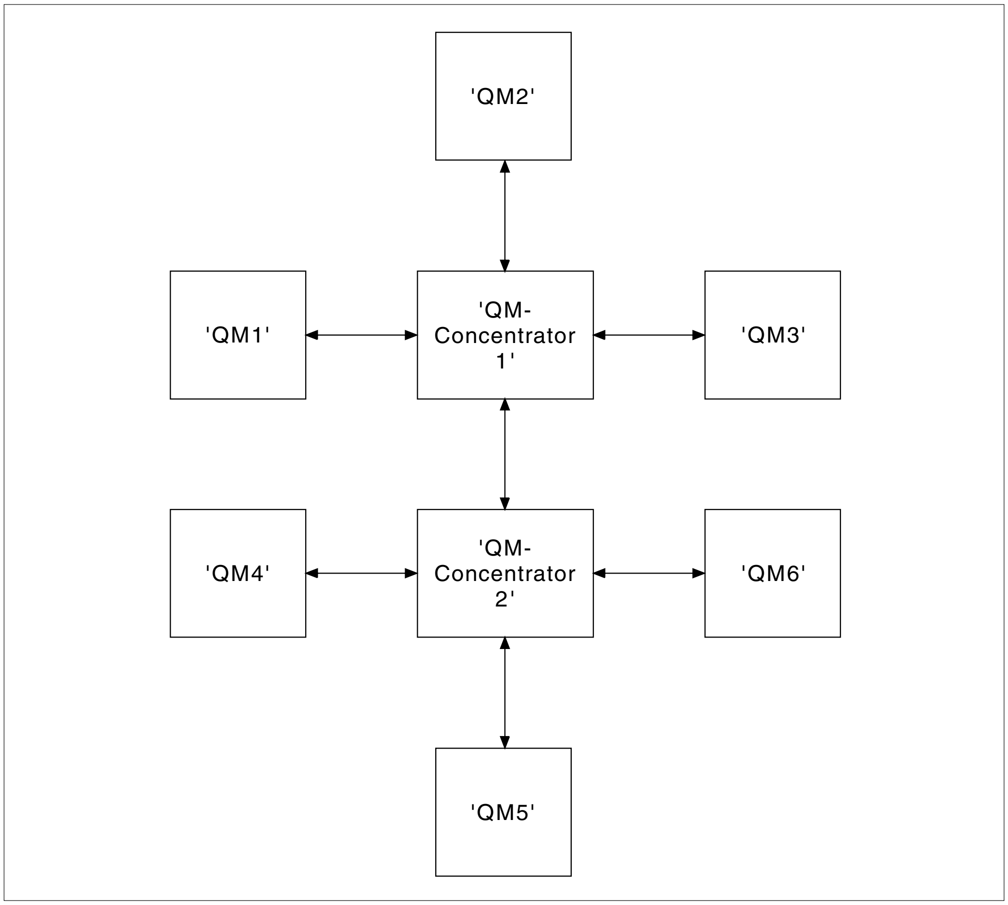

Figure 18. Network diagram showing QM-concentrators

Part 2. How intercommunication works

Chapter 4. WebSphere MQ distributed-messaging techniques

This chapter describes techniques that are of use when planning channels. It introduces the concept of message flow control and explains how this is arranged in distributed queue management (DQM). It gives more detailed information about the concepts introduced in the preceding chapters and starts to show how you might use distributed queue management. This chapter covers the following topics:

Message flow control

Message flow control is a task that involves the setting up and maintenance of message routes between queue managers. This is very important for routes that multi-hop through many queue managers.

You control message flow using a number of techniques that were introduced in Chapter 2, "Making your applications communicate", on page 17. If your queue manager is in a cluster, message flow is controlled using different techniques, as described in the *WebSphere MQ Queue Manager Clusters* book. If your queue managers are in a queue sharing group and intra-group queuing (IGQ) is enabled, then the message flow can be controlled by IGQ agents, which are described in Chapter 38, "Intra-group queuing", on page 505.

This chapter describes how you use your system's queues, alias queue definitions, and message channels to achieve message flow control.

You make use of the following objects:
- Transmission queues
- Message channels
- Remote queue definition
- Queue manager alias definition
- Reply-to queue alias definition

The queue manager and queue objects are described in the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, in the *WebSphere MQ for iSeries V5.3 System Administration Guide* book for WebSphere MQ for iSeries, in the *WebSphere MQ for z/OS Concepts and Planning Guide* for WebSphere MQ for z/OS, or in the *MQSeries System Management Guide* for your platform. Message channels are described in “Message channels” on page 8. The following techniques use these objects to create message flows in your system:

- Putting messages to remote queues
- Routing via particular transmission queues
- Receiving messages
- Passing messages through your system
- Separating message flows
- Switching a message flow to another destination
- Resolving the reply-to queue name to an alias name

Note

All the concepts described in this chapter are relevant for all nodes in a network, and include sending and receiving ends of message channels. For this reason, only one node is illustrated in most examples, except where the example requires explicit cooperation by the administrator at the other end of a message channel.

Before proceeding to the individual techniques it is useful to recap on the concepts of name resolution and the three ways of using remote queue definitions. See Chapter 3, “More about intercommunication”, on page 25.

Queue names in transmission header

The queue name used by the application, the logical queue name, is resolved by the queue manager to the destination queue name, that is, the physical queue name. This destination queue name travels with the message in a separate data area, the transmission header, until the destination queue has been reached after which the transmission header is stripped off.

You will be changing the queue manager part of this queue name when you create parallel classes of service. Remember to return the queue manager name to the original name when the end of the class of service diversion has been reached.

How to create queue manager and reply-to aliases

As discussed above, the remote queue definition object is used in three different ways. Table 2 on page 37 explains how to define each of the three ways:

- Using a remote queue definition to redefine a local queue name.

  The application provides only the queue name when opening a queue, and this queue name is the name of the remote queue definition.

  The remote queue definition contains the names of the target queue and queue manager, and optionally, the definition can contain the name of the transmission queue to be used. If no transmission queue name is provided, the queue manager uses the queue manager name, taken from the remote queue definition, for the transmission queue name. If a transmission queue of this name is not defined, but a default transmission queue is defined, the default transmission queue is used.
- Using a remote queue definition to redefine a queue manager name.

  The application, or channel program, provides a queue name together with the remote queue manager name when opening the queue.

  If you have provided a remote queue definition with the same name as the queue manager name, and you have left the queue name in the definition blank, then the queue manager will substitute the queue manager name in the open call with the queue manager name in the definition.

In addition, the definition can contain the name of the transmission queue to be used. If no transmission queue name is provided, the queue manager takes the queue manager name, taken from the remote queue definition, for the transmission queue name. If a transmission queue of this name is not defined, but a default transmission queue is defined, the default transmission queue is used.

- Using a remote queue definition to redefine a reply-to queue name.

  Each time an application puts a message to a queue, it may provide the name of a reply-to queue for answer messages but with the queue manager name blank.

  If you provide a remote queue definition with the same name as the reply-to queue then the local queue manager replaces the reply-to queue name with the queue name from your definition.

  You may provide a queue manager name in the definition, but not a transmission queue name.

Table 2. Three ways of using the remote queue definition object

Usage	**Queue manager name**	**Queue name**	**Transmission queue name**
1. Remote queue definition (on OPEN call)			
Supplied in the call	blank or local QM	(*) required	-
Supplied in the definition	required	required	optional
2. Queue manager alias (on OPEN call)			
Supplied in the call	(*) required and not local QM	required	-
Supplied in the definition	required	blank	optional
3. Reply-to queue alias (on PUT call)			
Supplied in the call	blank	(*) required	-
Supplied in the definition	optional	optional	blank
Note: (*) means that this name is the name of the definition object			

For a formal description, see Appendix C, "Queue name resolution", on page 759.

Putting messages on remote queues

In a distributed-queuing environment, a transmission queue and channel are the focal point for all messages to a location whether the messages originate from applications in your local system, or arrive through channels from an adjacent system. This is shown in Figure 19 on page 38 where an application is placing messages on a logical queue named 'QA_norm'. The name resolution uses the remote queue definition 'QA_norm' to select the transmission queue 'QMB', and adds a transmission header to the messages stating 'QA_norm at QMB'.

Messages arriving from the adjacent system on 'Channel_back' have a transmission header with the physical queue name 'QA_norm at QMB', for example. These messages are placed unchanged on transmission queue QMB.

The channel moves the messages to an adjacent queue manager.

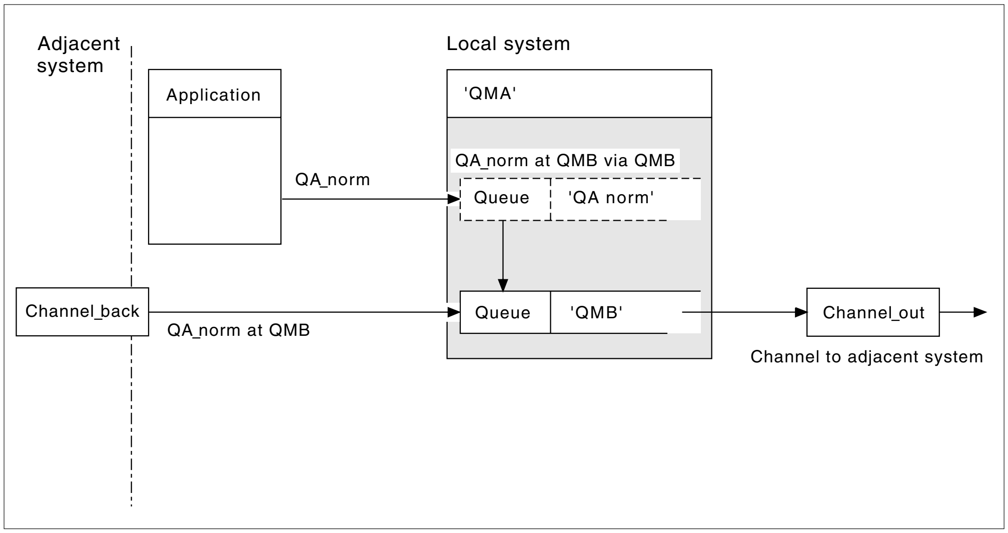

Figure 19. A remote queue definition is used to resolve a queue name to a transmission queue to an adjacent queue manager. Note: The dashed outline represents a remote queue definition. This is not a real queue, but a name alias that is controlled as though it were a real queue.

If you are the WebSphere MQ system administrator, you must:

- Define the message channel from the adjacent system
- Define the message channel to the adjacent system
- Create the transmission queue 'QMB'
- Define the remote queue object 'QA_norm' to resolve the queue name used by applications to the desired destination queue name, destination queue manager name, and transmission queue name

In a clustering environment, you only need to define a cluster-receiver channel at the local queue manager. You do not need to define a transmission queue or a remote queue object. For information about this, see the *WebSphere MQ Queue Manager Clusters* book.

More about name resolution

The effect of the remote queue definition is to define a physical destination queue name and queue manager name; these names are put in the transmission headers of messages.

Incoming messages from an adjacent system have already had this type of name resolution carried out by the original queue manager, and have the transmission header showing the physical destination queue name and queue manager name. These messages are unaffected by remote queue definitions.

Choosing the transmission queue

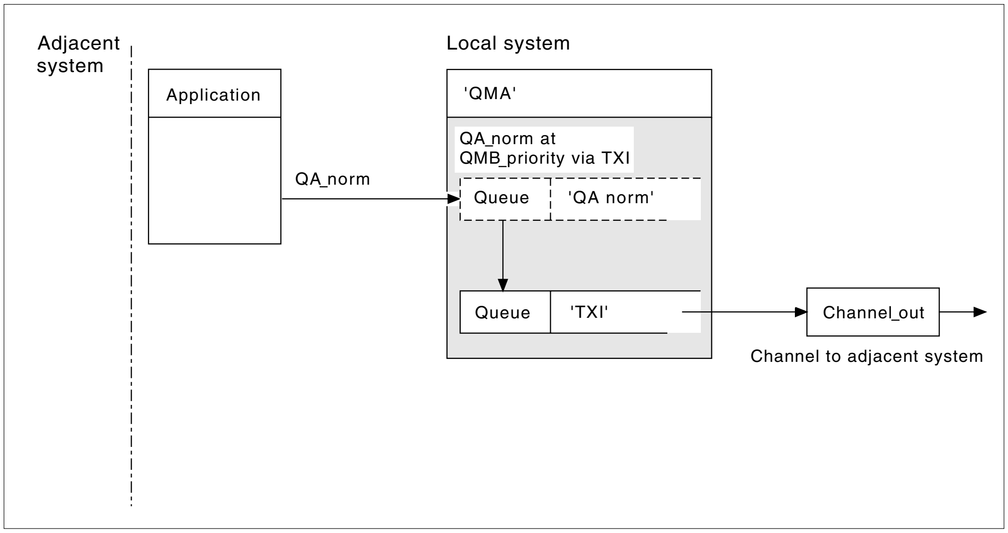

Figure 20. The remote queue definition allows a different transmission queue to be used

In a distributed-queuing environment, when you need to change a message flow from one channel to another, use the same system configuration as shown in Figure 19 on page 38. Figure 20 shows how you use the remote queue definition to send messages over a different transmission queue, and therefore over a different channel, to the same adjacent queue manager.

For the configuration shown in Figure 20 you must provide:

- The remote queue object 'QA_norm' to choose:
  - Queue 'QA_norm' at the remote queue manager
  - Transmission queue 'TX1'
  - Queue manager 'QMB_priority'
- The transmission queue 'TX1'. Specify this in the definition of the channel to the adjacent system

Messages are placed on transmission queue 'TX1' with a transmission header containing 'QA_norm at QMB_priority', and are sent over the channel to the adjacent system.

The channel_back has been left out of this illustration because it would need a queue manager alias; this is discussed in the following example.

In a clustering environment, you do not need to define a transmission queue or a remote queue definition. For more information about this, see the *WebSphere MQ Queue Manager Clusters* book.

Receiving messages

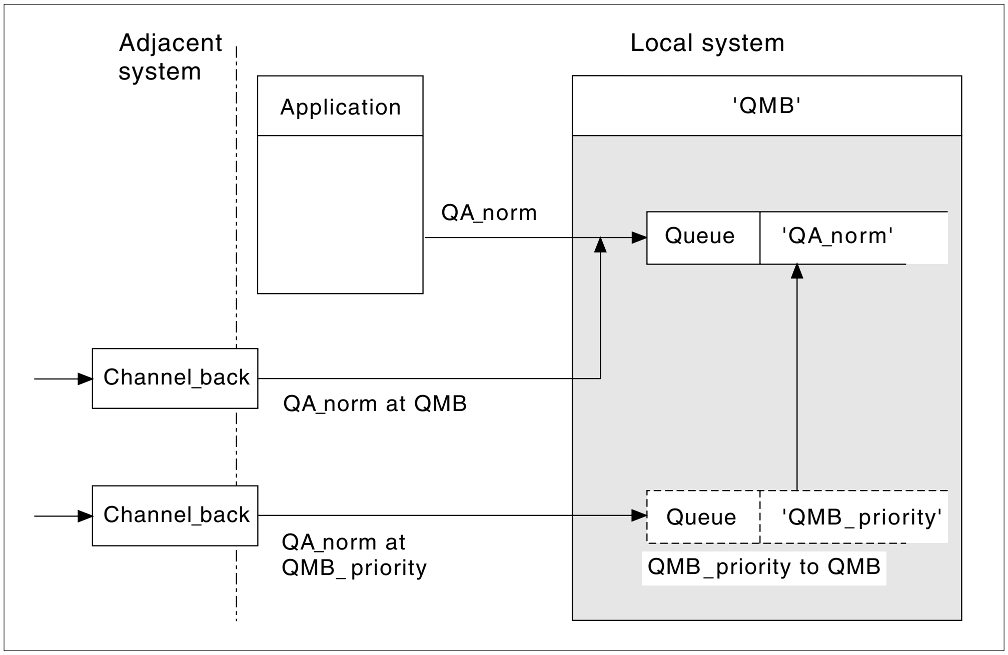

Figure 21. Receiving messages directly, and resolving alias queue manager name

As well as arranging for messages to be sent, the system administrator must also arrange for messages to be received from adjacent queue managers. Received messages contain the physical name of the destination queue manager and queue in the transmission header. They are treated exactly the same as messages from a local application that specifies both queue manager name and queue name. Because of this, you need to ensure that messages entering your system do not have an unintentional name resolution carried out. See Figure 21 for this scenario.

For this configuration, you must prepare:

- Message channels to receive messages from adjacent queue managers
- A queue manager alias definition to resolve an incoming message flow, ‘QMB_priority’, to the local queue manager name, ‘QMB’
- The local queue, ‘QA_norm’, if it does not already exist

Receiving alias queue manager names

The use of the queue manager alias definition in this illustration has not selected a different destination queue manager. Messages passing through this local queue manager and addressed to ‘QMB_priority’ are intended for queue manager ‘QMB’. The alias queue manager name is used to create the separate message flow.

Passing messages through your system

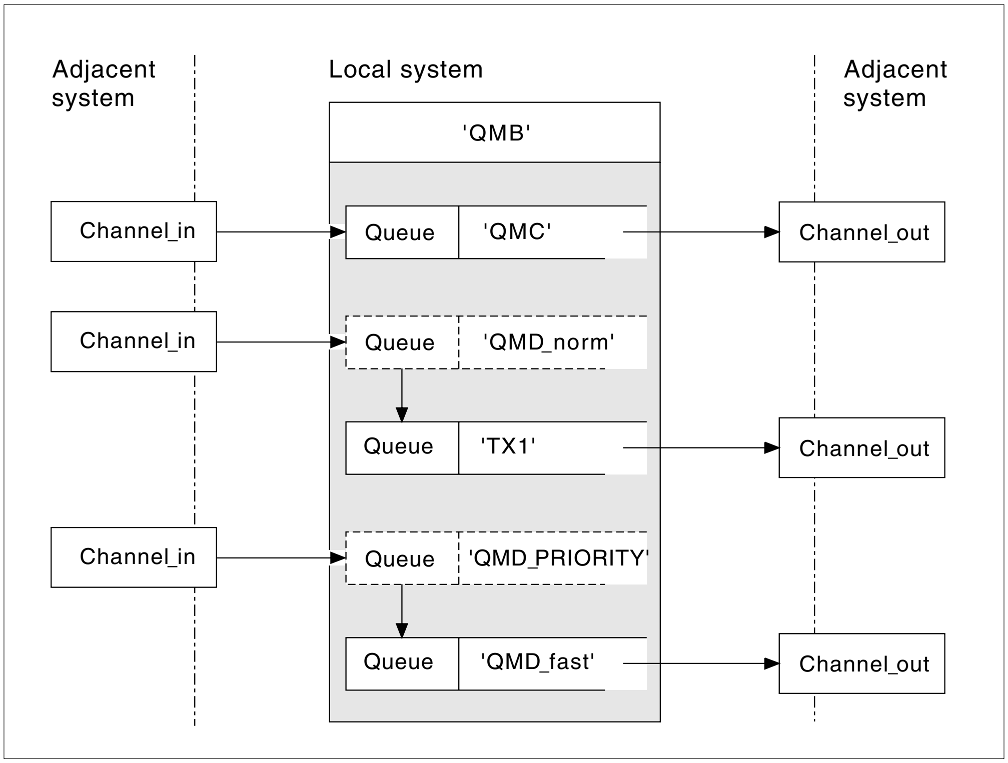

Figure 22. Three methods of passing messages through your system

Following on from the technique shown in Figure 21 on page 40, where you saw how an alias flow is captured, Figure 22 illustrates the ways networks are built up by bringing together the techniques we have discussed.

The configuration shows a channel delivering three messages with different destinations:
1. 'QB at QMC'
2. 'QB at QMD_norm'
3. 'QB at QMD_PRIORITY'

You must pass the first message flow through your system unchanged; the second message flow through a different transmission queue and channel, while reverting the messages from the alias queue manager name 'QMD_norm' to the physical location 'QMD'; and the third message flow simply chooses a different transmission queue without any other change.

In a clustering environment, all messages are passed through the cluster transmission queue, SYSTEM.CLUSTER.TRANSMIT.QUEUE. This is illustrated in Figure 4 on page 7.

The following methods describe techniques applicable to a distributed-queuing environment:

Method 1: Using the incoming location name

When you are going to receive messages with a transmission header containing another location name, the simplest preparation is to have a transmission queue with that name, ‘QMC’ in this example, as a part of a channel to an adjacent queue manager. The messages are delivered unchanged.

Method 2: Using an alias for the queue manager

The second method is to use the queue manager alias object definition, but specify a new location name, ‘QMD’, as well as a particular transmission queue, ‘TX1’. This action:

- Terminates the alias message flow set up by the queue manager name alias ‘QMD_norm’. That is the named class of service ‘QMD_norm’.
- Changes the transmission headers on these messages from ‘QMD_norm’ to ‘QMD’.

Method 3: Selecting a transmission queue

The third method is to have a queue manager alias object defined with the same name as the destination location, ‘QMD_PRIORITY’, and use the definition to select a particular transmission queue, ‘QMD_fast’, and therefore another channel. The transmission headers on these messages remain unchanged.

Using these methods

For these configurations, you must prepare the:

- Input channel definitions
- Output channel definitions
- Transmission queues:
  - QMC
  - TX1
  - QMD_fast
- Queue manager alias definitions:
  - QMD_norm with ‘QMD_norm to QMD via TX1’
  - QMD_PRIORITY with ‘QMD_PRIORITY to QMD_PRIORITY via QMD_fast’

Note

None of the message flows shown in the example changes the destination queue. The queue manager name aliases simply provide separation of message flows.

Separating message flows

In a distributed-queuing environment, the need to separate messages to the same queue manager into different message flows can arise for a number of reasons. For example:

- You may need to provide a separate flow for very large, medium, and small messages. This also applies in a clustering environment and, in this case, you may create clusters that overlap. There are a number of reasons you might do this, for example:
  - To allow different organizations to have their own administration.
  - To allow independent applications to be administered separately.
  - To create a class of service. For example you could have a cluster called STAFF that is a subset of the cluster called STUDENTS. When you put a message to a queue advertised in the STAFF cluster, a restricted channel is

used. When you put a message to a queue advertised in the STUDENTS cluster, either a general channel or a restricted channel may be used.
  - To create test and production environments.
- It may be necessary to route incoming messages via different paths from the path of the locally generated messages.
- Your installation may require to schedule the movement of messages at certain times (for example, overnight) and the messages then need to be stored in reserved queues until scheduled.

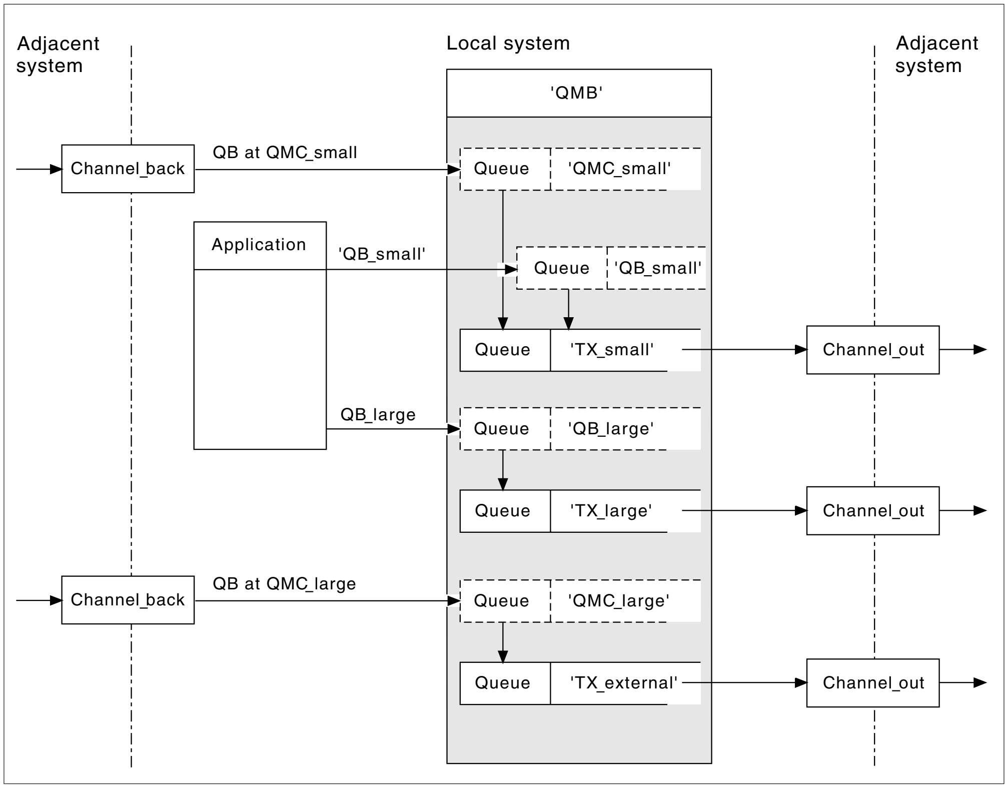

Figure 23. Separating messages flows

In the example shown in Figure 23, the two incoming flows are to alias queue manager names ‘QMC_small’ and ‘QMC_large’. You provide these flows with a queue manager alias definition to capture these flows for the local queue manager. You have an application addressing two remote queues and you need these message flows to be kept separate. You provide two remote queue definitions that specify the same location, ‘QMC’, but specify different transmission queues. This keeps the flows separate, and nothing extra is needed at the far end as they have the same destination queue manager name in the transmission headers. You provide:
- The incoming channel definitions
- The two remote queue definitions QB_small and QB_large
- The two queue manager alias definitions QMC_small and QMC_large
- The three sending channel definitions
- Three transmission queues: TX_small, TX_large, and TX_external

Coordination with adjacent systems

When you use a queue manager alias to create a separate message flow, you need to coordinate this activity with the system administrator at the remote end of the message channel to ensure that the corresponding queue manager alias is available there.

Concentrating messages to diverse locations

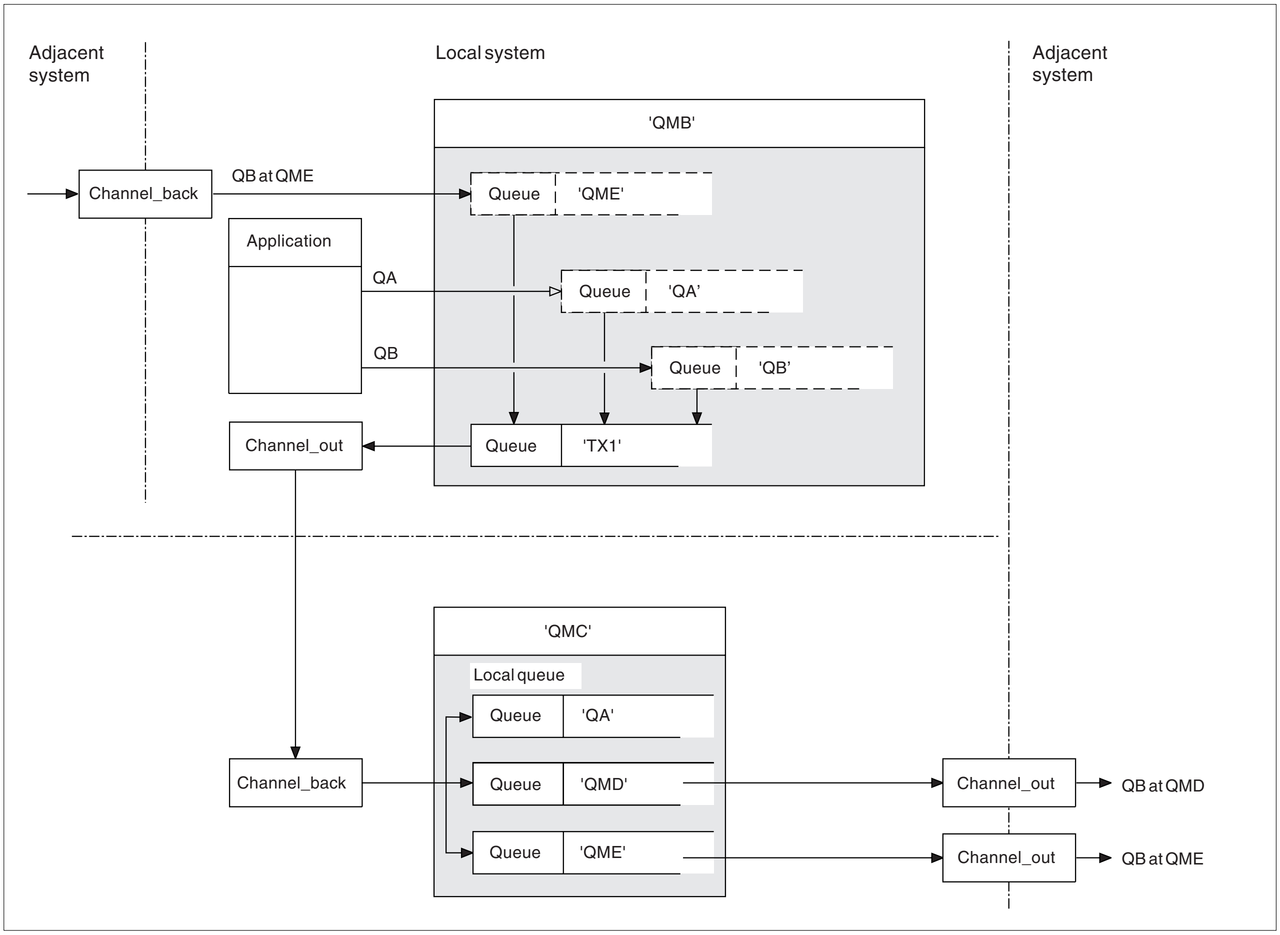

Figure 24. Combining message flows on to a channel

Figure 24 illustrates a distributed-queuing technique for concentrating messages that are destined for various locations on to one channel. Two possible uses would be:

- Concentrating message traffic through a gateway
- Using wide bandwidth highways between nodes

In this example, messages from different sources, local and adjacent, and having different destination queues and queue managers, are flowed via transmission queue 'TX1' to queue manager QMC. Queue manager QMC delivers the messages according to the destinations, one set to a transmission queue 'QMD' for onward transmission to queue manager QMD, another set to a transmission queue ‘QME’ for onward transmission to queue manager QME, while other messages are put on the local queue ‘QA’.

You must provide:
- Channel definitions
- Transmission queue TX1
- Remote queue definitions:
  - QA with ‘QA at QMC via TX1’
  - QB with ‘QB at QMD via TX1’
- Queue manager alias definition:
  - QME with ‘QME via TX1’

The complementary administrator who is configuring QMC must provide:
- Receiving channel definition with the same channel name
- Transmission queue QMD with associated sending channel definition
- Transmission queue QME with associated sending channel definition
- Local queue object QA.

Diverting message flows to another destination

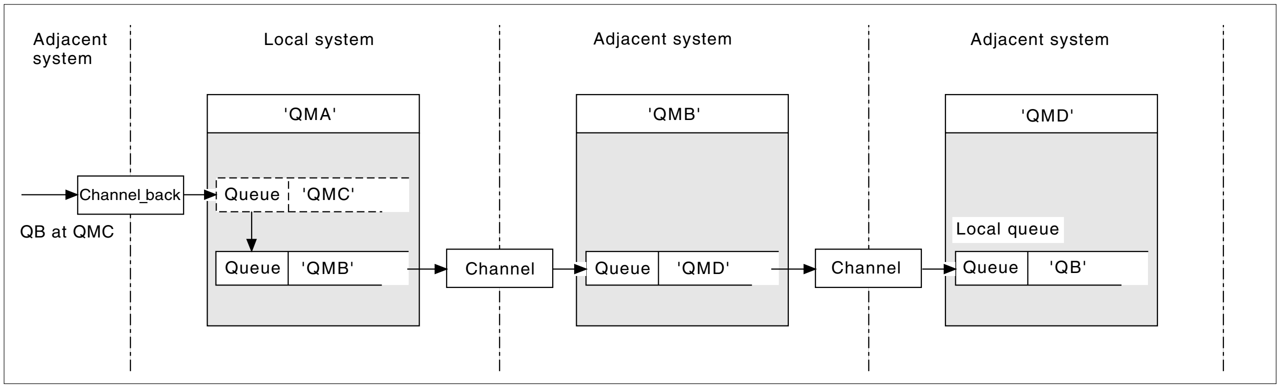

Figure 25. Diverting message streams to another destination

Figure 25 illustrates how you can redefine the destination of certain messages. Incoming messages to QMA are destined for ‘QB at QMC’. They would normally arrive at QMA and be placed on a transmission queue called QMC which would have been part of a channel to QMC. QMA must divert the messages to QMD, but is able to reach QMD only over QMB. This method is useful when you need to move a service from one location to another, and allow subscribers to continue to send messages on a temporary basis until they have adjusted to the new address.

The method of rerouting incoming messages destined for a certain queue manager to a different queue manager uses:
- A queue manager alias to change the destination queue manager to another queue manager, and to select a transmission queue to the adjacent system
- A transmission queue to serve the adjacent queue manager
- A transmission queue at the adjacent queue manager for onward routing to the destination queue manager

You must provide:
- Channel_back definition

Diverting message flows

- Queue manager alias object definition QMC with QB at QMD via QMB
- Channel_out definition
- The associated transmission queue QMB

The complementary administrator who is configuring QMB must provide:
- The corresponding channel_back definition
- The transmission queue, QMD
- The associated channel definition to QMD

You can use aliases within a clustering environment. For information about this, see the *WebSphere MQ Queue Manager Clusters* book.

Sending messages to a distribution list

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, an application can send a message to several destinations with a single MQPUT call. This applies in both a distributed-queuing environment and a clustering environment. You have to define the destinations in a distribution list, as described in the *WebSphere MQ Application Programming Guide*.

Not all queue managers support distribution lists. When an MCA establishes a connection with a partner, it determines whether or not the partner supports distribution lists and sets a flag on the transmission queue accordingly. If an application tries to send a message that is destined for a distribution list but the partner does not support distribution lists, the sending MCA intercepts the message and puts it onto the transmission queue once for each intended destination.

A receiving MCA ensures that messages sent to a distribution list are safely received at all the intended destinations. If any destinations fail, the MCA establishes which ones have failed so that it can generate exception reports for them and can try to re-send the messages to them.

Reply-to queue

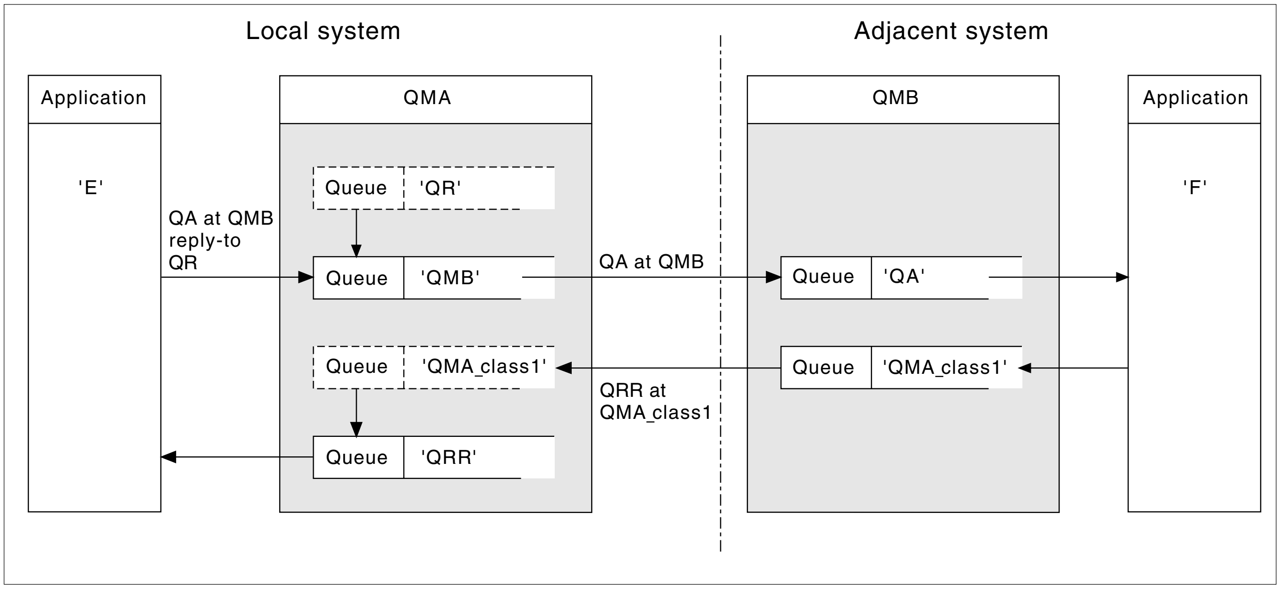

Figure 26. Reply-to queue name substitution during PUT call

A complete remote queue processing loop using a reply-to queue is shown in Figure 26. This applies in both a distributed-queuing environment and a clustering environment. The details are as shown in Table 6 on page 54.

The application opens QA at QMB and puts messages on that queue. The messages are given a reply-to queue name of QR, without the queue manager name being specified. Queue manager QMA finds the reply-to queue object QR and extracts from it the alias name of QRR and the queue manager name QMA_class1. These names are put into the reply-to fields of the messages.

Reply messages from applications at QMB are addressed to QRR at QMA_class1. The queue manager alias name definition QMA_class1 is used by the queue manager to flow the messages to itself, and to queue QRR.

This scenario depicts the way you give applications the facility to choose a class of service for reply messages, the class being implemented by the transmission queue QMA_class1 at QMB, together with the queue manager alias definition, QMA_class1 at QMA. In this way, you can change an application's reply-to queue so that the flows are segregated without involving the application. That is, the application always chooses QR for this particular class of service, and you have the opportunity to change the class of service with the reply-to queue definition QR.

You must create:
- Reply-to queue definition QR
- Transmission queue object QMB
- Channel_out definition
- Channel_back definition
- Queue manager alias definition QMA_class1
- Local queue object QRR, if it does not exist

The complementary administrator at the adjacent system must create:
- Receiving channel definition

- Transmission queue object QMA_class1
- Associated sending channel
- Local queue object QA.

Your application programs use:
- Reply-to queue name QR in put calls
- Queue name QRR in get calls

In this way, you may change the class of service as necessary, without involving the application, by changing the reply-to alias 'QR', together with the transmission queue 'QMA_class1' and queue manager alias 'QMA_class1'.

If no reply-to alias object is found when the message is put on the queue, the local queue manager name is inserted in the blank reply-to queue manager name field, and the reply-to queue name remains unchanged.

Name resolution restriction

Because the name resolution has been carried out for the reply-to queue at 'QMA' when the original message was put, no further name resolution is allowed at 'QMB', that is, the message is put with the physical name of the reply-to queue by the replying application.

Note that the applications must be aware of the naming convention that the name they use for the reply-to queue is different from the name of the actual queue where the return messages are to be found.

For example, when two classes of service are provided for the use of applications with reply-to queue alias names of 'C1_alias', and 'C2_alias', the applications use these names as reply-to queue names in the message put calls, but the applications will actually expect messages to appear in queues 'C1' and 'C2', respectively.

However, an application is able to make an inquiry call on the reply-to alias queue to check for itself the name of the real queue it must use to get the reply messages.

Reply-to queue alias example

This example illustrates the use of a reply-to alias to select a different route (transmission queue) for returned messages. The use of this facility requires the reply-to queue name to be changed in cooperation with the applications.

As shown in Figure 27 on page 49, the return route must be available for the reply messages, including the transmission queue, channel, and queue manager alias.

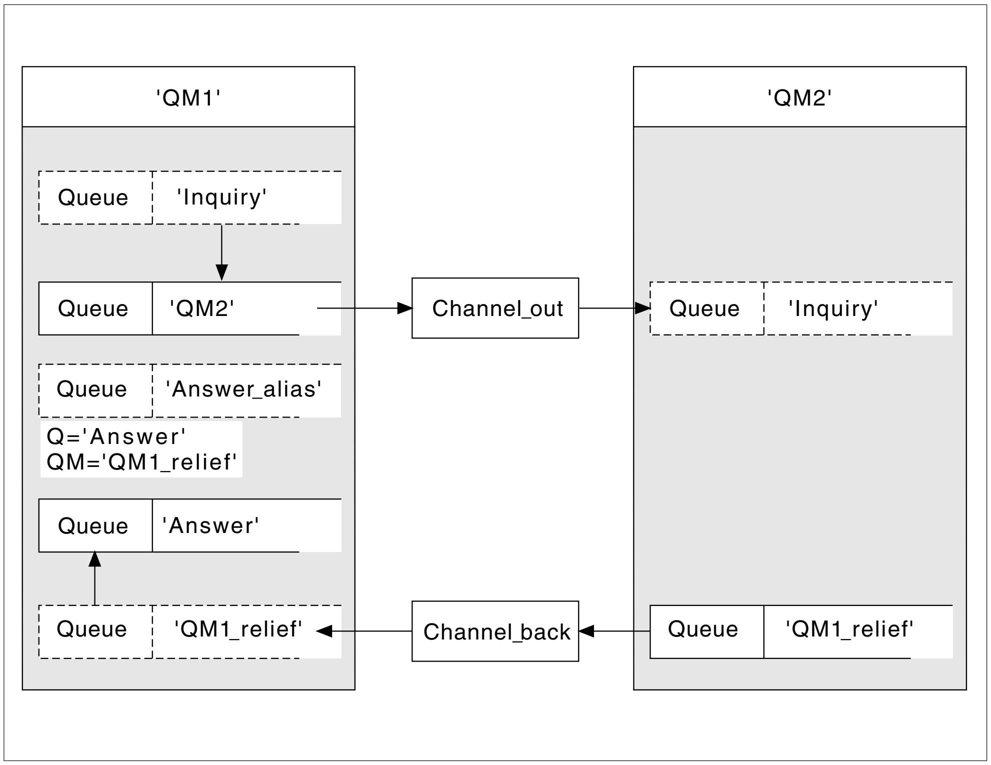

Figure 27. Reply-to queue alias example

This example is for requester applications at ‘QM1’ that send messages to server applications at ‘QM2’. The servers’ messages are to be returned through an alternative channel using transmission queue ‘QM1_relief’ (the default return channel would be served with a transmission queue ‘QM1’).

The reply-to queue alias is a particular use of the remote queue definition named ‘Answer_alias’. Applications at QM1 include this name, ‘Answer_alias’, in the reply-to field of all messages that they put on queue ‘Inquiry’.

Reply-to queue definition ‘Answer_alias’ is defined as ‘Answer at QM1_relief’. Applications at QM1 expect their replies to appear in the local queue named ‘Answer’.

Server applications at QM2 use the reply-to field of received messages to obtain the queue and queue manager names for the reply messages to the requester at QM1.

Definitions used in this example at QM1

The WebSphere MQ system administrator at QM1 must ensure that the reply-to queue ‘Answer’ is created along with the other objects. The name of the queue manager alias, marked with a ‘*’, must agree with the queue manager name in the reply-to queue alias definition, also marked with an ‘*’.

Reply-to queue

Object	Definition	
Local transmission queue	QM2	
Remote queue definition	Object name	Inquiry
	Remote queue manager name	QM2
	Remote queue name	Inquiry
	Transmission queue name	QM2 (DEFAULT)
Queue manager alias	Object name	QM1_relief *
	Queue manager name	QM1
	Queue name	(blank)
Reply-to queue alias	Object name	Answer_alias
	Remote queue manager name	QM1_relief *
	Remote queue name	Answer

Definitions used in this example at QM2

The WebSphere MQ system administrator at QM2 must ensure that the local queue exists for the incoming messages, and that the correctly named transmission queue is available for the reply messages.

Object	Definition
Local queue	Inquiry
Transmission queue	QM1_relief

Put definition at QM1

Applications fill the reply-to fields with the reply-to queue alias name, and leave the queue manager name field blank.

Field	Content
Queue name	Inquiry
Queue manager name	(blank)
Reply-to queue name	Answer_alias
Reply-to queue manager	(blank)

Put definition at QM2

Applications at QM2 retrieve the reply-to queue name and queue manager name from the original message and use them when putting the reply message on the reply-to queue.

Field	Content
Queue name	Answer
Queue manager name	QM1_relief

How the example works

In this example, requester applications at QM1 always use ‘Answer_alias’ as their reply-to queue in the relevant field of the put call, and they always retrieve their messages from the queue named ‘Answer’.

The reply-to queue alias definitions are available for use by the QM1 system administrator to change the name of the reply-to queue ‘Answer’, and of the return route ‘QM1_relief’.

Changing the queue name ‘Answer’ is normally not useful because the QM1 applications are expecting their answers in this queue. However, the QM1 system administrator is able to change the return route (class of service), as necessary.

How the queue manager makes use of the reply-to queue alias

Queue manager QM1 retrieves the definitions from the reply-to queue alias when the reply-to queue name, included in the put call by the application, is the same as the reply-to queue alias, and the queue manager part is blank.

The queue manager replaces the reply-to queue name in the put call with the queue name from the definition. It replaces the blank queue manager name in the put call with the queue manager name from the definition.

These names are carried with the message in the message descriptor.

Table 3. Reply-to queue alias

Field name	Put call	Transmission header
Queue name	Answer_alias	Answer
Queue manager name	(blank)	QM1_relief

Reply-to queue alias walk-through

To complete this example, let us take a walk through the process, from an application putting a message on a remote queue at queue manager 'QM1', through to the same application removing the reply message from the alias reply-to queue.

1. The application opens a queue named 'Inquiry', and puts messages to it. The application sets the reply-to fields of the message descriptor to:

Reply-to queue name	Answerable
Reply-to queue manager name	(blank)

2. Queue manager 'QM1' responds to the blank queue manager name by checking for a remote queue definition with the name 'Answer_alias'. If none is found, the queue manager places its own name, 'QM1', in the reply-to queue manager field of the message descriptor.
3. If the queue manager finds a remote queue definition with the name 'Answer_alias', it extracts the queue name and queue manager names from the definition (queue name='Answer' and queue manager name= 'QM1_relief') and puts them into the reply-to fields of the message descriptor.
4. The queue manager 'QM1' uses the remote queue definition 'Inquiry' to determine that the intended destination queue is at queue manager 'QM2', and the message is placed on the transmission queue 'QM2'. 'QM2' is the default transmission queue name for messages destined for queues at queue manager 'QM2'.
5. When queue manager 'QM1' puts the message on the transmission queue, it adds a transmission header to the message. This header contains the name of the destination queue, 'Inquiry', and the destination queue manager, 'QM2'.
6. The message arrives at queue manager 'QM2', and is placed on the 'Inquiry' local queue.
7. An application gets the message from this queue and processes the message. The application prepares a reply message, and puts this reply message on the reply-to queue name from the message descriptor of the original message. This is:

Reply-to queue name	Answer
Reply-to queue manager name	QM1_relief

Reply-to queue

8. Queue manager 'QM2' carries out the put command, and finding that the queue manager name, 'QM1_relief', is a remote queue manager, it places the message on the transmission queue with the same name, 'QM1_relief'. The message is given a transmission header containing the name of the destination queue, 'Answer', and the destination queue manager, 'QM1_relief'.
9. The message is transferred to queue manager 'QM1' where the queue manager, recognizing that the queue manager name 'QM1_relief' is an alias, extracts from the alias definition 'QM1_relief' the physical queue manager name 'QM1'.
10. Queue manager 'QM1' then puts the message on the queue name contained in the transmission header, 'Answer'.
11. The application extracts its reply message from the queue 'Answer'.

Networking considerations

In a distributed-queuing environment, because message destinations are addressed with just a queue name and a queue manager name, the following rules apply:

1. Where the queue manager name is given, and the name is different from the local queue manager's name:
   - A transmission queue must be available with the same name, and this transmission queue must be part of a message channel moving messages to another queue manager, or
   - A queue manager alias definition must exist to resolve the queue manager name to the same, or another queue manager name, and optional transmission queue, or
   - If the transmission queue name cannot be resolved, and a default transmission queue has been defined, the default transmission queue is used.
2. Where only the queue name is supplied, a queue of any type but with the same name must be available on the local queue manager. This queue may be a remote queue definition which resolves to: a transmission queue to an adjacent queue manager, a queue manager name, and an optional transmission queue.

To see how this works in a clustering environment, see the *WebSphere MQ Queue Manager Clusters* book.

If the queue managers are running in a queue-sharing group (QSG) and intra-group queuing (IGQ) is enabled, you can use the SYSTEM.QSG.TRANSMIT.QUEUE. For more information, see Chapter 38, "Intra-group queuing", on page 505.

Consider the scenario of a message channel moving messages from one queue manager to another in a distributed-queuing environment.

The messages being moved have originated from any other queue manager in the network, and some messages may arrive that have an unknown queue manager name as destination. This can occur when a queue manager name has changed or has been removed from the system, for example.

The channel program recognizes this situation when it cannot find a transmission queue for these messages, and places the messages on your undelivered-message (dead-letter) queue. It is your responsibility to look for these messages and arrange for them to be forwarded to the correct destination, or to return them to the originator, where this can be ascertained.

Exception reports are generated in these circumstances, if report messages were requested in the original message.

Name resolution convention

It is strongly recommended that name resolution that changes the identity of the destination queue, (that is, logical to physical name changing), should only occur once, and only at the originating queue manager.

Subsequent use of the various alias possibilities should be used only when separating and combining message flows.

Return routing

Messages may contain a return address in the form of the name of a queue and queue manager. This applies in both a distributed-queuing environment and a clustering environment. This address is normally specified by the application that creates the message, but may be modified by any application that subsequently handles the message, including user exit applications.

Irrespective of the source of this address, any application handling the message may choose to use this address for returning answer, status, or report messages to the originating application.

The way these response messages are routed is not different from the way the original message is routed. You need to be aware that the message flows you create to other queue managers will need corresponding return flows.

Physical name conflicts

The destination reply-to queue name has been resolved to a physical queue name at the original queue manager, and must not be resolved again at the responding queue manager.

This is a likely possibility for name conflict problems that can only be prevented by a network-wide agreement on physical and logical queue names.

Managing queue name translations

This description is mainly provided for application designers and channel planners concerned with an individual system that has message channels to adjacent systems. It takes a local view of channel planning and control.

When you create a queue manager alias definition or a remote queue definition, the name resolution is carried out for every message carrying that name, regardless of the source of the message. To oversee this situation, which may involve large numbers of queues in a queue manager network, you keep tables of:

- The names of source queues and of source queue managers with respect to resolved queue names, resolved queue manager names, and resolved transmission queue names, with method of resolution
- The names of source queues with respect to:
  - Resolved destination queue names
  - Resolved destination queue manager names

- Transmission queues
- Message channel names
- Adjacent system names
- Reply-to queue names

Note: The use of the term *source* in this context refers to the queue name or the queue manager name provided by the application, or a channel program when opening a queue for putting messages.

An example of each of these tables is shown in Table 4, Table 5, and Table 6.

The names in these tables are derived from the examples in this chapter, and this table is not intended as a practical example of queue name resolution in one node.

Table 4. Queue name resolution at queue manager QMA

Source queue specified when queue is opened	Source queue manager specified when queue is opened	Resolved queue name	Resolved queue manager name	Resolved transmission queue name	Resolution type
QA_norm	-	QA_norm	QMB	QMB	Remote queue
(any)	QMB	-	-	QMB	(none)
QA_norm	-	QA_norm	QMB	TX1	Remote queue
QB	QMC	QB	QMD	QMB	Queue manager alias

Table 5. Queue name resolution at queue manager QMB

Source queue specified when queue is opened	Source queue manager specified when queue is opened	Resolved queue name	Resolved queue manager name	Resolved transmission queue name	Resolution type
QA_norm	-	QA_norm	QMB	-	(none)
QA_norm	QMB	QA_norm	QMB	-	(none)
QA_norm	QMB_PRIORITY	QA_norm	QMB	-	Queue manager alias
(any)	QMC	(any)	QMC	QMC	(none)
(any)	QMD_norm	(any)	QMD_norm	TX1	Queue manager alias
(any)	QMD_PRIORITY	(any)	QMD_PRIORITY	QMD_fast	Queue manager alias
(any)	QMC_small	(any)	QMC_small	TX_small	Queue manager alias
(any)	QMC_large	(any)	QMC_large	TX_external	Queue manager alias
QB_small	QMC	QB_small	QMC	TX_small	Remote queue
QB_large	QMC	QB_large	QMC	TX_large	Remote queue
(any)	QME	(any)	QME	TX1	Queue manager alias
QA	QMC	QA	QMC	TX1	Remote queue
QB	QMD	QB	QMD	TX1	Remote queue

Table 6. Reply-to queue name translation at queue manager QMA

Application design		Reply-to alias definition	
Local QMGR	**Queue name for messages**	**Reply-to queue alias name**	**Redefined to**
QMA	QRR	QR	QRR at QMA_class1

Channel message sequence numbering

The channel uses sequence numbers to assure that messages are delivered, delivered without duplication, and stored in the same order as they were taken from the transmission queue. The sequence number is generated at the sending end of the channel and is incremented by one before being used, which means that the current sequence number is the number of the last message sent. This information can be displayed using DISPLAY CHSTATUS (see *WebSphere MQ Script (MQSC) Command Reference*). The sequence number and an identifier called the LUWID are stored in persistent storage for the last message transferred in a batch. These values are used during channel start-up to ensure that both ends of the link agree on which messages have been transferred successfully.

Note: On z/OS, if you are using distributed queuing with CICS, and you do not use the sequential delivery option, message sequence numbering is not used.

Sequential retrieval of messages

If an application puts a sequence of messages to the same destination queue, those messages can be retrieved in sequence by a ***single*** application with a sequence of MQGET operations, if the following conditions are met:

- All of the put requests were done from the same application.
- All of the put requests were either from the same unit of work, or all the put requests were made outside of a unit of work.
- The messages all have the same priority.
- The messages all have the same persistence.
- For remote queuing, the configuration is such that there can only be one path from the application making the put request, through its queue manager, through intercommunication, to the destination queue manager and the target queue.
- The messages are not put to a dead-letter queue (for example, if a queue is temporarily full).
- The application getting the message does not deliberately change the order of retrieval, for example by specifying a particular `MsgId` or `CorrelId` or by using message priorities.
- Only one application is doing get operations to retrieve the messages from the destination queue. If this is not the case, these applications must be designed to get all the messages in each sequence put by a sending application.

Note: Messages from other tasks and units of work may be interspersed with the sequence, even where the sequence was put from within a single unit of work.

If these conditions cannot be met, and the order of messages on the target queue is important, then the application can be coded to use its own message sequence number as part of the message to assure the order of the messages.

Sequence of retrieval of fast, nonpersistent messages

WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries V5.1 for OS/2 Warp, nonpersistent messages on a fast channel may overtake persistent messages on the same channel and so arrive out of sequence. The receiving MCA puts the nonpersistent messages on the destination queue immediately and makes them visible. Persistent messages are not made visible until the next syncpoint.

Loopback testing

Loopback testing is a technique on non-z/OS platforms that allows you to test a communications link without actually linking to another machine. You set up a connection between two queue managers as though they are on separate machines, but you test the connection by looping back to another process on the same machine. This means that you can test your communications code without requiring an active network.

The way you do this depends on which products and protocols you are using. For example the command to allow TCP/IP loopback testing on OS/2 without a network, is:

```
ifconfig lo ipaddress
```

On Windows systems, you can use the “loopback” adapter.

Refer to the documentation for the products you are using for more information.

Chapter 5. DQM implementation

This chapter describes the implementation of the concepts introduced in Chapter 2, "Making your applications communicate", on page 17.

Distributed queue management (DQM):

- Enables you to define and control communication channels between queue managers
- Provides you with a message channel service to move messages from a type of *local queue*, known as a transmission queue, to communication links on a local system, and from communication links to local queues at a destination queue manager
- Provides you with facilities for monitoring the operation of channels and diagnosing problems, using panels, commands, and programs

This chapter discusses:

- "Functions of DQM"
- "Message sending and receiving" on page 58
- "Channel control function" on page 59
- "What happens when a message cannot be delivered?" on page 72
- "Initialization and configuration files" on page 73
- "Data conversion" on page 75
- "Writing your own message channel agents" on page 76

Functions of DQM

Distributed queue management has these functions:

- Message sending and receiving
- Channel control
- Initialization file
- Data conversion
- Channel exits

Channel definitions associate channel names with transmission queues, communication link identifiers, and channel attributes. Channel definitions are implemented in different ways on different platforms. Message sending and receiving is controlled by programs known as *message channel agents* (MCAs), which use the channel definitions to start up and control communication.

The MCAs in turn are controlled by DQM itself. The structure is platform dependent, but typically includes listeners and trigger monitors, together with operator commands and panels.

A *message channel* is a one-way pipe for moving messages from one queue manager to another. Thus a message channel has two end-points, represented by a pair of MCAs. Each end-point has a definition of its end of the message channel. For example, one end would define a sender, the other end a receiver.

Functions of DQM

For details of how to define channels, see:

- Chapter 8, "Monitoring and controlling channels on distributed platforms", on page 111
- Chapter 24, "Monitoring and controlling channels on z/OS", on page 385
- Chapter 29, "Monitoring and controlling channels in z/OS with CICS", on page 427
- Chapter 40, "Monitoring and controlling channels in WebSphere MQ for iSeries", on page 529

For information about channel exits, see Chapter 46, "Channel-exit programs", on page 619.

Message sending and receiving

Figure 28 shows the relationships between entities when messages are transmitted, and shows the flow of control.

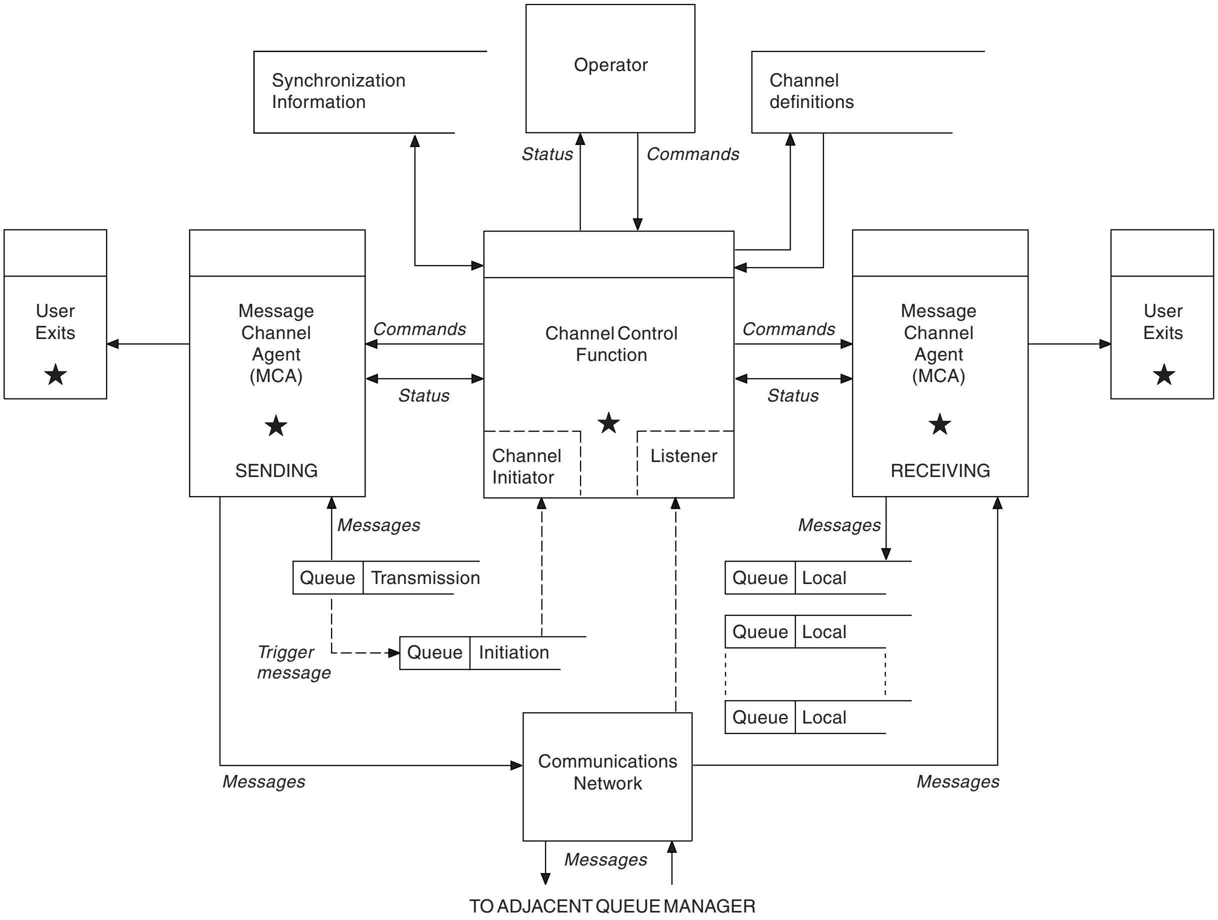

Figure 28. Distributed queue management model

Notes:

1. There is one MCA per channel, depending on the platform. There may be one or more channel control functions for a given queue manager.
2. The implementation of MCAs and channel control functions is highly platform dependent; they may be programs or processes or threads, and they may be a single entity or many comprising several independent or linked parts.

3. All components marked with a star can use the MQI.

Channel parameters

An MCA receives its parameters in one of several ways:

- If started by a command, the channel name is passed in a data area. The MCA then reads the channel definition directly to obtain its attributes.
- For sender, and in some cases server channels, the MCA can be started automatically by the queue manager trigger. The channel name is retrieved from the trigger process definition, where applicable, and is passed to the MCA. The remaining processing is the same as that described above.
- If started remotely by a sender, server, requester, or client-connection, the channel name is passed in the initial data from the partner message channel agent. The MCA reads the channel definition directly to obtain its attributes.

Certain attributes not defined in the channel definition are also negotiable:

Split messages
If one end does not support this, split messages will not be sent.

Conversion capability
If one end cannot perform the necessary code page conversion or numeric encoding conversion when needed, the other end must handle it. If neither end supports it, when needed, the channel cannot start.

Distribution list support
If one end does not support distribution lists, the partner MCA sets a flag in its transmission queue so that it will know to intercept messages intended for multiple destinations.

Channel status and sequence numbers

Message channel agent programs keep records of the current sequence number and logical unit of work number for each channel, and of the general status of the channel. Some platforms allow you to display this status information to help you control channels.

Channel control function

The channel control function provides facilities for you to define, monitor, and control channels. Commands are issued through panels, programs, or from a command line to the channel control function. The panel interface also displays channel status and channel definition data.

Note: For the channel control function on WebSphere MQ for UNIX and Windows, and MQSeries for OS/2 Warp, Compaq OpenVMS Alpha, and Compaq NonStop Kernel, you can use Programmable Command Formats or those WebSphere MQ commands (MQSC) and control commands that are detailed in Chapter 8, “Monitoring and controlling channels on distributed platforms”, on page 111.

The commands fall into the following groups:
- Channel administration
- Channel control
- Channel status monitoring

Channel administration commands deal with the definitions of the channels. They enable you to:

Channel control function

- Create a channel definition
- Copy a channel definition
- Alter a channel definition
- Delete a channel definition

Channel control commands manage the operation of the channels. They enable you to:

- Start a channel
- Stop a channel
- Re-synchronize with partner (in some implementations)
- Reset message sequence numbers
- Resolve an in-doubt batch of messages
- Ping; send a test communication across the channel

Channel monitoring displays the state of channels, for example:

- Current channel settings
- Whether the channel is active or inactive
- Whether the channel terminated in a synchronized state

Preparing channels

Before trying to start a message channel or MQI channel, you must make sure that all the attributes of the local and remote channel definitions are correct and compatible. Chapter 6, "Channel attributes", on page 77 describes the channel definitions and attributes.

Although you set up explicit channel definitions, the channel negotiations carried out when a channel starts up may override one or other of the values defined. This is quite normal, and transparent, and has been arranged like this so that otherwise incompatible definitions can work together.

Auto-definition of receiver and server-connection channels

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, if there is no appropriate channel definition, then for a receiver or server-connection channel that has auto-definition enabled, a definition is created automatically. The definition is created using:

1. The appropriate model channel definition, SYSTEM.AUTO.RECEIVER or SYSTEM.AUTO.SVRCONN. The model channel definitions for auto-definition are the same as the system defaults, SYSTEM.DEF.RECEIVER and SYSTEM.DEF.SVRCONN, except for the description field, which is "Auto-defined by" followed by 49 blanks. The systems administrator can choose to change any part of the supplied model channel definitions.
2. Information from the partner system. The partner's values are used for the channel name and the sequence number wrap value.
3. A channel exit program, which you can use to alter the values created by the auto-definition. See "Channel auto-definition exit program" on page 631.

The description is then checked to determine whether it has been altered by an auto-definition exit or because the model definition has been changed. If the first 44 characters are still "Auto-defined by" followed by 29 blanks, the queue manager name is added. If the final 20 characters are still all blanks the local time and date are added.

Once the definition has been created and stored the channel start proceeds as though the definition had always existed. The batch size, transmission size, and message size are negotiated with the partner.

Defining other objects

Before a message channel can be started, both ends must be defined (or enabled for auto-definition) at their respective queue managers. The transmission queue it is to serve must be defined to the queue manager at the sending end, and the communication link must be defined and available. In addition, it may be necessary for you to prepare other WebSphere MQ objects, such as remote queue definitions, queue manager alias definitions, and reply-to queue alias definitions, so as to implement the scenarios described in Chapter 2, “Making your applications communicate”, on page 17.

For information about MQI channels, see the *WebSphere MQ Clients* book.

Multiple message channels per transmission queue

It is possible to define more than one channel per transmission queue, but only one of these channels can be active at any one time. This is recommended for the provision of alternative routes between queue managers for traffic balancing and link failure corrective action. A transmission queue cannot be used by another channel if the previous channel to use it terminated leaving a batch of messages in-doubt at the sending end. For more information, see “In-doubt channels” on page 70.

Starting a channel

A channel can be caused to start transmitting messages in one of four ways. It can be:

- Started by an operator (not receiver, cluster-receiver or server-connection channels).
- Triggered from the transmission queue (sender, and fully-qualified server channels only). You will need to prepare the necessary objects for triggering channels.
- Started from an application program (not receiver, cluster-receiver or server-connection channels).
- Started remotely from the network by a sender, cluster-sender, requester, server, or client-connection channel. Receiver, cluster-receiver and possibly server and requester channel transmissions, are started this way; so are server-connection channels. The channels themselves must already be started (that is, enabled).

Note: Because a channel is ‘started’ it is not necessarily transmitting messages, but, rather, it is ‘enabled’ to start transmitting when one of the four events described above occurs. The enabling and disabling of a channel is achieved using the START and STOP operator commands.

Channel states

Figure 29 on page 62 shows the hierarchy of all possible channel states, and Figure 30 on page 63 shows the links between them. These apply to all types of message channel. On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, these states apply also to server-connection channels.

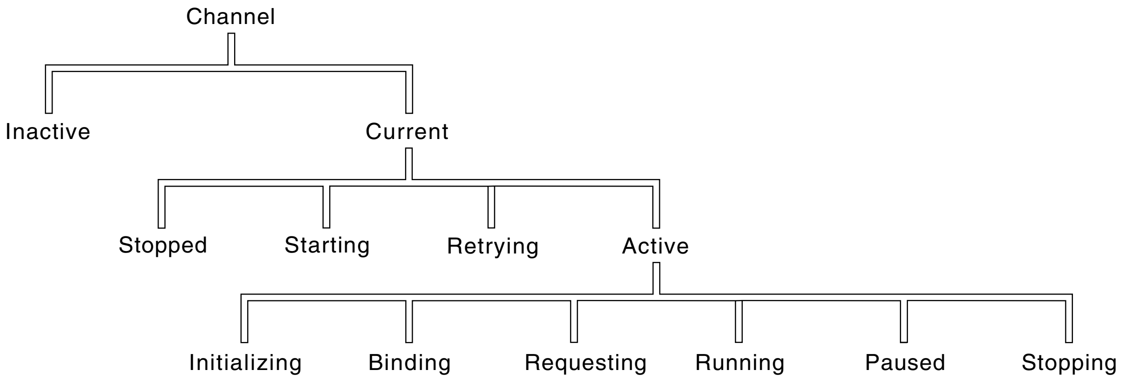

Figure 29. Channel states

Current and active

The channel is "current" if it is in any state other than inactive. A current channel is "active" unless it is in RETRYING, STOPPED, or STARTING state.

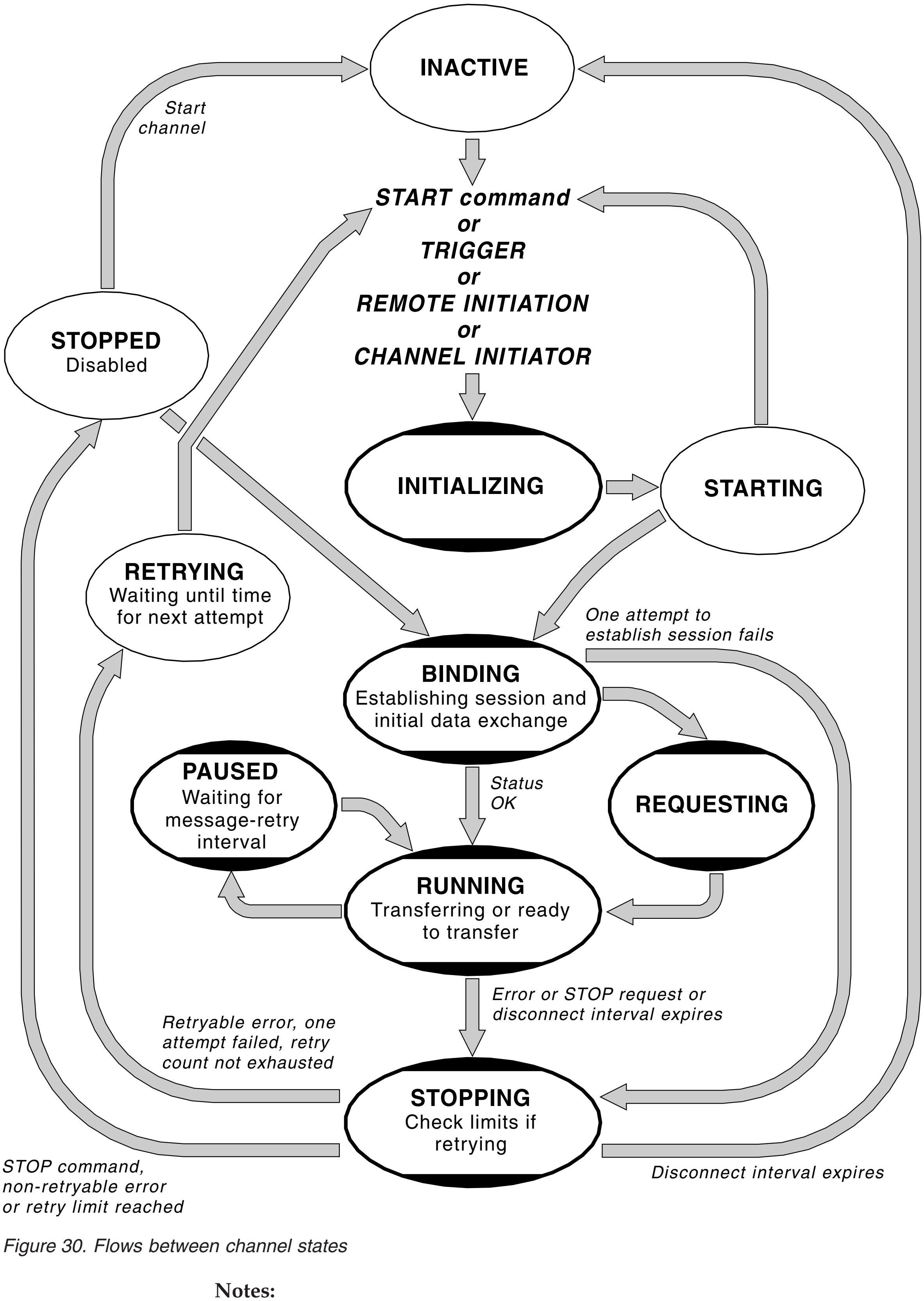
INACTIVE
Start channel
START command or TRIGGER or REMOTE INITIATION or CHANNEL INITIATOR
STOPPED
Disabled
INITIALIZING
STARTING
RETRYING
Waiting until time for next attempt
One attempt to establish session fails
BINDING
Establishing session and initial data exchange
PAUSED
Waiting for message-retry interval
Status OK
REQUESTING
RUNNING
Transferring or ready to transfer
Error or STOP request or disconnect interval expires
Retryable error, one attempt failed, retry count not exhausted
STOPPING
Check limits if retrying
STOP command, non-retryable error or retry limit reached
Disconnect interval expires

Figure 30. Flows between channel states

Notes:

1. When a channel is in one of the six states highlighted in Figure 30 (INITIALIZING, BINDING, REQUESTING, RUNNING, PAUSED, or STOPPING), it is consuming resource and a process or thread is running; the

channel is *active*. (INITIALIZING occurs on z/OS and on WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp. (PAUSED does not occur on z/OS.)
2. When a channel is in STOPPED state, the session may be active because the next state is not yet known.

Specifying the maximum number of current channels: You can specify the maximum number of channels that can be current at one time. This is the number of channels that have entries in the channel status table, including channels that are retrying and channels that are disabled (that is, stopped). Specify this in the channel initiator parameter module for z/OS, the queue manager initialization file for OS/400, the queue manager configuration file for OS/2, Compaq NonStop Kernel, and UNIX systems, or the registry for Windows. For more information about the values you set using the initialization or the configuration file see Appendix D, "Configuration file stanzas for distributed queuing", on page 763. For more information about specifying the maximum number of channels, see the *WebSphere MQ System Administration Guide* for WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, the *WebSphere MQ for iSeries V5.3 System Administration Guide* book for WebSphere MQ for iSeries, or the *WebSphere MQ for z/OS Concepts and Planning Guide* for information relating to your platform.

Notes:
1. On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, server-connection channels are included in this number.
2. A channel must be current before it can become active. If a channel is started, but cannot become current, the start fails.
3. If you are using CICS for distributed queuing on z/OS, you cannot specify the maximum number of channels.

Specifying the maximum number of active channels: You can also specify the maximum number of active channels (except on WebSphere MQ for z/OS using CICS). You can do this to prevent your system being overloaded by a large number of starting channels. If you use this method, you should set the disconnect interval attribute to a low value to allow waiting channels to start as soon as other channels terminate.

Each time a channel that is retrying attempts to establish connection with its partner, it must become an active channel. If the attempt fails, it remains a current channel that is not active, until it is time for the next attempt. The number of times that a channel will retry, and how often, is determined by the retry count and retry interval channel attributes. There are short and long values for both these attributes. See Chapter 6, "Channel attributes", on page 77 for more information.

When a channel has to become an active channel (because a START command has been issued, or because it has been triggered, or because it is time for another retry attempt), but is unable to do so because the number of active channels is already at the maximum value, the channel waits until one of the active slots is freed by another channel instance ceasing to be active. If, however, a channel is starting because it is being initiated remotely, and there are no active slots available for it at that time, the remote initiation is rejected.

Whenever a channel, other than a requester channel, is attempting to become active, it goes into the STARTING state. This is true even if there is an active slot immediately available, although in this case it will only be in STARTING state for a very short time. However, if the channel has to wait for an active slot, it is in STARTING state while it is waiting.

Requester channels do not go into STARTING state. If a requester channel cannot start because the number of active channels is already at the limit, the channel ends abnormally.

Whenever a channel, other than a requester channel, is unable to get an active slot, and so waits for one, a message is written to the log or the z/OS console, and an event is generated. When a slot is subsequently freed and the channel is able to acquire it, another message and event are generated. Neither of these events and messages are generated if the channel is able to acquire a slot straightaway.

If a STOP CHANNEL command is issued while the channel is waiting to become active, the channel goes to STOPPED state. A Channel-Stopped event is raised as usual.

On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS, and MQSeries V5.1 for OS/2 Warp, server-connection channels are included in the maximum number of active channels.

For more information about specifying the maximum number of active channels, see the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, iSeries, HP-UX, Solaris, and Windows systems, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp, the *WebSphere MQ for iSeries V5.3 System Administration Guide* book for WebSphere MQ for iSeries, or the *WebSphere MQ for z/OS Concepts and Planning Guide* for the z/OS platform.

Channel errors

Errors on channels cause the channel to stop further transmissions. If the channel is a sender or server, it goes to RETRY state because it is possible that the problem may clear itself. If it cannot go to RETRY state, the channel goes to STOPPED state. For sending channels, the associated transmission queue is set to GET(DISABLED) and triggering is turned off. (A STOP command with STATUS(STOPPED) takes the side that issued it to STOPPED state; only expiry of the disconnect interval or a STOP command with STATUS(INACTIVE) will make it end normally and become inactive.) Channels that are in STOPPED state need operator intervention before they will restart (see “Restarting stopped channels” on page 69).

Note: For Compaq OpenVMS Alpha, OS/2 Warp, OS/400, UNIX systems, Compaq NonStop Kernel, and Windows systems, a channel initiator must be running for retry to be attempted. If the channel initiator is not available, the channel becomes inactive and must be manually restarted. If you are using a script to start the channel, ensure the channel initiator is running before you try to run the script. On platforms other than AIX, Compaq Tru64 UNIX, HP-UX, OS/400, OS/2 Warp, Solaris, and Windows systems, the channel initiator must be monitoring the initiation queue specified in the transmission queue that the channel is using.

“Long retry count (LONGRTY)” on page 88 describes how retrying works. If the error clears, the channel restarts automatically, and the transmission queue is re-enabled. If the retry limit is reached without the error clearing, the channel goes to STOPPED state. A stopped channel must be restarted manually by the operator. If the error is still present, it does not retry again. When it does start successfully, the transmission queue is re-enabled.

Channel control function

On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries V5.1 for OS/2 Warp, if the channel initiator or queue manager stops while a channel is in RETRYING or STOPPED status, the channel status is remembered when the channel initiator or queue manager is restarted.

On OS/2 Warp, Windows systems, OS/400, Compaq NonStop Kernel, and UNIX systems, if a channel is unable to put a message to the target queue because that queue is full or put inhibited, the channel can retry the operation a number of times (specified in the message-retry count attribute) at a given time interval (specified in the message-retry interval attribute). Alternatively, you can write your own message-retry exit that determines which circumstances cause a retry, and the number of attempts made. The channel goes to PAUSED state while waiting for the message-retry interval to finish.

See Chapter 6, “Channel attributes”, on page 77 for information about the channel attributes, and Chapter 46, “Channel-exit programs”, on page 619 for information about the message-retry exit.

Checking that the other end of the channel is still available

Heartbeats

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries for OS/2 Warp, MQSeries for Compaq OpenVMS Alpha, and MQSeries for Compaq NonStop Kernel, V5.1, you can use the heartbeat-interval channel attribute to specify that flows are to be passed from the sending MCA when there are no messages on the transmission queue. This is described in “Heartbeat interval (HBINT)” on page 87.

Keep Alive

In WebSphere MQ for z/OS, if you are using TCP/IP as the transport protocol, you can also specify a value for the KeepAlive Interval channel attribute (KAINT). You are recommended to give the KeepAliveInterval a higher value than the heartbeat interval, and a smaller value than the disconnect value. You can use this attribute to specify a time-out value for each channel. This is described in “KeepAlive Interval (KAINT)” on page 87.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and MQSeries for OS/2 Warp, MQSeries for Compaq OpenVMS Alpha, and MQSeries for Compaq NonStop Kernel, V5.1, if you are using TCP as your transport protocol, you can set `keepalive=yes` in the qm.ini file (`keepalive=1` on MQSeries for Compaq NonStop Kernel). If you specify this option, TCP periodically checks that the other end of the connection is still available, and if it is not, the channel is terminated.

If you have unreliable channels that are suffering from TCP errors, use of KEEPALIVE will mean that your channels are more likely to recover

You can specify time intervals to control the behavior of the KEEPALIVE option. When you change the time interval, only TCP/IP channels started after the change are affected. The value that you choose for the time interval should be less than the value of the disconnect interval for the channel.

For more information about using the KEEPALIVE option on z/OS, see *WebSphere MQ for z/OS Concepts and Planning Guide* . For other platforms, see the chapter about setting up communications for your platform in this manual.

Receive Time Out

In WebSphere MQ for AIX, iSeries, z/OS, HP-UX, Linux, Solaris, and Windows systems, and MQSeries for OS/2 Warp, MQSeries for Compaq OpenVMS Alpha, and MQSeries for Compaq NonStop Kernel, V5.1, if you are using TCP as your transport protocol, the receiving end of an inactive non-MQI channel connection is also closed if no data is received for a period of time. This period of time is determined according to the HBINT (heartbeat interval) value.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and MQSeries for OS/2 Warp, MQSeries for Compaq OpenVMS Alpha, and MQSeries for Compaq NonStop Kernel, V5.1, the time-out value is set as follows:

1. For an initial number of flows, before any negotiation has taken place, the timeout is twice the HBINT value from the channel definition.
2. When the channels have negotiated a HBINT value, if HBINT is set to less than 60 seconds, the timeout is set to twice this value. If HBINT is set to 60 seconds or more, the timeout value is set to 60 seconds greater than the value of HBINT.

In WebSphere MQ for z/OS, the time-out value is set as follows:

1. For an initial number of flows, before any negotiation has taken place, the timeout is twice the HBINT value from the channel definition.
2. If RCVTIME is set, the timeout is set to one of
   - the negotiated HBINT multiplied by a constant
   - the negotiated HBINT plus a constant number of seconds
   - a constant number of seconds

   depending on the format of RCVTIME parameter used, and subject to any limit imposed by RCVTMIN. If you use a constant value of RCVTIME and you use a heartbeat interval, do not specify an RCVTIME less than the heartbeat interval. For more information, see*WebSphere MQ for z/OS System Setup Guide*.

Notes:

1. If either of the above values is zero, there is no timeout.
2. For connections that do not support heartbeats, the HBINT value is negotiated to zero in step 2 and hence there is no timeout, so you must use TCP/IP KEEPALIVE.
3. For client connections, heartbeats are only flowed from the server when the client issues an MQGET call with wait; none are flowed during other MQI calls. Therefore, you are not recommended to set the heartbeat interval too small for client channels. For example, if the heartbeat is set to ten seconds, an MQCMIT call will fail (with MQRC_CONNECTION_BROKEN) if it takes longer than twenty seconds to commit because no data will have been flowed during this time. This can happen with large units of work. However, it should not happen if appropriate values are chosen for the heartbeat interval because only MQGET with wait should take significant periods of time. Note that client heartbeats are not supported on WebSphere MQ for z/OS.
4. Aborting the connection after twice the heartbeat interval is valid because a data or hearbeat flow is expected at least every heartbeat interval. Setting the heartbeat interval too small, however, can cause problems, especially if you are using channel exits. For example, if the HBINT value is one second, and a send or receive exit is used, the receiving end will only wait for two seconds before aborting the channel. If the MCA is performing a task such as encrypting the message, this value might be too short.

Adopting an MCA

If a channel suffers a communications failure, the receiver channel could be left in a ’communications receive’ state. When communications are re-established the sender channel attempts to reconnect. If the remote queue manager finds that the receiver channel is already running it does not allow another version of the same receiver channel to be started. This problem requires user intervention to rectify the problem or the use of system keepalive.

The Adopt MCA function solves the problem automatically. It enables WebSphere MQ to cancel a receiver channel and to start a new one in its place.

The function can be set up with various options. For more information see *WebSphere MQ for z/OS System Setup Guide* or the appropriate equivalent publication for your platforms.

Stopping and quiescing channels

Message channels are designed to be long-running connections between queue managers with orderly termination controlled only by the disconnect interval channel attribute. This mechanism works well unless the operator needs to terminate the channel before the disconnect time interval expires. This can occur in the following situations:

- System quiesce
- Resource conservation
- Unilateral action at one end of a channel

In this case, an operator command is provided to allow you to stop the channel. The command provided varies by platform, as follows:

For z/OS without CICS:
The STOP CHANNEL MQSC command or the Stop a channel panel

For z/OS using CICS:
The Stop option on the Message Channel List panel

For OS/2, Windows systems, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems:
The STOP CHANNEL MQSC or PCF command

For OS/400:
ENDMQMCHL or the END option on the WRKMQMCHL panel

For VSE/ESA:
The CLOSE command from the MQMMSC panel or MQCL transaction closes (rather than stops) the channel.

There are three options for stopping channels using these commands:

QUIESCE
The QUIESCE option attempts to end the current batch of messages before stopping the channel.

FORCE
The FORCE option attempts to stop the channel immediately and may require the channel to resynchronize when it restarts because the channel may be left in doubt.

TERMINATE
The TERMINATE option attemps to stop the channel immediately, and terminates the channel’s thread or process.

Note that all of these options leave the channel in a STOPPED state, requiring operator intervention to restart it.

Stopping the channel at the sending end is quite effective but does require operator intervention to restart. At the receiving end of the channel, things are much more difficult because the MCA is waiting for data from the sending side, and there is no way to initiate an *orderly* termination of the channel from the receiving side; the stop command is pending until the MCA returns from its wait for data.

Consequently there are three recommended ways of using channels, depending upon the operational characteristics required:

- If you want your channels to be long running, you should note that there can be orderly termination only from the sending end. When channels are interrupted, that is, stopped, operator intervention (a START CHANNEL command) is required in order to restart them.
- If you want your channels to be active only when there are messages for them to transmit, you should set the disconnect interval to a fairly low value. Note that the default setting is quite high and so is not recommended for channels where this level of control is required. Because it is difficult to interrupt the receiving channel, the most economical option is to have the channel automatically disconnect and reconnect as the workload demands. For most channels, the appropriate setting of the disconnect interval can be established heuristically.
- For WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries V5.1 for OS/2 Warp, you can use the heartbeat-interval attribute to cause the sending MCA to send a heartbeat flow to the receiving MCA during periods in which it has no messages to send. This releases the receiving MCA from its wait state and gives it an opportunity to quiesce the channel without waiting for the disconnect interval to expire. Give the heartbeat interval a lower value than the value of the disconnect interval.

  Notes:

  1. You are advised to set the disconnect interval to a low value, or to use heartbeats, for server channels. This is to allow for the case where the requester channel ends abnormally (for example, because the channel was canceled) when there are no messages for the server channel to send. In this case, the server does not detect that the requester has ended (it will only do this the next time it tries to send a message to the requester). While the server is still running, it holds the transmission queue open for exclusive input in order to get any more messages that arrive on the queue. If an attempt is made to restart the channel from the requester, the start request receives an error because the server still has the transmission queue open for exclusive input. It is necessary to stop the server channel, and then restart the channel from the requester again.
  2. On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, server-connection channels can also be stopped like receiver channels.

Restarting stopped channels

When a channel goes into STOPPED state (either because you have stopped the channel manually using one of the methods given in “Stopping and quiescing channels” on page 68, or because of a channel error) you have to restart the channel manually.

To do this, issue one of the following commands:

For WebSphere MQ for z/OS without CICS:
The START CHANNEL MQSC command or the Start a channel panel

For WebSphere MQ for z/OS using CICS:
The Start option on the Message Channel List panel

For WebSphere MQ for UNIX systems and Windows systems, and MQSeries for OS/2 Warp, Compaq OpenVMS Alpha, Compaq NonStop Kernel, :
The START CHANNEL MQSC or PCF command

For WebSphere MQ for iSeries:
The START command on the WRKMQMCHL panel, the STRMQMCHL command, or the START CHANNEL MQSC or PCF command

For MQSeries for VSE/ESA:
The OPEN command from the MQMMSC panel or MQCL transaction opens (rather than restarts) the channel.

For sender or server channels, when the channel entered the STOPPED state, the associated transmission queue was set to GET(DISABLED) and triggering was set off. When the start request is received, these attributes are reset automatically. On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS without CICS, and MQSeries V5.1 for OS/2 Warp, if the channel initiator or queue manager stops while a channel is in RETRYING or STOPPED status, the channel status is remembered when the channel initiator or queue manager is restarted. On other platforms, if the channel initiator or queue manager is restarted the status is lost and you have to alter the queue attributes manually to re-enable triggering of the channel.

Note: If you are using CICS for distributed queuing on z/OS, these queue attributes are not reset automatically; you always have to alter them manually when you restart a channel.

In-doubt channels

An in-doubt channel is a channel that is in doubt with a remote channel about which messages have been sent and received. Note the distinction between this and a queue manager being in doubt about which messages should be committed to a queue.

You can reduce the opportunity for a channel to be placed in doubt by using the Batch Heartbeat channel parameter (BATCHHB). When a value for this parameter is specified, a sender channel checks that the remote channel is still active before taking any further action. If no response is received the receiver channel is considered to be no longer active. The messages can be rolled-back, and re-routed, and the sender-channel is not put in doubt. This reduces the time when the channel could be placed in doubt to the period between the sender channel verifying that the receiver channel is still active, and verifying that the receiver channel has received the sent messages. See Chapter 6, “Channel attributes”, on page 77 for more information on the batch heartbeat parameter.

In-doubt channel problems are usually resolved automatically. Even when communication is lost, and a channel is placed in doubt with a message batch at the sender whose receipt status is unknown, the situation is resolved when communication is re-established. Sequence number and LUWID records are kept for this purpose. The channel is in doubt until LUWID information has been exchanged, and only one batch of messages can be in doubt for the channel.

You can, when necessary, resynchronize the channel manually. The term *manual* includes use of operators or programs that contain WebSphere MQ system management commands. The manual resynchronization process works as follows. This description uses MQSC commands, but you can also use the PCF equivalents.

1. Use the DISPLAY CHSTATUS command to find the last-committed logical unit of work ID (LUWID) for ***each*** side of the channel. Do this using the following commands:
   - For the in-doubt side of the channel:
     ```
     DISPLAY CHSTATUS(name) SAVED CURLUWID
     ```
     You can use the CONNAME and XMITQ parameters to further identify the channel.
   - For the receiving side of the channel:
     ```
     DISPLAY CHSTATUS(name) SAVED LSTLUWID
     ```
     You can use the CONNAME parameter to further identify the channel.

   The commands are different because only the sending side of the channel can be in doubt. The receiving side is never in doubt.

   On WebSphere MQ for iSeries, the DISPLAY CHSTATUS command can be executed from a file using the STRMQMMQSC command or the Work with MQM Channel Status CL command, WRKMQMCHST
2. If the two LUWIDs are the same, the receiving side has committed the unit of work that the sender considers to be in doubt. The sending side can now remove the in-doubt messages from the transmission queue and re-enable it. This is done with the following channel RESOLVE command:
   ```
   RESOLVE CHANNEL(name) ACTION(COMMIT)
   ```
3. If the two LUWIDs are different, the receiving side has not committed the unit of work that the sender considers to be in doubt. The sending side needs to retain the in-doubt messages on the transmission queue and re-send them. This is done with the following channel RESOLVE command:
   ```
   RESOLVE CHANNEL(name) ACTION(BACKOUT)
   ```
   On WebSphere MQ for iSeries, you can use the Resolve MQM Channel command, RSVMQMCHL.

Once this process is complete the channel is no longer in doubt. The transmission queue can now be used by another channel, if required.

Problem determination

There are two distinct aspects to problem determination:
- Problems discovered when a command is being submitted
- Problems discovered during operation of the channels

Command validation

Commands and panel data must be free from errors before they are accepted for processing. Any errors found by the validation are immediately notified to the user by error messages.

Problem diagnosis begins with the interpretation of these error messages and taking the recommended corrective action.

Processing problems

Problems found during normal operation of the channels are notified to the system console or the system log. Problem diagnosis begins with the collection of all relevant information from the log, and continues with analysis to identify the problem.

Confirmation and error messages are returned to the terminal that initiated the commands, when possible.

Messages and codes

Where provided, the *Messages and Codes* manual of the particular platform can help with the primary diagnosis of the problem.

What happens when a message cannot be delivered?

Figure 31 shows the processing that occurs when an MCA is unable to put a message to the destination queue. (Note that the options shown do not apply on all platforms.)

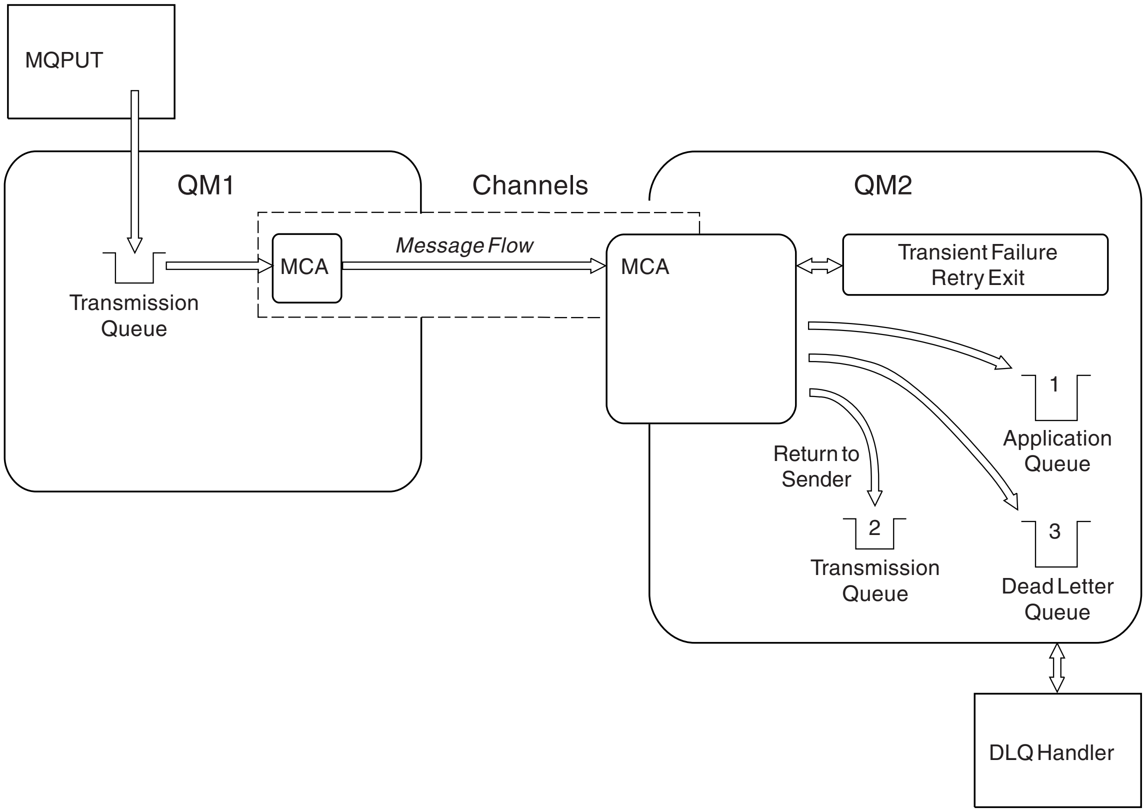

Figure 31. What happens when a message cannot be delivered

As shown in the figure, the MCA can do several things with a message that it cannot deliver. The action taken is determined by options specified when the channel is defined and on the MQPUT report options for the message.

1. Message-retry
If the MCA is unable to put a message to the target queue for a reason that could be transitory (for example, because the queue is full), the MCA has the option to wait and retry the operation later. You can determine if the MCA waits, for how long, and how many times it retries.

- You can specify a message-retry time and interval for MQPUT errors when you define your channel. If the message cannot be put to the destination queue because the queue is full, or is inhibited for puts, the MCA retries the operation the number of times specified, at the time interval specified.
- You can write your own message-retry exit. The exit enables you to specify under what conditions you want the MCA to retry the MQPUT or MQOPEN operation. Specify the name of the exit when you define the channel.

Message-retry is not available on WebSphere MQ for z/OS, or MQSeries for VSE/ESA.

2. Return-to-sender

If message-retry was unsuccessful, or a different type of error was encountered, the MCA can send the message back to the originator.

To enable this, you need to specify the following options in the message descriptor when you put the message to the original queue:
- The MQRO_EXCEPTION_WITH_FULL_DATA report option
- The MQRO_DISCARD_MSG report option
- The name of the reply-to queue and reply-to queue manager

If the MCA is unable to put the message to the destination queue, it generates an exception report containing the original message, and puts it on a transmission queue to be sent to the reply-to queue specified in the original message. (If the reply-to queue is on the same queue manager as the MCA, the message is put directly to that queue, not to a transmission queue.)

Return-to-sender is not available on MQSeries for VSE/ESA.

3. Dead-letter queue

If a message cannot be delivered or returned, it is put on to the dead-letter queue (DLQ). You can use the DLQ handler to process the message. This is described in the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, and in the *WebSphere MQ for z/OS System Administration Guide* for z/OS.

If the dead-letter queue is not available, the sending MCA leaves the message on the transmission queue, and the channel stops. On a fast channel, nonpersistent messages that cannot be written to a dead-letter queue are lost.

On WebSphere MQ Version 5 products, if no local dead-letter queue is defined, the remote queue is not available or defined, and there is no remote dead-letter queue, the channel stops abnormally, and messages are not rolled back to the sending transmission queue. You must resolve the channel using the COMMIT or BACKOUT functions.

Initialization and configuration files

The handling of channel initialization data depends on your WebSphere MQ platform.

z/OS without CICS

In WebSphere MQ for z/OS without CICS, initialization and configuration information is in the channel initiator parameter module CSQXPARM. You can also put commands in the CSQINPX initialization input data set, which is processed every time you start the channel initiator if you specify the optional DD statement CSQINPX in the channel initiator started task procedure. See *WebSphere MQ for z/OS Concepts and Planning Guide* for information about both of these.

z/OS using CICS

In WebSphere MQ for z/OS using CICS there is no channel initiator.

Windows systems

On WebSphere MQ for Windows systems, the *registry* file holds basic configuration information about the WebSphere MQ installation. That is, information relevant to all of the queue managers on the WebSphere MQ system and also information relating to individual queue managers.

OS/2, Compaq OpenVMS Alpha, Compaq NonStop Kernel, OS/400, and UNIX systems

On MQSeries for OS/2 Warp, MQSeries for Compaq OpenVMS Alpha, Compaq NonStop Kernel, and WebSphere MQ for iSeries and WebSphere MQ on UNIX systems, there are *configuration files* to hold basic configuration information about the WebSphere MQ installation.

There are two configuration files: one applies to the machine, the other applies to an individual queue manager.

WebSphere MQ configuration file

This holds information relevant to all of the queue managers on the WebSphere MQ system. The file is called MQSINI on Compaq NonStop Kernel and mqs.ini on other platforms. It is fully described in the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, HP-UX, and Solaris, and MQSeries for OS/2 Warp, and in the *WebSphere MQ for iSeries V5.3 System Administration Guide* book for WebSphere MQ for iSeries.

Queue manager configuration file

The queue manager configuration file holds configuration information relating to one particular queue manager. The file is called QMINI on Compaq NonStop Kernel, and qm.ini on other platforms.

It is created during queue manager creation and may hold configuration information relevant to any aspect of the queue manager. Information held in the file includes details of how the configuration of the log differs from the default in WebSphere MQ configuration file.

The queue manager configuration file is held in the root of the directory tree occupied by the queue manager. On WebSphere MQ for Windows, the information is held in the registry. For example, for the DefaultPath attributes, the queue manager configuration files for a queue manager called QMNAME would be:

For OS/2:

```
c:\mqm\qmgrs\QMNAME\qm.ini
```

For UNIX systems:

```
/var/mqm/qmgrs/QMNAME/qm.ini
```

For Compaq OpenVMS Alpha:

```
mqs_root:[mqm.qmgrs.QMNAME]qm.ini
```

For Compaq NonStop Kernel:

The file is held in the subvolume of the queue manager. For example, the path and name for a configuration file for a queue manager called QMNAME could be $VOLUME.QMNAMED.QMINI.

An excerpt of a qm.ini file follows. It specifies that the TCP/IP listener is to listen on port 2500, the maximum number of current channels is to be 200 and the maximum number of active channels is to be 100.

```
TCP:
  Port=2500
CHANNELS:
  MaxChannels=200
  MaxActiveChannels=100
```

In MQSeries V5.2 and WebSphere MQ, you can specify a range of TCP/IP ports to be used by an outbound channel. One method is to use the qm.ini file to specify the start and end of a range of port values. The example below shows a qm.ini file specifying a range of channels:

```
TCP:
  StrPort=2500
  EndPort=3000
CHANNELS:
  MaxChannels=200
  MaxActiveChannels=100
```

If you specify a value for StrPort or EndPort then you must specify a value for both. The value of EndPort must always be greater than the value of StrPort.

The channel tries to use each of the port values in the range specified. When the connection is successful, the port value is the port that the channel then uses.

Note: For Compaq NonStop Kernel, the format of the qm.ini file is slightly different. For more details about this, see the *MQSeries for Compaq NonStop Kernel System Administration*.

For OS/400:

```
/QIBM/UserData/mqm/qmgrs/QMNAME/qm.ini
```

For more information about qm.ini files see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

VSE/ESA

There is no qm.ini file on VSE/ESA. Instead, use the Configuration main menu on the MQMMCFG panel to configure the queue manager.

Data conversion

A WebSphere MQ message consists of two parts:
- Control information in a message descriptor
- Application data

Data conversion

Either of the two parts may require data conversion when sent between queues on different queue managers. For information about data conversion, see the *WebSphere MQ Application Programming Guide*.

Writing your own message channel agents

WebSphere MQ products allow you to write your own message channel agent (MCA) programs or to install one from an independent software vendor. You might want to do this to make a WebSphere MQ product interoperate over your own, proprietary communications protocol or to send messages over a protocol that WebSphere MQ does not support. (You cannot write your own MCA to interoperate with a WebSphere MQ-supplied MCA at the other end.)

If you decide to use an MCA that was not supplied by WebSphere MQ, you need to consider the following.

Message sending and receiving

You need to write a sending application that gets messages from wherever your application puts them, for example from a transmission queue (see the *WebSphere MQ Application Programming Reference* book), and sends them out on a protocol with which you want to communicate. You also need to write a receiving application that takes messages from this protocol and puts them onto destination queues. The sending and receiving applications use the message queue interface (MQI) calls, not any special interfaces.

You need to ensure that messages are delivered once and once only. Syncpoint coordination can be used to help with this.

Channel control function

You need to provide your own administration functions to control channels. You cannot use WebSphere MQ channel administration functions either for configuring (for example, the DEFINE CHANNEL command) or monitoring (for example, DISPLAY CHSTATUS) your channels.

Initialization file

You need to provide your own initialization file, if you require one.

Application data conversion

You will probably want to allow for data conversion for messages you send to a different system. If so, use the MQGMO_CONVERT option on the MQGET call when retrieving messages from wherever your application puts them, for example the transmission queue.

User exits

Consider whether you need user exits. If so, you can use the same interface definitions that WebSphere MQ uses.

Triggering

If your application puts messages to a transmission queue, you can set up the transmission queue attributes so that your sending MCA is triggered when messages arrive on the queue.

Channel initiator

You may need to provide your own channel initiator.

Chapter 6. Channel attributes

The previous chapters have introduced the basic concepts of the product, the business perspective basis of its design, its implementation, and the control features.

This chapter describes the channel attributes held in the channel definitions. This is product-sensitive programming interface information.

You choose the attributes of a channel to be optimal for a given set of circumstances for each channel. However, when the channel is running, the actual values may have changed during startup negotiations. See "Preparing channels" on page 60.

Many attributes have default values, and you can use these for most channels. However, in those circumstances where the defaults are not optimal, refer to this chapter for guidance in selecting the correct values.

Note: In WebSphere MQ for iSeries, most parameters can be specified as `*SYSDFTCHL`, which means that the value is taken from the system default channel in your system.

Channel attributes and channel types

The channel types for WebSphere MQ channel attributes are listed in Table 7.

Note: The only channel type supported on the reduced function form of WebSphere MQ for z/OS supplied with WebSphere Application Server is SVRCONN.

Table 7. Channel attributes for the channel types

Attribute field	**SDR**	**SVR**	**RCVR**	**RQSTR**	**CLNT-CONN**	**SVR-CONN**	**CLUS-SDR**	**CLUS-RCVR**
Batch heartbeat interval	✓	✓					✓	✓
Batch interval	✓	✓					✓	✓
Batch size	✓	✓	✓	✓			✓	✓
Channel name	✓	✓	✓	✓	✓	✓	✓	✓
Cluster							✓	✓
Cluster namelist							✓	✓
Channel type	✓	✓	✓	✓	✓	✓	✓	✓
Connection name	✓	✓		✓	✓		✓	✓
Convert message	✓	✓					✓	✓
Description	✓	✓	✓	✓	✓	✓	✓	✓
Disconnect interval	✓	✓					✓	✓
Heartbeat interval	✓	✓	✓	✓	✓	✓	✓	✓
Keepalive interval	✓	✓	✓	✓	✓	✓	✓	✓
Local address	✓	✓		✓	✓		✓	✓

Table 7. Channel attributes for the channel types (continued)

Attribute field	**SDR**	**SVR**	**RCVR**	**RQSTR**	**CLNT-CONN**	**SVR-CONN**	**CLUS-SDR**	**CLUS-RCVR**
Long retry count	✓	✓					✓	✓
Long retry interval	✓	✓					✓	✓
LU 6.2 Transaction program name	✓	✓		✓	✓		✓	✓
Maximum message length	✓	✓	✓	✓			✓	✓
Message channel agent type	✓	✓		✓	✓		✓	✓
Message channel agent user	✓	✓	✓	✓	✓	✓	✓	✓
Message exit name	✓	✓	✓	✓			✓	✓
Message exit user data	✓	✓	✓	✓			✓	✓
Message-retry exit name			✓	✓			✓	✓
Message-retry exit user data			✓	✓			✓	✓
Message retry count			✓	✓			✓	✓
Message retry interval			✓	✓			✓	✓
Mode name	✓	✓		✓	✓		✓	✓
Network-connection priority							✓	✓
Nonpersistent message speed	✓	✓	✓	✓			✓	✓
Password	✓	✓		✓	✓		✓	
PUT authority			✓	✓				✓
Queue manager name					✓			
Receive exit	✓	✓	✓	✓	✓	✓	✓	✓
Receive exit user data	✓	✓	✓	✓	✓	✓	✓	✓
Security exit	✓	✓	✓	✓	✓	✓	✓	✓
Security exit user data	✓	✓	✓	✓	✓	✓	✓	✓
Send exit	✓	✓	✓	✓	✓	✓		✓
Send exit user data	✓	✓	✓	✓	✓	✓	✓	✓
Sequence number wrap	✓	✓	✓	✓			✓	✓
Short retry interval	✓	✓					✓	✓
Short retry count	✓	✓					✓	✓
SSL Cipher Specification	✓	✓	✓	✓	✓	✓	✓	✓
SSL Client Authentication		✓	✓	✓		✓		✓
SSL Peer	✓	✓	✓	✓	✓	✓	✓	✓
Transport type	✓	✓		✓	✓		✓	✓

Table 7. Channel attributes for the channel types (continued)

Attribute field	SDR	SVR	RCVR	RQSTR	CLNT-CONN	SVR-CONN	CLUS-SDR	CLUS-RCVR
Transmission queue	✓	✓						
User ID	✓	✓		✓	✓		✓	

Channel attributes in alphabetical order

WebSphere MQ for some platforms may not implement all the attributes shown in the list. Exceptions and platform differences are mentioned in the individual attribute descriptions, where relevant.

The keyword that you can specify in MQSC is shown in brackets for each attribute. (Attributes that apply only to WebSphere MQ for z/OS with CICS do not have MQSC keywords.)

The attributes are arranged in alphabetical order, as follows:

Attribute	See page...
Auto start (AUTOSTART)	80
Alter date (ALTDATE)	80
Alter time (ALTTIME)	80
Batch Heartbeat Interval (BATCHHB)	80
Batch interval (BATCHINT)	81
Batch size (BATCHSZ)	81
Channel name (CHANNEL)	82
Channel type (CHLTYPE)	83
CICS profile name	83
Cluster (CLUSTER)	84
Cluster namelist (CLUSNL)	84
Connection name (CONNAME)	84
Convert message (CONVERT)	86
Description (DESCR)	86
Disconnect interval (DISCINT)	87
KeepAlive Interval (KAINT)	92
Local Address (LOCLADDR)	88
Long retry count (LONGRTY)	88
Long retry count (LONGRTY)	88
Long retry interval (LONGTMR)	89
LU 6.2 mode name (MODENAME)	89
LU 6.2 transaction program name (TPNAME)	89
Maximum message length (MAXMSGL)	90
Maximum transmission size	91
Message channel agent name (MCANAME)	91
Message channel agent type (MCATYPE)	91
Message channel agent user identifier (MCAUSER)	92
Message exit name (MSGEXIT)	92
Message exit user data (MSGDATA)	92
Message-retry exit name (MREXIT)	92
Message-retry exit user data (MRDATA)	92
Message retry count (MRRTY)	93
Message retry interval (MRTMR)	93
Nonpersistent message speed (NPMSPEED)	93

Channel attributes

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Alter date (ALTDATE)

This is the date on which the definition was last altered, in the form `yyyy-mm-dd`.

This parameter is supported on AIX, HP-UX, Linux, OS/2 Warp, z/OS, OS/400, Solaris, and Windows systems only.

Alter time (ALTTIME)

This is the time at which the definition was last altered, in the form `hh:mm:ss`.

This parameter is supported on AIX, HP-UX, Linux, OS/2 Warp, z/OS, OS/400, Solaris, and Windows systems only.

Auto start (AUTOSTART)

In MQSeries for Compaq NonStop Kernel there is no SNA listener process. Each channel initiated from a remote system must have its own, unique TP name on which it can listen. Such channels must be defined to MQSC with the attribute AUTOSTART(ENABLED) to ensure that there is an LU 6.2 responder process listening on this TP name whenever the queue manager is started.

SNA channels defined AUTOSTART(DISABLED) do not listen for incoming SNA requests. LU 6.2 responder processes are not started for such channels.

Batch Heartbeat Interval (BATCHHB)

The batch heartbeat interval allows a sending channel to verify that the receiving channel is still active just before committing a batch of messages, so that if the receiving channel is not active, the batch can be backed out rather than becoming in-doubt, as would otherwise be the case. By backing out the batch, the messages remain available for processing so they could, for example, be redirected to another channel.

If the sending channel has had a communication from the receiving channel within the batch heartbeat interval, the receiving channel is assumed to be still active, otherwise a ’heartbeat’ is sent to the receiving channel to check.

The value must be in the range zero through 999 999. A value of zero indicates that batch heartbeating is not used.

This parameter is valid for the following channel types:
- Sender
- Server
- Cluster sender
- Cluster receiver

Batch interval (BATCHINT)

WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, and WebSphere MQ for z/OS without CICS, you can specify a period of time, in milliseconds, during which the channel will keep a batch open even if there are no messages on the transmission queue. You can specify any number of milliseconds, from zero through 999 999 999. The default value is zero.

If you do not specify a batch interval, the batch closes when the number of messages specified in BATCHSZ has been sent or when the transmission queue becomes empty. On lightly loaded channels, where the transmission queue frequently becomes empty the effective batch size may be much smaller than BATCHSZ.

You can use the BATCHINT attribute to make your channels more efficient by reducing the number of short batches. Be aware, however, that you may slow down the response time, because batches will last longer and messages will remain uncommitted for longer.

If you specify a BATCHINT, batches close only when one of the following conditions is met:
- The number of messages specified in BATCHSZ have been sent.
- There are no more messages on the transmission queue and a time interval of BATCHINT has elapsed while waiting for messages (since the first message of the batch was retrieved).

Note: BATCHINT specifies the total amount of time that is spent waiting for messages. It does not include the time spent retrieving messages that are already available on the transmission queue, or the time spent transferring messages.

This attribute applies only to sender, cluster-sender, server, and cluster-receiver channels.

Batch size (BATCHSZ)

The batch size is the maximum number of messages to be sent before a syncpoint is taken. The batch size does not affect the way the channel transfers messages; messages are always transferred individually, but are committed or backed out as a batch.

Batch size (BATCHSZ)

To improve performance, you can set a batch size to define the maximum number of messages to be transferred between two *syncpoints*. The batch size to be used is negotiated when a channel starts up, and the lower of the two channel definitions is taken. On some implementations, the batch size is calculated from the lowest of the two channel definitions and the two queue manager MAXUMSGS values. The actual size of a batch can be less than this; for example, a batch completes when there are no messages left on the transmission queue or the batch interval expires.

A large value for the batch size increases throughput, but recovery times are increased because there are more messages to back out and re-send. The default BATCHSZ is 50, and you are advised to try that value first. You might choose a lower value for BATCHSZ if your communications are unreliable, making the need to recover more likely.

Syncpoint procedure needs a unique logical unit of work identifier to be exchanged across the link every time a syncpoint is taken, to coordinate batch commit procedures.

If the synchronized batch commit procedure is interrupted, an *in-doubt* situation may arise. In-doubt situations are resolved automatically when a message channel starts up. If this resolution is not successful, manual intervention may be necessary, making use of the RESOLVE command.

Some considerations when choosing the number for batch size:

- If the number is too large, the amount of queue space taken up on both ends of the link becomes excessive. Messages take up queue space when they are not committed, and cannot be removed from queues until they are committed.
- If there is likely to be a steady flow of messages, you can improve the performance of a channel by increasing the batch size. However, this has the negative effect of increasing restart times, and very large batches may also affect performance.
- If message flow characteristics indicate that messages arrive intermittently, a batch size of 1 with a relatively large disconnect time interval may provide a better performance.
- The number may be in the range 1 through 9999. However, for data integrity reasons, channels connecting to any of the current platforms, as described in this book, should specify a batch size greater than 1. (A value of 1 is for use with Version 1 products, apart from MQSeries for MVS/ESA.)

  For z/OS using CICS it must also be at least 3 less than the value set by the ALTER QMGR MAXUMSGS command.
- Even though nonpersistent messages on a fast channel do not wait for a syncpoint, they do contribute to the batch-size count.

Channel name (CHANNEL)

Specifies the name of the channel definition. The name can contain up to 20 characters, although as both ends of a message channel must have the same name, and other implementations may have restrictions on the size, the actual number of characters may have to be smaller.

Where possible, channel names should be unique to one channel between any two queue managers in a network of interconnected queue managers.

The name must contain characters from the following list:

Alphabetic	(A-Z, a-z; note that uppercase and lowercase are significant)
Numerics	(0-9)
Period	(.)
Forward slash	(/)
Underscore	(_)
Percentage sign	(%)

Notes:

1. Embedded blanks are not allowed, and leading blanks are ignored.
2. On systems using EBCDIC Katakana, you cannot use lowercase characters.

Channel type (CHLTYPE)

Specifies the type of the channel being defined. The possible channel types are:

Message channel types:

- Sender
- Server (not MQSeries for VSE/ESA)
- Cluster-sender (WebSphere MQ for z/OS without CICS, WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and OS/2 only)
- Receiver
- Requester (not MQSeries for VSE/ESA)
- Cluster-receiver (WebSphere MQ for z/OS without CICS, WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and OS/2 only)

MQI channel types:

- Client-connection (MQSeries for OS/2 Warp, Compaq OpenVMS Alpha, Compaq NonStop Kernel, VSE/ESA, DOS, Windows 3.1, Windows 95, and Windows 98 only, and WebSphere MQ for Windows systems, and UNIX systems only)

  Note: Client-connection channels can also be defined on z/OS and Compaq NonStop Kernel for use on other platforms.
- Server-connection (not WebSphere MQ for z/OS using CICS)

The two ends of a channel must have the same name and have compatible types:

- Sender with receiver
- Requester with server
- Requester with sender (for Call_back)
- Server with receiver (server is used as a sender)
- Client-connection with server-connection
- Cluster-sender with cluster-receiver

CICS profile name

This is for z/OS using CICS only, to give extra definition for the session characteristics of the connection when CICS performs a communication session allocation, for example to select a particular COS.

CICS profile name

The name must be known to CICS and be one to eight alphanumeric characters long.

Cluster (CLUSTER)

The name of the cluster to which the channel belongs. The maximum length is 48 characters conforming to the rules for naming WebSphere MQ objects.

This parameter is valid only for cluster-sender and cluster-receiver channels. Up to one of the resultant values of CLUSTER or CLUSNL can be nonblank. If one of the values is nonblank, the other must be blank.

This parameter is supported on AIX, HP-UX, Linux, OS/2 Warp, z/OS without CICS, OS/400, Solaris, and Windows systems only.

Cluster namelist (CLUSNL)

The name of the namelist that specifies a list of clusters to which the channel belongs.

This parameter is valid only for cluster-sender and cluster-receiver channels. Up to one of the resultant values of CLUSTER or CLUSNL can be nonblank. If one of the values is nonblank, the other must be blank.

This parameter is supported on AIX, HP-UX, Linux, OS/2 Warp, z/OS without CICS, OS/400, Solaris, and Windows systems only.

Connection name (CONNAME)

This is the communications connection identifier. It specifies the particular communications link to be used by this channel.

This attribute is required for sender channels, cluster-sender channels, cluster-receiver channels, requester channels, and client-connection channels. It does not apply to receiver or server-connection channel types.

It is optional for server channels, except on z/OS using CICS where it is required in the channel definition, but is ignored unless the server is initiating the conversation.

For z/OS using CICS this attribute names the CICS communication connection identifier for the session to be used for this channel. The name is one to four alphanumeric characters long.

Otherwise, the name is up to 48 characters for z/OS, 264 characters for other platforms, and:

If the transport type is TCP

This is either the hostname or the network address of the remote machine (or the local machine for cluster-receiver channels). For example, (`MACH1.ABC.COM`) or (`19.22.11.162`). It may include the port number, for example (`MACHINE(123)`). It can include the IP_name of a z/OS dynamic DNS group or a network dispatcher input port.

If the transport type is UDP

For WebSphere MQ for AIX only, UDP is an alternative to TCP. As with TCP/IP, it is either the hostname or the network address of the remote machine.

If the transport type is LU 6.2

For MQSeries for OS/2, and WebSphere MQ for iSeries, Windows systems, and UNIX systems, give the fully-qualified name of the partner LU if the TPNAME and MODENAME are specified. For other versions or if the TPNAME and MODENAME are blank, give the CPI-C side information object name as described in the section in this book about setting up communication for your platform.

On z/OS there are two forms in which to specify the value:

- Logical unit name

  The logical unit information for the queue manager, comprising the logical unit name, TP name, and optional mode name. This can be specified in one of 3 forms:

  luname, for example `IGY12355`

  luname/TPname, for example `IGY12345/APING`

  luname/TPname/modename, for example `IGY12345/APINGD/#INTER`

  For the first form, the TP name and mode name must be specified for the TPNAME and MODENAME attributes ; otherwise these attributes must be blank.

  Note: For client-connection channels, only the first form is allowed.
- Symbolic name

  The symbolic destination name for the logical unit information for the queue manager, as defined in the side information data set. The TPNAME and MODENAME attributes must be blank.

  Note: For cluster-receiver channels, the side information is on the other queue managers in the cluster. Alternatively, in this case it can be a name that a channel auto-definition exit can resolve into the appropriate logical unit information for the local queue manager.

The specified or implied LU name can be that of a VTAM® generic resources group.

For Compaq OpenVMS Alpha, specify the Gateway Node name, the Access Name to the channel program, and the TPNAME used to invoke the remote program. For example: `CONNAME('SNAGWY.VMSREQUESTER(HOSTVR)')`.

For Compaq NonStop Kernel, the value depends on whether SNAX or ICE is used; see Chapter 21, “Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1”, on page 349.

If the transmission protocol is NetBIOS

This is the NetBIOS name defined on the remote machine.

If the transmission protocol is SPX

This is an SPX-style address consisting of a 4-byte network address, a 6-byte node address and a 2-byte socket number. Enter these in hexadecimal, with the network and node addresses separated by a fullstop and the socket number in brackets. For example:

```
CONNAME('0a0b0c0d.804abcde23a1(5e86)')
```

If the socket number is omitted, the default WebSphere MQ SPX socket number is used. The default is X'5E86'.

Connection name (CONNAME)

Note: The definition of transmission protocol is contained in "Transport type (TRPTYPE)" on page 100.

Convert message (CONVERT)

Application message data is usually converted by the receiving application. However, if the remote queue manager is on a platform that does not support data conversion, use this channel attribute to specify that the message should be converted into the format required by the receiving system ***before*** transmission.

This attribute applies only to sender, cluster-sender, server, and cluster-receiver channels and does not apply to WebSphere MQ for z/OS with CICS.

The possible values are 'yes' and 'no'. If you specify 'yes', the application data in the message is converted before sending if you have specified one of the built-in format names, or a data conversion exit is available for a user-defined format (See the *WebSphere MQ Application Programming Guide*). If you specify 'no', the application data in the message is not converted before sending.

Description (DESCR)

This contains up to 64 bytes of text that describes the channel definition.

Note: The maximum number of characters is reduced if the system is using a double byte character set (DBCS).

Use characters from the character set identified by the coded character set identifier (CCSID) for the queue manager to ensure that the text is translated correctly if it is sent to another queue manager.

Disconnect interval (DISCINT)

This is a time-out attribute, specified in seconds, for the server, cluster-sender, sender, and cluster-receiver channels. The interval is measured from the point at which a batch ends, that is when the batch size is reached or when the batch interval expires and the transmission queue becomes empty. If no messages arrive on the transmission queue during the specified time interval, the channel closes down. (The time is approximate.)

The close-down exchange of control data between the two ends of the channel includes an indication of the reason for closing. This ensures that the corresponding end of the channel remains available to start up again.

On all platforms except z/OS with CICS, you can specify any number of seconds from zero through 999 999 where a value of zero means no disconnect; wait indefinitely.

In z/OS using CICS, you can specify any number of seconds from zero through 9999 where a value of zero means disconnect as soon as the transmission queue is empty.

Note: Performance is affected by the value specified for the disconnect interval.

A very low value (a few seconds) may cause excessive overhead in constantly starting up the channel. A very large value (more than an hour) could mean that system resources are unnecessarily held up. For WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and

MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, and for WebSphere MQ for z/OS without CICS, you can also specify a heartbeat interval, so that when there are no messages on the transmission queue, the sending MCA will send a heartbeat flow to the receiving MCA, thus giving the receiving MCA an opportunity to quiesce the channel without waiting for the disconnect interval to expire. For these two values to work together effectively, the heartbeat interval value must be significantly lower than the disconnect interval value.

A value for the disconnect interval of a few minutes is a reasonable value to use. Change this value only if you understand the implications for performance, and you need a different value for the requirements of the traffic flowing down your channels.

For more information, see “Stopping and quiescing channels” on page 68.

Heartbeat interval (HBINT)

This attribute applies to WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, and for WebSphere MQ for z/OS without CICS. You can specify the approximate time between heartbeat flows that are to be passed from a sending MCA when there are no messages on the transmission queue. Heartbeat flows unblock the receiving MCA, which is waiting for messages to arrive or for the disconnect interval to expire. When the receiving MCA is unblocked it can disconnect the channel without waiting for the disconnect interval to expire. Heartbeat flows also free any storage buffers that have been allocated for large messages and close any queues that have been left open at the receiving end of the channel.

The value is in seconds and must be in the range 0 through 999 999. A value of zero means that no heartbeat flows are to be sent. The default value is 300. To be most useful, the value should be significantly less than the disconnect interval value.

This attribute is valid for sender, cluster-sender, server, receiver, cluster-receiver, and requester channels. Other than on z/OS and OS/400, it also applies to server-connection and client-connection channels. On these channels, heartbeats flow when a server MCA has issued an MQGET command with the WAIT option on behalf of a client application.

KeepAlive Interval (KAINT)

The KeepAlive Interval parameter is used to specify a time-out value for a channel.

The KeepAlive Interval parameter is a value passed to the communications stack specifying the KeepAlive timing for the channel. It allows you to specify a different keepalive value for each channel.

The value indicates a time, in seconds, and must be in the range 0 to 99999. A KeepAlive value of 0 indicates that channel KeepAlive is not enabled for the channel. When the KeepAlive Interval is set to 0, keepalive still occurs if a value has been specified for TCP/IP keepalive. On z/OS, this occurs when the TCPKEEP=YES parameter is specified in CSQ6CHIP. On other platforms, it occurs when the KEEPALIVE=YES parameter is specified in the TCP stanza in the distributed queuing configuration file.

KeepAlive Interval (KAINT)

You can also set KAINT to a value of AUTO. If KAINT is set to AUTO, the keepalive value is based on the value of the negotiated HBINT as follows:

Table 8. Negotiated HBINT value and the corresponding KAINT value

Negotiated HBINT	KAINT
>0	Negotiated HBINT + 60 seconds
0	0

This parameter is valid for all channel types. The value is ignored for all channels that have a TransportType (TRPTYPE) other than TCP or SPX

KAINT is only available on WebSphere MQ for z/OS.

Local Address (LOCLADDR)

This parameter specifies the local communications address for the channel. When a LOCLADDR value is specified, a channel that is stopped and then restarted continues to use the TCP/IP address specified in LOCLADDR. In recovery scenarios, this could be useful when the channel is communicating through a firewall, because it removes problems caused by the channel restarting with a different IP address, specified by the TCP/IP stack to which it is connected.

This parameter is valid for the following channel types:

- Sender
- Server
- Requester
- Client-connection
- Cluster-receiver
- Cluster-sender

The value used is the optional IP address and optional port or port range to be used for outbound TCP/IP communications. The format is as follows:

```
LOCLADDR([ip-addr][(low-port[,high-port])])
```

where "ip-addr" is specified in dotted alphanumeric or decimal form, for example, `(MACH1.ABC.COM)` or `(19.22.11.162)`, and "low-port" and "high-port" are port numbers enclosed in parentheses. When two port values are specified, the channel binds to the address specified, using an available port within the range covered by the two port values. All values are optional.

The maximum length of the string is MQ_LOCAL_ADDRESS_LENGTH.

Note: If the LOCLADDR port is in use, TCP/IP requires a time period to release the previously used port. If enough time is not left, and if only 1 LOCLADDR port is specified, the previously used port will not be available and so a random port will be chosen rather than the LOCLADDR port.

Long retry count (LONGRTY)

Specify the maximum number of times that the channel is to try allocating a session to its partner. If the initial allocation attempt fails, the *`short retry count`* number is decremented and the channel retries the remaining number of times. If it still fails, it retries a *`long retry count`* number of times with an interval of *`long retry interval`* between each try. If it is still unsuccessful, the channel closes down. The channel must subsequently be restarted with a command (it is not started automatically by the channel initiator).

(Retry is not attempted if the cause of failure is such that a retry is not likely to be successful.)

If the channel initiator or queue manager stops while the channel is retrying, the *short retry count* and *long retry count* are reset when the channel initiator or queue manager is restarted.

The *long retry count* attribute is valid only for channel types of sender, cluster-sender, server, and cluster-receiver. It is also valid for requester channels on z/OS if you are using CICS. It may be set from zero through 999 999 999. On z/OS using CICS, it may be set from zero through 999, and the long and short retries have the same count.

Note: For OS/2, OS/400, UNIX systems, and Windows systems, in order for retry to be attempted a channel initiator must be running. The channel initiator must be monitoring the initiation queue specified in the transmission queue that the channel is using.

Long retry interval (LONGTMR)

The approximate interval in seconds that the channel is to wait before retrying to establish connection, during the long retry mode.

The interval between retries may be extended if the channel has to wait to become active.

The channel tries to connect `long retry count` number of times at this long interval, after trying the `short retry count` number of times at the short retry interval.

This is valid only for channel types of sender, cluster-sender, server, and cluster-receiver. It is also valid for requester channels on z/OS if you are using CICS. It may be set from zero through 999 999. On z/OS using CICS, it may be set from zero through 999.

LU 6.2 mode name (MODENAME)

This is for use with LU 6.2 connections. It gives extra definition for the session characteristics of the connection when a communication session allocation is performed.

When using side information for SNA communications, the mode name is defined in the CPI-C Communications Side Object or APPC side information and this attribute should be left blank; otherwise, it should be set to the SNA mode name.

The name must be one to eight alphanumeric characters long.

It is not valid for receiver or server-connection channels.

LU 6.2 transaction program name (TPNAME)

This is for use with LU 6.2 connections. It is the name, or generic name, of the transaction program (MCA) to be run at the far end of the link.

LU 6.2 transaction program name (TPNAME)

When using side information for SNA communications, the transaction program name is defined in the CPI-C Communications Side Object or APPC side information and this attribute should be left blank. Otherwise, this name is required by sender channels and requester channels except on z/OS using CICS where it is required in the channel definition but is ignored unless the server is initiating the conversation.

On platforms other than Compaq NonStop Kernel, the name can be up to 64 characters long. See Chapter 21, “Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1”, on page 349 for more information about that platform.

If the remote system is WebSphere MQ for z/OS using CICS, the transaction is:
- CKRC when you are defining a sender channel, or a server channel that acts as a sender
- CKSV when you are defining a requester channel of a requester-server pair
- CKRC when you are defining a requester channel of a requester-sender pair

On other platforms, this should be set to the SNA transaction program name, unless the CONNAME contains a side-object name in which case it should be set to blanks. The actual name is taken instead from the CPI-C Communications Side Object, or the APPC side information data set.

This information is set in a different way on other platforms; see the section in this book about setting up communication for your platform.

Maximum message length (MAXMSGL)

Specifies the maximum length of a message that can be transmitted on the channel.

On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq NonStop Kernel, Compaq OpenVMS Alpha, OS/2 Warp, and VSE/ESA, specify a value greater than or equal to zero, and less than or equal to the maximum message length for the queue manager. See the MAXMSGL parameter of the ALTER QMGR command in the *WebSphere MQ Script (MQSC) Command Reference* book for more information. On other platforms, specify a value greater than or equal to zero, and less than or equal to 4 194 304 bytes. On WebSphere MQ for z/OS, specify a value greater than or equal to zero, and less than or equal to 104 857 600 bytes.

Because various implementations of WebSphere MQ systems exist on different platforms, the size available for message processing may be limited in some applications. This number must reflect a size that your system can handle without stress. When a channel starts up, the lower of the two numbers at each end of the channel is taken.

Notes:
1. If splitting of messages is not supported at either end of a channel, the maximum message size cannot be greater than the negotiated maximum transmission size.
2. The IBM WebSphere MQ products that this edition of the book applies to all support message splitting. Other WebSphere MQ products do not support message splitting.
3. For a comparison of the functions available, including the different maximum message lengths available see the *WebSphere MQ Application Programming Guide*.

4. You may use a maximum message size of 0 which will be taken to mean that the size is to be set to the local queue manager maximum value.

Maximum transmission size

If you are using CICS for distributed queuing on z/OS, you can specify the maximum transmission size, in bytes, that your channel is allowed to use when transmitting a message, or part of a message. When a channel starts up, this value is negotiated between the sending and receiving channels and the lower of the two values is agreed. The maximum size is 32 000 bytes on TCP/IP, but the maximum usable size is 32 000 bytes less the message descriptor. On VSE/ESA, the maximum size is 64 000 bytes on SNA.

Use this facility to ensure that system resources are not exceeded by your channels. Set this value in conjunction with the maximum message size, remembering to allow for message descriptors. An error situation may be created if the message size is allowed to exceed the transmission size, and message splitting is not supported.

Notes:

1. If channel startup negotiation results in a size less than the minimum required for the local channel program, no messages can be transferred.

Message channel agent name (MCANAME)

This attribute is reserved and should not be used.

Message channel agent type (MCATYPE)

For WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for OS/2 Warp, this attribute can be specified as a *process* or a *thread*. This parameter is valid for channel types of sender, cluster-sender (on WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq OpenVMS Alpha, and OS/2 Warp), server, requester, or cluster-receiver. On WebSphere MQ for z/OS, it is supported only for channels with a channel type of cluster-receiver. On MQSeries for Compaq NonStop Kernel, channels are always started as processes whatever MCA type is specified.

Advantages of running as a process include:

- Isolation for each channel providing greater integrity
- Job authority specific for each channel
- Control over job scheduling

Advantages of threads include:

- Much reduced use of storage
- Easier configuration by typing on the command line
- Faster execution - it is quicker to start a thread than to instruct the operating system to start a process

For channel types of sender, server, and requester, the default is ‘process’. For channel types of cluster-sender and cluster-receiver, the default is ‘thread’. These defaults can change during your installation.

If you specify ‘process’ on the channel definition, a RUNMQCHL process is started. If you specify ‘thread’, the MCA runs on a thread of the RUNMQCHI process. On the machine that receives the inbound allocates, the MCA runs as a thread or process depending on whether you use inetd or RUNMQLSR.

Message channel agent user identifier (MCAUSER)

This is not valid for z/OS using CICS; it is not valid for channels of client-connection type.

This attribute is the user identifier (a string) to be used by the MCA for authorization to access WebSphere MQ resources, including (if PUT authority is DEF) authorization to put the message to the destination queue for receiver or requester channels.

On WebSphere MQ for Windows, the user identifier may be domain-qualified by using the format, `user@domain`, where the `domain` must be either the Windows systems domain of the local system or a trusted domain.

If this attribute is blank, the MCA uses its default user identifier.

Message exit name (MSGEXIT)

Specifies the name of the user exit program to be run by the channel message exit. On AIX, Compaq Tru64 UNIX, HP-UX, OS/400, Linux, OS/2 Warp, Solaris, Windows systems, and z/OS this can be a list of names of programs that are to be run in succession. Leave blank, if no channel message exit is in effect.

The format and maximum length of this attribute depend on the platform, as for "Receive exit name (RCVEXIT)" on page 95.

The message exit is not supported on client-connection or server-connection channels.

Message exit user data (MSGDATA)

Specifies user data that is passed to the channel message exits.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, you can run a sequence of message exits. The limitations on the user data length and an example of how to specify MSGDATA for more than one exit are as shown for RCVDATA. See "Receive exit user data (RCVDATA)" on page 96.

On other platforms the maximum length of the string is 32 characters.

Message-retry exit name (MREXIT)

Specifies the name of the user exit program to be run by the message-retry user exit. Leave blank if no message-retry exit program is in effect.

The format and maximum length of the name depend on the platform, as for "Receive exit name (RCVEXIT)" on page 95.

This parameter is only valid for receiver, cluster-receiver, and requester channels. It is not supported on WebSphere MQ for z/OS.

Message-retry exit user data (MRDATA)

This is passed to the channel message-retry exit when it is called.

This parameter is only valid for receiver, cluster-receiver, and requester channels. It is not supported on WebSphere MQ for z/OS.

Message retry count (MRRTY)

This is the number of times the channel will retry before it decides it cannot deliver the message.

This attribute controls the action of the MCA only if the message-retry exit name is blank. If the exit name is not blank, the value of MRRTY is passed to the exit for the exit's use, but the number of retries performed (if any) is controlled by the exit, and not by this attribute.

The value must be in the range 0 to 999 999 999. A value of zero means that no retries will be performed.

This parameter is only valid for receiver, cluster-receiver, and requester channels. It is not supported on WebSphere MQ for z/OS.

Message retry interval (MRTMR)

This is the minimum interval of time that must pass before the channel can retry the MQPUT operation. This time interval is in milliseconds.

This attribute controls the action of the MCA only if the message-retry exit name is blank. If the exit name is not blank, the value of MRTMR is passed to the exit for the exit's use, but the retry interval is controlled by the exit, and not by this attribute.

The value must be in the range 0 to 999 999 999. A value of zero means that the retry will be performed as soon as possible (provided that the value of MRRTY is greater than zero).

This parameter is only valid for receiver, cluster-receiver, and requester channels. It is not supported on WebSphere MQ for z/OS.

Network-connection priority (NETPRTY)

The priority for the network connection. Distributed queuing will choose the path with the highest priority if there are multiple paths available. The value must be in the range 0 through 9; 0 is the lowest priority.

This parameter is valid only for cluster-receiver channels.

This parameter is valid only on AIX, HP-UX, Linux, OS/2 Warp, z/OS without CICS, OS/400, Solaris, and Windows systems.

Nonpersistent message speed (NPMSPEED)

For WebSphere MQ for AIX, HP-UX, iSeries, Solaris and Windows systems, WebSphere MQ for z/OS without CICS, and MQSeries V5.1 for Compaq Tru64 UNIX and OS/2 Warp, you can specify the speed at which nonpersistent messages are to be sent. You can specify either 'normal' or 'fast'. The default is 'fast', which means that nonpersistent messages on a channel are not transferred within transactions. The advantage of this is that nonpersistent messages become available for retrieval far more quickly. The disadvantage is that because they are not part of a transaction, messages may be lost if there is a transmission failure or if the channel stops when the messages are in transit. See "Fast, nonpersistent messages" on page 22.

This attribute is valid for sender, cluster-sender, server, receiver, cluster-receiver, and requester channels.

Password (PASSWORD)

You can specify a password of maximum length 12 characters, although only the first 10 characters are used.

The password may be used by the MCA when attempting to initiate a secure LU 6.2 session with a remote MCA. It is valid for channel types of sender, server, requester, or client-connection.

This does not apply to WebSphere MQ for z/OS except for client-connection channels.

PUT authority (PUTAUT)

Use this attribute to choose the type of security processing to be carried out by the MCA when executing:

- An MQPUT command to the destination queue (for message channels) , or
- An MQI call (for MQI channels).

You can choose one of the following:

Process security, also called default authority (DEF)

The default user ID is used.

On platforms, with Process security, you choose to have the queue security based on the user ID that the process is running under. The user ID is that of the process, or user, running the MCA at the receiving end of the message channel.

The queues are opened with this user ID and the open option MQOO_SET_ALL_CONTEXT.

Context security (CTX)

The alternate user ID is used from the context information associated with the message.

The *UserIdentifier* in the message descriptor is moved into the *AlternateUserId* field in the object descriptor. The queue is opened with the open options MQOO_SET_ALL_CONTEXT and MQOO_ALTERNATE_USER_AUTHORITY.

Only Message Channel Agent security (ONLYMCA)

The default user ID is used.

On platforms, with ONLYMCA security, you choose to have the queue security based on the user ID that the process is running under. The user ID is that of the process, or user, running the MCA at the receiving end of the message channel.

The queues are opened with this user ID and the open option MQOO_SET_ALL_CONTEXT.

Alternate Message Channel Agent security (ALTMCA)

This is the same as for ONLYMCA security but allows you to use context.

This parameter is only valid for receiver, requester, cluster-receiver, and server-connection channels. Context security and alternate message channel agent security values are not supported on server-connection channels.

Further details about:

- Context fields and open options can be found in the *WebSphere MQ Application Programming Guide*.
- Security can be found in the *WebSphere MQ System Administration Guide* for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, or in the *MQSeries System Administration* book for your platform.

  Note: On WebSphere MQ for z/OS it is possible for two userids to be checked. Specific details of userids used by the channel initiator on z/OS can be found in the *WebSphere MQ for z/OS System Setup Guide* .

  .

Queue manager name (QMNAME)

This applies to a channel of client-connection type only. It is the name of the queue manager or queue manager group to which a WebSphere MQ client application can request connection.

Receive exit name (RCVEXIT)

Specifies the name of the user exit program to be run by the channel receive user exit. In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp this can be a list of names of programs that are to be run in succession. Leave blank, if no channel receive user exit is in effect.

The format and maximum length of this attribute depend on the platform:

- On z/OS it is a load module name, maximum length 8 characters, except for client-connection channels where the maximum length is 128 characters.
- On OS/400 it is of the form:

  ```
  libname/progname
  ```

  when specified in CL commands.

  When specified in WebSphere MQ Commands (MQSC) it has the form:

  ```
  progname libname
  ```

  where `progname` occupies the first 10 characters, and `libname` the second 10 characters (both blank-padded to the right if necessary). The maximum length of the string is 20 characters.
- On OS/2 and Windows it is of the form:

  ```
  dllname(functionname)
  ```

  where `dllname` is specified without the suffix ".DLL". The maximum length of the string is 40 characters.
- On UNIX systems, Compaq OpenVMS Alpha, and Compaq NonStop Kernel it is of the form:

  ```
  libraryname(functionname)
  ```

Receive exit name (RCVEXIT)

The maximum length of the string is 40 characters.

On AIX, Compaq Tru64 UNIX, Compaq OpenVMS Alpha, HP-UX, Linux, OS/400, OS/2 Warp, Solaris, Windows systems, and z/OS, you can specify a list of receive, send, or message exit program names. The names should be separated by a comma, a space, or both. For example:

```
RCVEXIT(exit1 exit2)
MSGEXIT(exit1,exit2)
SENDEXIT(exit1, exit2)
```

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, Windows systems, and z/OS, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, the total length of the string of exit names and strings of user data for a particular type of exit is limited to 500 characters. In WebSphere MQ for iSeries you can list up to 10 exit names. In WebSphere MQ for z/OS you can list up to eight exit names.

Receive exit user data (RCVDATA)

Specifies user data that is passed to the receive exit.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, z/OS, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp you can run a sequence of receive exits. The string of user data for a series of exits should be separated by a comma, spaces, or both. For example:

```
RCVDATA(exit1_data exit2_data)
MSGDATA(exit1_data,exit2_data)
SENDDATA(exit1_data, exit2_data)
```

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, the length of the string of exit names and strings of user data is limited to 500 characters. In WebSphere MQ for iSeries you can specify up to 10 exit names and the length of user data for each is limited to 32 characters. In WebSphere MQ for z/OS you can specify up to eight strings of user data each of length 32 characters.

On other platforms the maximum length of the string is 32 characters.

Security exit name (SCYEXIT)

Specifies the name of the exit program to be run by the channel security exit. Leave blank if no channel security exit is in effect.

The format and maximum length of the name depend on the platform, as for “Receive exit name (RCVEXIT)” on page 95.

Security exit user data (SCYDATA)

Specifies user data that is passed to the security exit. The maximum length is 32 characters.

Send exit name (SENDEXIT)

Specifies the name of the exit program to be run by the channel send exit. In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, z/OS, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, this can be a list of names of programs that are to be run in sequence. Leave blank if no channel send exit is in effect.

The format and maximum length of this attribute depend on the platform, as for "Receive exit name (RCVEXIT)" on page 95.

Send exit user data (SENDDATA)

Specifies user data that is passed to the send exit.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, z/OS, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, you can run a sequence of send exits. The limitations on the user data length and an example of how to specify SENDDATA for more than one exit, are as shown for RCVDATA. See "Receive exit user data (RCVDATA)" on page 96.

On other platforms the maximum length of the string is 32 characters.

Sequence number wrap (SEQWRAP)

This is the highest number the message sequence number reaches before it restarts at 1. In z/OS using CICS, this number is of interest only when sequential delivery of messages is selected. It is not valid for channel types of client-connection or server-connection.

The value of the number should be high enough to avoid a number being reissued while it is still being used by an earlier message. The two ends of a channel must have the same sequence number wrap value when a channel starts up; otherwise, an error occurs.

The value may be set from 100 through 999 999 999 (1 through 9 999 999 for z/OS using CICS).

Sequential delivery

This applies only to z/OS using CICS. Set this to 'YES' when using sequential numbering of messages. If one side of the channel requests this facility, it must be accepted by the other side.

There could be a performance penalty associated with the use of this option.

For other platforms, the MCA always uses message sequence numbering.

Short retry count (SHORTRTY)

Specify the maximum number of times that the channel is to try allocating a session to its partner. If the initial allocation attempt fails, the `short retry count` is decremented and the channel retries the remaining number of times with an interval, defined in the `short retry interval` attribute, between each attempt. If it still fails, it retries `long retry count` number of times with an interval of `long retry interval` between each attempt. If it is still unsuccessful, the channel terminates.

(Retry is not attempted if the cause of failure is such that a retry is not likely to be successful.)

Short retry count (SHORTRTY)

If the channel initiator or queue manager stops while the channel is retrying, the *short retry count* and *long retry count* are reset when the channel initiator or queue manager is restarted.

The *short retry count* attribute is valid only for channel types of sender, cluster-sender, server, and cluster-receiver. It is also valid for requester channels on z/OS if you are using CICS. It may be set from zero through 999 999 999 (1 through 999 for z/OS using CICS, and the long and short retries have the same count).

Note: On OS/2 Warp, OS/400, UNIX systems, and Windows systems, in order for retry to be attempted a channel initiator must be running. The channel initiator must be monitoring the initiation queue specified in the transmission queue that the channel in using.

Short retry interval (SHORTTMR)

Specify the approximate interval in seconds that the channel is to wait before retrying to establish connection, during the short retry mode.

The interval between retries may be extended if the channel has to wait to become active.

This attribute is valid only for channel types of sender, cluster-sender, server, and cluster-receiver. It is also valid for requester channels on z/OS if you are using CICS. It may be set from zero through 999 999. (0 through 999 for z/OS using CICS).

SSL Cipher Specification (SSLCIPH)

SSLCIPH defines a single CipherSpec for an SSL connection. Both ends of a WebSphere MQ SSL channel definition must include the parameter and the SSLCIPH values must specify the same CipherSpec on both ends of the channel. The value is a string with a maximum length of 32 characters.

SSLCIPH is valid for all channel types. It is supported on AIX, HP-UX, Linux, OS/400, Solaris, Windows, and z/OS. It is valid only for channels with a transport type (TRPTYPE) of TCP. If the TRPTYPE is not TCP, the data is ignored and no error message is issued.

SSLCIPH is an optional parameter.

For more information on SSLCIPH, see *WebSphere MQ Script (MQSC) Command Reference* and *WebSphere MQ Security*.

SSL Client Authentication (SSLCAUTH)

SSLCAUTH is used to define whether the channel needs to receive and authenticate an SSL certificate from an SSL client.

This parameter is valid on all channel types that can ever receive a channel initiation flow, except for sender channels. It is valid for receiver, server-connection, cluster-receiver, server, and requester channels.

The value of SSLCAUTH can be set to OPTIONAL or REQUIRED. The default value is REQUIRED. If SSLCAUTH is set to OPTIONAL, and the peer SSL client sends a certificate, the certificate is processed as normal.

You can specify a value for SSLCAUTH on a non-SSL channel definition, one on which SSLCIPH is missing or blank. You can use this to temporarily disable SSL for debugging without first having to clear and then reinput the SSL parameters.

This parameter is valid on AIX, HP-UX, Linux, OS/400, Solaris, Windows, and z/OS

SSLCAUTH is an optional parameter.

For more information on SSLCAUTH, see *WebSphere MQ Script (MQSC) Command Reference* and *WebSphere MQ Security*.

SSL Peer (SSLPEER)

The SSLPEER parameter is used to check the Distinguished Name (DN) of the certificate from the peer queue manager or client at the other end of a WebSphere MQ channel. If the DN received from the peer does not match the SSLPEER value, the channel does not start.

SSLPEER is an optional parameter. If a value is not specified, the peer DN is not checked when the channel is started.

This parameter is valid for all channel types.

This parameter is supported only on AIX, HP-UX, Linux, OS/2 Warp, OS/400, Solaris, Windows, and z/OS.

On z/OS the maximum length of the parameter is 256 bytes. On all other platforms it is 1024 bytes.

On z/OS the parameter values used are not checked. If you input incorrect values, the channel fails at startup, and error messages are written to the error log at both ends of the channel. A Channel SSL Error event is also generated at both ends of the channel. On platforms that support SSLPEER, other than z/OS, the validity of the string is checked when it is first input.

You can specify a value for SSLPEER on a non-SSL channel definition, one on which SSLCIPH is missing or blank. You can use this to temporarily disable SSL for debugging without having to clear and later reinput the SSL parameters.

For more information on using SSLPEER, see *WebSphere MQ Script (MQSC) Command Reference* and *WebSphere MQ Security*.

Target system identifier

This is for z/OS using CICS only. It identifies the particular CICS system where the sending or requesting channel transaction is to run.

The default is blank, which means the CICS system where you are logged on. The name may be one through four alphanumeric characters.

Transaction identifier

This only applies to z/OS using CICS.

The name of the local CICS transaction that you want to start. If you do not specify a value, the name of the supplied transaction for the channel type is used.

Transmission queue name (XMITQ)

The name of the transmission queue from which messages are retrieved. This is required for channels of type sender or server, it is not valid for other channel types.

Provide the name of the transmission queue to be associated with this sender or server channel, that corresponds to the queue manager at the far side of the channel. The transmission queue may be given the same name as the queue manager at the remote end.

Transport type (TRPTYPE)

This does not apply to z/OS using CICS.

The possible values are:

LU62	LU 6.2
TCP	TCP/IP
UDP	UDP (1)
NETBIOS	NetBIOS (2)
SPX	SPX (2)

Notes:

1. UDP is supported on WebSphere MQ for AIX only.
2. For use on OS/2 and Windows. Can also be used on z/OS for defining client-connection channels for use on OS/2 and Windows.

User ID (USERID)

On WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, you can specify a task user identifier of 20 characters. On other platforms, you can specify a task user identifier of maximum length 12 characters, although only the first 10 characters are used.

The user ID may be used by the MCA when attempting to initiate a secure SNA session with a remote MCA. It is valid for channel types of sender, server, requester, or client-connection.

This does not apply to WebSphere MQ for z/OS. except for client-connection channels.

On the receiving end, if passwords are kept in encrypted format and the LU 6.2 software is using a different encryption method, an attempt to start the channel fails with invalid security details. You can avoid this by modifying the receiving SNA configuration to either:

- Turn off password substitution, or
- Define a security user ID and password.

Chapter 7. Example configuration chapters in this book

Throughout the following parts of the book, there is a series of chapters containing examples of how to configure the various platforms to communicate with each other. These chapters describe tasks performed to establish a working WebSphere MQ network. The tasks were to establish WebSphere MQ *sender* and *receiver* channels to enable bi-directional message flow between the platforms over all supported protocols.

Figure 32 is a conceptual representation of a single channel and the WebSphere MQ objects associated with it.

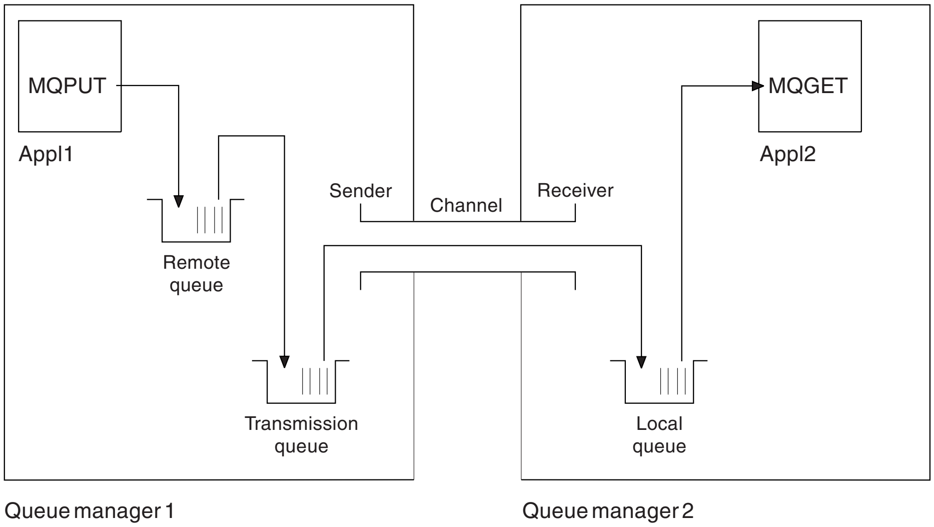


Figure 32. WebSphere MQ channel to be set up in the example configuration chapters in this book

This is a simple example, intended to introduce only the basic elements of the WebSphere MQ network. It does not demonstrate the use of triggering which is described in “Triggering channels” on page 20.

The objects in this network are:
- A remote queue
- A transmission queue
- A local queue
- A sender channel
- A receiver channel

Appl1 and Appl2 are both application programs; Appl1 is putting messages and Appl2 is receiving them.

Appl1 puts messages to a remote queue. The definition for this remote queue specifies the name of a target queue manager, a local queue on that queue manager, and a transmission queue on this the local queue manager.

When the queue manager receives the request from Appl1 to put a message to the remote queue, it looks at the queue definition and sees that the destination is remote. It therefore puts the message, along with a transmission header, straight onto the transmission queue specified in the definition. The message remains on the transmission queue until the channel becomes available, which may happen immediately.

A sender channel has in its definition a reference to one, and one only, transmission queue. When a channel is started, and at other times during its normal operation, it will look at this transmission queue and send any messages on it to the target system. The message has in its transmission header details of the destination queue and queue manager.

The intercommunication examples in the following chapters describe in detail the creation of each of the objects described above, for a variety of platform combinations.

On the target queue manager, definitions are required for the local queue and the receiver side of the channel. These objects operate independently of each other and so can be created in any sequence.

On the local queue manager, definitions are required for the remote queue, the transmission queue, and the sender side of the channel. Since both the remote queue definition and the channel definition refer to the transmission queue name, it is advisable to create the transmission queue first.

Network infrastructure

The configuration examples assume that all the systems are connected to a Token Ring network with the exception of z/OS and VSE/ESA, which communicate via a 3745 (or equivalent) that is attached to the Token Ring, and Solaris, which is on an adjacent local area network (LAN) also attached to the 3745.

It is also assumed that, for SNA, all the required definitions in VTAM and network control program (NCP) are in place and activated for the LAN-attached platforms to communicate over the wide area network (WAN).

Similarly, for TCP, it is assumed that nameserver function is available, either via a domain nameserver or via locally held tables (for example a host file).

Communications software

Working configurations are given in the following chapters for the following network software products:

- SNA
  - Communications Manager/2 Version 1.11
  - Communications Server for Windows NT, Version 5.0
  - AIX Communications Server, V5.0
  - Hewlett-Packard SNAplus2
  - AT&T GIS SNA Services Version 2.06 or later
  - OS/400 Version 4 Release 4
  - SunLink Peer-to-Peer Version 9.1
  - OS/390 Version 2 Release 4
  - CICS/VSE® Version 2 Release 1

- TCP
  - TCP for OS/2 Version 2
  - Microsoft® Windows 2000, Windows NT Version 4, or Windows XP
  - AIX Version 4 Release 1.4
  - HP-UX Version 10.2 or later
  - AT&T GIS UNIX Release 2.03.01
  - Sun Solaris Release 2.4 or later
  - OS/400 Version 4 Release 4
  - TCP for z/OS
  - Digital UNIX Version 4.0 or later
- NetBIOS
- SPX
- UDP

How to use the communication examples

The following chapters contain example configurations:

- Chapter 11, “Example configuration - MQSeries for OS/2 Warp”, on page 145
- Chapter 12, “Example configuration - IBM WebSphere MQ for Windows”, on page 171
- Chapter 14, “Example configuration - IBM WebSphere MQ for AIX”, on page 205
- Chapter 15, “Example configuration - IBM MQSeries for Compaq Tru64 UNIX”, on page 225
- Chapter 16, “Example configuration - IBM WebSphere MQ for HP-UX”, on page 231
- Chapter 17, “Example configuration - IBM MQSeries for AT&T GIS UNIX, V2.2”, on page 257
- Chapter 18, “Example configuration - IBM WebSphere MQ for Solaris”, on page 273
- Chapter 27, “Example configuration - IBM WebSphere MQ for z/OS”, on page 409
- Chapter 43, “Example configuration - IBM WebSphere MQ for iSeries”, on page 565
- Chapter 45, “Example configuration - MQSeries for VSE/ESA”, on page 595
- Chapter 32, “Example configuration - IBM WebSphere MQ for z/OS using CICS” , on page 465
- Chapter 36, “Example configuration - WebSphere MQ for z/OS using queue-sharing groups”, on page 491

The information in the example-configuration chapters describes the tasks that were carried out on a single platform, to set up communication to another of the platforms, and then describes the WebSphere MQ tasks to establish a working channel to that platform. Wherever possible, the intention is to make the information as generic as possible. Thus, to connect any two WebSphere MQ queue managers on different platforms, you should need to refer to only the relevant two chapters. Any deviations or special cases are highlighted as such. Of course, you can also connect two queue managers running on the same platform (on different machines or on the same machine). In this case, all the information can be derived from the one chapter.

The examples only cover how to set up communications where clustering is not being used. For information about setting up communications while using clustering, see the *WebSphere MQ Queue Manager Clusters* book. The communications’ configuration values given here still apply.

Using communication examples

Each chapter contains a worksheet in which you can find the parameters used in the example configurations. There is a short description of each parameter and some guidance on where to find the equivalent values in your system. When you have a set of values of your own, record these in the spaces on the worksheet. As you proceed through the chapter, you will find cross-references to these values as you need them.

Notes:

1. Example queue manager names usually reflect the platform that the queue manager runs on, but MVS™ is used for both z/OS and MVS/ESA, which are essentially the same.
2. The **sequence number wrap** value for sender definitions defaults to 999999999 for Version 2 WebSphere MQ products.
3. For connections to WebSphere MQ for z/OS the examples, in general, cover only connection without using CICS. See Chapter 30, “Preparing WebSphere MQ for z/OS when using CICS”, on page 457 for information about connecting using CICS.

IT responsibilities

Because the IT infrastructure can vary greatly between organizations, it is difficult to indicate who, within an organization, controls and maintains the information required to complete each parameter value. To understand the terminology used in the following chapters, consider the following guidelines as a starting point.

- *System administrator* is used to describe the person (or group of people) who installs and configures the software for a specific platform.
- *Network administrator* is used to describe the person who controls LAN connectivity, LAN address assignments, network naming conventions, and so on. This person may be in a separate group or may be part of the system administration group.

  In most z/OS installations, there is a group responsible for updating the ACF/VTAM®, ACF/NCP, and TCP/IP software to support the network configuration. The people in this group should be the main source of information needed when connecting any WebSphere MQ platform to WebSphere MQ for z/OS. They may also influence or mandate network naming conventions on LANs and you should verify their span of control before creating your definitions.
- A specific type of administrator, for example *CICS administrator* is indicated in cases where we can more clearly describe the responsibilities of the person.

The example-configuration chapters do not attempt to indicate who is responsible for and able to set each parameter. In general, several different people may be involved.

Part 3. DQM in WebSphere MQ for UNIX and Windows systems, and MQSeries for Compaq OpenVMS Alpha, Compaq NonStop Kernel, and OS/2 Warp

Chapter 22. Message channel planning example for distributed platforms 367

Chapter 23. Example SINIX and DC/OSx configuration files 373

Chapter 8. Monitoring and controlling channels on distributed platforms

For DQM you need to create, monitor, and control the channels to remote queue managers. You can use the following types of command to do this:

The WebSphere MQ commands (MQSC)
You can use the MQSC as single commands in an MQSC session in OS/2, Windows, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems. To issue more complicated, or multiple, commands the MQSC can be built into a file that you then run from the command line. For full details see the *WebSphere MQ Script (MQSC) Command Reference* book. This chapter gives some simple examples of using MQSC for distributed queuing.

Control commands
You can also issue *control commands* at the command line for some of these functions. Reference material for these commands is contained in the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp.

Programmable command format commands
See the *WebSphere MQ Programmable Command Formats and Administration Interface* book for information about using these commands.

Message Queue Management facility
On Compaq NonStop Kernel, you can use the Message Management facility. See the *MQSeries for Compaq NonStop Kernel System Administration* for information about this facility.

IBM WebSphere MQ Explorer
On Windows, you can use an MMC snap-in called the WebSphere MQ Explorer. This provides a graphical administration interface to perform administrative tasks as an alternative to using control commands or MQSC commands.

Each queue manager has a DQM component for controlling interconnections to compatible remote queue managers.

For a list of the functions available to you when setting up and controlling message channels, using the two types of commands, see Table 9 on page 112.

The DQM channel control function

The channel control function provides the interface and function for administration and control of message channels between systems.

It consists of commands, programs, a file for the channel definitions, and a storage area for synchronization information. The following is a brief description of the components.

- The channel commands are a subset of the WebSphere MQ Commands (MQSC).
- You use MQSC and the control commands to:
  - Create, copy, display, change, and delete channel definitions

Channel control function

  - Start and stop channels, ping, reset channel sequence numbers, and resolve in-doubt messages when links cannot be re-established
  - Display status information about channels
- The channel definition file (CDF), amqrfcda.dat:
  - Is indexed on channel name
  - Holds channel definitions
- A storage area holds sequence numbers and *logical unit of work (LUW)* identifiers. These are used for channel synchronization purposes.

Functions available

Table 9 shows the full list of WebSphere MQ functions that you may need when setting up and controlling channels. The channel functions are explained in this chapter.

For more details of the control commands that you issue at the command line, see the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp.

The MQSC commands are fully described in the *WebSphere MQ Script (MQSC) Command Reference* book.

Table 9. Functions available in OS/2, Windows systems, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems

Function	**Control commands**	**MQSC**	**WebSphere MQ Explorer equivalent?**	**WebSphere MQ Service snap-in equivalent?**
Queue manager functions				
Change queue manager		ALTER QMGR	Yes	No
Create queue manager	crtmqm		Yes	Yes
Delete queue manager	dltmqm		Yes	Yes
Display queue manager		DISPLAY QMGR	Yes	No
End queue manager	endmqm		Yes	Yes
Ping queue manager		PING QMGR	No	No
Start queue manager	strmqm		Yes	Yes
Add a queue manager to Windows systems Service Control Manager			No	Yes
Command server functions				
Display command server	dspmqcsv		No	Yes
End command server	endmqcsv		No	Yes
Start command server	strmqcsv		No	Yes
Queue functions				
Change queue		ALTER QALIAS ALTER QLOCAL ALTER QMODEL ALTER QREMOTE	Yes	No
Clear queue		CLEAR QLOCAL CLEAR QUEUE	Yes	No

Table 9. Functions available in OS/2, Windows systems, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems (continued)

Function	Control commands	MQSC	WebSphere MQ Explorer equivalent?	WebSphere MQ Service snap-in equivalent?
Create queue		DEFINE QALIAS DEFINE QLOCAL DEFINE QMODEL DEFINE QREMOTE	Yes	No
Delete queue		DELETE QALIAS DELETE QLOCAL DELETE QMODEL DELETE QREMOTE	Yes	No
Display queue		DISPLAY QUEUE	Yes	No
Process functions				
Change process		ALTER PROCESS	Yes	No
Create process		DEFINE PROCESS	Yes	No
Delete process		DELETE PROCESS	Yes	No
Display process		DISPLAY PROCESS	Yes	No
Channel functions				
Change channel		ALTER CHANNEL	Yes	No
Create channel		DEFINE CHANNEL	Yes	No
Delete channel		DELETE CHANNEL	Yes	No
Display channel		DISPLAY CHANNEL	Yes	No
Display channel status		DISPLAY CHSTATUS	Yes	No
End channel		STOP CHANNEL	Yes	Yes
Ping channel		PING CHANNEL	Yes	No
Reset channel		RESET CHANNEL	Yes	No
Resolve channel		RESOLVE CHANNEL	Yes	No
Run channel	runmqchl	START CHANNEL	Yes	Yes
Run channel initiator	runmqchi	START CHINIT (not Compaq NonStop Kernel)	No	Yes

Functions available

Table 9. Functions available in OS/2, Windows systems, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems (continued)

Function	Control commands	MQSC	WebSphere MQ Explorer equivalent?	WebSphere MQ Service snap-in equivalent?
Run listener	runmqlsr (not AT®&T GIS UNIX and Compaq Tru64 UNIX)	START LISTENER (not Compaq NonStop Kernel)	No	Yes
End listener	endmqlsr (OS/2, Windows systems, AIX, HP-UX, Solaris, and SINIX and DC/OSx only)		No	Yes

Getting started with objects

Use the WebSphere MQ commands (MQSC) or the WebSphere MQ Explorer on Windows systems to:
1. Define message channels and associated objects
2. Monitor and control message channels

The objects you may need to define are:
- Transmission queues
- Remote queue definitions
- Queue manager alias definitions
- Reply-to queue alias definitions
- Reply-to local queues
- Processes for triggering (MCAs)
- Message channel definitions

Channels must be completely defined, and their associated objects must exist and be available for use, before a channel can be started. This chapter shows you how to do this.

In addition, the particular communication link for each channel must be defined and available before a channel can be run. For a description of how LU 6.2, TCP/IP, NetBIOS, SPX, and DECnet links are defined, see the particular communication guide for your installation. See also the example configuration chapters in this book.

Creating objects

Use MQSC to create the queue and alias objects: transmission queues, remote queue definitions, queue manager alias definitions, reply-to queue alias definitions, and reply-to local queues.

Also create the definitions of processes for triggering (MCAs) in a similar way.

For an example showing how to create all the required objects see Chapter 22, “Message channel planning example for distributed platforms”, on page 367.

Creating default objects

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, default objects are created automatically when a queue manager is created. These objects are queues, channels, a process definition, and administration queues. They correspond to the objects that are created when you run the amqscoma.tst sample command file on earlier releases of these products and on other WebSphere MQ products.

How are default objects created?

When you use the CRTMQM command to create a queue manager, the command also initiates a program to create a set of default objects.

1. Each default object is created in turn. The program keeps a count of how many objects are successfully defined, how many already existed and were replaced, and how many unsuccessful attempts there were.
2. The program displays the results to you and if any errors occurred, directs you to the appropriate error log for details.

When the program has finished running, you can use the STRMQM command to start the queue manager.

See the *WebSphere MQ System Administration Guide* book for information about the CRTMQM and STRMQM commands and a list of default objects.

Changing the default objects

Once the default objects have been created, you can replace them at any time by running the STRMQM command with the -c option. When you specify the -c option, the queue manager is started temporarily while the objects are created and is then shut down again. You must use the STRMQM command again, without the -c option, if you want to start the queue manager.

If you wish to make any changes to the default objects, you can create your own version of the old amqscoma.tst file and edit it.

Creating a channel

To create a new channel you have to create ***two*** channel definitions, one at each end of the connection. You create the first channel definition at the first queue manager. Then you create the second channel definition at the second queue manager, on the other end of the link.

Both ends must be defined using the ***same*** channel name. The two ends must have **compatible** channel types, for example: Sender and Receiver.

To create a channel definition for one end of the link use the MQSC command DEFINE CHANNEL. Include the name of the channel, the channel type for this end of the connection, a connection name, a description (if required), the name of the transmission queue (if required), and the transmission protocol. Also include any other attributes that you want to be different from the system default values for the required channel type, using the information you have gathered previously.

You are provided with help in deciding on the values of the channel attributes in Chapter 6, “Channel attributes”, on page 77.

Note: You are very strongly recommended to name all the channels in your network uniquely. Including the source and target queue manager names in the channel name is a good way to do this.

Create channel example

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(SDR) +
DESCR('Sender channel to QM2') +
CONNAME(QM2) TRPTYPE(TCP) XMITQ(QM2) CONVERT(YES)
```

In all the examples of MQSC the command is shown as it would appear in a file of commands, and as it would be typed in OS/2, Windows, UNIX systems, Compaq OpenVMS Alpha, or Compaq NonStop Kernel. The two methods look identical, except that to issue a command interactively, you must first start an MQSC session. Type `runmqsc`, for the default queue manager, or `runmqsc` *`qmname`* where *`QMNAME`* is the name of the required queue manager. Then type any number of commands, as shown in the examples.

For portability, you should restrict the line length of your commands to 72 characters. Use a concatenation character as shown to continue over more than one line. On Compaq NonStop Kernel, use Ctrl-y to end the input at the command line, or enter `exit` or `quit`. On OS/2, Windows, or Compaq OpenVMS Alpha use Ctrl-z. On UNIX systems, use Ctrl-d. Alternatively, on V5.3 of WebSphere MQ for AIX, Compaq Tru64 UNIX, HP-UX, OS/2 Warp, Solaris, and Windows, use the **end** command.

Displaying a channel

Use the MQSC command DISPLAY CHANNEL, specifying the channel name, the channel type (optional), and the attributes you want to see, or specifying that all attributes are to be displayed. In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp the ALL parameter of the DISPLAY CHANNEL command is assumed by default if no specific attributes are requested and the channel name specified is not generic.

The attributes are described in Chapter 6, “Channel attributes”, on page 77.

Display channel examples

```
DISPLAY CHANNEL(QM1.TO.QM2) TRPTYPE,CONVERT

DISPLAY CHANNEL(QM1.TO.*) TRPTYPE,CONVERT

DISPLAY CHANNEL(*) TRPTYPE,CONVERT

DISPLAY CHANNEL(QM1.TO.QMR34) ALL
```

Displaying channel status

Use the MQSC command DISPLAY CHSTATUS, specifying the channel name and whether you want the current status of channels or the status of saved information.

Display channel status examples

```
DISPLAY CHSTATUS(*) CURRENT

DISPLAY CHSTATUS(QM1.TO.*) SAVED
```

Note that the saved status does not apply until at least one batch of messages has been transmitted on the channel. In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp status is also saved when a channel is stopped (using the STOP CHL command) and when the queue manager is ended.

Starting a channel

For applications to be able to exchange messages you must start a listener program for inbound connections (or, in the case of UNIX systems, create a listener attachment). In OS/2, Windows systems, and Compaq NonStop Kernel, use the runmqlsr command to start the WebSphere MQ listener process. Any inbound requests for channel attachment start MCAs as threads of this listener process. In Compaq OpenVMS Alpha, each receiver or server channel requires a listener process that then starts a channel process.

```
runmqlsr -t tcp -m QM2
```

For outbound connections you must start the channel in one of the following three ways:

1. Use the MQSC command START CHANNEL, specifying the channel name, to start the channel as a process or a thread, depending on the MCATYPE parameter. (If channels are started as threads, they are threads of a channel initiator.)
   ```
   START CHANNEL(QM1.TO.QM2)
   ```
2. Use the control command runmqchl to start the channel as a process.
   ```
   runmqchl -c QM1.TO.QM2 -m QM1
   ```
3. Use the channel initiator to trigger the channel.

Renaming a channel

To rename a message channel, use MQSC to carry out the following steps:

1. Use STOP CHANNEL to stop the channel.
2. Use DEFINE CHANNEL to create a duplicate channel definition with the new name.
3. Use DISPLAY CHANNEL to check that it has been created correctly.
4. Use DELETE CHANNEL to delete the original channel definition.

If you decide to rename a message channel, remember that a channel has ***two*** channel definitions, one at each end. Make sure you rename the channel at both ends at the same time.

Channel attributes and channel types

The channel attributes for each type of channel are shown in Table 7 on page 77. The channel attributes are described in detail in Chapter 6, “Channel attributes”, on page 77. Client-connection channels and server-connection channels are described in the *WebSphere MQ Clients* book.

Channel functions

The channel functions available are shown in Table 9 on page 112. Here some more detail is given about the channel functions.

Create

You can create a new channel definition using the default values supplied by WebSphere MQ, specifying the name of the channel, the type of channel you are creating, the communication method to be used, the transmission queue name and the connection name.

The channel name must be the same at both ends of the channel, and unique within the network. However, you should restrict the characters used to those that are valid for WebSphere MQ object names.

Change

Use the MQSC command ALTER CHANNEL to change an existing channel definition, except for the channel name, or channel type.

Delete

Use the MQSC command DELETE CHANNEL to delete a named channel.

Display

Use the MQSC command DISPLAY CHANNEL to display the current definition for the channel.

Display Status

The MQSC command DISPLAY CHSTATUS displays the status of a channel whether the channel is active or inactive. It applies to all message channels. It does not apply to MQI channels other than server-connection channels on WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp. See “Displaying channel status” on page 116.

Information displayed includes:
- Channel name
- Communication connection name
- In-doubt status of channel (where appropriate)
- Last sequence number
- Transmission queue name (where appropriate)
- The in-doubt identifier (where appropriate)
- The last committed sequence number
- Logical unit of work identifier
- Process ID
- Thread ID (OS/2 and Windows only)

Ping

Use the MQSC command PING CHANNEL to exchange a fixed data message with the remote end. This gives some confidence to the system supervisor that the link is available and functioning.

Ping does not involve the use of transmission queues and target queues. It uses channel definitions, the related communication link, and the network setup. It can only be used if the channel is not currently active.

It is available from sender and server channels only. The corresponding channel is started at the far side of the link, and performs the startup parameter negotiation. Errors are notified normally.

The result of the message exchange is presented as `Ping complete` or an error message.

Ping with LU 6.2

When Ping is invoked, by default no USERID or password flows to the receiving end. If USERID and password are required, they can be created at the initiating end in the channel definition. If a password is entered into the channel definition, it is encrypted by WebSphere MQ before being saved. It is then decrypted before flowing across the conversation.

Start

Use the MQSC command START CHANNEL for sender, server, and requester channels. It should not be necessary where a channel has been set up with queue manager triggering.

Also use the START CHANNEL command for receiver channels that have a disabled status, and on WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, for server-connection channels that have a disabled status. Starting a receiver or server-connection channel that is in disabled status resets the channel and allows it to be started from the remote channel.

When started, the sending MCA reads the channel definition file and opens the transmission queue. A channel start-up sequence is executed, which remotely starts the corresponding MCA of the receiver or server channel. When they have been started, the sender and server processes await messages arriving on the transmission queue and transmit them as they arrive.

When you use triggering or run channels as threads, you will need to start the channel initiator to monitor the initiation queue. Use the **runmqchi** command for this.

However, TCP and LU 6.2 do provide other capabilities:

- For TCP on OS/2, Compaq OpenVMS Alpha, and UNIX systems, inetd (or an equivalent TCP/IP service on OpenVMS) can be configured to start a channel. This will be started as a separate process.
- For LU 6.2 in OS/2, using Communications Manager/2 it is possible to configure the Attach Manager to start a channel. This will be started as a separate process.
- For LU 6.2 in UNIX systems, configure your SNA product to start the LU 6.2 responder process.
- For LU 6.2 in Windows systems, using SNA Server you can use TpStart (a utility provided with SNA Server) to start a channel. This will be started as a separate process.
- For LU 6.2 in Compaq OpenVMS Alpha systems, use the **runmqlsr** command to start the LU 6.2 responder process.
- For LU 6.2 in Compaq NonStop Kernel, the **strmqm** command normally starts the LU 6.2 responder process if your channel is defined AUTOSTART (ENABLED). To start the process manually, use the **runmqsc** or **runmqchl** command.

Use of the Start option always causes the channel to re-synchronize, where necessary.

For the start to succeed:

- Channel definitions, local and remote, must exist. If there is no appropriate channel definition for a receiver or server-connection channel, a default one is created automatically if the channel is auto-defined. See “Channel auto-definition exit program” on page 631.

- Transmission queue must exist, and have no other channels using it.
- MCAs, local and remote, must exist.
- Communication link must be available.
- Queue managers must be running, local and remote.
- Message channel must not be already running.

A message is returned to the screen confirming that the request to start a channel has been accepted. For confirmation that the start command has succeeded, check the error log, or use DISPLAY CHSTATUS. The error logs are:

OS/2 and Windows

`\mqm\qmgrs\qmname\errors\AMQERR01.LOG` (for each queue manager called `qmname`)

`\mqm\qmgrs\@SYSTEM\errors\AMQERR01.LOG` (for general errors)

Note: On Windows systems, you still also get a message in the Windows systems application event log.

Compaq OpenVMS Alpha

`MQS_ROOT:[MQM.QMGRS.QMNAME.ERRORS]AMQERR01.LOG` (for each queue manager called `qmname`)

`MQS_ROOT:[MQM.QMGRS.$SYSTEM.ERRORS]AMQERR01.LOG` (for general errors)

Compaq NonStop Kernel

The location of the error logs depends on whether the queue manager name is known and whether the error is associated with a client.

- If the queue manager name is known and the queue manager is available:

  ```
  <QMVOL>.<SUBVOL>L.MQERRLG1
  ```

- If the queue manager is not available:

  ```
  <MQSVOL>.ZMQSSYS.MQERRLG1
  ```

UNIX systems

`/var/mqm/qmgrs/qmname/errors/AMQERR01.LOG` (for each queue manager called `qmname`)

`/var/mqm/qmgrs/@SYSTEM/errors/AMQERR01.LOG` (for general errors)

Stop

Use the MQSC command STOP CHANNEL to request the channel to stop activity. The channel will not start a new batch of messages until the operator starts the channel again. (For information about restarting stopped channels, see “Restarting stopped channels” on page 69.)

This command can be issued to a channel of any type except MQCHT_CLNTCONN.

You can select the type of stop you require:

Stop quiesce example

```
STOP CHANNEL(QM1.TO.QM2) MODE(QUIESCE)
```

This command requests the channel to close down in an orderly way. The current batch of messages is completed and the syncpoint procedure is carried out with the other end of the channel.

Note: If the channel is idle this command will not terminate a receiving channel.

Stop force example

```
STOP CHANNEL(QM1.TO.QM2) MODE(FORCE)
```

This option stops the channel immediately, but does not terminate the channel's thread or process. The channel does not complete processing the current batch of messages, and can, therefore, leave the channel in doubt. In general, it is recommended that operators use the quiesce stop option.

Stop terminate example

```
STOP CHANNEL(QM1.TO.QM2) MODE(TERMINATE)
```

This option stops the channel immediately, and terminates the channel's thread or process.

Stop (quiesce) stopped example

```
STOP CHANNEL(QM1.TO.QM2) STATUS(STOPPED)
```

This command does not specify a MODE, so will default to MODE(QUIESCE). It requests that the channel be stopped so that it cannot be restarted automatically but must be started manually.

Stop (quiesce) inactive example

```
STOP CHANNEL(QM1.TO.QM2) STATUS(INACTIVE)
```

This command does not specify a MODE, so will default to MODE(QUIESCE). It requests that the channel be made inactive so that it will be restarted automatically when required.

Reset

Use the MQSC command RESET CHANNEL to change the message sequence number. This command is available for any message channel, but not for MQI channels (client-connection or server-connection). The first message starts the new sequence the next time the channel is started.

If the command is issued on a sender or server channel, it informs the other side of the change when the channel is restarted.

Resolve

Use the MQSC command RESOLVE CHANNEL when messages are held in-doubt by a sender or server, for example because one end of the link has terminated, and there is no prospect of it recovering. The RESOLVE CHANNEL command accepts one of two parameters: BACKOUT or COMMIT. Backout restores messages to the transmission queue, while Commit discards them.

The channel program does not try to establish a session with a partner. Instead, it determines the logical unit of work identifier (LUWID) which represents the in-doubt messages. It then issues, as requested, either:
- BACKOUT to restore the messages to the transmission queue; or
- COMMIT to delete the messages from the transmission queue.

For the resolution to succeed:

- The channel must be inactive
- The channel must be in doubt
- The channel type must be sender or server
- A local channel definition must exist
- The local queue manager must be running

Chapter 9. Preparing WebSphere MQ for distributed platforms

This chapter describes the WebSphere MQ preparations required before DQM can be used in OS/2, Windows, Compaq OpenVMS Alpha, Compaq NonStop Kernel, and UNIX systems. It includes "Transmission queues and triggering" and "Channel programs" on page 125.

Transmission queues and triggering

Before a channel (other than a requester channel) can be started, the transmission queue must be defined as described in this chapter, and must be included in the message channel definition.

In addition, where needed, the triggering arrangement must be prepared with the definition of the necessary processes and queues.

Creating a transmission queue

Define a local queue with the USAGE attribute set to XMITQ for each sending message channel. If you want to make use of a specific transmission queue in your remote queue definitions, create a remote queue as shown below.

To create a transmission queue, use the WebSphere MQ Commands (MQSC), as shown in the following examples:

Create transmission queue example

```
DEFINE QLOCAL(QM2) DESCR('Transmission queue to QM2') USAGE(XMITQ)
```

Create remote queue example

```
DEFINE QREMOTE(PAYROLL) DESCR('Remote queue for QM2') +
XMITQ(QM2) RNAME(PAYROLL) RQMNAME(QM2)
```

The recommended name for the transmission queue is the queue manager name on the remote system, as shown in the examples above.

Triggering channels

An overview of triggering is given in "Triggering channels" on page 20, while it is described in depth in the *WebSphere MQ Application Programming Guide*. This description provides you with information specific to WebSphere MQ for UNIX and Windows systems, and MQSeries for OS/2 Warp, Compaq OpenVMS Alpha, and Compaq NonStop Kernel.

You can create a process definition in WebSphere MQ, defining processes to be triggered. Use the MQSC command DEFINE PROCESS to create a process definition naming the process to be triggered when messages arrive on a transmission queue. The USERDATA attribute of the process definition should contain the name of the channel being served by the transmission queue.

Alternatively, for WebSphere MQ for AIX, HP-UX, Solaris, and Windows, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp, you can eliminate the need for a process definition by specifying the channel name in the TRIGDATA attribute of the transmission queue.

If you do not specify a channel name, the channel initiator searches the channel definition files until it finds a channel that is associated with the named transmission queue.

Example definitions for triggering

Define the local queue (Q3), specifying that trigger messages are to be written to the default initiation queue SYSTEM.CHANNEL.INITQ, to trigger the application (process P1) that starts channel (QM3.TO.QM4):

```
DEFINE QLOCAL(QM4) TRIGGER INITQ(SYSTEM.CHANNEL.INITQ) PROCESS(P1) USAGE (XMITQ)
```

Define the application (process P1) to be started:

```
DEFINE PROCESS(P1) USERDATA(QM3.TO.QM4)
```

Examples for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp

Define the local queue (Q3), specifying that trigger messages are to be written to the initiation queue (IQ) to trigger the application that starts channel (QM3.TO.QM4):

```
DEFINE QLOCAL(QM4) TRIGGER INITQ(SYSTEM.CHANNEL.INITQ) +
USAGE (XMITQ) TRIGDATA(QM3.TO.QM4)
```

Starting the channel initiator

Triggering is implemented using the channel initiator process. On MQSeries for AT&T GIS UNIX, Compaq OpenVMS Alpha, SINIX and DC/OSx, and Compaq NonStop Kernel, this process is started with the run channel initiator command, **runmqchi**, or (on distributed platforms except Compaq NonStop Kernel) with the MQSC command START CHINIT. For example, to use the **runmqchi** command to start the default initiation queue for the default queue manager, enter:

```
runmqchi
```

Whichever command you use, specify the name of the initiation queue on the command, unless you are using the default initiation queue. For example, to use the **runmqchi** command to start queue IQ for the default queue manager, enter:

```
runmqchi -q IQ
```

To use the START CHINIT command (not on Compaq NonStop Kernel), enter:

```
START CHINIT INITQ(IQ)
```

Note: Compaq NonStop Kernel also allows control of the channel initiator from the PATHWAY environment. This is the recommended method. For more information about this, see the *MQSeries for Compaq NonStop Kernel System Administration*.

In WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, a channel initiator is started automatically and the number of channel initiators that you can start is limited. The default limit is 3. You can change this using MAXINITIATORS in the qm.ini file for AIX, HP-UX, OS/2 Warp, and Solaris, and in the registry for Windows systems.

See the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp for details of the run channel initiator command, and the other control commands.

Stopping the channel initiator

The default channel initiator is started automatically when you start a queue manager. Similarly, it is stopped automatically when a queue manager is stopped.

However, if you need to stop a channel initiator but **not** the queue manager, you should inhibit the queue that the initiator queue is reading from. To do this, you disable the GET attribute of the initiation queue. To restart the channel initiator, simply use the runmqchi command.

The consequences of stopping a channel initiator are:

- If you stop the only channel initiator running, no channels that you have attempted to start will be retried.
- If you have more than one channel initiator running, channels that have a transmission queue configured with this initiation queue are not automatically started. However, those channels configured for connection retries will continue to be retried.

Channel programs

There are different types of channel programs (MCAs) available for use at the channels. The names are shown in the following tables.

Table 10. Channel programs for OS/2 and Windows systems

Program name	Direction of connection	Communication
RUNMQLSR	Inbound	Any
ENDMQLSR		Any
AMQCRS6A	Inbound	LU 6.2
AMQCRSTA	Inbound	TCP
RUNMQCHL	Outbound	Any
RUNMQCHI	Outbound	Any

Table 11. Channel programs for UNIX systems, Compaq OpenVMS Alpha, and Compaq NonStop Kernel

Program name	Direction of connection	Communication
amqcrs6a (MQLU6RES on Compaq NonStop Kernel only)	Inbound	LU 6.2
amqcrsta (MQTCPRES (on Compaq NonStop Kernel only)	Inbound	TCP and DECnet for Compaq OpenVMS Alpha
runmqchl	Outbound	TCP for UNIX systems
runmqlsr	Inbound	LU 6.2 for Compaq OpenVMS Alpha and Compaq NonStop Kernel and TCP for UNIX systems
runmqchi	Outbound	Any

RUNMQLSR (Run WebSphere MQ listener), ENDMQLSR (End WebSphere MQ listener), and RUNMQCHL (Run WebSphere MQ channel) are control commands that you can enter at the command line. AMQCRS6A and AMQCRSTA are programs that, if you are using SNA, you define as transaction programs, or, if you are using TCP, you define in the INETD.LST file for OS/2 or Windows systems or the inetd.conf file for UNIX systems. Examples of the use of these channel programs are given in the following chapters.

Other things to consider

Here are some other topics that you should consider when preparing WebSphere MQ for distributed queue management.

Undelivered-message queue

A DLQ handler is provided with WebSphere MQ for z/OS, MQSeries for OS/2 Warp , WebSphere MQ on UNIX systems, Compaq OpenVMS Alpha and Compaq NonStop Kernel. See the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows systems, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp for information about this.

Queues in use

MCAs for receiver channels may keep the destination queues open even when messages are not being transmitted; this results in the queues appearing to be “in use”.

Security of WebSphere MQ objects

This section deals with remote messaging aspects of security.

You need to provide users with authority to make use of the WebSphere MQ facilities, and this is organized according to actions to be taken with respect to objects and definitions. For example:

- Queue managers can be started and stopped by authorized users
- Applications need to connect to the queue manager, and have authority to make use of queues
- Message channels need to be created and controlled by authorized users
- Objects are kept in libraries, and access to these libraries may be restricted

The message channel agent at a remote site needs to check that the message being delivered originated from a user with authority to do so at this remote site. In addition, as MCAs can be started remotely, it may be necessary to verify that the remote processes trying to start your MCAs are authorized to do so. There are three possible ways for you to deal with this:

1. Specify PUTAUT=CTX in the channel definition to indicate that messages must contain acceptable *context* authority, otherwise they will be discarded.
2. Implement *user exit* security checking to ensure that the corresponding message channel is authorized. The security of the installation hosting the corresponding channel ensures that all users are properly authorized, so that you do not need to check individual messages.
3. Implement *user exit* message processing to ensure that individual messages are vetted for authorization.

On UNIX systems, Compaq OpenVMS Alpha, and Compaq NonStop Kernel

Administration users must be part of the mqm group on your system (including root) if this ID is going to use WebSphere MQ administration commands. In Compaq OpenVMS Alpha, the user must hold the mqm identifier.

You should always run amqcrsta as the “mqm” user ID.

User IDs on UNIX systems, Compaq OpenVMS Alpha: In Compaq OpenVMS Alpha, all user IDs are displayed in uppercase. The queue manager converts all uppercase or mixed case user identifiers into lowercase, before inserting them into the context part of a message, or checking their authorization. All authorizations should therefore be based only on lowercase identifiers.

Message descriptor extension (MQMDE): When the listener program (amqcrsta, for example) is started by INETD it inherits the locale from INETD. It is possible that the MQMDE will not be honored and will be placed on the queue as message data.

To ensure that the MQMDE is honored (merged) the locale must be set correctly. The locale set by INETD may not match that chosen for other locales used by WebSphere MQ processes.

To set the locale, create a shell script which sets the locale environment variables LANG, LC_COLLATE, LC_CTYPE, LC_MONETARY, LC_NUMERIC, LC_TIME, and LC_MESSAGES to the locale used for other WebSphere MQ processes. In the same shell script call the listener program. Modify the inetd.conf file to call your shell script in place of the listener program.

On Windows systems

Administration users must be part of both the mqm group and the administrators group on Windows systems if this ID is going to use WebSphere MQ administration commands.

User IDs on Windows systems: On Windows systems, *if there is no message exit installed*, the queue manager converts any uppercase or mixed case user identifiers into lowercase, before inserting them into the context part of a message, or checking their authorization. All authorizations should therefore be based only on lowercase identifiers.

User IDs across systems

Platforms other than Windows systems and UNIX systems use uppercase characters for user IDs. To allow Windows systems and UNIX systems to use lowercase user IDs, the following conversions are carried out by the message channel agent (MCA) on these platforms:

At the sending end
The alpha characters in all user IDs are converted to uppercase, ***if there is no message exit installed***.

At the receiving end
The alpha characters in all user IDs are converted to lowercase, ***if there is no message exit installed***.

Note that the automatic conversions are ***not*** carried out if you provide a message exit on UNIX systems and Windows systems for any other reason.

User IDs on OS/2

The user identifier service enables queue managers running under OS/2 to obtain a user-defined user ID. This is described in the *WebSphere MQ Programmable Command Formats and Administration Interface* book.

System extensions and user-exit programs

A facility is provided in the channel definition to allow extra programs to be run at defined times during the processing of messages. These programs are not supplied with WebSphere MQ, but may be provided by each installation according to local requirements.

In order to run, these user-exit programs must have predefined names and be available on call to the channel programs. The names of the user-exit programs are included in the message channel definitions.

There is a defined control block interface for handing over control to these programs, and for handling the return of control from these programs.

The precise places where these programs are called, and details of control blocks and names, are to be found in Part 7, “Further intercommunication considerations”, on page 615.

Running channels and listeners as trusted applications

If performance is an important consideration in your environment and your environment is stable, you can choose to run your channels and listeners as trusted, that is, using the fastpath binding. There are two factors that influence whether or not channels and listeners run as trusted.

- The environment variable MQ_CONNECT_TYPE=FASTPATH or MQ_CONNECT_TYPE=STANDARD. This is case sensitive. If you specify a value that is not valid it is ignored.
- MQIBindType in the Channels stanza of the qm.ini or registry file. You can set this to FASTPATH or STANDARD and it is not case sensitive. The default is STANDARD.

You can use MQIBindType in association with the environment variable to achieve the desired affect as follows:

MQIBindType	Environment variable	Result
STANDARD	UNDEFINED	STANDARD
FASTPATH	UNDEFINED	FASTPATH
STANDARD	STANDARD	STANDARD
FASTPATH	STANDARD	STANDARD
STANDARD	FASTPATH	STANDARD
FASTPATH	FASTPATH	FASTPATH

In summary, there are only two ways of actually making channels and listeners run as trusted:

1. By specifying MQIBindType=FASTPATH in qm.ini or registry and not specifying the environment variable.
2. By specifying MQIBindType=FASTPATH in qm.ini or registry and setting the environment variable to FASTPATH.

You are recommended to run channels and listeners as trusted only in a stable environment in which you are not, for example, testing applications or user exits that may abend or need to be cancelled. An errant application could compromise the integrity of your queue manager. However, if your environment is stable and if performance is an important issue, you may choose to run channels and listeners as trusted.

Note: If you are using MQSeries for Compaq OpenVMS Alpha, the option on the MQ_CONNECT_TYPE is FAST, not FASTPATH.

What next?

When you have made the preparations described in this chapter you are ready to set up communications. Proceed to one of the following chapters, depending on what platform you are using:

- Chapter 10, “Setting up communication for OS/2 and Windows”, on page 131
- Chapter 13, “Setting up communication on UNIX systems”, on page 197
- Chapter 20, “Setting up communication in Compaq OpenVMS Alpha systems”, on page 337
- Chapter 21, “Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1”, on page 349

Chapter 10. Setting up communication for OS/2 and Windows

DQM is a remote queuing facility for WebSphere MQ. It provides channel control programs for the queue manager which form the interface to communication links, controllable by the system operator. The channel definitions held by distributed-queuing management use these connections.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This chapter explains how to do this. You may also find it helpful to refer to Chapter 11, "Example configuration - MQSeries for OS/2 Warp", on page 145 or Chapter 12, "Example configuration - IBM WebSphere MQ for Windows", on page 171.

For UNIX systems see Chapter 13, "Setting up communication on UNIX systems", on page 197. For Compaq OpenVMS Alpha, see Chapter 20, "Setting up communication in Compaq OpenVMS Alpha systems", on page 337.

Deciding on a connection

There are four forms of communication for MQSeries for OS/2 Warp and Windows systems:
- TCP
- LU 6.2
- NetBIOS
- SPX

Each channel definition must specify only one protocol as the Transmission protocol (Transport Type) attribute. One or more protocols may be used by a queue manager.

For WebSphere MQ clients, it may be useful to have alternative channels using different transmission protocols. See the *WebSphere MQ Clients* book.

Defining a TCP connection

The channel definition at the sending end specifies the address of the target. A listener program must be run at the receiving end.

Sending end

Specify the host name, or the TCP address of the target machine, in the Connection name field of the channel definition. The port to connect to will default to 1414. Port number 1414 is assigned by the Internet Assigned Numbers Authority to WebSphere MQ.

To use a port number other than the default, change the connection name field thus:

```
Connection Name OS2ROG3(1822)
```

where 1822 is the port required. (This must be the port that the listener at the receiving end is listening on.)

You can change the default port number by specifying it in the queue manager configuration file (qm.ini) for MQSeries for OS/2 Warp and the registry for WebSphere MQ for Windows:

```
TCP:
  Port=1822
```

Note: To select which TCP/IP port number to use, WebSphere MQ uses the first port number it finds in the following sequence:

1. The port number explicitly specified in the channel definition or command line. This number allows the default port number to be overriden for a channel.
2. The port attribute specified in the TCP stanza in the qm.ini file. This number allows the default port number to be overriden for a queue manager.
3. The value specified for ’MQSeries’ in the ’/etc/services’ file. This number allows the default port number to be overriden for a machine.
4. The default value of 1414. This is the number assigned to WebSphere MQ by the Internet Assigned Numbers Authority.

For more information about the values you set using qm.ini, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

Receiving on TCP

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel.

You should use either the TCP/IP listener (INETD) (not for Windows) or the WebSphere MQ listener.

Using the TCP/IP listener

To use INETD to start channels on OS/2, two files must be configured:

1. Add a line in the TCPIP\ETC\SERVICES file:

   ```
   MQSeries      1414/tcp
   ```

where 1414 is the port number required for WebSphere MQ. You can change this but it must match the port number specified at the sending end.

2. Add a line to the TCPIP\ETC\INETD.LST file:

   ```
   MQSeries      tcp C:\MQM\BIN\AMQCRSTA [-m QMName]
   ```

   The last part in square brackets is optional and is not required for the default queue manager. If your MQSeries for OS/2 Warp is installed on a different drive, replace the C: above with the correct drive letter.

It is possible to have more than one queue manager on the machine. You must add a line to each of the two files, as above, for each of the queue managers. For example:

```
MQSeries2     1822/tcp
```

Now stop, and then start the inetd program, before continuing.

Using the TCP listener backlog option

When receiving on TCP, a maximum number of outstanding connection requests is set. This can be considered a *backlog* of requests waiting on the TCP port for the listener to accept the request. The default listener backlog values are shown in Table 12.

Table 12. Default outstanding connection requests on OS/2 and Windows

Platform	Default listener backlog value
OS/2 Warp	10
Windows Server	100
Windows Workstation	100

If the backlog reaches the values shown in Table 12, the TCP/IP connection is rejected and the channel will not be able to start.

For MCA channels, this results in the channel going into a RETRY state and retrying the connection at a later time.

For client connections, the client receives an MQRC_Q_MGR_NOT_AVAILABLE reason code from MQCONN and should retry the connection at a later time.

However, to avoid this error, you can add an entry in the qm.ini file or in the registry for Windows:

```
TCP:
ListenerBacklog = n
```

This overrides the default maximum number of outstanding requests (see Table 12) for the TCP/IP listener.

Note: Some operating systems support a larger value than the default. If necessary, this can be used to avoid reaching the connection limit.

To run the listener with the backlog option switched on, use the `RUNMQLSR -b` command. For information about the `RUNMQLSR` command, see the *WebSphere MQ System Administration Guide* book.

Defining a TCP connection

Using the WebSphere MQ listener

To run the Listener supplied with WebSphere MQ, that starts new channels as threads, use the RUNMQLSR command. For example:

```
RUNMQLSR -t tcp [-m QMNAME] [-p 1822]
```

The square brackets indicate optional parameters; `QMNAME` is not required for the default queue manager, and the port number is not required if you are using the default (1414).

For the best performance, run the WebSphere MQ listener as a trusted application as described in “Running channels and listeners as trusted applications” on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.

You can stop all WebSphere MQ listeners running on a queue manager that is inactive, using the command:

```
ENDMQLSR [-m QMNAME]
```

If you do not specify a queue manager name, the default queue manager is assumed.

Using the TCP/IP SO_KEEPALIVE option

If you want to use the SO_KEEPALIVE option (as discussed in “Checking that the other end of the channel is still available” on page 66) you need to add the following entry to your queue manager configuration file (qm.ini):

```
TCP:
   KeepAlive=yes
```

If you are using OS/2, you must then issue the following command:

```
  inetcfg  keepalive=value
```

where `value` is the time interval in minutes.

On Windows, the TCP configuration registry value for KeepAliveTime controls the interval that elapses before the connection will be checked. The default is two hours. For information about changing this value, see the Microsoft article *TCP/IP and NBT Configuration Parameters for Windows NT 3.5* (PSS ID number Q120642).

Defining an LU 6.2 connection

SNA must be configured so that an LU 6.2 conversation can be established between the two machines. Then proceed as follows.

See the *Multiplatform APPC Configuration Guide* for OS/2 examples, and the following table for information.

Table 13. Settings on the local OS/2 or Windows system for a remote queue manager platform

Remote platform	TPNAME	TPPATH
z/OS or OS/390 or MVS/ESA without CICS	The same as in the corresponding side information on the remote queue manager.	-
z/OS or OS/390 or MVS/ESA using CICS	CKRC (sender) CKSV (requester) CKRC (server)	-

Table 13. Settings on the local OS/2 or Windows system for a remote queue manager platform (continued)

Remote platform	TPNAME	TPPATH
OS/400	The same as the compare value in the routing entry on the OS/400 system.	-
OS/2	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file.	<drive>:\mqm\bin\amqcrs6a
UNIX systems	The same as in the corresponding side information on the remote queue manager.	`mqmtop`/bin/amqcrs6a
Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows.	<drive>:\mqm\bin\amqcrs6a

If you have more than one queue manager on the same machine, ensure that the TPnames in the channel definitions are unique.

Sending end for OS/2

Establish a valid session between the two machines. The local LU that WebSphere MQ uses is decided in the following order:

1. Specify the LU that will be used. In the queue manager configuration file (qm.ini), under the LU 6.2 section add the line:

   ```
   LOCALLU = Your_LU_Name
   ```

   For more information about the values you set using qm.ini, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.
2. Specify the environment variable:

   ```
   APPNLLU = Your_LU_Name
   ```
3. If this has not been specified, your default LU will be used.

When you define a WebSphere MQ channel that will use the LU 6.2 connection, the Connection name (CONNAME) channel attribute specifies the fully-qualified name of the partner LU. as defined in the local Communications Manager/2 profile.

SECURITY PROGRAM is always used when WebSphere MQ attempts to establish an SNA session.

Sending end for Windows

Create a CPI-C side object (symbolic destination) from the administration application of the LU 6.2 product you are using, and enter this name in the Connection name field in the channel definition. Also create an LU 6.2 link to the partner.

In the CPI-C side object enter the partner LU Name at the receiving machine, the TP Name and the Mode Name. For example:

```
Partner LU Name              OS2ROG2
Partner TP Name              recv
Mode Name                    #INTER
```

Receiving on LU 6.2

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel. You start this listener program with the RUNMQLSR command, giving the TpName to listen on. Alternatively, you can use Attach Manager in Communications Manager/2 for OS/2, or TpStart under SNA Server for Windows.

Using the RUNMQLSR command

Example of the command to start the listener:

```
RUNMQLSR -t LU62 -n RECV [-m QMNAME]
```

where `RECV` is the TpName that is specified at the other (sending) end as the "TpName to start on the remote side". The last part in square brackets is optional and is not required for the default queue manager.

It is possible to have more than one queue manager running on one machine. You must assign a different TpName to each queue manager, and then start a listener program for each one. For example:

```
RUNMQLSR -t LU62 -m QM1 -n TpName1
RUNMQLSR -t LU62 -m QM2 -n TpName2
```

For the best performance, run the WebSphere MQ listener as a trusted application as described in "Running channels and listeners as trusted applications" on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.

You can stop all WebSphere MQ listeners running on a queue manager that is inactive, using the command:

```
ENDMQLSR [-m QMNAME]
```

If you do not specify a queue manager name, the default queue manager is assumed.

Using Communications Manager/2 on OS/2

If you are going to use Attach Manager in Communications Manager/2 to start the listener program, you must specify the *Program parameter string* or *parm_string* in addition to the TPNAME and TPPATH.

You can do this using the panel configuration in Communications Manager/2 or, alternatively, you can edit your NDF file directly (see the heading "Define Transaction Programs" in the *Multiplatform APPC Configuration Guide*).

Panel configuration: These are the entries required on the TP definition panel:

```
Transaction Program (TP) name  :  AMQCRS6A
OS/2 program path and file name:  c:\mqm\bin\amqcrs6a.exe
Program parameter string       :  -n AMQCRS6A
```

NDF file configuration: Your node definitions file (.ndf) must contain a **define_tp** command. The following example shows what must be included:

```
define_tp
  tp_name(AMQCRS6A)
  filespec(c:\mqm\bin\amqcrs6a.exe)
  parm_string(-n AMQCRS6A -m QM1)
```

Using Microsoft SNA Server on Windows

You can use TpSetup (from the SNA Server SDK) to define an invokable TP that then drives amqcrs6a.exe, or you can set various registry values manually. The parameters that should be passed to amqcrs6a.exe are:

```
  -m QM -n TpName
```

where `QM` is the Queue Manager name and `TpName` is the TP Name. See the *Microsoft SNA Server APPC Programmers Guide* or the *Microsoft SNA Server CPI-C Programmers Guide* for more information.

Defining a NetBIOS connection

WebSphere MQ uses three types of NetBIOS resource when establishing a NetBIOS connection to another WebSphere MQ product: sessions, commands, and names. Each of these resources has a limit, which is established either by default or by choice during the installation of NetBIOS.

Each running channel, regardless of type, uses one NetBIOS session and one NetBIOS command. The IBM NetBIOS implementation allows multiple processes to use the same local NetBIOS name. Therefore, only one NetBIOS name needs to be available for use by WebSphere MQ. Other vendors' implementations, for example Novell's NetBIOS emulation, require a different local name per process. Verify your requirements from the documentation for the NetBIOS product you are using.

In all cases, ensure that sufficient resources of each type are already available, or increase the maximums specified in the configuration. Any changes to the values will require a system restart.

During system startup, the NetBIOS device driver displays the number of sessions, commands, and names available for use by applications. These resources are available to any NetBIOS-based application that is running on the same system. Therefore, it is possible for other applications to consume these resources before WebSphere MQ needs to acquire them. Your LAN network administrator should be able to clarify this for you.

Defining the WebSphere MQ local NetBIOS name

The local NetBIOS name used by WebSphere MQ channel processes can be specified in three ways. In order of precedence they are:

1. The value specified in the `-l` parameter of the RUNMQLSR command, for example:
   ```
   RUNMQLSR -t NETBIOS -l my_station
   ```
2. The MQNAME environment variable whose value is established by the command:
   ```
   SET MQNAME=my_station
   ```

   You can set the MQNAME value for each process. Alternatively, you may set it at a system level — in the CONFIG.SYS file on OS/2 or in the Windows registry.

Defining a NetBIOS connection

If you are using a NetBIOS implementation that requires unique names, you must issue a SET™ MQNAME command in each window in which a WebSphere MQ process is started. The MQNAME value is arbitrary but it must be unique for each process.

3. The NETBIOS stanza in the queue manager configuration file qm.ini or in the Windows registry. For example:

```
NETBIOS:

  LocalName=my_station
```

Notes:

1. Due to the variations in implementation of the NetBIOS products supported, you are advised to make each NetBIOS name unique in the network. If you do not, unpredictable results may occur. If you have problems establishing a NetBIOS channel and there are error messages in the queue-manager error log showing a NetBIOS return code of X'15', review your use of NetBIOS names.
2. On Windows you cannot use your machine name as the NetBIOS name because Windows already uses it.
3. Sender channel initiation requires that a NetBIOS name be specified either via the MQNAME environment variable or the LocalName in the qm.ini file or in the Windows registry.

Establishing the queue manager NetBIOS session, command, and name limits

The queue manager limits for NetBIOS sessions, commands, and names can be specified in two ways. In order of precedence they are:

1. The values specified in the RUNMQLSR command:

```
-s  Sessions
-e  Names
-o  Commands
```

   If the -m operand is not specified in the command, the values will apply only to the default queue manager.

2. The NETBIOS stanza in the queue manager configuration file qm.ini or in the Windows registry. For example:

```
NETBIOS:

  NumSess=Qmgr_max_sess
  NumCmds=Qmgr_max_cmds
  NumNames=Qmgr_max_names
```

Establishing the LAN adapter number

For channels to work successfully across NetBIOS, the adapter support at each end must be compatible. WebSphere MQ allows you to control the choice of adapter number (lana) by using the AdapterNum value in the NETBIOS stanza of your qm.ini file or the Windows registry and by specifying the `-a` parameter on the runmqlsr command.

The default LAN adapter number used by WebSphere MQ for NetBIOS connections is 0. Verify the adapter number being used on your system as follows:

On OS/2 the adapter number used by NetBIOS on your system can be viewed in the PROTOCOL.INI file or the LANTRAN.LOG file found in the \IBMCOM directory.

On Windows, view the information displayed in the NetBIOS Interface pop-up window. This is accessible by selecting the Network option, which is one of many options displayed when opening the Control icon from the Main Window. Windows can assign multiple 'logical' adapter numbers to one physical LAN adapter. The installation default for 'logical' adapter number 0 is NetBIOS running over a TCP network, not a Token-Ring network. This is not necessary for WebSphere MQ. You should select logical adapter number 1, which is native NetBIOS. WebSphere MQ for Windows uses the 'logical' adapter number for communication.

Specify the correct value in the NETBIOS stanza of the queue manager configuration file, qm.ini, or the Windows registry:

```
NETBIOS:
  AdapterNum=n
```

where n is the correct LAN adapter number for this system.

Initiating the connection

To initiate the connection, follow these steps at the sending end:

1. Define the NetBIOS station name using the MQNAME or LocalName value as described above.
2. Verify the LAN adapter number being used on your system and specify the correct file using the AdapterNum as described above.
3. In the ConnectionName field of the channel definition, specify the NetBIOS name being used by the target listener program. On Windows, NetBIOS channels ***must*** be run as threads. Do this by specifying MCATYPE(THREAD) in the channel definition.

```
DEFINE CHANNEL (chname) CHLTYPE(SDR) +
       TRPTYPE(NETBIOS) +
       CONNAME(your_station) +
       XMITQ(xmitq) +
       MCATYPE(THREAD) +
       REPLACE
```

Target listener

At the receiving end, follow these steps:

1. Define the NetBIOS station name using the MQNAME or LocalName value as described above.
2. Verify the LAN adapter number being used on your system and specify the correct file using the AdapterNum as described above.
3. Define the receiver channel:

```
DEFINE CHANNEL (chname) CHLTYPE(RCVR) +
       TRPTYPE(NETBIOS) +
       REPLACE
```

4. Start the WebSphere MQ listener program to establish the station and make it possible to contact it. For example:

```
RUNMQLSR -t NETBIOS -l your_station [-m qmgr]
```

   This command establishes `your_station` as a NetBIOS station waiting to be contacted. The NetBIOS station name must be unique throughout your NetBIOS network.

Defining a NetBIOS connection

For the best performance, run the WebSphere MQ listener as a trusted application as described in “Running channels and listeners as trusted applications” on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.

You can stop all WebSphere MQ listeners running on a queue manager that is inactive, using the command:

```
ENDMQLSR [-m QMNAME]
```

If you do not specify a queue manager name, the default queue manager is assumed.

Defining an SPX connection

The channel definition at the sending end specifies the address of the target. A listener program must be run at the receiving end.

Sending end

If the target machine is remote, specify the SPX address of the target machine in the Connection name field of the channel definition.

The SPX address is specified in the following form:

```
network.node(socket)
```

where:

network
Is the 4-byte network address of the network on which the remote machine resides,

node Is the 6-byte node address, which is the LAN address of the LAN adapter in the remote machine

socket Is the 2-byte socket number on which the remote machine will listen.

If the local and remote machines are on the same network then the network address need not be specified. If the remote end is listening on the default socket (5E86) then the socket need not be specified.

An example of a fully specified SPX address specified in the CONNAME parameter of an MQSC command is:

```
CONNAME('00000001.08005A7161E5(5E87)')
```

In the default case, where the machines are both on the same network, this becomes:

```
CONNAME(08005A7161E5)
```

The default socket number may be changed by specifying it in the queue manager configuration file (qm.ini) or the Windows registry:

```
SPX:
  Socket=5E87
```

For more information about the values you set using qm.ini or the Windows registry, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

Using the SPX KEEPALIVE option (OS/2 only)

If you want to use the KEEPALIVE option (as discussed in “Checking that the other end of the channel is still available” on page 66) you need to add the following entry to your queue manager configuration file (qm.ini):

```
SPX:
   KeepAlive=yes
```

You can use the timeouts described in “IPX/SPX parameters” on page 142 to adjust the behavior of KEEPALIVE.

Receiving on SPX

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel.

You should use the WebSphere MQ listener.

Using the SPX listener backlog option

When receiving on SPX, a maximum number of outstanding connection requests is set. This can be considered a *backlog* of requests waiting on the SPX port for the listener to accept the request. The default listener backlog values are shown in Table 14.

Table 14. Default outstanding connection requests on OS/2 and Windows

Platform	Default listener backlog value
OS/2 Warp	5
Windows Server	5
Windows Workstation	5

If the backlog reaches the values in Table 14, the reason code, MQRC_Q_MGR_NOT_AVAILABLE is received when trying to connect to the queue manager using MQCONN or MQCONNX. If this happens, it is possible to try to connect again.

However, to avoid this error, you can add an entry in the qm.ini file or in the registry for Windows:

```
SPX:
ListenerBacklog = n
```

This overrides the default maximum number of outstanding requests (see Table 14) for the SPX listener.

Note: Some operating systems support a larger value than the default. If necessary, this can be used to avoid reaching the connection limit.

To run the listener with the backlog option switched on, use the `RUNMQLSR -B` command. For information about the `RUNMQLSR` command, see the *WebSphere MQ System Administration Guide* book.

Using the WebSphere MQ listener

To run the Listener supplied with WebSphere MQ, that starts new channels as threads, use the RUNMQLSR command. For example:

```
RUNMQLSR -t spx [-m QMNAME] [-x 5E87]
```

Defining an SPX connection

The square brackets indicate optional parameters; `QMNAME` is not required for the default queue manager, and the socket number is not required if you are using the default (5E86).

For the best performance, run the WebSphere MQ listener as a trusted application as described in “Running channels and listeners as trusted applications” on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.

You can stop all WebSphere MQ listeners running on a queue manager that is inactive, using the command:

```
ENDMQLSR [-m QMNAME]
```

If you do not specify a queue manager name, the default queue manager is assumed.

IPX/SPX parameters

In most cases the default settings for the IPX/SPX parameters will suit your needs. However, you may need to modify some of them in your environment to tune its use for WebSphere MQ. The actual parameters and the method of changing them varies according to the platform and provider of SPX communications support. The following sections describe some of these parameters, particularly those that may influence the operation of WebSphere MQ channels and client connections.

OS/2

Please refer to the Novell Client for OS/2 documentation for full details of the use and setting of NET.CFG parameters.

The following IPX/SPX parameters can be added to the Novell NET.CFG file, and can affect WebSphere MQ SPX channels and client connections.

IPX:

sockets (range = 9 - 128, default 64)
This specifies the total number of IPX sockets available. WebSphere MQ channels use this resource, so depending on the number of channels and the requirements of other IPX/SPX applications, you may need to increase this value.

SPX:

sessions (default 16)
This specifies the total number of simultaneous SPX connections. Each WebSphere MQ channel or client connection uses one session. You may need to increase this value depending on the number of WebSphere MQ channels or client connections you need to run.

retry count (default = 12)
This controls the number of times an SPX session will resend unacknowledged packets. WebSphere MQ does not override this value.

verify timeout, listen timeout, and abort timeout (milliseconds)
These timeouts adjust the ‘Keepalive’ behavior. If an SPX sending end does not receive anything within the ‘verify timeout’ period, it sends a packet to the receiving end. It then waits for the duration of the ‘listen timeout’ for a response. If it still does not receive a response, it sends another packet and expects a response within the ‘abort timeout’ period.

DOS and Windows 3.1 client

Please refer to the Novell Client for DOS and MS Windows documentation for full details of the use and setting of NET.CFG parameters.

The following IPX/SPX parameters can be added to the Novell NET.CFG file, and can affect WebSphere MQ SPX channels and client connections.

IPX:

sockets (default = 20)
This specifies the total number of IPX sockets available. WebSphere MQ channels use this resource, so depending on the number of channels and the requirements of other IPX/SPX applications, you may need to increase this value.

retry count
This controls the number of times unacknowledged packets will be resent. WebSphere MQ does not override this value.

SPX:

connections (default 15)
This specifies the total number of simultaneous SPX connections. Each WebSphere MQ channel or client connection uses one session. You may need to increase this value depending on the number of WebSphere MQ channels or client connections you need to run.

Windows systems

Please refer to the Microsoft documentation for full details of the use and setting of the NWLink IPX and SPX parameters. The IPX/SPX parameters are in the following paths in the registry:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Service\NWLinkSPX\Parameters
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Service\NWLinkIPX\Parameters
```

Windows 95 and Windows 98

Please refer to the Microsoft documentation for full details of the use and setting of the IPX and SPX parameters. You access them by selecting Network option in the control panel, then double-clicking on **IPX/SPX Compatible Transport**.

Chapter 11. Example configuration - MQSeries for OS/2 Warp

This chapter gives an example of how to set up communication links from MQSeries for OS/2 Warp to WebSphere MQ and MQSeries products on the following platforms:

- Windows systems
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[1]
- Solaris
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

First it describes the parameters needed for an LU 6.2 connection, then it guides you through the following tasks:

- "Establishing an LU 6.2 connection" on page 151
- "Establishing a TCP connection" on page 158
- "Establishing a NetBIOS connection" on page 160
- "Establishing an SPX connection" on page 160

Once the connection is established, you need to define some channels to complete the configuration. This is described in "MQSeries for OS/2 Warp configuration" on page 162.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 15 on page 146 presents a worksheet listing all the parameters needed to set up communication from OS/2 to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

This chapter shows how to use the values on the worksheet for:

- "Defining local node characteristics" on page 151
- "Connecting to a peer system" on page 154
- "Connecting to a host system" on page 156
- "Verifying the configuration" on page 157

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book.

---

[1] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

OS/2 and LU 6.2

The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in "Explanation of terms" on page 149.

Table 15. Configuration worksheet for Communications Manager/2

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
1	Configuration name		**EXAMPLE**	
2	Network ID		**NETID**	
3	Local node name		**OS2PU**	
4	Local node ID (hex)		**05D 12345**	
5	Local node alias name		**OS2PU**	
6	LU name (local)		**OS2LU**	
7	Alias (for local LU name)		**OS2QMGR**	
8	Local transaction program (TP) name		**MQSERIES**	
9	OS/2 program path and file name		**c:\mqm\bin\amqcrs6a.exe**	
10	LAN adapter address		**10005AFC5D83**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
11	Link name		**WINNT**	
12	LAN destination address (hex)	9	**08005AA5FAB9**	
13	Partner network ID	2	**NETID**	
14	Partner node name	3	**WINNTCP**	
15	LU name	5	**WINNTLU**	
16	Alias (for remote LU name)		**NTQMGR**	
17	Mode	17	**#INTER**	
18	Remote transaction program name	7	**MQSERIES**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
11	Link name		**RS6000**	
12	LAN destination address (hex)	8	**123456789012**	
13	Partner network ID	1	**NETID**	
14	Partner node name	2	**AIXPU**	
15	LU name	4	**AIXLU**	
16	Alias (for remote LU name)		**AIXQMGR**	
17	Mode	17	**#INTER**	
18	Remote transaction program name	6	**MQSERIES**	
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
11	Link name		**HPUX**	
12	LAN destination address (hex)	8	**100090DC2C7C**	
13	Partner network ID	4	**NETID**	

Table 15. Configuration worksheet for Communications Manager/2 (continued)

ID	Parameter Name	Reference	Example Used	User Value
14	Partner node name	2	**HPUXPU**	
15	LU name	5	**HPUXLU**	
16	Alias (for remote LU name)		**HPUXQMGR**	
17	Mode	6	**#INTER**	
18	Remote transaction program name	7	**MQSERIES**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
11	Link name		**GIS**	
12	LAN destination address (hex)	8	**10007038E86B**	
13	Partner network ID	2	**NETID**	
14	Partner node name	3	**GISPU**	
15	LU name	4	**GISLU**	
16	Alias (for remote LU name)		**GISQMGR**	
17	Mode	15	**#INTER**	
18	Remote transaction program name	5	**MQSERIES**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
11	Link name		**SOLARIS**	
12	LAN destination address (hex)	5	**08002071CC8A**	
13	Partner network ID	2	**NETID**	
14	Partner node name	3	**SOLARPU**	
15	LU name	7	**SOLARLU**	
16	Alias (for remote LU name)		**SOLQMGR**	
17	Mode	17	**#INTER**	
18	Remote transaction program name	8	**MQSERIES**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
11	Link name		**LINUX**	
12	LAN destination address (hex)	8	**08005AC6DF33**	
13	Partner network ID	4	**NETID**	
14	Partner node name	2	**LINUXPU**	
15	LU name	5	**LINUXLU**	
16	Alias (for remote LU name)		**LXQMGR**	
17	Mode	6	**#INTER**	
18	Remote transaction program name	7	**MQSERIES**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
11	Link name		**AS400**	
12	LAN destination address (hex)	4	**10005A5962EF**	

Table 15. Configuration worksheet for Communications Manager/2 (continued)

ID	Parameter Name	Reference	Example Used	User Value
13	Partner network ID	1	**NETID**	
14	Partner node name	2	**AS400PU**	
15	LU name	3	**AS400LU**	
16	Alias (for remote LU name)		**AS4QMGR**	
17	Mode	17	**#INTER**	
18	Remote transaction program name	8	**MQSERIES**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
11	Link name		**HOST0001**	
12	LAN destination address (hex)	8	**400074511092**	
13	Partner network ID	2	**NETID**	
14	Partner node name	3	**MVSPU**	
15	LU name	4	**MVSLU**	
16	Alias (for remote LU name)		**MVSQMGR**	
17	Mode	6	**#INTER**	
18	Remote transaction program name	7	**MQSERIES**	
Connection to a z/OS system using a generic interface The values in this section of the table must match those used in Table 44 on page 492, as indicated.				
11	Link name		**HOST0001**	
12	LAN destination address (hex)	8	**400074511092**	
13	Partner network ID	2	**NETID**	
14	Partner node name	3	**MVSPU**	
15	LU name	10	**MVSGR**	
16	Alias (for remote LU name)		**MVSQMGR**	
17	Mode	6	**#INTER**	
18	Remote transaction program name	7	**MQSERIES**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
11	Link name		**HOST0001**	
12	LAN destination address (hex)	5	**400074511092**	
13	Partner network ID	1	**NETID**	
14	Partner node name	2	**VSEPU**	
15	LU name	3	**VSELU**	
16	Alias (for remote LU name)		**VSEQMGR**	
17	Mode		**#INTER**	
18	Remote transaction program name	4	**MQ01**	**MQ01**

Explanation of terms

1 Configuration name
This is the name of the OS/2 file that will hold the configuration.

If you are adding to or modifying an existing configuration it will be the name previously specified.

If you are creating a new configuration then you can specify any 8-character name that obeys the normal rules for file naming.

2 Network ID
This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network ID works with the local node name to uniquely identify a system. Your network administrator will tell you the value.

3 Local node name
This is the unique Control Point name for this workstation. Your network administrator will assign this to you.

4 Local node ID (hex)
This is a unique identifier for this workstation. On other platforms it is often referred to as the exchange ID (XID). Your network administrator will assign this to you.

5 Local node alias name
This is the name by which your local node will be known within this workstation. This value is not used elsewhere, but it is recommended that it be the same as **3**, the local node name.

6 LU name (local)
An LU manages the exchange of data between systems. The local LU name is the name of the LU on your system. Your network administrator will assign this to you.

7 Alias (for local LU name)
The name by which your local LU will be known to your applications. You choose this name yourself. It can be 1-8 characters long. This value is used during WebSphere MQ configuration, when entries are added to the qm.ini file.

8 Local transaction program (TP) name
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. The TP name is also used during WebSphere MQ configuration, when entries are added to the qm.ini file. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 13 on page 134 for more information.

9 OS/2 program path and file name
This is the path and name of the actual program to be run when a conversation has been initiated with this workstation. The example shown on the worksheet assumes that WebSphere MQ is installed in the default directory, c:\mqm. The configuration pairs this name with the symbolic name **8**.

10 LAN adapter address

This is the address of your token-ring card. When using the default address, the exact value can be found in the LANTRAN.LOG file found in the \IBMCOM directory.

For example:

```
Adapter 0 is using node address 10005AFC5D83
```

11 Link name

This is a meaningful symbolic name by which the connection to a partner node is known. It is used only inside Communications Manager/2 setup and is specified by you. It can be 1-8 characters in length.

16 Alias (for remote LU name)

This is a value known only on this workstation and is used to represent the fully qualified partner LU name. You supply the value.

17 Mode

This is the name given to the set of parameters that control the APPC conversation. This name must be defined at each point in the network between the local and partner LUs. Your network administrator will assign this to you.

Establishing an LU 6.2 connection

This section describes how to establish an LU 6.2 connection using Communications Manager/2 Version 1.11. You may use any of the supported LU 6.2 products for this platform. The panels would look different from those shown but most of their content would be similar.

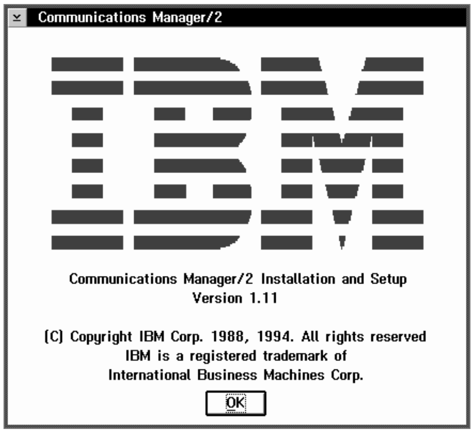
Defining local node characteristics

To set up the local node you need to perform these tasks:

1. Configure a DLC.
2. Configure the local node.
3. Add a local LU.
4. Add a transaction program definition.
5. Configure a mode.

To define the local node characteristics:

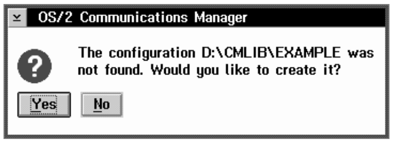
1. Start the Communications Manager/2 Installation and Setup program by typing CMSETUP on an OS/2 command line, and pressing Enter.



Communications Manager/2 Installation and Setup
Version 1.11

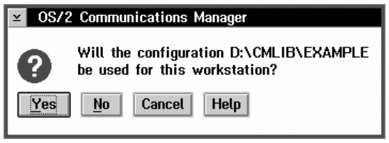
(C) Copyright IBM Corp. 1988, 1994. All rights reserved
IBM is a registered trademark of
International Business Machines Corp.

2. Press **OK** to continue.
3. Press **Setup** to create or modify a configuration.
4. Specify a name (up to 8-characters) for a new configuration file **1**, or select the one that you wish to update. The following examples guide you through the creation of a new configuration file. Treat them as a guide if you are modifying an existing configuration.



The configuration D:\CMLIB\EXAMPLE was not found. Would you like to create it?

5. Press **Yes**.



Will the configuration D:\CMLIB\EXAMPLE be used for this workstation?

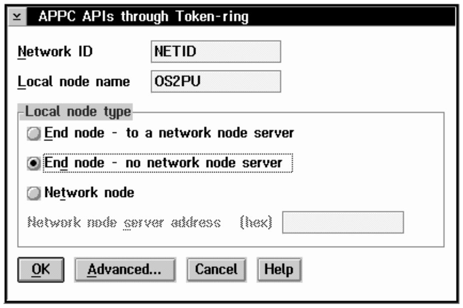
6. Press **Yes**.

   In this example we set up connections using APPC over Token-ring. The following screen appears in two stages. When you first see it, highlight the line:

   `APPC APIs through Token-ring`

   The complete screen appears as shown below.
7. Press **Configure...**.

Configuring a DLC



APPC APIs through Token-ring

Network ID: NETID

Local node name: OS2PU

Local node type

○ End node - to a network node server

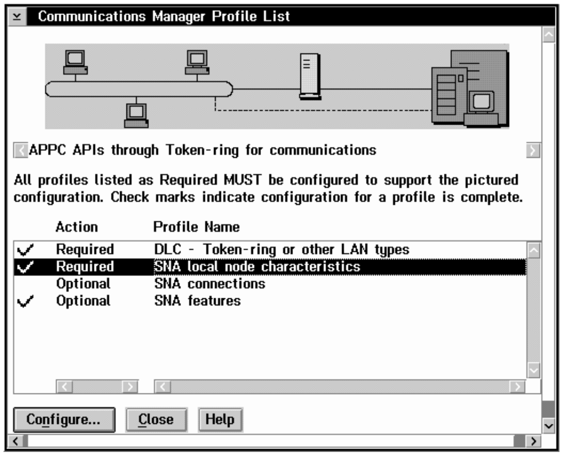
● End node - no network node server

○ Network node

Network node server address (hex)

1. Complete the values for **Network ID** (2) and **Local node name** (3).
   a.
   b. Select **End node - no network node server**.
   c. Click on **Advanced**.
   d. Select **DLC - Token-ring or other LAN types** and press **Configure...**.
   e. Enter the value for **C&SM LAN ID**. This should be the same value as the Network ID entered earlier (2).
   f. Leave the remaining default values and press **OK**.

Configuring the local node



Communications Manager Profile List

APPC APIs through Token-ring for communications

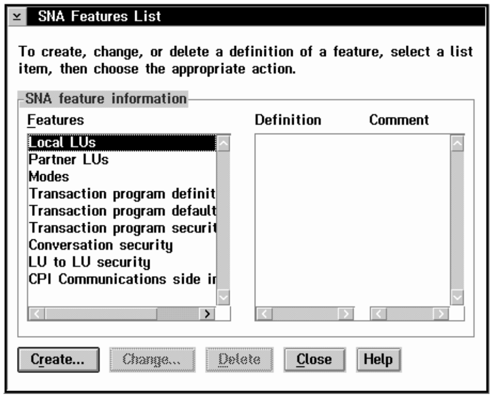
All profiles listed as Required MUST be configured to support the pictured configuration. Check marks indicate configuration for a profile is complete.

	Action	Profile Name
✓	Required	DLC - Token-ring or other LAN types
✓	Required	SNA local node characteristics
	Optional	SNA connections
✓	Optional	SNA features

1. Select **SNA local node characteristics** and press **Configure...**.
2. Complete the value for **Local node ID (hex)** (4) using the values in your configuration worksheet.
3. Press **Options...**
4. Complete the value for **Local node alias name** (5) and press **OK**.
5. Press **OK**.

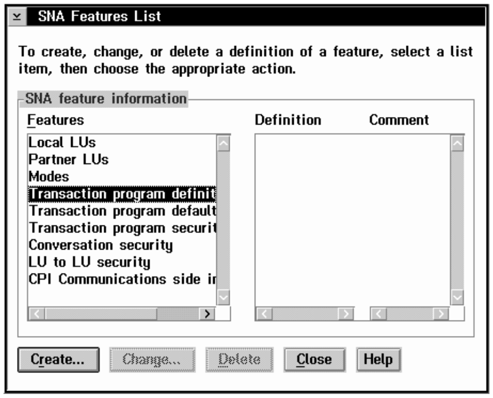
6. Select **SNA features** and press **Configure...**.

Adding a local LU


SNA Features List
To create, change, or delete a definition of a feature, select a list item, then choose the appropriate action.
SNA feature information
Features
Definition
Comment
Local LUs
Partner LUs
Modes
Transaction program definit
Transaction program default
Transaction program securit
Conversation security
LU to LU security
CPI Communications side ir
Create...
Change...
Delete
Close
Help

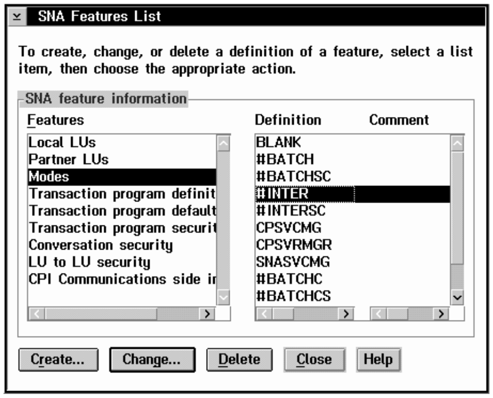
1. Select **Local LUs** and press **Create...**.
2. Complete the fields **LU name** (**6**) and **Alias** (**7**).
3. Press **OK**.

Adding a transaction program definition


SNA Features List
To create, change, or delete a definition of a feature, select a list item, then choose the appropriate action.
SNA feature information
Features
Definition
Comment
Local LUs
Partner LUs
Modes
Transaction program definit
Transaction program default
Transaction program securit
Conversation security
LU to LU security
CPI Communications side ir
Create...
Change...
Delete
Close
Help

1. Select **Transaction program definitions** and press **Create...**.
2. Complete the values for **Transaction program (TP) name** (**8**) and **OS/2 program path and file name** (**9**). If you are going to use Attach Manager to start the listener program, specify the **Program parameter string**, for example `-m OS2 -n MQSERIES`.
3. Press **Continue...**.
4. Specify that the program is to be run in the **Background** and that it is to be **Non-queued, Attach Manager started**.
5. Press **OK**.

Configuring a mode



SNA Features List

To create, change, or delete a definition of a feature, select a list item, then choose the appropriate action.

SNA feature information

Features

Local LUs
Partner LUs
Modes
Transaction program definit
Transaction program default
Transaction program securit
Conversation security
LU to LU security
CPI Communications side ir

Definition

BLANK
#BATCH
#BATCHSC
#INTER
#INTERSC
CPSVCMG
CPSVRMGR
SNASVCMG
#BATCHC
#BATCHCS

Comment

1. Select **Modes** and **#INTER** and press **Change...**.
2. Ensure that the default values match those shown above and press **Cancel**.
3. Press **Close** to close the SNA Features List window.

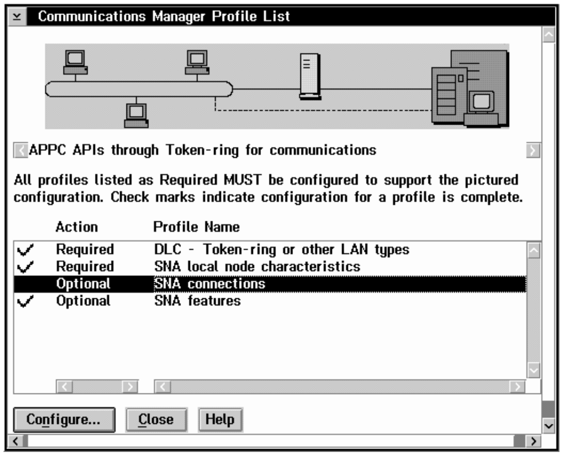
Local configuration is complete.

The following sections describe how to create connections to other nodes.

Connecting to a peer system

To set up a connection to a peer system the steps are:
1. Adding a peer connection
2. Defining a partner LU

Start from the Communications Manager Profile List panel.



Communications Manager Profile List

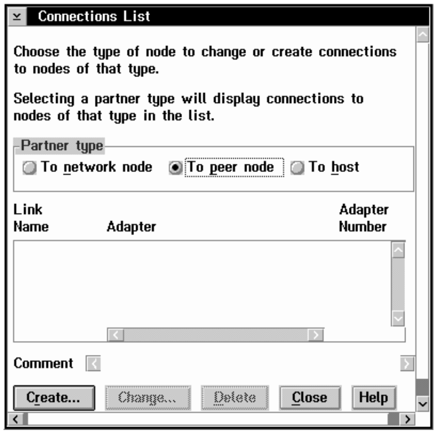
APPC APIs through Token-ring for communications

All profiles listed as Required MUST be configured to support the pictured configuration. Check marks indicate configuration for a profile is complete.

	Action	Profile Name
✓	Required	DLC - Token-ring or other LAN types
✓	Required	SNA local node characteristics
	Optional	SNA connections
✓	Optional	SNA features

Select **SNA connections** and press **Configure...**.

Adding a peer connection


Connections List

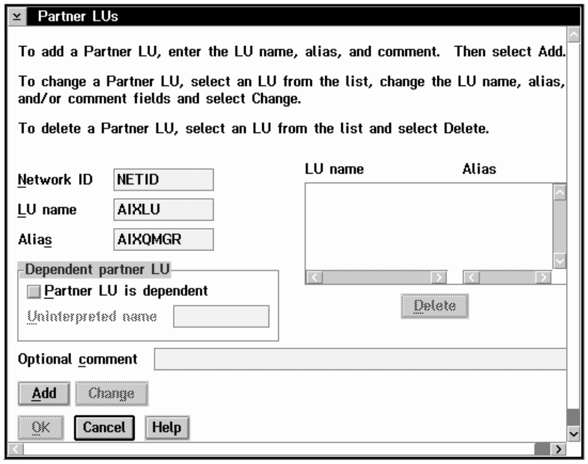
Choose the type of node to change or create connections to nodes of that type.

Selecting a partner type will display connections to nodes of that type in the list.

Partner type: ○ To network node ● To peer node ○ To host

1. Select **To peer node** and press **Create...**.
2. Select **Token-ring or other LAN types** and press **Continue...**.
3. Specify a **Link name** (11) and check **Activate at startup**.
4. Complete the fields **LAN destination address (hex)** (12), **Partner network ID** (13), and **Partner node name** (14).
5. Press **Define Partner LUs...**.

Defining a partner LU


Partner LUs

To add a Partner LU, enter the LU name, alias, and comment. Then select Add.

To change a Partner LU, select an LU from the list, change the LU name, alias, and/or comment fields and select Change.

To delete a Partner LU, select an LU from the list and select Delete.

Network ID: NETID

LU name: AIXLU

Alias: AIXQMGR

Dependent partner LU: ☐ Partner LU is dependent

1. Complete the fields **Network ID** (13), **LU name** (15), and **Alias** (16).
2. Press **Add**.
3. Press **OK**.
4. Press **OK**.
5. Press **Close**.

If you have connections to make to other platforms repeat this section as appropriate.

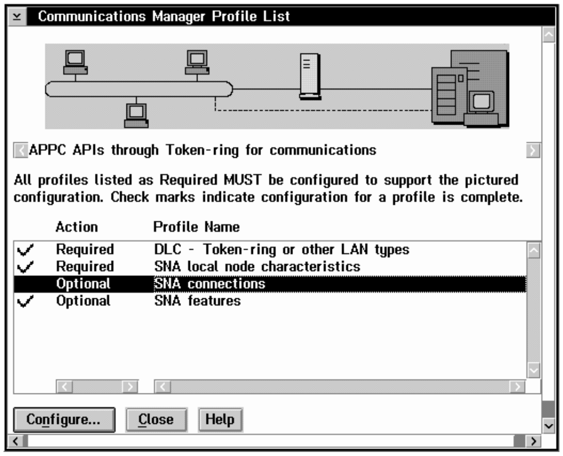
If you have made all the connections you require proceed to “Verifying the configuration” on page 157 to complete Communications Manager/2 configuration.

Connecting to a host system

To set up a connection to a host system, for example z/OS or VSE/ESA, the steps are:

1. Adding a host connection
2. Defining a partner LU

Start from the Communications Manager Profile List panel.



Communications Manager Profile List

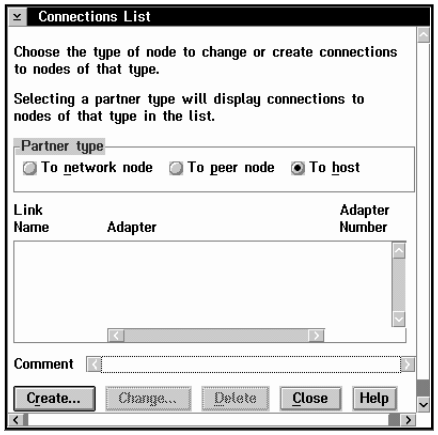
APPC APIs through Token-ring for communications

All profiles listed as Required MUST be configured to support the pictured configuration. Check marks indicate configuration for a profile is complete.

	Action	Profile Name
✓	Required	DLC - Token-ring or other LAN types
✓	Required	SNA local node characteristics
	Optional	SNA connections
✓	Optional	SNA features

Select **SNA connections** and press **Configure...**.

Adding a host connection



Connections List

Choose the type of node to change or create connections to nodes of that type.

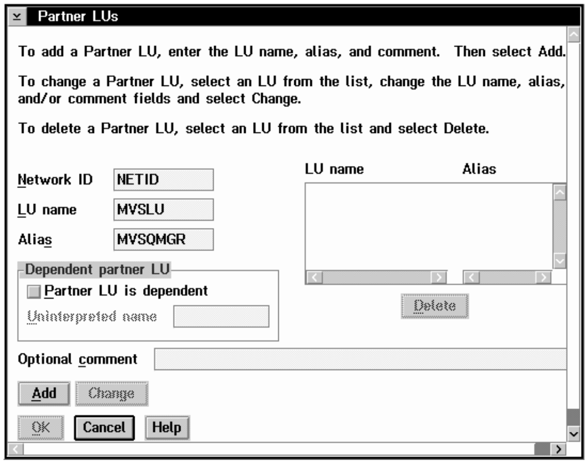
Selecting a partner type will display connections to nodes of that type in the list.

Partner type

○ To network node ○ To peer node ● To host

1. Select **To host** and press **Create...**.
2. Select **Token-ring or other LAN types** and press **Continue...**.
3. Specify a **Link name** (**11**) and check **Activate at startup**.
4. Complete the fields **LAN destination address (hex)** (**12**), **Partner network ID** (**13**), and **Partner node name** (**14**).
5. Press **Define Partner LUs...**.

Defining a partner LU



To add a Partner LU, enter the LU name, alias, and comment. Then select Add.

To change a Partner LU, select an LU from the list, change the LU name, alias, and/or comment fields and select Change.

To delete a Partner LU, select an LU from the list and select Delete.

Network ID: NETID
LU name: MVSLU
Alias: MVSQMGR

Dependent partner LU
☐ Partner LU is dependent
Uninterpreted name:

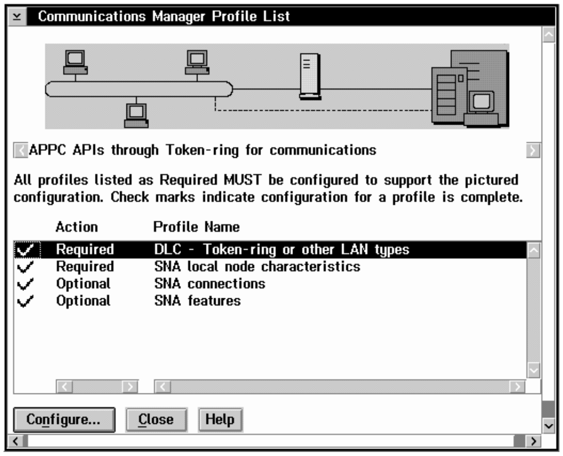
Optional comment:

1. Complete the fields **Network ID** (13), **LU name** (15), and **Alias** (16).
2. Press **Add**
3. Press **OK**.
4. Press **OK**.
5. Press **Close**.

If you have connections to make to other platforms, proceed to the appropriate section.

If you have made all the connections you require proceed to “Verifying the configuration” to complete Communications Manager/2 configuration.

Verifying the configuration



APPC APIs through Token-ring for communications

All profiles listed as Required MUST be configured to support the pictured configuration. Check marks indicate configuration for a profile is complete.

	Action	Profile Name
✓	Required	DLC - Token-ring or other LAN types
✓	Required	SNA local node characteristics
✓	Optional	SNA connections
✓	Optional	SNA features

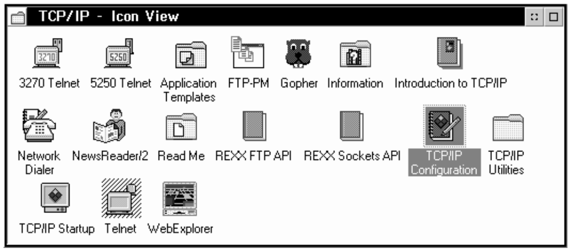
1. Press **Close** to close the Communications Manager Profile List panel.
2. Press **Close**.
3. Press **Yes**.
4. Press **OK**.
5. Press **Close**.

What next?

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “MQSeries for OS/2 Warp configuration” on page 162.

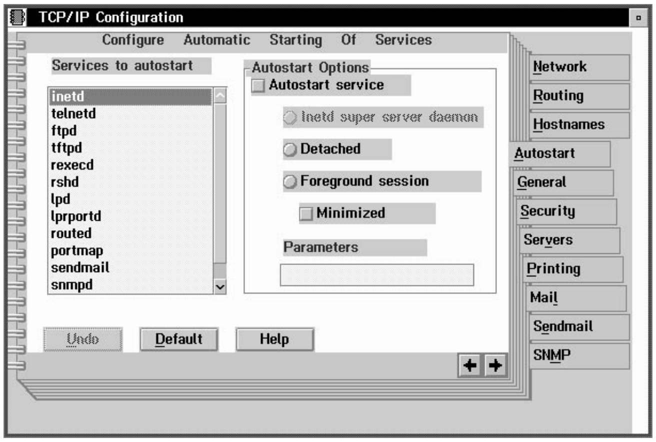
Establishing a TCP connection

1. From your desktop, open the TCP Icon View.



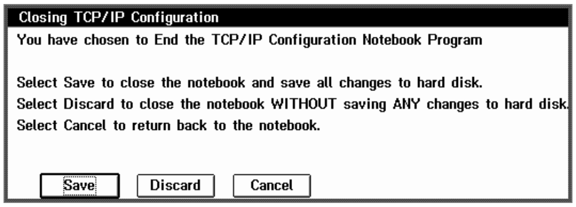
   The icons you see may vary from those shown above, depending on how you have installed the product.

2. Start the TCP Configuration program.
3. On the Network page, ensure that the **IP Address** and **Subnet Mask** fields have been completed.
4. Select the **Autostart** tab.



5. Ensure that **inetd** is selected.
6. Select the **Hostnames** tab.
7. Ensure that **This machine’s hostname**, **Local domain name**, and **Nameserver address** have been completed.
8. Close the configuration notebook.

   Note: You may see a panel warning that the inetd superserver has been selected without selecting servers. Press **No** to indicate that you do not wish to correct this.



Closing TCP/IP Configuration

You have chosen to End the TCP/IP Configuration Notebook Program

Select Save to close the notebook and save all changes to hard disk.
Select Discard to close the notebook WITHOUT saving ANY changes to hard disk.
Select Cancel to return back to the notebook.

9. Press **Save** to save the changes made.
10. Verify that the \MPTN\ETC\SERVICES file, which is located on the drive where you installed IBM Multi-Protocol Transport Services (MPTS), contains the following line:

    ```
    MQSeries 1414/tcp # MQSeries Chan'l Listener
    ```

    If this line is not present, add it.
11. Verify that the file \MPTN\ETC\INETD.LST, located on the same drive contains the following line:

    ```
    MQSeries tcp c:\mqm\bin\amqcrsta [-m QMName]
    ```

    If this line is not present, add it. Note that this assumes you have installed WebSphere MQ on the default drive and in the default directories.
12. (Re)start the inetd superserver, either by rebooting OS/2 or by stopping any existing inetd superserver and then entering `start inetd` on the command line.

What next?

The TCP connection is now established. You are ready to complete the configuration. Go to “MQSeries for OS/2 Warp configuration” on page 162.

Establishing a NetBIOS connection

A NetBIOS connection is initiated from a queue manager that uses the ConnectionName parameter on its channel definition to connect to a target listener. To set up a NetBIOS connection, follow these steps:

1. At each end of the channel specify the local NetBIOS name to be used by the WebSphere MQ channel processes, in the queue manager configuration file qm.ini or in the registry for Windows systems. For example, the NETBIOS stanza in qm.ini at the sending end might look like this:

   ```
   NETBIOS:
    LocalName=O2NETB1
   ```

   and at the receiving end:

   ```
   NETBIOS:
    LocalName=O2NETB2
   ```

2. At each end of the channel, look at the LANTRAN.LOG file in the \IBMCOM directory to see what LAN adapter number is used by NetBIOS on your system. If it is not 0, which WebSphere MQ uses by default, specify the correct value in the NETBIOS stanza of the qm.ini file or of the registry for Windows systems. For example:

   ```
   NETBIOS:
    AdapterNum=1
   ```

3. At the sending end, define a channel specifying the NetBIOS name being used at the other end of the channel. For example:

   ```
   DEFINE CHANNEL (OS2.WINNT.NET) CHLTYPE(SDR) +
          TRPTYPE(NETBIOS) +
          CONNAME(O2NETB2) +
          XMITQ(WINNT) +
          REPLACE
   ```

4. At the receiving end, define the corresponding receiver channel. For example:

   ```
   DEFINE CHANNEL (OS2.WINNT.NET) CHLTYPE(RCVR) +
          TRPTYPE(NETBIOS) +
          REPLACE
   ```

5. At the receiving end, start the WebSphere MQ listener:

   ```
   runmqlsr -t netbios
   ```

   Optionally you may specify values for the queue manager name, NetBIOS local name, number of sessions, number of names, and number of commands. See “Defining a NetBIOS connection” on page 137 for more information about setting up NetBIOS connections.

Establishing an SPX connection

This section discusses the following topics:
- IPX/SPX parameters
- SPX addressing
- Using the SPX KEEPALIVE option
- Receiving on SPX

IPX/SPX parameters

In most cases the default settings for the IPX/SPX parameters will suit your needs. However, you may need to modify some of them in your environment to tune its use for WebSphere MQ. The actual parameters and the method of changing them varies according to the platform and provider of SPX communications support. The following sections describe some of these parameters, particularly those that may influence the operation of WebSphere MQ channels and client connections.

Please refer to the Novell Client for OS/2 documentation for full details of the use and setting of NET.CFG parameters.

The following IPX/SPX parameters can be added to the Novell NET.CFG file, and can affect WebSphere MQ SPX channels and client connections.

IPX

sockets (range = 9 - 128, default 64)
This specifies the total number of IPX sockets available. WebSphere MQ channels use this resource, so depending on the number of channels and the requirements of other IPX/SPX applications, you may need to increase this value.

SPX

sessions (default 16)
This specifies the total number of simultaneous SPX connections. Each WebSphere MQ channel or client connection uses one session. You may need to increase this value depending on the number of WebSphere MQ channels or client connections you need to run.

retry count (default = 12)
This controls the number of times an SPX session will resend unacknowledged packets. WebSphere MQ does not override this value.

verify timeout, listen timeout, and abort timeout (milliseconds)
These timeouts adjust the 'Keepalive' behavior. If an SPX sending end does not receive anything within the 'verify timeout' period, it sends a packet to the receiving end. It then waits for the duration of the 'listen timeout' for a response. If it still does not receive a response, it sends another packet and expects a response within the 'abort timeout' period.

SPX addressing

WebSphere MQ uses the SPX address of each machine to establish connectivity. The SPX address is specified in the following form:

```
network.node(socket)
```

where

network	Is the 4-byte network address of the network on which the remote machine resides,
node	Is the 6-byte node address, which is the LAN address of the LAN adapter in the remote machine, and
socket	Is the 2-byte socket number on which the remote machine will listen.

The default socket number used by WebSphere MQ is 5E86. You can change the default socket number by specifying it in the queue manager configuration file qm.ini or the Windows systems registry. If you have taken the default options for installation, the qm.ini file for queue manager OS2 is found in c:\mqm\qmgs\os2. The lines in qm.ini might read:

```
SPX:
  SOCKET=n
```

OS/2 and SPX

For more information about values you can set in qm.ini, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

The SPX address is later specified in the CONNAME parameter of the sender channel definition. If the WebSphere MQ systems being connected reside on the same network, the network address need not be specified. Similarly, if the remote system is listening on the default socket number (5E86), it need not be specified. A fully qualified SPX address in the CONNAME parameter would be:

```
CONNAME('network.node(socket)')
```

but if the systems reside on the same network and the default socket number is used, the parameter would be:

```
CONNAME(node)
```

A detailed example of the channel configuration parameters is given in “MQSeries for OS/2 Warp configuration”.

Using the SPX KEEPALIVE option

If you want to use the KEEPALIVE option you need to add the following entry to your queue manager configuration file (qm.ini) or the Windows systems registry:

```
SPX:
   KeepAlive=yes
```

You can use the timeout parameters described above to adjust the behavior of KEEPALIVE.

Receiving on SPX

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel.

You should use the WebSphere MQ listener.

Using the WebSphere MQ listener

To run the Listener supplied with WebSphere MQ, that starts new channels as threads, use the RUNMQLSR command. For example:

```
RUNMQLSR -t spx
```

Optionally you may specify the queue manager name or the socket number if you are not using the defaults.

MQSeries for OS/2 Warp configuration

Notes:

1. You can use the sample program AMQSBCG to display, to the stdout spool, the contents and headers of all the messages in a queue. For example:

   ```
   AMQSBCG q_name qmgr_name
   ```

   displays the contents of the queue *q_name* defined in queue manager *qmgr_name*.
2. The WebSphere MQ command used to start the TCP listener is:

   ```
   runmqlsr -t tcp
   ```

   The listener enables receiver channels to start automatically in response to a start request from an inbound sender channel.

3. You can start any channel from the command prompt using the command

   ```
   runmqchl -c channel.name
   ```

4. Error logs can be found in the directories \mqm\qmgrs\qmgrname\errors, \mqm\qmgrs\@system\errors, and \mqm\errors. In all cases, the most recent messages are at the end of amqerr01.log.
5. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Basic configuration

1. Create the queue manager from the OS/2 command line using the command:

   ```
   crtmqm -u dlqname -q os2
   ```

   where:

   os2 Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and a set of default objects, and sets the DEADQ attribute of the queue manager.
2. For SNA channels add an LU 6.2 stanza to the queue manager's qm.ini file:

   ```
   LU62:
     TPName=MQSERIES  8
     LocalLU=OS2QMGR  7
   ```

   If you have taken the default options for installation, the qm.ini file for queue manager `os2` is found in c:\mqm\qmgrs\os2.
3. Start the queue manager from the OS/2 command line using the command:

   ```
   strmqm os2
   ```

   where *os2* is the name given to the queue manager when it was created.

Channel configuration

The following sections detail the configuration to be performed on the OS/2 queue manager to implement the channel described in Figure 32 on page 101. In each case the MQSC command is shown.

Examples are given for connecting MQSeries for OS/2 Warp and WebSphere MQ for Windows. If you wish connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for WebSphere MQ for Windows.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

OS/2 configuration

Table 16. Configuration worksheet for MQSeries for OS/2 Warp

	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**OS2**	
B	Local queue name		**OS2.LOCALQ**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**OS2.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**OS2.WINNT.TCP**	
I	Receiver (SNA) channel name	G	**WINNT.OS2.SNA**	
J	Receiver (TCP/IP) channel name	H	**WINNT.OS2.TCP**	
K	Sender (NetBIOS) channel name		**OS2.WINNT.NET**	
L	Sender (SPX) channel name		**OS2.WINNT.SPX**	
M	Receiver (NetBIOS) channel name	K	**WINNT.OS2.NET**	
N	Receiver (SPX) channel name	L	**WINNT.OS2.SPX**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**OS2.AIX.SNA**	
H	Sender (TCP/IP) channel name		**OS2.AIX.TCP**	
I	Receiver (SNA) channel name	G	**AIX.OS2.SNA**	
J	Receiver (TCP) channel name	H	**AIX.OS2.TCP**	
Connection to Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	A	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.OS2.TCP**	
J	Receiver (TCP) channel name	H	**OS2.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	

Table 16. Configuration worksheet for MQSeries for OS/2 Warp (continued)

	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	**B**	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (SNA) channel name		**OS2.HPUX.SNA**	
H	Sender (TCP) channel name		**OS2.HPUX.TCP**	
I	Receiver (SNA) channel name	**G**	**HPUX.OS2.SNA**	
J	Receiver (TCP) channel name	**H**	**HPUX.OS2.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	**A**	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	**B**	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**OS2.GIS.SNA**	
H	Sender (TCP) channel name		**OS2.GIS.TCP**	
I	Receiver (SNA) channel name	**G**	**GIS.OS2.SNA**	
J	Receiver (TCP) channel name	**H**	**GIS.OS2.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	**A**	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	**B**	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**OS2.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**OS2.SOLARIS.TCP**	
I	Receiver (SNA) channel name	**G**	**SOLARIS.OS2.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**SOLARIS.OS2.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	**A**	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	**B**	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**OS2.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**OS2.LINUX.TCP**	
I	Receiver (SNA) channel name	**G**	**LINUX.OS2.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**LINUX.OS2.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	**A**	**AS400**	

Table 16. Configuration worksheet for MQSeries for OS/2 Warp (continued)

	Parameter Name	Reference	Example Used	User Value
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**OS2.AS400.SNA**	
H	Sender (TCP/IP) channel name		**OS2.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.OS2.SNA**	
J	Receiver (TCP) channel name	H	**AS400.OS2.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**OS2.MVS.SNA**	
H	Sender (TCP) channel name		**OS2.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.OS2.SNA**	
J	Receiver (TCP) channel name	H	**MVS.OS2.TCP**	
Connection to WebSphere MQ for z/OS using queue sharing groups The values in this section of the table must match those used in Table 45 on page 498, as indicated.				
C	Remote queue manager name	A	**QSG**	
D	Remote queue name		**QSG.REMOTEQ**	
E	Queue name at remote system	B	**QSG.SHAREDQ**	
F	Transmission queue name		**QSG**	
G	Sender (SNA) channel name		**OS2.QSG.SNA**	
H	Sender (TCP) channel name		**OS2.QSG.TCP**	
I	Receiver (SNA) channel name	G	**QSG.OS2.SNA**	
J	Receiver (TCP) channel name	H	**QSG.OS2.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**OS2.VSE.SNA**	
I	Receiver channel name	G	**VSE.OS2.SNA**	

MQSeries for OS/2 Warp sender-channel definitions using SNA

```
def ql (WINNT)                                  F
    usage(xmitq) +
    replace

def qr (WINNT.REMOTEQ) +                        D
    rname(WINNT.LOCALQ) +                       E
    rqmname(WINNT) +                            C
    xmitq(WINNT) +                              F
    replace

def chl (OS2.WINNT.SNA) chltype(sdr) +          G
    trptype(lu62) +
    conname('NETID.WINNTLU') +                  13 . 15
    xmitq(WINNT) +                              F
    modename('#INTER') +                        17
    tpname('MQSERIES') +                        18
    replace
```

MQSeries for OS/2 Warp receiver-channel definitions using SNA

```
def ql (OS2.LOCALQ) replace                     B

def chl (WINNT.OS2.SNA) chltype(rcvr) +         I
    trptype(lu62) +
    replace
```

MQSeries for OS/2 Warp sender-channel definitions using TCP

```
def ql (WINNT) +                                F
    usage(xmitq) +
    replace

def qr (WINNT.REMOTEQ) +                        D
    rname(WINNT.LOCALQ) +                       E
    rqmname(WINNT) +                            C
    xmitq(WINNT) +                              F
    replace

def chl (OS2.WINNT.TCP) chltype(sdr) +          H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(WINNT) +                              F
    replace
```

MQSeries for OS/2 Warp receiver-channel definitions using TCP/IP

```
def ql (OS2.LOCALQ) replace                     B

def chl (WINNT.OS2.TCP) chltype(rcvr) +         J
    trptype(tcp) +
    replace
```

MQSeries for OS/2 Warp sender-channel definitions using NetBIOS

```
def ql (WINNT) +                                F
    usage(xmitq) +
    replace

def qr (WINNT.REMOTEQ) +                        D
    rname(WINNT.LOCALQ) +                       E
    rqmname(WINNT) +                            C
    xmitq(WINNT) +                              F
    replace

def chl (OS2.WINNT.NET) chltype(sdr) +          K
```

```
    trptype(netbios) +
    conname(remote NetBIOS name) +
    xmitq(WINNT) +                                F
    replace
```

MQSeries for OS/2 Warp receiver-channel definitions using NetBIOS

```
def ql (OS2.LOCALQ) replace                      B

def chl (WINNT.OS2.NET) chltype(rcvr) +          M
    trptype(netbios) +
    replace
```

MQSeries for OS/2 Warp sender-channel definitions using IPX/SPX

```
def ql (WINNT) +                                 F
    usage(xmitq) +
    replace

def qr (WINNT.REMOTEQ) +                         D
    rname(WINNT.LOCALQ) +                        E
    rqmname(WINNT) +                             C
    xmitq(WINNT) +                               F
    replace

def chl (OS2.WINNT.SPX) chltype(sdr) +           L
    trptype(spx) +
    conname('network.node(socket)') +
    xmitq(WINNT) +                               F
    replace
```

MQSeries for OS/2 Warp receiver-channel definitions using IPX/SPX

```
def ql (OS2.LOCALQ) replace                      B

def chl (WINNT.OS2.SPX) chltype(rcvr) +          N
    trptype(spx) +
    replace
```

Running channels as processes or threads

MQSeries for OS/2 Warp provides the flexibility to run sender channels as OS/2 processes or OS/2 threads. This is specified in the MCATYPE parameter on the sender channel definition. Each installation should select the type appropriate for their application and configuration. Factors affecting this choice are discussed below.

Most installations will select to run their sender channels as threads, because the virtual and real memory required to support a large number of concurrent channel connections will be reduced. When the WebSphere MQ listener process (started via the RUNMQLSR command) exhausts the available private memory needed, an additional listener process will need to be started to support more channel connections. When each channel runs as a process, additional processes are automatically started, avoiding the out-of-memory condition.

If all channels are run as threads under one WebSphere MQ listener, a failure of the listener for any reason will cause all channel connections to be temporarily lost. This can be prevented by balancing the threaded channel connections across two or more listener processes, thus enabling other connections to keep running. If each sender channel is run as a separate process, the failure of the listener for that process will affect only that specific channel connection.

A NetBIOS connection needs a separate process for the Message Channel Agent. Therefore, before you can issue a START CHANNEL command, you must start the channel initiator, or you may start a channel using the RUNMQCHL command.

Chapter 12. Example configuration - IBM WebSphere MQ for Windows

This chapter gives an example of how to set up communication links from WebSphere MQ for Windows to WebSphere MQ products on the following platforms:
- OS/2
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[2]
- Solaris
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

This chapter first describes the parameters needed for an LU 6.2 connection, then it guides you through the following tasks:
- "Establishing an LU 6.2 connection" on page 176
- "Establishing a TCP connection" on page 185
- "Establishing a NetBIOS connection" on page 185
- "Establishing an SPX connection" on page 186

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for Windows configuration" on page 188.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 17 on page 172 presents a worksheet listing all the parameters needed to set up communication from Windows to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

The steps required to set up an LU 6.2 connection are described, with numbered cross references to the parameters on the worksheet. These steps are:
- "Configuring the local node" on page 177
- "Adding a connection" on page 179
- "Adding a partner" on page 181
- "Adding a CPI-C entry" on page 182
- "Configuring an invokable TP" on page 182

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[2] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in "Explanation of terms" on page 175.

Table 17. Configuration worksheet for IBM Communications Server for Windows systems

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
1	Configuration name		**NTCONFIG**	
2	Network Name		**NETID**	
3	Control Point Name		**WINNTCP**	
4	Local Node ID (hex)		**05D 30F65**	
5	LU Name (local)		**WINNTLU**	
6	LU Alias (local)		**NTQMGR**	
7	TP Name		**MQSERIES**	
8	Command line		**c:\mqm\bin\amqcrs6a.exe**	
9	LAN adapter address		**08005AA5FAB9**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
10	Connection		**OS2**	
11	Remote Network Address	**10**	**10005AFC5D83**	
12	Network Name	**2**	**NETID**	
13	Control Point Name	**3**	**OS2PU**	
14	Remote Node ID	**4**	**05D 12345**	
15	LU Alias (remote)		**OS2QMGR**	
16	LU Name	**6**	**OS2LU**	
17	Mode	**17**	**#INTER**	
18	CPI-C Name		**OS2CPIC**	
19	Partner TP Name	**8**	**MQSERIES**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
10	Connection		**AIX**	
11	Remote Network Address	**8**	**123456789012**	
12	Network Name	**1**	**NETID**	
13	Control Point Name	**2**	**AIXPU**	
14	Remote Node ID	**3**	**071 23456**	
15	LU Alias (remote)		**AIXQMGR**	
16	LU Name	**4**	**AIXLU**	
17	Mode	**14**	**#INTER**	
18	CPI-C Name		**AIXCPIC**	
19	Partner TP Name	**6**	**MQSERIES**	

Table 17. Configuration worksheet for IBM Communications Server for Windows systems (continued)

ID	Parameter Name	Reference	Example Used	User Value
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
10	Connection		**HPUX**	
11	Remote Network Address	8	**100090DC2C7C**	
12	Network Name	4	**NETID**	
13	Control Point Name	2	**HPUXPU**	
14	Remote Node ID	3	**05D 54321**	
15	LU Alias (remote)		**HPUXQMGR**	
16	LU Name	5	**HPUXLU**	
17	Mode	17	**#INTER**	
18	CPI-C Name		**HPUXCPIC**	
19	Partner TP Name	7	**MQSERIES**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
10	Connection		**GIS**	
11	Remote Network Address	8	**10007038E86B**	
12	Network Name	2	**NETID**	
13	Control Point Name	3	**GISPU**	
14	Remote Node ID	9	**03E 00018**	
15	LU Alias (remote)		**GISQMGR**	
16	LU Name	4	**GISLU**	
17	Mode	15	**#INTER**	
18	CPI-C Name		**GISCPIC**	
19	Partner TP Name	5	**MQSERIES**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
10	Connection		**SOLARIS**	
11	Remote Network Address	5	**08002071CC8A**	
12	Network Name	2	**NETID**	
13	Control Point Name	3	**SOLARPU**	
14	Remote Node ID	6	**05D 310D6**	
15	LU Alias (remote)		**SOLARQMGR**	
16	LU Name	7	**SOLARLU**	
17	Mode	17	**#INTER**	
18	CPI-C Name		**SOLCPIC**	
19	Partner TP Name	8	**MQSERIES**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
10	Connection		**LINUX**	

Table 17. Configuration worksheet for IBM Communications Server for Windows systems (continued)

ID	Parameter Name	Reference	Example Used	User Value
11	Remote Network Address	8	**08005AC6DF33**	
12	Network Name	4	**NETID**	
13	Control Point Name	2	**LINUXPU**	
14	Remote Node ID	3	**05D 30A55**	
15	LU Alias (remote)		**LXQMGR**	
16	LU Name	5	**LINUXLU**	
17	Mode	6	**#INTER**	
18	CPI-C Name		**LXCPIC**	
19	Partner TP Name	7	**MQSERIES**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
10	Connection		**AS400**	
11	Remote Network Address	4	**10005A5962EF**	
12	Network Name	1	**NETID**	
13	Control Point Name	2	**AS400PU**	
14	Remote Node ID			
15	LU Alias (remote)		**AS400QMGR**	
16	LU Name	3	**AS400LU**	
17	Mode	17	**#INTER**	
18	CPI-C Name		**AS4CPIC**	
19	Partner TP Name	8	**MQSERIES**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Connection		**MVS**	
11	Remote Network Address	8	**400074511092**	
12	Network Name	2	**NETID**	
13	Control Point Name	3	**MVSPU**	
14	Remote Node ID			
15	LU Alias (remote)		**MVSQMGR**	
16	LU Name	4	**MVSLU**	
17	Mode	10	**#INTER**	
18	CPI-C Name		**MVSCPIC**	
19	Partner TP Name	7	**MQSERIES**	
Connection to a z/OS system using a generic interface The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Connection		**MVS**	
11	Remote Network Address	8	**400074511092**	
12	Network Name	2	**NETID**	
13	Control Point Name	3	**MVSPU**	

Table 17. Configuration worksheet for IBM Communications Server for Windows systems (continued)

ID	Parameter Name	Reference	Example Used	User Value
14	Remote Node ID			
15	LU Alias (remote)		**MVSQMGR**	
16	LU Name	**10**	**MVSGR**	
17	Mode	**6**	**#INTER**	
18	CPI-C Name		**MVSCPIC**	
19	Partner TP Name	**7**	**MQSERIES**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
10	Connection		**MVS**	
11	Remote Network Address	**5**	**400074511092**	
12	Network Name	**1**	**NETID**	
13	Control Point Name	**2**	**VSEPU**	
14	Remote Node ID			
15	LU Alias (remote)		**VSEQMGR**	
16	LU Name	**3**	**VSELU**	
17	Mode		**#INTER**	
18	CPI-C Name		**VSECPIC**	
19	Partner TP Name	**4**	**MQ01**	**MQ01**

Explanation of terms

1 Configuration Name
This is the name of the file in which the Communications Server configuration is saved.

2 Network Name
This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network name works with the Control Point Name to uniquely identify a system. Your network administrator will tell you the value.

3 Control Point Name
In Advanced Peer-to-Peer Networking® (APPN®), a control point is responsible for managing a node and its resources. A control point is also a logical unit (LU). The Control Point Name is the name of the LU and is assigned to your system by the network administrator.

4 Local Node ID (hex)
Some SNA products require partner systems to specify a node identifier that uniquely identifies their workstation. The two systems exchange this node identifier in a message unit called the exchange identifier (XID). Your network administrator will assign this ID for you.

5 LU Name (local)
A logical unit (LU) is software that serves as an interface or translator between a transaction program and the network. An LU manages the

exchange of data between transaction programs. The local LU Name is the name of the LU on your workstation. Your network administrator will assign this to you.

6 LU Alias (local)
The name by which your local LU will be known to your applications. You choose this name yourself. It can be 1-8 characters long.

7 TP Name
WebSphere MQ applications trying to converse with your workstation specify a symbolic name for the program that is to start running. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 13 on page 134 for more information.

8 Command line
This is the path and name of the actual program to be run when a conversation has been initiated with your workstation. The example shown on the worksheet assumes that WebSphere MQ is installed in the default directory, c:\mqm. The configuration pairs this name with the symbolic name **7** when you use TPSETUP (which is part of the SNA Server software developers kit).

9 LAN adapter address
This is the address of your token-ring card. To discover this type **net config server** at a command prompt. The address appears in the output. For example:

```
Server is active on 08005AA5FAB9
```

10 Connection
This is a meaningful symbolic name by which the connection to a partner node is known. It is used only within SNA Server administration and is specified by you.

15 LU Alias (remote)
This is a value known only in this server and is used to represent the fully qualified partner LU name. You supply the value.

17 Mode
This is the name given to the set of parameters that control the APPC conversation. An entry with this name and a similar set of parameters must be defined at each partner system. Your network administrator will tell you this name.

18 CPI-C Name
This is the name given to a locally held definition of a partner application. You supply the name and it must be unique within this server. The name is specified in the CONNAME attribute of the WebSphere MQ sender channel definition.

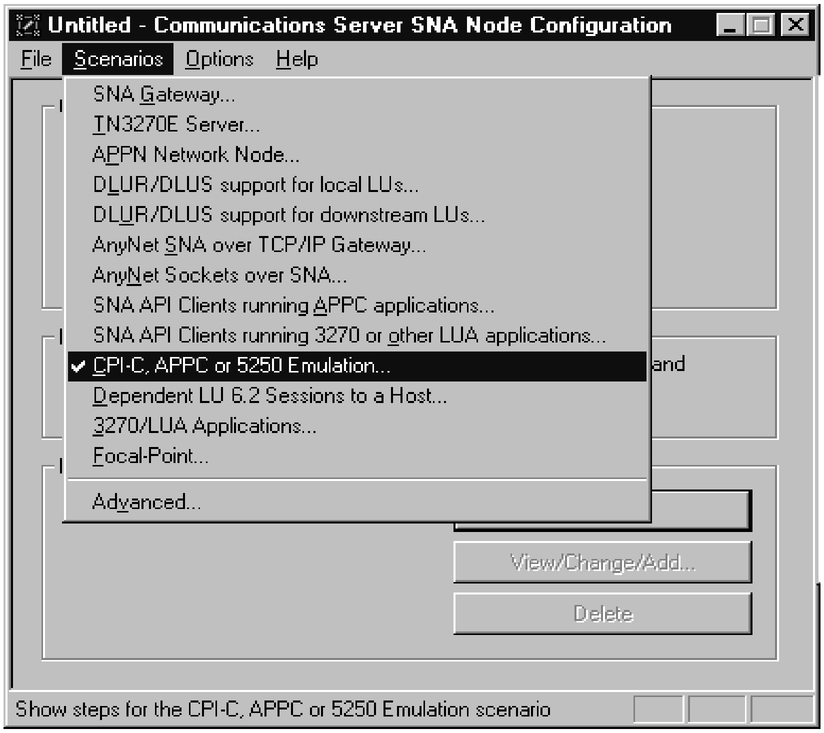
Establishing an LU 6.2 connection

This section describes how to establish an LU 6.2 connection using IBM Communications Server for Windows NT, Version 5.0. You may use any of the supported LU 6.2 products for this platform. The panels of other products will not be identical to those shown here, but most of their content will be similar.

Configuring the local node

To configure the local node, follow these steps:

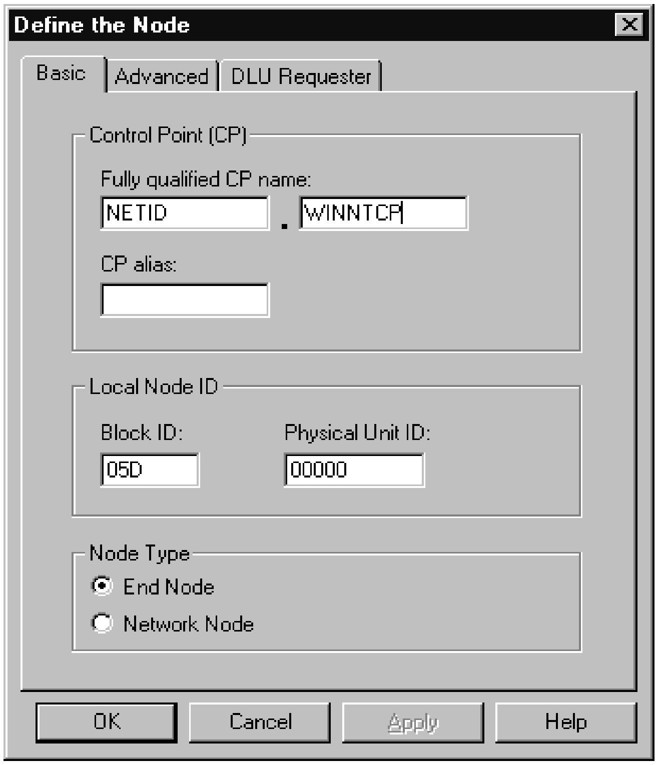
1. From the **Scenarios** pull-down of the Communications Server SNA Node Configuration window, select the **CPI-C, APPC or 5250 Emulation** scenario.


Untitled - Communications Server SNA Node Configuration
File
Scenarios
Options
Help
SNA Gateway...
TN3270E Server...
APPN Network Node...
DLUR/DLUS support for local LUs...
DLUR/DLUS support for downstream LUs...
AnyNet SNA over TCP/IP Gateway...
AnyNet Sockets over SNA...
SNA API Clients running APPC applications...
SNA API Clients running 3270 or other LUA applications...
✓ CPI-C, APPC or 5250 Emulation...
Dependent LU 6.2 Sessions to a Host...
3270/LUA Applications...
Focal-Point...
Advanced...
and
View/Change/Add...
Delete

Show steps for the CPI-C, APPC or 5250 Emulation scenario

The CPI-C, APPC or 5250 Emulation scenario window is displayed.

2. Click on **Configure Node**, then click on **New**. The Define the Node property sheet is displayed.



Fully qualified CP name: NETID . WINNTCP

CP alias:

Block ID: 05D

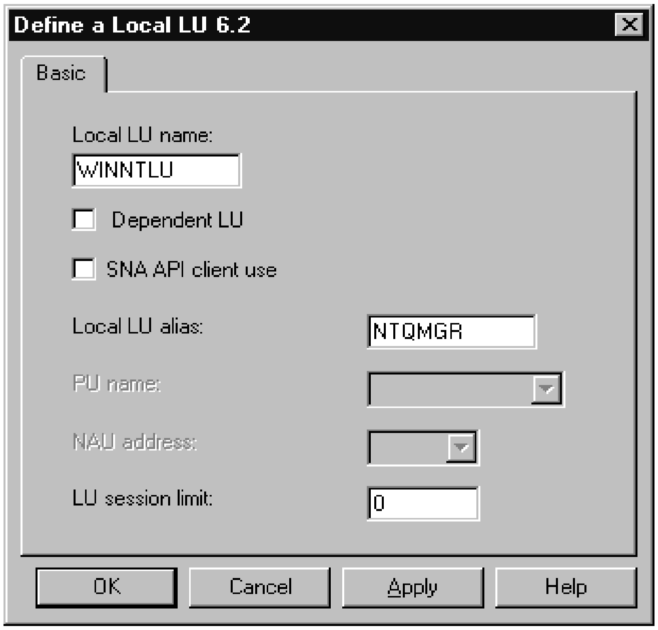
Physical Unit ID: 00000

Node Type

● End Node

○ Network Node

3. In the **Fully qualified CP name** field on the Basic page, enter the unique ID of the network to which you are connected (❷) and the control point name (❸). Click on **OK** to continue.
4. From the SNA Node Configuration window, click on **Configure Local LU 6.2**, then click on **New**. The Define a Local LU 6.2 window is displayed.



Local LU name: WINNTLU

☐ Dependent LU

☐ SNA API client use

Local LU alias: NTQMGR

PU name:

NAU address:

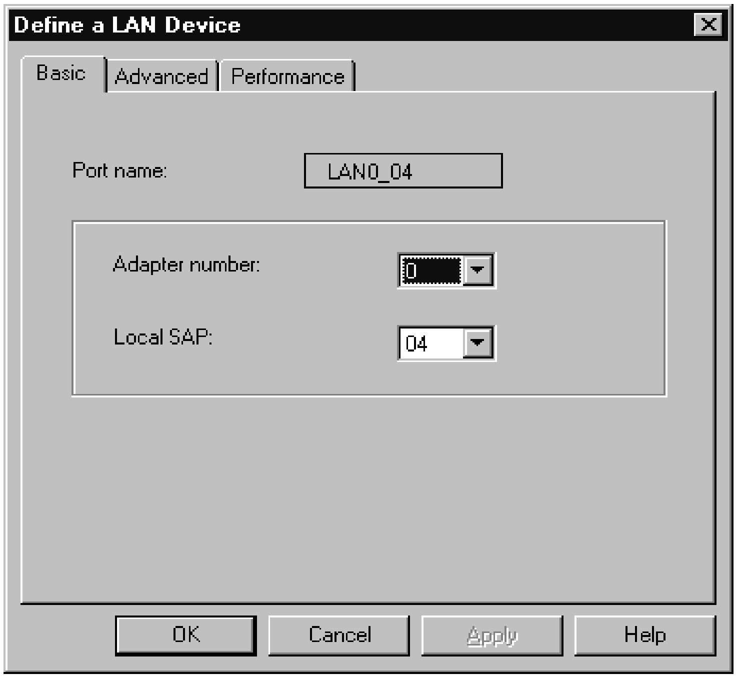
LU session limit: 0

5. In the **Local LU name** field on the Basic page, enter the name of the LU on your workstation (5). In the **Local LU alias** field, enter the name by which your local LU will be known to your applications (6). Click on **OK** to continue.

Adding a connection

To add a connection, follow these steps:

1. From the SNA Node Configuration window, select **Configure Devices**, select **LAN** as the DLC type, then click on **New**. The Define a LAN Device property sheet is displayed.



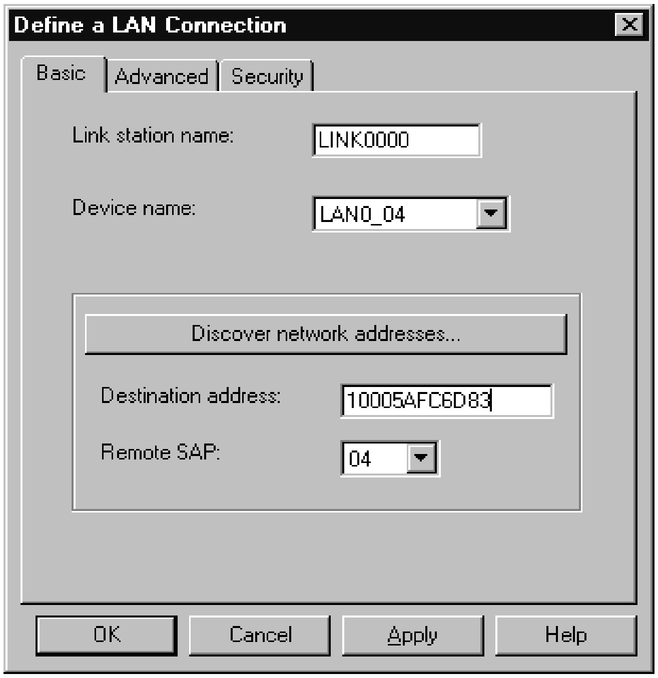
Define a LAN Device

Port name: LAN0_04

Adapter number: 0

Local SAP: 04

2. If you have the LLC2 protocol installed with Communications Server for Windows NT, the Adapter number list box lists the available LAN adapters. See the help file INLLC40.HLP (Windows NT 4.0) or INLLC35.HLP (Windows NT 3.51) in the Communications Server installation directory for LLC2 installation instructions.
3. The default values displayed on the Define a LAN Device Basic page may be accepted. Click on **OK** to continue.
4. From the SNA Node Configuration window, select **Configure Connections**, select **LAN** as the DLC type, then click on **New**. The Define a LAN Connection property sheet is displayed.



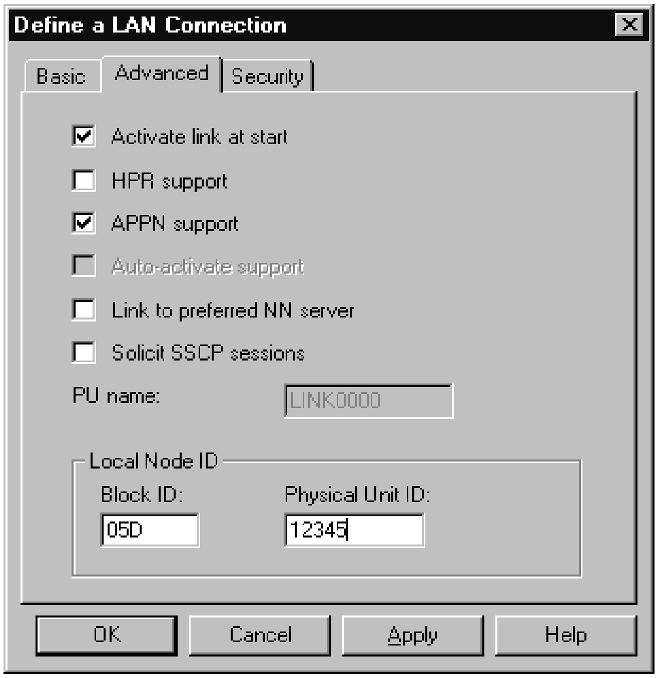
Link station name: LINK0000

Device name: LAN0_04

Destination address: 10005AFC6D83

Remote SAP: 04

5. In the **Destination address** field on the Basic page, enter the LAN address of the system to which you are connecting (11). Select the Advanced page.



☑ Activate link at start

☐ HPR support

☑ APPN support

☐ Auto-activate support

☐ Link to preferred NN server

☐ Solicit SSCP sessions

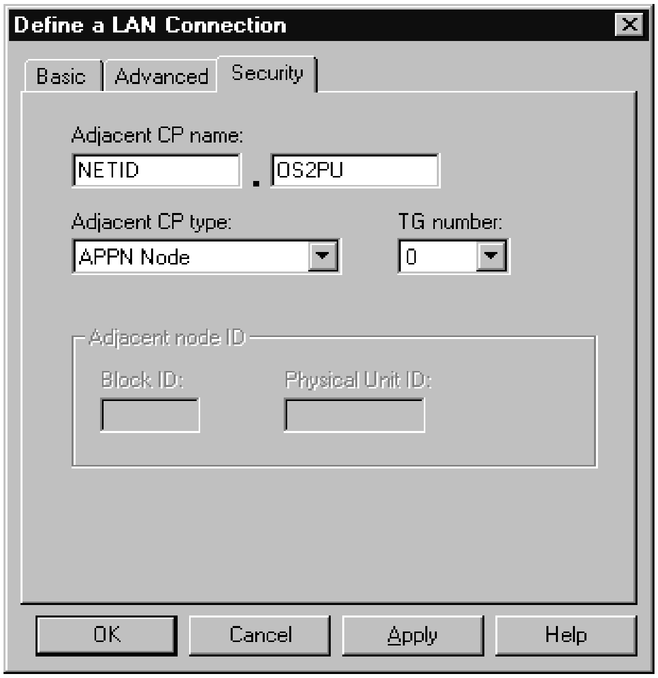
PU name: LINK0000

Local Node ID

Block ID: 05D

Physical Unit ID: 12345

6. In the **Block ID** field on the Advanced page, enter the local node ID (hex) (4). Select the Security page.



Adjacent CP name: NETID . OS2PU

Adjacent CP type: APPN Node

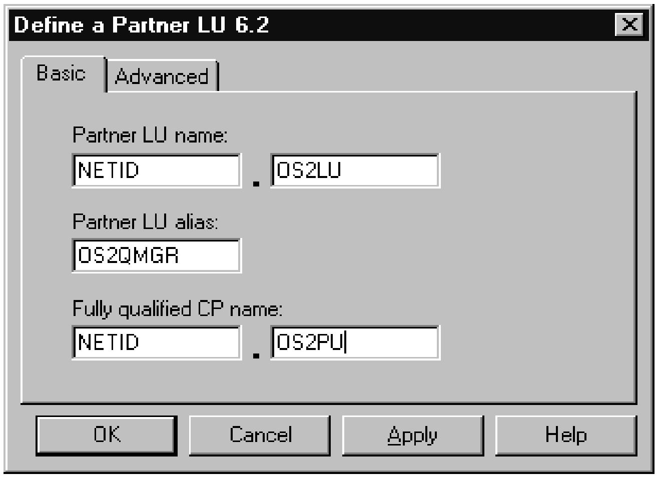
TG number: 0

7. In the **Adjacent CP name** field on the Security page, enter the network name and control point name of the remote node (**12** and **13**). In the **Adjacent CP type** field, enter `APPN Node`. You do not need to complete the **Adjacent node ID** field for a peer-to-peer connection. Click on **OK** to continue. Take note of the default link name used to identify this new definition (for example, LINK0000).

Adding a partner

To add a partner LU definition, follow these steps:

1. From the SNA Node Configuration window, select **Configure Partner LU 6.2**, then click on **New**. The Define a Partner LU 6.2 property sheet is displayed.



Partner LU name: NETID . OS2LU

Partner LU alias: OS2QMGR

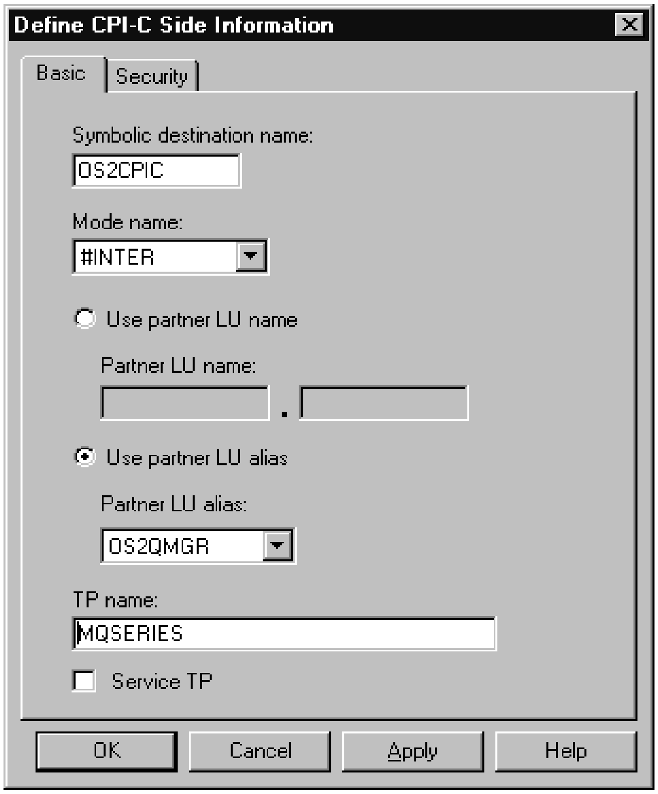
Fully qualified CP name: NETID . OS2PU

2. In the **Partner LU name** field on the Basic page, enter the network name (**12**) and LU name of the remote system (**16**). In the **Partner LU alias** field, enter the remote LU alias (**15**). In the **Fully qualified CP name** fields, enter the network name and control point name of the remote system (**12** and **13**). Click on **OK** to continue.

Adding a CPI-C entry

To add a CPI-C Side information entry, follow these steps:

1. From the SNA Node Configuration window, select **Configure CPI-C Side Information**, then click on **New**. The Define a CPI-C Side Information property sheet is displayed.



Symbolic destination name: OS2CPIC

Mode name: #INTER

○ Use partner LU name

Partner LU name: .

● Use partner LU alias

Partner LU alias: OS2QMGR

TP name: MQSERIES

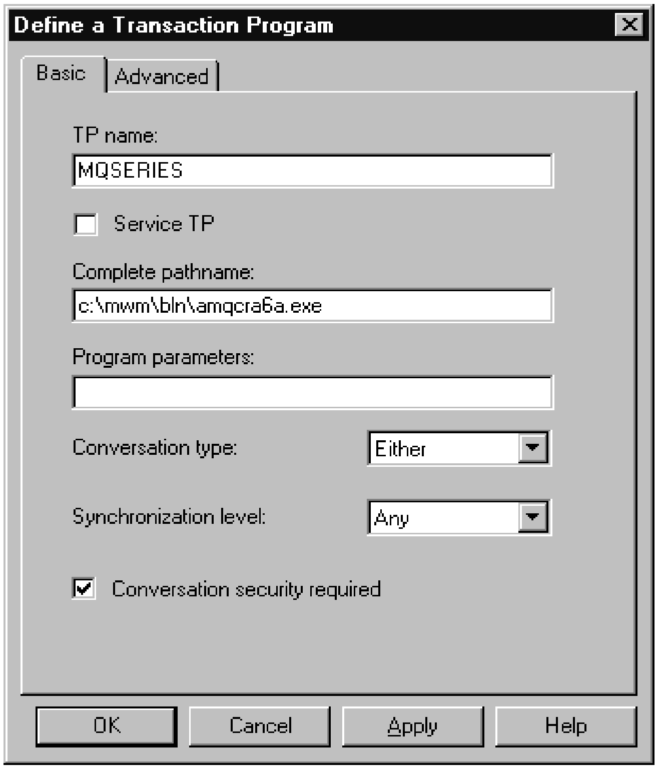
☐ Service TP

2. In the **Symbolic destination name** field of the Basic page, enter the CPI-C name (18). In the **Mode name** field, enter the mode value (17). Enter either a **fully qualified partner LU name** (12 . 16) or a **partner LU alias** (15) depending on what you choose in the CPI-C Side Information property sheet. In the **TP name** field, enter the partner TP name (19). Click on **OK** to continue.

Configuring an invokable TP

To add a Transaction Program (TP) definition, follow these steps:

1. From the SNA Node Configuration window, select **Configure Transaction Programs**, then click on **New**. The Define a Transaction Program property sheet is displayed.



TP name: MQSERIES

☐ Service TP

Complete pathname: c:\mwm\bln\amqcra6a.exe

Program parameters:

Conversation type: Either

Synchronization level: Any

☑ Conversation security required

2. In the **TP name** field on the Basic page, enter the transaction program name (**7**). In the **Complete pathname** field, enter the actual path and name of the the program that will be run when a conversation is initiated with your workstation (**8**). When you are happy with the settings, click on **OK** to continue.
3. In order to be able to stop the WebSphere MQ Transaction Program, you need to start it in one of the following ways:
   a. Check **Service TP** on the Basic page. This starts the TP programs at Windows startup and will run the programs under the system user ID.
   b. Check **Dynamically loaded** on the Advanced page. This dynamically loads and starts the programs as and when incoming SNA conversation requests arrive. It will run the programs under the same user ID as the rest of WebSphere MQ.

      Note: To use dynamic loading, it is necessary to vary the user ID under which the WebSphere MQ SNA Transaction program runs. To do this, set the Attach Manager to run under the desired user context by modifying the startup parameters within the Control Panel in the Services applet for the AppnNode service.
   c. Issue the WebSphere MQ command, runmqlsr, to run the channel listener process.

Communications Server has a tuning parameter called the Receive_Allocate timeout parameter that is set in the Transaction Program. The default value of this parameter is 3600 and this indicates that the listener will only remain active for 3600 seconds, that is, 1 hour. You can make your listener run for longer than this by increasing the value of the Receive_Allocate timeout parameter. You can also make it run ‘forever’ by specifying zero.

What next?

The SNA configuration task is complete. From the **File** pull-down, select **Save** and specify a file name under which to save your SNA configuration information, for example, NTCONFIG (**1**). When prompted, select this configuration as the default.

From the SNA Node Operations application, start the node by clicking the **Start node** button on the toolbar. Specify the file name of the configuration you just saved. (It should appear in the file-name box by default, because you identified it as your default configuration.) When the node startup is complete, ensure that your link to the remote node has been established by selecting the **Connections** button on the toolbar, then find the link name you configured (for example, LINK0000). The link should be active if the remote node is active waiting for the link to be established.

A complementary SNA setup process is required on the node to which you are connecting before you can attempt WebSphere MQ server-to-server message transmissions.

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for Windows configuration” on page 188.

Establishing a TCP connection

The TCP stack that is shipped with Windows systems do not include an *inet* daemon or equivalent.

The WebSphere MQ command used to start a TCP listener is:

```
runmqlsr -t tcp
```

The listener must be started explicitly before any channels are started.

What next?

When the TCP/IP connection is established, you are ready to complete the configuration. Go to “WebSphere MQ for Windows configuration” on page 188.

Establishing a NetBIOS connection

A NetBIOS connection is initiated from a queue manager that uses the ConnectionName parameter on its channel definition to connect to a target listener. To set up a NetBIOS connection, follow these steps:

1. At each end of the channel specify the local NetBIOS name to be used by the WebSphere MQ channel processes, in the Windows registry or in the queue manager configuration file qm.ini. For example, the NETBIOS stanza in the Windows registry at the sending end might look like this:

   ```
   NETBIOS:
    LocalName=WNTNETB1
   ```

   and at the receiving end:

   ```
   NETBIOS:
    LocalName=WNTNETB2
   ```

   Each WebSphere MQ process must use a different local NetBIOS name. Do not use your machine name as the NetBIOS name because Windows already uses it.
2. At each end of the channel, verify the LAN adapter number being used on your system. The WebSphere MQ for Windows default for logical adapter number 0 is NetBIOS running over a TCP/IP network. To use native NetBIOS you need to select logical adapter number 1. See “Establishing the LAN adapter number” on page 138.

   Specify the correct LAN adapter number in the NETBIOS stanza of the the Windows registry. For example:

   ```
   NETBIOS:
    AdapterNum=1
   ```
3. So that sender channel initiation will work, specify the local NetBIOS name via the MQNAME environment variable:

   ```
    SET MQNAME=WNTNETB1I
   ```

   This name must be unique.
4. At the sending end, define a channel specifying the NetBIOS name being used at the other end of the channel. For example:

Windows and NetBIOS

```
DEFINE CHANNEL (WINNT.OS2.NET) CHLTYPE(SDR) +
       TRPTYPE(NETBIOS) +
       CONNAME(WNTNETB2) +
       XMITQ(OS2) +
       MCATYPE(THREAD) +
       REPLACE
```

You must specify the option `MCATYPE(THREAD)` because, on Windows, sender channels must be run as threads.

5. At the receiving end, define the corresponding receiver channel. For example:

```
DEFINE CHANNEL (WINNT.OS2.NET) CHLTYPE(RCVR) +
       TRPTYPE(NETBIOS) +
       REPLACE
```

6. Start the channel initiator because each new channel is started as a thread rather than as a new process.

```
runmqchi
```

7. At the receiving end, start the WebSphere MQ listener:

```
runmqlsr -t netbios
```

Optionally you may specify values for the queue manager name, NetBIOS local name, number of sessions, number of names, and number of commands. See "Defining a NetBIOS connection" on page 137 for more information about setting up NetBIOS connections.

Establishing an SPX connection

This section discusses the following topics:
- IPX/SPX parameters
- SPX addressing
- Receiving on SPX

IPX/SPX parameters

Please refer to the Microsoft documentation for full details of the use and setting of the NWLink IPX and SPX parameters. The IPX/SPX parameters are in the following paths in the registry:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Service\NWLinkSPX\Parameters
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Service\NWLinkIPX\Parameters
```

SPX addressing

WebSphere MQ uses the SPX address of each machine to establish connectivity. The SPX address is specified in the following form:

```
network.node(socket)
```

where

network
Is the 4-byte network address of the network on which the remote machine resides,

node Is the 6-byte node address, which is the LAN address of the LAN adapter in the remote machine

socket Is the 2-byte socket number on which the remote machine will listen.

The default socket number used by WebSphere MQ is 5E86. You can change the default socket number by specifying it in the the Windows registry or in the queue manager configuration file qm.ini. If you have taken the default options for installation, the qm.ini file for queue manager OS2 is found in c:\mqm\qmgs\os2. The lines in the Windows registry might read:

```
SPX:
  SOCKET=n
```

For more information about values you can set in qm.ini, see Appendix D, "Configuration file stanzas for distributed queuing", on page 763.

The SPX address is later specified in the CONNAME parameter of the sender channel definition. If the WebSphere MQ systems being connected reside on the same network, the network address need not be specified. Similarly, if the remote system is listening on the default socket number (5E86), it need not be specified. A fully qualified SPX address in the CONNAME parameter would be:

```
CONNAME('network.node(socket)')
```

but if the systems reside on the same network and the default socket number is used, the parameter would be:

```
CONNAME(node)
```

A detailed example of the channel configuration parameters is given in "WebSphere MQ for Windows configuration" on page 188.

Receiving on SPX

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel.

You should use the WebSphere MQ listener.

Using the WebSphere MQ listener

To run the Listener supplied with WebSphere MQ, that starts new channels as threads, use the RUNMQLSR command. For example:

```
RUNMQLSR -t spx
```

Optionally you may specify the queue manager name or the socket number if you are not using the defaults.

WebSphere MQ for Windows configuration

Notes:

1. You can use the sample program, AMQSBCG, to display the contents and headers of all the messages in a queue. For example:

   ```
   AMQSBCG q_name qmgr_name
   ```

   displays the contents of the queue `q_name` defined in queue manager `qmgr_name`.

   Alternatively, you can use the message browser in the WebSphere MQ Explorer.
2. The WebSphere MQ command used to start the TCP/IP listener is:

   ```
   runmqlsr -t tcp
   ```

   The listener enables receiver channels to start automatically in response to a start request from an inbound sender channel.
3. You can start any channel from the command prompt using the command

   ```
   runmqchl -c channel.name
   ```
4. Error logs can be found in the directories \mqm\qmgrs\qmgrname\errors and \mqm\qmgrs\@system\errors. In both cases, the most recent messages are at the end of amqerr01.log.
5. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Default configuration

You can create a default configuration by using either the First Steps application or the WebSphere MQ Postcard application to guide you through the process. For information about this, see the *WebSphere MQ System Administration Guide* book.

Basic configuration

You can create and start a queue manager from the WebSphere MQ Explorer or from the command prompt.

If you choose the command prompt:

1. Create the queue manager using the command:

   ```
   crtmqm -u dlqname -q winnt
   ```

   where:

   `winnt` Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and a set of default objects.
2. Start the queue manager using the command:

   ```
   strmqm winnt
   ```

   where `winnt` is the name given to the queue manager when it was created.

Channel configuration

The following sections detail the configuration to be performed on the Windows queue manager to implement the channel described in Figure 32 on page 101.

In each case the MQSC command is shown. Either start **runmqsc** from a command prompt and enter each command in turn, or build the commands into a command file.

Examples are given for connecting WebSphere MQ for Windows and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 18. Configuration worksheet for WebSphere MQ for Windows

	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**WINNT**	
B	Local queue name		**WINNT.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**WINNT.OS2.SNA**	
H	Sender (TCP/IP) channel name		**WINNT.OS2.TCP**	
I	Receiver (SNA) channel name	**G**	**OS2.WINNT.SNA**	
J	Receiver (TCP) channel name	**H**	**OS2.WINNT.TCP**	
K	Sender (NetBIOS) channel name		**WINNT.OS2.NET**	
L	Sender (SPX) channel name		**WINNT.OS2.SPX**	
M	Receiver (NetBIOS) channel name	**K**	**OS2.WINNT.NET**	
N	Receiver (SPX) channel name	**L**	**OS2.WINNT.SPX**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	**A**	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	**B**	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**WINNT.AIX.SNA**	
H	Sender (TCP) channel name		**WINNT.AIX.TCP**	
I	Receiver (SNA) channel name	**G**	**AIX.WINNT.SNA**	

Table 18. Configuration worksheet for WebSphere MQ for Windows (continued)

	Parameter Name	**Reference**	**Example Used**	**User Value**
J	Receiver (TCP) channel name	H	**AIX.WINNT.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	A	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.WINNT.TCP**	
J	Receiver (TCP) channel name	H	**WINNT.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (SNA) channel name		**WINNT.HPUX.SNA**	
H	Sender (TCP) channel name		**WINNT.HPUX.TCP**	
I	Receiver (SNA) channel name	G	**HPUX.WINNT.SNA**	
J	Receiver (TCP/IP) channel name	H	**HPUX.WINNT.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	A	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**WINNT.GIS.SNA**	
H	Sender (TCP/IP) channel name		**WINNT.GIS.TCP**	
I	Receiver (SNA) channel name	G	**GIS.WINNT.SNA**	
J	Receiver (TCP/IP) channel name	H	**GIS.WINNT.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**WINNT.SOLARIS.SNA**	
H	Sender (TCP) channel name		**WINNT.SOLARIS.TCP**	
I	Receiver (SNA) channel name	G	**SOLARIS.WINNT.SNA**	
J	Receiver (TCP) channel name	H	**SOLARIS.WINNT.TCP**	

Table 18. Configuration worksheet for WebSphere MQ for Windows (continued)

	Parameter Name	Reference	Example Used	User Value
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**WINNT.LINUX.SNA**	
H	Sender (TCP) channel name		**WINNT.LINUX.TCP**	
I	Receiver (SNA) channel name	G	**LINUX.WINNT.SNA**	
J	Receiver (TCP) channel name	H	**LINUX.WINNT.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**WINNT.AS400.SNA**	
H	Sender (TCP) channel name		**WINNT.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.WINNT.SNA**	
J	Receiver (TCP) channel name	H	**AS400.WINNT.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**WINNT.MVS.SNA**	
H	Sender (TCP) channel name		**WINNT.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.WINNT.SNA**	
J	Receiver (TCP/IP) channel name	H	**MVS.WINNT.TCP**	
Connection to WebSphere MQ for z/OS using queue-sharing groups The values in this section of the table must match those used in Table 45 on page 498, as indicated.				
C	Remote queue manager name	A	**QSG**	
D	Remote queue name		**QSG.REMOTEQ**	
E	Queue name at remote system	B	**QSG.SHAREDQ**	
F	Transmission queue name		**QSG**	
G	Sender (SNA) channel name		**WINNT.QSG.SNA**	
H	Sender (TCP) channel name		**WINNT.QSG.TCP**	
I	Receiver (SNA) channel name	G	**QSG.WINNT.SNA**	

Table 18. Configuration worksheet for WebSphere MQ for Windows (continued)

	Parameter Name	Reference	Example Used	User Value
J	Receiver (TCP/IP) channel name	H	**QSG.WINNT.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**WINNT.VSE.SNA**	
I	Receiver channel name	G	**VSE.WINNT.SNA**	

WebSphere MQ for Windows sender-channel definitions using SNA

```
def ql (OS2) +                                   F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                           D
    rname(OS2.LOCALQ) +                          E
    rqmname(OS2) +                               C
    xmitq(OS2) +                                 F
    replace

def chl (WINNT.OS2.SNA) chltype(sdr) +           G
    trptype(lu62) +
    conname(OS2CPIC) +                           18
    xmitq(OS2) +                                 F
    replace
```

WebSphere MQ for Windows receiver-channel definitions using SNA

```
def ql (WINNT.LOCALQ) replace                    B

def chl (OS2.WINNT.SNA) chltype(rcvr) +          I
    trptype(lu62) +
    replace
```

WebSphere MQ for Windows sender-channel definitions using TCP/IP

```
def ql (OS2) +                                   F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                           D
    rname(OS2.LOCALQ) +                          E
    rqmname(OS2) +                               C
    xmitq(OS2) +                                 F
    replace

def chl (WINNT.OS2.TCP) chltype(sdr) +           H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                                 F
    replace
```

WebSphere MQ for Windows receiver-channel definitions using TCP

```
def ql (WINNT.LOCALQ) replace                    B

def chl (OS2.WINNT.TCP) chltype(rcvr) +          J
    trptype(tcp) +
    replace
```

WebSphere MQ for Windows sender-channel definitions using NetBIOS

```
def ql (OS2) +                                   F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                           D
    rname(OS2.LOCALQ) +                          E
    rqmname(OS2) +                               C
    xmitq(OS2) +                                 F
    replace

def chl (WINNT.OS2.NET) chltype(sdr) +           K
    trptype(netbios) +
    conname(remote_system_NetBIOS_name) +
    xmitq(OS2) +                                 F
    replace
```

WebSphere MQ for Windows receiver-channel definitions using NetBIOS

```
def ql (WINNT.LOCALQ) replace                    B

def chl (OS2.WINNT.NET) chltype(rcvr) +          M
    trptype(tcp) +
    replace
```

WebSphere MQ for Windows sender-channel definitions using SPX

```
def ql (OS2) +                                   F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                           D
    rname(OS2.LOCALQ) +                          E
    rqmname(OS2) +                               C
    xmitq(OS2) +                                 F
    replace

def chl (WINNT.OS2.SPX) chltype(sdr) +           L
    trptype(spx) +
    conname('network.node(socket)') +
    xmitq(OS2) +                                 F
    replace
```

WebSphere MQ for Windows receiver-channel definitions using SPX

```
def ql (WINNT.LOCALQ) replace                    B

def chl (OS2.WINNT.SPX) chltype(rcvr) +          N
    trptype(tcp) +
    replace
```

Automatic startup

WebSphere MQ for Windows allows you to automate the startup of a queue manager and its channel initiator, channels, listeners, and command servers. Use the IBM WebSphere MQ Services snap-in to define the services for the queue manager. When you have successfully completed testing of your communications setup, set the relevant services to **automatic** within the snap-in. This file can be read by the supplied WebSphere MQ service when the system is started.

For more information about this, see the *WebSphere MQ System Administration Guide* book.

Running channels as processes or threads

WebSphere MQ for Windows provides the flexibility to run sender channels as Windows processes or Windows threads. This is specified in the MCATYPE parameter on the sender channel definition. Each installation should select the type appropriate for their application and configuration. Factors affecting this choice are discussed below.

Most installations will select to run their sender channels as threads, because the virtual and real memory required to support a large number of concurrent channel connections will be reduced. When the WebSphere MQ listener process (started via the RUNMQLSR command) exhausts the available private memory needed, an additional listener process will need to be started to support more channel connections. When each channel runs as a process, additional processes are automatically started, avoiding the out-of-memory condition.

If all channels are run as threads under one WebSphere MQ listener, a failure of the listener for any reason will cause all channel connections to be temporarily lost. This can be prevented by balancing the threaded channel connections across two or more listener processes, thus enabling other connections to keep running. If each sender channel is run as a separate process, the failure of the listener for that process will affect only that specific channel connection.

A NetBIOS connection needs a separate process for the Message Channel Agent. Therefore, before you can issue a START CHANNEL command, you must start the channel initiator, or you may start a channel using the RUNMQCHL command.

Multiple thread support — pipelining

You can optionally allow a message channel agent (MCA) to transfer messages using multiple threads. This process, called *pipelining*, enables the MCA to transfer messages more efficiently, with fewer wait states, which improves channel performance. Each MCA is limited to a maximum of two threads.

You control pipelining with the *PipeLineLength* parameter in the qm.ini file. This parameter is added to the `CHANNELS` stanza:

PipeLineLength=1|*number*
: This attribute specifies the maximum number of concurrent threads a channel will use. The default is 1. Any value greater than 1 will be treated as 2.

With WebSphere MQ for Windows, use the WebSphere MQ Services snap-in to set the *PipeLineLength* parameter in the registry. Refer to the *WebSphere MQ System Administration Guide* book for a complete description of the `CHANNELS` stanza.

Notes:

1. *PipeLineLength* applies only to V5.2 or later products.
2. Pipelining is effective only for TCP/IP channels.

When you use pipelining, the queue managers at both ends of the channel must be configured to have a *PipeLineLength* greater than 1.

Channel exit considerations

Note that pipelining can cause some exit programs to fail, because:

- Exits might not be called serially.
- Exits might be called alternately from different threads.

Check the design of your exit programs before you use pipelining:

- Exits must be reentrant at all stages of their execution.
- When you use MQI calls, remember that MQI handles are thread-specific.

Consider a message exit that opens a queue and uses its handle for MQPUT calls on all subsequent invocations of the exit. This fails in pipelining mode because the exit is called from different threads. To avoid this failure, keep a queue handle for each thread and check the thread identifier each time the exit is invoked.

Chapter 13. Setting up communication on UNIX systems

DQM is a remote queuing facility for WebSphere MQ. It provides channel control programs for the queue manager which form the interface to communication links, controllable by the system operator. The channel definitions held by distributed-queuing management use these connections.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This chapter explains how to do this. You might also find it helpful to refer to the following chapters:

- Chapter 14, “Example configuration - IBM WebSphere MQ for AIX”, on page 205
- Chapter 15, “Example configuration - IBM MQSeries for Compaq Tru64 UNIX”, on page 225
- Chapter 16, “Example configuration - IBM WebSphere MQ for HP-UX”, on page 231
- Chapter 17, “Example configuration - IBM MQSeries for AT&T GIS UNIX, V2.2”, on page 257
- Chapter 18, “Example configuration - IBM WebSphere MQ for Solaris”, on page 273
- Chapter 19, “Example configuration - IBM WebSphere MQ for Linux”, on page 313

For OS/2 and Windows, see Chapter 10, “Setting up communication for OS/2 and Windows”, on page 131. For Compaq OpenVMS Alpha, see Chapter 20, “Setting up communication in Compaq OpenVMS Alpha systems”, on page 337. For Compaq NonStop Kernel, see Chapter 21, “Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1”, on page 349.

Deciding on a connection

There are three forms of communication for WebSphere MQ on UNIX systems:
- TCP
- LU 6.2
- UDP (WebSphere MQ for AIX only)

Each channel definition must specify one only as the transmission protocol (Transport Type) attribute. One or more protocols may be used by a queue manager.

For WebSphere MQ clients, it may be useful to have alternative channels using different transmission protocols. See the *WebSphere MQ Clients* book.

Defining a TCP connection

The channel definition at the sending end specifies the address of the target. The inet daemon is configured for the connection at the receiving end.

Sending end

Specify the host name, or the TCP address of the target machine, in the Connection Name field of the channel definition. The port to connect to will default to 1414. Port number 1414 is assigned by the Internet Assigned Numbers Authority to WebSphere MQ.

To use a port number other than the default, change the connection name field thus:

```
Connection Name REMHOST(1822)
```

where `REMHOST` is the hostname of the remote machine and `1822` is the port number required. (This must be the port that the listener at the receiving end is listening on.)

Alternatively you can change the port number by specifying it in the queue manager configuration file (qm.ini):

```
TCP:
  Port=1822
```

For more information about the values you set using QM.INI, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

Receiving on TCP

You can use either the TCP/IP listener, which is the inet daemon (INETD), or the WebSphere MQ listener.

Some Linux distributions now use the extended inet daemon (XINETD) instead of the inet daemon. For information about how to use the extended inet daemon on a Linux system, see “Using the extended inet daemon (XINETD)” on page 331.

Using the TCP/IP listener

To start channels on UNIX, the /etc/services file and the inetd.conf file must be edited, following the instructions below:

1. Edit the /etc/services file:

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. You can change this, but it must match the port number specified at the sending end.

   Add the following line to the file:

   ```
   MQSeries 1414/tcp
   ```

   where 1414 is the port number required by WebSphere MQ.
2. Add a line in the inetd.conf file to call the program amqcrsta:

   ```
   MQSeries stream tcp nowait mqm /mqmtop/bin/amqcrsta amqcrsta
   [-m Queue_Man_Name]
   ```

The updates are active after inetd has reread the configuration files. To do this, issue the following commands from the root user ID:

- On AIX:

  ```
  refresh -s inetd
  ```
- On other UNIX systems:

  ```
  kill -1 <process number>
  ```

When the listener program started by INETD inherits the locale from INETD, it is possible that the MQMDE will not be honored (merged) and will be placed on the queue as message data. To ensure that the MQMDE is honored, you must set the locale correctly. The locale set by INETD may not match that chosen for other locales used by WebSphere MQ processes. To set the locale:

1. Create a shell script which sets the locale environment variables LANG, LC_COLLATE, LC_CTYPE, LC_MONETARY, LC_NUMERIC, LC_TIME, and LC_MESSAGES to the locale used for other WebSphere MQ process.
2. In the same shell script, call the listener program.
3. Modify the inetd.conf file to call your shell script in place of the listener program.

It is possible to have more than one queue manager on the server machine. You must add a line to each of the two files, as above, for each of the queue managers. For example:

```
MQSeries1     1414/tcp
MQSeries2     1822/tcp
```

```
MQSeries2 stream tcp nowait mqm /mqmtop/bin/amqcrsta amqcrsta -m QM2
```

This avoids error messages being generated if there is a limitation on the number of outstanding connection requests queued at a single TCP port. For information about the number of outstanding connection requests, see "Using the TCP listener backlog option".

Using the TCP listener backlog option

When receiving on TCP, a maximum number of outstanding connection requests is set. This can be considered a *backlog* of requests waiting on the TCP port for the listener to accept the request. The default listener backlog values are shown in Table 19.

Table 19. Default outstanding connection requests

Platform	Default listener backlog value
AIX V4.2 or later	100
AIX V4.1	10
HP-UX	20
Solaris	100
Linux	100
All others	5

If the backlog reaches the values shown in Table 19, the TCP/IP connection is rejected and the channel will not be able to start.

For MCA channels, this results in the channel going into a RETRY state and retrying the connection at a later time.

For client connections, the client receives an MQRC_Q_MGR_NOT_AVAILABLE reason code from MQCONN and should retry the connection at a later time.

However, to avoid this error, you can add an entry in the qm.ini file:

```
TCP:
ListenerBacklog = n
```

This overrides the default maximum number of outstanding requests (see Table 19 on page 199) for the TCP/IP listener.

Note: Some operating systems support a larger value than the default. If necessary, this can be used to avoid reaching the connection limit.

To run the listener with the backlog option switched on, use the `RUNMQLSR -B` command. For information about the `RUNMQLSR` command, see the *WebSphere MQ System Administration Guide* book.

Using the WebSphere MQ listener

To run the listener supplied with WebSphere MQ, which starts new channels as threads, use the `runmqlsr` command. For example:

```
runmqlsr -t tcp [-m QMNAME] [-p 1822]
```

The square brackets indicate optional parameters; `QMNAME` is not required for the default queue manager, and the port number is not required if you are using the default (1414).

For the best performance, run the WebSphere MQ listener as a trusted application as described in "Running channels and listeners as trusted applications" on page 128. See the *WebSphere MQ Application Programming Guide* for information about trusted applications.

You can stop all WebSphere MQ listeners running on a queue manager that is inactive, using the command:

```
endmqlsr [-m QMNAME]
```

If you do not specify a queue manager name, the default queue manager is assumed.

Using the TCP/IP SO_KEEPALIVE option

If you want to use the SO_KEEPALIVE option (as discussed in "Checking that the other end of the channel is still available" on page 66) you must the add the following entry to your queue manager configuration file (QM.INI) or the Windows registry:

```
TCP:
   KeepAlive=yes
```

On some UNIX systems, you can define how long TCP waits before checking that the connection is still available, and how frequently it retries the connection if the first check fails. This is either a kernel tunable parameter, or can be entered at the command line. See the documentation for your UNIX system for more information.

On MQSeries for SINIX and DC/OSx you can set the TCP keepalive parameters by using the idtune and idbuild commands to modify the TCP_KEEPCNT and TCP_KEEPINT values for the kernel configuration. The default configuration is to retry 7 times at 7200 second (2 hourly) intervals.

Defining an LU 6.2 connection

SNA must be configured so that an LU 6.2 conversation can be established between the two machines.

See the *Multiplatform APPC Configuration Guide* and the following table for information.

Table 20. Settings on the local UNIX system for a remote queue manager platform

Remote platform	TPNAME	TPPATH
z/OS or OS/390 or MVS/ESA without CICS	The same as the corresponding TPName in the side information on the remote queue manager.	-
z/OS or OS/390 or MVS/ESA using CICS	CKRC (sender) CKSV (requester) CKRC (server)	-
OS/400	The same as the compare value in the routing entry on the OS/400 system.	-
OS/2	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file.	<drive>:\mqm\bin\amqcrs6a
UNIX systems	The same as the corresponding TPName in the side information on the remote queue manager.	`mqmtop`/bin/amqcrs6a
Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows.	<drive>:\mqm\bin\amqcrs6a

If you have more than one queue manager on the same machine, ensure that the TPnames in the channel definitions are unique.

Sending end

- On UNIX systems other than SINIX, and DC/OSx, create a CPI-C side object (symbolic destination) and enter this name in the Connection name field in the channel definition. Also create an LU 6.2 link to the partner.

  In the CPI-C side object enter the partner LU name at the receiving machine, the transaction program name and the mode name. For example:

  ```
  Partner LU Name             REMHOST
  Remote TP Name              recv
  Service Transaction Program no
  Mode Name                   #INTER
  ```

  On HP-UX, use the APPCLLU environment variable to name the local LU that the sender should use. On Solaris, set the APPC_LOCAL_LU environment variable to be the local LU name.

  SECURITY PROGRAM is used, where supported by CPI-C, when WebSphere MQ attempts to establish an SNA session.
- On SINIX, create an XSYMDEST entry in SNA configuration file (the TRANSIT KOGS file), for example:

  ```
  XSYMDEST sendMP01,
                    RLU       = forties,
                    MODE      = MODE1,
                    TP        = recvMP01,
                    TP-TYP    = USER,
                    SEC-TYP   = NONE
  ```

See the *MQSeries for SINIX and DC/OSx System Management Guide* for more information about the TRANSIT KOGS file.

- On DC/OSx, create an entry in the /etc/opt/lu62/cpic_cfg file, for example:

```
sendMP01 <local LU name> <remote LU name> <mode name> <remote TP name>
```

Receiving on LU 6.2

- On UNIX systems other than SINIX, and DC/OSx, create a listening attachment at the receiving end, an LU 6.2 logical connection profile, and a TPN profile.

  In the TPN profile, enter the full path to the executable and the Transaction Program name:

```
Full path to TPN executable   mqmtop/bin/amqcrs6a
Transaction Program name      recv
User ID                       0
```

  On systems where you can set the User ID, you should specify a user who is a member of the mqm group. On HP-UX, set the APPCTPN (transaction name) and APPCLLU (local LU name) environment variables (you can use the configuration panels for the invoked transaction program). On Solaris, set the APPC_LOCAL_LU environment variable to be the local LU name.

  On Solaris, amqcrs6a requires the option `-n` *`tp_name`*, where *`tp_name`* is the TP name on the receiving end of the SNA connection. It is the value of the `tp_path` variable in the SunLink configuration file.

  You may need to use a queue manager other than the default queue manager. If so, define a command file that calls:

```
amqcrs6a -m Queue_Man_Name
```

  then call the command file. On AIX, use the TPN profile parameters as follows:

```
 Use Command Line Parameters ?                yes
 Command Line Parameters                      -m Queue_Man_Name
```

- On SINIX, create an XTP entry in the SNA configuration file (the TRANSIT KOGS file), for example:

```
 XTP       recvMP01,
                    UID         = abcdefgh,
                    TYP         = USER,
                    PATH        = /home/abcdefgh/recvMP01.sh,
                    SECURE      = NO
```

  Where /home/abcdefgh/recvMP01.sh is a file that contains:

```
#!/bin/sh
#
# script to start the receiving side for the qmgr MP01
#
exec /opt/mqm/bin/amqcrs6a -m <queue manager>
```

  See the *MQSeries for SINIX and DC/OSx System Management Guide* for more information about the TRANSIT KOGS file.

- On DC/OSx, add a Transaction Program entry to the SNA configuration file, including the following information:

```
TRANSACTION PROGRAM
        transaction programname (ebcdic): recvMP04
        transaction program execute name:
                'home/abcdefgh/recvMP04.sh
        tp is enabled
        tp supports basic conversations
        tp supports mapped conversations
        tp supports confirm synchronization
        tp supports no synchronization
        no verification is required
        number of pip fields required: 0
        privilege mask (hex): 0
                (no privileges)
```

Defining an LU 6.2 connection

Chapter 14. Example configuration - IBM WebSphere MQ for AIX

This chapter gives an example of how to set up communication links from WebSphere MQ for AIX to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[3]
- Solaris
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

First it describes the parameters needed for an LU 6.2 connection, then it describes "Establishing a TCP connection" on page 216 and "Establishing a UDP connection" on page 217.

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for AIX configuration" on page 217.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 21 presents a worksheet listing all the parameters needed to set up communication from AIX to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in "Explanation of terms" on page 209.

Table 21. Configuration worksheet for Communications Server for AIX

ID	Parameter Name	Reference	Example	User Value
Parameters for local node				

---

[3] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 21. Configuration worksheet for Communications Server for AIX (continued)

ID	Parameter Name	Reference	Example	User Value
1	Network name		**NETID**	
2	Control Point name		**AIXPU**	
3	Node ID		**07123456**	
4	Local LU name		**AIXLU**	
5	Local LU alias		**AIXQMGR**	
6	TP Name		**MQSERIES**	
7	Full path to TP executable		**usr/lpp/mqm/bin/amqcrs6a**	
8	Token-ring adapter address		**123456789012**	
9	Mode name		**#INTER**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
10	Network name	2	**NETID**	
11	Remote LU name	6	**OS2LU**	
12	Remote Transaction Program name	8	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**OS2CPIC**	
14	Mode name	17	**#INTER**	
15	LAN destination address	10	**10005AFC5D83**	
16	Token-Ring Link Station profile name		**OS2PRO**	
17	CP name of adjacent node	3	**OS2PU**	
18	LU 6.2 partner location profile name		**OS2LOCPRO**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
10	Network name	2	**NETID**	
11	Remote LU name	5	**WINNTLU**	
12	Remote Transaction Program name	7	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**NTCPIC**	
14	Mode name	17	**#INTER**	
15	LAN destination address	9	**08005AA5FAB9**	
16	Token-Ring Link Station profile name		**NTPRO**	
17	CP name of adjacent node	3	**WINNTCP**	
18	LU 6.2 partner LU profile name		**NTLUPRO**	
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
10	Network name	4	**NETID**	
11	Remote LU name	5	**HPUXLU**	
12	Remote Transaction Program name	7	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**HPUXCPIC**	

Table 21. Configuration worksheet for Communications Server for AIX (continued)

ID	Parameter Name	Reference	Example	User Value
14	Mode name	6	**#INTER**	
15	LAN destination address	8	**100090DC2C7C**	
16	Token-Ring Link Station profile name		**HPUXPRO**	
17	CP name of adjacent node	2	**HPUXPU**	
18	LU 6.2 partner LU profile name		**HPUXLUPRO**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
10	Network name	2	**NETID**	
11	Remote LU name	4	**GISLU**	
12	Remote Transaction Program name	5	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**GISCPIC**	
14	Mode name	7	**#INTER**	
15	LAN destination address	8	**10007038E86B**	
16	Token-Ring Link Station profile name		**GISPRO**	
17	CP name of adjacent node	3	**GISPU**	
18	LU 6.2 partner LU profile name		**GISLUPRO**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
10	Network name	2	**NETID**	
11	Remote LU name	7	**SOLARLU**	
12	Remote Transaction Program name	8	**MQSERIES**	
17	LU 6.2 CPI-C Side Information profile name		**SOLCPIC**	
14	Mode name	17	**#INTER**	
5	LAN destination address	5	**08002071CC8A**	
16	Token-Ring Link Station profile name		**SOLPRO**	
17	CP name of adjacent node	3	**SOLARPU**	
18	LU 6.2 partner LU profile name		**SOLLUPRO**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
10	Network name	4	**NETID**	
11	Remote LU name	5	**LINUXLU**	
12	Remote Transaction Program name	7	**MQSERIES**	
17	LU 6.2 CPI-C Side Information profile name		**LXCPIC**	
14	Mode name	6	**#INTER**	
5	LAN destination address	8	**08005AC6DF33**	
16	Token-Ring Link Station profile name		**LXPRO**	
17	CP name of adjacent node	2	**LINUXPU**	

AIX and LU 6.2

Table 21. Configuration worksheet for Communications Server for AIX (continued)

ID	Parameter Name	Reference	Example	User Value
18	LU 6.2 partner LU profile name		**LXLUPRO**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
10	Network name	**1**	**NETID**	
11	Remote LU name	**3**	**AS400LU**	
12	Remote Transaction Program name	**8**	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**AS4CPIC**	
14	Mode name	**17**	**#INTER**	
15	LAN destination address	**4**	**10005A5962EF**	
16	Token-Ring Link Station profile name		**AS4PRO**	
17	CP name of adjacent node	**2**	**AS400PU**	
18	LU 6.2 partner LU profile name		**AS4LUPRO**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Network name	**2**	**NETID**	
11	Remote LU name	**4**	**MVSLU**	
12	Remote Transaction Program name	**7**	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**MVSCPIC**	
14	Mode name	**10**	**#INTER**	
15	LAN destination address	**6**	**400074511092**	
16	Token-Ring Link Station profile name		**MVSPRO**	
17	CP name of adjacent node	**3**	**MVSPU**	
18	LU 6.2 partner LU profile name		**MVSLUPRO**	
Connection to a z/OS system using a generic interface The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Network name	**2**	**NETID**	
11	Remote LU name	**10**	**MVSGR**	
12	Remote Transaction Program name	**7**	**MQSERIES**	
13	LU 6.2 CPI-C Side Information profile name		**MVSCPIC**	
14	Mode name	**6**	**#INTER**	
15	LAN destination address	**8**	**400074511092**	
16	Token-Ring Link Station profile name		**MVSPRO**	
17	CP name of adjacent node	**3**	**MVSPU**	
18	LU 6.2 partner LU profile name		**MVSLUPRO**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
10	Network name	**1**	**NETID**	

Table 21. Configuration worksheet for Communications Server for AIX (continued)

ID	Parameter Name	Reference	Example	User Value
11	Remote LU name	3	**VSELU**	
12	Remote Transaction Program name	4	**MQ01**	
13	LU 6.2 CPI-C Side Information profile name		**VSECPIC**	
14	Mode name		**#INTER**	
15	LAN destination address	5	**400074511092**	
16	Token-Ring Link Station profile name		**VSEPRO**	
17	CP name of adjacent node	2	**VSEPU**	
18	LU 6.2 partner LU profile name		**VSELUPRO**	

Explanation of terms

1 Network name
This is the unique ID of the network to which you are connected. Your network administrator will tell you this value.

2 Control Point name
This is a unique control point name for this workstation. Your network administrator will assign this to you.

3 XID node ID
This is a unique identifier for this workstation. On other platforms it is often referred to as the exchange ID (XID). Your network administrator will assign this to you.

4 Local LU name
A logical unit (LU) manages the exchange of data between systems. The local LU name is the name of the LU on your system. Your network administrator will assign this to you.

5 Local LU alias
The local LU alias is the name by which your local LU is known to your applications. You can choose this name yourself. It need be unique only on this machine.

6 TP Name
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. It is recommended that when AIX is the receiver a Transaction Program Name of MQSERIES is used, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 20 on page 201 for more information.

7 Full path to TP executable
This is the path and name of a shell script file that invokes the actual program to be run when a conversation is initiated with this workstation. You can choose the path and name of the script file. The contents of the file are illustrated in “WebSphere MQ for AIX TPN setup” on page 222.

8 Token-ring adapter address
This is the 12-character hex address of the token-ring card. It can be found by entering the AIX command:

```
lsfg -v -l tokn
```

where `n` is the number assigned to the token-ring adapter you are using. The **Network Address** field of the Token-Ring section indicates the adapter's address.

9 Mode name
This is the name of a configuration profile used by Communications Server for AIX. The profile contains the set of parameters that control the APPC conversation. The mode name specified in the profile will be assigned to you by your network administrator. You supply the name to be used for the profile.

13 LU 6.2 CPI-C Side Information profile name
This is a name given to the Side Information profile defining a partner node. You supply the name. It needs to be unique only on this machine. You will later use the name in the WebSphere MQ sender channel definition.

16 Token-Ring Link Station profile name
This is the name of a configuration profile used by Communications Server for AIX. You supply the name to be used for the profile. The link station profile associates the link station with the SNA DLC profile, which has been used to define the hardware adapter and link characteristics, and the node control point.

17 CP name of adjacent node
This is the unique control point name of the partner system which which you are establishing communication. Your network administrator will assign this to you.

18 LU 6.2 partner LU profile name
This is the name of a configuration profile used by Communications Server for AIX. You supply the name to be used for the profile. It needs to be unique only on this machine. The profile defines parameters for establishing a session with a specific partner LU. In some scenarios, this profile may not be required but it is shown here to reduce the likelihood of error. See the *SNA Server for AIX Configuration Reference* manual for details.

Establishing a session using Communications Server for AIX V5

Verify the level of Communications Server software you have installed by entering the AIX command:

```
lslpp -h sna.rte
```

The level displayed in the response needs to be at least Version 5.0.

To update the SNA configuration profile, you need root authority. (Without root authority you can display options and appear to modify them, but cannot actually make any changes.) You can make configuration changes when SNA is either active or inactive.

The configuration scenario that follows was accomplished using the graphical interface.

Note: The setup used is APPN using independent LUs.

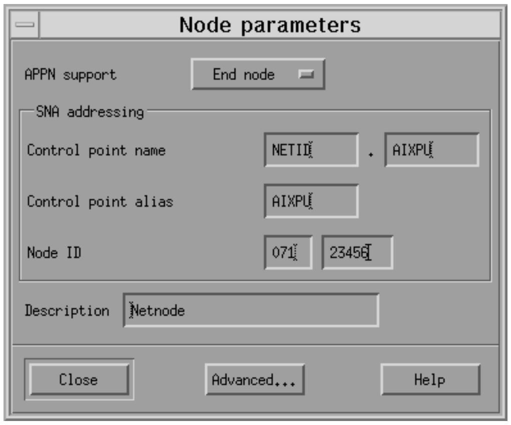
If you are an experienced user of AIX, you may choose to circumvent the panels and use the command-line interface. Refer to the *SNA Server for AIX Configuration Reference* manual to see the commands that correspond to the panels illustrated.

Throughout the following example, only the panels for profiles that must be added or updated are shown.

Configuring your node

This configuration uses a token ring setup. To define the end node to connect to the network node (assuming that a network node already exists), you need to:

1. Click on **Services** from the main menu on the main window.
2. Select **Configuration node parameters ...** from the drop-down list. A window entitled **Node parameters** appears:



Node parameters

APPN support: End node

SNA addressing

Control point name: NETID . AIXPU

Control point alias: AIXPU

Node ID: 071 23456

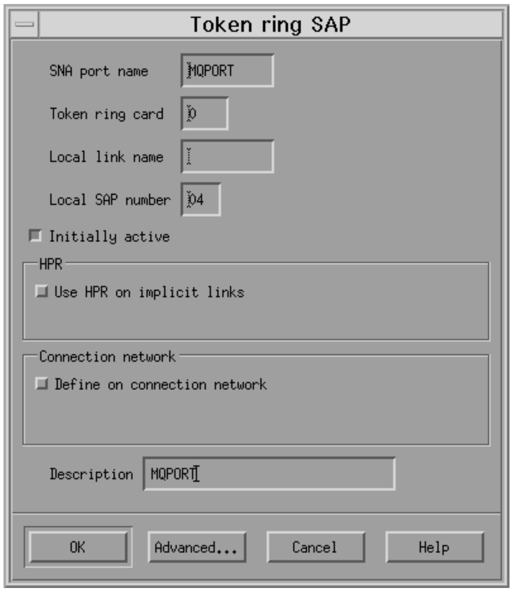
Description: Netnode

3. Click on **End node for APPN support**.
4. In the **SNA addressing** box, enter a name and alias for the Control point. The Control point name consists of a Network name (**1**) and a Control point name (**2**).
5. Enter the Node ID (**3**) of your local machine.
6. Click on **OK**.

You have now configured your node to connect to the network node.

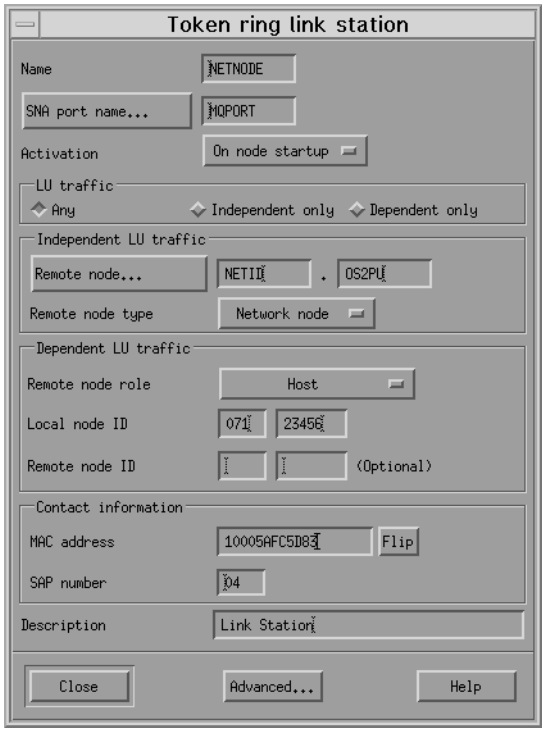
Configuring connectivity to the network

1. Defining your port:
   a. From the main menu of the main window, click on **Services**, **Connectivity**, and **New port ...** A window entitled **Add to *machine name* screen** appears.
   b. Select the default card for connecting to the network (**Token ring card**).
   c. Click on **OK**. A window entitled **Token ring SAP** appears:



SNA port name: MQPORT
Token ring card: 0
Local link name:
Local SAP number: 04
☑ Initially active
HPR
☐ Use HPR on implicit links
Connection network
☐ Define on connection network
Description: MQPORT

   d. Enter a port name in the **SNA port name** box, for example, `MQPORT`.
   e. Check **Initially Active**.
   f. Click on **OK**.
2. Defining your connection to the network node:
   a. From the main menu on the main window, click on **Services**, **Connectivity**, and **New link station ...**
   b. Click on **OK** to link your station to the chosen port (`MQPORT`). A window entitled **Token ring link station** appears:



Token ring link station

Name: NETNODE

SNA port name...: MQPORT

Activation: On node startup

LU traffic: ◆ Any ◇ Independent only ◇ Dependent only

Independent LU traffic

Remote node...: NETID . OS2PU

Remote node type: Network node

Dependent LU traffic

Remote node role: Host

Local node ID: 071 23456

Remote node ID: (Optional)

Contact information

MAC address: 10005AFC5D83

SAP number: 04

Description: Link Station

c. Enter a name for your link station (**4**), for example, `NETNODE`.

d. Enter the port name to which you want to connect the link station. In this case, the port name would be `MQPORT`.

e. Check **Any** in the **LU traffic** box.

f. Define where the remote node is by entering the control point on the network node in the **Independent LU traffic** box. The control point consists of a **Network name** (**10**) and a **CP name of adjacent node** (**17**).

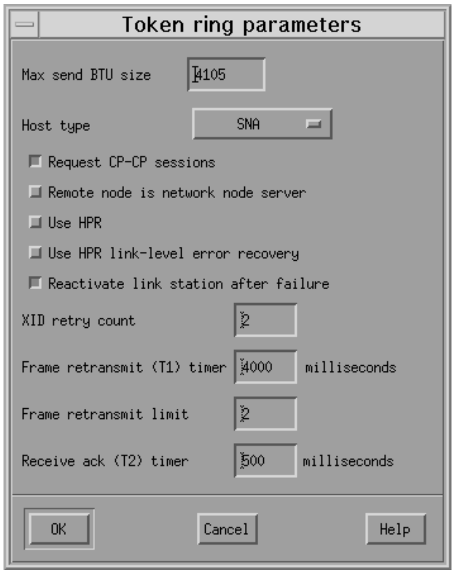
   Note: The network node does not have to be on the remote system that you are connecting to.

g. Ensure the **Remote node type** is **Network node**.

h. In the **Contact information**, enter the **MAC address** (**15**) of the token ring card on the network node.

   Note: The network node does not have to be on the remote system that you are connecting to.

i. Click on **Advanced ...**. A window entitled **Token ring parameters** appears:



Max send BTU size 4105

Host type SNA

☑ Request CP-CP sessions

☐ Remote node is network node server

☐ Use HPR

☐ Use HPR link-level error recovery

☑ Reactivate link station after failure

XID retry count 2

Frame retransmit (T1) timer 4000 milliseconds

Frame retransmit limit 2

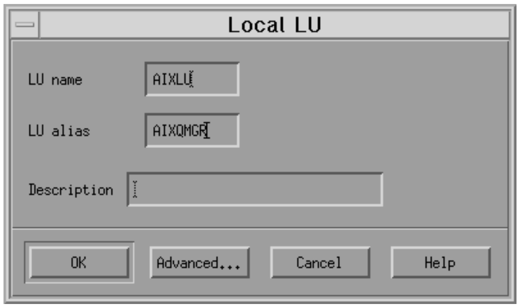
Receive ack (T2) timer 500 milliseconds

j. Check **Remote node is network node server**.
k. Click on **OK**. The **Token ring link station** window remains on the screen.
l. Click on **OK** on the **Token ring link station** window.

Defining a local LU

To define a local LU:

1. From the main menu on the main window, click on **Services**, **APPC**, and **New independent local LU ...**. A window entitled **Local LU** appears:



LU name AIXLU

LU alias AIXQMGR

Description

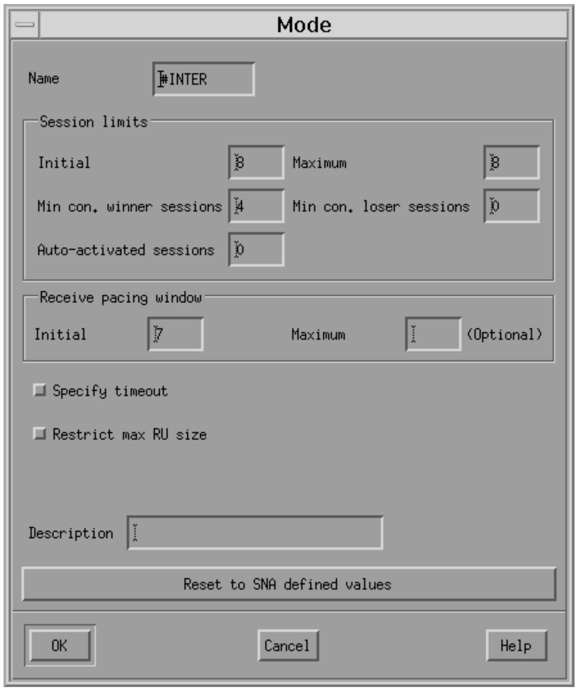
Figure 33. Local LU window

2. Enter an LU name (**4**) and alias (**5**).
3. Click on **OK**.

You have now set up a basic SNA system.

To define the mode controlling the SNA session limits:

1. From the main menu in the main window, click on **Services**, **APPC**, and **Modes ...**. A **Modes** window appears.
2. Select the **New ...** button. A window entitled **Mode** appears:



Name #INTER

Initial 8 Maximum 8

Min con. winner sessions 4 Min con. loser sessions 0

Auto-activated sessions 0

Receive pacing window: Initial 7 Maximum (Optional)

☐ Specify timeout

☐ Restrict max RU size

Description

Figure 34. Mode window

3. Enter a **Name** (**9**) for your mode.
4. When you are happy with the session limits, click on **OK**. The **Modes** window remains on the screen.
5. Click on **Done** in the **Modes** window.

Defining a transaction program

WebSphere MQ allows you to use the Communications Server for AIX V5 graphical interface to configure transaction programs.

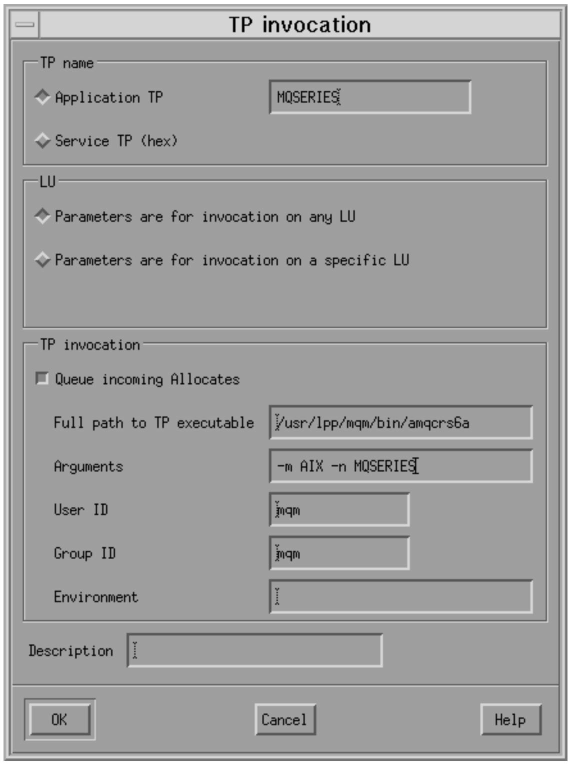
If you are migrating from a previous version of MQSeries, you should delete any existing Communications Server definitions of transaction programs that can be invoked by WebSphere MQ using the following commands:

1. Type
   ```
   snaadmin delete_tp_load_info.tp_name=xxxxx
   ```
2. Then type
   ```
   snaadmin delete_tp.tp_name=xxxxx
   ```

An attempt to invoke a previously defined transaction program results in a SNA sense code of 084B6031. In addition, error message AMQ9213 is returned. See *WebSphere MQ Messages* for more information about this and other WebSphere MQ messages.

You can then re-create the transaction program definition using the following instructions

From the main window, click **Services**, **APPC**, and **Transaction programs ...** The following panel is displayed:



TP name

◆ Application TP: MQSERIES

◇ Service TP (hex)

LU

◆ Parameters are for invocation on any LU

◇ Parameters are for invocation on a specific LU

TP invocation

☑ Queue incoming Allocates

Full path to TP executable: /usr/lpp/mqm/bin/amqcrs6a

Arguments: -m AIX -n MQSERIES

User ID: mqm

Group ID: mqm

Environment:

Description:

1. Type **TP name** (**6**) in the **Application TP** field.
2. Clear the **Queue incoming Allocates** check box.
3. Type the **Full path to executable** (**7**).
4. Type **–m Local queue manager** in the **Arguments** field.
5. Type **mqm** in the **User ID** and **Group ID** fields.
6. Enter environment variables **APPCLLU=local LU** (**4**) and **APPCTPN=Invokable TP** (**6**) separated by the pipe character in the **Environment** field.
7. Click **OK**.

Establishing a TCP connection

1. Edit the file /etc/services.

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```
2. Edit the file /etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait root /usr/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Enter the command `refresh -s inetd`.

Note: You must add **root** to the mqm group. You need not have the primary group set to mqm. As long as mqm is in the set of groups, you can use the commands. If you are running only applications that use the queue manager you do not need mqm group authority.

What next?

The connection is now established. You are ready to complete the configuration. Go to "WebSphere MQ for AIX configuration".

Establishing a UDP connection

To establish a UDP connection, ensure a listener is started by issuing the following MQSC command:

```
runmqlsr -m QMgrName -t UDP -p 1414
```

Notes:

1. You cannot start a listener channel on AIX using the START LISTENER MQSC command.
2. Using the `runmqlsr` command implies that you ***must not*** add entries to the /etc/services and /etc/inetd.conf file for UDP on WebSphere MQ for AIX.

What next?

The connection is now established. You are ready to complete the configuration. Go to "WebSphere MQ for AIX configuration".

WebSphere MQ for AIX configuration

Notes:

1. Before beginning the installation process ensure that you have first created the *mqm* user and group, and set the password.
2. If installation fails as a result of insufficient space in the file system you can increase the size as follows, using the command `smit C sna`. (Use `df` to display the current status of the file system. This will indicate the logical volume that is full.)

   ```
   -- Physical and Logical Storage
     -- File Systems
       -- Add / Change / Show / Delete File Systems
         -- Journaled File Systems
           -- Change/Show Characteristics of a Journaled File System
   ```

3. Start any channel using the command:

   ```
   runmqchl -c channel.name
   ```

4. Sample programs are installed in /usr/mqm/samp.
5. Error logs are stored in /var/mqm/qmgrs/*qmgrname*/errors.
6. You can start an AIX trace of the WebSphere MQ components using the command:

   ```
   trace -a -j30D,30E -o trace.file
   ```

   You can stop AIX trace by entering:

   ```
   trcstop
   ```

   | Format the trace report using the command:

   ```
   trcrpt -t /usr/mqm/lib/amqtrc.fmt trace.file > trace.report
   ```

7. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

AIX configuration

Basic configuration

1. Create the queue manager from the AIX command line using the command:

   ```
   crtmqm -u dlqname -q aix
   ```

   where:

   aix Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and a set of default objects.
2. Start the queue manager from the AIX command line using the command:

   ```
   strmqm aix
   ```

   where *aix* is the name given to the queue manager when it was created.
3. Start **runmqsc** from the AIX command line and use it to create the undeliverable message queue by entering the command:

   ```
   def ql (dlqname)
   ```

   where *dlqname* is the name given to the undeliverable message queue when the queue manager was created.

Channel configuration

The following section details the configuration to be performed on the AIX queue manager to implement the channel described in Figure 32 on page 101.

In each case the MQSC command is shown. Either start **runmqsc** from an AIX command line and enter each command in turn, or build the commands into a command file.

Examples are given for connecting WebSphere MQ for AIX and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 22. Configuration worksheet for WebSphere MQ for AIX

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**AIX**	
B	Local queue name		**AIX.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	A	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	

Table 22. Configuration worksheet for WebSphere MQ for AIX (continued)

<table>
<tr><th>ID</th><th>Parameter Name</th><th>Reference</th><th>Example Used</th><th>User Value</th></tr>
<tr><td>E</td><td>Queue name at remote system</td><td>B</td><td><b>OS2.LOCALQ</b></td><td></td></tr>
<tr><td>F</td><td>Transmission queue name</td><td></td><td><b>OS2</b></td><td></td></tr>
<tr><td>G</td><td>Sender (SNA) channel name</td><td></td><td><b>AIX.OS2.SNA</b></td><td></td></tr>
<tr><td>H</td><td>Sender (TCP/IP) channel name</td><td></td><td><b>AIX.OS2.TCP</b></td><td></td></tr>
<tr><td>I</td><td>Receiver (SNA) channel name</td><td>G</td><td><b>OS2.AIX.SNA</b></td><td></td></tr>
<tr><td>J</td><td>Receiver (TCP/IP) channel name</td><td>H</td><td><b>OS2.AIX.TCP</b></td><td></td></tr>
<tr><td colspan="5"><i><b>Connection to WebSphere MQ for Windows</b></i>
The values in this section of the table must match those used in Table 18 on page 189, as indicated.</td></tr>
<tr><td>C</td><td>Remote queue manager name</td><td>A</td><td><b>WINNT</b></td><td></td></tr>
<tr><td>D</td><td>Remote queue name</td><td></td><td><b>WINNT.REMOTEQ</b></td><td></td></tr>
<tr><td>E</td><td>Queue name at remote system</td><td>B</td><td><b>WINNT.LOCALQ</b></td><td></td></tr>
<tr><td>F</td><td>Transmission queue name</td><td></td><td><b>WINNT</b></td><td></td></tr>
<tr><td>G</td><td>Sender (SNA) channel name</td><td></td><td><b>AIX.WINNT.SNA</b></td><td></td></tr>
<tr><td>H</td><td>Sender (TCP/IP) channel name</td><td></td><td><b>AIX.WINNT.TCP</b></td><td></td></tr>
<tr><td>I</td><td>Receiver (SNA) channel name</td><td>G</td><td><b>WINNT.AIX.SNA</b></td><td></td></tr>
<tr><td>J</td><td>Receiver (TCP) channel name</td><td>H</td><td><b>WINNT.AIX.TCP</b></td><td></td></tr>
<tr><td colspan="5"><i><b>Connection to MQSeries for Compaq Tru64 UNIX</b></i>
The values in this section of the table must match those used in Table 23 on page 226, as indicated.</td></tr>
<tr><td>C</td><td>Remote queue manager name</td><td>A</td><td><b>DECUX</b></td><td></td></tr>
<tr><td>D</td><td>Remote queue name</td><td></td><td><b>DECUX.REMOTEQ</b></td><td></td></tr>
<tr><td>E</td><td>Queue name at remote system</td><td>B</td><td><b>DECUX.LOCALQ</b></td><td></td></tr>
<tr><td>F</td><td>Transmission queue name</td><td></td><td><b>DECUX</b></td><td></td></tr>
<tr><td>H</td><td>Sender (TCP) channel name</td><td></td><td><b>DECUX.AIX.TCP</b></td><td></td></tr>
<tr><td>J</td><td>Receiver (TCP) channel name</td><td>H</td><td><b>AIX.DECUX.TCP</b></td><td></td></tr>
<tr><td colspan="5"><i><b>Connection to WebSphere MQ for HP-UX</b></i>
The values in this section of the table must match those used in Table 25 on page 252, as indicated.</td></tr>
<tr><td>C</td><td>Remote queue manager name</td><td>A</td><td><b>HPUX</b></td><td></td></tr>
<tr><td>D</td><td>Remote queue name</td><td></td><td><b>HPUX.REMOTEQ</b></td><td></td></tr>
<tr><td>E</td><td>Queue name at remote system</td><td>B</td><td><b>HPUX.LOCALQ</b></td><td></td></tr>
<tr><td>F</td><td>Transmission queue name</td><td></td><td><b>HPUX</b></td><td></td></tr>
<tr><td>G</td><td>Sender (SNA) channel name</td><td></td><td><b>AIX.HPUX.SNA</b></td><td></td></tr>
<tr><td>H</td><td>Sender (TCP) channel name</td><td></td><td><b>AIX.HPUX.TCP</b></td><td></td></tr>
<tr><td>I</td><td>Receiver (SNA) channel name</td><td>G</td><td><b>HPUX.AIX.SNA</b></td><td></td></tr>
<tr><td>J</td><td>Receiver (TCP) channel name</td><td>H</td><td><b>HPUX.AIX.TCP</b></td><td></td></tr>
<tr><td colspan="5"><i><b>Connection to MQSeries for AT&T GIS UNIX</b></i>
The values in this section of the table must match those used in Table 27 on page 267, as indicated.</td></tr>
<tr><td>C</td><td>Remote queue manager name</td><td>A</td><td><b>GIS</b></td><td></td></tr>
<tr><td>D</td><td>Remote queue name</td><td></td><td><b>GIS.REMOTEQ</b></td><td></td></tr>
<tr><td>E</td><td>Queue name at remote system</td><td>B</td><td><b>GIS.LOCALQ</b></td><td></td></tr>
</table>

Table 22. Configuration worksheet for WebSphere MQ for AIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**AIX.GIS.SNA**	
H	Sender (TCP) channel name		**AIX.GIS.TCP**	
I	Receiver (SNA) channel name	G	**GIS.AIX.SNA**	
J	Receiver (TCP/IP) channel name	H	**GIS.AIX.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**AIX.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**AIX.SOLARIS.TCP**	
I	Receiver (SNA) channel name	G	**SOLARIS.AIX.SNA**	
J	Receiver (TCP/IP) channel name	H	**SOLARIS.AIX.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**AIX.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**AIX.LINUX.TCP**	
I	Receiver (SNA) channel name	G	**LINUX.AIX.SNA**	
J	Receiver (TCP/IP) channel name	H	**LINUX.AIX.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**AIX.AS400.SNA**	
H	Sender (TCP) channel name		**AIX.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.AIX.SNA**	
J	Receiver (TCP) channel name	H	**AS400.AIX.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	

Table 22. Configuration worksheet for WebSphere MQ for AIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**AIX.MVS.SNA**	
H	Sender (TCP) channel name		**AIX.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.AIX.SNA**	
J	Receiver (TCP) channel name	H	**MVS.AIX.TCP**	
Connection to WebSphere MQ for z/OS using queue-sharing groups The values in this section of the table must match those used in Table 45 on page 498, as indicated.				
C	Remote queue manager name	A	**QSG**	
D	Remote queue name		**QSG.REMOTEQ**	
E	Queue name at remote system	B	**QSG.SHAREDQ**	
F	Transmission queue name		**QSG**	
G	Sender (SNA) channel name		**AIX.QSG.SNA**	
H	Sender (TCP) channel name		**AIX.QSG.TCP**	
I	Receiver (SNA) channel name	G	**QSG.AIX.SNA**	
J	Receiver (TCP) channel name	H	**QSG.AIX.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**AIX.VSE.SNA**	
I	Receiver channel name	G	**VSE.AIX.SNA**	

WebSphere MQ for AIX sender-channel definitions using SNA

```
def ql (OS2) +                                 F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                         D
    rname(OS2.LOCALQ) +                        E
    rqmname(OS2) +                             C
    xmitq(OS2) +                               F
    replace

def chl (AIX.OS2.SNA) chltype(sdr) +           G
    trptype(lu62) +
    conname('OS2CPIC') +                       17
    xmitq(OS2) +                               F
    replace
```

AIX configuration

WebSphere MQ for AIX receiver-channel definitions using SNA

```
def ql (AIX.LOCALQ) replace                    B

def chl (OS2.AIX.SNA) chltype(rcvr) +          I
    trptype(lu62) +
    replace
```

WebSphere MQ for AIX TPN setup

During the AIX Communications Server configuration process, an LU 6.2 TPN profile was created, which contained the full path to a TP executable. In the example the file was called u/interops/AIX.crs6a. You can choose a name, but you are recommended to include the name of your queue manager in it. The contents of the executable file must be:

```
#!/bin/sh
/opt/mqm/bin/amqcrs6a -m aix
```

where *aix* is the queue manager name (**A**). After creating this file, enable it for execution by running the command:

```
    chmod 755 /u/interops/AIX.crs6a
```

As an alternative to creating an executable file, you can specify the path on the Add LU 6.2 TPN Profile panel, using command line parameters.

Specifying a path in one of these two ways ensures that SNA receiver channels activate correctly when a sender channel initiates a conversation.

WebSphere MQ for AIX sender-channel definitions using TCP

```
def ql (OS2) +                                 F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                         D
    rname(OS2.LOCALQ) +                        E
    rqmname(OS2) +                             C
    xmitq(OS2) +                               F
    replace

def chl (AIX.OS2.TCP) chltype(sdr) +           H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                               F
    replace
```

WebSphere MQ for AIX receiver-channel definitions using TCP

```
def ql (AIX.LOCALQ) replace                    B

def chl (OS2.AIX.TCP) chltype(rcvr) +          J
    trptype(tcp) +
    replace
```

WebSphere MQ for AIX sender-channel definitions using UDP

```
def ql (OS2) +                                 F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                         D
    rname(OS2.LOCALQ) +                        E
    rqmname(OS2) +                             C
    xmitq(OS2) +                               F
    replace
```

```
def chl (AIX.OS2.UDP) chltype(sdr) +          H
    trptype(udp) +
    conname(remote_udpip_hostname) +
    xmitq(OS2) +                              F
    replace
```

WebSphere MQ for AIX receiver-channel definitions using UDP

```
def ql (AIX.LOCALQ) replace                   B

def chl (OS2.AIX.UDP) chltype(rcvr) +         J
    trptype(udp) +
    replace
```

AIX configuration

Chapter 15. Example configuration - IBM MQSeries for Compaq Tru64 UNIX

This chapter shows how to set up TCP communication links from MQSeries for Compaq Tru64 UNIX to WebSphere MQ products on other platforms.

Note: MQSeries for Compaq Tru64 UNIX supports the TCP communication protocol only.

Once the connection is established, you need to define some channels to complete the configuration. This process is described in "MQSeries for Compaq Tru64 UNIX configuration".

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Establishing a TCP connection

1. Edit the file /etc/services.

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```
2. Edit the file /etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait root /opt/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Find the process ID of the inetd with the command:

   ```
   ps -ef | grep inetd
   ```
4. Run the command:

   ```
   kill -1 inetd processid
   ```

What next?

Inetd is now ready to listen for incoming requests and pass them to WebSphere MQ. You are ready to complete the configuration as described in the next section.

MQSeries for Compaq Tru64 UNIX configuration

Before beginning the installation process ensure that you have first created the *mqm* user and group, and set the password.

Start any channel using the command:

```
runmqchl -c channel.name -m qmname
```

Notes:

1. Sample programs are installed in /opt/mqm/samp.
2. Error logs are stored in /var/mqm/qmgrs/*qmname*/errors.

3. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Basic configuration

1. Create the queue manager from the UNIX prompt using the command:

   ```
   crtmqm -u dlqname -q qmname
   ```

   where:

   qmname Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and sets the DEADQ attribute of the queue manager, but does not create the undeliverable message queue.
2. Start the queue manager from the UNIX prompt using the command:

   ```
   strmqm qmname
   ```

   where *qmname* is the name given to the queue manager when it was created.

Channel configuration

This section describes the configuration to be performed on the Compaq Tru64 UNIX queue manager to implement the single channel, and the WebSphere MQ objects associated with it.

Examples are given at the end of this chapter for connecting MQSeries for Compaq Tru64 UNIX and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

In each example, the MQSC command is shown. Either start **runmqsc** from a UNIX prompt and enter each command in turn, or build the commands into a command file.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. All others are keywords and should be entered as shown.

Table 23. Configuration worksheet for MQSeries for Compaq Tru64 UNIX

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**DECUX**	
B	Local queue name		**DECUX.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	

Table 23. Configuration worksheet for MQSeries for Compaq Tru64 UNIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	B	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
H	Sender (TCP) channel name		**DECUX.OS2.TCP**	
J	Receiver (TCP) channel name	H	**OS2.DECUX.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
H	Sender (TCP) channel name		**DECUX.WINNT.TCP**	
J	Receiver (TCP) channel name	H	**WINNT.DECUX.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
H	Sender (TCP) channel name		**DECUX.AIX.TCP**	
J	Receiver (TCP) channel name	H	**AIX.DECUX.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267.				
C	Remote queue manager name	A	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
H	Sender (TCP) channel name		**DECUX.GIS.TCP**	
J	Receiver (TCP) channel name	H	**GIS.DECUX.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
H	Sender (TCP) channel name		**DECUX.SOLARIS.TCP**	
J	Receiver (TCP) channel name	H	**SOLARIS.DECUX.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332.				

Table 23. Configuration worksheet for MQSeries for Compaq Tru64 UNIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
H	Sender (TCP) channel name		**DECUX.LINUX.TCP**	
J	Receiver (TCP) channel name	H	**LINUX.DECUX.TCP**	
Connection to WebSphere MQ for iSeries. The values in this section of the table must match those used in Table 51 on page 580.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
H	Sender (TCP) channel name		**DECUX.AS400.TCP**	
J	Receiver (TCP) channel name	H	**AS400.DECUX.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
H	Sender (TCP) channel name		**DECUX.MVS.TCP**	
J	Receiver (TCP) channel name	H	**MVS.DECUX.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender (SNA) channel name		**DECUX.VSE.SNA**	
I	Receiver (SNA) channel name	G	**VSE.DECUX.SNA**	

MQSeries for Compaq Tru64 UNIX sender-channel definitions using TCP/IP

```
def ql (OS2) +                                F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                        D
    rname(OS2.LOCALQ) +                       E
    rqmname(OS2) +                            C
    xmitq(OS2) +                              F
    replace
```

```
def chl (DECUX.OS2.TCP) chltype(sdr) +           H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                                F
    replace
```

MQSeries for Compaq Tru64 UNIX receiver-channel definitions using TCP/IP

```
def ql (DECUX.LOCALQ) replace                    B

def chl (OS2.DECUX.TCP) chltype(rcvr) +          J
    trptype(tcp) +
    replace
```

Compaq Tru64l UNIX configuration

Chapter 16. Example configuration - IBM WebSphere MQ for HP-UX

This chapter gives an example of how to set up communication links from WebSphere MQ for HP-UX to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compq Tru 64UNIX
- AT&T GIS UNIX[4]
- Solaris
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

First it describes the parameters needed for an LU 6.2 connection, then it describes "Establishing a session using HP SNAplus2" on page 236 and "Establishing a TCP connection" on page 250.

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for HP-UX configuration" on page 251.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 24 presents a worksheet listing all the parameters needed to set up communication from HP-UX to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in "Explanation of terms" on page 234.

Table 24. Configuration worksheet for HP SNAplus2

ID	Parameter Name	Reference	Example	User Value
Parameters for local node				
1	Configuration file name		**sna_node.cfg**	

---

[4] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 24. Configuration worksheet for HP SNAplus2 (continued)

ID	Parameter Name	Reference	Example	User Value
2	Control point name		**HPUXPU**	
3	Node ID to send		**05D 54321**	
4	Network name		**NETID**	
5	Local APPC LU		**HPUXLU**	
6	APPC mode		**#INTER**	
7	Invokable TP		**MQSERIES**	
8	Token-Ring adapter address		**100090DC2C7C**	
9	Port name		**MQPORT**	
10	Full path to executable		**/opt/mqm/bin/amqcrs6a**	
11	Local queue manager		**HPUX**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
12	Link station name		**OS2CONN**	
13	Network name	2	**NETID**	
14	CP name	3	**OS2PU**	
15	Remote LU	6	**OS2LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**OS2CPIC**	
19	Remote network address	10	**10005AFC5D83**	
20	Node ID to receive	4	**05D 12345**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
12	Link station name		**NTCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**WINNTCP**	
15	Remote LU	5	**WINNTLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**NTCPIC**	
19	Remote network address	9	**08005AA5FAB9**	
20	Node ID to receive	4	**05D 30F65**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
12	Link station name		**AIXCONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AIXPU**	
15	Remote LU	4	**AIXLU**	
16	Application TP	6	**MQSERIES**	

Table 24. Configuration worksheet for HP SNAplus2 (continued)

ID	Parameter Name	Reference	Example	User Value
17	Mode name	14	**#INTER**	
18	CPI-C symbolic destination name		**AIXCPIC**	
19	Remote network address	8	**123456789012**	
20	Node ID to receive	3	**071 23456**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in the table Table 26 on page 257, as indicated.				
12	Link station name		**GISCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**GISPU**	
15	Remote LU		**GISLU**	
16	Application TP	5	**MQSERIES**	
17	Mode name	7	**#INTER**	
18	CPI-C symbolic destination name		**GISCPIC**	
19	Remote network address	8	**10007038E86B**	
20	Node ID to receive	9	**03E 00018**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
12	Link station name		**SOLCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**SOLARPU**	
15	Remote LU	7	**SOLARLU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**SOLCPIC**	
19	Remote network address	5	**08002071CC8A**	
20	node ID to receive	6	**05D 310D6**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
12	Link station name		**LXCONN**	
13	Network name	4	**NETID**	
14	CP name	2	**LINUXPU**	
15	Remote LU	5	**LINUXLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	6	**#INTER**	
18	CPI-C symbolic destination name		**LXCPIC**	
19	Remote network address	8	**08005AC6DF33**	
20	node ID to receive	3	**05D 30A55**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				

Table 24. Configuration worksheet for HP SNAplus2 (continued)

ID	Parameter Name	Reference	Example	User Value
12	Link station name		**AS4CONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AS400PU**	
15	Remote LU	3	**AS400LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**AS4CPIC**	
19	Remote network address	4	**10005A5962EF**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
12	Link station name		**MVSCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**MVSPU**	
15	Remote LU	4	**MVSLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	10	**#INTER**	
18	CPI-C symbolic destination name		**MVSCPIC**	
19	Remote network address	8	**400074511092**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
12	Link station name		**VSECONN**	
13	Network name	1	**NETID**	
14	CP name	2	**VSEPU**	
15	Remote LU	3	**VSELU**	
16	Application TP	4	**MQ01**	**MQ01**
17	Mode name		**#INTER**	
18	CPI-C symbolic destination name		**VSECPIC**	
19	Remote network address	5	**400074511092**	

Explanation of terms

1 Configuration file name

This is the unique name of the SNAplus2 configuration file. The default for this name is `sna_node.cfg`.

Although it is possible to edit this file it is strongly recommended that configuration is done using xsnapadmin.

2 Control point name

This is the unique Control point name for this workstation. In the SNA network, the Control point is an addressable location (PU type 2.1). Your network administrator will assign this to you.

3 Node ID to send
This is the unique ID of this workstation. On other platforms this is often referred to as the *Exchange ID* or *XID*. Your network administrator will assign this ID for you.

4 Network name
This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network name works with the Control point name to uniquely identify a system. Your network administrator will tell you the value.

5 Local APPC LU
An LU manages the exchange of data between transactions. The local APPC LU name is the name of the LU on your system. Your network administrator will assign this to you.

6 APPC mode
This is the name given to the set of parameters that control the APPC conversation. This name must be defined at each partner system. Your network administrator will assign this to you.

7 Invokable TP
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 20 on page 201 for more information.

8 Token-ring adapter address
Use the HP-UX System Administration Manager (SAM) to discover the adapter address for this workstation. You need root authority to use SAM. From the initial menu, select **Networking and Communications**, then select **Network Interface cards** followed by **LAN 0** (or whichever LAN you are using). The adapter address is displayed under the heading Station Address (hex). The card name represents the appropriate card type. If you do not have root level authority, your HP-UX system administrator can tell you the value.

9 Port name
This is a meaningful symbolic name that is used to associate the definitions with a network interface (in this case, a Token-Ring adapter). A separate Port must be defined for each physical device attached to the workstation.

10 Full path to executable
On HP SNAplus2 Release 5, this is the path and name of a shell script file that invokes the actual program to be run when a conversation is initiated with this workstation. You can choose the path and name of the script file. The contents of the file are illustrated in “WebSphere MQ for HP-UX invokable TP setup” on page 255. On HP SNAplus2 Release 6, this is the path and name of the program to be run when a conversation is initiated with this workstation. You enter the path in the **TP invocation** screen (see “Adding a TP definition using HP SNAplus2 Release 6” on page 248).

11 Local queue manager
This is the name of the queue manager on your local system.

10 Link station name
This is a meaningful symbolic name by which the connection to a peer or

host node is known. It defines a logical path to the remote system. Its name is used only inside SNAplus2 and is specified by you. The connection must be associated with an existing Link and owned by one local node. You must define one connection for each partner or host system.

18 **CPI-C symbolic destination name**
This is a name given to the definition of a partner node. You choose the name. It need be unique only on this machine. Later you can use this name in the WebSphere MQ sender channel definition.

20 **Node ID to receive**
This is the unique ID of the partner workstation with which you will be communicating. On other platforms this is often referred to as the *Exchange ID* or *XID*. For a connection to a host system any values except `000 FFFFF` and `FFF FFFFF` may be specified. Your network administrator will assign this ID for you.

Establishing a session using HP SNAplus2

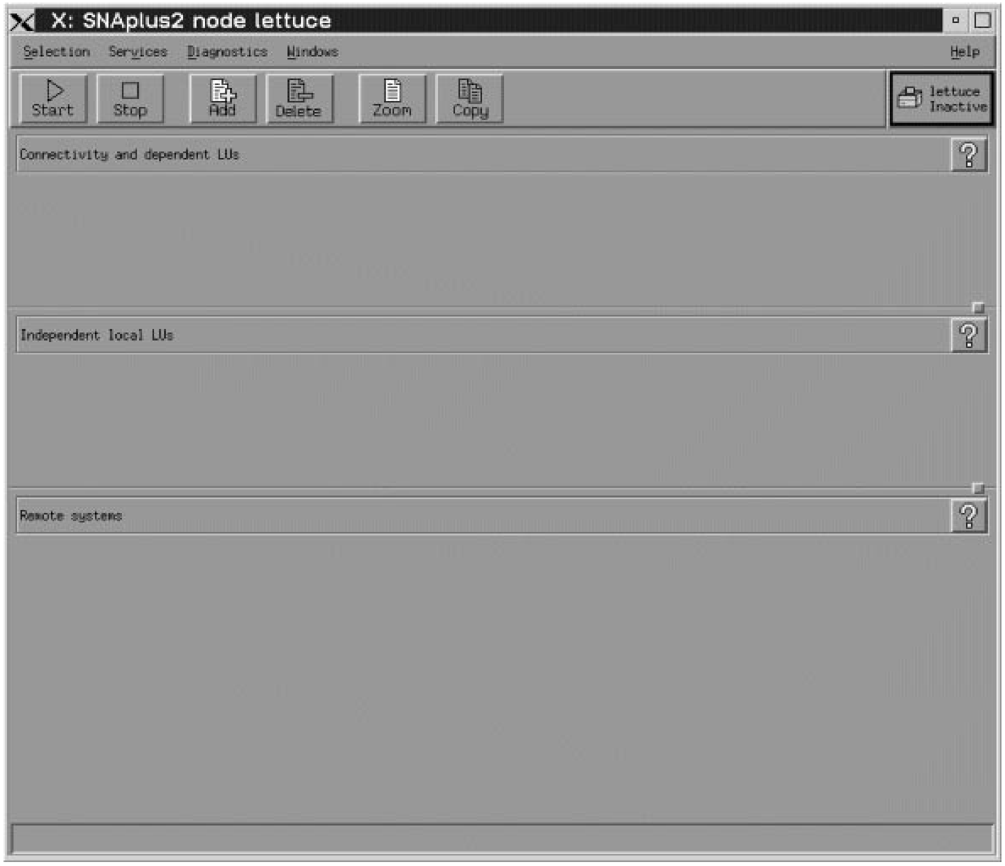
The following information guides you through the tasks you must perform to create the SNA infrastructure that WebSphere MQ requires. This example creates the definitions for a partner node and LU on OS/2.

Use **snap start** followed by **xsnapadmin** to enter the HP SNAplus2 configuration panels. You need root authority to use **xsnapadmin**.

SNAplus2 configuration

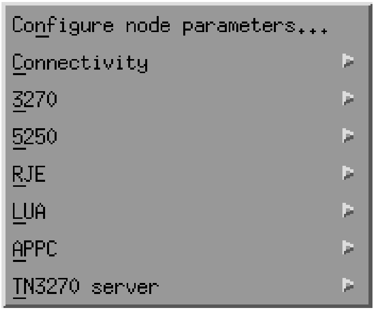
SNAplus2 configuration involves the following steps:
1. Defining a local node
2. Adding a Token Ring Port
3. Defining a local LU

The SNAplus2 main menu, from which you will start, is shown below:

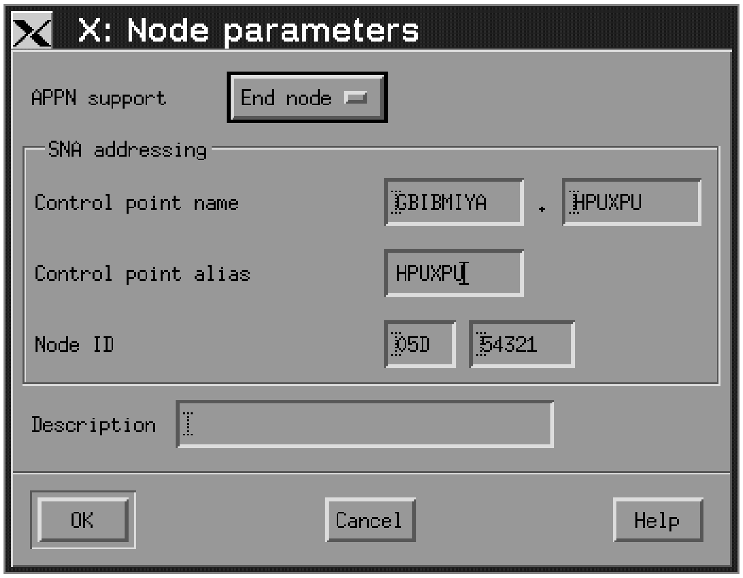

X: SNAplus2 node lettuce
Selection
Services
Diagnostics
Windows
Help
Start
Stop
Add
Delete
Zoom
Copy
lettuce
Inactive
Connectivity and dependent LUs
Independent local LUs
Remote systems

Defining a local node

1. From the SNAplus2 main menu, select the **Services** pull-down:



2. Select **Configure node parameters...**. The following panel is displayed:



APPN support: End node

Control point name: GBIBMIYA . HPUXPU

Control point alias: HPUXPU

Node ID: 05D 54321

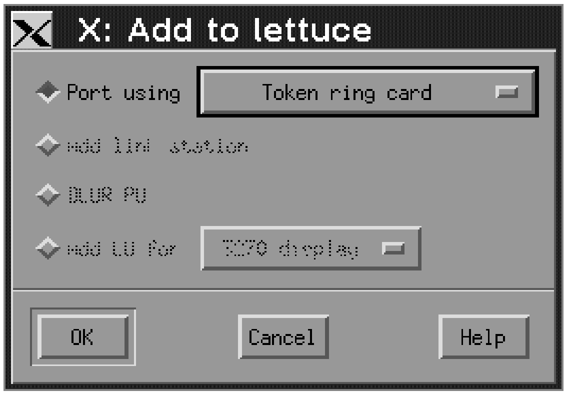
Description:

3. Complete the **Control point name** with the values **Network name** (4) and **Control point name** (2).
4. Enter the **Control point name** (2) in the **Control point alias** field.
5. Enter the **Node ID** (3).
6. Select **End node**.
7. Press **OK**.

A default independent local LU is defined.

Adding a Token Ring Port

1. From the main SNAplus2 menu, select the Connectivity and dependent LUs panel.
2. Press **Add**. The following panel is displayed:



X: Add to lettuce

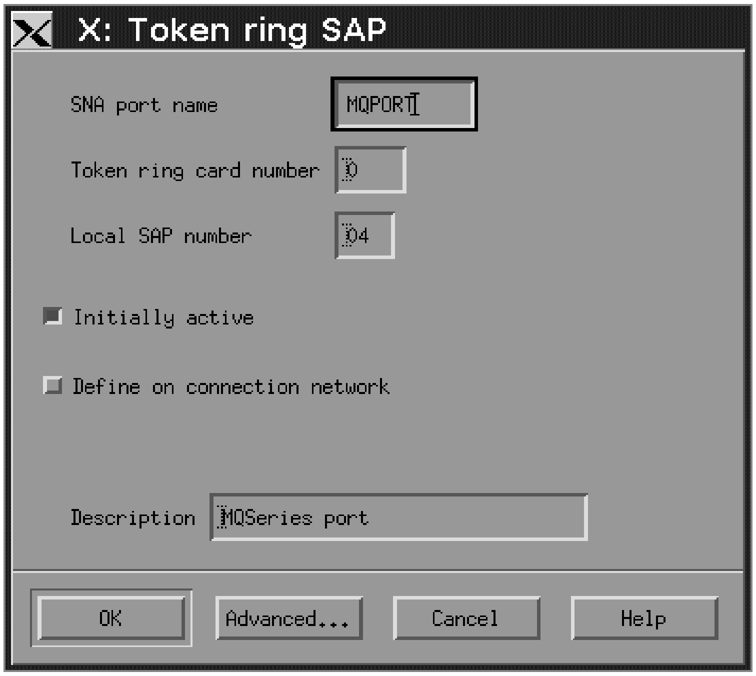
● Port using: Token ring card

○ Add link station

○ DLUR PU

○ Add LU for: 3270 display

3. Select a Token Ring Card port and press **OK**. The following panel is displayed:



X: Token ring SAP

SNA port name: MQPORT

Token ring card number: 0

Local SAP number: 04

☑ Initially active

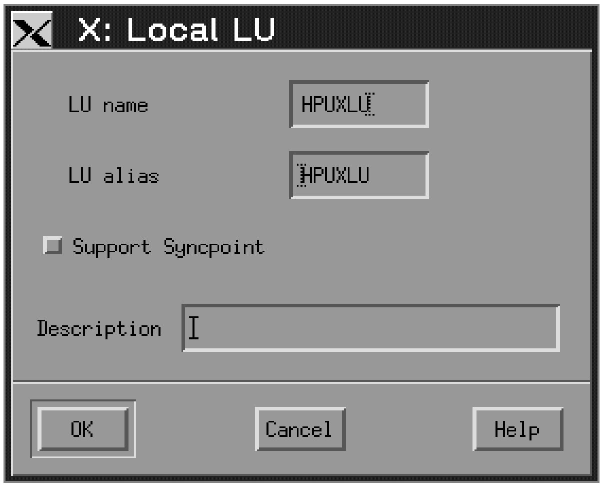
☐ Define on connection network

Description: MQSeries port

4. Enter the **SNA port name** (9).
5. Enter a **Description** and press **OK** to take the default values.

Defining a local LU

1. From the main SNAplus2 menu, select the Independent local LUs panel.
2. Press **Add**. The following panel is displayed:



LU name HPUXLU

LU alias HPUXLU

☐ Support Syncpoint

Description

3. Enter the **LU name** (5) and press **OK**.

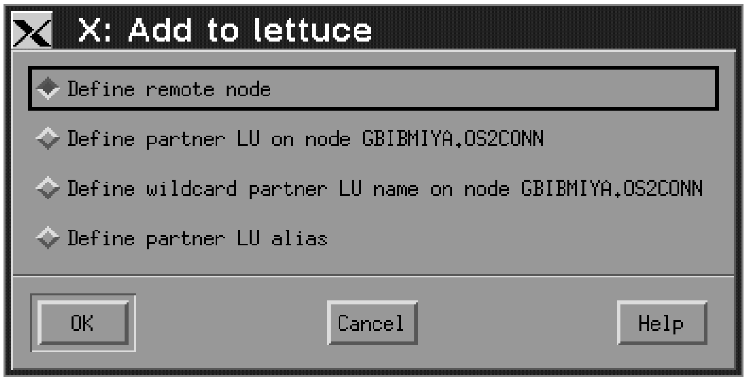
APPC configuration

APPC configuration involves the following steps:

1. Defining a remote node
2. Defining a partner LU
3. Defining a link station
4. Defining a mode
5. Adding CPI-C information
6. Adding a TP definition

Defining a remote node

1. From the main SNAplus2 menu, select the Remote systems panel.
2. Press **Add**. The following panel is displayed:



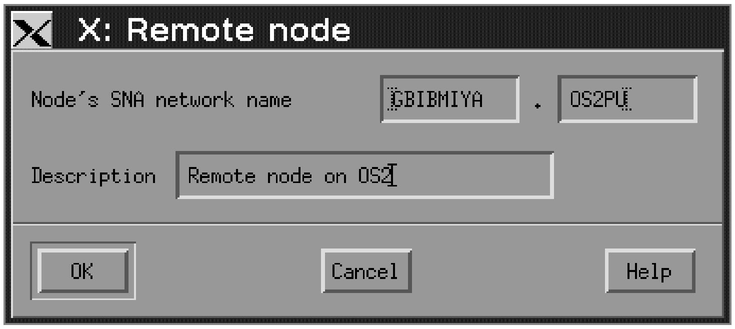
● Define remote node

○ Define partner LU on node GBIBMIYA.OS2CONN

○ Define wildcard partner LU name on node GBIBMIYA.OS2CONN

○ Define partner LU alias

3. Select **Define remote node** and press **OK**. The following panel is displayed:



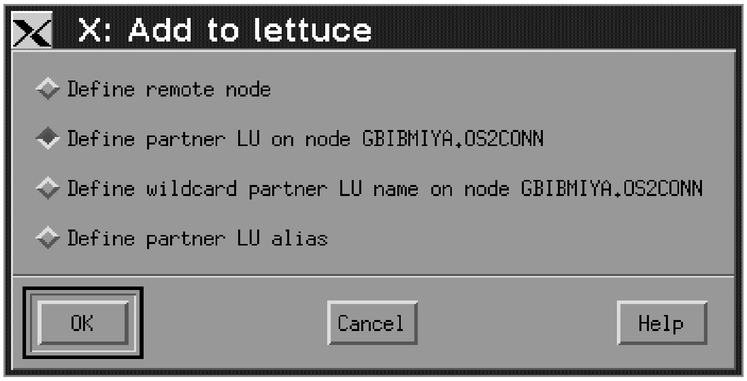
Node's SNA network name GBIBMIYA . OS2PU

Description Remote node on OS2

4. Enter the **Node's SNA network name** (13) and a **Description**.
5. Press **OK**.
6. A default partner LU with the same name is generated and a message is displayed.
7. Press **OK**.

Defining a partner LU

1. From the main SNAplus2 menu, select the remote node in the Remote systems panel.
2. Press **Add**. The following panel is displayed:



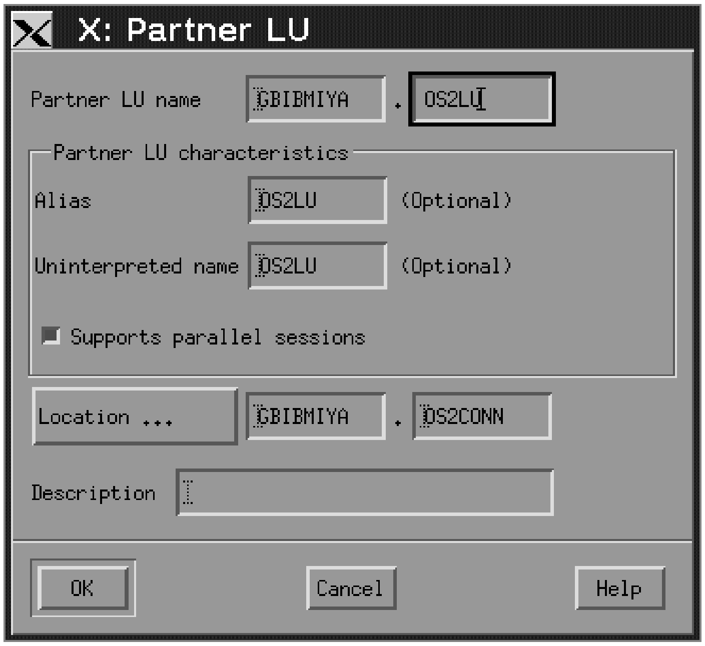
○ Define remote node

● Define partner LU on node GBIBMIYA.OS2CONN

○ Define wildcard partner LU name on node GBIBMIYA.OS2CONN

○ Define partner LU alias

3. Select **Define partner LU on node `node name`**.
4. Press **OK**. The following panel is displayed:


X: Partner LU

Partner LU name: GBIBMIYA . OS2LU

Partner LU characteristics

Alias: OS2LU (Optional)

Uninterpreted name: OS2LU (Optional)

☑ Supports parallel sessions

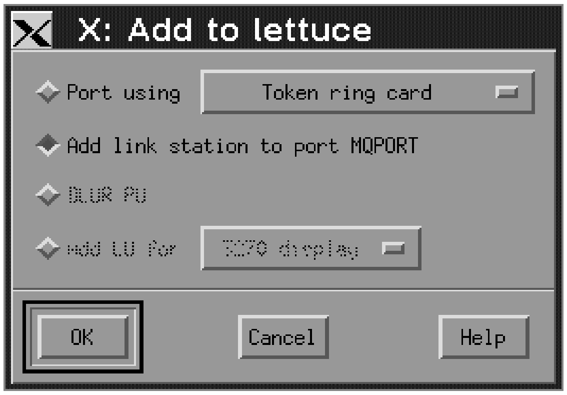
Location ...: GBIBMIYA . OS2CONN

Description:

5. Enter the **partner LU name** (**15**) and press **OK**.

Defining a link station

1. From the main SNAplus2 menu, select the Connectivity and dependent LUs panel.
2. Select the MQPORT port.
3. Press **Add**. The following panel is displayed:


X: Add to lettuce

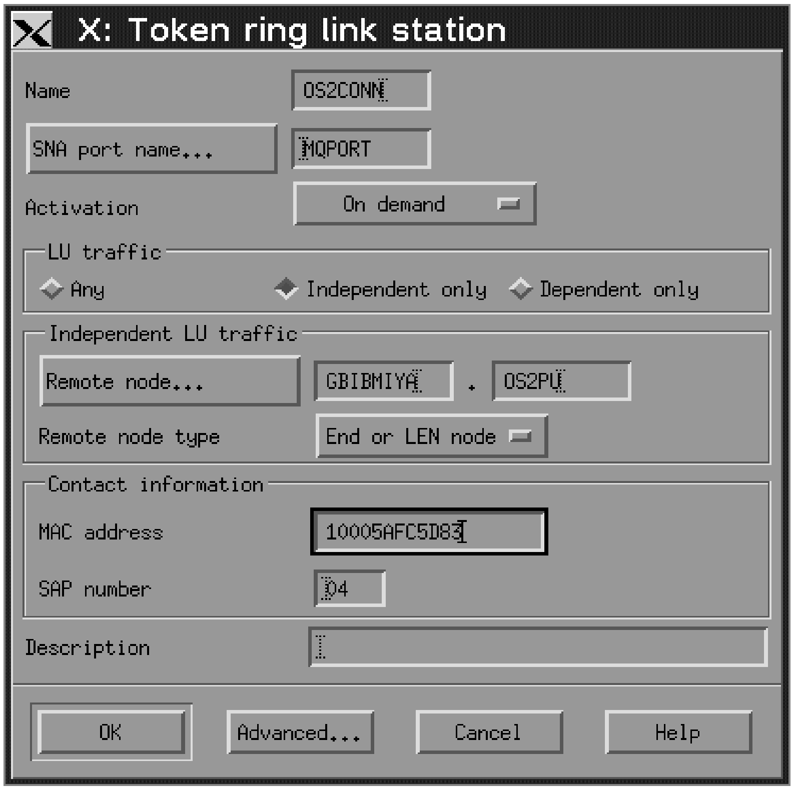
○ Port using: Token ring card

● Add link station to port MQPORT

○ DLUR PU

○ Add LU for: 3270 display

4. Select **Add link station to port MQPORT**.
5. Press **OK**. The following panel is displayed:



Name: OS2CONN

SNA port name...: MQPORT

Activation: On demand

LU traffic: ◇ Any ◆ Independent only ◇ Dependent only

Independent LU traffic

Remote node...: GBIBMIYA . OS2PU

Remote node type: End or LEN node

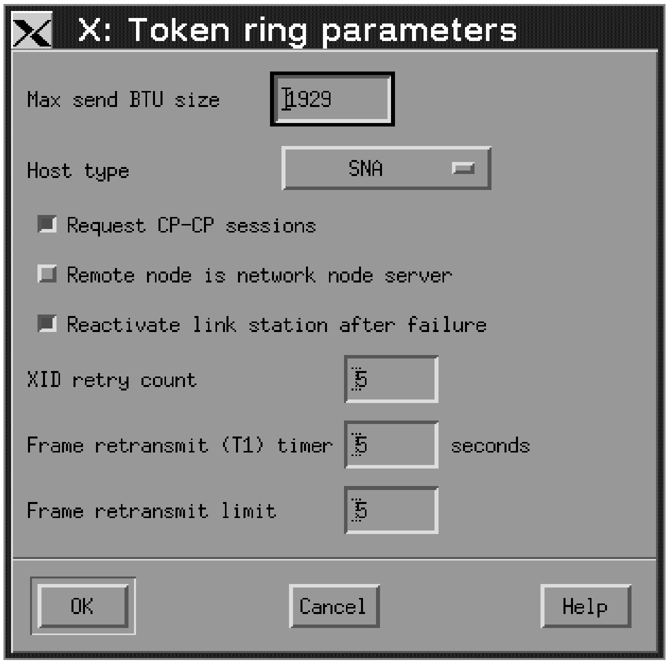
Contact information

MAC address: 10005AFC5D83

SAP number: 04

Description:

6. Enter the **Name** of the link station (**12**).
7. Set the value of **Activation** to “On demand”.
8. Select **Independent only**.
9. Press **Remote node...** and select the value of the remote node (**14**).
10. Press **OK**.
11. Set the value of **Remote node type** to “End or LEN node”.
12. Enter the value for **MAC address** (**19**) and press **Advanced...**. The following panel is displayed:



Max send BTU size 1929

Host type SNA

☑ Request CP-CP sessions

☐ Remote node is network node server

☑ Reactivate link station after failure

XID retry count 5

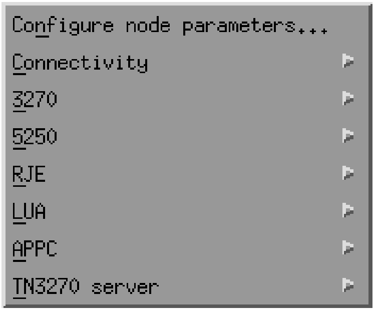
Frame retransmit (T1) timer 5 seconds

Frame retransmit limit 5

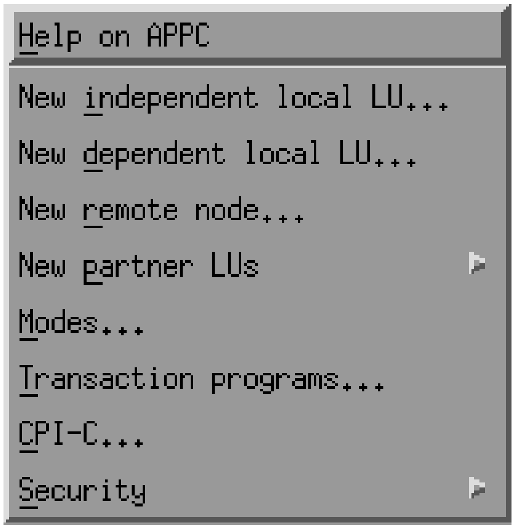
13. Select **Reactivate link station after failure**.
14. Press **OK** to exit the Advanced... panel.
15. Press **OK** again.

Defining a mode

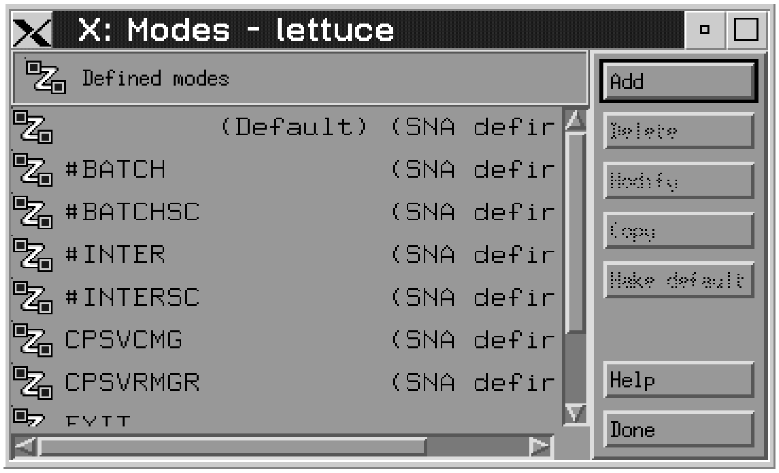
1. From the SNAplus2 main menu, select the **Services** pull-down: The following panel is displayed:



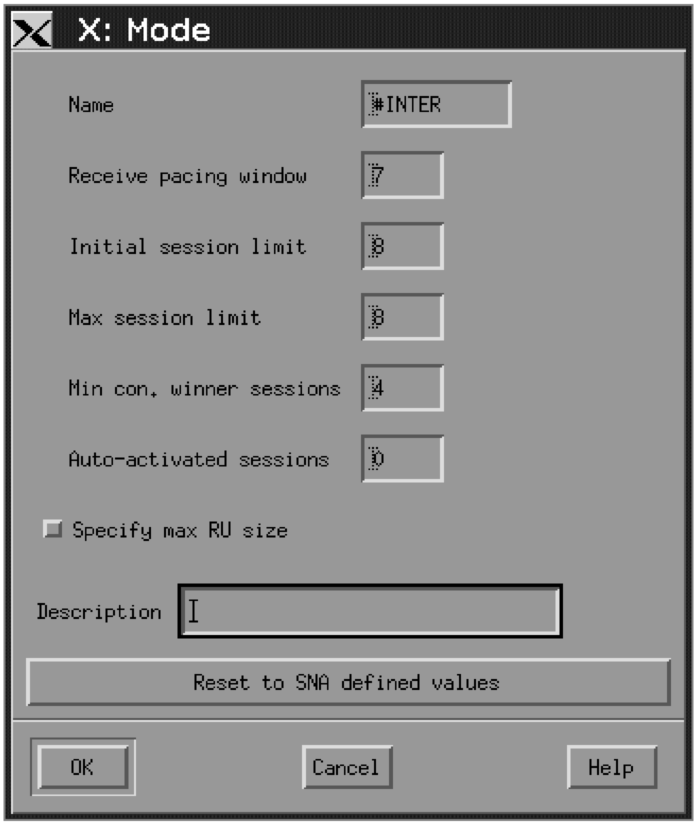
2. Select **APPC**. The following panel is displayed:



3. Select **Modes...**. The following panel is displayed:



4. Press **Add**. The following panel is displayed:



Name #INTER

Receive pacing window 7

Initial session limit 8

Max session limit 8

Min con. winner sessions 4

Auto-activated sessions 0

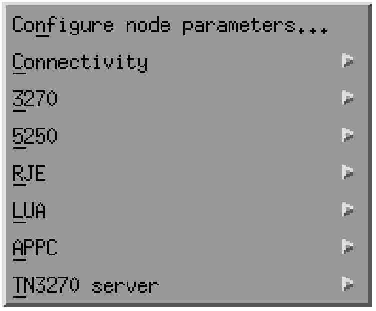
☐ Specify max RU size

Description

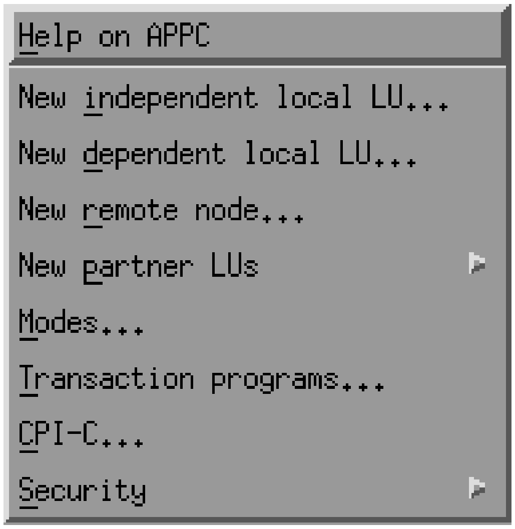
5. Enter the **Name** to be given to the mode (**17**).
6. Set the values of **Initial session limit** to 8, **Min con. winner sessions** to 4, and **Auto-activated sessions** to 0.
7. Press **OK**.
8. Press **Done**.

Adding CPI-C information

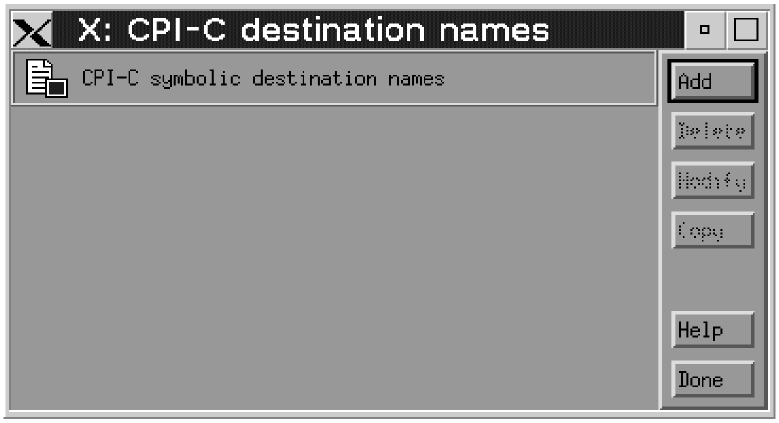
1. From the SNAplus2 main menu, select the **Services** pull-down:



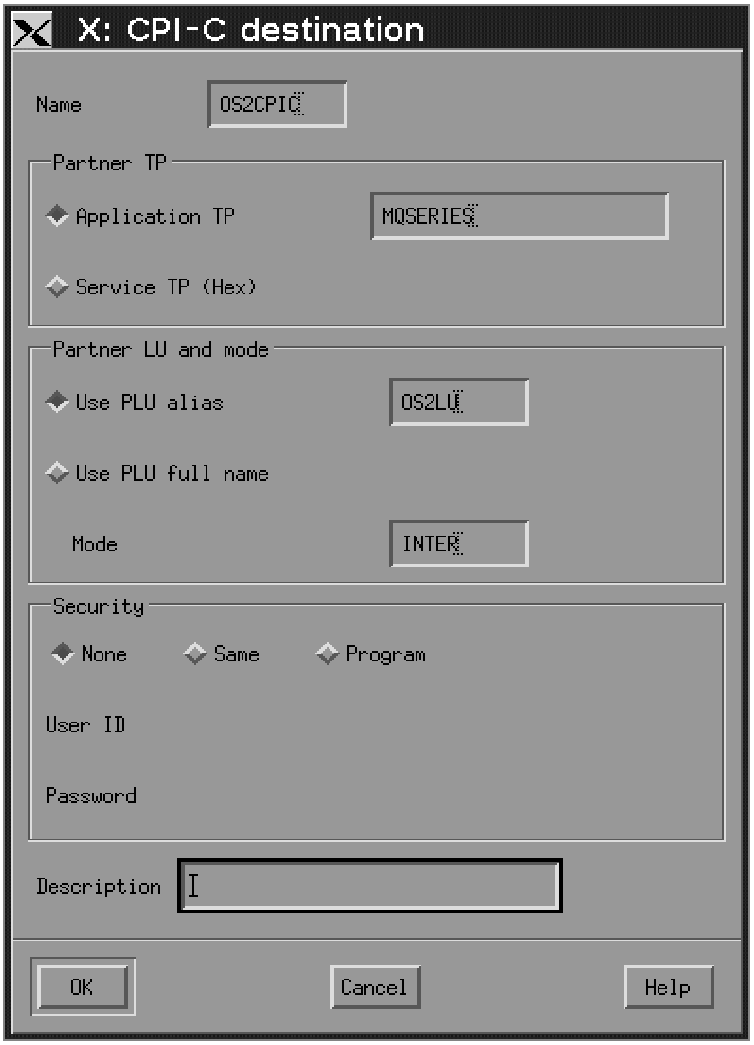
2. Select **APPC**. The following panel is displayed:



3. Select **CPI-C...**. The following panel is displayed:



4. Press **Add**. The following panel is displayed:



Name: OS2CPIC

● Application TP: MQSERIES

○ Service TP (Hex)

● Use PLU alias: OS2LU

○ Use PLU full name

Mode: INTER

● None ○ Same ○ Program

User ID

Password

Description

5. Enter the **Name** (18). Select **Application TP** and enter the value (16). Select **Use PLU alias** and enter the name (15). Enter the **Mode** name (17).
6. Press **OK**.

Adding a TP definition using HP SNAplus2 Release 5

Invokable TP definitions are kept in the file /etc/opt/sna/sna_tps. This should be edited to add a TP definition. Add the following lines:

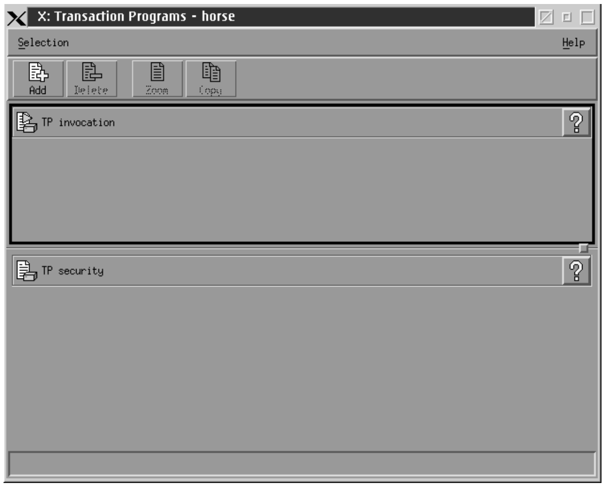
```
[MQSERIES]
    PATH = /users/interops/HPUX.crs6a
    TYPE = NON-QUEUED
    USERID =  mqm
    ENV = APPCLLU=HPUXLU
    ENV = APPCTPN=MQSERIES
```

See "WebSphere MQ for HP-UX invokable TP setup" on page 255 for more information about TP definitions.

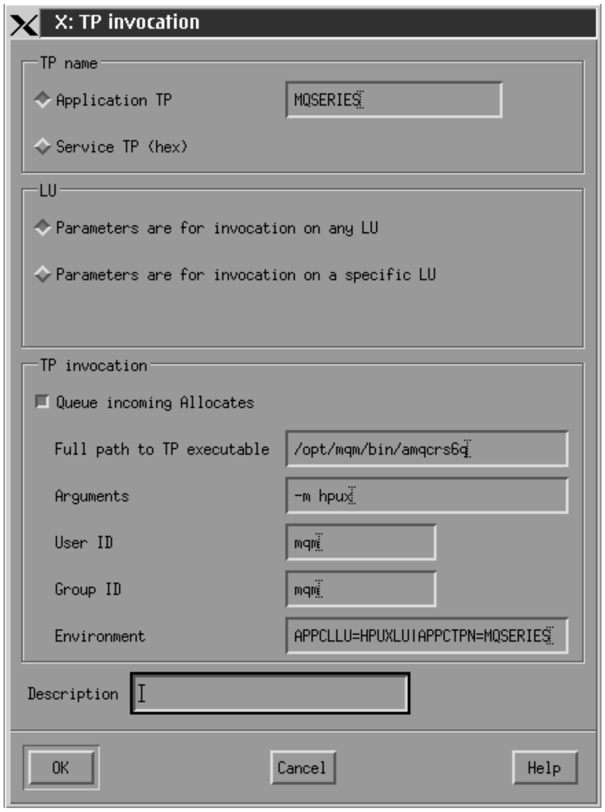
Adding a TP definition using HP SNAplus2 Release 6

To add a TP definition:

1. Select **Services** pulldown and select **APPC** as for CPI-C information.
2. Select **Transaction Programs**. The following panel is displayed:



3. Select **Add**. The following panel is displayed:



Application TP: MQSERIES

Full path to TP executable: /opt/mqm/bin/amqcrs6a

Arguments: -m hpux

User ID: mqm

Group ID: mqm

Environment: APPCLLU=HPUXLU|APPCTPN=MQSERIES

4. Enter **TP name** (7) in the **Application TP** field.
5. Mark **Incoming Allocates** as non-queued.
6. Enter **Full path to executable** (10).
7. Enter **-m Local queue manager** (11) in the **Arguments** field.
8. Enter **mqm** in the **User ID** and **Group ID** fields.
9. Enter environment variables **APPCLLU=local LU** (5) and **APPCTPN=Invokable TP** (7) separated by the pipe character in the **Environment** field.
10. Press **OK** to save your definition.

HP-UX operation

The SNAplus2 control daemon is started with the **snap start** command. Depending on the options selected at installation, it may already be running.

The **xsnapadmin** utility controls SNAplus2 resources.

Logging and tracing are controlled from here. Log and trace files can be found in the /var/opt/sna directory. The logging files sna.aud and sna.err can be read using a standard editor such as vi.

In order to read the trace files **sna1.trc** and **sna2.trc** they must first be formatted by running the command **snaptrcfmt -f sna1.trc -o sna1** which produces a sna1.dmp file which can be read using a normal editor.

The configuration file itself is editable but this is not a recommended method of configuring SNAplus2.

The APPCLU environment variables must be set before starting a sender channel from the HP-UX system. The command can be either entered interactively or added to the logon profile. Depending on the level of BOURNE shell or KORN shell program being used, the command will be:

```
export APPCLLU=HPUXLU      5    newer level
```

or

```
APPCLLU=HPUXLU             5    older level
export
```

What next?

The connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for HP-UX configuration” on page 251.

Establishing a TCP connection

1. Edit the file /etc/services.

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```
2. Edit the file /etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait root /opt/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Find the process ID of the inetd with the command:

   ```
   ps -ef | grep inetd
   ```
4. Run the command:

   ```
   kill -1 inetd processid
   ```

Note: You must add **root** to the mqm group. You do not need not have the primary group set to mqm. As long as mqm is in the set of groups, you can use the commands. If you are running only applications that use the queue manager you do not need to have mqm group authority.

What next?

The connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for HP-UX configuration”.

WebSphere MQ for HP-UX configuration

Before beginning the installation process ensure that you have first created the *mqm* user and group, and set the password.

Start any channel using the command:

```
runmqchl -c channel.name
```

Notes:

1. Sample programs are installed in /opt/mqm/samp.
2. Error logs are stored in /var/mqm/qmgrs/*qmgrname*/errors.
3. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Basic configuration

1. Create the queue manager from the UNIX prompt using the command:

   ```
   crtmqm -u dlqname -q hpux
   ```

   where:

   hpux Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and a set of default objects. It sets the DEADQ attribute of the queue manager but does not create the undeliverable message queue.
2. Start the queue manager from the UNIX prompt using the command:

   ```
   strmqm hpux
   ```

   where *hpux* is the name given to the queue manager when it was created.

Channel configuration

The following section details the configuration to be performed on the HP-UX queue manager to implement the channel described in Figure 32 on page 101.

In each case the MQSC command is shown. Either start **runmqsc** from a UNIX prompt and enter each command in turn, or build the commands into a command file.

Examples are given for connecting WebSphere MQ for HP-UX and MQSeries for OS/2 Warp. If you wish connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 25. Configuration worksheet for WebSphere MQ for HP-UX

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**HPUX**	
B	Local queue name		**HPUX.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	A	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	B	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**HPUX.OS2.SNA**	
H	Sender (TCP/IP) channel name		**HPUX.OS2.TCP**	
I	Receiver (SNA) channel name	G	**OS2.HPUX.SNA**	
J	Receiver (TCP/IP) channel name	H	**OS2.HPUX.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**HPUX.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**HPUX.WINNT.TCP**	
I	Receiver (SNA) channel name	G	**WINNT.HPUX.SNA**	
J	Receiver (TCP) channel name	H	**WINNT.HPUX.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**HPUX.AIX.SNA**	
H	Sender (TCP) channel name		**HPUX.AIX.TCP**	
I	Receiver (SNA) channel name	G	**AIX.HPUX.SNA**	
J	Receiver (TCP) channel name	H	**AIX.HPUX.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	A	**DECUX**	

Table 25. Configuration worksheet for WebSphere MQ for HP-UX (continued)

ID	Parameter Name	Reference	Example Used	User Value
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	**B**	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.HPUX.TCP**	
J	Receiver (TCP) channel name	**H**	**HPUX.DECUX.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	**A**	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	**B**	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**HPUX.GIS.SNA**	
H	Sender (TCP) channel name		**HPUX.GIS.TCP**	
I	Receiver (SNA) channel name	**G**	**GIS.HPUX.SNA**	
J	Receiver (TCP) channel name	**H**	**GIS.HPUX.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	**A**	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	**B**	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**HPUX.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**HPUX.SOLARIS.TCP**	
I	Receiver (SNA) channel name	**G**	**SOLARIS.HPUX.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**SOLARIS.HPUX.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	**A**	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	**B**	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**HPUX.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**HPUX.LINUX.TCP**	
I	Receiver (SNA) channel name	**G**	**LINUX.HPUX.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**LINUX.HPUX.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	**A**	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	

Table 25. Configuration worksheet for WebSphere MQ for HP-UX (continued)

ID	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**HPUX.AS400.SNA**	
H	Sender (TCP/IP) channel name		**HPUX.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.HPUX.SNA**	
J	Receiver (TCP) channel name	H	**AS400.HPUX.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**HPUX.MVS.SNA**	
H	Sender (TCP) channel name		**HPUX.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.HPUX.SNA**	
J	Receiver (TCP) channel name	H	**MVS.HPUX.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**HPUX.VSE.SNA**	
I	Receiver channel name	G	**VSE.HPUX.SNA**	

WebSphere MQ for HP-UX sender-channel definitions using SNA

```
def ql (OS2) +                                  F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                          D
    rname(OS2.LOCALQ) +                         E
    rqmname(OS2) +                              C
    xmitq(OS2) +                                F
    replace

def chl (HPUX.OS2.SNA) chltype(sdr) +           G
    trptype(lu62) +
    conname('OS2CPIC') +                        16
    xmitq(OS2) +                                F
    replace
```

WebSphere MQ for HP-UX receiver-channel definitions using SNA

```
def ql (HPUX.LOCALQ) replace                    B

def chl (OS2.HPUX.SNA) chltype(rcvr) +          I
    trptype(lu62) +
    replace
```

WebSphere MQ for HP-UX invokable TP setup

This is not required for HP SNAplus2 Release 6.

During the HP SNAplus2 configuration process, you created an invokable TP definition, which points to an executable file. In the example, the file was called /users/interops/HPUX.crs6a. You can choose what you call this file, but you are recommended to include the name of your queue manager in the name. The contents of the executable file must be:

```
#!/bin/sh
/opt/mqm/bin/amqcrs6a -m hpux
```

where *hpux* is the name of your queue manager **A**.

This ensures that SNA receiver channels activate correctly when a sender channel initiates a conversation.

WebSphere MQ for HP-UX sender-channel definitions using TCP

```
def ql (OS2) +                                  F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                          D
    rname(OS2.LOCALQ) +                         E
    rqmname(OS2) +                              C
    xmitq(OS2) +                                F
    replace

def chl (HPUX.OS2.TCP) chltype(sdr) +           H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                                F
    replace
```

WebSphere MQ for HP-UX receiver-channel definitions using TCP/IP

```
def ql (HPUX.LOCALQ) replace                    B

def chl (OS2.HPUX.TCP) chltype(rcvr) +          J
    trptype(tcp) +
    replace
```

HP-UX configuration

Chapter 17. Example configuration - IBM MQSeries for AT&T GIS UNIX, V2.2

This chapter gives an example of how to set up communication links from MQSeries for AT&T GIS UNIX to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- Solaris
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

First it describes the parameters needed for an LU 6.2 connection, then it describes "Establishing a connection using AT&T GIS SNA Server" on page 261 and "Establishing a TCP connection" on page 266.

Once the connection is established, you need to define some channels to complete the configuration. This is described in "Channel configuration" on page 267.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 26 presents a worksheet listing all the parameters needed to set up communication from AT&T GIS UNIX[5] to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in "Explanation of terms" on page 260.

Table 26. Configuration worksheet for AT&T GIS SNA Services

ID	Parameter Name	Reference	Example	User Value
Parameters for local node				

---

[5] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 26. Configuration worksheet for AT&T GIS SNA Services (continued)

ID	Parameter Name	Reference	Example	User Value
1	Configuration		**010**	
2	Network name		**NETID**	
3	Control Point name		**GISPU**	
4	Local LU name		**GISLU**	
5	LU 6.2 Transaction Program name		**MQSERIES**	
6	Local PU name		**GISPU**	
7	Mode name		**#INTER**	
8	Token-Ring adapter address		**10007038E86B**	
9	Local XID		**03E 00018**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
10	Remote Node name	3	**OS2PU**	
11	Network name	2	**NETID**	
12	Remote LU name	6	**OS2LU**	
13	Remote Transaction Program name	8	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**OS2CPIC**	
15	Mode name	17	**#INTER**	
16	LAN destination address	10	**10005AFC5D83**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
10	Remote Node name	3	**WINNTCP**	
11	Network name	2	**NETID**	
12	Remote LU name	5	**WINNTLU**	
13	Remote Transaction Program name	7	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**NTCPIC**	
15	Mode name	17	**#INTER**	
16	LAN destination address	9	**08005AA5FAB9**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
10	Remote Node name	2	**AIXPU**	
11	Network name	1	**NETID**	
12	Remote LU name	4	**AIXLU**	
13	Remote Transaction Program name	6	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**AIXCPIC**	
15	Mode name	14	**#INTER**	
16	LAN destination address	8	**123456789012**	

Table 26. Configuration worksheet for AT&T GIS SNA Services (continued)

ID	Parameter Name	Reference	Example	User Value
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
10	Remote Node name	2	**HPUXPU**	
11	Network name	4	**NETID**	
12	Remote LU name	5	**HPUXLU**	
13	Remote Transaction Program name	7	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**HPUXCPIC**	
15	Mode name	6	**#INTER**	
16	LAN destination address	8	**100090DC2C7C**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
10	Remote Node name	3	**SOLARPU**	
11	Network name	2	**NETID**	
12	Remote LU name	7	**SOLARLU**	
13	Remote Transaction Program name	8	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**SOLCPIC**	
15	Mode name	17	**#INTER**	
16	LAN destination address	5	**08002071CC8A**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
10	Remote Node name	2	**LINUXPU**	
11	Network name	4	**NETID**	
12	Remote LU name	5	**LINUXLU**	
13	Remote Transaction Program name	7	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**LXCPIC**	
15	Mode name	6	**#INTER**	
16	LAN destination address	8	**08005AC6DF33**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
10	Remote Node name	2	**AS400PU**	
11	Network name	1	**NETID**	
12	Remote LU name	3	**AS400LU**	
13	Remote Transaction Program name	8	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**AS4CPIC**	
15	Mode name	17	**#INTER**	
16	LAN destination address	4	**10005A5962EF**	

Table 26. Configuration worksheet for AT&T GIS SNA Services (continued)

ID	Parameter Name	Reference	Example	User Value
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Remote Node name	3	**MVSPU**	
11	Network name	2	**NETID**	
12	Remote LU name	4	**MVSLU**	
13	Remote Transaction Program name	7	**MQSERIES**	
14	LU 6.2 CPI-C side information symbolic destination		**MVSCPIC**	
15	Mode name	10	**#INTER**	
16	LAN destination address	8	**400074511092**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
10	Remote Node name	2	**VSEPU**	
11	Network name	1	**NETID**	
12	Remote LU name	3	**VSELU**	
13	Remote Transaction Program name	4	**MQ01**	
14	LU 6.2 CPI-C side information symbolic destination		**VSECPIC**	
15	Mode name		**#INTER**	
16	LAN destination address	5	**400074511092**	

Explanation of terms

1 Configuration
This is the unique ID of the SNA Server configuration you are creating or modifying. Valid values are between 0 and 255.

2 Network name
This is the unique ID of the network to which you are connected. Your network administrator will tell you this value.

3 Control Point name
This is a unique Control Point name for this workstation. Your network administrator will assign this to you.

4 Local LU name
A logical unit (LU) manages the exchange of data between systems. The local LU name is the name of the LU on your system. Your network administrator will assign this to you.

5 LU 6.2 Transaction Program name
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. Wherever possible we use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 20 on page 201 for more information.

6 **Local PU name**
This is a unique PU name for this workstation. Your network administrator will assign this to you.

7 **Mode name**
This is the name given to the set of parameters that control the APPC conversation. This name must be defined at each partner system. Your network administrator will assign this to you.

8 **Token-ring adapter address**
The is the 12-character hex address of the token-ring card.

10 **Remote Node name**
This is a meaningful symbolic name by which the connection to a partner node is known. It is used only inside SNA Server setup and is specified by you.

14 **LU 6.2 CPI-C Side Information Symbolic Destination**
This is a name given to the definition of a partner node. You supply the name. It need be unique only on this machine. You will later use the name in the WebSphere MQ sender channel definition.

Establishing a connection using AT&T GIS SNA Server

The following information guides you through the tasks you must perform to create the SNA infrastructure that WebSphere MQ requires. This example creates the definitions for a new partner node and LU on OS/2.

Use **snamgr** to enter the AT&T GIS SNA Server configuration panels. You need root authority to use **snamgr**.

Throughout the following example, only the panels containing information that must be added or updated are shown. Preceding each panel is a list of the sequence of panels that you must invoke to proceed from the initial menu to the relevant customization panel.

Note: SNA Server works better in an Xterm session than it does in an ASCII session such as TELNET.

Defining local node characteristics

Setting up the local node involves the following steps:
1. Configuring the SNA subsystem
2. Defining a mode
3. Defining a local Transaction Program

Configuring the SNA subsystem

Proceed through these panels:

```
1 SNA Manager
  2 Configuration
    3 SNA Subsystem Configuration
      4 SNA Subsystem Configuration Creation
```

The panels are shown as figures representing the screens that appear. Instructions for completing the screens and entering the correct information to configure the SNA subsystem are given in the text after each figure.

```
5               Create a Configuration

 Enter a unique configuration identifier (0-255) 010
```

Enter the **configuration identifier** (1).

```
6            Parameter File Configuration
     Will LU 6.2 be used?         Y
```

Enter `Y`.

```
1     SNA Configuration of the Local Node

 Node Parameters:

   Node ID of Local Node          00

   PU Resource Name (optional)    GISPU

   Network Identifier (optional)  NETID

   Control Point (CP) Name (optional) GISPU

 Local LU 6.2 Parameters:

   LU 6.2 Logical Unit Name       GISLU

   Max Number of LU 6.2 Sessions  0100
```

Enter the values for **Node ID of Local Node**, **PU Resource Name** (6), **Network Identifier** (2), **CP Name** (3), **LU 6.2 Logical Unit Name** (4), and **Max Number of LU 6.2 Sessions**.

Defining a mode

Proceed through these panels:

```
2 Local Configuration
```

Select **Define a mode**.

```
3                    Conversation Mode Definition

 Mode Name                                      #INTER

 Maximum Number of Sessions                                 008

 Number of Locally Controlled Sessions                      004

 Honor Pending Conversation Requests Before
     an Existing Session is Terminated?                     N

 Number of Automatically Established Sessions               004

 Code Set to be Used During Transmission of TP Data         E
```

Enter the values for **Mode Name** (7), **Maximum Number of Sessions**, and **Number of Locally Controlled Sessions**.

```
4  Conversation Mode Definition for Max RU

Send Max RU Size Upper Bound           03840

Send Max RU Size Lower Bound           00128

Receive Max RU Size Upper Bound        03840

Receive Max RU Size Lower Bound        00128
```

Defining a local Transaction Program

```
2 Local Configuration
```

Select **Define a RECEIVE_ALLOCATE local TP**.

```
3            Receive_Allocate Transaction Program Definition

TP name       MQSERIES_______________________

TP start type  A                (M = Manual, A = Automatic)


receive_allocate timer (seconds)  -1__     (0 - 9999, -1)

Incoming allocate timer (seconds) -1__     (0 - 9999, -1)

Max number of auto-started TP instances 1_ (1 - 99)
```

Enter the values for **TP name** (5), and set the **TP start type** to `A`.

Note: Before this will work you need to associate the TP name with an executable program. You do this outside **snamgr** by creating a symbolic link entry in the directory /usr/lbin either before or after you configure SNA Server. Enter the following commands:

```
cd /usr/lbin
ln -s /opt/mqm/bin/amqcrs6a MQSeries    5
```

Connecting to a partner node

To connect to a partner node you need to:

1. Configure a remote node
2. Define a partner LU
3. Add a CPI-C Side Entry

Configuring a remote node

Proceed through these panels:

```
2 Local Configuration
```

Select **End Local Configuration**.

```
1 Remote Node Definition
```

Select **Peer Node Definition**.

```
2     Remote Node Configuration

Remote Node Name           OS2PU

Type of Link Connection    TR

SNA Logical Connection ID  00

Link to Backup (Optional)  ____
```

Enter the values for **Remote Node Name** (**10**), **Type of Link Connection**, and **SNA Logical Connection ID**.

```
3 SNA/TR Configuration for Connection 01

Token Ring Adapter ID    01

Maximum Send BTU Length  1033

Local XID                03E00018

Data link role of local system   NEG_

Remote DLSAP             04

Remote MAC Address       10005AFC5D83

Route Discovery Command  T

Broadcast Timer          1_
```

Enter the values for **Token Ring Adapter ID**, **Local XID** (**9**), and **Remote MAC address** (**16**).

```
4 Configuration of TR Adapter 01 for Connection 01

Local DLSAP              04

Adapter Type             ild_
```

Defining a partner LU

Proceed through these panels:

```
1           LU 6.2 Logical Unit Definition

To complete the definition of Remote
  Peer Node, OS2, you need to
  define at least one Remote LU 6.2
        Logical Unit.

     Press CONT to Continue.
```

```
2   Partner LU 6.2 Definition

Locally Known Name    OS2LU

Network Identifier    NETID

Network Name (LUNAME) OS2LU

Uninterpreted Name    OS2LU

Session Capability    P
```

Enter the values for **Locally Known Name** (12), **Network Identifier** (11), **Network Name (LUNAME)** (12), and **Uninterpreted Name** (12),

```
3       Automatic Activation

Auto Activate at Start of Day?  N
```

```
4   LU 6.2 Partner Definition

Do you want to define another
remote LU 6.2 Logical Unit in
the remote node, OS2?       N
```

Adding a CPI-C Side Entry

Proceed through these panels:

```
1 SNA MANAGER
  2 Configuration
    3 CPI-C Side Information
```

```
4         Add a CPI-C Side Information File

Enter the CPI-C Side Information File Name OS2CPIC

(This name is the Symbolic Destination Name used by
 the CPI-C program to reference side information.)
```

Enter the name of the **CPI-C Side Information File** (14).

```
5                       Add CPI-C Side Information

Symbolic destination name:  OS2CPIC

Partner LU name OS2LU

Mode name #INTER

TP name MQSERIES

Conversation security type NONE___

Security user ID __________

Security password __________
```

Enter the values for **Partner LU name** (12), **Mode name** (15), and **TP name** (13).

What next?

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “MQSeries for AT&T GIS UNIX configuration”.

Establishing a TCP connection

1. Edit the file /etc/services.

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```
2. Edit the file /usr/etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait root /opt/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Find the process ID of the inetd with the command:

   ```
   ps -ef | grep inetd
   ```
4. Run the command:

   ```
   kill -1 inetd processid
   ```

   The command `kill -1` can be unreliable. If it doesn’t work, use the command `kill -9` and then restart /usr/etc/inetd manually.

What next?

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “MQSeries for AT&T GIS UNIX configuration”.

MQSeries for AT&T GIS UNIX configuration

Before beginning the installation process ensure that you have first created the *mqm* user and group, and set the password.

Start any channel using the command:

```
runmqchl -c channel.name
```

Notes:

1. Sample programs are installed in /opt/mqm/samp.
2. Error logs are stored in /var/mqm/qmgrs/*qmgrname*/errors.
3. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Basic configuration

1. Create the queue manager from the UNIX prompt using the command:

   ```
   crtmqm -u dlqname -q gis
   ```

   where:

gis	Is the name of the queue manager
-q	Indicates that this is to become the default queue manager

-u *dlqname*
Specifies the name of the undeliverable message queue

2. Start the queue manager from the UNIX prompt using the command:

```
strmqm gis
```

where *gis* is the name given to the queue manager when it was created.

3. Before creating your own objects you must first create the system default objects. These are a number of definitions for required objects and templates on which user definitions will be modelled.

   Create the default objects from the UNIX prompt using the command:

```
runmqsc gis < /opt/mqm/samp/amqscoma.tst > defobj.out
```

where *gis* is the name of the queue manager. Display the file defobj.out and ensure that all objects were created successfully. There is a report at the end of the file.

Channel configuration

The following section details the configuration to be performed on the AT&T GIS UNIX queue manager to implement the channel described in Figure 32 on page 101.

In each case the MQSC command is shown. Either start **runmqsc** from a UNIX prompt and enter each command in turn, or build a command file of the same format as amqscoma.tst and use it as before to create the objects.

Examples are given for connecting MQSeries for AT&T GIS UNIX and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 27. Configuration worksheet for MQSeries for AT&T GIS UNIX

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**GIS**	
B	Local queue name		**GIS.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	A	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	B	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**GIS.OS2.SNA**	
H	Sender (TCP/IP) channel name		**GIS.OS2.TCP**	
I	Receiver (SNA) channel name	G	**OS2.GIS.SNA**	

Table 27. Configuration worksheet for MQSeries for AT&T GIS UNIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
J	Receiver (TCP/IP) channel name	**H**	**OS2.GIS.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	**A**	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	**B**	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**GIS.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**GIS.WINNT.TCP**	
I	Receiver (SNA) channel name	**G**	**WINNT.GIS.SNA**	
J	Receiver (TCP) channel name	**H**	**WINNT.GIS.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	**A**	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	**B**	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**GIS.AIX.SNA**	
H	Sender (TCP) channel name		**GIS.AIX.TCP**	
I	Receiver (SNA) channel name	**G**	**AIX.GIS.SNA**	
J	Receiver (TCP) channel name	**H**	**AIX.GIS.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	**A**	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	**B**	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.GIS.TCP**	
J	Receiver (TCP) channel name	**H**	**GIS.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	**A**	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	**B**	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (SNA) channel name		**GIS.HPUX.SNA**	
H	Sender (TCP) channel name		**GIS.HPUX.TCP**	
I	Receiver (SNA) channel name	**G**	**HPUX.GIS.SNA**	
J	Receiver (TCP) channel name	**H**	**HPUX.GIS.TCP**	

Table 27. Configuration worksheet for MQSeries for AT&T GIS UNIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**GIS.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**GIS.SOLARIS.TCP**	
I	Receiver (SNA) channel name	G	**SOLARIS.GIS.SNA**	
J	Receiver (TCP/IP) channel name	H	**SOLARIS.GIS.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**GIS.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**GIS.LINUX.TCP**	
I	Receiver (SNA) channel name	G	**LINUX.GIS.SNA**	
J	Receiver (TCP/IP) channel name	H	**LINUX.GIS.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**GIS.AS400.SNA**	
H	Sender (TCP/IP) channel name		**GIS.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.GIS.SNA**	
J	Receiver (TCP) channel name	H	**AS400.GIS.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**GIS.MVS.SNA**	
H	Sender (TCP) channel name		**GIS.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.GIS.SNA**	

Table 27. Configuration worksheet for MQSeries for AT&T GIS UNIX (continued)

ID	Parameter Name	Reference	Example Used	User Value
J	Receiver (TCP) channel name	H	**MVS.GIS.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**GIS.VSE.SNA**	
I	Receiver channel name	G	**VSE.GIS.SNA**	

MQSeries for AT&T GIS UNIX sender-channel definitions using SNA

```
def ql (OS2) +                             F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                     D
    rname(OS2.LOCALQ) +                    E
    rqmname(OS2) +                         C
    xmitq(OS2) +                           F
    replace

def chl (GIS.OS2.SNA) chltype(sdr) +       G
    trptype(lu62) +
    conname('OS2CPIC') +                   14
    xmitq(OS2) +                           F
    replace
```

MQSeries for AT&T GIS UNIX receiver-channel definitions using SNA

```
def ql (GIS.LOCALQ) replace                B

def chl (OS2.GIS.SNA) chltype(rcvr) +      I
    trptype(lu62) +
    replace
```

MQSeries for AT&T GIS UNIX sender-channel definitions using TCP

```
def ql (OS2) +                             F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                     D
    rname(OS2.LOCALQ) +                    E
    rqmname(OS2) +                         C
    xmitq(OS2) +                           F
    replace

def chl (GIS.OS2.TCP) chltype(sdr) +       H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                           F
    replace
```

MQSeries for AT&T GIS UNIX receiver-channel definitions using TCP/IP

```
def ql (GIS.LOCALQ) replace                     B

def chl (OS2.GIS.TCP) chltype(rcvr) +           J
    trptype(tcp) +
    replace
```

AT&T GIS UNIX configuration

Chapter 18. Example configuration - IBM WebSphere MQ for Solaris

This chapter gives an example of how to set up communication links from WebSphere MQ for Solaris to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[6]
- Linux
- OS/400
- z/OS without CICS
- VSE/ESA

It describes the parameters needed for an LU 6.2 connection, using SunLink Version 9.1, and "Establishing a connection using SunLink Version 9.1" on page 278.

WebSphere MQ allows you to set up communication links from WebSphere MQ for Solaris using SNAP-IX V6.2 or later. See "Configuration parameters for an LU 6.2 connection using SNAP-IX" on page 289, and "Establishing a session using SNAP-IX" on page 293.

To establish a TCP connection, see "Establishing a TCP connection" on page 306.

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for Solaris configuration" on page 307.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Loading the WebSphere MQ library to support SNA

You determine the WebSphere MQ library loaded to support SNA with the *MQCommLibrary* parameter in the qm.ini file. On WebSphere MQ the `LU62` stanza applies. *MQCommLibrary* is the only attribute that can be specified:

MQCommLibrary=amqcc62a | amqcc62s

This attribute specifies the WebSphere MQ library loaded to support SNA for WebSphere MQ V5.3.

SNAP-IX support is provided if amqcc62a is loaded. This is the default if this attribute is not specified.

SunLink Version 9.1 support is provided if amqcc62s is loaded.

Refer to the *WebSphere MQ System Administration Guide* book for a full description of the `LU62` stanza in the qm.ini file.

---

[6] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

If you are migrating from previous versions of MQSeries other than MQSeries V5.2, to use SunLink 9.1, you must correctly specify the LU62 stanza entry to be used for SNA communication. If you do not specify the LU62 stanza entry correctly, the following errors are returned:

- When attempting to start an outbound LU62 channel, message AMQ6175 is returned, and the following entry appears in the queue manager error log:

  ```
  AMQ9220: The APPC communications program could not be loaded

  EXPLANATION:
  The attempt to load the APPC library or procedure 'amqcc62a' failed with error
  code 536895861
  ```

- When attempting to start an inbound LU62 channel, the following errors are produced on the sending machine:

  ```
  AMQ9201: Allocate failed to host 'TEST'
  ```

  ```
  AMQ9999: Channel program ended abnormally
  ```

  See *WebSphere MQ Messages* for details of AMQ9201, the contents of which are produced in the sending queue manager error log.

Configuration parameters for an LU 6.2 connection using SunLink Version 9.1

Table 28 presents a worksheet listing all the parameters needed to set up communication from Solaris to one of the other WebSphere MQ platforms, using SunLink Version 9.1. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in “Explanation of terms” on page 277.

Table 28. Configuration worksheet for SunLink Version 9.1

ID	Parameter Name	Reference	Example	User Value
Parameters for local node				
1	PU 2.1 server name		**SOLSERV**	
2	Network name		**NETID**	
3	CP name		**SOLARPU**	
4	Line name		**MQLINE**	
5	Local MAC address		**08002071CC8A**	
6	Local terminal ID		**05D 310D6**	
7	Local LU name		**SOLARLU**	
8	TP name		**MQSERIES**	
9	Command Path		**home/interops/crs6a**	

Table 28. Configuration worksheet for SunLink Version 9.1 (continued)

ID	Parameter Name	Reference	Example	User Value
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
10	Unique session name		**OS2SESS**	
11	Network name	2	**NETID**	
12	DLC name		**OS2QMGR**	
13	Remote CP name		**OS2PU**	
14	Local LSAP		**x‘04’, x‘08’, x‘0C’, ...**	
15	Partner LU	6	**OS2LU**	
16	TP name	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C file name		**/home/mqstart/OS2CPIC**	
19	Remote MAC address	10	**10005AFC5D83**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
10	Unique session name		**WINNTSESS**	
11	Network name	2	**NETID**	
12	DLC name		**NTQMGR**	
13	Remote CP name		**WINNTCP**	
14	Local LSAP		**x‘04’, x‘08’, x‘0C’, ...**	
15	Partner LU	6	**WINNTLU**	
16	TP name	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C file name		**/home/mqstart/NTCPIC**	
19	Remote MAC address	10	**10005AFC5D83**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
10	Unique session name		**AIXSESS**	
11	Network name	1	**NETID**	
12	DLC name		**AIXQMGR**	
13	Remote CP name	2	**AIXPU**	
14	Local LSAP		**x‘04’, x‘08’, x‘0C’, ...**	
15	Partner LU	4	**AIXLU**	
16	TP name	6	**MQSERIES**	
17	Mode name	14	**#INTER**	
18	CPI-C file name		**/home/mqstart/AIXCPIC**	
19	Remote MAC address	15	**10005AFC5D83**	
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
10	Unique session name		**HPUXSESS**	

Table 28. Configuration worksheet for SunLink Version 9.1 (continued)

ID	Parameter Name	Reference	Example	User Value
11	Network name	4	**NETID**	
12	DLC name		**HPUXQMGR**	
13	Remote CP name		**HPUXPU**	
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	5	**HPUXLU**	
16	TP name	7	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C file name		**/home/mqstart/HPCPIC**	
19	Remote MAC address	19	**10005AFC5D83**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in the Table 26 on page 257, as indicated.				
10	Unique session name		**GISSESS**	
11	Network name	2	**NETID**	
12	DLC name		**GISQMGR**	
13	Remote CP name		**GISPU**	
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	6	**GISLU**	
16	TP name	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C file name		**/home/mqstart/ATTCPIC**	
19	Remote MAC address	10	**10005AFC5D83**	
Connection to a Linux for Intel system The values in this section of the table must match those used in the Table 31 on page 313, as indicated.				
10	Unique session name		**LXSESS**	
11	Network name	4	**NETID**	
12	DLC name		**LXQMGR**	
13	Remote CP name	2	**LINUXPU**	
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	5	**LINUXLU**	
16	TP name	7	**MQSERIES**	
17	Mode name	6	**#INTER**	
18	CPI-C file name		**/home/mqstart/LXCPIC**	
19	Remote MAC address	8	**08005AC6DF33**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
10	Unique session name		**AS400SESS**	
11	Network name	2	**NETID**	
12	DLC name		**ASQMGR**	
13	Remote CP name		**AS400PU**	

Table 28. Configuration worksheet for SunLink Version 9.1 (continued)

ID	Parameter Name	Reference	Example	User Value
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	**6**	**AS400LU**	
16	TP name	**8**	**MQSERIES**	
17	Mode name	**17**	**#INTER**	
18	CPI-C file name		**/home/mqstart/400CPIC**	
19	Remote MAC address	**10**	**10005AFC5D83**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
10	Unique session name		**MVSSESS**	
11	Network name	**2**	**NETID**	
12	DLC name		**MVSQMGR**	
13	Remote CP name		**MVSPU**	
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	**6**	**MVSLU**	
16	TP name	**8**	**MQSERIES**	
17	Mode name	**17**	**#INTER**	
18	CPI-C file name		**/home/mqstart/MVSCPIC**	
19	Remote MAC address	**10**	**10005AFC5D83**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
10	Unique session name		**VSESESS**	
11	Network name	**2**	**NETID**	
12	DLC name		**VSEQMGR**	
13	Remote CP name		**VSEPU**	
14	Local LSAP		**x'04', x'08', x'0C', ...**	
15	Partner LU	**6**	**VSELU**	
16	TP name	**8**	**MQSERIES**	
17	Mode name	**17**	**#INTER**	
18	CPI-C file name		**/home/mqstart/VSECPIC**	
19	Remote MAC address	**10**	**10005AFC5D83**	

Explanation of terms

1 PU2.1 server name
This is the name of the PU2.1 server for the local control point.

2 Network name
This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network name works with the Control Point name to uniquely identify a system. Your network administrator will tell you the value.

3 CP name
This is the unique Control Point name for this workstation. Your network administrator will assign this to you.

4 Line name
This is the name that identifies the connection to the LAN.

5 Local MAC address
This is the network address of the token-ring card. The address to be specified is found in the ether value displayed in response to the `ifconfig tr0` command issued at a root level of authority. (Tr0 is the name of the machine’s token-ring interface.) If you do not have the necessary level of authority, your Solaris system administrator can tell you the value.

6 Local terminal ID
This is the unique ID of this workstation. On other platforms this is often referred to as the *Exchange ID* or *XID*. Your network administrator will assign this ID for you.

7 Local LU name
An LU manages the exchange of data between transactions. The local LU name is the name of the LU on your system. Your network administrator will assign this to you.

8 TP name
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQ01.

See Table 20 on page 201 for more information.

9 TP path
This is the path and name of the script file that invokes the WebSphere MQ program to run.

10 Unique session name
This is the unique name of the Partner LU/Mode definition.

12 DLC name
This is the name of the link to the remote system.

13 Remote CP name
This is the name of the control point on the remote system.

18 CPI-C file name
This is the full path and name of the file which holds CPI-C side information for a partner system. There must be a separate CPI-C file for each partner. For increased flexibility, include the full path and file name in the WebSphere MQ sender channel definition.

Establishing a connection using SunLink Version 9.1

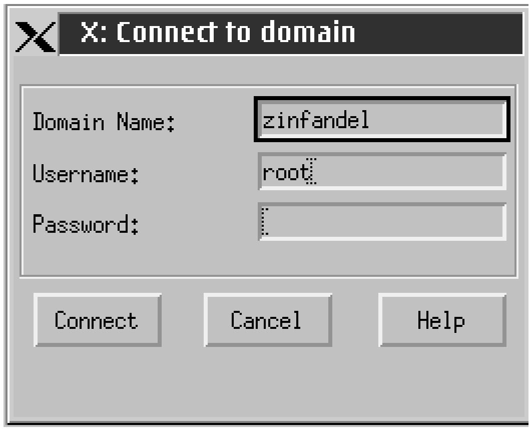
This section describes how to establish a connection using SunLink Version 9.1 The topics discussed are:
- SunLink 9.0 base configuration
- Invokable TPs
- CPI-C side information

SunLink 9.1 base configuration

To start the SunLink 9.1 graphical interface:

1. Enter `sungmi` at the command line.

   It is assumed that the domain, manager systems, and default system were defined during installation.
2. On the main screen, highlight **Config1** in the resource tree and select **File** and **Open**. A window entitled **Connect to domain** appears:

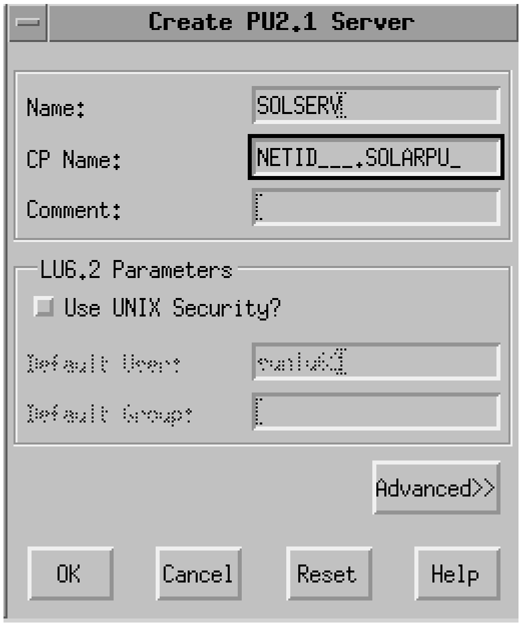


Domain Name: zinfandel
Username: root
Password:

3. Enter required details to connect to the required domain.

Configuring a PU 2.1 server

1. Double click on **Systems** in the resource tree to display a list of systems.
2. Double click on **System name** in the resource tree to open its subordinate entries.
3. Using the right mouse button, highlight **PU2.1 Servers** in the resource tree and select **New** and **PU2.1 Server** from the pop-up menu. A window entitled **Create PU2.1 Server** appears:



Name: SOLSERV

CP Name: NETID___.SOLARPU_

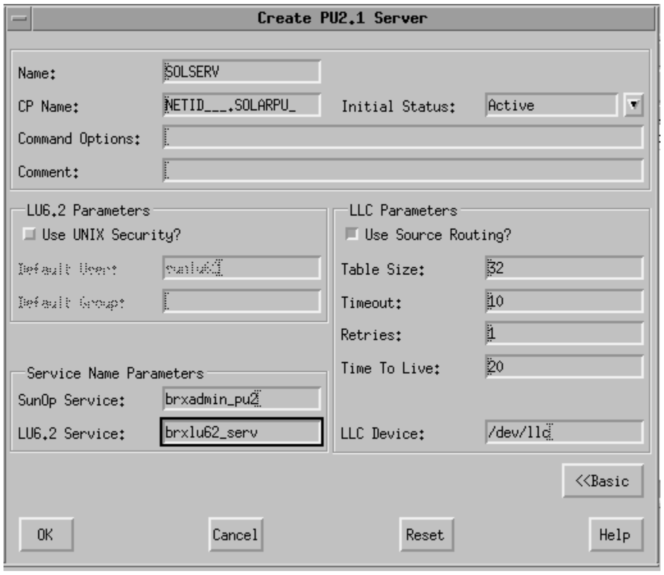
Comment:

☐ Use UNIX Security?

Default User: sunlu62

Default Group:

4. Enter the **PU2.1 Name** (**1**).
5. Enter the **CP Name**. This consists of the **Network Name** (**2**)and the **CP Name** (**3**).
6. Click on **Advanced >>**. The advanced window appears:



Name: SOLSERV

CP Name: NETID___.SOLARPU_

Initial Status: Active

Command Options:

Comment:

☐ Use UNIX Security?

Default User: sunlu62

Default Group:

SunOp Service: brxadmin_pu2

LU6.2 Service: brxlu62_serv

☐ Use Source Routing?

Table Size: 32

Timeout: 10

Retries: 1

Time To Live: 20

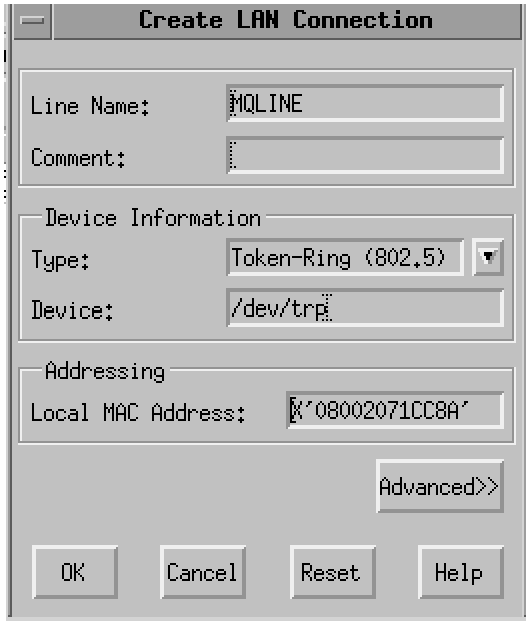
LLC Device: /dev/llc

7. Enter the **SunOp Service** and **LU6.2 Service**
8. Click on **OK** when you are happy with the settings.

Adding a LAN connection

1. Double click on **PU2.1 Servers** in the resource tree to display the name of the PU2.1 server.

2. Using the right mouse button, highlight the server name in the resource tree and select **New** and **LAN Connection** from the pop-up menu. A window entitled **Create LAN Connection** appears:



Line Name: MQLINE

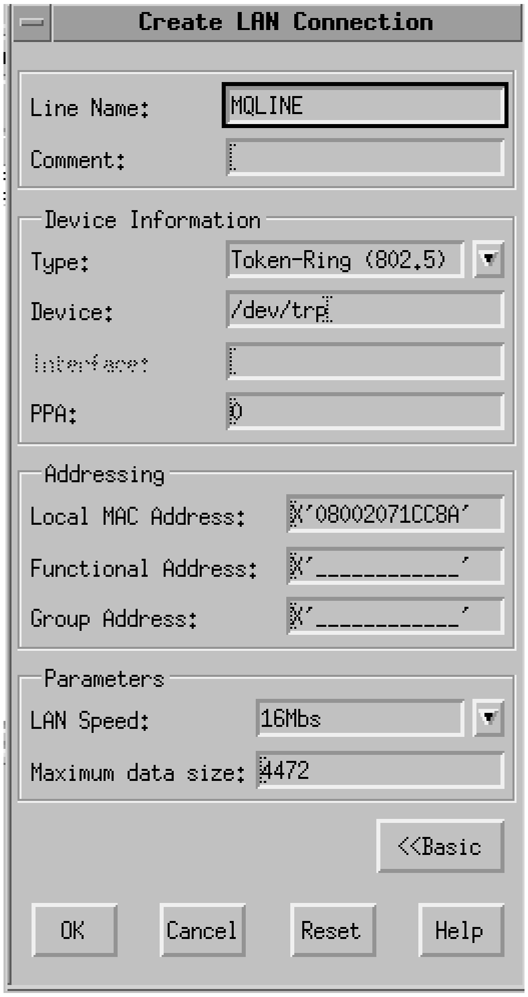
Comment:

Type: Token-Ring (802.5)

Device: /dev/trp

Local MAC Address: X'08002071CC8A'

3. Enter a **Line Name** (**4**) and **Local MAC Address** (**5**).
4. Click on **Advanced>>** The advanced window appears:



Line Name: MQLINE

Comment:

Device Information

Type: Token-Ring (802.5)

Device: /dev/trp

Interface:

PPA: 0

Addressing

Local MAC Address: X'08002071CC8A'

Functional Address: X'____________'

Group Address: X'____________'

Parameters

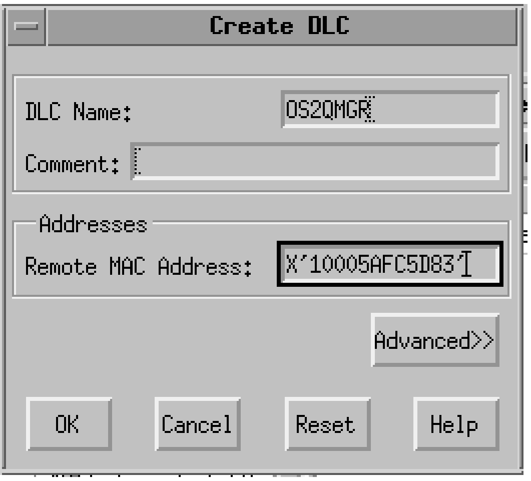
LAN Speed: 16Mbs

Maximum data size: 4472

5. Check the **LAN Speed** is correct.
6. Click on **OK** when you are happy with the settings.

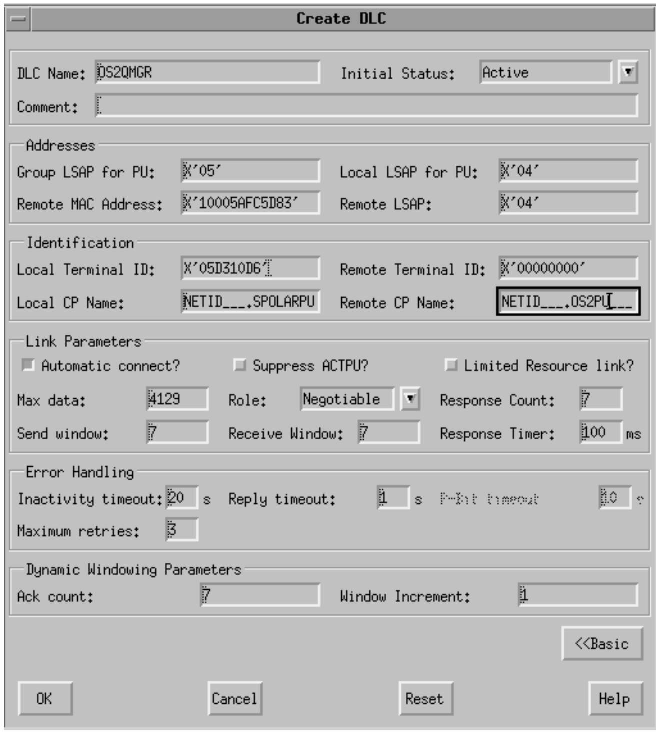
Configuring a connection to a remote PU

1. Double click the **PU2.1 server name** in the resource tree to open its suborditnate entries.
2. Double click on **LAN Connections**.
3. Using the right mouse button, highlight the LAN connection name in the resource tree and select **New** and **DLC** from the pop-up menu. A window entitled **Create DLC** appears:



DLC Name: OS2QMGR
Comment:
Remote MAC Address: X'10005AFC5D83'

4. Enter the **DLC Name** (**12**) and **Remote MAC Address** (**19**).
5. Click on **Advanced>>**. A window entitled **Create DLC** (advanced) appears:



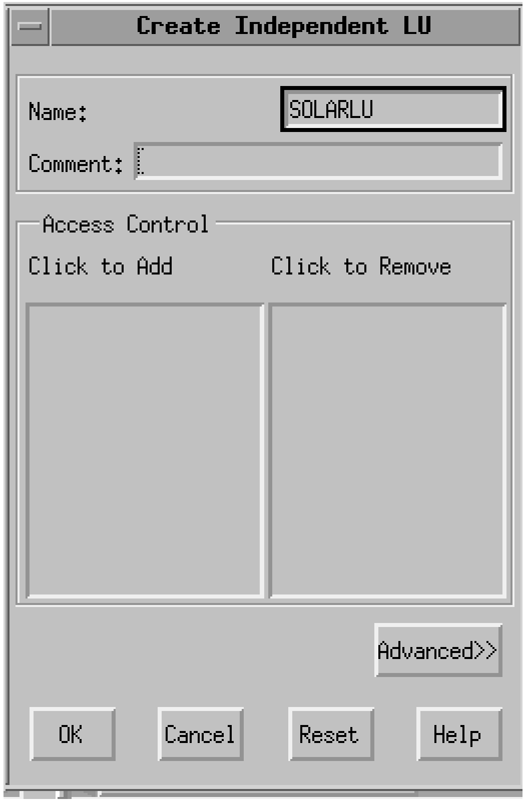
DLC Name: OS2QMGR
Initial Status: Active
Comment:
Group LSAP for PU: X'05'
Local LSAP for PU: X'04'
Remote MAC Address: X'10005AFC5D83'
Remote LSAP: X'04'
Local Terminal ID: X'05D310D6'
Remote Terminal ID: X'00000000'
Local CP Name: NETID___.SPOLARPU
Remote CP Name: NETID___.OS2PU___
☐ Automatic connect?
☐ Suppress ACTPU?
☐ Limited Resource link?
Max data: 4129
Role: Negotiable
Response Count: 7
Send window: 7
Receive Window: 7
Response Timer: 100 ms
Inactivity timeout: 20 s
Reply timeout: 1 s
P-bit timeout 10 s
Maximum retries: 3
Ack count: 7
Window Increment: 1

6. Enter the **Local LSAP** for this DLC (**14**), **Local Terminal ID** (**6**), and **Remote CP Name** (**13**).
7. When you are happy with the settings, click on **OK**.

Configuring an independent LU

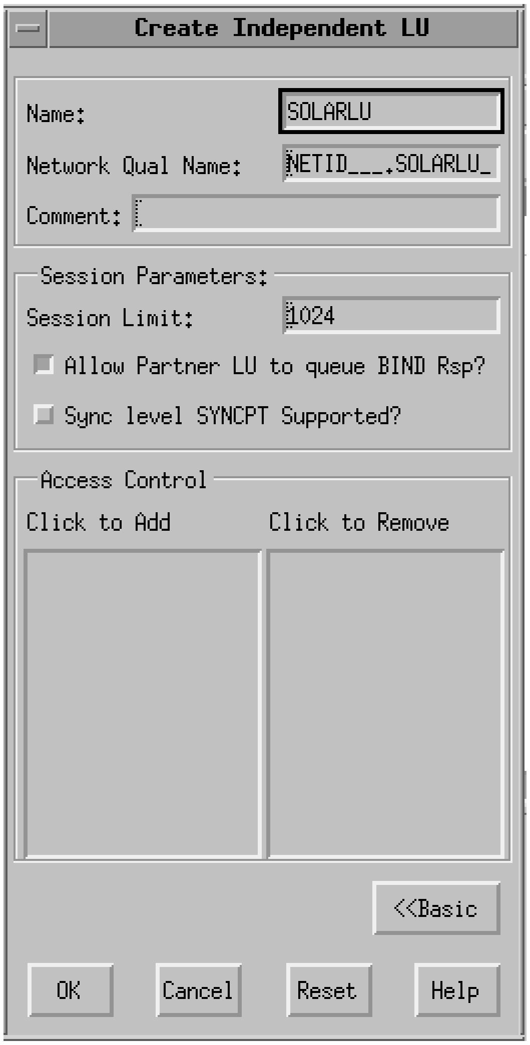
1. Double click on **Systems** in the resource tree to display a list of systems.
2. Double click on the system name to open its subordinate entries.
3. Double click on **PU2.1 Servers** to display a list of servers.
4. Double click on the PU2.1 server name to open its subordinate entries.

5. From the main window, select **Edit**, **New**, and **Independent LU** to display the **Create Independent LU** window:



Name: SOLARLU

6. Enter the **Local LU Name** (7).
7. Click on **Advanced>>**. An advanced **Create Independent LU** window appears:


Create Independent LU

Name: SOLARLU

Network Qual Name: NETID___.SOLARLU_

Comment:

Session Parameters:

Session Limit: 1024

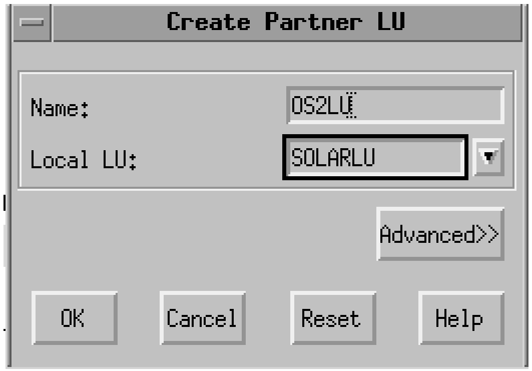
☐ Allow Partner LU to queue BIND Rsp?

☐ Sync level SYNCPT Supported?

8. Enter the **Network Qual Name**. This consists of the **Network Name** (2) and the **Local LU** (7).
9. Click on **OK**

Configuring a partner LU

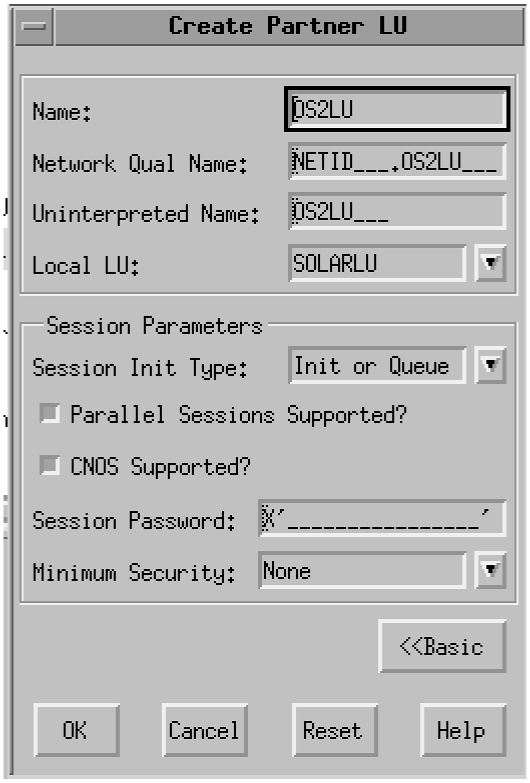
1. Double click on the PU2.1 server name in the resource tree to open its subordinate entries.
2. From the main window, select **Edit**, **New**, and **Partner LU** to display the **Create Partner LU** window:



Name: OS2LU

Local LU: SOLARLU

3. Enter the **Partner LU** (**15**) and the **Local LU Name** (**7**).
4. Click on **Advanced>>**. The advanced **Create Partner LU** window appears:



Name: OS2LU

Network Qual Name: NETID___.OS2LU___

Uninterpreted Name: OS2LU___

Local LU: SOLARLU

Session Init Type: Init or Queue

☐ Parallel Sessions Supported?

☐ CNOS Supported?

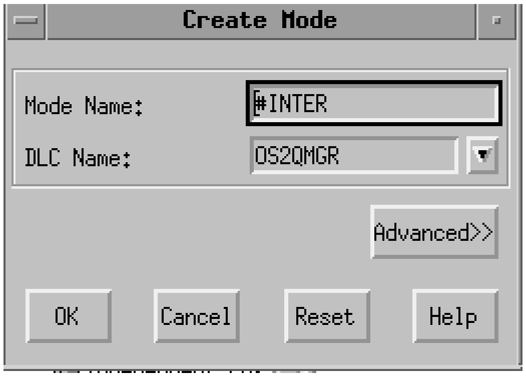
Session Password: X'________________'

Minimum Security: None

5. Choose a **Local LU** from the drop-down list.
6. Click on **OK**.

Configuring the session mode

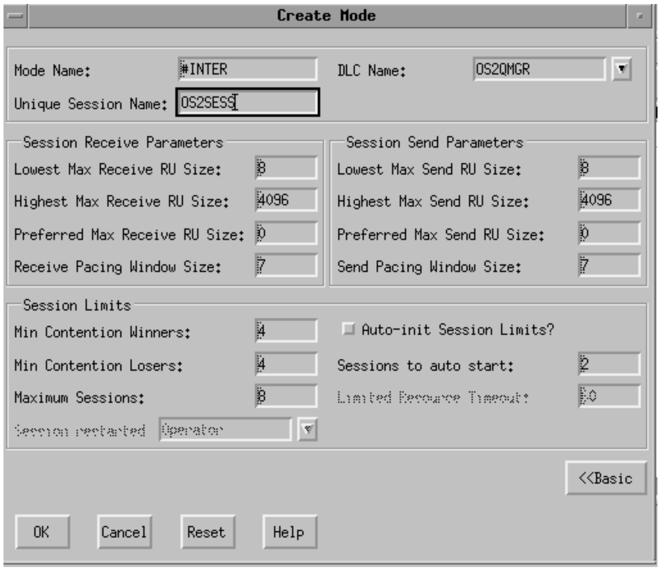
1. Double click on the PU2.1 server name to open its subordinate entries.
2. Double click on **Partner LU** in the resource tree to display a list of partner LUs.
3. Click on the partner LU to select it.
4. From the main window, select **Edit**, **New**, and **Mode** to display the **Create Mode** window:



Mode Name: #INTER

DLC Name: OS2QMGR

5. Enter the **Mode Name** (**17**) and **DLC Name** (**12**).
6. Click on **Advanced>>**. The advanced **Create Mode** window appears:



Mode Name: #INTER

DLC Name: OS2QMGR

Unique Session Name: OS2SESS

Lowest Max Receive RU Size: 8

Highest Max Receive RU Size: 4096

Preferred Max Receive RU Size: 0

Receive Pacing Window Size: 7

Lowest Max Send RU Size: 8

Highest Max Send RU Size: 4096

Preferred Max Send RU Size: 0

Send Pacing Window Size: 7

Min Contention Winners: 4

Min Contention Losers: 4

Maximum Sessions: 8

Session restarted: Operator

☐ Auto-init Session Limits?

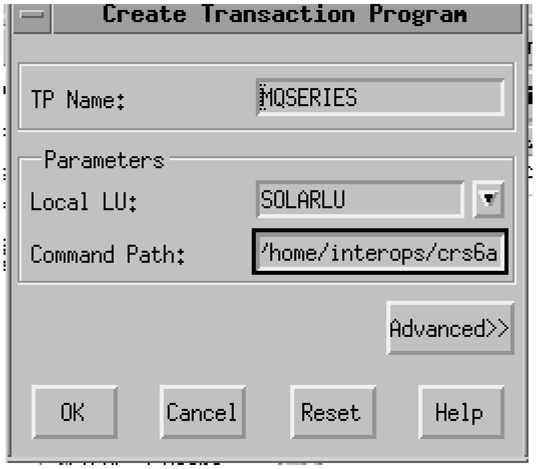
Sessions to auto start: 2

Limited Resource Timeout: 0

7. Enter the **Unique Session Name** (**10**).
8. When you are happy with the settings, click on **OK**.

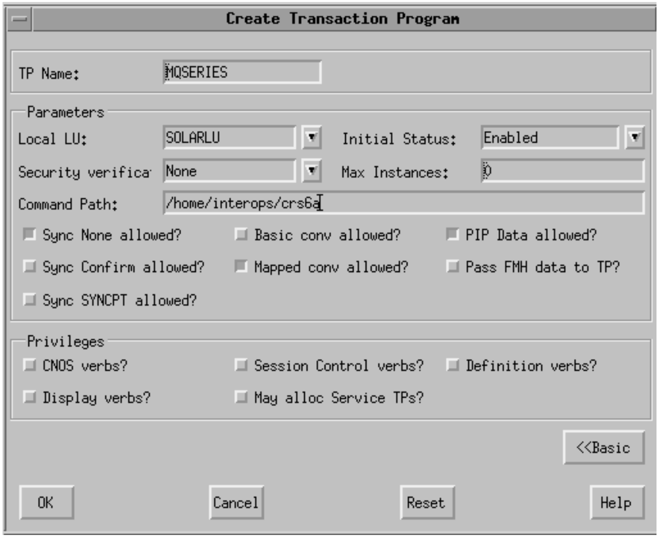
Configuring a transaction program

1. Double click on the PU2.1 server name to open its subordinate entries.
2. Click on **Transaction Programs** in the resource tree to select it.
3. From the main window, select **Edit**, **New**, and **Transaction Program** to display the **Create Transaction Program** window:



TP Name: MQSERIES
Local LU: SOLARLU
Command Path: /home/interops/crs6a

4. Enter the **TP Name** (**8**) and **Local LU** (**7**).
5. Enter a path to the invokable TP in the **Command Path** (**9**) field:
6. Click on **Advanced>>**. The advanced **Create Transaction Program** window appears:



TP Name: MQSERIES
Local LU: SOLARLU
Initial Status: Enabled
Security verifica: None
Max Instances: 0
Command Path: /home/interops/crs6a
☑ Sync None allowed?
☐ Basic conv allowed?
☑ PIP Data allowed?
☐ Sync Confirm allowed?
☑ Mapped conv allowed?
☐ Pass FMH data to TP?
☐ Sync SYNCPT allowed?
☐ CNOS verbs?
☐ Session Control verbs?
☐ Definition verbs?
☐ Display verbs?
☐ May alloc Service TPs?

7. When you are happy with the settings, click on **OK**.

Invokable TP path

In order to set required environment variables a script file should be defined for each invokable TP containing the following:

```
#!/bin/ksh
export APPC_GATEWAY=zinfandel
export APPC_LOCAL_LU=SOLARLU
/opt/mqm/bin/amqcrs6a -m SOLARIS -n MQSERIES
```

CPI-C side information

In common with most other platforms, WebSphere MQ for Solaris uses CPI-C side information files (**18**) to hold information about its partner systems. In SunLink 9.1, these are ASCII files (one per partner).

```
PTNR_LU_NAME = OS2LU                   15
MODE_NAME = #INTER                     17
TP_NAME = MQSERIES                     16
SECURITY = NONE
```

Figure 35. CPI-C side information file for SunLink Version 9.0

The location of the file must be specified either explicitly in the conname parameter of the sender channel definition or in the search path. It is better to specify it fully in the conname parameter because the value of the PATH environment variable can vary from user to user.

What next?

The connection is now established. You are ready to complete the configuration. Go to "WebSphere MQ for Solaris configuration" on page 307.

Configuration parameters for an LU 6.2 connection using SNAP-IX

Table 29 presents a worksheet listing all the parameters needed to set up communication from Solaris using SNAP-IX to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet for the platform to which you are connecting.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer to the values in the ID column. The entries in the Parameter Name column are explained in "Explanation of terms" on page 292.

Table 29. Configuration worksheet for SNAP-IX

ID	Parameter Name	Ref.	Example	User Value
Parameters for local node				
1	Configuration file name		**sna_node.cfg**	
2	Control point name		**SOLARXPU**	
3	Node ID to send		**05D 23456**	
4	Network name		**NETID**	
5	Local APPC LU		**SOLARXLU**	
6	APPC mode		**#INTER**	
7	Invokable TP		**MQSERIES**	
8	Local MAC address		**08002071CC8A**	
9	Port name		**MQPORT**	
10	Command path		**/opt/mqm/bin/amqcrs6a**	
11	Local queue manager		**SOLARIS**	
Connection to an OS/2 system The values in this section of the table must match those used in the Table for OS/2 and LU6.2, as indicated.				
12	Link station name		**OS2CONN**	

Table 29. Configuration worksheet for SNAP-IX (continued)

ID	Parameter Name	Ref.	Example	User Value
13	Network name	2	**NETID**	
14	CP name	3	**OS2PU**	
15	Remote LU	6	**OS2LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**OS2CPIC**	
19	Remote network address	10	**10005AFC5D83**	
20	Node ID to receive	4	**05D 12345**	
Connection to a Windows system The values in this section of the table must match those used in the Table for Windows and LU6.2, as indicated.				
12	Link station name		**NTCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**WINNTCP**	
15	Remote LU	5	**WINNTLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**NTCPIC**	
19	Remote network address	9	**08005AA5FAB9**	
20	Node ID to receive	4	**05D 30F65**	
Connection to an AIX system The values in this section of the table must match those used in the Table for AIX and LU6.2, as indicated.				
12	Link station name		**AIXCONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AIXPU**	
15	Remote LU	4	**AIXLU**	
16	Application TP	6	**MQSERIES**	
17	Mode name	14	**#INTER**	
18	CPI-C symbolic destination name		**AIXCPIC**	
19	Remote network address	8	**123456789012**	
20	Node ID to receive	3	**071 23456**	
Connection to an HP-UX system The values in this section of the table must match those used in the Table for HP-UX and LU6.2, as indicated.				
12	Link station name		**HPUXCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**HPUXPU**	
15	Remote LU	7	**HPUXLU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**HPUXCPIC**	

Table 29. Configuration worksheet for SNAP-IX (continued)

ID	Parameter Name	Ref.	Example	User Value
19	Remote network address	5	**10005FC5D83**	
20	node ID to receive	6	**05D 54321**	
Connection to an AT&T GIS (NCR) UNIXUNIX system The values in this section of the table must match those used in the table the Table for AT&T GIS UNIX and LU6.2, as indicated.				
12	Link station name		**GISCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**GISPU**	
15	Remote LU	4	**GISLU**	
16	Application TP	5	**MQSERIES**	
17	Mode name	7	**#INTER**	
18	CPI-C symbolic destination name		**GISCPIC**	
19	Remote network address	8	**10007038E86B**	
20	Node ID to receive	9	**03E 00018**	
Connection to a Linux for Intel system The values in this section of the table must match those used in the table the Table for Linux for Intel and LU6.2, as indicated.				
12	Link station name		**LXCONN**	
13	Network name	4	**NETID**	
14	CP name	2	**LINUXPU**	
15	Remote LU	5	**LINUXLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	6	**#INTER**	
18	CPI-C symbolic destination name		**LXCPIC**	
19	Remote network address	8	**08005AC6DF33**	
20	Node ID to receive	3	**05D 30A55**	
Connection to an OS/400 system The values in this section of the table must match those used in the Table for OS/400 and LU6.2, as indicated.				
12	Link station name		**AS4CONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AS400PU**	
15	Remote LU	3	**AS400LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**AS4CPIC**	
19	Remote network address	4	**10005A5962EF**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in the Table for z/OS and LU6.2, as indicated.				
12	Link station name		**MVSCONN**	

Table 29. Configuration worksheet for SNAP-IX (continued)

ID	Parameter Name	Ref.	Example	User Value
13	Network name	2	**NETID**	
14	CP name	3	**MVSPU**	
15	Remote LU	4	**MVSLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	10	**#INTER**	
18	CPI-C symbolic destination name		**MVSCPIC**	
19	Remote network address	8	**400074511092**	
Connection to a VSE/ESA system The values in this section of the table must match those used in the Table for VSE/ESA and LU6.2, as indicated.				
12	Link station name		**VSECONN**	
13	Network name	1	**NETID**	
14	CP name	2	**VSEPU**	
15	Remote LU	3	**VSELU**	
16	Application TP	4	**MQ01**	**MQ01**
17	Mode name		**#INTER**	
18	CPI-C symbolic destination name		**VSECPIC**	
19	Remote network address	5	**400074511092**	

Explanation of terms

1 Configuration file name

This is the unique name of the SNAP-IX configuration file. The default for this name is `sna_node.cfg`.

Although it is possible to edit this file, it is strongly recommended that configuration is done using xsnadmin.

2 Control point name

This is the unique Control point name for this workstation. In the SNA network, the Control point is an addressable location (PU type 2.1). Your network administrator will assign this to you.

3 Node ID to send

This is the unique ID of this workstation. On other platforms this is often referred to as the *Exchange ID* or *XID*. Your network administrator will assign this ID for you.

4 Network name

This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network name works with the Control point name to uniquely identify a system. Your network administrator will tell you the value.

5 Local APPC LU

An LU manages the exchange of data between transactions. The local APPC LU name is the name of the LU on your system. Your network administrator will assign this to you.

6 **APPC mode**
This is the name given to the set of parameters that control the APPC conversation. This name must be defined at each partner system. Your network administrator will assign this to you.

7 **Invokable TP**
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

8 **Local MAC address**
This is the network address of the token-ring card. The address to be specified is found in the ether value displayed in response to the `ifconfig tr0` command issued at a root level of authority. (Tr0 is the name of the machine's token-ring interface.) If you do not have the necessary level of authority, your Sun Solaris system administrator can tell you the value.

9 **Port name**
This is a meaningful symbolic name that is used to associate the definitions with a network interface (in this case, a Token-Ring adapter). A separate Port must be defined for each physical device attached to the workstation.

10 **Full path to executable**
This is the path and name of the script file that invokes the WebSphere MQ program to run.

11 **Local queue manager**
This is the name of the queue manager on your local system.

10 **Link station name**
This is a meaningful symbolic name by which the connection to a peer or host node is known. It defines a logical path to the remote system. Its name is used only inside SNAP-IX and is specified by you. The connection must be associated with an existing Link and owned by one local node. You must define one connection for each partner or host system.

18 **CPI-C symbolic destination name**
This is a name given to the definition of a partner node. You choose the name. It need be unique only on this machine. Later you can use this name in the WebSphere MQ sender channel definition.

20 **Node ID to receive**
This is the unique ID of the partner workstation with which you will be communicating. On other platforms this is often referred to as the *Exchange ID* or *XID*. For a connection to a host system any values except `000 FFFFF` and `FFF FFFFF` may be specified. Your network administrator will assign this ID for you.

Establishing a session using SNAP-IX

The following information guides you through the tasks you must perform to create the SNA infrastructure that WebSphere MQ requires. This example creates the definitions for a partner node and LU on OS/2.

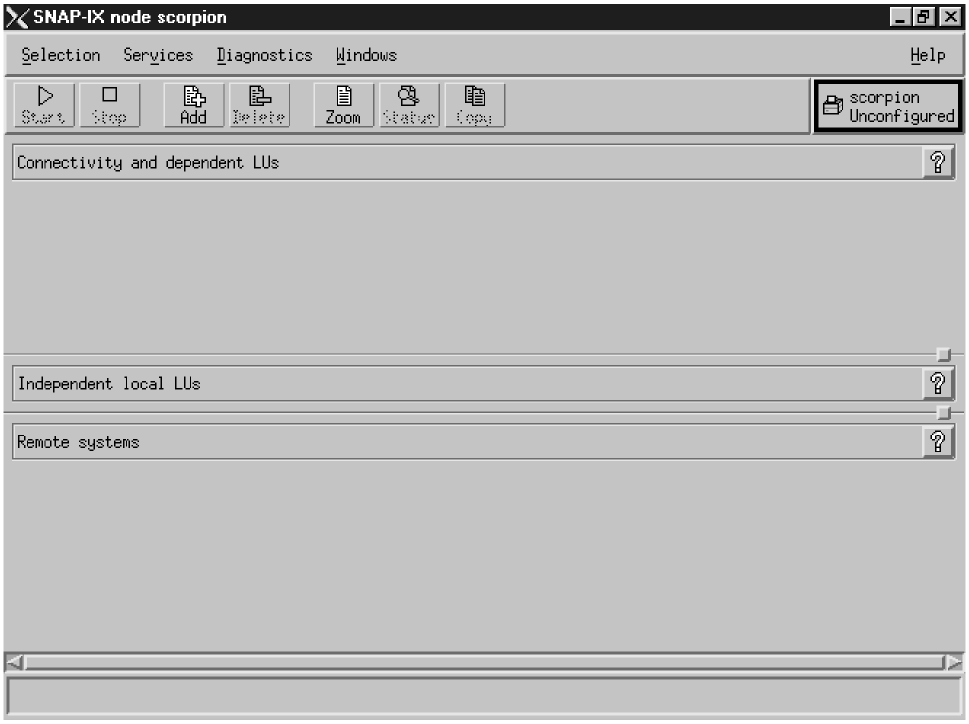
Use **sna start** followed by **xsnaadmin** to type the SNAP-IX configuration panels. You need root authority to use **xsnaadmin**.

SNAP-IX configuration

SNAP-IX configuration involves the following steps:

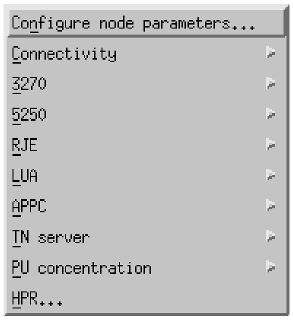
1. Defining a local node
2. Adding a Token Ring Port
3. Defining a local LU

The SNAP-IX main menu, from which you start, is shown here:

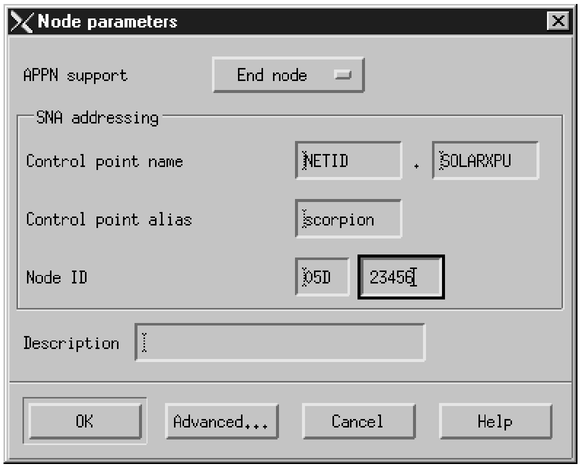


Defining a local node

1. From the SNAP-IX main menu, click the **Services** pull-down. The **Services** pull-down appears::



2. Click **Configure node parameters**. The following panel is displayed:



APPN support: End node

Control point name: NETID . SOLARXPU

Control point alias: scorpion

Node ID: 05D 23456

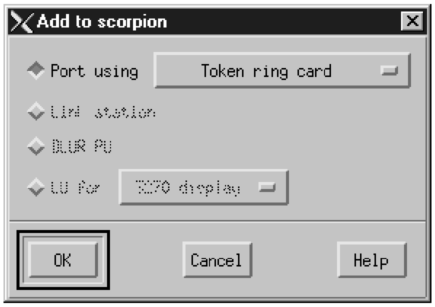
Description:

3. Complete the **Control point name** with the values **Network name** (4) and **Control point name** (2).
4. Type the **Control point name** (2) in the **Control point alias** field.
5. Type the **Node ID** (3).
6. Click **End node**.
7. Click **OK**.

A default independent local LU is defined.

Adding a Token Ring Port

1. From the main SNAP-IX menu, click **Connectivity and dependent LUs**.
2. Click **Add**. The following panel is displayed:



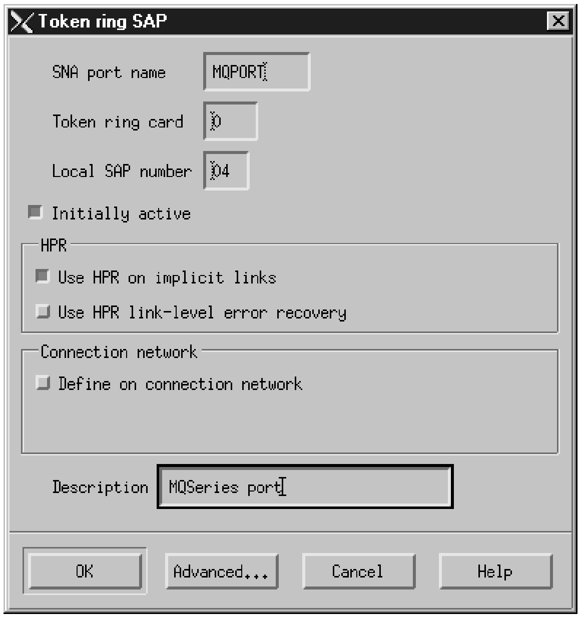
● Port using: Token ring card

○ Link station

○ DLUR PU

○ LU for: 3270 display

3. Click **Token Ring Card** and click **OK**. The following panel is displayed:



SNA port name: MQPORT

Token ring card: 0

Local SAP number: 04

☑ Initially active

☑ Use HPR on implicit links

☐ Use HPR link-level error recovery

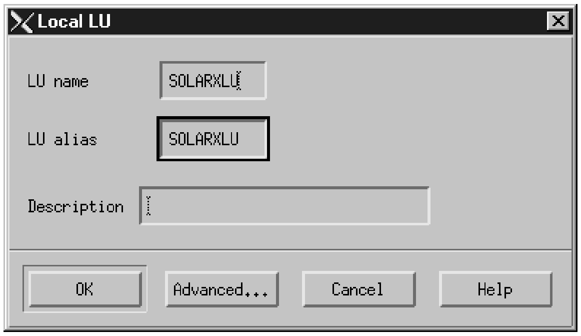
☐ Define on connection network

Description: MQSeries port

4. Type the **SNA port name** (**9**).
5. Type a **Description** and click **OK** to take the default values.

Defining a local LU

1. From the main SNAP-IX menu, click **Independent local LUs**.
2. Click **Add**. The following panel is displayed:



LU name SOLARXLU

LU alias SOLARXLU

Description

3. Type the **LU name** (**5**) and click **OK**.

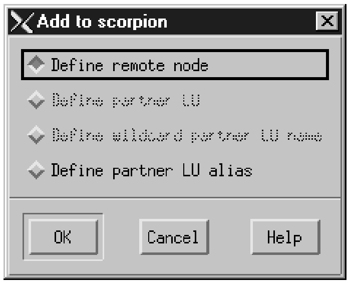
APPC configuration

APPC configuration involves the following steps:

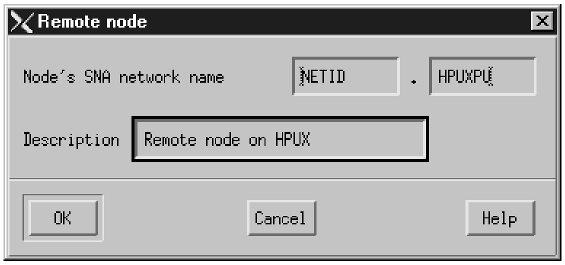
1. Defining a remote node
2. Defining a partner LU
3. Defining a link station
4. Defining a mode
5. Adding CPI-C information
6. Adding a TP definition

Defining a remote node

1. From the main SNAP-IX menu, click **Remote systems**.
2. Click **Add**. The following panel is displayed:



3. Select the **Define remote node** check box and click **OK**. The following panel is displayed:



Node's SNA network name NETID . HPUXPU

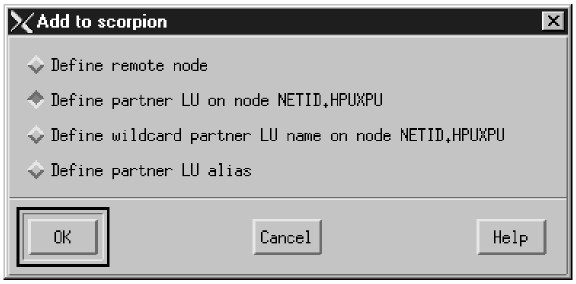
Description Remote node on HPUX

4. Type the **Node's SNA network name** (**13**) and a **Description**.

5. Click **OK**.
6. A default partner LU with the same name is generated and a message is displayed.
7. Click **OK**.

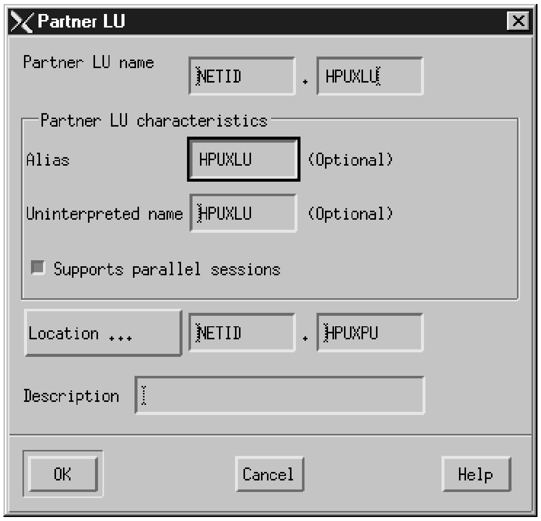
Defining a partner LU

1. From the main SNAP-IX menu, click **Remote systems** and click the remote node.
2. Click **Add**. The following panel is displayed:



○ Define remote node
● Define partner LU on node NETID.HPUXPU
○ Define wildcard partner LU name on node NETID.HPUXPU
○ Define partner LU alias

3. Select the**Define partner LU on node `node name`** check box.
4. Click **OK**. The following panel is displayed:



Partner LU name NETID . HPUXLU

Partner LU characteristics

Alias HPUXLU (Optional)

Uninterpreted name HPUXLU (Optional)

☑ Supports parallel sessions

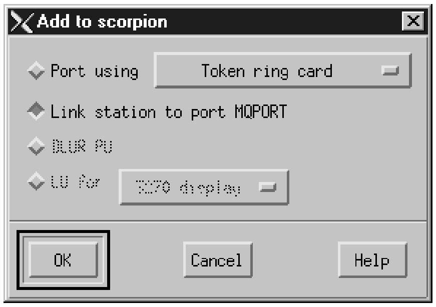
Location ... NETID . HPUXPU

Description

5. Type the **partner LU name** (**15**) and click **OK**.

Defining a link station

1. From the main SNAP-IX menu, click **Connectivity and dependent LUs**.
2. Click the MQPORT port.
3. Click **Add**. The following panel is displayed:


Add to scorpion

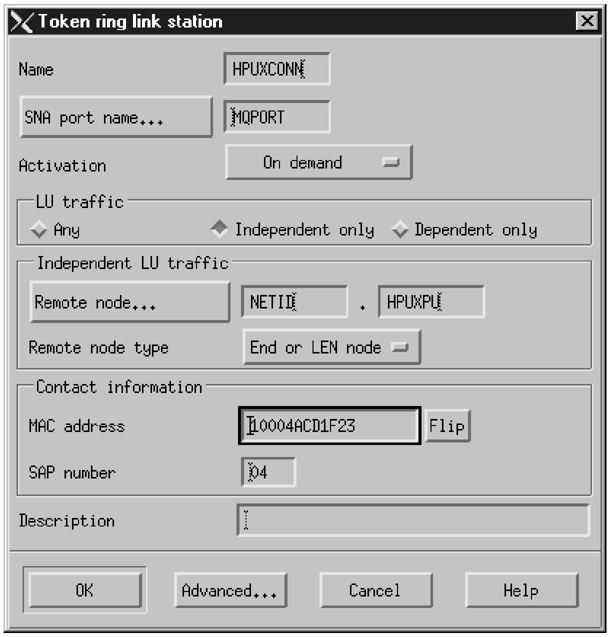
◇ Port using: Token ring card

◆ Link station to port MQPORT

◇ DLUR PU

◇ LU for: 3270 display

4. Select the **Add link station to port MQPORT** check box.
5. Click **OK**. The following panel is displayed:


Token ring link station

Name: HPUXCONN

SNA port name...: MQPORT

Activation: On demand

LU traffic: ◇ Any ◆ Independent only ◇ Dependent only

Independent LU traffic

Remote node...: NETID . HPUXPU

Remote node type: End or LEN node

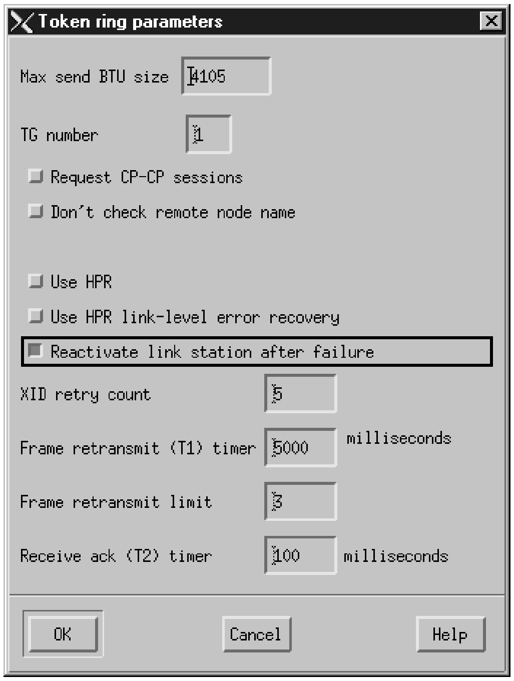
Contact information

MAC address: 10004ACD1F23

SAP number: 04

Description:

6. Type the **Name** of the link station (12).
7. Set the value of **Activation** to “On demand”.
8. Select the **Independent only** check box.
9. Click **Remote node** and select the value of the remote node (14).
10. Click **OK**.
11. Set the value of **Remote node type** to “End or LEN node”.
12. Type the value for **MAC address** (19) and click **Advanced**. The following panel is displayed:



Max send BTU size 4105

TG number 1

☐ Request CP-CP sessions

☐ Don't check remote node name

☐ Use HPR

☐ Use HPR link-level error recovery

☐ Reactivate link station after failure

XID retry count 5

Frame retransmit (T1) timer 5000 milliseconds

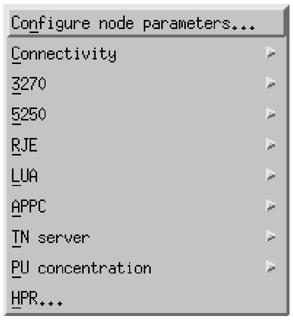
Frame retransmit limit 3

Receive ack (T2) timer 100 milliseconds

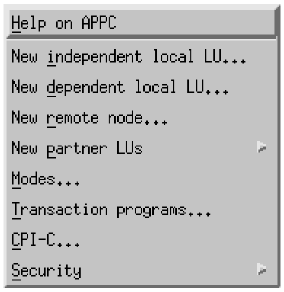
13. Select the **Request CP-CP sessions**. check box
14. Select the **Reactivate link station after failure**. check box
15. Click **OK** to exit the Advanced panel.
16. Click **OK** again.

Defining a mode

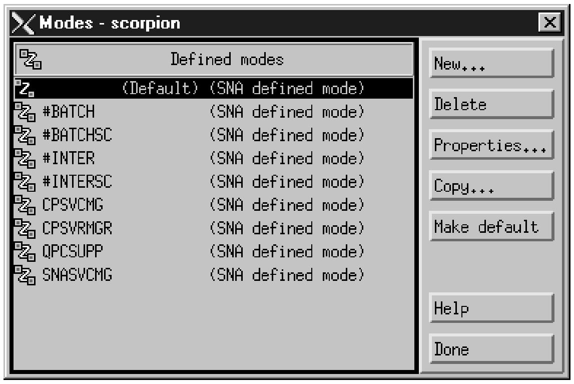
1. From the SNAP-IX main menu, click the **Services** pull-down: The following panel is displayed:



2. Click **APPC**. The following panel is displayed:



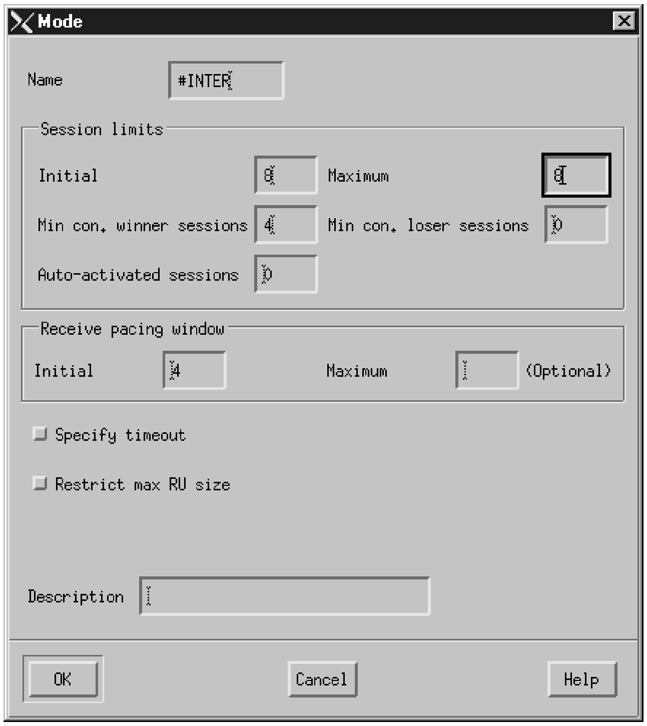
3. Click **Modes**. The following panel is displayed:



Defined modes

(Default) (SNA defined mode)
#BATCH (SNA defined mode)
#BATCHSC (SNA defined mode)
#INTER (SNA defined mode)
#INTERSC (SNA defined mode)
CPSVCMG (SNA defined mode)
CPSVRMGR (SNA defined mode)
QPCSUPP (SNA defined mode)
SNASVCMG (SNA defined mode)

4. Click **Add**. The following panel is displayed:



Name #INTER

Session limits
Initial 8
Maximum 8
Min con. winner sessions 4
Min con. loser sessions 0
Auto-activated sessions 0

Receive pacing window
Initial 4
Maximum (Optional)

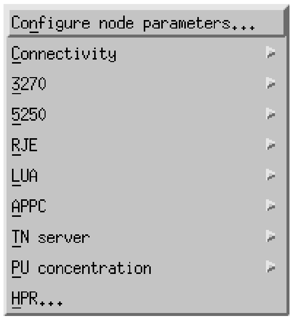
☐ Specify timeout
☐ Restrict max RU size

Description

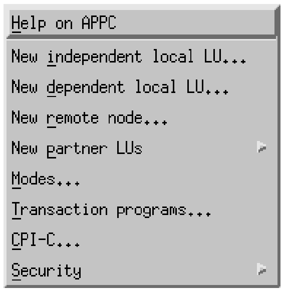
5. Type the **Name** to be given to the mode (**17**).
6. Set the values of **Initial session limit** to 8, **Min con. winner sessions** to 4, and **Auto-activated sessions** to 0.
7. Click **OK**.
8. Click **Done**.

Adding CPI-C information

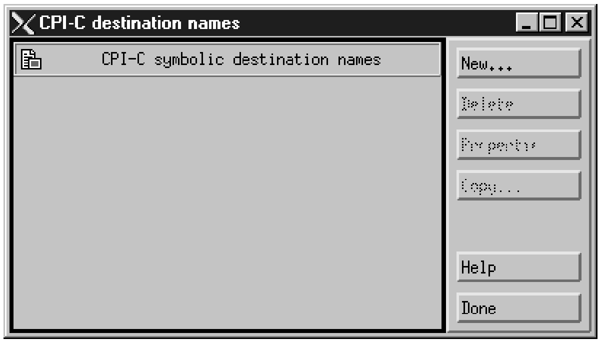
1. From the SNAP-IX main menu, click the **Services** pull-down:



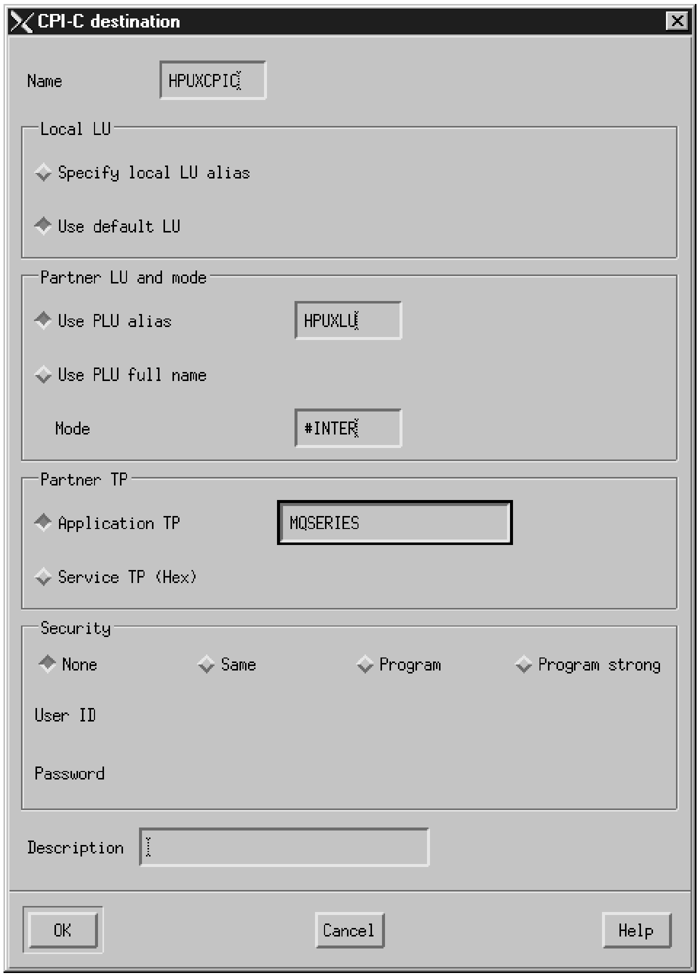
2. Click **APPC**. The following panel is displayed:



3. Click **CPI-C**. The following panel is displayed:



4. Click **Add**. The following panel is displayed:



Name HPUXCPIC

● Use default LU

● Use PLU alias HPUXLU

Mode #INTER

● Application TP MQSERIES

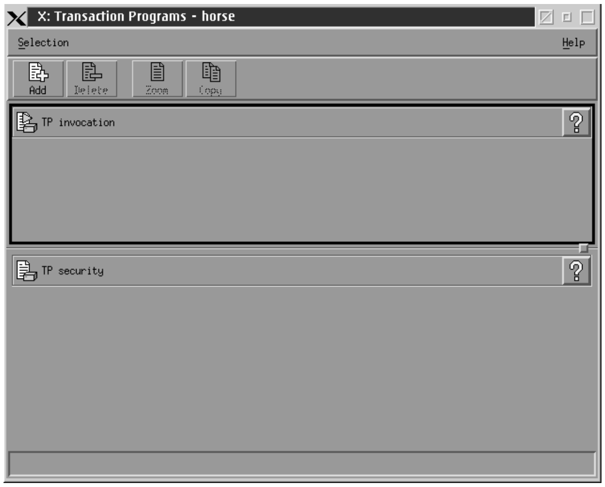
● None

5. Type the **Name** (**18**). Select the **Application TP** check box and type the value (**16**). Select the **Use PLU alias** check box and type the name (**15**). Type the **Mode** name (**17**).
6. Click **OK**.

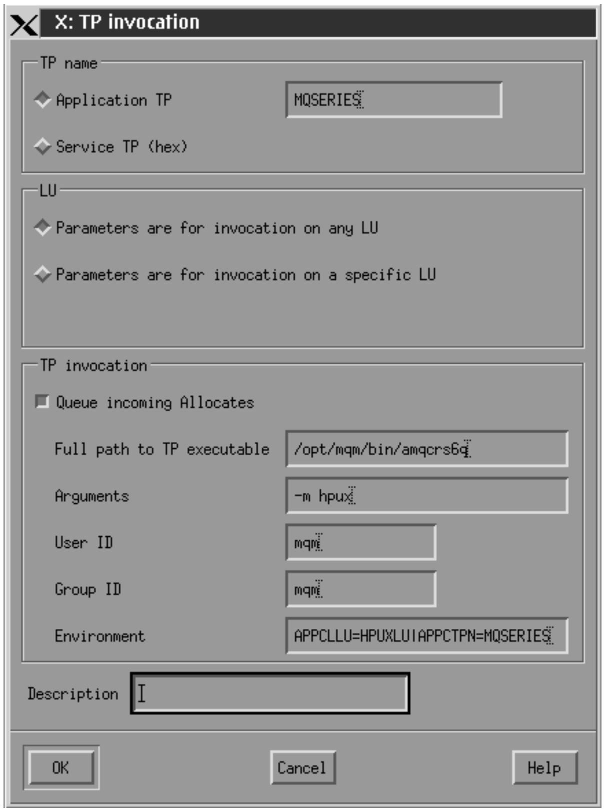
Adding a TP definition using SNAP-IX Release 6

To add a TP definition:

1. Click the **Services** pull-down and click **APPC** as for CPI-C information.
2. Click **Transaction Programs**. The following panel is displayed:



3. Click **Add**. The following panel is displayed:


X: TP invocation
TP name
Service TP (hex)
LU
Parameters are for invocation on any LU
Parameters are for invocation on a specific LU
TP invocation
Description
OK
Cancel
Help

◆ Application TP: MQSERIES

☐ Queue incoming Allocates

Full path to TP executable: /opt/mqm/bin/amqcrs6a

Arguments: -m hpux

User ID: mqm

Group ID: mqm

Environment: APPCLLU=HPUXLU|APPCTPN=MQSERIES

4. Type **TP name** (7) in the **Application TP** field.
5. Clear the **Queue incoming Allocates** check box.
6. Type **Full path to executable** (10).
7. Type **-m Local queue manager** (11) in the **Arguments** field.

8. Type **mqm** in the **User ID** and **Group ID** fields.
9. Type environment variables **APPCLLU=local LU** (**5**) and **APPCTPN=Invokable TP** (**7**) separated by the pipe character in the **Environment** field.
10. Click **OK** to save your definition.

SNAP-IX operation

The SNAP-IX control daemon is started with the **sna start** command. Depending on the options selected at installation, it may already be running.

The **xsnaadmin** utility controls SNAP-IX resources.

Logging and tracing are controlled from here. Log and trace files can be found in the `/var/opt/sna` directory. The logging files sna.aud and sna.err can be read using a standard editor such as vi.

In order to read the trace files **sna1.trc** and **sna2.trc** you must first format them by running the command **snatrcfmt -f sna1.trc -o sna1**. This produces a sna1.dmp file that can be read using a normal editor.

It is possible to edit the configuration file, but this is not a recommended method of configuring SNAP-IX.

The APPCLLU environment variables must be set before starting a sender channel from the Solaris system. The command can be either entered interactively or added to the logon profile. Depending on the level of BOURNE shell or KORN shell program being used, the command will be:

```
export APPCLLU=SOLARXLU      5    newer level
```

or

```
APPCLLU=SOLARXLU             5    older level
export
```

What next?

The connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for Solaris configuration” on page 307.

Establishing a TCP connection

To establish a TCP connection, follow these steps.

1. Edit the file /etc/services.

   Note: To edit the /etc/services file, you must be logged in as a superuser or root. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```
2. Edit the file /etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait mqm /opt/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Find the process ID of the inetd with the command:

   ```
   ps -ef | grep inetd
   ```
4. Run the command:

   ```
   kill -1 inetd processid
   ```

What next?

The TCP/IP connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for Solaris configuration” on page 307.

WebSphere MQ for Solaris configuration

Before beginning the installation process ensure that you have first created the *mqm* user and group, and set the password.

Start any channel using the command:

```
runmqchl -c channel.name
```

Notes:

1. Sample programs are installed in /opt/mqm/samp.
2. Error logs are stored in /var/mqm/qmgrs/*qmgrname*/errors.
3. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.
4. For an SNA or LU6.2 channel, if you experience an error when you try to load the communications library, probably file liblu62.so cannot be found. A likely solution to this problem is to add its location, which is probably /opt/SUNWlu62, to LD_LIBRARY_PATH.

Basic configuration

1. Create the queue manager from the UNIX prompt using the command:

   ```
   crtmqm -u dlqname -q solaris
   ```

   where:

   `solaris`
   Is the name of the queue manager

   `-q` Indicates that this is to become the default queue manager

   `-u` *`dlqname`*
   Specifies the name of the undeliverable message queue

   This command creates a queue manager and a set of default objects.
2. Start the queue manager from the UNIX prompt using the command:

   ```
   strmqm solaris
   ```

   where *`solaris`* is the name given to the queue manager when it was created.

Channel configuration

The following section details the configuration to be performed on the Solaris queue manager to implement the channel described in Figure 32 on page 101.

The MQSC command to create each object is shown. Either start **runmqsc** from a UNIX prompt and enter each command in turn, or build the commands into a command file.

Examples are given for connecting WebSphere MQ for Solaris and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Solaris configuration

Table 30. Configuration worksheet for WebSphere MQ for Solaris

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**SOLARIS**	
B	Local queue name		**SOLARIS.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**SOLARIS.OS2.SNA**	
H	Sender (TCP/IP) channel name		**SOLARIS.OS2.TCP**	
I	Receiver (SNA) channel name	**G**	**OS2.SOLARIS.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**OS2.SOLARIS.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	**A**	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	**B**	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**SOLARIS.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**SOLARIS.WINNT.TCP**	
I	Receiver (SNA) channel name	**G**	**WINNT.SOLARIS.SNA**	
J	Receiver (TCP) channel name	**H**	**WINNT.SOLARIS.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	**A**	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	**B**	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**SOLARIS.AIX.SNA**	
H	Sender (TCP) channel name		**SOLARIS.AIX.TCP**	
I	Receiver (SNA) channel name	**G**	**AIX.SOLARIS.SNA**	
J	Receiver (TCP) channel name	**H**	**AIX.SOLARIS.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	**A**	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	**B**	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	

Table 30. Configuration worksheet for WebSphere MQ for Solaris (continued)

ID	Parameter Name	Reference	Example Used	User Value
H	Sender (TCP) channel name		**DECUX.SOLARIS.TCP**	
J	Receiver (TCP) channel name	**H**	**SOLARIS.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX				
The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	**A**	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	**B**	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (SNA) channel name		**SOLARIS.HPUX.SNA**	
H	Sender (TCP) channel name		**SOLARIS.HPUX.TCP**	
I	Receiver (SNA) channel name	**G**	**HPUX.SOLARIS.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**HPUX.SOLARIS.TCP**	
Connection to MQSeries for AT&T GIS UNIX				
The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	**A**	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	**B**	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**SOLARIS.GIS.SNA**	
H	Sender (TCP/IP) channel name		**SOLARIS.GIS.TCP**	
I	Receiver (SNA) channel name	**G**	**GIS.SOLARIS.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**GIS.SOLARIS.TCP**	
Connection to WebSphere MQ for Linux				
The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	**A**	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	**B**	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**SOLARIS.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**SOLARIS.LINUX.TCP**	
I	Receiver (SNA) channel name	**G**	**LINUX.SOLARIS.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**LINUX.SOLARIS.TCP**	
Connection to WebSphere MQ for iSeries				
The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	**A**	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	**B**	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**SOLARIS.AS400.SNA**	

Table 30. Configuration worksheet for WebSphere MQ for Solaris (continued)

ID	Parameter Name	Reference	Example Used	User Value
H	Sender (TCP) channel name		**SOLARIS.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.SOLARIS.SNA**	
J	Receiver (TCP) channel name	H	**AS400.SOLARIS.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**SOLARIS.MVS.SNA**	
H	Sender (TCP) channel name		**SOLARIS.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.SOLARIS.SNA**	
J	Receiver (TCP) channel name	H	**MVS.SOLARIS.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**SOLARIS.VSE.SNA**	
I	Receiver channel name	G	**VSE.SOLARIS.SNA**	

WebSphere MQ for Solaris sender-channel definitions using SNA using SunLink Version 9.1

```
def ql (OS2) +                                      F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                              D
    rname(OS2.LOCALQ) +                             E
    rqmname(OS2) +                                  C
    xmitq(OS2) +                                    F
    replace

def chl (SOLARIS.OS2.SNA) chltype(sdr) +            G
    trptype(lu62) +
    conname('/home/mqstart/OS2CPIC') +              14
    xmitq(OS2) +                                    F
    replace
```

WebSphere MQ for Solaris sender-channel definitions using SNAP-IX SNA

```
def ql (OS2) +                                      F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                              D
    rname(OS2.LOCALQ) +                             E
    rqmname(OS2) +                                 C
    xmitq(OS2) +                                   F
    replace

def chl (SOLARIS.OS2.SNA) chltype(sdr) +           G
    trptype(lu62) +
    conname('OS2CPIC') +             14
    xmitq(OS2) +                                   F
    replace
```

WebSphere MQ for Solaris receiver-channel definitions using SNA

```
def ql (SOLARIS.LOCALQ) replace                    B

def chl (OS2.SOLARIS.SNA) chltype(rcvr) +          I
    trptype(lu62) +
    replace
```

WebSphere MQ for Solaris sender-channel definitions using TCP

```
def ql (OS2) +                                     F
    usage(xmitq) +
    replace

def qr (OS2.REMOTEQ) +                             D
    rname(OS2.LOCALQ) +                            E
    rqmname(OS2) +                                 C
    xmitq(OS2) +                                   F
    replace

def chl (SOLARIS.OS2.TCP) chltype(sdr) +           H
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(OS2) +                                   F
    replace
```

WebSphere MQ for Solaris receiver-channel definitions using TCP/IP

```
def ql (SOLARIS.LOCALQ) replace                    B

def chl (OS2.SOLARIS.TCP) chltype(rcvr) +          J
    trptype(tcp) +
    replace
```

Chapter 19. Example configuration - IBM WebSphere MQ for Linux

This chapter gives an example of how to set up communication links from WebSphere MQ for Linux to WebSphere MQ products on the following platforms:
- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[7]
- Solaris
- OS/400
- z/OS without CICS
- VSE/ESA

This chapter contains the following sections:
- "Configuration parameters for an LU 6.2 connection"
- "Establishing a session using Communications Server for Linux" on page 318
- "Establishing a TCP connection" on page 330
- "WebSphere MQ for Linux configuration" on page 331

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Note: The information in this section applies only to WebSphere MQ for Linux for Intel. It does not apply to WebSphere MQ for Linux for zSeries.

Table 31 presents a worksheet listing all the parameters needed to set up communication from Linux to one of the other WebSphere MQ platforms using Communications Server for Linux. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet for the platform to which you are connecting.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer to the values in the ID column. The entries in the Parameter Name column are explained in "Explanation of terms" on page 316.

Table 31. Configuration worksheet for Communications Server for Linux

ID	Parameter Name	Reference	Example	User Value
Parameters for local node				

---

[7] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 31. Configuration worksheet for Communications Server for Linux (continued)

ID	Parameter Name	Reference	Example	User Value
1	Configuration file name		**sna_node.cfg**	
2	Control point name		**LINUXPU**	
3	Node ID to send		**05D 30A55**	
4	Network name		**NETID**	
5	Local APPC LU		**LINUXLU**	
6	APPC mode		**#INTER**	
7	Invokable TP		**MQSERIES**	
8	Local MAC address		**08005AC6DF33**	
9	Port name		**MQPORT**	
10	Command path		**/opt/mqm/bin/amqcrs6a**	
11	Local queue manager		**LINUX**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
12	Link station name		**OS2CONN**	
13	Network name	2	**NETID**	
14	CP name	3	**OS2PU**	
15	Remote LU	6	**OS2LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**OS2CPIC**	
19	Remote network address	10	**10005AFC5D83**	
20	Node ID to receive	4	**05D 12345**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
12	Link station name		**NTCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**WINNTCP**	
15	Remote LU	5	**WINNTLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**NTCPIC**	
19	Remote network address	9	**08005AA5FAB9**	
20	Node ID to receive	4	**05D 30F65**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
12	Link station name		**AIXCONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AIXPU**	
15	Remote LU	4	**AIXLU**	

Table 31. Configuration worksheet for Communications Server for Linux (continued)

ID	Parameter Name	Reference	Example	User Value
16	Application TP	6	**MQSERIES**	
17	Mode name	9	**#INTER**	
18	CPI-C symbolic destination name		**AIXCPIC**	
19	Remote network address	8	**123456789012**	
20	Node ID to receive	3	**071 23456**	
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
12	Link station name		**HPUXCONN**	
13	Network name	4	**NETID**	
14	CP name	2	**HPUXPU**	
15	Remote LU	5	**HPUXLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	6	**#INTER**	
18	CPI-C symbolic destination name		**HPUXCPIC**	
19	Remote network address	8	**100090DC2C7C**	
20	node ID to receive	3	**05D 54321**	
Connection to an AT&T GIS UNIX (NCR UNIX) system The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
12	Link station name		**GISCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**GISPU**	
15	Remote LU	4	**GISLU**	
16	Application TP	5	**MQSERIES**	
17	Mode name	7	**#INTER**	
18	CPI-C symbolic destination name		**GISCPIC**	
19	Remote network address	8	**10007038E86B**	
20	Node ID to receive	9	**03E 00018**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
12	Link station name		**SOLCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**SOLARPU**	
15	Remote LU	7	**SOLARLU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**SOLCPIC**	
19	Remote network address	5	**08002071CC8A**	
20	Node ID to receive	6	**05D 310D6**	

Table 31. Configuration worksheet for Communications Server for Linux (continued)

ID	Parameter Name	Reference	Example	User Value
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
12	Link station name		**AS4CONN**	
13	Network name	1	**NETID**	
14	CP name	2	**AS400PU**	
15	Remote LU	3	**AS400LU**	
16	Application TP	8	**MQSERIES**	
17	Mode name	17	**#INTER**	
18	CPI-C symbolic destination name		**AS4CPIC**	
19	Remote network address	4	**10005A5962EF**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in Table 35 on page 410, as indicated.				
12	Link station name		**MVSCONN**	
13	Network name	2	**NETID**	
14	CP name	3	**MVSPU**	
15	Remote LU	4	**MVSLU**	
16	Application TP	7	**MQSERIES**	
17	Mode name	6	**#INTER**	
18	CPI-C symbolic destination name		**MVSCPIC**	
19	Remote network address	8	**400074511092**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
12	Link station name		**VSECONN**	
13	Network name	1	**NETID**	
14	CP name	2	**VSEPU**	
15	Remote LU	3	**VSELU**	
16	Application TP	4	**MQ01**	
17	Mode name		**#INTER**	
18	CPI-C symbolic destination name		**VSECPIC**	
19	Remote network address	5	**400074511092**	

Explanation of terms

1 Configuration file name
This is the unique name of the Communications Server for Linux configuration file. The default for this name is `sna_node.cfg`.

Although it is possible to edit this file, it is strongly recommended that configuration is done using xsnadmin.

2 Control point name
This is the unique control point name for this workstation. In the SNA

network, the control point is an addressable location (PU type 2.1). Your network administrator will assign this to you.

3 Node ID to send
This is the unique ID of this workstation. On other platforms this is often referred to as the *Exchange ID* or *XID*. Your network administrator will assign this ID for you.

4 Network name
This is the unique ID of the network to which you are connected. It is an alphanumeric value and can be 1-8 characters long. The network name works with the control point name to uniquely identify a system. Your network administrator will tell you the value.

5 Local APPC LU
An LU manages the exchange of data between transactions. The local APPC LU name is the name of the LU on your system. Your network administrator will assign this to you.

6 APPC mode
This is the name given to the set of parameters that control the APPC conversation. This name must be defined at each partner system. Your network administrator will assign this to you.

7 Invokable TP
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQ01.

8 Local MAC address
This is the network address of the token-ring card. The address to be specified is found in the ether value displayed in response to the `ifconfig tr0` command issued at a root level of authority. (Tr0 is the name of the machine's token-ring interface.) If you do not have the necessary level of authority, your Linux system administrator can tell you the value.

9 Port name
This is a meaningful symbolic name that is used to associate the definitions with a network interface (in this case, a Token-Ring adapter). A separate Port must be defined for each physical device attached to the workstation.

10 Full path to executable
This is the path and name of the script file that invokes the WebSphere MQ program to run.

11 Local queue manager
This is the name of the queue manager on your local system.

10 Link station name
This is a meaningful symbolic name by which the connection to a peer or host node is known. It defines a logical path to the remote system. Its name is used only inside Communications Server for Linux and is specified by you. The connection must be associated with an existing Link and owned by one local node. You must define one connection for each partner or host system.

18 CPI-C symbolic destination name
This is a name given to the definition of a partner node. You choose the

name. It need be unique only on this machine. Later you can use this name in the WebSphere MQ sender channel definition.

20 **Node ID to receive**
This is the unique ID of the partner workstation with which you will be communicating. On other platforms this is often referred to as the *Exchange ID* or *XID*. For a connection to a host system any values except `000 FFFFF` and `FFF FFFFF` may be specified. Your network administrator will assign this ID for you.

Establishing a session using Communications Server for Linux

Note: The information in this section applies only to WebSphere MQ for Linux for Intel. It does not apply to WebSphere MQ for Linux for zSeries.

The following information guides you through the tasks you must perform to create the SNA infrastructure that WebSphere MQ requires. This example creates the definitions for a partner node and LU on HP-UX.

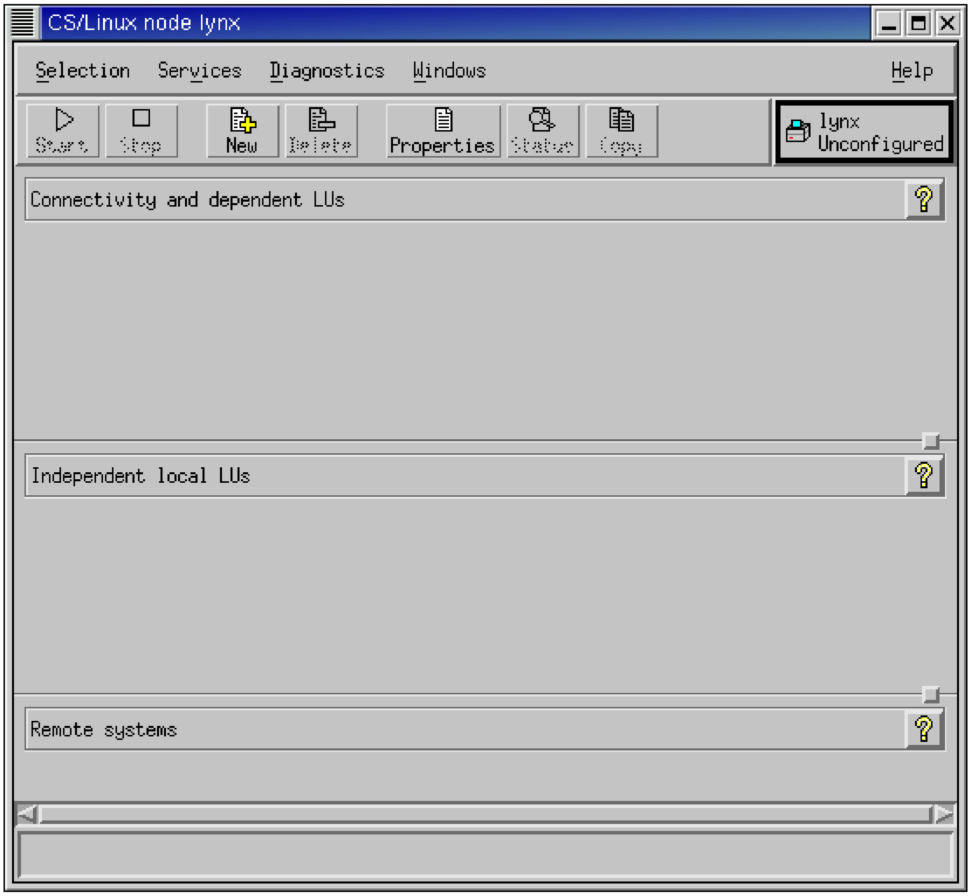
Use **sna start** followed by **xsnaadmin** to access the Communications Server for Linux main window. You need root authority to use **xsnaadmin**.

Communications Server for Linux configuration

Communications Server for Linux configuration involves the following steps:

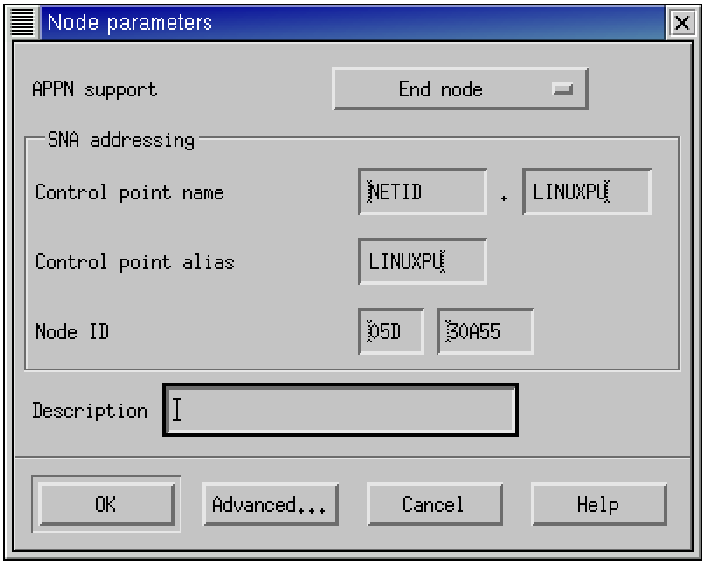
1. Defining a local node
2. Adding a Token-Ring port
3. Defining a local LU

The Communications Server for Linux main window, from which you start, is shown here:



Defining a local node

1. From the Communications Server for Linux main menu, click **Services —> Configure node parameters**. The “Node parameters” window opens.



APPN support: End node

Control point name: NETID . LINUXPU

Control point alias: LINUXPU

Node ID: 05D 30A55

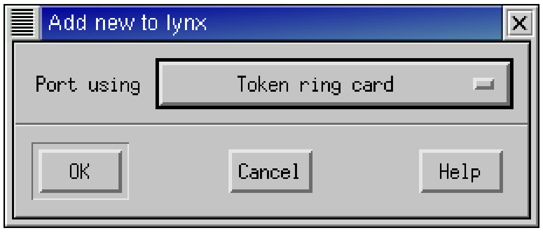
Description:

2. Set **APPN support** to **End node**.

3. In the **Control point name** fields, specify the network qualified name of the control point at the local node. In the first field, type the network name (4). In the second field, type the control point name (2).
4. In the **Control point alias** field, type the control point name (2) again.
5. In the **Node ID** fields, type the two components of the node ID (3).
6. Click **OK**. A message is displayed informing you that a default LU has been defined automatically for the local node.
7. Click **OK**.

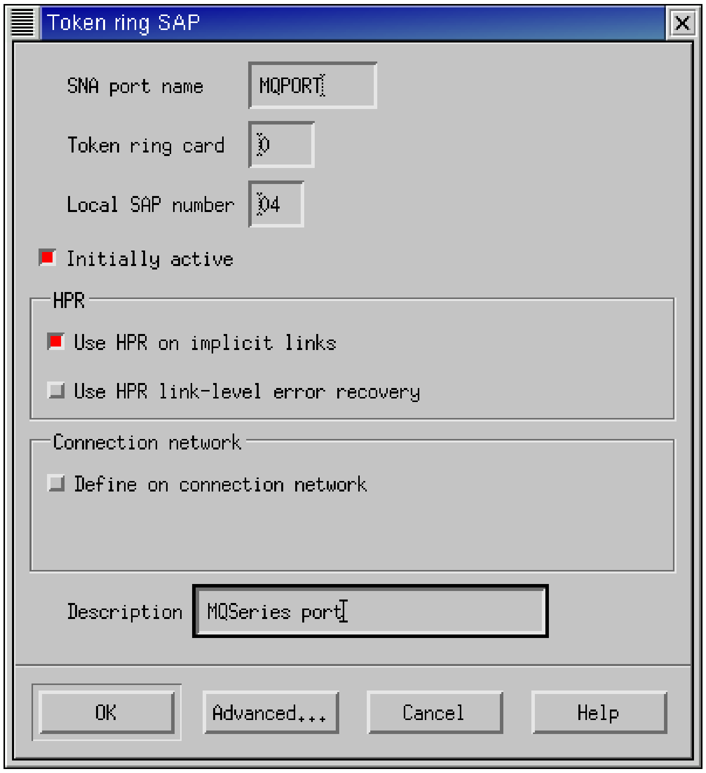
Adding a Token-Ring port

1. From the Communications Server for Linux main menu, click **Services —> Connectivity —> New port**. The following window opens.



Port using: Token ring card

2. Set **Port using** to **Token Ring Card**, or to the type of network adapter card you are using.
3. Click **OK**. The “Token-Ring SAP” window opens.



SNA port name: MQPORT

Token ring card: 0

Local SAP number: 04

☑ Initially active

☑ Use HPR on implicit links

☐ Use HPR link-level error recovery

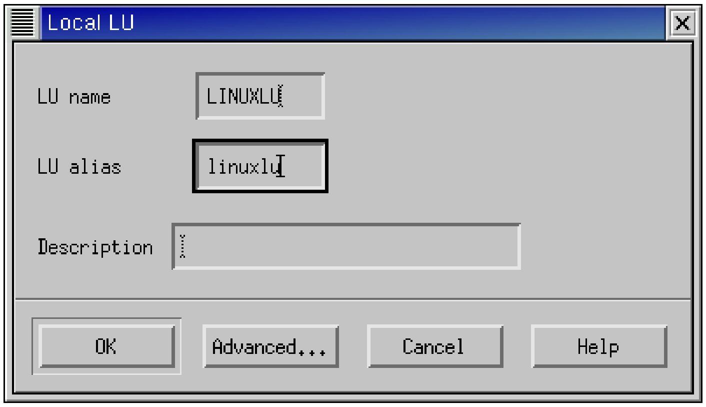
☐ Define on connection network

Description: MQSeries port

4. In the **SNA port name** field, type the port name (9).
5. Click **OK**.

Defining a local LU

1. From the Communications Server for Linux main menu, click **Services —> APPC —> New independent local LU**. The “Local LU” window opens.



LU name LINUXLU

LU alias linuxlu

Description

2. In the **LU name** field, type the name of the local LU (**5**).
3. Click the **LU alias** field. Communications Server for Linux suggests an LU alias that is the same as the name of the local LU (**5**).
4. Click **OK**.

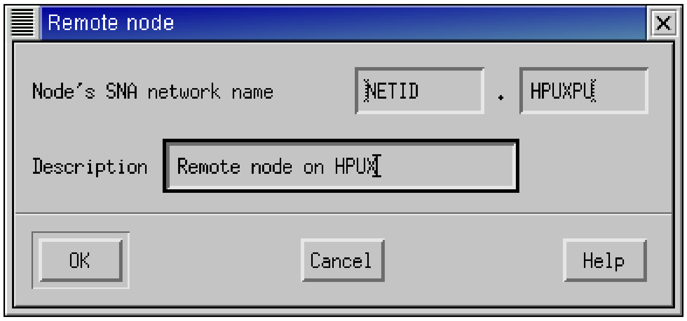
APPC configuration

APPC configuration involves the following steps:

1. Defining a remote node
2. Defining a partner LU
3. Defining a link station
4. Defining a mode
5. Adding CPI-C information
6. Adding a TP definition

Defining a remote node

1. From the Communications Server for Linux main menu, click **Services —> APPC —> New remote node**. The “Remote node” window opens.



Node's SNA network name NETID . HPUXPU

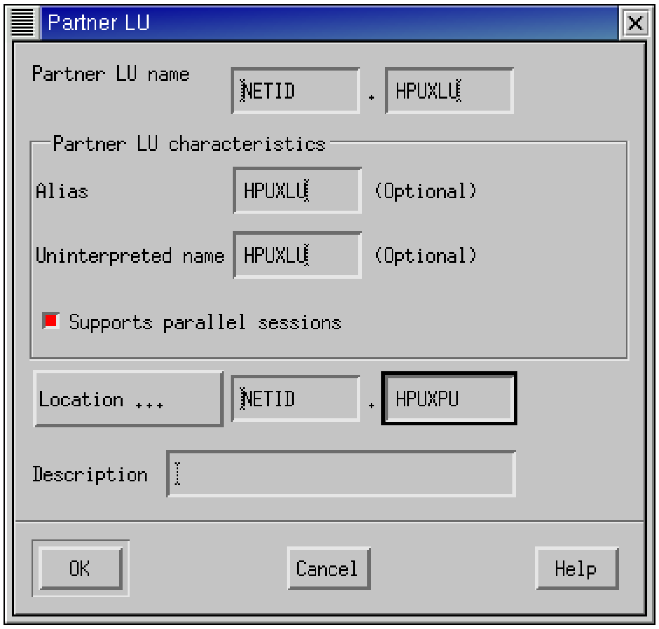
Description Remote node on HPUX

2. In the **Node’s SNA network name** fields, specify the network qualified name of the control point at the remote node. Communications Server for Linux completes the first field for you by setting it to the network name (**4** and **13**) you entered earlier. In the second field, type the control point name (**14**).

3. Click **OK**. A message is displayed informing you that a default LU has been defined automatically for the remote node.
4. Click **OK**.

Defining a partner LU

1. From the Communications Server for Linux main menu, click **Services —> APPC —> New partner LUs —> Partner LU on remote node**. The “Partner LU” window opens.



Partner LU name NETID . HPUXLU

Partner LU characteristics

Alias HPUXLU (Optional)

Uninterpreted name HPUXLU (Optional)

☑ Supports parallel sessions

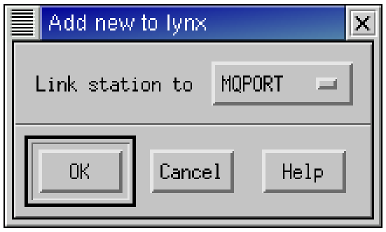
Location ... NETID . HPUXPU

Description

2. In the **Partner LU name** fields, specify the network qualified name of the partner LU at the remote node. Communications Server for Linux completes the first field for you by setting it to the network name (4 and 13) you entered earlier. In the second field, type the name of the partner LU (15).
3. In the **Alias** and **Uninterpreted name** fields, type the name of the partner LU (15) again.
4. Click **Location**, select the network qualified name of the control point at the remote node (13 . 14) from the list that is displayed, and click **OK**.
5. Click **OK**.

Defining a link station

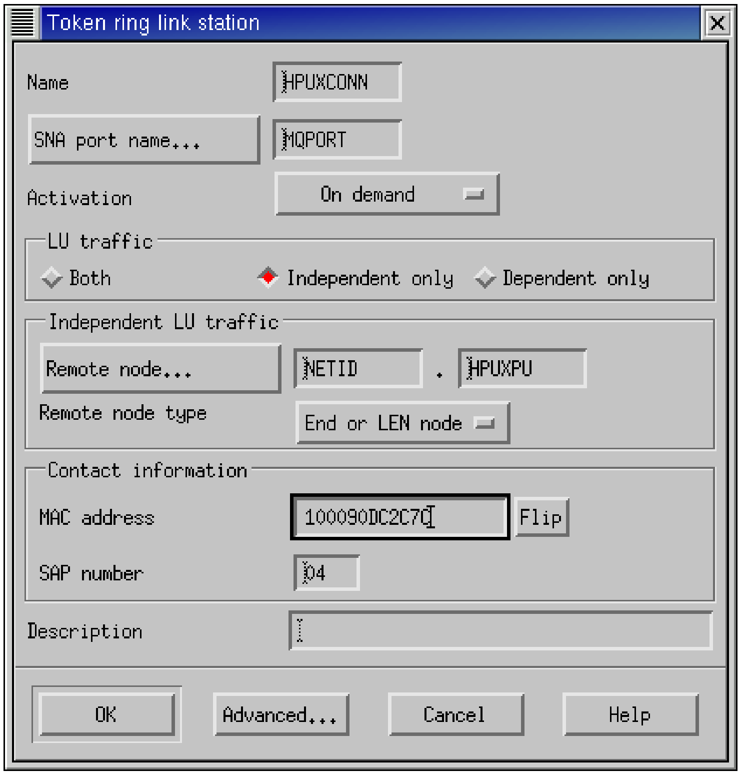
1. From the Communications Server for Linux main menu, click **Services —> Connectivity —> New link station**. The following window opens.



Link station to MQPORT

2. Set **Link station to** to **MQPORT**.

3. Click **OK**. The "Token ring link station" window opens.



Token ring link station

Name: HPUXCONN

SNA port name...: MQPORT

Activation: On demand

LU traffic: ○ Both ● Independent only ○ Dependent only

Independent LU traffic

Remote node...: NETID . HPUXPU

Remote node type: End or LEN node

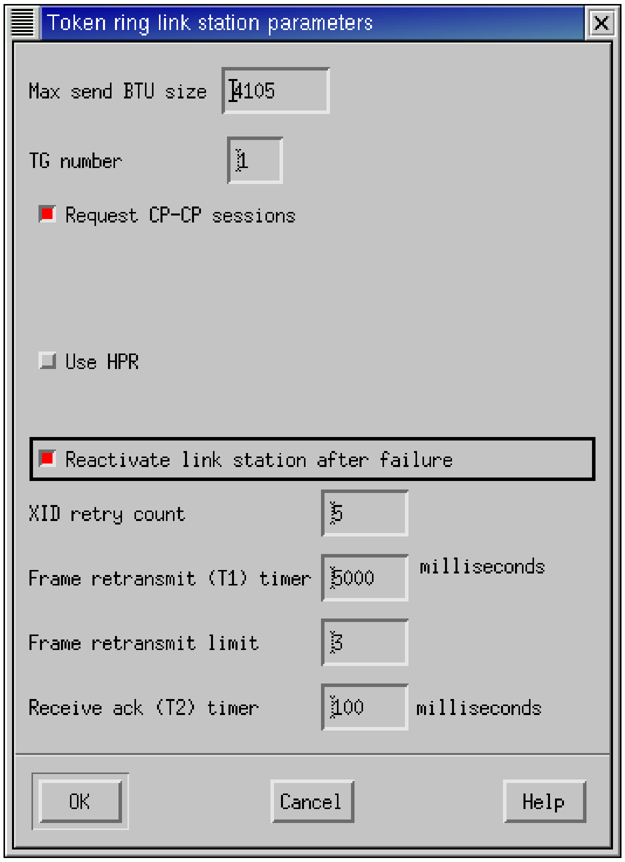
Contact information

MAC address: 100090DC2C7C

SAP number: 04

Description:

4. In the **Name** field, type the name of the link station (**12**).
5. Set **Activation** to **On demand**.
6. Select the **Independent only** check box.
7. Click **Remote node**, select the network qualified name of the control point at the remote node (**13** . **14**) from the list that is displayed, and click **OK**.
8. Set **Remote node type** to **End or LEN node**.
9. In the **MAC address** field, type the MAC address (**19**) of the network adapter card at the remote node.
10. Click **Advanced**. The "Token ring link station parameters" window opens.



Token ring link station parameters

Max send BTU size: 4105

TG number: 1

☒ Request CP-CP sessions

☐ Use HPR

☒ Reactivate link station after failure

XID retry count: 5

Frame retransmit (T1) timer: 5000 milliseconds

Frame retransmit limit: 3

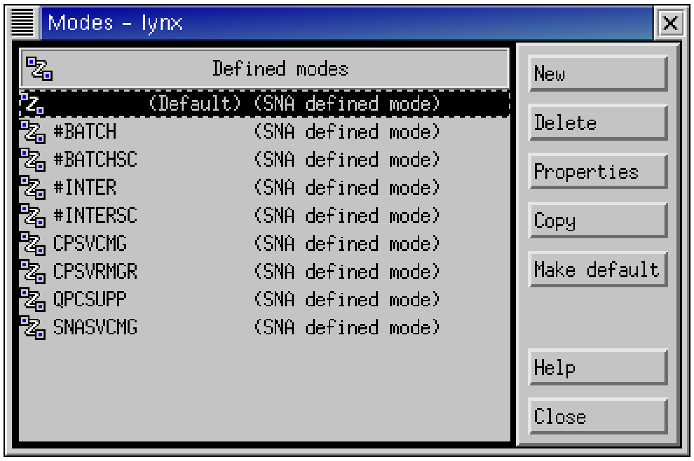
Receive ack (T2) timer: 100 milliseconds

11. Select the **Request CP-CP sessions** check box.
12. Select the **Reactivate link station after failure** check box.
13. Click **OK** to exit the “Token ring link station parameters” window.
14. Click **OK** to exit the “Token ring link station” window.

Defining a mode

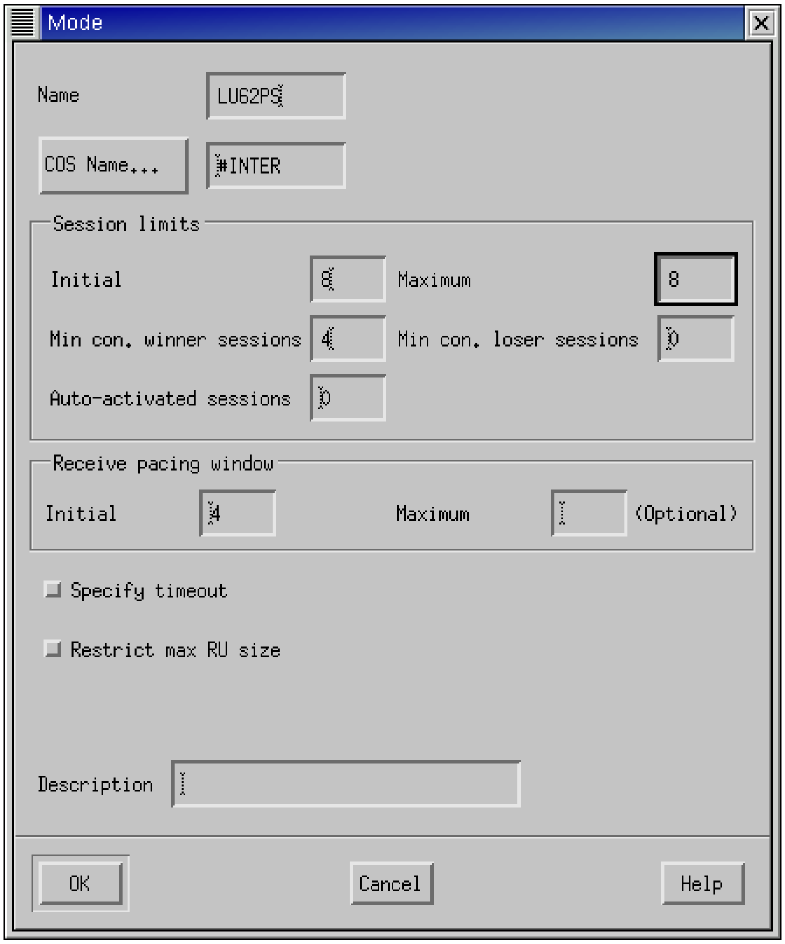
This purpose of the section is to explain how to define a new mode with the name LU62PS. The example continues subsequently, however, by using the mode #INTER (**17**), which is a standard mode supplied by Communications Server for Linux.

1. From the Communications Server for Linux main menu, click **Services —> APPC —> Modes**. The “Modes” window opens.



Defined modes
(Default) (SNA defined mode)
#BATCH (SNA defined mode)
#BATCHSC (SNA defined mode)
#INTER (SNA defined mode)
#INTERSC (SNA defined mode)
CPSVCMG (SNA defined mode)
CPSVRMGR (SNA defined mode)
QPCSUPP (SNA defined mode)
SNASVCMG (SNA defined mode)

2. Click **New**. The “Mode” window opens.



Name: LU62PS
COS Name: #INTER
Session limits: Initial 8, Maximum 8
Min con. winner sessions 4, Min con. loser sessions 0
Auto-activated sessions 0
Receive pacing window: Initial 4, Maximum (Optional)
☐ Specify timeout
☐ Restrict max RU size
Description

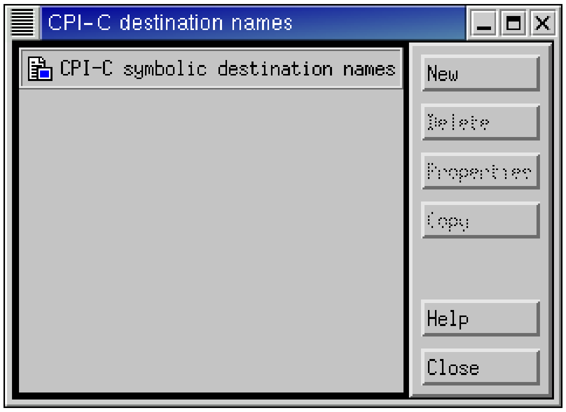
3. In the **Name** field, type the name of the new mode, `LU62PS`.
4. Click **COS Name**, select the class of service **#INTER** from the list that is displayed, and click **OK**.
5. For the **Session limits**:
   - Type 8 in the **Initial** field.
   - Type 8 in the **Maximum** field.

- Type 4 in the **Min con. winner sessions** field.

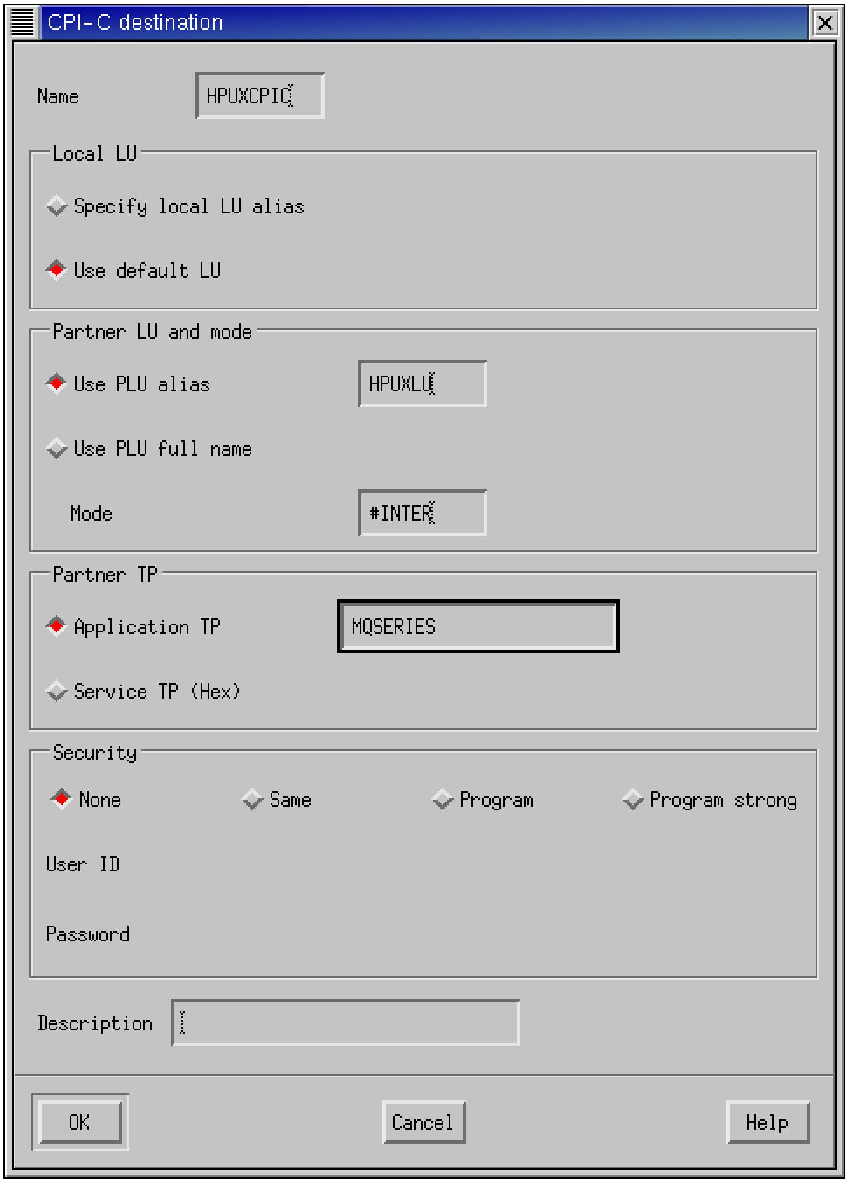
6. Click **OK** to exit the “Mode” window.
7. Click **Close** to exit the “Modes” window.

Adding CPI-C information

1. From the Communications Server for Linux main menu, click **Services —> APPC —> CPI-C**. The “CPI-C destination names” window opens.



2. Click **New**. The “CPI-C destination” window opens.



Name HPUXCPIC

● Use default LU

● Use PLU alias HPUXLU

Mode #INTER

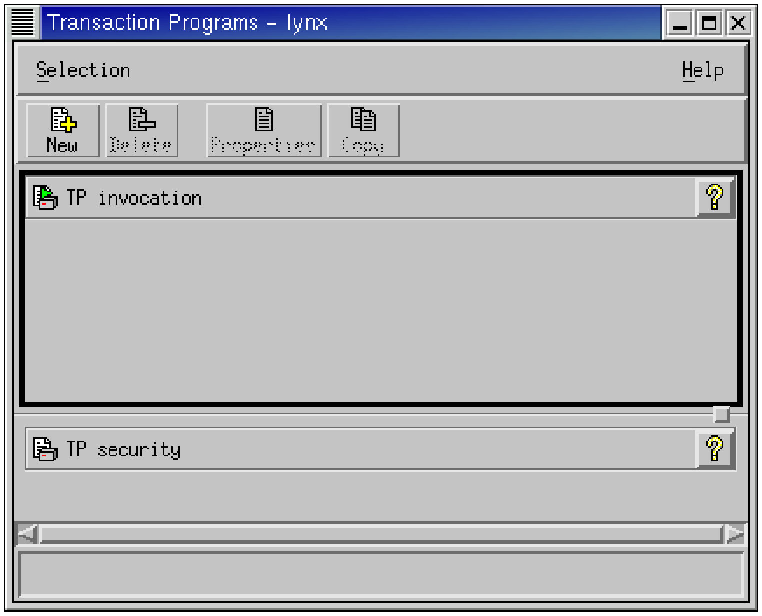
● Application TP MQSERIES

● None

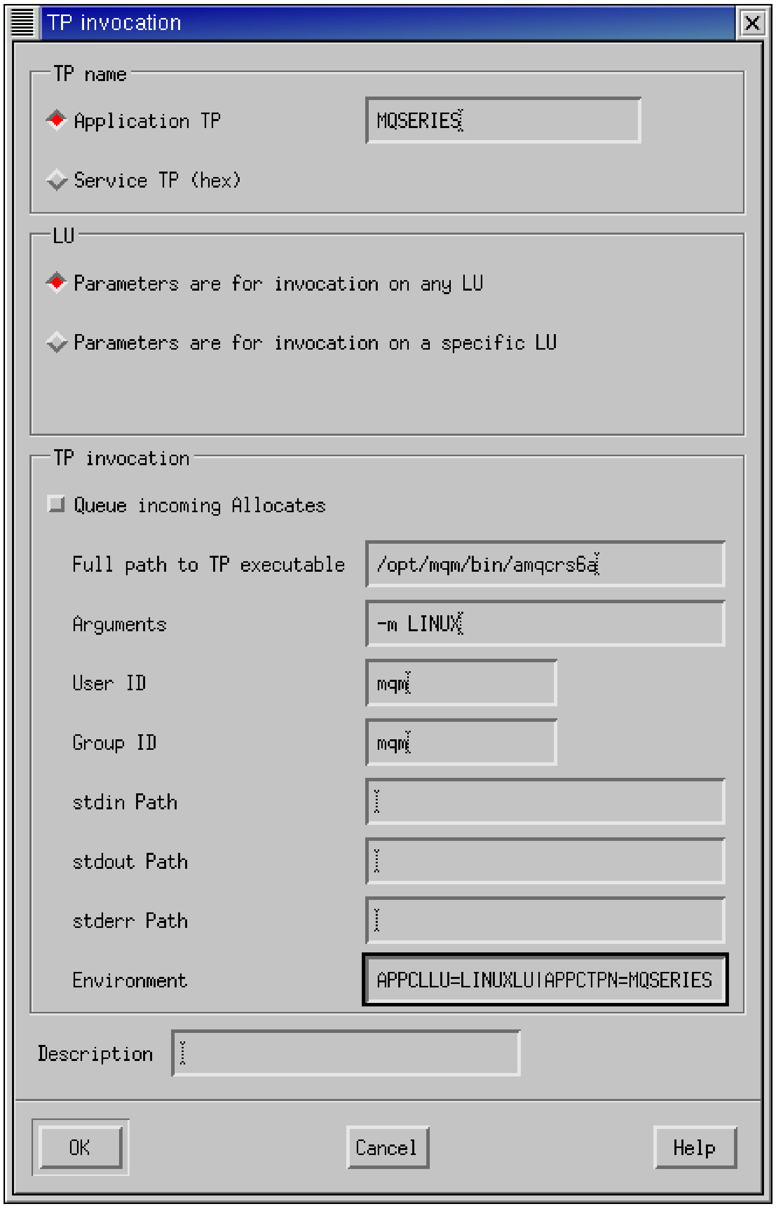
3. In the **Name** field, type the CPI-C symbolic destination name (**18**).
4. Select the **Use PLU alias** check box, and type the name of the partner LU (**15**), which you specified earlier as the partner LU alias.
5. In the **Mode** field, type the mode name (**17**).
6. Select the **Application TP** check box, and type the TP name (**16**).
7. Click **OK** to exit the “CPI-C destination” window.
8. Click **Close** to exit the “CPI-C destination names” window.

Adding a TP definition

1. From the Communications Server for Linux main menu, click **Services —> APPC —> Transaction programs**. The “Transaction Programs” window opens.



2. Click **New**. The “TP invocation” window opens.



TP invocation

TP name

● Application TP MQSERIES

○ Service TP (hex)

LU

● Parameters are for invocation on any LU

○ Parameters are for invocation on a specific LU

TP invocation

☐ Queue incoming Allocates

Full path to TP executable: /opt/mqm/bin/amqcrs6a

Arguments: -m LINUX

User ID: mqm

Group ID: mqm

stdin Path:

stdout Path:

stderr Path:

Environment: APPCLLU=LINUXLU|APPCTPN=MQSERIES

Description:

3. Select the **Application TP** check box, and type the TP name (7).
4. Clear the **Queue incoming Allocates** check box.
5. In the **Full path to TP executable** field, type the full path to the executable program (10).
6. In the **Arguments** field, type `-m` *`local queue manager`* (11).
7. In the **User ID** and **Group ID** fields, type `mqm`.
8. In the **Environment** field, type `APPCLLU=`*`local LU name`* (5) and `APPCTPN=`*`TP name`* (7) separated by the pipe character.
9. Click **OK** to exit the “TP invocation” window.
10. Click **Selection —> Close TP window** to exit the “Transaction Programs” window.

Communications Server for Linux operation

The Communications Server for Linux control daemon is started with the **sna start** command. Depending on the options selected at installation, it may already be running.

The **xsnaadmin** utility controls Communications Server for Linux resources.

Logging and tracing are controlled from here. Log and trace files can be found in the /var/opt/sna directory. The logging files sna.aud and sna.err can be read using a standard editor such as vi.

In order to read the sna1.trc trace file, you must first format it by running the command:

```
snatrcfmt -f sna1.trc -o sna1
```

This produces an sna1.dmp file, which can be read using a normal editor. The sna2.trc trace file can be processed in the same way.

It is possible to edit the configuration file, but this is not a recommended method of configuring Communications Server for Linux.

The APPCLLU environment variable must be set before starting a sender channel from the Linux system. The command can be either entered interactively or added to the logon profile. Depending on the level of Bourne shell or Korn shell program being used, the command is:

```
export APPCLLU=Local LU name      5    newer level
```

or

```
APPCLLU=Local LU name             5    older level
export
```

What next?

The connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for Linux configuration” on page 331.

Establishing a TCP connection

Some Linux distributions now use the extended inet daemon (XINETD) instead of the inet daemon (INETD). The following instructions tell you how to establish a TCP connection using either the inet daemon or the extended inet daemon.

Using the inet daemon (INETD)

To establish a TCP connection, follow these steps.

1. Edit the file /etc/services. If you do not have the following line in the file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```

   Note: To edit this file, you must be logged in as a superuser or root.
2. Edit the file /etc/inetd.conf. If you do not have the following line in that file, add it as shown:

   ```
   MQSeries stream tcp nowait mqm /opt/mqm/bin/amqcrsta amqcrsta
   [-m queue.manager.name]
   ```
3. Find the process ID of the inetd with the command:

```
ps -ef | grep inetd
```

4. Run the command:

```
kill -1 inetd processid
```

Using the extended inet daemon (XINETD)

The following instructions describe how the extended inet daemon is implemented on Red Hat Linux. If you are using a different Linux distribution, you might have to adapt these instructions.

To establish a TCP connection, follow these steps.

1. Edit the file /etc/services. If you do not have the following line in the file, add it as shown:

   ```
   MQSeries       1414/tcp      # MQSeries channel listener
   ```

   Note: To edit this file, you must be logged in as a superuser or root.
2. Create a file called MQSeries in the XINETD configuration directory, /etc/xinetd.d. Add the following stanza to the file:

   ```
   # WebSphere MQ service for XINETD
   service MQSeries
   {
     disable         = no
     flags           = REUSE
     socket_type     = stream
     wait            = no
     user            = mqm
     server          = /opt/mqm/bin/amqcrsta
     server_args     = -m queue.manager.name
     log_on_failure += USERID
   }
   ```
3. Restart the extended inet daemon by issuing the following command:

   ```
   /etc/rc.d/init.d/xinetd restart
   ```

If you have more than one queue manager on your system, and therefore require more than one service, you can create a file in the /etc/xinetd.d directory for each service, or you can add additional stanzas to the MQSeries file you created previously.

What next?

The TCP/IP connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for Linux configuration”.

WebSphere MQ for Linux configuration

Before beginning the installation process ensure that you have first created the mqm user ID and the mqm group, and set the password.

Start any channel using the command:

```
runmqchl -c channel.name
```

Notes:

1. Sample programs are installed in /opt/mqm/samp.
2. Error logs are stored in /var/mqm/qmgrs/*qmgrname*/errors.

3. When you are using the command interpreter **runmqsc** to enter administration commands, a + at the end of a line indicates that the next line is a continuation. Ensure that there is a space between the last parameter and the continuation character.

Basic configuration

1. Create the queue manager from the UNIX prompt using the command:

   ```
   crtmqm -u dlqname -q linux
   ```

   where:

   linux Is the name of the queue manager

   -q Indicates that this is to become the default queue manager

   -u *dlqname*
   Specifies the name of the dead letter queue

   This command creates a queue manager and a set of default objects.
2. Start the queue manager from the UNIX prompt using the command:

   ```
   strmqm linux
   ```

   where *linux* is the name given to the queue manager when it was created.

Channel configuration

The following section details the configuration to be performed on the Linux queue manager to implement the channel described in Figure 32 on page 101.

The MQSC command to create each object is shown. Either start **runmqsc** from a UNIX prompt and enter each command in turn, or build the commands into a command file.

Examples are given for connecting WebSphere MQ for Linux and WebSphere MQ for HP-UX. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for HP-UX.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 32. Configuration worksheet for WebSphere MQ for Linux

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**LINUX**	
B	Local queue name		**LINUX.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	

Table 32. Configuration worksheet for WebSphere MQ for Linux (continued)

ID	Parameter Name	Reference	Example Used	User Value
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**LINUX.OS2.SNA**	
H	Sender (TCP/IP) channel name		**LINUX.OS2.TCP**	
I	Receiver (SNA) channel name	G	**OS2.LINUX.SNA**	
J	Receiver (TCP/IP) channel name	H	**OS2.LINUX.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**LINUX.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**LINUX.WINNT.TCP**	
I	Receiver (SNA) channel name	G	**WINNT.LINUX.SNA**	
J	Receiver (TCP) channel name	H	**WINNT.LINUX.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**LINUX.AIX.SNA**	
H	Sender (TCP) channel name		**LINUX.AIX.TCP**	
I	Receiver (SNA) channel name	G	**AIX.LINUX.SNA**	
J	Receiver (TCP) channel name	H	**AIX.LINUX.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	A	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.LINUX.TCP**	
J	Receiver (TCP) channel name	H	**LINUX.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	

Table 32. Configuration worksheet for WebSphere MQ for Linux (continued)

ID	Parameter Name	Reference	Example Used	User Value
G	Sender (SNA) channel name		**LINUX.HPUX.SNA**	
H	Sender (TCP) channel name		**LINUX.HPUX.TCP**	
I	Receiver (SNA) channel name	G	**HPUX.LINUX.SNA**	
J	Receiver (TCP/IP) channel name	H	**HPUX.LINUX.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	A	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**LINUX.GIS.SNA**	
H	Sender (TCP/IP) channel name		**LINUX.GIS.TCP**	
I	Receiver (SNA) channel name	G	**GIS.LINUX.SNA**	
J	Receiver (TCP/IP) channel name	H	**GIS.LINUX.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**LINUX.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**LINUX.SOLARIS.TCP**	
I	Receiver (SNA) channel name	G	**SOLARIS.LINUX.SNA**	
J	Receiver (TCP/IP) channel name	H	**SOLARIS.LINUX.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (SNA) channel name		**LINUX.AS400.SNA**	
H	Sender (TCP) channel name		**LINUX.AS400.TCP**	
I	Receiver (SNA) channel name	G	**AS400.LINUX.SNA**	
J	Receiver (TCP) channel name	H	**AS400.LINUX.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	

Table 32. Configuration worksheet for WebSphere MQ for Linux (continued)

ID	Parameter Name	Reference	Example Used	User Value
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**LINUX.MVS.SNA**	
H	Sender (TCP) channel name		**LINUX.MVS.TCP**	
I	Receiver (SNA) channel name	G	**MVS.LINUX.SNA**	
J	Receiver (TCP) channel name	H	**MVS.LINUX.TCP**	
Connection to MQSeries for VSE/ESA (WebSphere MQ for Linux for Intel only) The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**LINUX.VSE.SNA**	
I	Receiver channel name	G	**VSE.LINUX.SNA**	

WebSphere MQ for Linux for Intel sender-channel definitions using SNA

```
def ql (HPUX) +                                     F
    usage(xmitq) +
    replace

def qr (HPUX.REMOTEQ) +                             D
    rname(HPUX.LOCALQ) +                            E
    rqmname(HPUX) +                                 C
    xmitq(HPUX) +                                   F
    replace

def chl (LINUX.HPUX.SNA) chltype(sdr) +             G
    trptype(lu62) +
    conname('HPUXCPIC') +                           14
    xmitq(HPUX) +                                   F
    replace
```

WebSphere MQ for Linux for Intel receiver-channel definitions using SNA

```
def ql (LINUX.LOCALQ) replace                       B

def chl (HPUX.LINUX.SNA) chltype(rcvr) +            I
    trptype(lu62) +
    replace
```

WebSphere MQ for Linux sender-channel definitions using TCP

```
def ql (HPUX) +                                     F
    usage(xmitq) +
    replace

def qr (HPUX.REMOTEQ) +                             D
    rname(HPUX.LOCALQ) +                            E
    rqmname(HPUX) +                                 C
    xmitq(HPUX) +                                   F
    replace

def chl (LINUX.HPUX.TCP) chltype(sdr) +             H
```

```
    trptype(tcp) +
    conname(remote_tcpip_hostname) +
    xmitq(HPUX) +                                   F
    replace
```

WebSphere MQ for Linux receiver-channel definitions using TCP/IP

```
def ql (LINUX.LOCALQ) replace                       B

def chl (HPUX.LINUX.TCP) chltype(rcvr) +            J
    trptype(tcp) +
    replace
```

Chapter 20. Setting up communication in Compaq OpenVMS Alpha systems

Distributed queue management (DQM) is a remote queuing facility for WebSphere MQ. It provides channel control programs for the queue manager that form the interface to communication links, controllable by the system operator. The channel definitions held by distributed-queuing management use these connections.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This chapter explains how to do this.

For OS/2 and Windows, see Chapter 10, “Setting up communication for OS/2 and Windows”, on page 131. For UNIX systems, see Chapter 13, “Setting up communication on UNIX systems”, on page 197. For Compaq NonStop Kernel, see Chapter 21, “Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1”, on page 349.

Deciding on a connection

There are four forms of communication for WebSphere MQ on Compaq OpenVMS Alpha systems:
- TCP
- LU 6.2
- DECnet Phase IV
- DECnet Phase V

Each channel definition must specify one only as the transmission protocol (Transport Type) attribute. One or more protocols may be used by a queue manager.

For WebSphere MQ clients, it may be useful to have alternative channels using different transmission protocols. See the *WebSphere MQ Clients* book.

Defining a TCP connection

The channel definition at the sending end specifies the address of the target. The TCP service is configured for the connection at the receiving end.

Sending end

Specify the host name, or the TCP address of the target machine, in the Connection Name field of the channel definition. Port number 1414 is assigned by the Internet Assigned Numbers Authority to WebSphere MQ.

To use a port number other than the default, change the connection name field thus:

```
Connection Name REMHOST(1822)
```

where `REMHOST` is the hostname of the remote machine and `1822` is the port number required. (This must be the port that the listener at the receiving end is listening on.)

Alternatively you can change the default sending port number by specifying it in the queue manager configuration file (qm.ini):

```
TCP:
  Port=1822
```

For more information about the values you set using qm.ini, see Appendix D, “Configuration file stanzas for distributed queuing”, on page 763.

Receiving channels using Compaq (DIGITAL) TCP/IP services (UCX) for OpenVMS

To use Compaq (DIGITAL) TCP/IP Services (UCX) for OpenVMS, you must configure a UCX service as follows:

1. Create a file consisting of one line and containing the DCL command to start the TCP/IP receiver program, amqcrsta.exe:

   ```
   $ mcr amqcrsta [-m Queue_Man_Name]
   ```

   Place this file in the SYS$MANAGER directory. In this example the name of the file is `MQRECV.COM`.

   Notes:

   a. If you have multiple queue managers you must make a new file and UCX service for each queue manager.
   b. Ensure that the protection on the file and its parent directory allow it to be executable, that is, the protection is `/PROT=W:RE`.
2. Create a UCX service to start the receiving channel program automatically:

   ```
   $ UCX
   UCX> set service <p1>/port=<p2>/protocol=TCP/user_name=MQM -
   UCX> /process=<p3>/file=<p4>/limit=<p5>
   ```

   where:

   p1 Is the service name, for example MQSERIES01. A unique name is required for each queue manager defined.

   p2 Is the TCP/IP port number in the range 1 to 65 535. The default value for WebSphere MQ is 1414.

p3 Is the process name. This consists of a string up to 15 characters long.

p4 Is the name of the startup command file, for example, `SYS$MANAGER:MQRECV.COM`.

p5 Is the process limit. This is the maximum number of connections allowed using the port number. If this limit is reached, subsequent requests are rejected.

Note: Each channel represents a single connection to the queue manager.

If a receiving channel does not start when the sending end starts, it is probably due to the permissions on the file being incorrect.

3. To enable the service upon every system IPL (reboot), issue the command

```
$ UCX SET CONFIGURATION ENABLE SERVICE MQSERIES
```

Using the TCP/IP SO_KEEPALIVE option

If you want to use the SO_KEEPALIVE option (as discussed in “Checking that the other end of the channel is still available” on page 66) you must the add the following entry to your queue manager configuration file (qm.ini) or the Windows registry:

```
TCP:
   KeepAlive=yes
```

Receiving channels using Cisco MultiNet for OpenVMS

To use Cisco MultiNet for OpenVMS, you must configure a MultiNet service as follows:

1. Create a file consisting of one line and containing the DCL command to start the TCP receiver program, amqcrsta.exe:

   ```
   $ mcr amqcrsta.exe [-m Queue_Man_Name]
   ```

   Place this file in the SYS$MANAGER directory.

   Notes:

   a. If you have multiple queue managers you must make a new file and MultiNet service for each queue manager.
   b. Ensure that the protection on the file and its parent directory allow it to be executable, that is, the protection is `/PROT=W:RE`.
2. Create a MultiNet service to start the receiving channel program automatically:

```
$ multinet configure/server
MultiNet Server Configuration Utility 3.5 (101)
[Reading in configuration from MULTINET:SERVICES.MASTER_SERVER]
SERVER-CONFIG> add WebSphere MQ
[Adding new configuration entry for service "MQSERIES"]
Protocol: [TCP]
TCP Port number: 1414
Program to run: sys$manager:mqrecv.com
[Added service MQSERIES to configuration]
[Selected service is now MQSERIES]
SERVER-CONFIG> set flags UCX_SERVER
 MQSERIES flags set to <UCX_SERVER>]
SERVER-CONFIG> set username MQM
[Username for service MQSERIES set to MQM]
SERVER-CONFIG> exit
[Writing configuration to MULTINET_COMMON_ROOT:SERVICES.MASTER_SERVER]
$
```

Defining a TCP connection

The service is enabled automatically after the next system IPL (reboot). To enable the service immediately, issue the command

```
'MULTINET
CONFIGURE /SERVER RESTART'.
```

Receiving channels using Attachmate PathWay for OpenVMS

To use Attachmate PathWay for OpenVMS to start channels, you ***must*** configure a PathWay service as follows:

1. Create a file consisting of one line and containing the DCL command to start the TCP/IP receiver program, amqcrsta.exe:
   ```
   $ mcr amqcrsta [-m Queue_Manager_Name]
   ```
   Place this file in the SYS$MANAGER directory. In this example the name `mqrecv.com` is used.
2. Create an Attachmate service to start the receiving channel program automatically.

   You do this by adding the following lines to the file TWG$COMMON:[NETDIST.ETC]SERVERS.DAT.
   ```
   # MQSeries
   service-name    MQSeries
   program         SYS$MANAGER:MQRECV.COM
   socket-type     SOCK_STREAM
   socket-options  SO_ACCEPTCONN | SO_KEEPALIVE
   socket-address  AF_INET , 1414
   working-set     512
   priority        4
   INIT            TCP_Init
   LISTEN          TCP_Listen
   CONNECTED       TCP_Connected
   SERVICE         Run_Program
   username        MQM
   device-type     UCX
   ```

Receiving channels using Process Software Corporation TCPware

To use Process Software Corporation TCPware, you must configure a TCPware service as follows:

1. Create a file consisting of one line and containing the DCL command to start the TCP receiver program amqcrsta.exe:
   ```
   $ mcr amqcrsta (-m Queue_Manager_Name)
   ```
   Place this file in the SYS$MANAGER directory. In this example the name of the file is MQRECV.COM.

   Notes:
   - a. If you have multiple queue managers you must make a new file and TCPware service for each queue manager.
   - b. Ensure that the protection on the file and its parent directory allow it to be executable, that is, the protection is `/PROT=W:RE`.
2. Create a TCPware service to start the receiving channel program automatically:
   - a. Edit the TCPWARE:SERVICES. file and add an entry for the service you want to use:
     ```
     MQSeries 1414/tcp # MQSeries port
     ```

b. Edit the TCPWARE:SERVERS.COM file and add an entry for the service defined in the previous step:

```
$! SERVERS.COM
$!
$ RUN TCPWARE:NETCU
ADD SERVICE MQSeries BG_TCP -

    /INPUT=SYS$MANAGER:MQRECV.COM -
    /LIMIT=6 -
    /OPTION=KEEPALIVE -
    /USERNAME=MQM

EXIT
```

3. The service is enabled automatically after the next system IPL. To enable the service immediately issue the command:

```
@TCPWARE:SERVERS.COM
```

Defining an LU 6.2 connection

MQSeries for Compaq OpenVMS Alpha uses the DECnet SNA APPC/LU 6.2 Programming Interface. This interface requires access through DECnet to a suitably configured SNA Gateway, for example, the SNA Gateway-ST, or SNA Gateway-CT.

SNA configuration

To enable WebSphere MQ to work with DECnet APPC/LU 6.2 you ***must*** complete your Gateway SNA configuration first. The Digital SNA configuration ***must*** be in agreement with the Host SNA configuration.

Notes:

1. When configuring your host system, be aware that the DECnet SNA Gateway supports PU 2.0 and ***not*** node type 2.1. This means that the LUs on the Digital SNA node must be dependent LUs. They reside on the Digital SNA node and so must be defined and configured there. However, because they are dependent LUs, they have to be activated by VTAM, by means of an ACTLU command, and so they also need to be defined to VTAM as dependent LUs.
2. Ensure that the SNA libraries are installed as shared images upon each system IPL by running the command `@SYS$STARTUP:SNALU62$STARTUP.COM` in the system startup procedure.

To configure your SNA Gateway, set up the `SNAGATEWAY_<node>_SNA.COM` file,

where `<node>` is replaced with the node name of your DECnet SNA gateway.

Do this by responding to the configuration prompts in the Gateway installation procedure, or by directly editing the file.

The SNA Gateway installation procedure creates the file in the directory SYS$COMMON:[SNA$CSV].

The configuration information in this file is downloaded to the Gateway when you run the NCP LOAD NODE command.

Notes:

1. Online changes to the current Gateway configuration can be made using the utility SNANCP.
2. SNA resources can be monitored using the SNAP utility.

Defining an LU 6.2 connection

A sample SNA Gateway Configuration file follows:

```
$!+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
$! Start of file: SYS$COMMON:[SNA$CSV]SNAGATEWAY_SNAGWY_SNA.COM
$! DECnet SNA Gateway-ST SNA configuration file
$! Created: 23-FEB-1996 19:10:43.68 by SNACST$CONFIGURE V1.2
$! Host node: CREAMP  User$ CHO
$!+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
$ v = f$verify(1)
$ RUN SYS$SYSTEM:SNANCP
SET LINE SYN-0 -                    // Line definition
   DUPLEX FULL -
   PROTOCOL SDLC POINT -
   SIGNALLING NORMAL -
   CLOCK EXTERNAL -
   MODEM TYPE NORMAL -
   RECEIVE BUFFERS 34 -
   LOGGING INFORMATIONAL -
   BUFFER SIZE 265
SET CIRCUIT SDLC-0 -                // Circuit definition
   LINE SYN-0 -
   DUPLEX FULL -
   RESPONSE MODE NORMAL -
   STATION ADDRESS C1 -
   LOGGING INFORMATIONAL -
   STATION ID 0714002A           // XID
SET PU SNA-0 CIRCUIT SDLC-0 -
   LU LIST 1-32 -
   SEGMENT SIZE 265 -            // must equal MAXDATA on Host PU definition
   LOGGING WARNING
SET CIRCUIT SDLC-0 STATE ON
SET LINE SYN-0 STATE ON
SET SERVER SNA-ACCESS -
   LOGGING WARNING -
   NOTE "Gateway Access Server" -
   STATE ON
SET ACCESS NAME VTAMSDR  PU SNA-0  LU 2 APPL  MVSLU LOGON LU62SS
SET ACCESS NAME VTAMRCVR PU SNA-0  LU 3 APPL  MVSLU LOGON LU62SS
$ EXIT $STATUS + (0 * 'f$verify(v)')
$!+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
$! End of file: SYS$COMMON:[SNA$CSV]SNAGATEWAY_SNAGWY_SNA.COM
$!+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Defining access names

You should set up a separate Access name for each WebSphere MQ channel. This ensures that the VMS system and the remote system agree on the LU used for the channel.

Note: If you use a single access name, with a range of LUs specified, the Gateway selects the LUs in a circular order. Therefore the LU selected by the Gateway may not correspond with the LU used by the Host channel, because the Host associates a specific LU with a channel.

The access name is used only to communicate between the DECnet SNA APPC program and the Gateway. It has no network meaning.

Notes:

1. The LUs are single session. You ***must*** define a separate LU for each channel if they are to run simultaneously.
2. You are advised to use names that associate the access name to the corresponding channel, but you can choose any name.
3. The APPL in the ACCESS name definition must match the remote (in this case MVSLU) APPL in VTAM.
4. The LU number must correspond to the LOCADDR in the LU definition statement in VTAM. Here is an example VTAM line and LU definitions:

```
IYA8L007 LINE ADDRESS=(007,FULL),
               ISTATUS=ACTIVE
IYA8P307 PU ADDR=C2,
               ISTATUS=ACTIVE,
               IRETRY=NO,
               MAXDATA=521,
               MAXOUT=7,
               PASSLIM=7,
               PUTYPE=2
IYA83071 LU LOCADDR=2,PACING=1,DLOGMOD=LU62CP1
IYA83072 LU LOCADDR=3
```

5. The LOGON must specify the logmode entry on the VTAM host that specifies parameters acceptable to the SNA Gateway. Here is an example of a single session logmode entry:

```
LU62SS   MODEENT LOGMODE=LU62SS,
               TYPE=0,                 ONLY TYPE RECOGNIZED
               FMPROF=X'13',    SNA
               TSPROF=X'07',    SNA
               PRIPROT=X'B0',   PRIMARY PROTOCOL
               SECPROT=X'B0',   SECONDARY PROTOCOL
               COMPROT=X'50B1', COMMON PROTOCOL
               SSNDPAC=X'00',
               SRCVPAC=X'00',
               RUSIZES=X'8989', RUSIZES  IN-4096 OUT-4096
               PSNDPAC=X'00',
               PSERVIC=X'060200000000000000002C00',
```

The *DECnet SNA Gateway Guide to IBM Parameters* details the parameters expected by the Gateway.

Specifying SNA configuration parameters to WebSphere MQ

WebSphere MQ obtains knowledge of the SNA resources by passing the Gateway Node name and the Access name to the channel program.

Passing parameters to sender and requester channel pairs

For sender and requester channel pairs specify the Gateway Node and Access Name in the CONNAME string in the channel definition.

The CONNAME also includes the TPNAME that is used by the SNA Allocate verb to invoke the remote program.

The format of the CONNAME is: CONNAME('`GatewayNode.AccessName(TpName)`').

For example: `CONNAME('SNAGWY.VTAMSDR(MQSERIES)')`, where `SNAGWY` is the Gateway node, `VTAMSDR` is the access name, and `WebSphere MQ` is the TPNAME.

Note: Do not use the TPNAME field in the channel definition.

Running senders and requesters

Senders, requesters, and fully qualified servers can be explicitly run by performing a START CHANNEL command in runmqsc.

Senders and requesters on Compaq OpenVMS Alpha initiate a session by issuing an INIT-SELF to request a BIND from the host. In issuing the Allocate verb, the WebSphere MQ channel program takes the LU name and the Mode Name from the Access Name.

WebSphere MQ then allocates a conversation using the specified TPNAME.

Passing parameters to servers and receivers

For servers and receivers, specify the Gateway Node, Access Name, and TPNAME as command line parameters to the **runmqlsr** command.

Running servers and receivers

Servers and receivers are started by running the runmqlsr command.

```
$ RUNMQLSR -m QMname -n TPname -g GatewayNode(AccessName)
```

Note: Each server and receiver channel requires its own listener process.

You can include these commands in the WebSphere MQ startup file, SYS$STARTUP:MQS_STARTUP.

Receivers and servers issue the ACTIVATE_SESSION request to the Gateway in passive mode. In passive mode the channel program waits for a BIND from the remote system, which puts the LU into the active-listening state, waiting for a bind from the host.

You can check the LU status using SNANCP to make sure that you are in active-listening state on the correct LU. If a BIND from the host arrives specifying the LU that is in active-listening state, the session will be established. After establishing the session, the host attempts to allocate a conversation.

The TPNAME used by the host sender/requester channel ***must*** be the same name as that specified on the command line in order to establish the conversation.

Note: `RUNMQLSR` recycles when a remote channel disconnects. There is a finite period of time before the listener is ready to accept further binds from the host.

Ending the SNA Listener process

To find the batch job number for the SNA listener process, type: `$ show queue /all`

To end the SNA Listener process type:

```
$ delete /entry=<jobnumber>
```

where `<jobnumber>` is the job number of the listener batch job.

Sample WebSphere MQ configuration

```
*
*      channel configuration for saturn.queue.manager for LU6.2
*
def ql('HOST_SENDER_TQ') usage(xmitq)

def chl('HOST.TO.VMS') chltype(rcvr) trptype(lu62) +
   seqwrap(999999999)

def chl('VMS.TO.HOST') chltype(sdr) trptype(lu62) +
 conname('SNAGWY.VTAMSDR(MQSERIES)')  +
   xmitq('HOST_SENDER_TQ') seqwrap(999999999)
```

In this example two channels, a sender and a receiver, have been set up.

On the remote system you need to configure the corresponding channels. Channels that talk to each other must have the same name.

- The OpenVMS sender, VMS.TO.HOST, talks to a receiver called VMS.TO.HOST on the host system.
- The OpenVMS receiver, HOST.TO.VMS talks to a sender HOST.TO.VMS on the host system.

The commands to start each channel are:

```
// Start sender channel to host system
$ runmqchl -m "saturn.queue.manager" -c "VMS.TO.HOST"
// Set up listener to lesten for incoming SNA requests.
$ runmqlsr -m "saturn.queue.manager" -n "TPNAME" -g SNAGWY(VTAMRCVR)
```

Note: The `TPNAME` must match the outbound `TPNAME` on the z/OS sender channel side. This is specified in the z/OS side information, for example:

```
SIDELETE
  DESTNAME(ID1)
SIADD
  DESTNAME(ID1)
  MODENAME(LU62SS)
  TPNAME(MQSERIES)
  PARTNER_LU(IYA83072)
```

Problem solving

Error PUNOTAVA - PU has not been activated

This error indicates a lack of connectivity between the two machines. Make sure your line and circuit are set to state ON. Use SNATRACE at the circuit level to verify that the Compaq OpenVMS Alpha machine is polling. If no response is received for the poll, check that the PU on the host is enabled. If the line will not go to the ON STATE check your physical line. If the trace shows the host responding to the poll, but the PU still does not become active, check your setting of the STATION ID.

Failure to allocate conversation

This error is returned by a sender or requester to indicate that allocate failed. Run trace to verify that the session can be established. Verify that the Compaq OpenVMS Alpha machine sends the INIT-SELF (010681). If there is no response to the INIT-SELF make sure that the host WebSphere MQ channel is started. If the BIND from the host is rejected by the Compaq OpenVMS Alpha machine analyze the Digital bind response. Use the *DECnet SNA Gateway Guide to IBM Parameters* to see what is set incorrectly in the mode. If a session is established and the conversation allocate request is rejected verify that the TPNAMEs are configured the same on both systems.

For receivers and servers verify that a BIND is sent by the host. If not, enable the Host WebSphere MQ channel. If the BIND is rejected check the reason for rejection. Make sure that the Compaq OpenVMS Alpha listener LU is the LU with which the host is trying to establish a session.

WebSphere MQ connection failure

After establishing a conversation the two WebSphere MQ channels engage in a protocol to establish a WebSphere MQ channel connection. If this fails, the reason for failure should be indicated in the error logs on the two systems. Check both logs and correct the indicated problem. For example the connection fails if one system has a SEQWRAP value of 999999999 and the other 999999. In the

SNATRACE you will see that the allocate succeeded and that MQ is trying to establish a channel connection. At this point the WebSphere MQ logs are the best aid in resolving problems.

Defining a DECnet Phase IV connection

The channel definition at the sending end specifies the address of the target. The DECnet network object is configured for the connection at the receiving end.

Sending end

Specify the DECnet node name and the DECNET object name in the Connection Name field of the channel definition. You need a different DECnet object for each separate queue manager that is defined. For example, to specify DECnet object MQSERIES on node FOONT enter the following when defining the channel:

```
CONNAME('FOONT(MQSERIES)')
```

Receiving on DECnet Phase IV

To use DECnet Phase IV to start channels, you must configure a DECnet object as follows:

1. Create a file consisting of one line and containing the DCL command to start the DECnet receiver program, amqcrsta.exe:

   ```
   $ mcr amqcrsta [-m Queue_Man_Name]  -t DECnet
   ```

   Place this file in the SYS$MANAGER directory. In this example the file is named `MQRECVDECNET.COM`.

   Notes:

   a. If you have multiple queue managers you **must** make a new file and DECnet object for each queue manager.

   b. If a receiving channel does not start when the sending end starts, it is probably due to the permissions on this file being incorrect.

2. Create a DECnet object to start the receiving channel program automatically. You must supply the correct password for WebSphere MQ.

   ```
   $ MCR NCP
   NCP> define object MQSERIES
   Object number              (0-255): 0
   File name                (filename):sys$manager:mqrecvdecnet.com
   Privileges (List of VMS privileges):
   Outgoing connect privileges (List of VMS privileges):
   User ID          (1-39 characters): mqm
   Password         (1-39 characters): mqseries
   Account          (1-39 characters):
   Proxy access (INCOMING, OUTGOING, BOTH, NONE, REQUIRED):
   NCP> set known objects all
   NCP> exit
   ```

   Note: You could use proxy user identifiers rather than actual user identifiers. This will prevent any unauthorized access to the database. Information on how to set up proxy identifiers is given in the *Digital DECnet for OpenVMS Networking Manual*.

3. Ensure that all known objects are set when DECnet is started.

Defining a DECnet Phase V connection

Set up the WebSphere MQ configuration for channel objects:

1. Start the NCL configuration interface by issuing the following command:

```
$ MC NCL
NCL>
```

2. Create a session control application entity by issuing the following commands:

```
NCL> create session control application MQSERIES
NCL> set sess con app MQSERIES address {name=MQSERIES}
NCL> set sess con app MQSERIES image name -
_ SYS$MANAGER:MQRECVDECNET.COM
NCL> set sess con app MQSERIES user name "MQM"
NCL> set sess con app MQSERIES node synonym true
NCL> show sess con app MQSERIES all [characteristics]
```

   Note: User-defined values are in **uppercase**.

3. Create the command file as for DECnet PhaseIV.
4. The log file for the object is net$server.log in the sys$login directory for the application-specified user name.
5. To enable the session control application upon every system IPL (reboot), add the preceding NCL commands to the file `SYS$MANAGER:NET$APPLICATION_LOCAL.NCL`.

DECnet Phase V connections

Chapter 21. Setting up communication in MQSeries for Compaq NonStop Kernel, V5.1

Distributed queue management (DQM) is a remote queuing facility for WebSphere MQ. It provides channel control programs for the queue manager that form the interface to communication links, controllable by the system operator. The channel definitions held by distributed-queuing management use these connections.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This chapter explains how to do this.

Deciding on a connection

There are two forms of communication for MQSeries for Compaq NonStop Kernel:
- TCP
- LU 6.2

This appendix describes how to set up communications for MQSeries for Compaq NonStop Kernel using both communications protocols. The following examples are provided:
- "SNAX communications example" on page 356
- "ICE communications example" on page 361
- "TCP/IP communications example" on page 364

Each channel definition must specify one only as the transmission protocol (Transport Type) attribute. One or more protocols can be used by a queue manager.

When connecting to WebSphere MQ clients, it might be useful to have alternative channels using different transmission protocols. See the *WebSphere MQ Clients* book for more information. (There is no MQSeries for Compaq NonStop Kernel client.)

SNA channels

The CONNAME, MODENAME, and TPNAME channel attributes described below are necessary for SNA channels in MQSeries for Compaq NonStop Kernel.

Note: As shown below, the CONNAME and TPNAME attributes are constructed of several pieces of information using the period character (**.**) as a delimiter. You cannot therefore use the period character in LU or TP names that are to be configured for SNA channels, even if the underlying communications subsystem allows this, because MQSeries will treat them as delimiters.

CONNAME

The value of CONNAME depends on whether SNAX or ICE is used as the communications protocol:

If SNAX is used:

CONNAME('$PPPP.LOCALLU.REMOTELU')

Applies to sender, requester, and fully qualified server channels, where:

$PPPP	Is the process name of the SNAX/APC process.

LOCALLU	Is the name of the Local LU.
REMOTELU	Is the name of the partner LU on the remote machine.

For example:

```
CONNAME('$BP01.IYAHT080.IYCNVM03')
```

If ICE is used:

CONNAME('$PPPP.#OPEN.LOCALLU.REMOTELU')
Applies to sender, requester and fully qualified server channels, where:

$PPPP	Is the process name of the ICE process.
#OPEN	Is the ICE open name.
LOCALLU	Is the name of the Local LU.
REMOTELU	Is the name of the partner LU on the remote machine.

For example:

```
CONNAME('$ICE.#IYAHT0C.IYAHT0C0.IYCNVM03')+
```

MODENAME
Is the SNA mode name. For example, MODENAME(LU62PS).

TPNAME('LOCALTP[.REMOTETP]')
Is the Transaction Process (TP) name.

LOCALTP	Is the name of the server class (usually MQSeries) in the PATHWAY used for SNA communication. In the case of SNAX, the server class must exist in the same PATHWAY as the SNAX dispatcher and the APC Process server class. In the case of ICE, it must be in the PATHWAY declared in the NOF - ADD TP command.
REMOTETP	Is the name of the TP on the remote machine. This value is optional. If it is not specified, and the channel is one that initiates a conversation (that is, a sender, requester, or fully qualified server channel), the LOCALTP name is used.

Both the LOCALTP and REMOTETP values can be up to 16 characters in length.

LU 6.2 responder processes

In MQSeries for Compaq NonStop Kernel, an SNA Listener process is needed to listen for incoming attach requests from remote queue manager channels.

MQSeries SNA listeners must be dispatched by the SNA product when an incoming Attach arrives from a remote channel.

Using the SNAX APC Dispatcher allows SNAX to accept incoming Attach requests from partner Transaction Programs. To do this, the SNAX Dispatcher requires that:
- The SNAX Dispatcher is run in a different PATHWAY from the queue managers
- The APC process is run as a server class from that same PATHWAY

Using Insession's ICE requires that:
- A transaction program (server class) is defined in a PATHWAY
- A transaction program is added in NOF that points to this server class.

There is no separate ICE Dispatcher; the ICE process itself handles incoming Attach requests.

SNAX TP dispatching

The Compaq SNAX SNA product supports starting APPC transaction programs (TPs) when an APPC Attach arrives from a partner transaction program. A SNAX Dispatcher dispatches these requests to its associated SNAX $APC process using a local transaction program server class.

The SNAX Dispatcher for MQSeries has the following requirements:

- The SNAX Dispatcher must run in the same PATHWAY as the associated $APC process.
- Each incoming TPNAME must be defined as a server class (usually named MQSERIES) in the same PATHWAY as the Dispatcher and the $APC process.
- The server class program name is the **runmqlsr** program that exists in the MQSeries executables subvolume (usually ZMQSEXE).
- The Dispatcher process starts the server class and passes all relevant information ($APC Process, LUName, TPName) to this server class (TP) in a DISPATCH-TP IPC request.

ICE TP dispatching

ICE Version 3.2 implements its SNA Attach Manager similarly to SNAX; its TP is a PATHWAY server class. The ICE process accepts an Attach request and is itself the Dispatcher. However, this ICE process does not need to run in the same PATHWAY as the TP (ServerClass). The environment in this case has the following requirements:

- An active ICE process must be running.
- A Dispatch TP must be added in NOF. For example:

  ```
  ADD TP <tpname>, PROCESS <$process>, SERVERCLASS <Serverclass name>,
                   PROTOCAL DISPATCH
  ```

  Serverclass name is usually MQSeries.
- Each incoming TPNAME be defined as a server class (usually named MQSERIES) in the PATHWAY<$process>.
- The server class program name is the **runmqlsr** program that exists in the MQSeries executables subvolume (usually ZMQSEXE)
- The ICE process starts the server class and passes all relevant information ($ICE Process, ApplName, TPName) to this server class (TP) in a DISPATCH-TP IPC request.

Sample SNA environment setup

The following are examples of how to configure your SNA environments.

Using SNAX APC:

- Create a PATHWAY to be used exclusively for this listener
- Run an APC process serverclass from this PATHWAY.

Enter the following at a TACL prompt:

```
TACL> Pathmon /name $PMAP, nowait, out $vhs, cpu 3/4
TACL> Pathcom $PMAP
= O LU62SCFG
```

where LU62SCFG is an edit file containing the following:

```
[ SET PATHMON BACKUPCPU 6
SET PATHWAY MAXTCPS 10
SET PATHWAY MAXTERMS 10
SET PATHWAY MAXPROGRAMS 10
SET PATHWAY MAXSERVERCLASSES 10
SET PATHWAY MAXSERVERPROCESSES 10
SET PATHWAY MAXSTARTUPS 10
SET PATHWAY MAXPATHCOMS 40
SET PATHWAY MAXASSIGNS 32
SET PATHWAY MAXPARAMS 32
START PATHWAY COLD!

SET TCP PROGRAM $ SYSTEM.SYSTEM.PATHTCP2
SET TCP CPUS 3:4
SET TCP MAXTERMS 5
SET TCP MAXSERVERCLASSES 010
SET TCP MAXSERVERPROCESSES 010
SET TCP MAXTERMDATA 08960
SET TCP MAXREPLY 20000  SET TCP NONSTOP 0
SET TCP TCLPROG $system.system.APCP
ADD TCP SNAXAPC-TCP
```

Figure 36. Sample MQSeries SNAX setup file (Part 1 of 3)

```
[Configure the SNAX/APC SERVER]
RESET SERVER
SET SERVER PARAM LOGFILE APCLOG
SET SERVER PARAM TRACEFILE APCTRC
SET SERVER PARAM BACKUPCPU -1
SET SERVER PARAM MAXINRUSIZE 4096
SET SERVER PARAM MAXOUTRUSIZE 4096
SET SERVER PARAM MAXAPPLIOSIZE 32000
SET SERVER PARAM DATAPAGES "100 E"
SET SERVER PARAM TRACEPAGES 300
SET SERVER PARAM RMTATTACHDISP QUEUE
SET SERVER PARAM RMTATTACHTIMER -1
[SET SERVER PARAM CONFIG APCCFG]
SET SERVER PROGRAM $system.system.APCOBJ
SET SERVER OUT $VHS
SET SERVER HOMETERM $VHS
SET SERVER PROCESS $AP02
SET SERVER NUMSTATIC 1
SET SERVER MAXSERVERS 1
SET SERVER CREATEDELAY 0 SECS
SET SERVER DELETEDELAY 1 MINS
SET SERVER CPUS 3:4
ADD SERVER SNAXAPCSVR
```

Figure 36. Sample MQSeries SNAX setup file (Part 2 of 3)

```
[Add MQSeries SNAX Listener]
RESET SERVER
SET SERVER PROGRAM $DATA00.ZMQSEXE.RUNMQLSR
SET SERVER PROCESS $lrcv
SET SERVER NUMSTATIC 1
SET SERVER MAXSERVERS 1
SET SERVER CREATEDELAY 0 SECS
SET SERVER DELETEDELAY 1 MINS
SET SERVER STARTUP "-t LU62"
SET SERVER PARAM MQQUEMGRNAME "QMGR"
SET SERVER PARAM MQMACHINIFILE "$DATA03.QMGRD.UMQSINI"
SET SERVER PARAM MQDEFAULTPREFIX "$DATA00"
SET SERVER OUT $VHS
SET SERVER HOMETERM $VHS
SET SERVER CPUS 3:4
[ADD SERVER MQSERIES]
ADD SERVER MQSERIES
START TCP *

[Configure the DISPATCHER]
SET TERM FILE $s.#displog
SET TERM INITIAL SNAXAPC-DISPATCHER
SET TERM TYPE CONVERSATIONAL
SET TERM TCP SNAXAPC-TCP
ADD TERM SNAXAPCSVR01 [First 10 chars are the SNAX/APC server name]

start server MQSERIES
start server SNAXAPCSVR
start term SNAXAPCSVR01
```

Figure 36. Sample MQSeries SNAX setup file (Part 3 of 3)

Note: The Listener server class is identical to the MQS-TCPLIS00 server class in the queue manager's own PATHWAY, except that there is an additional startup parameter: `SET SERVER STARTUP "-t LU62"`

Using Insession ICE: If you are using Insession ICE, create a PATHWAY to be used exclusively for this listener. The ICE process is not run from this PATHWAY.

1. Add the TP in NOF as follows:

   ```
   ADD TP <tpname>, PROCESS <process>, SERVERCLASS <server>,
           PROTOCAL DISPATCH [, <option> ...]
   ```

   process
   The name of the PATHMON process that manages the TP

   server The name of the PATHMON SERVERCLASS to which the TP belongs

   option Can be:

   [ATTACHTIMER n]
   The amount of time (in hundredths of a second) that ICE waits for an ATTACH after dispatching a new TP thread. The default is 6000 (60 seconds).

   [MAXDISPATCHTHREADS n]
   The maximum number of simultaneous dispatched TPs. The default is 0 (no limit on the number of simultaneous dispatched TPs)

   [TIMEOUT n]
   How ICE responds to an ATTACH if MAXDISPATCHTHREADS has been reached on a TP:

TIMEOUT -1
ATTACH is queued indefinitely

TIMEOUT >0
ATTACH is queued for n/100 seconds

The default is 0; the ATTACH is rejected immediately.

2. You still need to add the server class to the PATHWAY. At the TACL prompt, enter:

```
TACL> Pathmon /name $PMAP, nowait, out $vhs, cpu 3/4
TACL> Pathcom $PMAP
 = O LU62ICFG
```

   where LU62ICFG is an edit file containing the following:

```
[
SET PATHMON BACKUPCPU 6
SET PATHWAY MAXTCPS 10
SET PATHWAY MAXTERMS 10
SET PATHWAY MAXPROGRAMS 10
SET PATHWAY MAXSERVERCLASSES 10
SET PATHWAY MAXSERVERPROCESSES 10
SET PATHWAY MAXSTARTUPS 10
SET PATHWAY MAXPATHCOMS 40
SET PATHWAY MAXASSIGNS 32
SET PATHWAY MAXPARAMS 32
START PATHWAY COLD!
SET TCP PROGRAM $SYSTEM.SYSTEM.PATHTCP2
SET TCP CPUS 3:4
SET TCP MAXTERMS 5
SET TCP MAXSERVERCLASSES 010
SET TCP MAXSERVERPROCESSES 010
SET TCP MAXTERMDATA 08960SET TCP MAXREPLY 20000
SET TCP NONSTOP 0
SET TCP TCLPROG $system.system.APCP
ADD TCP SNAXAPC-TCP
```

Figure 37. Sample MQSeries SNA setup file for ICE (Part 1 of 2)

```
[Add MQSeries ICE Listener]
RESET SERVER
SET SERVER PROGRAM $DATA00.ZMQSEXE.RUNMQLSR
SET SERVER PROCESS $lrcv
SET SERVER NUMSTATIC 1
SET SERVER MAXSERVERS 1
SET SERVER CREATEDELAY 0 SECS
SET SERVER DELETEDELAY 1 MINS
SET SERVER STARTUP "-t LU62"
SET SERVER PARAM MQQUEMGRNAME "QMGR"
SET SERVER PARAM MQMACHINIFILE "$DATA03.QMGRD.UMQSINI"
SET SERVER PARAM MQDEFAULTPREFIX "$DATA00"
SET SERVER OUT $VHS
SET SERVER HOMETERM $VHS
SET SERVER CPUS 3:4
[ADD SERVER MQSERIES]
ADD SERVER MQSERIES

START TCP *
start server MQSERIES
```

Figure 37. Sample MQSeries SNA setup file for ICE (Part 2 of 2)

Note: The Listener server class is identical to the MQS-TCPLIS00 server class in the queue manager’s own PATHWAY, except that there is an additional startup parameter: `SET SERVER STARTUP "-t LU62"`

TCP channels

MQSeries for Compaq NonStop Kernel gives you the option of using multiple TCP processes within a single MQSeries queue manager environment. This means that you can select TCP processes used within a queue manager by associating the required TCP process with a given channel. Outbound channels (sender, server, requester) can specify the required TCP process name in the CONNAME field of the channel definition.

Using **runmqsc**:

```
alter channel ... conname ('$ZTC1.123.456.789.012(1415)')
alter channel ... conname ('$ZTC1.dnshostname(1415)')
```

Using the MQMC panels:

```
TCPIP/SNA Process:  $ZTC1
```

Using PCF commands:

```
strncpy( pPCFString->String, '('$ZTC1.123.456.789.012(1415)', len );
```

To reconfigure DNS resolution for a non-default resolver, add the following to all PATHWAY ECnn server classes:

```
DEFINE =TCPIP^RESOLVER^NAME, FILE filename
```

where `filename` is the location of the resolver file.

If you are using a hosts file, add the following to all PATHWAY ECnn server classes:

```
DEFINE =TCPIP^HOST^FILE, FILE filename
```

where `filename` is the location of the hosts file.

TCP channels

Inbound channels use environment variables to determine which TCP process to use. The TCP listeners pass this process value to their respective ECs and on to their respective TCP responder processes using their agents. To set the inbound channel TCP/IP process:

- Using TACL:

  ```
  ADD DEFINE =TCPIP^PROCESS^NAME, FILE processname
  ```

  where `processname` is the name of the TCP process.
- Using PATHWAY, for MQS-TCPLIS*nn* server classes, where *nn* is the listener server class number:

  ```
  DEFINE =TCPIP^PROCESS^NAME, FILE \HAWK.$ZTC1
  PARAM MQLISTENPORTNUM "1415"
  ```

For information about using a non-default TCP process for communications through TCP, see *MQSeries for Compaq NonStop Kernel System Administration*.

Communications examples

This section provides communications setup examples for SNA (SNAX and ICE) and TCP/IP.

SNAX communications example

This section provides:

- An example SCF configuration file for the SNA line
- Some example SYSGEN parameters to support the line
- An example SCF configuration file for the SNA process definition
- Some example MQSC channel definitions

SCF SNA line configuration file

Here is an example SCF configuration file:

```
==
== SCF configuration file for defining SNA LINE, PUs and LUs to VTAM®
== Line is called $SNA02 and SYSGEN'd into the Compaq system
==

ALLOW ALL
ASSUME LINE $SNA02

ABORT, SUB LU
ABORT, SUB PU
ABORT

DELETE, SUB LU
DELETE, SUB PU
DELETE

==
== ADD $SNA02 LINE DEFINITION
==

ADD LINE $SNA02, STATION SECONDARY, MAXPUS 5, MAXLUS 1024, RECSIZE 2048, &
        CHARACTERSET ASCII, MAXLOCALLUS 256, &
        PUIDBLK %H05D, PUIDNUM %H312FB

==
== ADD REMOTE PU OBJECT, LOCAL IS IMPLICITLY DEFINED AS #ZNT21
==

ADD PU #PU2, ADDRESS 1, MAXLUS 16, RECSIZE 2046, TYPE (13,21), &
```

```
             TRRMTADDR 04400045121088, DYNAMIC ON, &
             ASSOCIATESUBDEV $CHAMB.#p2, &
             TRSSAP %H04, &
             CPNAME IYAQCDRM, SNANETID GBIBMIYA

==
== ADD LOCAL LU OBJECT
==

ADD LU #ZNTLU1, TYPE (14,21), RECSIZE 1024, &
          CHARACTERSET ASCII, PUNAME #ZNT21, SNANAME IYAHT080

==
== ADD PARTNER LU OBJECTS
==

== spinach (HP)

ADD LU #PU2LU1, TYPE(14,21), PUNAME #PU2, SNANAME IYABT0F0

== stingray (AIX)

ADD LU #PU2LU2, TYPE(14,21), PUNAME #PU2, SNANAME IYA3T995

== coop007 (OS/2)

ADD LU #PU2LU3, TYPE(14,21), PUNAME #PU2, SNANAME IYAFT170

== MVS CICS

ADD LU #PU2LU4, TYPE(14,21), PUNAME #PU2, SNANAME IYCMVM03

== MVS Non-CICS

ADD LU #PU2LU5, TYPE(14,21), PUNAME #PU2, SNANAME IYCNVM03

== finnr100 (NT)

ADD LU #PU2LU6, TYPE(14,21), PUNAME #PU2, SNANAME IYAFT080

== winas18 (AS400)

ADD LU #PU2LU7, TYPE(14,21), PUNAME #PU2, SNANAME IYAFT110

== MQ-Portugese (OS/2)

ADD LU #PU2LU8, TYPE(14,21), PUNAME #PU2, SNANAME IYAHT090

== VSE

ADD LU #PU2LU10, TYPE(14,21), PUNAME #PU2, SNANAME IYZMZSI2

== START UP TOKEN RING ASSOCIATE SUB DEVICE $CHAMB.#P2
== then start the line, pu's and lu's

START LINE $CHAMB, SUB ALL

START
START, SUB PU

STATUS
STATUS, SUB PU
STATUS, SUB LU
```

SYSGEN parameters

The following are CONFTEXT file entries for a SYSGEN to support the SNA and token ring lines:

Communications examples

```
!**************************************************************************
!                       LAN MACRO
!**************************************************************************
!  This macro is used for all 361x LAN controllers
!  REQUIRES T9375 SOFTWARE PACKAGE

   C3613^MLAM         = MLAM
                        TYPE 56,             SUBTYPE 0,
                        PROGRAM              C9376P00,
                        INTERRUPT            IOP^INTERRUPT^HANDLER,
                        MAXREQUESTSIZE       32000,
                        RSIZE                32000,
                        BURSTSIZE            16,
                        LINEBUFFERSIZE       32,
                        STARTDOWN  #;
!**************************************************************************
!                       SNAX macro for Token ring lines
!**************************************************************************
TOKEN^RING^SNAX^MACRO = SNATS
                        TYPE 58,
                        SUBTYPE 4,
                        RSIZE 1024,
                        SUBTYPE 4,
                        FRAMESIZE 1036 # ;

!**************************************************************************
!                       SNAX MANAGER
!**************************************************************************
  SSCP^MACRO          = SNASVM
                        TYPE 13,         SUBTYPE 5,
                        RSIZE                256  #;

!**************************************************************************
!                       LAN CONTROLLER
!**************************************************************************
LAN1      3616    0,1     %130    ;

!***********   Service manager
SNAX     6999    0,1     %370    ;

!***********   SNAX/Token Ring Pseudocontroller
RING      6997    0,1     %360    ;

!*********** Token Ring Line
$CHAMB     LAN1.0, LAN1.1       C3613^MLAM, NAME #LAN1;

!***********   Configure the SSCP
 $SSCP     SNAX.0, SNAX.1 SSCP^MACRO;

!***********   Sna lines for Dummy Controller over Token Ring
 $SNA01    RING.0, RING.1 TOKEN^RING^SNAX^MACRO;
 $SNA02    RING.2, RING.3 TOKEN^RING^SNAX^MACRO;
```

SNAX/APC process configuration

The following definitions configure the example APC process (process name $BP01) using SCF for the SNA line.

Note: The APC process $BP01 is defined as a server class process running in the same PATHWAY as the SNAX APC Dispatcher.

```
==
== SCF Configuration file for SNAX/APC Lus
==

ALLOW ERRORS

ASSUME PROCESS $BP01
```

```
ABORT  SESSION *
ABORT  TPN *
ABORT  PTNR-MODE *
ABORT  PTNR-LU *
ABORT  LU *

DELETE TPN *
DELETE PTNR-MODE *
DELETE PTNR-LU *
DELETE LU *

==
== ADD LOCAL LU
==
ADD LU IYAHT080, SNANAME GBIBMIYA.IYAHT080, SNAXFILENAME $SNA02.#ZNTLU1, &
                 MAXSESSION 256, AUTOSTART YES

== TPnames for MQSeries

ADD TPN IYAHT080.MQSeries

=== Spinach (HP) Partner LU

ADD PTNR-LU   IYAHT080.IYABT0F0, SNANAME GBIBMIYA.IYABT0F0, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYABT0F0.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
==  Winas18 (AS400) Partner LU
==

ADD PTNR-LU   IYAHT080.IYAFT110, SNANAME GBIBMIYA.IYAFT110, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYAFT110.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
==  Stingray (AIX) Partner LU
==

ADD PTNR-LU   IYAHT080.IYA3T995, SNANAME GBIBMIYA.IYA3T995, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYA3T995.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== coop007 (OS/2) Partner LU
==

ADD PTNR-LU   IYAHT080.IYAFT170, SNANAME GBIBMIYA.IYAFT170, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYAFT170.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== MQ-Portugese (OS/2) Partner LU
==

ADD PTNR-LU   IYAHT080.IYAHT090, SNANAME GBIBMIYA.IYAHT090, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYAHT090.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== finnr100 (NT)  Partner LU
==

ADD PTNR-LU   IYAHT080.IYAFT080, SNANAME GBIBMIYA.IYAFT080, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYAFT080.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== MVS CICS       Partner LU
==

ADD PTNR-LU   IYAHT080.IYCMVM03, SNANAME GBIBMIYA.IYCMVM03, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYCMVM03.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== MVS Non CICS Partner LU
==

ADD PTNR-LU   IYAHT080.IYCNVM03, SNANAME GBIBMIYA.IYCNVM03, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYCNVM03.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4
==
== VSE Partner LU
==

ADD PTNR-LU   IYAHT080.IYZMZSI2, SNANAME GBIBMIYA.IYZMZSI2, &
              PERIPHERAL-NODE NO, PARALLEL-SESSION-LU YES

ADD PTNR-MODE IYAHT080.IYZMZSI2.LU62PS, MODENAME LU62PS, &
              DEFAULTMAXSESSION 8, DEFAULTMINCONWINNER 4, &
              DEFAULTMINCONLOSER 3, MAXAUTOACT 1, RCVWINDOW 4, &
              DEFAULTMAXINRUSIZE 1024, DEFAULTMAXOUTRUSIZE 1024, &
              SENDWINDOW 4

==
== Start the LUs
```

```
==

START LU IYAHT080, SUB ALL
START TPN *
```

MQSeries applications require the `Maxapplio` value, which controls the maximum size of interprocess data transfers between MQSeries and the communications server process, to be set to 32000, which is larger than the default.

Channel definitions

Here are some example MQSeries channel definitions that support the SNAX configuration:

- A sender channel to WebSphere MQ for z/OS (not using CICS):

```
DEFINE CHANNEL(MT01.VM03.SDRC.0002) CHLTYPE(SDR) +
        TRPTYPE(LU62)  +
        SEQWRAP(9999999) MAXMSGL(2048) +
        XMITQ('VM03NCM.TQ.SDRC.0001') +
        CONNAME('$BP01.IYAHT080.IYCNVM03') +
        MODENAME('LU62PS') TPNAME(MQSERIES)
```

- A receiver channel from WebSphere MQ for z/OS:

```
DEFINE CHANNEL(VM03.MT01.SDRC.0002) CHLTYPE(RCVR) +
        TRPTYPE(LU62) REPLACE DESCR('Receiver channel from VM03NCM') +
        SEQWRAP(9999999) +
        MAXMSGL(2048)
```

- A server channel to WebSphere MQ for z/OS that can initiate a conversation, or be initiated by a remote requester channel:

```
DEFINE CHANNEL(MT01.VM03.RQSV.0002) CHLTYPE(SVR) +
         TRPTYPE(LU62)  +
         SEQWRAP(9999999) MAXMSGL(2048) +
         XMITQ('VM03NCM.TQ.RQSV.0001') +
         CONNAME('$BP01.IYAHT080.IYCNVM03') +
         MODENAME('LU62PS') TPNAME(MQSERIES)
```

where `MQSERIES` is the TPNAME on which the z/OS queue manager is listening.

ICE communications example

There are two stages in configuring ICE for MQSeries:

1. Configure the ICE process itself
2. Input line ($ICE01, in the following example) and SNA information to the ICE process.

Configuring the ICE process

Here is an example ICE process configuration. This configuration is located by default in a file called GOICE:

```
?tacl macro
clear all
param backupcpu 1
param cinittimer 120
param collector $0
param config icectl
param idblk 05d
param idnum 312FF
param cpname IYAHR00C
param datapages 64
param dynamicrlu yes
param genesis $gen
param maxrcv 32000
param loglevel info
param netname GBIBMIYA
param password xxxxxxxxxxxxxxxxxxxx
param retrys1 5
param secuserid super.super
param startup %1%
param timer1 20
param timer2 300
param usstable default
run $system.ice.ice/name $ICE,nowait,cpu 0,pri 180,highpin off/
```

Notes:

1. The password PARAM has been replaced by xxxxxxxxxxxxxxxxxxxxx.
2. MQSeries applications require the `maxrcv` PARAM, which controls the maximum size of interprocess data transfers between MQSeries and the communications server process, to be set to 32000, which is larger than the default.

Defining the line and APC information

Once the ICE process has been started with this configuration, the following information is input to the ICE process using the Node Operator Facility (NOF**). This example defines a line called $ICE01 running on the token ring port $CHAMB.#ICE:

```
==
== ICE definitions for PU IYAHR00C.
== Local LU for this PU is IYAHT0C0.
==

ALLOW ERRORS

OPEN $ICE

ABORT LINE $ICE01, SUB ALL

DELETE LINE $ICE01, SUB ALL

==
==  ADD TOKEN RING LINE
==

ADD LINE $ICE01, TNDM $CHAMB.#ICE, &
      IDBLK %H05D, &
      PROTOCOL TOKENRING, WRITEBUFFERSIZE 8192

==
== ADD PU OBJECT
==

ADD PU IYAHR00C, LINE $ICE01, MULTIROUTE YES, &
             DMAC 400045121088, DSAP %H04, &
             NETNAME GBIBMIYA, IDNUM %H312FF, IDBLK %H05D, &
             RCPNAME GBIBMIYA.IYAQCDRM, SSAP %H08

==
== Add Local APPL Object
==

DELETE APPL IYAHT0C0
ADD APPL IYAHT0C0, ALIAS IYAHT0C0, PROTOCOL CPIC, &
         OPENNAME #IYAHT0C

==
== Add Mode LU62PS
==

DELETE MODE LU62PS
ADD MODE LU62PS, MAXSESS 8, MINCONWIN 4, MINCONLOS 3
```

```
==
== Add Partner LU Objects
==

== spinach (HP)

ABORT RLU IYABT0F0
DELETE RLU IYABT0F0
ADD RLU IYABT0F0, MODE LU62PS, PARSESS YES

== stingray (AIX)

ABORT RLU IYA3T995
DELETE RLU IYA3T995
ADD RLU IYA3T995, MODE LU62PS, PARSESS YES

== coop007 (OS/2)

ABORT RLU IYAFT170
DELETE RLU IYAFT170
ADD RLU IYAFT170, MODE LU62PS, PARSESS YES

== MVS CICS

ABORT RLU IYCMVM03
DELETE RLU IYCMVM03
ADD RLU IYCMVM03, MODE LU62PS, PARSESS YES

== MVS Non-CICS

ABORT RLU IYCNVM03
DELETE RLU IYCNVM03
ADD RLU IYCNVM03, MODE LU62PS, PARSESS YES

== finnr100 (NT)

ABORT RLU IYAFT080
DELETE RLU IYAFT080
ADD RLU IYAFT080, MODE LU62PS, PARSESS YES

== winas18 (AS400)

ABORT RLU IYAFT110
DELETE RLU IYAFT110
ADD RLU IYAFT110, MODE LU62PS, PARSESS YES

ABORT RLU IYAHT080
DELETE RLU IYAHT080
ADD RLU IYAHT080, MODE LU62PS, PARSESS YES

==
== START UP ICE LINE $ICE01 AND SUB DEVICE
==

START LINE $ICE01, SUB ALL
```

Note: For this configuration to work, the port #ICE must have been defined to the token ring line.

For example, these commands could be entered into SCF:

```
add port $chamb.#ice, type tr8025, address %H08
start port $chamb.#ice
```

where $chamb is a token-ring controller, and the SAP of the port is %08.

Channel definitions for ICE

Here are some MQSeries channel definitions that would support this ICE configuration:

- A sender channel to WebSphere MQ for z/OS (not using CICS):

```
DEFINE CHANNEL(MT01.VM03.SDRC.ICE) CHLTYPE(SDR) +
        TRPTYPE(LU62)  +
        SEQWRAP(9999999) MAXMSGL(2048) +
        XMITQ('VM03NCM.TQ.SDRC.ICE') +
        CONNAME('$ICE.#IYAHT0C.IYAHT0C0.IYCNVM03')+
        MODENAME('LU62PS') TPNAME(MQSERIES)
```

- A receiver channel from WebSphere MQ for z/OS:

```
DEFINE CHANNEL(VM03.MT01.SDRC.ICE) CHLTYPE(RCVR) +
        TRPTYPE(LU62) REPLACE DESCR('Receiver channel from VM03NCM') +
        SEQWRAP(9999999) +
        MAXMSGL(2048) +
       TPNAME(VM03NCMSDRCRCVR)
```

- A server channel to WebSphere MQ for z/OS that can initiate a conversation, or be initiated by a remote requester channel:

```
DEFINE CHANNEL(MT01.VM03.RQSV.ICE) CHLTYPE(SVR) +
         TRPTYPE(LU62)  +
         SEQWRAP(9999999) MAXMSGL(2048) +
         XMITQ('VM03NCM.TQ.RQSV.ICE') +
         CONNAME('$ICE.#IYAHT0C.IYAHT0C0.IYCNVM03')+
         MODENAME('LU62PS') TPNAME(MQSERIES) +
```

where `MQSERIES` is the TPNAME the on which z/OS queue manager is listening.

TCP/IP communications example

This example shows how to establish communications with a remote MQSeries system over TCP/IP.

TCPConfig stanza in QMINI

The QMINI file must contain an appropriate `TCPConfig` stanza. For example:

```
TCPConfig:
   TCPPort=1414
   TCPNumListenerPorts=1
   TCPListenerPort=1996
   TCPKeepAlive=1
```

The `TCPPort` value is the default outbound port for channels without a port value in the CONNAME field. `TCPListenerPort` identifies the default port that is used if the –p option is not supplied when using **runmqlsr** on the command line.

Defining a TCP sender channel

You must define a TCP sender channel. In this example, the queue manager is MH01 on a host called SPINACH:

```
DEFINE CHANNEL(MT01_MH01_SDRC_0001) CHLTYPE(SDR) +
        TRPTYPE(TCP) +
        SEQWRAP(9999999) MAXMSGL(4194304) +
        XMITQ('MH01_TQ_SDRC_0001') +
        CONNAME('SPINACH.HURSLEY.IBM.COM(2000)')
```

This channel tries to attach to a TCP/IP port number 2000 on the host SPINACH.

The following example shows a TCP sender channel definition for a queue manager MH01 on the host SPINACH using the *default* outbound TCP port:

```
DEFINE CHANNEL(MT01_MH01_SDRC_0001) CHLTYPE(SDR) +
       TRPTYPE(TCP) +
       SEQWRAP(9999999) MAXMSGL(4194304) +
       XMITQ('MH01_TQ_SDRC_0001') +
       CONNAME('SPINACH.HURSLEY.IBM.COM')
```

No port number is specified in the CONNAME; the value specified on the `TCPPort` entry in the QMINI file (1414) is used.

Defining a TCP receiver channel

An example TCP receiver channel is:

```
DEFINE CHANNEL(MH01_MT01_SDRC_0001) CHLTYPE(RCVR) +
       TRPTYPE(TCP)
```

A TCP receiver channel requires no CONNAME value, but a TCP listener must be running. There are two ways of starting a TCP/IP listener:

1. Go into the queue manager’s PATHWAY using PATHCOM, and enter:
   ```
   start server mqs-tcplis00
   ```
2. From the TACL prompt, enter:
   ```
   runmqlsr -m QMgrName
   ```

Either way starts a TCP listener that listens on the port defined in the QMINI file (in this example, 1996).

Note: This port number can be overridden by the -p `Port` flag on **runmqlsr**.

Defining a TCP/IP sender channel on the remote system

The sender channel definition on the remote system to connect to this receiver channel could look like:

```
DEFINE CHANNEL(MH01_MT01_SDRC_0001) CHLTYPE(SDR) +
        TRPTYPE(TCP) +
        XMITQ('MT01_TQ_SDRC_0001') +
        CONNAME('Compaq.ISC.UK.IBM.COM(1996)')
```

Configuring QMINI to support multiple TCP listeners

To enable a queue manager to support multiple TCP listeners, you must create a new PATHWAY server class for each additional listener, based on MQS-TCPLIS00.

In addition, each TCP listener must have its own listener port entry in the `TCPConfig` stanza of the QMINI file.

For example:

```
TCPConfig:
 TCPPort=1414
 TCPNumListenerPorts=3
 TCPListenerPort=1996
 TCPListenerPort=1997
 TCPListenerPort=1998
 TCPKeepAlive=1
```

`TCPNumListenerPorts` must match the number of `TCPListenerPort` entries (three in this example). This QMINI file can support three TCP listeners listening on ports 1996, 1997, and 1998. Typically, the server classes to support these three ports are named MQS-TCPLIS00, MQS-TCPLIS01, and MQS-TCPLIS02.

For more information about adding server classes, see *MQSeries for Compaq NonStop Kernel System Administration*.

Chapter 22. Message channel planning example for distributed platforms

This chapter provides a detailed example of how to connect two queue managers together so that messages can be sent between them. The example illustrates the preparations needed to allow an application using queue manager QM1 to put messages on a queue at queue manager QM2. An application running on QM2 can retrieve these messages, and send responses to a reply queue on QM1.

The example illustrates the use of TCP/IP connections. The example assumes that channels are to be triggered to start when the first message arrives on the transmission queue they are servicing. You must start the channel initiator in order for triggering to work.

This example uses SYSTEM.CHANNEL.INITQ as the initiation queue. This queue is already defined by WebSphere MQ. You can use a different initiation queue, but you will have to define it yourself and specify the name of the queue when you start the channel initiator.

What the example shows

The example shows the WebSphere MQ commands (MQSC) that you can use.

In all the examples, the MQSC commands are shown as they would appear in a file of commands, and as they would be typed at the command line. The two methods look identical, but, to issue a command at the command line, you must first type `runmqsc`, for the default queue manager, or `runmqsc` *`qmname`* where *`qmname`* is the name of the required queue manager. Then type any number of commands, as shown in the examples.

An alternative method is to create a file containing these commands. Any errors in the commands are then easy to correct. If you called your file mqsc.in then to run it on queue manager QMNAME use:

```
runmqsc QMNAME < mqsc.in > mqsc.out
```

You could verify the commands in your file before running it using:

```
runmqsc -v QMNAME < mqsc.in > mqsc.out
```

For portability, you should restrict the line length of your commands to 72 characters. Use a concatenation character to continue over more than one line. On Compaq NonStop Kernel use Ctrl-y to end the input at the command line, or enter the `exit` or `quit` command. On OS/2, Windows, or Compaq OpenVMS Alpha use Ctrl-z. On UNIX systems use Ctrl-d. Alternatively, on WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, use the **end** command.

Figure 38 on page 368 shows the example scenario.

Planning example for distributed platforms

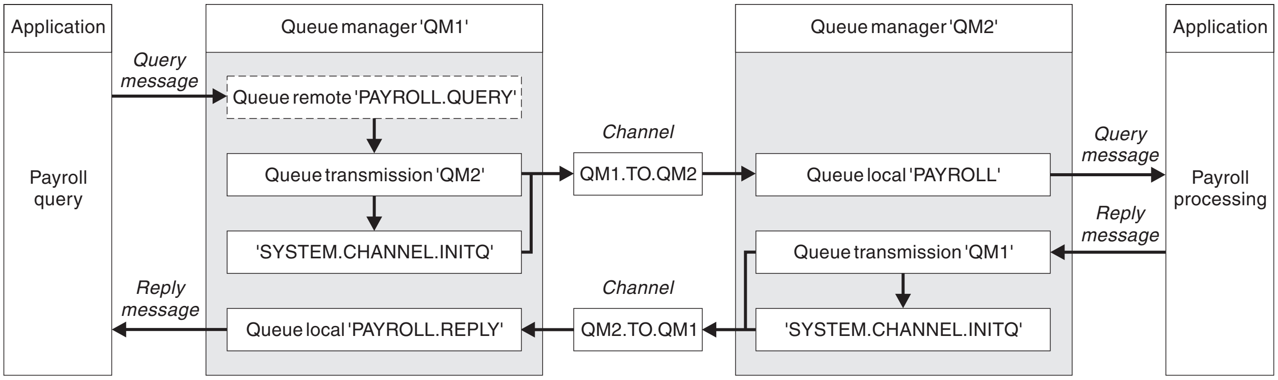


Figure 38. The message channel example for OS/2, Windows, and UNIX systems

The example involves a payroll query application connected to queue manager QM1 that sends payroll query messages to a payroll processing application running on queue manager QM2. The payroll query application needs the replies to its queries sent back to QM1. The payroll query messages are sent from QM1 to QM2 on a sender-receiver channel called QM1.TO.QM2, and the reply messages are sent back from QM2 to QM1 on another sender-receiver channel called QM2.TO.QM1. Both of these channels are triggered to start as soon as they have a message to send to the other queue manager.

The payroll query application puts a query message to the remote queue “PAYROLL.QUERY” defined on QM1. This remote queue definition resolves to the local queue “PAYROLL” on QM2. In addition, the payroll query application specifies that the reply to the query is sent to the local queue “PAYROLL.REPLY” on QM1. The payroll processing application gets messages from the local queue “PAYROLL” on QM2, and sends the replies to wherever they are required; in this case, local queue “PAYROLL.REPLY” on QM1.

In the example definitions for TCP/IP, QM1 has a host address of 9.20.9.31 and is listening on port 1411, and QM2 has a host address of 9.20.9.32 and is listening on port 1412. The example assumes that these are already defined on your system and available for use.

The object definitions that need to be created on QM1 are:

- Remote queue definition, PAYROLL.QUERY
- Transmission queue definition, QM2 (default=remote queue manager name)
- Process definition, QM1.TO.QM2.PROCESS (not needed for WebSphere MQ for AIX, HP-UX, Solaris, and Windows, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp)
- Sender channel definition, QM1.TO.QM2
- Receiver channel definition, QM2.TO.QM1
- Reply-to queue definition, PAYROLL.REPLY

The object definitions that need to be created on QM2 are:

- Local queue definition, PAYROLL
- Transmission queue definition, QM1 (default=remote queue manager name)
- Process definition, QM2.TO.QM1.PROCESS (not needed for WebSphere MQ for AIX, HP-UX, Solaris, and Windows, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp)
- Sender channel definition, QM2.TO.QM1

- Receiver channel definition, QM1.TO.QM2

The connection details are supplied in the CONNAME attribute of the sender channel definitions.

You can see a diagram of the arrangement in Figure 38 on page 368.

Queue manager QM1 example

The following object definitions allow applications connected to queue manager QM1 to send request messages to a queue called PAYROLL on QM2, and to receive replies on a queue called PAYROLL.REPLY on QM1.

All the object definitions have been provided with the DESCR and REPLACE attributes. The other attributes supplied are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM1.

Run the following commands on queue manager QM1.

Remote queue definition

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QM2') REPLACE +
PUT(ENABLED) XMITQ(QM2) RNAME(PAYROLL) RQMNAME(QM2)
```

Note: The remote queue definition is not a physical queue, but a means of directing messages to the transmission queue, QM2, so that they can be sent to queue manager QM2.

Transmission queue definition

```
DEFINE QLOCAL(QM2) DESCR('Transmission queue to QM2') REPLACE +
USAGE(XMITQ) PUT(ENABLED) GET(ENABLED) TRIGGER TRIGTYPE(FIRST) +
INITQ(SYSTEM.CHANNEL.INITQ) PROCESS(QM1.TO.QM2.PROCESS)
```

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the named process.

Process definition

```
DEFINE PROCESS(QM1.TO.QM2.PROCESS) DESCR('Process for starting channel') +
REPLACE APPLTYPE(OS2) USERDATA(QM1.TO.QM2)
```

The channel initiator uses this process information to start channel QM1.TO.QM2. (This sample definition uses OS2 as the application type).

Note: For WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp the need for a process definition can be eliminated by specifying the channel name in the *TRIGDATA* attribute of the transmission queue.

Sender channel definition

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QM2') XMITQ(QM2) +
CONNAME('9.20.9.32(1412)')
```

Receiver channel definition

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QM2')
```

Reply-to queue definition

```
DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to query messages sent to QM2')
```

The reply-to queue is defined as PUT(ENABLED). This ensures that reply messages can be put to the queue. If the replies cannot be put to the reply-to queue, they are sent to the dead-letter queue on QM1 or, if this queue is not available, remain on transmission queue QM1 on queue manager QM2. The queue has been defined as GET(ENABLED) to allow the reply messages to be retrieved.

Queue manager QM2 example

The following object definitions allow applications connected to queue manager QM2 to retrieve request messages from a local queue called PAYROLL, and to put replies to these request messages to a queue called PAYROLL.REPLY on queue manager QM1.

You do not need to provide a remote queue definition to enable the replies to be returned to QM1. The message descriptor of the message retrieved from local queue PAYROLL contains both the reply-to queue and the reply-to queue manager names. Therefore, as long as QM2 can resolve the reply-to queue manager name to that of a transmission queue on queue manager QM2, the reply message can be sent. In this example, the reply-to queue manager name is QM1 and so queue manager QM2 simply requires a transmission queue of the same name.

All the object definitions have been provided with the DESCR and REPLACE attributes and are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM2.

Run the following commands on queue manager QM2.

Local queue definition

```
DEFINE QLOCAL(PAYROLL) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Local queue for QM1 payroll details')
```

This queue is defined as PUT(ENABLED) and GET(ENABLED) for the same reason as the reply-to queue definition on queue manager QM1.

Transmission queue definition

```
DEFINE QLOCAL(QM1) DESCR('Transmission queue to QM1') REPLACE +
USAGE(XMITQ) PUT(ENABLED) GET(ENABLED) TRIGGER TRIGTYPE(FIRST) +
INITQ(SYSTEM.CHANNEL.INITQ) PROCESS(QM2.TO.QM1.PROCESS)
```

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the named process.

Process definition

```
DEFINE PROCESS(QM2.TO.QM1.PROCESS) DESCR('Process for starting channel') +
REPLACE APPLTYPE(OS2) USERDATA(QM2.TO.QM1)
```

The channel initiator uses this process information to start channel QM2.TO.QM1. (This sample definition uses OS2 as the application type.)

Note: For WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp the need for a process definition can be eliminated by specifying the channel name in the *TRIGGERDATA* attribute of the transmission queue.

Sender channel definition

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QM1') XMITQ(QM1) +
CONNAME('9.20.9.31(1411)')
```

Receiver channel definition

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QM1')
```

Running the example

Once these definitions have been created, you need to:

- Start the channel initiator on each queue manager.
- Start the INETD daemon for each queue manager. On OS/2, Windows, and Compaq NonStop Kernel, you can use the WebSphere MQ listener in place of INETD.

For information about starting the channel initiator and listener, see Chapter 10, “Setting up communication for OS/2 and Windows”, on page 131 and Chapter 13, “Setting up communication on UNIX systems”, on page 197.

Note: On OS/2 and Windows, you can also run the channel as a thread; see the *WebSphere MQ Script (MQSC) Command Reference* book for information about how to define a channel as a threaded channel.

Expanding this example

This simple example could be expanded with:

- The use of LU 6.2 communications for interconnection with CICS systems, and transaction processing.
- Adding more queue, process, and channel definitions to allow other applications to send messages between the two queue managers.
- Adding user-exit programs on the channels to allow for link encryption, security checking, or additional message processing.
- Using queue-manager aliases and reply-to queue aliases to understand more about how these can be used in the organization of your queue manager network.

Chapter 23. Example SINIX and DC/OSx configuration files

This chapter contains working examples of SNA LU 6.2 configuration files for SINIX and DC/OSx.

Notes:

1. The TCP/IP names for the SINIX machines involved are `forties`, which is an RM400, and `bight`, which is an RM200.
2. The name of the queue manager on `forties` is MP01, and the name of the queue manager on `bight` is MP02.
3. Both machines are running the SINIX-N operating system.
4. The LU names have a resemblance to the TCP/IP names.
5. The XIDs have been arbitrarily chosen to reflect the RM model numbers.
6. The machine `rameses` is a DC/OSx MIS-2ES/2 machine using the DC/OSx operating system. The configuration for `rameses` is different because the operating system SNA software on DC/OSx is different.
7. The name of the queue manager on `rameses` is MP04.

The preceding information can be summarized as follows:

Machine name	Machine model	Operating system	Queue manager
forties	RM400	SINIX-N	MP01
bight	RM200	SINIX-N	MP02
rameses	MIS-2ES/2	DC/OSx	MP04

You should use these examples as a basis for your system. You need to generate configuration files that are appropriate to your SNA network.

For a further description on the contents of KOGS files and Transit (SINIX LU6.2) setup, see the *Transit SINIX Version 3.2 Administration of Transit* manual.

The KOGS files can be found in the directory /opt/lib/transit/KOGS.

“Working configuration files for Pyramid DC/OSx” on page 376 shows example working configuration files from the DC/OSx machine `rameses`. The file is /etc/opt/lu62/cpic_cfg. For further information on the format of this file see the Pyramid Technology publications *OpenNet LU 6.2, System Administrator’s Guide*, and *OpenNet SNA Engine, System Administrator’s Guide*.

“Output of dbd command” on page 376 is the output of the dbd command on cfg.ncpram, which is a binary configuration file created by the **cm** command.

Configuration file on bight

```
* Transit config file for bight (RM200).
* Versionen und Korrekturstaende
*      TRANSIT-SERVER V 3.3  confnuc.h K1
*      SNA_Kgen K1

 XLINK     lforties,
                    ACT         = AUTO,
                    TYP         = LAN,
                    XID         = 00000400,
                    CPNAME      = CP.FORTIES,
                    CONFSTR     = /opt/lib/llc2/conf.str,
                    DEVICE      = tr0,
                    SSAP        = 04
 XPU       pbight,
                    TYP         = PEER,
                    CONNECT     = AUTO,
*                   DISCNT      = AUTO,
                    LINK        = lforties,
                    NVSCONNECT  = PARTNER,
                    MAXDATA     = 1033,
                    XID         = 00000200,
                    CPNAME      = CP.BIGHT,
                    ROLE        = NEG,
                    PAUSE       = 3,
                    RETRIES     = 10,
                    DMAC        = 000F01626436,
                    DSAP        = 04,
                    RWINDOW     = 7
 XLU       forties,
                    TYP         = 6,
                    PUCONNECT   = APHSTART,
                    CTYP        = PUBLIC,
                    SESS-LMT    = 130,
                    SESS-CTR    = IND,
                    NETNAME     = SNI.FORTIES,
                    PAIR        = bight MODE1
 XRLU      bight,
                    NETNAME     = SNI.BIGHT,
                    PU          = pbight
 XMODE     MODE1,
                    SESS-MAX    = 13,
                    SESS-LOS    = 6,
                    SESS-WIN    = 7,
                    SESS-AUTO   = 7,
                    SRU-MAX     = 87,
                    RRU-MAX     = 87,
                    PAC-SEND    = 0,
                    PAC-RCV     = 0
 XSYMDEST  sendMP02,
                    RLU         = bight,
                    MODE        = MODE1,
                    TP          = recvMP02,
                    TP-TYP      = USER,
                    SEC-TYP     = NONE
 XTP       recvMP01,
                    UID         = guenther,
                    TYP         = USER,
                    PATH        = /home/guenther/recvMP01.sh,
                    SECURE      = NO

 XEND
```

Configuration file on forties

```
* Transit config file for forties (RM 400).
* Versionen und Korrekturstaende
*       TRANSIT-SERVER V 3.3  confnuc.h K1
*       SNA_Kgen K1

 XLINK     lbight,
                   ACT         = AUTO,
                   TYP         = LAN,
                   XID         = 00000200,
                   CPNAME      = CP.BIGHT,
                   CONFSTR     = /opt/lib/llc2/conf.str,
                   DEVICE      = tr0,
                   SSAP        = 04

 XPU       pforties,
                   TYP         = PEER,
                   CONNECT     = AUTO,
                   DISCNT      = AUTO,
                   LINK        = lbight,
                   NVSCONNECT  = PARTNER,
                   MAXDATA     = 1033,
                   XID         = 00000400,
                   CPNAME      = CP.FORTIES,
                   ROLE        = NEG,
                   PAUSE       = 3,
                   RETRIES     = 10,
                   DMAC        = 00006f106935,
                   DSAP        = 04,
                   RWINDOW     = 7
 XLU       bight,
                   TYP         = 6,
                   PUCONNECT   = APHSTART,
                   CTYP        = PUBLIC,
                   SESS-LMT    = 15,
                   SESS-CTR    = IND,
                   NETNAME     = SNI.BIGHT,
                   PAIR        = forties MODE1
 XRLU      forties,
                   NETNAME     = SNI.FORTIES,
                   PU          = pforties
 XMODE     MODE1,
                   SESS-MAX    = 13,
                   SESS-LOS    = 7,
                   SESS-WIN    = 6,
                   SESS-AUTO   = 6,
                   SRU-MAX     = 87,
                   RRU-MAX     = 87,
                   PAC-SEND    = 0,
                   PAC-RCV     = 0
 XSYMDEST  sendMP01,
                   RLU         = forties,
                   MODE        = MODE1,
                   TP          = recvMP01,
                   TP-TYP      = USER,
                   SEC-TYP     = NONE
 XTP       recvMP02,
                   UID         = guenther,
                   TYP         = USER,
                   PATH        = /home/guenther/recvMP02.sh,
                   SECURE      = NO



 XEND
```

Working configuration files for Pyramid DC/OSx

```
#
# This is the side information file for CPI-C.
#
# The default file name is /etc/opt/lu62/cpic_cfg, use set environmental
# variable CPIC_CFG to change the default.
#
#
# The lines starting with # are for comments; no blank lines are allowed.
# The format of each line is "1 2 3 4 5 6 7 8 9" all in one line.
#       1 - symbolic destination name
#       2 - local LU name (locally known name)
#       3 - remote LU name (locally known name)
#       4 - mode name
#       5 - remote TP name
#       6 - trace flag (1 if you want the trace on, 0 otherwise)
#       7 - security type (0 for none, 2 for program)
#       8 - user id (omit if security type is 0)
#       9 - password (omit if security type is 0)
#
# The following are some examples:
#
#sendMP02       LRAMESES        BIGHT   MODE1   recvMP02        1       0
sendMP02        IYAFT1F0        IYAFT000        LU62PS  recvMP02        1  0
sendMP03        IYAFT1F0        IYAFT010        LU62PS  recvMP03        1  0
sendMP01        IYAFT1F0        IYAET120        LU62PS  recvMP01        1  0
sdEH01rc        IYAFT1F0        IYABT0F0        LU62PS  MP04RCV         1  0
sdEH01sv        IYAFT1F0        IYABT0F0        LU62PS  MP04SVR         1  0
sendM401        IYAFT1F0        IYAFT110        LU62PS  INTCRS6A        1  0
sendvm02        IYAFT1F0        IYCNVM02        LU62PS  DUMMY           1  0
sndvm2rc        IYAFT1F0        IYCMVM02        LU62PS  CKRC            1  0
sndvm2sd        IYAFT1F0        IYCMVM02        LU62PS  CKSD            1  0
sndvm2sv        IYAFT1F0        IYCMVM02        LU62PS  CKSV            1  0
```

Output of dbd command

```
        ****    COMMUNICATIONS MANAGER DATABASE    ****
Database version number 80


SNA CONTROLLER
        controller name: SNA
        controller execute name:
            'startsna62 -c 24'

62 MANAGER
        62 manager name: LU62MGR
        62 manager execute name:
            'lu62mgr'

LOCAL PU
        local pu name: IYAFT1F0
        controller name: SNA
        non-specific type pu
        unsolicited recfms is NOT supported
        xid format (0/3): 3

LOCAL LU
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        locally known local lu name: IYAFT1F0
        local pu name: IYAFT1F0
        lu number at the pu: 1
        lu6.2 type lu
        62 manager name: LU62MGR
        lu session limit: 100
        share limit: 2
        send window size: 7
        LU configuration options:
                is NOT the default lu
                will NOT terminate on disconnect
                printer can NOT be used in system mode
                independent LU on BF connections

REMOTE PU
        remote pu name: CPPG

REMOTE LU
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f0 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT000
        locally known remote lu name: IYAFT000
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        uniterpreted remote lu name (hex): c9 e8 c1 c6 e3 f0 f0 f0
        uniterpreted remote lu name (ebcdic): IYAFT000
        remote pu name: CPPG
        session initiation requests are initiate or queue
        parallel sessions supported
        no security information accepted
        lu-lu verification NOT required
        lu-lu password not displayed for security reasons

REMOTE LU
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f1 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT010
        locally known remote lu name: IYAFT010
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        uniterpreted remote lu name (hex): c9 e8 c1 c6 e3 f0 f1 f0
        uniterpreted remote lu name (ebcdic): IYAFT010
        remote pu name: CPPG
        session initiation requests are initiate or queue
        parallel sessions supported
        no security information accepted
        lu-lu verification NOT required
        lu-lu password not displayed for security reasons

REMOTE LU
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c5 e3 f1 f2 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAET120
        locally known remote lu name: IYAET120
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        uniterpreted remote lu name (hex): c9 e8 c1 c5 e3 f1 f2 f0
        uniterpreted remote lu name (ebcdic): IYAET120
        remote pu name: CPPG
        session initiation requests are initiate or queue
        parallel sessions supported
        no security information accepted
        lu-lu verification NOT required
        lu-lu password not displayed for security reasons

MODE
        mode name (hex): e2 d5 c1 e2 e5 c3 d4 c7
        mode name (ebcdic): SNASVCMG
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f0 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT000
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 1

MODE
        mode name (hex): d3 e4 f6 f2 d7 e2
        mode name (ebcdic): LU62PS
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f0 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT000
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 5

MODE
        mode name (hex): e2 d5 c1 e2 e5 c3 d4 c7
        mode name (ebcdic): SNASVCMG
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f1 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT010
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 1

MODE
        mode name (hex): d3 e4 f6 f2 d7 e2
        mode name (ebcdic): LU62PS
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f0 f1 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAFT010
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 5

MODE
        mode name (hex): e2 d5 c1 e2 e5 c3 d4 c7
        mode name (ebcdic): SNASVCMG
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c5 e3 f1 f2 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAET120
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 1

MODE
        mode name (hex): d3 e4 f6 f2 d7 e2
        mode name (ebcdic): LU62PS
        fully qualified local lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c6 e3 f1 c6 f0
        fully qualified local lu name (ebcdic): GBIBMIYA.IYAFT1F0
        fully qualified remote lu name (hex): c7 c2 c9 c2 d4 c9 e8 c1 4b c9 e8 c1 c5 e3 f1 f2 f0
        fully qualified remote lu name (ebcdic): GBIBMIYA.IYAET120
        line class name: leased
        send pacing window: 7
        receive pacing window: 7
        lower bound max RU size, send: 128
        upper bound max RU size, send: 896
        lower bound max RU size, receive: 128
        upper bound max RU size, receive: 896
        synchronization level of none or confirm
        either lu may attempt to reinitiate the session
        cryptography not supported
        contention-winner automatic initiation limit: 5

TRANSACTION PROGRAM
        transaction program name (hex): 99 85 83 a5 d4 d7 f0 f4
        transaction program name (ebcdic): recvMP04
        transaction program execute name:
            '/home/guenther/recvMP04.sh'
        tp is enabled
        tp supports basic conversations
        tp supports mapped conversations
        tp supports confirm synchronization
        tp supports no synchronization
        no verification is required
        number of pip fields required: 0
        privilege mask (hex): 0
          (no   privileges)

TRANSACTION PROGRAM
        transaction program name (hex): 06 f1
        transaction program name (ebcdic): ?1
        transaction program execute name:
            '06f1'
        tp is enabled
        tp supports basic conversations
        tp supports confirm synchronization
        tp supports no synchronization
        no verification is required
        number of pip fields required: 0
        privilege mask (hex): 82
          (cnos - allocate_service_tp   privileges)

TOKEN RING COMMUNICATIONS MEDIA
        line name: LINE0
        line number: 0
        controller name: SNA
        line class: leased

LOCAL LINK STATION
        link station name: LYAFT1F0
        pu name: IYAFT1F0
        line name: LINE0
        secondary station
        LSAP address (in hex): 04
        i-field size: 1033
        Acknowledgement delay window size : 7
        Acknowledgement delay timeout in tenth of seconds : 3
        Retry count : 20
        Retry timeout in seconds : 3
        send xid block number:  0 5d
        send xid id number:  3 0f 5c
        send xid control vector:

REMOTE LINK STATION
        link station name: LCPPG
        pu name: CPPG
        line name: LINE0
        primary station
        MAC address: 40 00 45 12 10 88
        LSAP address (in hex): 04
        i-field size: 1033
        Remote station type : BF
        send xid block number:
        send xid id number:
        send xid control vector:
```

Part 4. DQM in WebSphere MQ for z/OS

Important notice

Distributed queuing using CICS ISC is retained for compatibility with previous releases; there will be no further enhancements to this function. Therefore you are recommended to use the channel initiator for distributed queuing.

Chapter 24. Monitoring and controlling channels on z/OS

Use the DQM commands and panels to create, monitor, and control the channels to remote queue managers. Each z/OS queue manager has a DQM program (the *channel initiator*) for controlling interconnections to remote queue managers using native z/OS facilities.

The implementation of these panels and commands on z/OS is integrated into the operations and control panels and the MQSC commands. No differentiation is made in the organization of these two sets of panels and commands.

The information in this chapter applies in all cases where the channel initiator is used for distributed queuing. It applies whether or not you are using queue-sharing groups, or intra-group queuing.

If you are using CICS for DQM, the information in this chapter does not apply. See Chapter 29, "Monitoring and controlling channels in z/OS with CICS", on page 427 for more information.

The DQM channel control function

The channel control function provides the administration and control of message channels between WebSphere MQ for z/OS and remote systems. See Figure 28 on page 58 for a conceptual picture.

The channel control function consists of panels, commands and programs, two synchronization queues, channel command queues, and the channel definitions. The following is a brief description of the components of the channel control function.

- The channel definitions are held as objects in page set zero or in DB2®, like other WebSphere MQ objects in z/OS.
- You use the operations and control panels or MQSC commands to:
  - Create, copy, display, alter, and delete channel definitions
  - Start and stop channel initiators and listeners
  - Start, stop, and ping channels, reset channel sequence numbers, and resolve in-doubt messages when links cannot be re-established
  - Display status information about channels
  - Display information about DQM

  In particular, you can use the CSQINPX initialization input data set to issue your MQSC commands. This can be processed every time you start the channel initiator. See the *WebSphere MQ for z/OS Concepts and Planning Guide* for information about this.
- There are two queues (SYSTEM.CHANNEL.SYNCQ and SYSTEM.QSG.CHANNEL.SYNCQ) used for channel re-synchronization purposes. You should define these with INDXTYPE(MSGID) for performance reasons.
- The channel command queue (SYSTEM.CHANNEL.INITQ) is used to hold commands for channel initiators, channels, and listeners.

Channel control function

- The channel control function program runs in its own address space, separate from the queue manager, and comprises the channel initiator, listeners, MCAs, trigger monitor, and command handler.
- For queue-sharing groups and shared channels, see Chapter 34, “Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups”, on page 483.
- For intra-group queuing, see Chapter 38, “Intra-group queuing”, on page 505

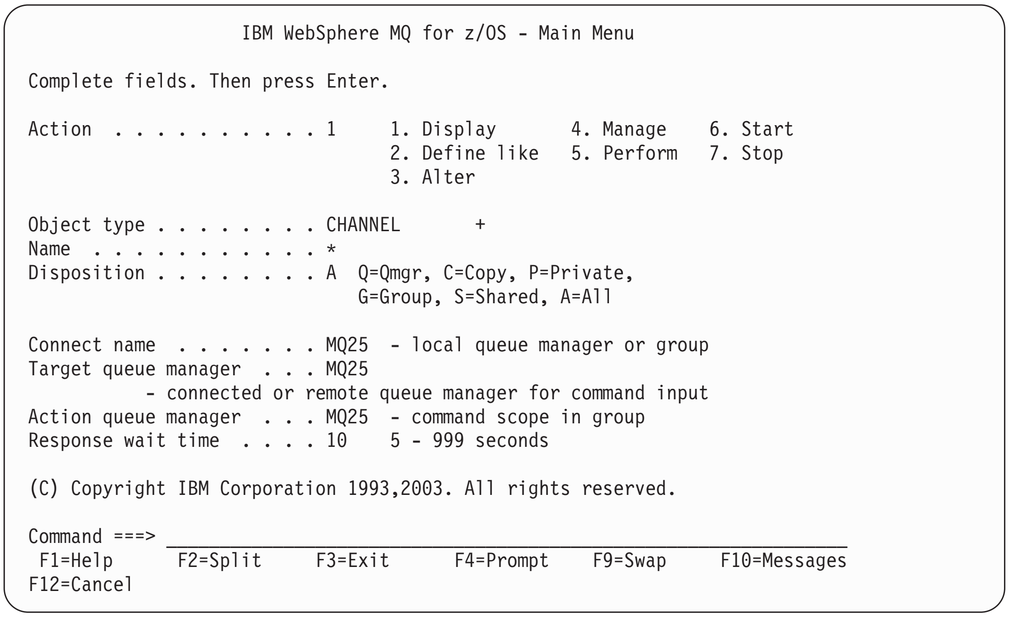
Using the panels and the commands

You can use either the MQSC commands or the operations and control panels to manage DQM. For information about the syntax of the MQSC commands, see the *WebSphere MQ Script (MQSC) Command Reference* book.

Using the initial panel

For an introduction to invoking the operations and control panels, using the function keys, and getting help, see the *WebSphere MQ for z/OS System Administration Guide*.

Note: To use the operations and control panels, you must have the correct security authorization; see the *WebSphere MQ for z/OS System Setup Guide* for information. Figure 39 shows the panel that is displayed when you start a panel session. The text after the panel explains the actions you should perform in this panel.
+



```
                    IBM WebSphere MQ for z/OS - Main Menu

Complete fields. Then press Enter.

Action  . . . . . . . . . . 1     1. Display       4. Manage    6. Start
                                  2. Define like   5. Perform   7. Stop
                                  3. Alter

Object type . . . . . . . . CHANNEL       +
Name  . . . . . . . . . . . *
Disposition . . . . . . . . A  Q=Qmgr, C=Copy, P=Private,
                               G=Group, S=Shared, A=All

Connect name  . . . . . . . MQ25  - local queue manager or group
Target queue manager  . . . MQ25
           - connected or remote queue manager for command input
Action queue manager  . . . MQ25  - command scope in group
Response wait time  . . . . 10    5 - 999 seconds

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Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F4=Prompt    F9=Swap     F10=Messages
F12=Cancel
```

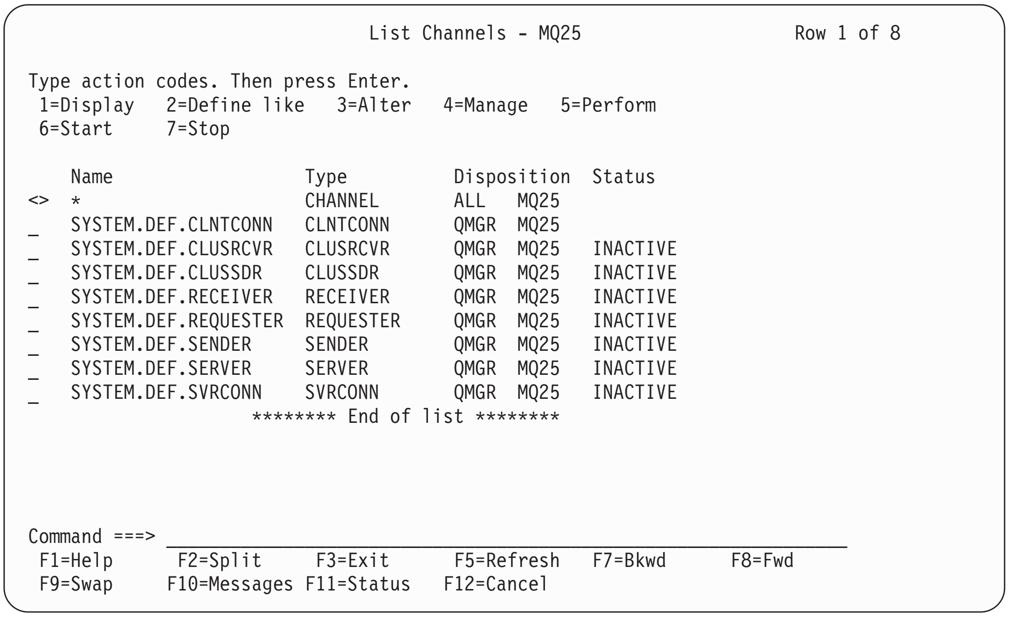
Figure 39. The operations and controls initial panel

From this panel you can:

- Select the action you want to perform by typing in the appropriate number in the **Action** field.
- Specify the object type that you want to work with. Press F4 for a list of object types if you are not sure what they are.
- Display a list of objects of the type specified. Type in an asterisk (*) in the **Name** field and press Enter to display a list of objects (of the type specified) that have

already been defined on this subsystem. You can then select one or more objects to work with in sequence. Figure 40 shows a list of channels produced in this way.

- Specify the disposition in the queue-sharing group of the objects you want to work with in the **Disposition** field. The disposition determines where the object is kept and how the object behaves.
- Choose the local queue manager, or queue-sharing group to which you want to connect in the **Connect name** field. If you want the commands to be issued on a remote queue manager, choose either the **Target queue manager** field or the **Action queue manager** field, depending upon whether the remote queue manager is not or is a member of a queue-sharing group. If the remote queue manager is *not* a member of a queue-sharing group, choose the **Target queue manager** field. If the remote queue manager *is* a member of a queue-sharing group, choose the **Action queue manager** field.
- Choose the wait time for responses to be received in the **Response wait time** field.



```
                                List Channels - MQ25                Row 1 of 8

Type action codes. Then press Enter.
 1=Display   2=Define like   3=Alter   4=Manage   5=Perform
 6=Start     7=Stop

    Name                 Type          Disposition  Status
<>  *                    CHANNEL       ALL   MQ25
_   SYSTEM.DEF.CLNTCONN   CLNTCONN      QMGR  MQ25
_   SYSTEM.DEF.CLUSRCVR   CLUSRCVR      QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.CLUSSDR    CLUSSDR       QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.RECEIVER   RECEIVER      QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.REQUESTER  REQUESTER     QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.SENDER     SENDER        QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.SERVER     SERVER        QMGR  MQ25   INACTIVE
_   SYSTEM.DEF.SVRCONN    SVRCONN       QMGR  MQ25   INACTIVE
                   ******** End of list ********




Command ===> _________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F5=Refresh   F7=Bkwd      F8=Fwd
 F9=Swap     F10=Messages F11=Status   F12=Cancel
```

Figure 40. Listing channels

Managing your channels

Table 33 lists the tasks that you can perform to manage your channels, channel initiators, and listeners. It also gives the name of the relevant MQSC command, and points to the page where each task is discussed.

Table 33. Channel tasks

Task to be performed	MQSC command	See page
Define a channel	DEFINE CHANNEL	388
Alter a channel definition	ALTER CHANNEL	389
Display a channel definition	DISPLAY CHANNEL	389
Delete a channel definition	DELETE CHANNEL	389
Start a channel initiator	START CHINIT	390
Stop a channel initiator	STOP CHINIT	391
Display channel initiator information	DISPLAY DQM	390
Start a channel listener	START LISTENER	392
Stop a channel listener	STOP LISTENER	393
Start a channel	START CHANNEL	393
Test a channel	PING CHANNEL	395
Reset message sequence numbers for a channel	RESET CHANNEL	395
Resolve in-doubt messages on a channel	RESOLVE CHANNEL	396
Stop a channel	STOP CHANNEL	396
Display channel status	DISPLAY CHSTATUS	398
Display cluster channels	DISPLAY CLUSQMGR	399

Defining a channel

To define a channel using the MQSC commands, use DEFINE CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	**Value**
Action	2 (Define like)
Object type	channel type (for example SENDER) or CHANNEL
Name	
Disposition	The location of the new object.

You are presented with some panels to complete with information about the name and attributes you want for the channel you are defining. They are initialized with the default attribute values. Change any you want before pressing Enter.

Note: If you entered CHANNEL in the **object type** field, you are presented with the Select a Valid Channel Type panel first.

If you want to define a channel with the same attributes as an existing channel, put the name of the channel you want to copy in the **Name** field on the initial panel. The panels will be initialized with the attributes of the existing object.

For information about the channel attributes, see Chapter 6, “Channel attributes”, on page 77

Notes:

1. If you are using distributed queuing with CICS as well, don’t use any of the same channel names.
2. You are strongly recommended to name all the channels in your network uniquely. As shown in Table 1 on page 30, including the source and target queue manager names in the channel name is a good way to do this.

Altering a channel definition

To alter a channel definition using the MQSC commands, use ALTER CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	3 (Alter)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.ALTER
Disposition	The location of the stored object.

You are presented with some panels containing information about the current attributes of the channel. Change any of the unprotected fields that you want by overtyping the new value, and then press Enter to change the channel definition.

For information about the channel attributes, see Chapter 6, “Channel attributes”, on page 77.

Displaying a channel definition

To display a channel definition using the MQSC commands, use DISPLAY CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	1 (Display)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.DISPLAY
Disposition	The location of the object.

You are presented with some panels displaying information about the current attributes of the channel.

For information about the channel attributes, see Chapter 6, “Channel attributes”, on page 77.

Deleting a channel definition

To delete a channel definition using the MQSC commands, use DELETE CHANNEL.

Deleting a channel definition

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	4 (Manage)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.DELETE
Disposition	The location of the object.

You are presented with another panel. Select function type 1 on this panel.

Press Enter to delete the channel definition; you will be asked to confirm that you want to delete the channel definition by pressing Enter again.

Note: The channel initiator has to be running before a channel definition can be deleted (except for client-connection channels).

Displaying information about DQM

To display information about the channel initiator using the MQSC commands, use DISPLAY DQM.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	1 (Display)
Object type	SYSTEM
Name	Blank

You are presented with another panel. Select function type 1 on this panel.

Notes:

1. Displaying distributed queuing information may take some time if you have lots of channels.
2. The channel initiator has to be running before you can display information about distributed queuing.

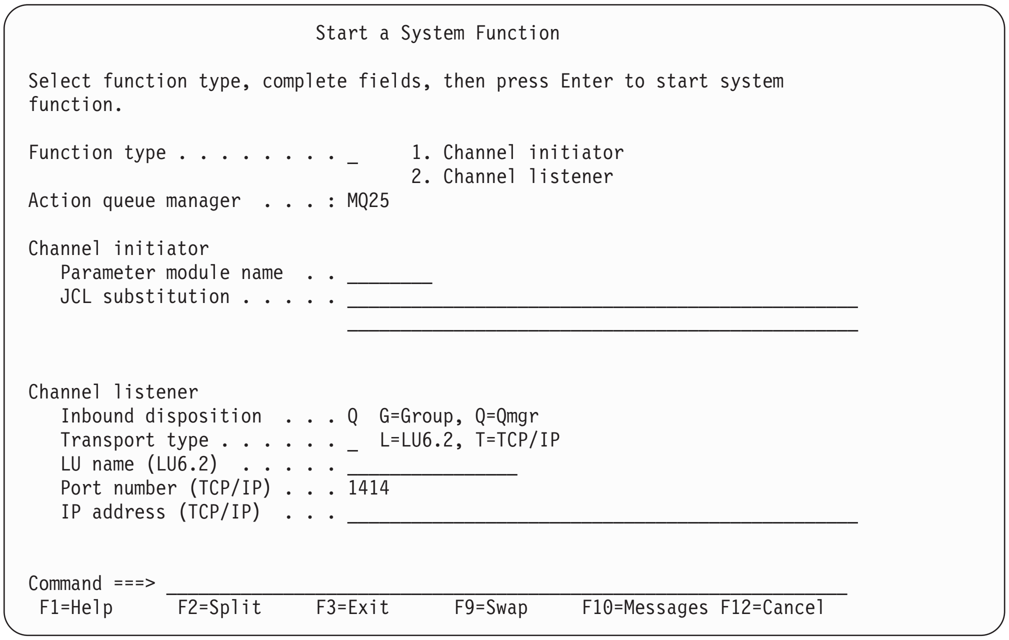
Starting a channel initiator

To start a channel initiator using the MQSC commands, use START CHINIT.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	6 (Start)
Object type	SYSTEM
Name	Blank

The Start a System Function panel is displayed. The text following the panel below explains what action you should take.:



```
                             Start a System Function

Select function type, complete fields, then press Enter to start system
function.

Function type . . . . . . . . _     1. Channel initiator
                                    2. Channel listener
Action queue manager  . . . : MQ25

Channel initiator
   Parameter module name  . . ________
   JCL substitution . . . . . ________________________________________________
                              ________________________________________________


Channel listener
   Inbound disposition  . . . Q  G=Group, Q=Qmgr
   Transport type . . . . . . _  L=LU6.2, T=TCP/IP
   LU name (LU6.2)  . . . . . ________________
   Port number (TCP/IP) . . . 1414
   IP address (TCP/IP)  . . . ________________________________________________


Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F9=Swap     F10=Messages F12=Cancel
```

Figure 41. Starting a system function

Select function type 1 (channel initiator), and press Enter. The channel initiator parameter module name defaults to CSQXPARM. If you want to use a different parameter module, enter the name on the panel.

Note: If you are using Interlink TCP, this must be started before you start the channel initiator. If you are using IBM TCP, you can start the channel initiator first but, unless you are using OE sockets, you will need to restart the channel initiator after you have started TCP, in order to establish communication. If you are using LU 6.2, this can be started before or after the channel initiator.

Stopping a channel initiator

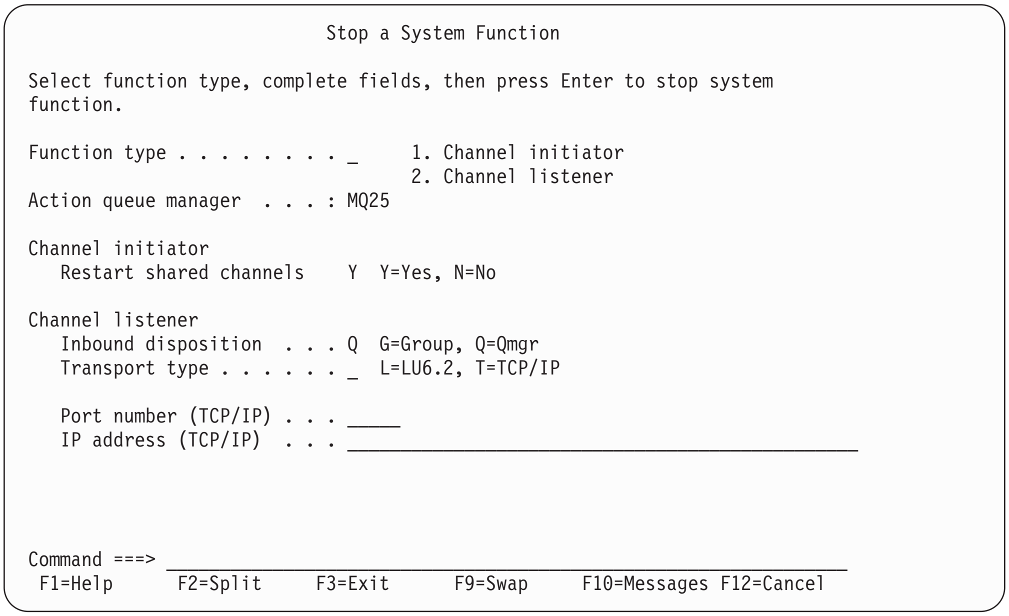
To stop a channel initiator using the MQSC commands, use STOP CHINIT.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	**Value**
Action	7 (Stop)
Object type	SYSTEM
Name	Blank

The Stop a System Function panel is displayed. The text following the panel explains how you should use this panel:

Stopping a channel initiator



```
                             Stop a System Function

Select function type, complete fields, then press Enter to stop system
function.

Function type . . . . . . . . _     1. Channel initiator
                                    2. Channel listener
Action queue manager  . . . : MQ25

Channel initiator
   Restart shared channels    Y  Y=Yes, N=No

Channel listener
   Inbound disposition  . . . Q  G=Group, Q=Qmgr
   Transport type . . . . . . _  L=LU6.2, T=TCP/IP

   Port number (TCP/IP) . . . _____
   IP address (TCP/IP)  . . . ________________________________________________




Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F9=Swap     F10=Messages F12=Cancel
```

Figure 42. Stopping a function control

Select function type 1 (channel initiator) and press Enter.

The channel initiator will wait for all running channels to stop in quiesce mode before it stops.

Note: If some of the channels are receiver or requester channels that are running but not active, a stop request issued to either the receiver's or sender's channel initiator will cause it to stop immediately.

However, if messages are flowing, the channel initiator waits for the current batch of messages to complete before it stops.

Starting a channel listener

To start a channel listener using the MQSC commands, use START LISTENER.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	**Value**
Action	6 (Start)
Object type	SYSTEM
Name	Blank

The Start a System Function panel is displayed (see Figure 41 on page 391).

Select function type 2 (channel listener). Select Inbound disposition. Select Transport type. If the Transport type is L, select LU name. If the Transport type is T, select Port number and (optionally) IP address. Press Enter.

Note: For the TCP/IP listener, you can start multiple combinations of Port and IP address.

Stopping a channel listener

To stop a channel listener using the MQSC commands, use STOP LISTENER.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	7 (Stop)
Object type	SYSTEM
Name	Blank

The Stop a System Function panel is displayed (see Figure 42 on page 392).

Select function type 2 (channel listener). Select Inbound disposition. Select Transport type. If the transport type is ’T’, select Port number and (optionally) IP address. Press Enter.

Note: For a TCP/IP listener, you can stop specific combinations of Port and IP address, or you can stop all combinations.

Starting a channel

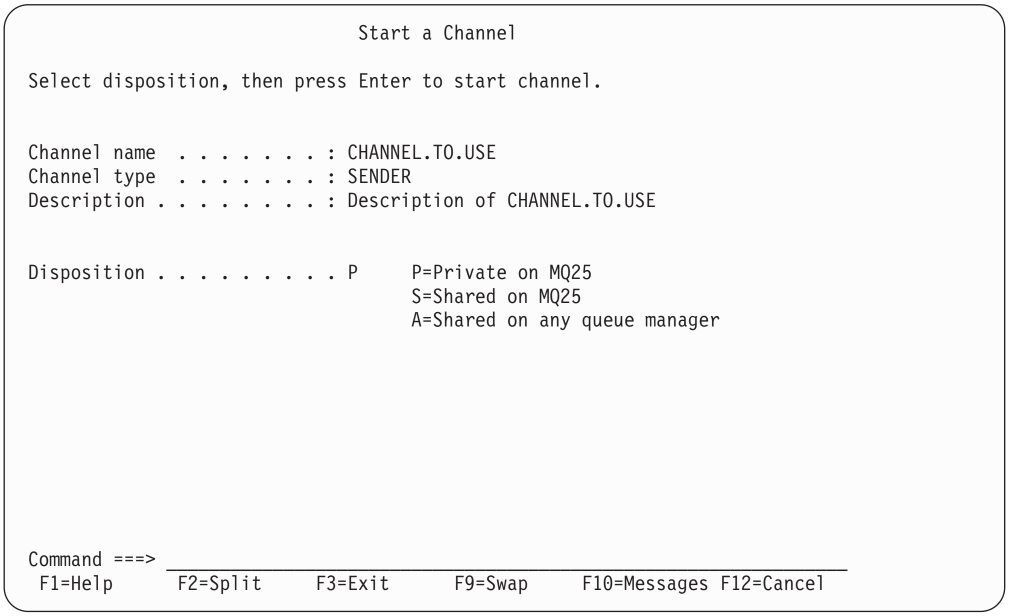
To start a channel using the MQSC commands, use START CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	6 (Start)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.USE
Disposition	The disposition of the object.

The Start a Channel panel is displayed. The text following the panel explains how to use the panel.:

Starting a channel



```
                              Start a Channel

Select disposition, then press Enter to start channel.


Channel name  . . . . . . . : CHANNEL.TO.USE
Channel type  . . . . . . . : SENDER
Description . . . . . . . . : Description of CHANNEL.TO.USE


Disposition . . . . . . . . . P     P=Private on MQ25
                                    S=Shared on MQ25
                                    A=Shared on any queue manager










Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F9=Swap     F10=Messages F12=Cancel
```

Figure 43. Starting a channel

Select the disposition of the channel instance and on which queue manager it is to be started.

Press Enter to start the channel.

Starting a shared channel

To start a shared channel, and keep it on a nominated channel initiator, use disposition = S (on the START CHANNEL command, specify CHLDISP(FIXSHARED)).

When you start a channel in this way, the following rules apply to that channel:

- You can stop the channel from any queue manager in the queue-sharing group. You can do this even if the channel initiator on which it was started is not running at the time you issue the stop-channel request. When the channel has stopped, you can restart it by specifying disposition = S (CHLDISP(FIXSHARED)) on the same, or another, channel initiator. You can also start it by specifying disposition = A (CHLDISP(SHARED)).
- If the channel is in the starting or retry state, you can restart it by specifying disposition = S (CHLDISP(FIXSHARED)) on the same or a different channel initiator. You can also start it by specifying disposition = A (CHLDISP(SHARED)).
- The channel is eligible to be trigger started when it goes into the inactive state. Shared channels that are trigger started always have a shared disposition (CHLDISP(SHARED)).
- The channel is eligible to be started with CHLDISP(FIXSHARED), on any channel initiator, when it goes into the inactive state. You can also start it by specifying disposition = A (CHLDISP(SHARED)).
- The channel is not recovered by any other active channel initiator in the queue-sharing group when the channel initiator on which it was started is stopped with SHARED(RESTART), or when the channel initiator terminates abnormally. The channel is recovered only when the channel initiator on which it was started is next restarted. This stops failed channel-recovery attempts being passed to other channel initiators in the queue-sharing group, which would add to their workload.

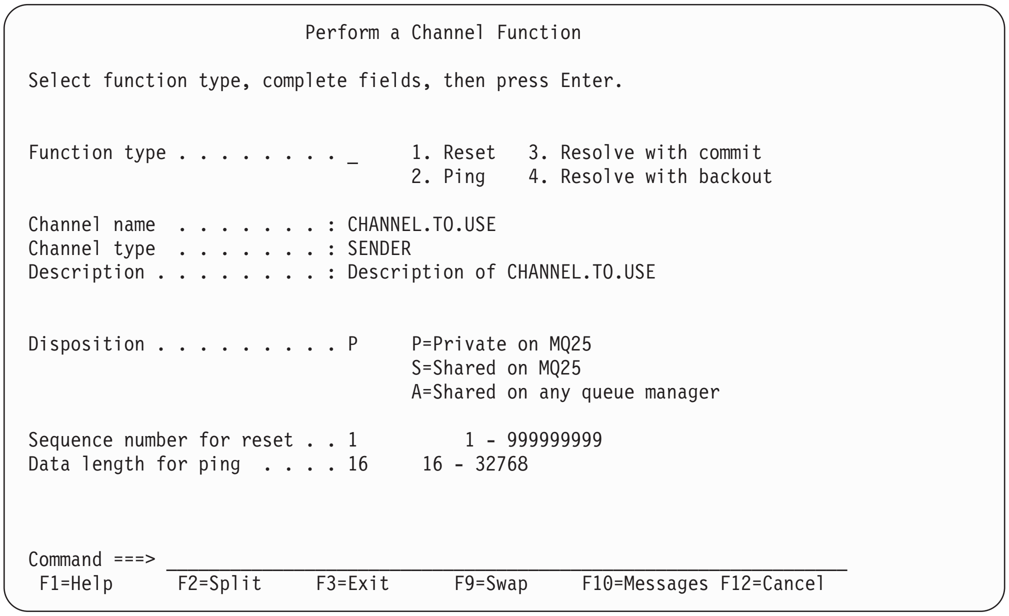
Testing a channel

To test a channel using the MQSC commands, use PING CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	**Value**
Action	5 (Perform™)
Object type	SENDER, SERVER, or CHANNEL
Name	CHANNEL.TO.USE
Disposition	The disposition of the channel object.

The Perform a Channel Function panel is displayed. The text following the panel explains how to use the panel.:



```
                         Perform a Channel Function

 Select function type, complete fields, then press Enter.


 Function type . . . . . . . . _     1. Reset   3. Resolve with commit
                                     2. Ping    4. Resolve with backout

 Channel name  . . . . . . . : CHANNEL.TO.USE
 Channel type  . . . . . . . : SENDER
 Description . . . . . . . . : Description of CHANNEL.TO.USE


 Disposition . . . . . . . . . P     P=Private on MQ25
                                     S=Shared on MQ25
                                     A=Shared on any queue manager

 Sequence number for reset . . 1          1 - 999999999
 Data length for ping  . . . . 16     16 - 32768



 Command ===> ________________________________________________________________
  F1=Help      F2=Split     F3=Exit      F9=Swap     F10=Messages F12=Cancel
```

Figure 44. Testing a channel

Select function type 2 (ping).

Select the disposition of the channel for which the test is to be done and on which queue manager it is to be tested.

The data length is initially set to 16. Change it if you want and press Enter.

Resetting message sequence numbers for a channel

To reset channel sequence numbers using the MQSC commands, use RESET CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Resetting message sequence numbers

Field	Value
Action	5 (Perform)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.USE
Disposition	The disposition of the channel object.

The Perform a Channel Function panel is displayed (see Figure 44 on page 395).

Select Function type 1 (reset).

Select the disposition of the channel for which the reset is to be done and on which queue manager it is to be done.

The **sequence number** field is initially set to one. Change this if you want, and press Enter.

Resolving in-doubt messages on a channel

To resolve in-doubt messages on a channel using the MQSC commands, use RESOLVE CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	5 (Perform)
Object type	SENDER, SERVER, or CHANNEL
Name	CHANNEL.TO.USE
Disposition	The disposition of the object.

The Perform a Channel Function panel is displayed (see Figure 44 on page 395).

Select Function type 3 or 4 (resolve with commit or backout). (See “In-doubt channels” on page 70 for more information.)

Select the disposition of the channel for which resolution is to be done and which queue manager it is to be done on. Press Enter.

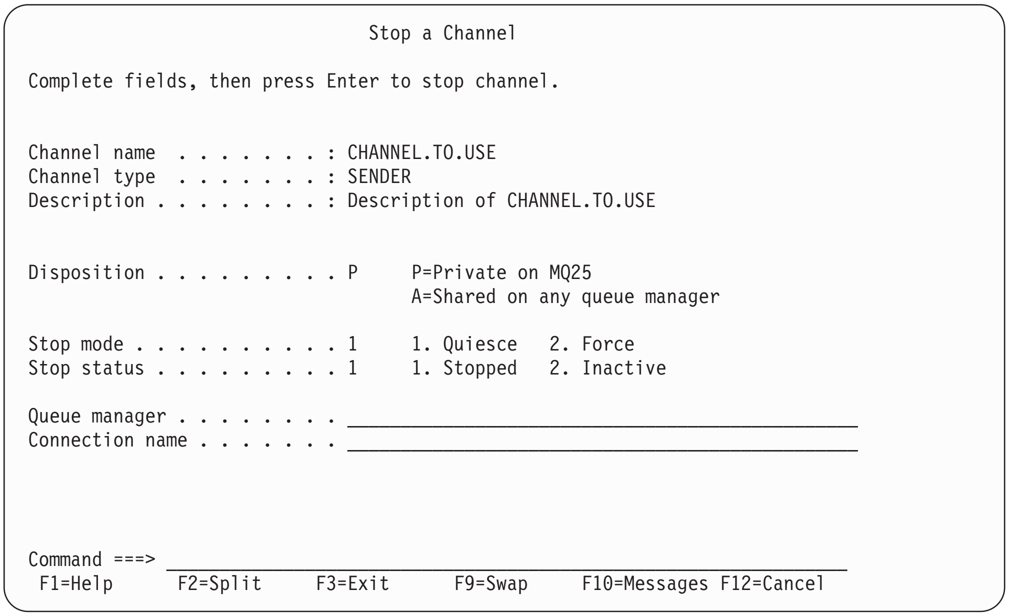
Stopping a channel

To stop a channel using the MQSC commands, use STOP CHANNEL.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	Value
Action	7 (Stop)
Object type	channel type (for example SENDER) or CHANNEL
Name	CHANNEL.TO.USE
Disposition	The disposition of the object.

The Stop a Channel panel is displayed. The text following the panel explains how to use the panel.:



```
                                Stop a Channel

Complete fields, then press Enter to stop channel.


Channel name  . . . . . . . : CHANNEL.TO.USE
Channel type  . . . . . . . : SENDER
Description . . . . . . . . : Description of CHANNEL.TO.USE


Disposition . . . . . . . . . P     P=Private on MQ25
                                    A=Shared on any queue manager

Stop mode . . . . . . . . . . 1     1. Quiesce   2. Force
Stop status . . . . . . . . . 1     1. Stopped   2. Inactive

Queue manager . . . . . . . . ________________________________________________
Connection name . . . . . . . ________________________________________________




Command ===> __________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F9=Swap     F10=Messages F12=Cancel
```

Figure 45. Stopping a channel

Select the disposition of the channel for which the stop is to be done and on which queue manager it is to be stopped.

Choose the stop mode that you require:

Quiesce
: The channel will stop when the current message is completed and the batch will then be ended, even if the batch size value has not been reached and there are messages already waiting on the transmission queue. No new batches will be started. This is the default.

Force
: The channel stops immediately. If a batch of messages is in progress, an 'in-doubt' situation may result.

Choose the queue manager and connection name for the channel you want to stop.

Choose the status that you require:

Stopped
: The channel will not be restarted automatically, and must be restarted manually. This is the default value if no queue manager or connection name is specified. If a name is specified, it is not allowed.

Inactive
: The channel will be restarted automatically when required. This is the default value if a queue manager or connection name is specified.

Press Enter to stop the channel.

Usage notes

This section gives some usage notes about stopping a channel:

- If a shared channel is in a retry state and the channel initiator on which it was started is not running, a STOP request for the channel is issued on the queue manager where the command was entered.

Stopping a channel

See “Stopping and quiescing channels” on page 68 for more information. For information about restarting stopped channels, see “Restarting stopped channels” on page 69.

Displaying channel status

To display the status of a channel or a set of channels using the MQSC commands, use DISPLAY CHSTATUS.

Note: Displaying channel status information may take some time if you have lots of channels.

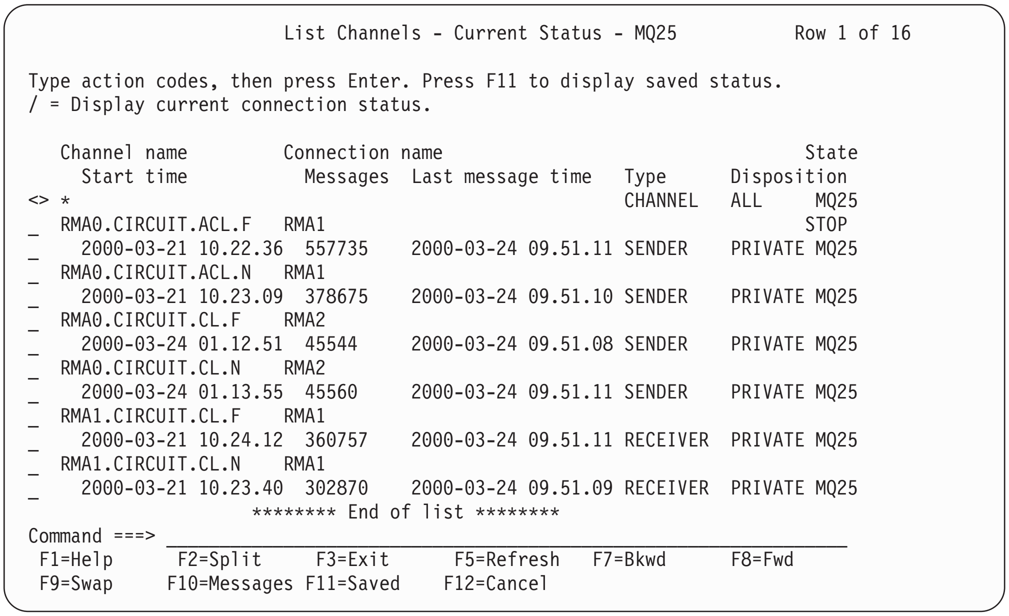
Using the operations and control panels on the List Channel panel (see Figure 40 on page 387), a summary of the channel status is shown for each channel as follows:

INACTIVE	No connections are active
status	One connection is active
nnn status	More than one connection is current and all current connections have the same status
nnn CURRENT	More than one connection is current and the current connections do not all have the same status
Blank	WebSphere MQ is unable to determine how many connections are active (for example, because the channel initiator is not running) **Note:** For channel objects with the disposition GROUP, no status is displayed.

where *nnn* is the number of active connections, and *status* is one of the following:

INIT	INITIALIZING
BIND	BINDING
START	STARTING
RUN	RUNNING
STOP	STOPPING or STOPPED
RETRY	RETRYING
REQST	REQUESTING

To display more information about the channel status, press the Status key (F11) on the List Channel or the Display, or Alter channel panels to display the List Channels - Current Status panel (see Figure 46 on page 399).



```
                        List Channels - Current Status - MQ25           Row 1 of 16

Type action codes, then press Enter. Press F11 to display saved status.
/ = Display current connection status.

   Channel name         Connection name                                  State
     Start time           Messages  Last message time   Type      Disposition
<> *                                                    CHANNEL   ALL     MQ25
_  RMA0.CIRCUIT.ACL.F   RMA1                                             STOP
_    2000-03-21 10.22.36  557735    2000-03-24 09.51.11 SENDER    PRIVATE MQ25
_  RMA0.CIRCUIT.ACL.N   RMA1
_    2000-03-21 10.23.09  378675    2000-03-24 09.51.10 SENDER    PRIVATE MQ25
_  RMA0.CIRCUIT.CL.F    RMA2
_    2000-03-24 01.12.51  45544     2000-03-24 09.51.08 SENDER    PRIVATE MQ25
_  RMA0.CIRCUIT.CL.N    RMA2
_    2000-03-24 01.13.55  45560     2000-03-24 09.51.11 SENDER    PRIVATE MQ25
_  RMA1.CIRCUIT.CL.F    RMA1
_    2000-03-21 10.24.12  360757    2000-03-24 09.51.11 RECEIVER  PRIVATE MQ25
_  RMA1.CIRCUIT.CL.N    RMA1
_    2000-03-21 10.23.40  302870    2000-03-24 09.51.09 RECEIVER  PRIVATE MQ25
                     ******** End of list ********
Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F5=Refresh   F7=Bkwd      F8=Fwd
 F9=Swap     F10=Messages F11=Saved    F12=Cancel
```

Figure 46. Listing channel connections

The values for status are as follows:

INIT	INITIALIZING
BIND	BINDING
START	STARTING
RUN	RUNNING
STOP	STOPPING or STOPPED
RETRY	RETRYING
REQST	REQUESTING
DOUBT	STOPPED and INDOUBT(YES)

See “Channel states” on page 61 for more information about these.

You can press F11 to see a similar list of channel connections with saved status; press F11 to get back to the **current** list. Note that the saved status does not apply until at least one batch of messages has been transmitted on the channel.

Use a slash (/) to select a connection and press Enter. The Display Channel Connection Current Status panels are displayed.

Displaying cluster channels

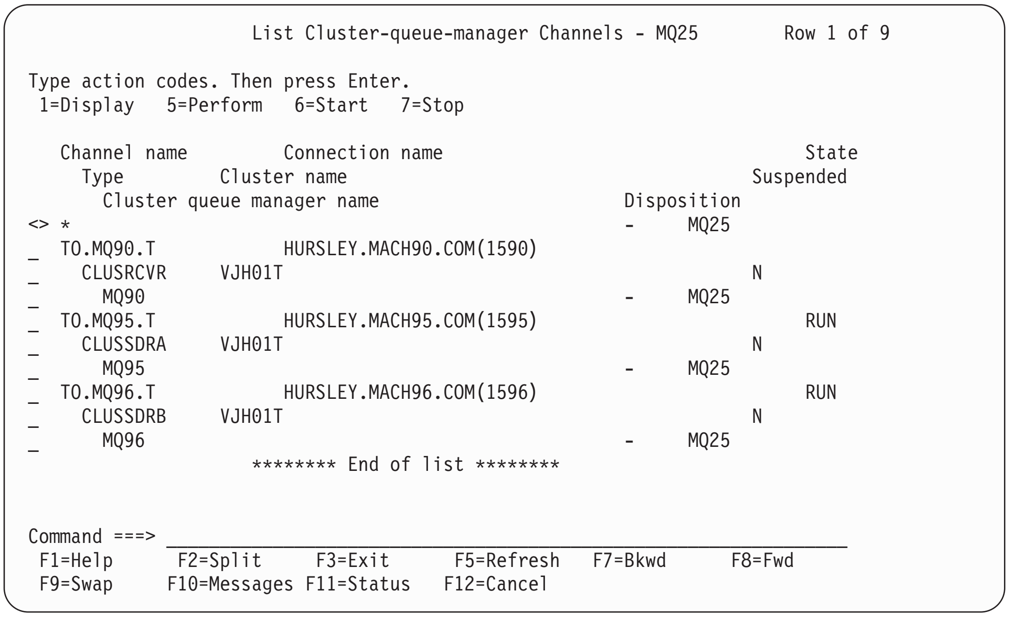
To display all the cluster channels that have been defined (explicitly or using auto-definition), use the MQSC command, DISPLAY CLUSQMGR.

Using the operations and control panels, starting from the initial panel, complete these fields and press Enter:

Field	**Value**
Action	1 (Display)
Object type	CLUSCHL
Name	*

Displaying cluster channels

You are presented with a panel like figure 47, in which the information for each cluster channel occupies three lines, and includes its channel, cluster, and queue manager names. For cluster-sender channels, the overall state is shown.



```
                     List Cluster-queue-manager Channels - MQ25        Row 1 of 9

Type action codes. Then press Enter.
 1=Display   5=Perform   6=Start   7=Stop

   Channel name         Connection name                                  State
     Type         Cluster name                                      Suspended
       Cluster queue manager name                       Disposition
<> *                                                    -     MQ25
_  TO.MQ90.T            HURSLEY.MACH90.COM(1590)
_    CLUSRCVR     VJH01T                                            N
_      MQ90                                             -     MQ25
_  TO.MQ95.T            HURSLEY.MACH95.COM(1595)                         RUN
_    CLUSSDRA     VJH01T                                            N
_      MQ95                                             -     MQ25
_  TO.MQ96.T            HURSLEY.MACH96.COM(1596)                         RUN
_    CLUSSDRB     VJH01T                                            N
_      MQ96                                             -     MQ25
                     ******** End of list ********


Command ===> ________________________________________________________________
 F1=Help      F2=Split     F3=Exit      F5=Refresh   F7=Bkwd      F8=Fwd
 F9=Swap     F10=Messages F11=Status   F12=Cancel
```

Figure 47. Listing cluster channels

To display full information about one or more channels, type Action code 1 against their names and press Enter. Use Action codes 5, 6, or 7 to perform functions (such as ping, resolve, and reset), and start or stop a cluster channel.

To display more information about the channel status, press the Status key (F11).

Chapter 25. Preparing WebSphere MQ for z/OS

This chapter describes the WebSphere MQ for z/OS preparations you need to make before you can start to use distributed queuing. If you are using queue-sharing groups, see Chapter 34, “Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups”, on page 483. (If you want to use CICS ISC for distributed queuing, see Chapter 30, “Preparing WebSphere MQ for z/OS when using CICS”, on page 457.) Much of the information here applies equally to MQSeries for OS/390 or MVS/ESA.

To enable distributed queuing, you must perform the following three tasks:

- Customize the distributed queuing facility and define the WebSphere MQ objects required; this is described in the *WebSphere MQ for z/OS Concepts and Planning Guide* and the *WebSphere MQ for z/OS System Setup Guide* .
- Define access security; this is described in the *WebSphere MQ for z/OS System Setup Guide* .
- Set up your communications; this is described in Chapter 26, “Setting up communication for z/OS”, on page 405.

Defining DQM requirements to WebSphere MQ

In order to define your distributed-queuing requirements, you have to:

- Define the channel initiator procedures and data sets
- Define the channel definitions
- Define the queues and other objects
- Define access security

See the *WebSphere MQ for z/OS Concepts and Planning Guide* for information about these tasks.

Defining WebSphere MQ objects

Use one of the WebSphere MQ command input methods to define WebSphere MQ objects. Refer to Chapter 24, “Monitoring and controlling channels on z/OS”, on page 385 for information about defining objects.

Transmission queues and triggering channels

Define the following:

- A local queue with the usage of XMITQ for each sending message channel.
- Remote queue definitions.

  A remote queue object has three distinct uses, depending upon the way the name and content are specified:
  - Remote queue definition
  - Queue manager alias definition
  - Reply-to queue alias definition

  This is shown in Table 2 on page 37.

Use the TRIGDATA field on the transmission queue to trigger the specified channel. For example:

```
DEFINE QLOCAL(MYXMITQ) USAGE(XMITQ) TRIGGER(YES) +
      INITQ(SYSTEM.CHANNEL.INITQ) TRIGDATA(MYCHANNEL)
DEFINE CHL(MYCHANNEL) CHLTYPE(SDR) TRPTYPE(TCP) +
      XMITQ(MYXMITQ) CONNAME('9.20.9.30(1555)')
```

The supplied sample CSQ4INYD gives additional examples of the necessary definitions.

Synchronization queue

DQM requires a queue for use with sequence numbers and logical units of work identifiers (LUWID). You must ensure that a queue is available with the name SYSTEM.CHANNEL.SYNCQ (see *WebSphere MQ for z/OS Concepts and Planning Guide*). This queue must be available otherwise the channel initiator cannot start.

Make sure that you define this queue using INDXTYPE(MSGID). This will improve the speed at which they can be accessed.

Channel command queues

You need to ensure that a channel command queue exists for your system with the name SYSTEM.CHANNEL.INITQ.

If the channel initiator detects a problem with the SYSTEM.CHANNEL.INITQ, it will be unable to continue normally until the problem is corrected. The problem could be one of the following:
- The queue is full
- The queue is not enabled for put
- The page set that the queue is on is full
- The channel initiator does not have the correct security authorization to the queue

If the definition of the queue is changed to GET(DISABLED) while the channel initiator is running, it will not be able to get messages from the queue, and will terminate.

Starting the channel initiator

Triggering is implemented using the channel initiator. On WebSphere MQ for z/OS, this is strarted with the MQSC command `START CHINIT PARM(xparm)` where `xparm` is your channel initiator parameter module.

Stopping the channel initiator

The channel initiator is stopped automatically when you stop the queue manager. If you need to stop the channel initiator but not the queue manager, you can use the MQSC command `STOP CHINIT`.

Other things to consider

Here are some other topics that you should consider when preparing WebSphere MQ for distributed queue management.

Operator messages

Because the channel initiator uses a number of asynchronously operating dispatchers, operator messages could appear on the log out of chronological sequence.

Channel operation commands

Channel operation commands generally involve two stages. When the command syntax has been checked and the existence of the channel verified, a request is sent to the channel initiator, and message CSQM134I or CSQM137I is sent to the command issuer to indicate the completion of the first stage. When the channel initiator has processed the command, further messages indicating its success or otherwise are send to the command issuer along with message CSQ9022I or CSQ9023I respectively. Any error messages generated could also be sent to the z/OS console.

All cluster commands except DISPLAY CLUSQMGR, however, work asynchronously. Commands that change object attributes update the object and send a request to the channel initiator, and commands for working with clusters are checked for syntax and a request is sent to the channel initiator. In both cases, message CSQM130I is sent to the command issuer indicating that a request has been sent; this is followed by message CSQ9022I to indicate that the command has completed successfully, in that a request has been sent. It does not indicate that the cluster request has completed successfully. The requests sent to the channel initiator are processed asynchronously, along with cluster requests received from other members of the cluster. In some cases, these requests have to be sent to the whole cluster to determine if they are successful or not. Any errors are reported to the z/OS on the system where the channel initiator is running. They are not sent to the command issuer.

Undelivered-message queue

A DLQ handler is provided with WebSphere MQ for z/OS. See *WebSphere MQ for z/OS System Administration Guide* for more information.

Queues in use

MCAs for receiver channels may keep the destination queues open even when messages are not being transmitted; this results in the queues appearing to be 'in use'.

Security changes

If you change security access for a user ID, the change may not take effect immediately. (See one of *WebSphere MQ for z/OS Concepts and Planning Guide*, *WebSphere MQ for z/OS System Setup Guide* and *WebSphere MQ for z/OS System Administration Guide* for more information.)

Communications stopped

TCP

If TCP is stopped for some reason and then restarted, the WebSphere MQ for z/OS TCP listener waiting on a TCP port is stopped.

If you are not using the OpenEdition® sockets interface, (for example, if you are using the IUCV interface or the Computer Associates SOLVE:TCPaccess interface,) the channel initiator must be stopped and manually restarted when TCP returns. Then, the listener must also be manually restarted to resume communications.

If you are using the OpenEdition sockets interface, automatic channel reconnect allows the channel initiator to detect that TCP/IP is not available and to automatically restart the TCP/IP listener when TCP/IP returns. This alleviates the need for operations staff to notice the problem with TCP/IP and manually restart the listener. While the listener is out of action, the channel initiator can also be used to retry the listener at the interval specified by LSTRTMR in the channel initiator parameter module. These attempts can continue until TCP/IP returns and the listener successfully restarts automatically. For information about LSTRTMR, see the *WebSphere MQ for z/OS System Setup Guide*.

LU6.2

If APPC is stopped, the listener is also stopped. Again, in this case, the listener automatically retries at the LSTRTMR interval so that, if APPC restarts, the listener can restart too.

If the DB2 fails, shared channels that are already running continue to run, but any new channel start requests will fail. When the DB2 is restored new requests are able to complete.

z/OS Automatic Restart Management (ARM)

Automatic restart management (ARM) is a z/OS recovery function that can improve the availability of specific batch jobs or started tasks (for example, subsystems), and therefore result in a faster resumption of productive work.

To use ARM, you must set up your queue managers and channel initiators in a particular way to make them restart automatically. For information about this, see *WebSphere MQ for z/OS Concepts and Planning Guide*.

Chapter 26. Setting up communication for z/OS

DQM is a remote queuing facility for WebSphere MQ. It provides channel control programs for the queue manager that form the interface to communication links. These links are controllable by the system operator. The channel definitions held by distributed queuing management use these connections.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This section explains how to do this.

You might also find it helpful to refer to Chapter 27, "Example configuration - IBM WebSphere MQ for z/OS", on page 409. For z/OS using CICS, see Chapter 31, "Setting up CICS communication for WebSphere MQ for z/OS", on page 461. If you are using queue sharing groups, see Chapter 35, "Setting up communication for WebSphere MQ for z/OS using queue-sharing groups", on page 489

Deciding on a connection

There are two forms of communication protocol that can be used:
- TCP
- LU 6.2 through APPC/MVS

Each channel definition must specify only one protocol as the transmission protocol (Transport Type) attribute. A queue manager can use more than one protocol to communicate.

Defining a TCP connection

The TCP address space name must be specified in the TCP system parameters data set, *tcpip*.TCPIP.DATA. In the data set, a "TCPIPJOBNAME *TCPIP_proc*" statement must be included.

The channel initiator address space must have authority to read the data set. The following techniques can be used to access your TCPIP.DATA data set, depending on which TCP/IP product and interface you are using:
- Environment variable, RESOLVER_CONFIG
- HFS file, /etc/resolv.conf
- //SYSTCPD DD statement
- //SYSTCPDD DD statement
- *jobname/userid*.TCPIP.DATA
- SYS1.TCPPARMS(TCPDATA)
- *zapname*.TCPIP.DATA

You must also be careful to specify the high-level qualifier for TCP/IP correctly.

You should have a suitably configured Domain Name System (DNS) server, capable of both Name to IP Address translation and IP Address to Name translation.

For more information, see the following:
- *TCP/IP OpenEdition: Planning and Release Guide*, SC31-8303
- *z/OS Unix System Services Planning*, GA22–7800
- Your SOLVE:TCPaccess documentation

Each TCP channel when started will use TCP resources; you may need to adjust the following parameters in your PROFILE.TCPIP configuration data set:

ACBPOOLSIZE
Add one per started TCP channel, plus one

CCBPOOLSIZE
Add one per started TCP channel, plus one per DQM dispatcher, plus one

DATABUFFERPOOLSIZE
Add two per started TCP channel, plus one

MAXFILEPROC
Controls how many channels each dispatcher in the channel initiator can handle.

This parameter is specified in the BPXPRMxx member of SYSI.PARMLIB. If you are using OpenEdition sockets, ensure that you specify a value large enough for your needs.

Sending end

The connection name (CONNAME) field in the channel definition should be set to either the TCP network address of the target, in dotted decimal form (for example 9.20.9.30) or the host name (for example MVSHUR1). If the connection name is a host name, a TCP name server is required to convert the host name into a TCP host address. (This is a function of TCP, not WebSphere MQ.)

On the initiating end of a connection (sender, requester, and server channel types) it is possible to provide an optional port number for the connection, for example:

Connection name
9.20.9.30(1555)

In this case the initiating end will attempt to connect to a receiving program listening on port 1555.

Receiving on TCP

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel. You start this listener program with the START LISTENER command, or using the operations and control panels.

By default, the TCP Listener program uses port 1414 and listens on all addresses available to your TCP stack. You may start your TCP listener program to only listen on a specific address or hostname by specifying IPADDR in the START LISTENER command. (For more information, see Chapter 34, “Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups”, on page 483, "Listeners".)

Using the TCP listener backlog option

When receiving on TCP/IP, a maximum number of outstanding connection requests is set. This can be considered a *backlog* of requests waiting on the TCP/IP port for the listener to accept the request.

The default listener backlog value on z/OS is 255. If the backlog reaches this values, the TCP/IP connection is rejected and the channel will not be able to start.

For MCA channels, this results in the channel going into a RETRY state and retrying the connection at a later time.

For client connections, the client receives an MQRC_Q_MGR_NOT_AVAILABLE reason code from MQCONN and should retry the connection at a later time.

Defining an LU6.2 connection

APPC/MVS setup

Each instance of the channel initiator must have the name of the LU that it is to use defined to APPC/MVS, in the APPCPMxx member of SYS1.PARMLIB, as in the following example:

```
LUADD ACBNAME(luname) NOSCHED TPDATA(CSQ.APPCTP)
```

luname is the name of the logical unit to be used. `NOSCHED` is required; `TPDATA` is not used. No additions are necessary to the ASCHPMxx member, or to the APPC/MVS TP profile data set.

The side information data set must be extended to define the connections used by DQM. See the supplied sample CSQ4SIDE for details of how to do this using the APPC utility program ATBSDFMU. For details of the TPNAME values to use, see the *Multiplatform APPC Configuration Guide* (“Red Book”) and the following table for information:

Table 34. Settings on the local z/OS system for a remote queue manager platform

Remote platform	TPNAME
z/OS, OS/390, or MVS/ESA	The same as TPNAME in the corresponding side information on the remote queue manager.
z/OS, OS/390, or MVS/ESA using CICS	CKRC (sender) CKSV (requester) CKRC (server)
OS/400	The same as the compare value in the routing entry on the OS/400 system.
OS/2	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file.
Compaq OpenVMS Alpha	As specified in the Digital OVMS Run Listener command.
Compaq NonStop Kernel	The same as the TPNAME specified in the receiver-channel definition.
Other UNIX systems	The same as TPNAME in the corresponding side information on the remote queue manager.
Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows.

If you have more than one queue manager on the same machine, ensure that the TPnames in the channel definitions are unique.

See the *Multiplatform APPC Configuration Guide* also for information about the VTAM definitions that may be required.

Deciding on a connection

In an environment where the queue manager is communicating via APPC with a queue manager on the same or another z/OS system, ensure that either the VTAM definition for the communicating LU specifies SECACPT(ALREADYV), or that there is a RACF® APPCLU profile for the connection between LUs, which specifies CONVSEC(ALREADYV).

The z/OS command VARY ACTIVE must be issued against both base and listener LUs before attempting to start either inbound or outbound communications.

Connecting to APPC/MVS (LU 6.2)

The connection name (CONNAME) field in the channel definition should be set to the symbolic destination name, as specified in the side information data set for APPC/MVS.

The LU name to use (defined to APPC/MVS as described above) must also be specified in the channel initiator parameters. It must be set to the same LU that will be used for receiving by the listener.

The channel initiator uses the “SECURITY(SAME)” APPC/MVS option, so it is the user ID of the channel initiator address space that is used for outbound transmissions, and will be presented to the receiver.

Receiving on LU 6.2

Receiving MCAs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel. The listener program is an APPC/MVS server. You start it with the START LISTENER command, or using the operations and control panels. You must specify the LU name to use by means of a symbolic destination name defined in the side information data set. The local LU so identified must be the same as that used for outbound transmissions, as set in the channel initiator parameters.

Chapter 27. Example configuration - IBM WebSphere MQ for z/OS

This chapter gives an example of how to set up communication links from WebSphere MQ for z/OS or MQSeries for OS/390 or MVS/ESA to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[8]
- Solaris
- Linux
- OS/400
- VSE/ESA

You can also connect any of the following:

z/OS to z/OS
z/OS to MVS/ESA
MVS/ESA to MVS/ESA

First it describes the parameters needed for an LU 6.2 connection; then it describes:

- "Establishing an LU 6.2 connection" on page 413
- "Establishing a TCP connection" on page 415

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for z/OS configuration" on page 416.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 35 on page 410 presents a worksheet listing all the parameters needed to set up communication from z/OS to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

---

[8] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

z/OS and LU 6.2

The steps required to set up an LU 6.2 connection are described in “Establishing an LU 6.2 connection” on page 413 with numbered cross references to the parameters on the worksheet.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in “Explanation of terms” on page 411.

Table 35. Configuration worksheet for z/OS using LU 6.2

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
1	Command prefix		**+cpf**	
2	Network ID		**NETID**	
3	Node name		**MVSPU**	
4	Local LU name		**MVSLU**	
5	Symbolic destination		**M1**	
6	Modename		**#INTER**	
7	Local Transaction Program name		**MQSERIES**	
8	LAN destination address		**400074511092**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
13	Symbolic destination		**M2**	
14	Modename	**21**	**#INTER**	
15	Remote Transaction Program name	**8**	**MQSERIES**	
16	Partner LU name	**6**	**OS2LU**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
13	Symbolic destination		**M3**	
14	Modename	**21**	**#INTER**	
15	Remote Transaction Program name	**7**	**MQSERIES**	
16	Partner LU name	**5**	**WINNTLU**	
21	Remote node ID	**4**	**05D 30F65**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
13	Symbolic Destination		**M4**	
14	Modename	**18**	**#INTER**	
15	Remote Transaction Program name	**6**	**MQSERIES**	
16	Partner LU name	**4**	**AIXLU**	
Connection to an HP-UX system The values in this section of the table must match those used in Table 24 on page 231, as indicated.				

Table 35. Configuration worksheet for z/OS using LU 6.2 (continued)

ID	Parameter Name	Reference	Example Used	User Value
13	Symbolic Destination		**M5**	
14	Modename	6	**#INTER**	
15	Remote Transaction Program name	7	**MQSERIES**	
16	Partner LU name	5	**HPUXLU**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
13	Symbolic Destination		**M6**	
14	Modename	19	**#INTER**	
15	Remote Transaction Program name	5	**MQSERIES**	
16	Partner LU name	4	**GISLU**	
Connection to a Solaris system The values in this section of the table must match those used in Table 28 on page 274, as indicated.				
13	Symbolic destination		**M7**	
14	Modename	21	**#INTER**	
15	Remote Transaction Program name	8	**MQSERIES**	
16	Partner LU name	7	**SOLARLU**	
Connection to a Linux for Intel system The values in this section of the table must match those used in Table 31 on page 313, as indicated.				
13	Symbolic destination		**M8**	
14	Modename	6	**#INTER**	
15	Remote Transaction Program name	7	**MQSERIES**	
16	Partner LU name	5	**LINUXLU**	
Connection to an OS/400 system The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
13	Symbolic Destination		**M9**	
14	Modename	21	**#INTER**	
15	Remote Transaction Program name	8	**MQSERIES**	
16	Partner LU name	3	**AS400LU**	
Connection to a VSE/ESA system The values in this section of the table must match those used in Table 52 on page 595, as indicated.				
13	Symbolic destination		**MA**	
14	Modename		**#INTER**	
15	Remote Transaction Program name	4	**MQ01**	
16	Partner LU name	3	**VSELU**	

Explanation of terms

1 Command prefix

This is the unique command prefix of your WebSphere MQ for z/OS queue-manager subsystem. The z/OS systems programmer defines this at installation time, in SYS1.PARMLIB(IEFSSNss), and will be able to tell you the value.

2 Network ID
The VTAM startup procedure in your installation is partly customized by the ATCSTRxx member of the data set referenced by the DDNAME VTAMLST. The Network ID is the value specified for the NETID parameter in this member. For Network ID you must specify the name of the NETID that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). Your network administrator will tell you the value.

3 Node name
VTAM, being a low-entry network node, does not have a Control Point name for Advanced Peer-to-Peer Networking (APPN) use. It does however have a system services control point name (SSCPNAME). For node name, you must specify the name of the SSCP that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). This is defined in the same ATCSTRxx member as the Network ID. Your network administrator will tell you the value.

4 Local LU name
A logical unit (LU) is software that serves as an interface or translator between a transaction program and the network. It manages the exchange of data between transaction programs. The local LU name is the unique VTAM APPLID of this WebSphere MQ subsystem. Your network administrator will tell you this value.

5 13 Symbolic destination
This is the name you give to the CPI-C side information profile. You need a side information entry for each LU 6.2 listener.

6 14 Modename
This is the name given to the set of parameters that control the LU 6.2 conversation. An entry with this name and similar attributes must be defined at each end of the session. In VTAM, this corresponds to a mode table entry. You network administrator will assign this to you.

7 15 Transaction Program name
WebSphere MQ applications trying to converse with this queue manager will specify a symbolic name for the program to be run at the receiving end. This will have been specified in the TPNAME attribute on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 34 on page 407 for more information. If the receiving end is z/OS using CICS, special values are required.

8 LAN destination address
This is the LAN destination address that your partner nodes will use to communicate with this host. When you are using a 3745 network controller, it will be the value specified in the LOCADD parameter for the line definition to which your partner is physically connected. If your partner nodes use other devices such as 317X or 6611 devices, the address will have been set during the customization of those devices. Your network administrator will tell you this value.

16 Partner LU name
This is the LU name of the WebSphere MQ queue manager on the system with which you are setting up communication. This value is specified in the side information entry for the remote partner.

21 Remote node ID
For a connection to Windows, this is the ID of the local node on the Windows system with which you are setting up communication.

Establishing an LU 6.2 connection

To establish and LU 6.2 connection, there are two steps:

1. Define yourself to the network.
2. Define a connection to the partner.

Defining yourself to the network

1. SYS1.PARMLIB(APPCPMxx) contains the startup parameters for APPC. You must add a line to this file to define the local LU name you intend to use for the WebSphere MQ LU 6.2 listener. The line you add should take the form

   ```
   LUADD ACBNAME(mvslu)
         NOSCHED
         TPDATA(csq.appctp)
   ```

   Specify values for `ACBNAME(` **4** `)` and `TPDATA` .

   The NOSCHED parameter tells APPC that our new LU will not be using the LU 6.2 scheduler (ASCH), but has one of its own. TPDATA refers to the Transaction Program data set in which LU 6.2 stores information about transaction programs. Again, WebSphere MQ will not use this, but it is required by the syntax of the LUADD command.
2. Start the APPC subsystem with the command:

   ```
   START APPC,SUB=MSTR,APPC=xx
   ```

   where *xx* is the suffix of the PARMLIB member in which you added the LU in step 1.

   Note: If APPC is already running, it can be refreshed with the command:

   ```
   SET APPC=xx
   ```

   The effect of this is cumulative, that is, APPC will not lose its knowledge of objects already defined to it in this or another PARMLIB member.
3. Add the new LU to a suitable VTAM major node definition. These are typically in SYS1.VTAMLST. The APPL definition will look similar to the sample shown in Figure 48 on page 414.

LU 6.2 without CICS

```
MVSLU APPL  ABCNAME=MVSLU,      4
            APPXC=YES,
            AUTOSES=0,
            DDRAINL=NALLOW,
            DLOGMOD=#INTER,     6
            DMINWML=10,
            DMINWNR=10,
            DRESPL=NALLOW,
            DSESLIM=60,
            LMDENT=19,
            MODETAB=MTCICS,
            PARSESS=YES,
            VERIFY=NONE,
            SECACPT=ALREADYV,
            SRBEXIT=YES
```

Figure 48. Channel Initiator APPL definition

4. Activate the major node. This can be done with the command:

   ```
   V NET,ACT,ID=majornode
   ```

5. Add an entry defining your LU to the CPI-C side information data set. Use the APPC utility program ATBSDFMU to do this. Sample JCL is in *thlqual*.SCSQPROC(CSQ4SIDE) (where *thlqual* is the target library high-level qualifier for WebSphere MQ data sets in your installation.)

   The entry you add will look like this:

   ```
   SIADD
        DESTNAME(M1)            5
        MODENAME(#INTER)        6
        TPNAME(MQSERIES)        7
        PARTNER_LU(MVSLU)       4
   ```

6. Create the channel-initiator parameter module for your queue manager. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4XPRM). You must specify the local LU (4) assigned to your queue manager in the LUNAME= parameter of the CSQ6CHIP macro.

```
//SYSIN   DD *
        CSQ6CHIP ADAPS=8,                 X
              ACTCHL=200,                 X
              ADOPTMCA=NO,                X
              ADOPTCHK=ALL,               X
              CURRCHL=200,                X
              DISPS=5,                    X
              DNSGROUP=,                  X
              DNSWLM=NO,                  X
              LSTRTMR=60,                 X
              LUGROUP=                    X
              LUNAME=MVSLU,               X
              LU62ARM=,                   X
              LU62CHL=200,                X
              OPORTMIN=0,                 X
              OPORTMAX=0,                 X
              TCPCHL=200,                 X
              TCPKEEP=NO,                 X
              TCPNAME=TCPIP,              X
              TCPTYPE=OESOCKET,           X
              TRAXSTR=YES,                X
              TRAXTBL=2,                  X
              SERVICE=0
          END
/*
```

Figure 49. Channel Initiator initialization parameters

7. Modify the job to assemble and link-edit the tailored version of the initiator macro to produce a new load module.
8. Submit the job and verify that it completes successfully.
9. Put the new initialization-parameters module in an APF-authorized user library. Include this library in the STEPLIB concatenation for the channel initiator's started-task procedure, ensuring that it precedes the library *thlqual*.SCSQAUTH.

Defining a connection to a partner

Note: This example is for a connection to an OS/2 system but the task is the same for other platforms.

Add an entry to the CPI-C side information data set to define the connection. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4SIDE).

The entry you add will look like this:

```
SIADD
     DESTNAME(M2)            13
     MODENAME(#INTER)        14
     TPNAME(MQSERIES)        15
     PARTNER_LU(OS2LU)       16
```

Establishing a TCP connection

Edit the channel initiator initialization parameters. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4XPRM). You must add the name of the TCP address space to the TCPNAME= parameter.

```
//SYSIN    DD *
        CSQ6CHIP ADAPS=8,                X
              ACTCHL=200,                X
              ADOPTMCA=NO,               X
              ADOPTCHK=ALL,              X
              CURRCHL=200,               X
              DISPS=5,                   X
              DNSGROUP=,                 X
              DNSWLM=NO,                 X
              LSTRTMR=60,                X
              LUGROUP=,                  X
              LUNAME=MVSLU,              X
              LU62ARM=,                  X
              LU62CHL=200,               X
              OPORTMIN=0,                X
              OPORTMAX=0,                X
              TCPCHL=200,                X
              TCPKEEP=NO,                X
              TCPNAME=TCPIP,             X
              TCPTYPE=OESOCKET,          X
              TRAXSTR=YES,               X
              TRAXTBL=2,                 X
              SERVICE=0
          END
/*
```

Figure 50. Channel Initiator initialization parameters

What next?

The TCP connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for z/OS configuration”.

WebSphere MQ for z/OS configuration

1. Start the channel initiator using the command:

   `+cpf START CHINIT PARM(xparms)` **1**

   where *xparms* is the name of the channel-initiator parameter module that you created.
2. Start an LU 6.2 listener using the command:

   `+cpf START LSTR LUNAME(M1) TRPTYPE(LU62)`

   The LUNAME of M1 refers to the symbolic name you gave your LU (**5**). You must specify TRPTYPE(LU62), otherwise the listener will assume you want TCP.
3. Start a TCP listener using the command:

   `+cpf START LSTR`

   If you wish to use a port other than 1414 (the default WebSphere MQ port), use the command:

   `+cpf START LSTR PORT(1555)`

WebSphere MQ channels will not initialize successfully if the channel negotiation detects that the message sequence number is different at each end. You may need to reset this manually.

Channel configuration

The following sections detail the configuration to be performed on the z/OS queue manager to implement the channel described in Figure 32 on page 101.

Examples are given for connecting WebSphere MQ for z/OS and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 36. Configuration worksheet for WebSphere MQ for z/OS

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**MVS**	
B	Local queue name		**MVS.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	A	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	B	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (LU 6.2) channel name		**MVS.OS2.SNA**	
H	Sender (TCP) channel name		**MVS.OS2.TCP**	
I	Receiver (LU 6.2) channel name	G	**OS2.MVS.SNA**	
J	Receiver (TCP) channel name	H	**OS2.MVS.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (LU 6.2) channel name		**MVS.WINNT.SNA**	
H	Sender (TCP) channel name		**MVS.WINNT.TCP**	
I	Receiver (LU 6.2) channel name	G	**WINNT.MVS.SNA**	
J	Receiver (TCP/IP) channel name	H	**WINNT.MVS.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	

Table 36. Configuration worksheet for WebSphere MQ for z/OS (continued)

ID	Parameter Name	Reference	Example Used	User Value
F	Transmission queue name		**AIX**	
G	Sender (LU 6.2) channel name		**MVS.AIX.SNA**	
H	Sender (TCP/IP) channel name		**MVS.AIX.TCP**	
I	Receiver (LU 6.2) channel name	G	**AIX.MVS.SNA**	
J	Receiver (TCP/IP) channel name	H	**AIX.MVS.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	A	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.MVS.TCP**	
J	Receiver (TCP) channel name	H	**MVS.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (LU 6.2) channel name		**MVS.HPUX.SNA**	
H	Sender (TCP) channel name		**MVS.HPUX.TCP**	
I	Receiver (LU 6.2) channel name	G	**HPUX.MVS.SNA**	
J	Receiver (TCP) channel name	H	**HPUX.MVS.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	A	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (LU 6.2) channel name		**MVS.GIS.SNA**	
H	Sender (TCP) channel name		**MVS.GIS.TCP**	
I	Receiver (LU 6.2) channel name	G	**GIS.MVS.SNA**	
J	Receiver (TCP) channel name	H	**GIS.MVS.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	

Table 36. Configuration worksheet for WebSphere MQ for z/OS (continued)

ID	Parameter Name	Reference	Example Used	User Value
G	Sender (LU 6.2) channel name		**MVS.SOLARIS.SNA**	
H	Sender (TCP) channel name		**MVS.SOLARIS.TCP**	
I	Receiver (LU 6.2) channel name	G	**SOLARIS.MVS.SNA**	
J	Receiver (TCP/IP) channel name	H	**SOLARIS.MVS.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender (LU 6.2) channel name		**MVS.LINUX.SNA**	
H	Sender (TCP) channel name		**MVS.LINUX.TCP**	
I	Receiver (LU 6.2) channel name	G	**LINUX.MVS.SNA**	
J	Receiver (TCP/IP) channel name	H	**LINUX.MVS.TCP**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender (LU 6.2) channel name		**MVS.AS400.SNA**	
H	Sender (TCP/IP) channel name		**MVS.AS400.TCP**	
I	Receiver (LU 6.2) channel name	G	**AS400.MVS.SNA**	
J	Receiver (TCP/IP) channel name	H	**AS400.MVS.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	A	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	B	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**MVS.VSE.SNA**	
I	Receiver channel name	G	**VSE.MVS.SNA**	

WebSphere MQ for z/OS sender-channel definitions using LU 6.2

```
Local Queue
       Object type :   QLOCAL
              Name :   OS2               F
             Usage :   X (XmitQ)

Remote Queue
       Object type :   QREMOTE
              Name :   OS2.REMOTEQ       D
```

```
  Name on remote system :   OS2.LOCALQ         E
     Remote system name :   OS2                C
     Transmission queue :   OS2                F

     Sender Channel
           Channel name :   MVS.OS2.SNA        G
         Transport type :   L (LU6.2)
Transmission queue name :   OS2                F
        Connection name :   M2                 13
```

WebSphere MQ for z/OS receiver-channel definitions using LU 6.2

```
     Local Queue
            Object type :   QLOCAL
                   Name :   MVS.LOCALQ         B
                  Usage :   N (Normal)

     Receiver Channel
           Channel name :   OS2.MVS.SNA        I
```

WebSphere MQ for z/OS sender-channel definitions using TCP

```
     Local Queue
            Object type :   QLOCAL
                   Name :   OS2                F
                  Usage :   X (XmitQ)

     Remote Queue
            Object type :   QREMOTE
                   Name :   OS2.REMOTEQ        D
  Name on remote system :   OS2.LOCALQ         E
     Remote system name :   OS2                C
     Transmission queue :   OS2                F

     Sender Channel
           Channel name :   MVS.OS2.TCP        H
         Transport type :   T (TCP)
Transmission queue name :   OS2                F
        Connection name :   os2.tcpip.hostname
```

WebSphere MQ for z/OS receiver-channel definitions using TCP

```
     Local Queue
            Object type :   QLOCAL
                   Name :   MVS.LOCALQ        B
                  Usage :   N (Normal)

     Receiver Channel
           Channel name :   OS2.MVS.TCP       J
```

Chapter 28. Message channel planning example for z/OS

This chapter provides a detailed example of how to connect z/OS, OS/390, or MVS/ESA queue managers together so that messages can be sent between them.

The example illustrates the preparations needed to allow an application using queue manager QM1 to put messages on a queue at queue manager QM2. An application running on QM2 can retrieve these messages, and send responses to a reply queue on QM1.

The example illustrates the use of both TCP/IP and LU 6.2 connections. The example assumes that channels are to be triggered to start when the first message arrives on the transmission queue they are servicing.

What the example shows

This example shows the WebSphere MQ commands (MQSC) that you can use in WebSphere MQ for z/OS for DQM.

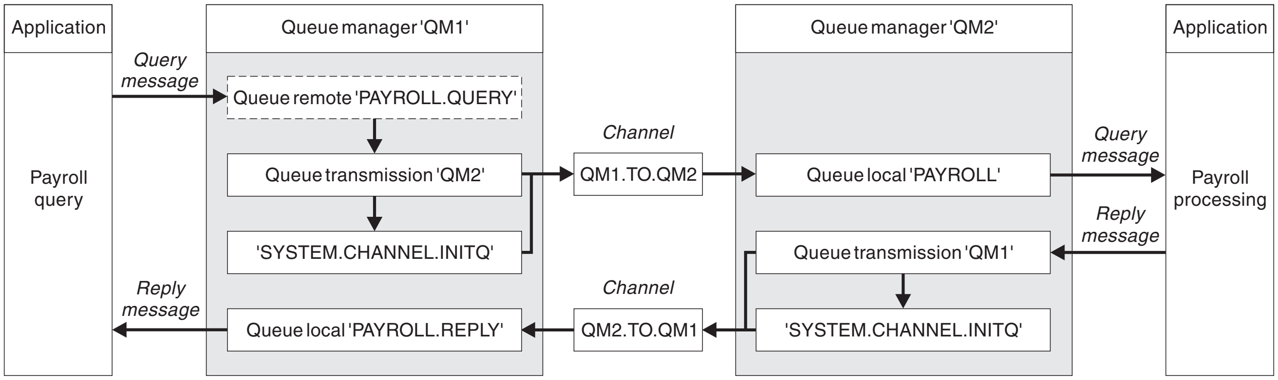


Figure 51. The first example for WebSphere MQ for z/OS

It involves a payroll query application connected to queue manager QM1 that sends payroll query messages to a payroll processing application running on queue manager QM2. The payroll query application needs the replies to its queries sent back to QM1. The payroll query messages are sent from QM1 to QM2 on a sender-receiver channel called QM1.TO.QM2, and the reply messages are sent back from QM2 to QM1 on another sender-receiver channel called QM2.TO.QM1. Both of these channels are triggered to start as soon as they have a message to send to the other queue manager.

The payroll query application puts a query message to the remote queue "PAYROLL.QUERY" defined on QM1. This remote queue definition resolves to the local queue "PAYROLL" on QM2. In addition, the payroll query application specifies that the reply to the query is sent to the local queue "PAYROLL.REPLY" on QM1. The payroll processing application gets messages from the local queue "PAYROLL" on QM2, and sends the replies to wherever they are required; in this case, local queue "PAYROLL.REPLY" on QM1.

Both queue managers are assumed to be running on z/OS. In the example definitions for TCP/IP, QM1 has a host address of 9.20.9.31 and is listening on port

1411, and QM2 has a host address of 9.20.9.32 and is listening on port 1412. In the definitions for LU 6.2, QM1 is listening on a symbolic luname called LUNAME1 and QM2 is listening on a symbolic luname called LUNAME2. The example assumes that these are already defined on your z/OS system and available for use. To define them, see Chapter 27, "Example configuration - IBM WebSphere MQ for z/OS", on page 409.

The object definitions that need to be created on QM1 are:
- Remote queue definition, PAYROLL.QUERY
- Transmission queue definition, QM2 (default=remote queue manager name)
- Sender channel definition, QM1.TO.QM2
- Receiver channel definition, QM2.TO.QM1
- Reply-to queue definition, PAYROLL.REPLY

The object definitions that need to be created on QM2 are:
- Local queue definition, PAYROLL
- Transmission queue definition, QM1 (default=remote queue manager name)
- Sender channel definition, QM2.TO.QM1
- Receiver channel definition, QM1.TO.QM2

The example assumes that all the SYSTEM.COMMAND.* and SYSTEM.CHANNEL.* queues required to run DQM have been defined as shown in the supplied sample definitions, CSQ4INSG and CSQ4INSX.

The connection details are supplied in the CONNAME attribute of the sender channel definitions.

You can see a diagram of the arrangement in Figure 51 on page 421.

Queue manager QM1 example

The following object definitions allow applications connected to queue manager QM1 to send request messages to a queue called PAYROLL on QM2, and to receive replies on a queue called PAYROLL.REPLY on QM1.

All the object definitions have been provided with the DESCR and REPLACE attributes. The other attributes supplied are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM1.

Run the following commands on queue manager QM1.

Remote queue definition

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QM2') REPLACE +
PUT(ENABLED) XMITQ(QM2)  RNAME(PAYROLL) RQMNAME(QM2)
```

Note: The remote queue definition is not a physical queue, but a means of directing messages to the transmission queue, QM2, so that they can be sent to queue manager QM2.

Transmission queue definition

```
DEFINE QLOCAL(QM2) DESCR('Transmission queue to QM2') REPLACE +
USAGE(XMITQ) PUT(ENABLED) GET(ENABLED) TRIGGER TRIGTYPE(FIRST) +
TRIGDATA(QM1.TO.QM2) INITQ(SYSTEM.CHANNEL.INITQ)
```

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the trigger data. The channel initiator can only get trigger messages from the SYSTEM.CHANNEL.INITQ queue, so you should not use any other queue as the initiation queue.

Sender channel definition

For a TCP/IP connection:

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QM2') XMITQ(QM2) +
CONNAME('9.20.9.32(1412)')
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(SDR) TRPTYPE(LU62) +
REPLACE DESCR('Sender channel to QM2') XMITQ(QM2) +
CONNAME('LUNAME2')
```

Receiver channel definition

For a TCP/IP connection:

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QM2')
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(RCVR) TRPTYPE(LU62) +
REPLACE DESCR('Receiver channel from QM2')
```

Reply-to queue definition

```
DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to query messages sent to QM2')
```

The reply-to queue is defined as PUT(ENABLED). This ensures that reply messages can be put to the queue. If the replies cannot be put to the reply-to queue, they are sent to the dead-letter queue on QM1 or, if this queue is not available, remain on transmission queue QM1 on queue manager QM2. The queue has been defined as GET(ENABLED) to allow the reply messages to be retrieved.

Queue manager QM2 example

The following object definitions allow applications connected to queue manager QM2 to retrieve request messages from a local queue called PAYROLL, and to put replies to these request messages to a queue called PAYROLL.REPLY on queue manager QM1.

You do not need to provide a remote queue definition to enable the replies to be returned to QM1. The message descriptor of the message retrieved from local queue PAYROLL contains both the reply-to queue and the reply-to queue manager names. Therefore, as long as QM2 can resolve the reply-to queue manager name to that of a transmission queue on queue manager QM2, the reply message can be sent. In this example, the reply-to queue manager name is QM1 and so queue manager QM2 simply requires a transmission queue of the same name.

All the object definitions have been provided with the DESCR and REPLACE attributes and are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM2.

Run the following commands on queue manager QM2.

Local queue definition

```
DEFINE QLOCAL(PAYROLL) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Local queue for QM1 payroll details')
```

This queue is defined as PUT(ENABLED) and GET(ENABLED) for the same reason as the reply-to queue definition on queue manager QM1.

Transmission queue definition

```
DEFINE QLOCAL(QM1) DESCR('Transmission queue to QM1') REPLACE +
USAGE(XMITQ) PUT(ENABLED) GET(ENABLED) TRIGGER TRIGTYPE(FIRST) +
TRIGDATA(QM2.TO.QM1) INITQ(SYSTEM.CHANNEL.INITQ)
```

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the trigger data. The channel initiator can only get trigger messages from SYSTEM.CHANNEL.INITQ so you should not use any other queue as the initiation queue.

Sender channel definition

For a TCP/IP connection:

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QM1') XMITQ(QM1) +
CONNAME('9.20.9.31(1411)')
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM2.TO.QM1) CHLTYPE(SDR) TRPTYPE(LU62) +
REPLACE DESCR('Sender channel to QM1') XMITQ(QM1) +
CONNAME('LUNAME1')
```

Receiver channel definition

For a TCP/IP connection:

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QM1')
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM1.TO.QM2) CHLTYPE(RCVR) TRPTYPE(LU62) +
REPLACE DESCR('Receiver channel from QM1')
```

Running the example

When you have created the required objects, you must:
- Start the channel initiator for both queue managers
- Start the listener for both queue managers

The applications can then send messages to each other. Because the channels are triggered to start by the arrival of the first message on each transmission queue, you do not need to issue the START CHANNEL MQSC command.

For details about starting a channel initiator see “Starting a channel initiator” on page 390, and for details about starting a listener see “Starting a channel listener” on page 392.

Expanding this example

This example can be expanded by:

- Adding more queue, and channel definitions to allow other applications to send messages between the two queue managers.
- Adding user exit programs on the channels to allow for link encryption, security checking, or additional message processing.
- Using queue manager aliases and reply-to queue aliases to understand more about how these can be used in the organization of your queue manager network.

Chapter 29. Monitoring and controlling channels in z/OS with CICS

You monitor and control the channels to remote queue managers from the distributed queue management (DQM) panels. Each z/OS queue manager has a set of DQM CICS transactions for controlling interconnections to compatible remote queue managers using CICS intersystem communication (ISC) facilities.

Important notice

Distributed queuing using CICS ISC is retained for compatibility with previous releases; there will be no further enhancements to this function. Therefore you are recommended to use the channel initiator for distributed queuing.

The DQM channel control function

The channel control function provides the administration and control of message channels using CICS between WebSphere MQ for z/OS and compatible systems. See Figure 28 on page 58 for a conceptual picture.

The channel control function consists of CICS panels and programs, a sequence number queue, a channel command queue, and a VSAM file for the channel definitions. The following is a brief description of the components of the channel control function.

- The channel definition file (CDF):
  - Is a VSAM file
  - Is indexed on channel name
  - Holds channel definitions
  - Must be available to the CICS regions in which the channel control program runs, and where the message channel agent (MCA) programs run
- You use channel definition panels to:
  - Create, copy, display, alter, find, and delete channel definitions
  - Start channels, reset channel sequence numbers, stop channels, ping channels, resync channels, and resolve in-doubt messages when links cannot be re-established
  - Display status information about channels

  The panels are CICS basic-mapping support maps.
- Sequence numbers and logical unit of work IDs (LUWIDs) are stored in the sequence number queue, SYSTEM.CHANNEL.SEQNO, and are used for channel re-synchronization purposes.
- A channel command queue, SYSTEM.CHANNEL.COMMAND, is used to hold certain commands for channels.
- The programs are a series of CICS transactions, which include transactions for the MCAs. There are different MCAs available for each type of channel. The names are contained in the following table. Other transactions provide channel control, command handling, and trigger monitoring.

Table 37. Program and transaction names

Program name	Channel type	CICS transaction ID
CSQKMSGS	Sender	CKSG
CSQKMSGR	Receiver	CKRC
CSQKMSGQ	Requester	CKRQ
CSQKMSGV	Server	CKSV

- A transient data queue CKMQ for error messages.

CICS regions

Figure 52 shows a configuration of two CICS regions, connected to a single queue manager. The regions have multiregion operation (MRO) links to one another, for function shipping of EXEC CICS START commands from the channel control program.

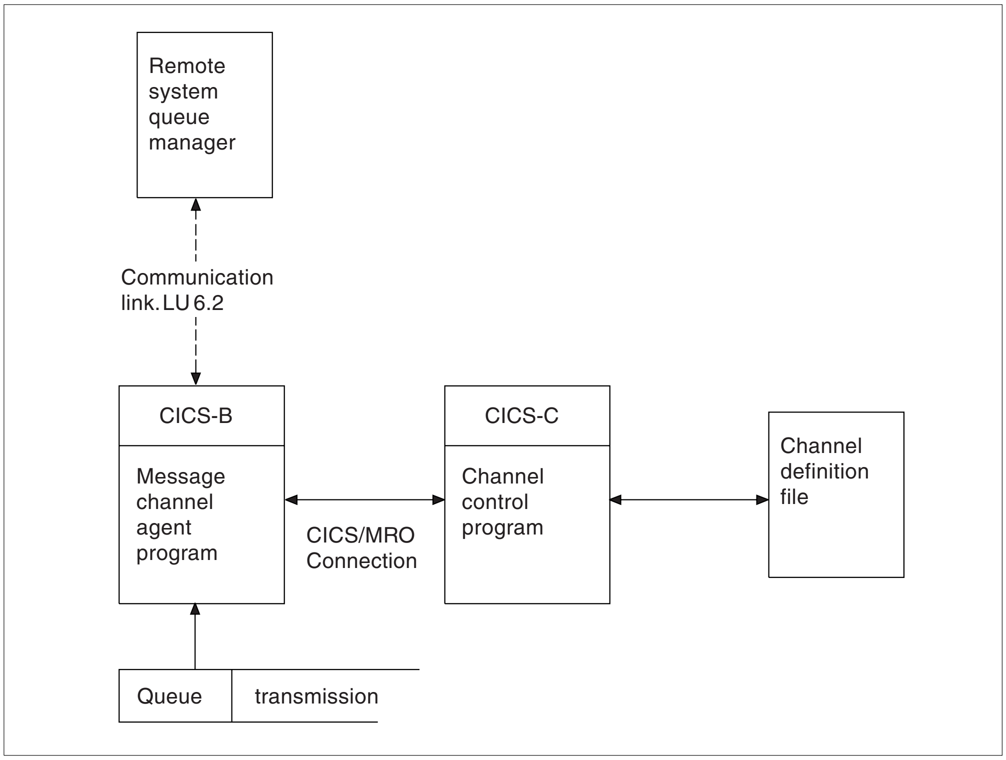


Figure 52. Sample configuration of channel control and MCA. MRO is used for an EXEC CICS START of the MCA, and for an EXEC CICS READ of the channel definition file by the MCA. Communication with the remote queue manager is through CICS ISC, not MRO.

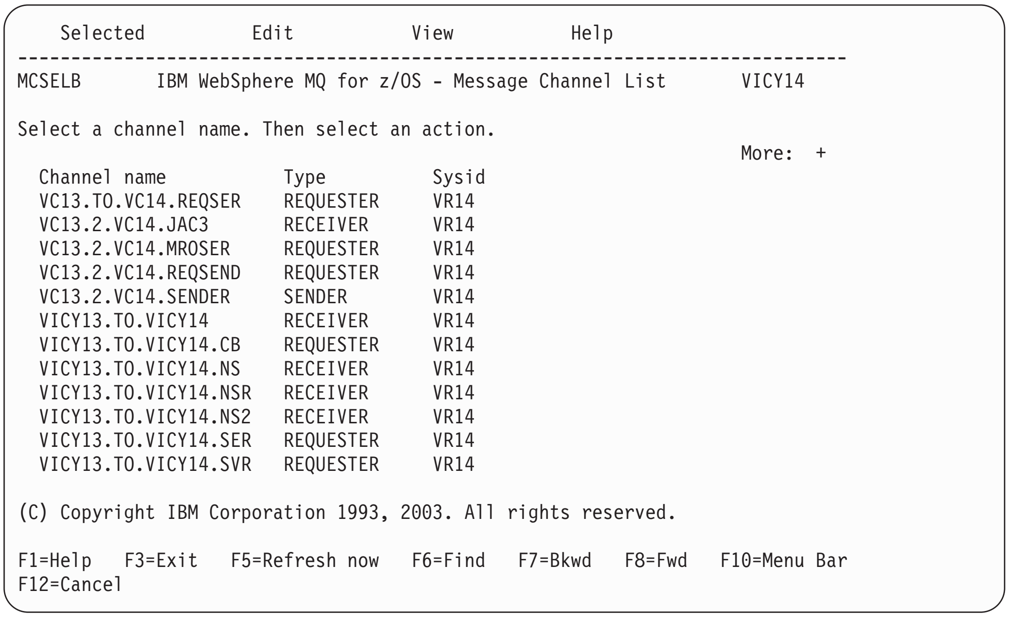
Starting DQM panels

You invoke DQM panels with the CKMC CICS transaction. On invocation, DQM presents you with the main Message Channel List panel. All activity with the other panels follows from selections made on this panel.

The Message Channel List panel

The main panel is called the Message Channel List panel; for an example of it, see Figure 53. It has a menu bar with choices you can pull down to reveal the various options you can select for these choices. The work area of the panel is used to present a selection column, and three other columns showing the:

- Full name of each channel
- Type of channel
- CICS system identifier



```
    Selected          Edit          View          Help
------------------------------------------------------------------------------
MCSELB       IBM WebSphere MQ for z/OS - Message Channel List       VICY14

Select a channel name. Then select an action.
                                                                    More:  +
  Channel name          Type          Sysid
  VC13.TO.VC14.REQSER   REQUESTER     VR14
  VC13.2.VC14.JAC3      RECEIVER      VR14
  VC13.2.VC14.MROSER    REQUESTER     VR14
  VC13.2.VC14.REQSEND   REQUESTER     VR14
  VC13.2.VC14.SENDER    SENDER        VR14
  VICY13.TO.VICY14      RECEIVER      VR14
  VICY13.TO.VICY14.CB   REQUESTER     VR14
  VICY13.TO.VICY14.NS   RECEIVER      VR14
  VICY13.TO.VICY14.NSR  RECEIVER      VR14
  VICY13.TO.VICY14.NS2  RECEIVER      VR14
  VICY13.TO.VICY14.SER  REQUESTER     VR14
  VICY13.TO.VICY14.SVR  REQUESTER     VR14

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F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 53. The Message Channel List panel

Keyboard functions

The following sections describe the function, Enter, and Clear keys, as well as what happens if you press any unassigned keys associated with this panel.

Function keys

The function keys control the use of the panel. They are listed below, together with their purpose.

F1	Call help panels
F3	Exit from the panel and the program
F5	Refresh the screen fields with current data
F6	Find a particular channel name
F7	Scroll the panel backward to display more channels
F8	Scroll the panel forward to display more channels
F10	Move the cursor to the menu bar
F12	Cancel pull-down menus or secondary windows, if any, otherwise as F3

Note: Function keys 13 to 24 have the same functions as functions keys 1 to 12, respectively.

Enter key

Pressing the Enter key while the cursor is on a menu-bar choice results in the pull-down menu for that choice appearing.

Message Channel List panel

Pressing the Enter key while the cursor is not on a menu-bar choice and a channel selection has been made selects the default option, Display Settings.

Pressing the Enter key while the cursor is not on a menu-bar choice and no channel selection has been made results in the panel being redisplayed.

Clear key

If you find while typing that what you have typed is not correct, press the Clear key on your terminal to revert all the input fields to their previous state.

For individual fields, use the 'Erase EOF', or 'Ctrl Delete', depending upon the type of terminal you are using.

Unassigned keys and unavailable choices

If you press a function key, or an attention key that has not been assigned an action, a warning message is displayed that states that the key is invalid.

Selecting a channel

To select a channel, begin at the Message Channel List panel:

1. Move the cursor to the left of the required channel name.
2. Type a slash (/) character.
3. Press F10 to move the cursor to the menu bar, or press the Enter key to browse the channel settings.

If you try to select more than one channel, only the first one you select is valid.

Working with channels

When a channel has been selected, function key F10 moves the cursor to the menu bar (see Table 38). The menu-bar choices are:

Table 38. Message Channel List menu-bar choices

Selected	Edit	View	Help

Selecting each of these choices causes its pull-down menu to be displayed (see Figure 54 on page 431).

When you select an option that requires further information, such as a channel name, an action window appears with an entry field for the data.

In general, any incorrect input from the keyboard results in a warning message being issued.

```
   Selected         Edit          View          Help
 +--------------------------+-------------------------------------------------
 |   1. Start               |r z/OS - Message Channel List           VICY14
 |   2. Stop...             |
 |   3. Resync              |select an action.
 |   4. Reset...            |                                       More: - +
 |   5. Resolve...          |e          Sysid
 |   6. Display Status      |UESTER     VR14
 |   7. Display Settings    |EIVER      VR14
 |   8. Ping...             |UESTER     VR14
 |   9. Exit             F3 |UESTER     VR14
 +--------------------------+DER        VR14
```

```
   Selected         Edit          View          Help
 ------------------ +--------------------------+-------------------------------
 MCSELB       IBM W |   1. Copy...             | Channel List         VICY14
                    |   2. Create...           |
 Select a channel n |   3. Alter               |
                    |   4. Delete...           |                    More: - +
   Channel name     |   5. Find...          F6 |
   VC13.TO.VC14.SEQ +--------------------------+
   VC13.2.VC14.JAC3       RECEIVER      VR14
   VC13.2.VC14.MROSER     REQUESTER     VR14
   VC13.2.VC14.REQSEND    REQUESTER     VR14
   VC13.2.VC14.SENDER     SENDER        VR14
```

```
   Selected         Edit          View          Help
 --------------------------------- +------------------------+------------------
 MCSELB       IBM WebSphere MQ for |   1. Include all       |        VICY14
                                   |   2. Include...        |
 Select a channel name. Then selec |   3. Refresh now    F5 |
                                   +------------------------+       More: - +
   Channel name           Type          Sysid
   VC13.TO.VC14.SEQSER    REQUESTER     VR14
   VC13.2.VC14.JAC3       RECEIVER      VR14
   VC13.2.VC14.MROSER     REQUESTER     VR14
   VC13.2.VC14.REQSEND    REQUESTER     VR14
   VC13.2.VC14.SENDER     SENDER        VR14
```

```
   Selected         Edit          View          Help
 ------------------------------------------------ +----------------------------+-
 MCSELB       IBM WebSphere MQ for z/OS - Message|   1. Using help            |
                                                 |   2. General help          |
 Select a channel name. Then select an action.   |   3. Keys help             |
                                                 |   4. Tutorial              |
   Channel name           Type          Sysid    |   5. Product Info          |
   VC13.TO.VC14.SEQSER    REQUESTER     VR14     +----------------------------+
   VC13.2.VC14.JAC3       RECEIVER      VR14
   VC13.2.VC14.MROSER     REQUESTER     VR14
   VC13.2.VC14.REQSEND    REQUESTER     VR14
   VC13.2.VC14.SENDER     SENDER        VR14
```

Figure 54. The Message Channel List panel pull-down menus

Creating a channel

To create a new channel, begin at the Message Channel List panel:

1. Press function key F10 and move the cursor to the **Edit** choice on the menu bar.
2. Press the Enter key to display the Edit pull-down menu, and select the **Create** option.
3. Press the Enter key to display the Create action window.
4. Type the name of the channel in the field provided.
5. Select the channel type for this end of the link.
6. Press the Enter key.

Notes:

1. If you are using distributed queuing without CICS as well, don’t use any of the same channel names.
2. You are recommended to name all the channels in your network uniquely. As shown in Table 1 on page 30, including the source and target queue manager names in the channel name is a good way to do this.

You are presented with the appropriate Settings panel for the type of channel you have chosen. Fill in the fields with the information you have gathered previously, and select the **Save** option from the Channel pull-down menu.

You are provided with help in deciding on the content of the various fields in the descriptions of the channel definition panels in the following sections of this chapter.

Altering a channel

To alter an existing channel, begin at the Message Channel List panel:

1. Select a channel.
2. Press function key F10 and move the cursor to the **Edit** choice on the menu bar.
3. Press the Enter key to display the Edit pull-down menu, and select the **Alter** option.

You are presented with the appropriate Settings panel for the channel you have chosen. Alter the fields with the information you have gathered previously, and select the **Save** option from the Channel pull-down menu.

You are provided with help in deciding on the content of the various fields in the descriptions of the channel definition panels in the following sections of this chapter, and in the contextual help panels.

Browsing a channel

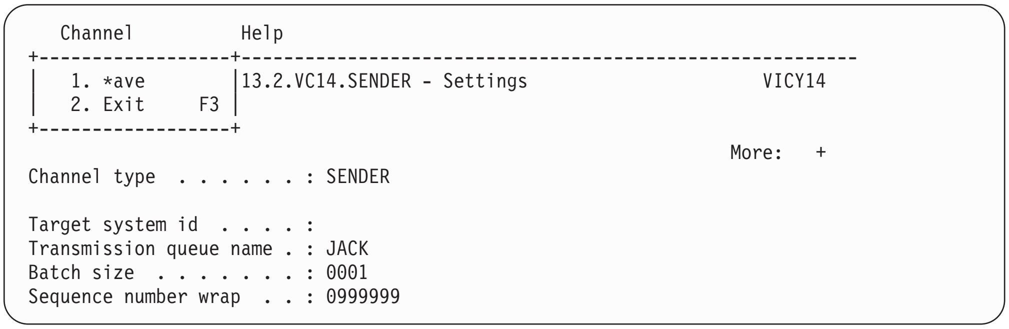
To browse the settings of a channel, begin at the Message Channel List panel:

1. Select a channel.
2. Press the Enter key.

If you try to select more than one channel, only the first one you select is valid.

This results in the respective Settings panel being displayed with details of the current settings for the channel, but with the fields protected against user input.

If the Channel pull-down menu is selected from the menu bar, the Save option is unavailable and this is indicated by an asterisk (*) in place of the first letter, as shown in Figure 55 on page 433.



```
   Channel          Help
+------------------+--------------------------------------------------------
|   1. *ave        |13.2.VC14.SENDER - Settings                     VICY14
|   2. Exit     F3 |
+------------------+
                                                              More:   +
Channel type  . . . . . . : SENDER

Target system id  . . . . :
Transmission queue name . : JACK
Batch size  . . . . . . . : 0001
Sequence number wrap  . . : 0999999
```

Figure 55. The Channel pull-down menu

Renaming a channel

To rename a message channel, begin at the Message Channel List panel:
1. Ensure that the channel is inactive.
2. Select the channel.
3. Use **Copy** to create a duplicate with the new name.
4. Use **Delete** to delete the original channel.

If you decide to rename a message channel, ensure that both ends of the channel are renamed at the same time.

Selected menu-bar choice

The options available in the Selected pull-down menu are:

Menu option	Description
Start	Starts the selected channel.
Stop	Requests the channel to close down, immediately, or controlled.
Resync	Requests the channel to re-synchronize with the remote end, and then close. No messages are sent.
Reset	Requests the channel to reset the sequence numbers on this end of the link. The numbers must be equal at both ends for the channel to start.
Resolve	Requests the channel to resolve in doubt messages without establishing connection to the other end.
Display Status	Displays the current status of the channel.
Display Settings	Displays the current settings for the channel.
Ping	Exchanges a data message with the remote end.
Exit	Exits from the program.

Start

The **Start** option is available for sender and requester channels, and moreover should not be necessary where a sender channel has been set up with queue manager triggering. For the method of setting up triggering, see “How to trigger channels” on page 434.

When a server channel has been fully defined as a sender, then the same applies as for sender channels.

Message Channel List panel

When you choose the **Start** option, an EXEC CICS START call is issued to the MCA, which reads the channel definition file and opens the transmission queue. A channel startup sequence is executed which remotely starts the corresponding MCA of the receiver or server channel. When they are running, the sender and server processes await messages arriving on the transmission queue and transmit them as they arrive.

Using the **Start** option always causes re-synchronization where necessary.

For the start to succeed:

- Channel definitions, local and remote must exist.
- The associated transmission queue must exist and it must be enabled for GETs. If sequential numbering is required, then no other process can have the transmission queue open for input.
- CICS transactions, local (and remote if it is z/OS using CICS) must exist.
- CICS communication must be running.
- The queue managers must be running, local and remote.
- Channel must be inactive.
- Sequence number queue must exist on the receiving system (if it is z/OS using CICS).

It is not necessary that:

- Messages be available
- Remote queue definitions be used
- Remote destination queues be available

A message is returned to the panel confirming that the request to start a channel has been accepted. For confirmation that the start command has succeeded, check the system console for the CICS system hosting the MCA, or the transient data queue.

The sender, server, and requester channel transactions can be started automatically by CICS, if necessary. This is achieved by arranging for the MCA CICS transaction to be started by the CICS system in the required way. This is similar to the triggering startup in that the MCA is passed the required information in a trigger message. For example, it can be customized to start at a certain time every day, or at regular intervals. When started, it retrieves its channel definition and responds accordingly.

How to trigger channels: If triggering is to be used to start a channel when messages arrive on the associated transmission queue, use WebSphere MQ for z/OS operations and control panels or MQSC commands to set it up in accordance with the details on triggering in the *WebSphere MQ Application Programming Guide*, after having collected all the planning data.

Trigger control is exercised by means of the trigger control parameter in the transmission queue definition. You need to set up the transmission queue for the channel, specifying `TRIGGER`, define an initiation queue, and define a process. For example:

```
DEFINE QLOCAL(MYXMITQ) USAGE(XMITQ) TRIGGER INITQ(MYINITQ) +
       TRIGTYPE(FIRST) PROCESS(MYPROCESS)
```

```
DEFINE QLOCAL(MYINITQ)

DEFINE PROCESS(MYPROCESS) APPLTYPE(CICS) APPLICID(CKSG) +
       USERDATA(MYCHANNEL)
```

On the process definition:

APPLICID
Names the application that is to be triggered. If you have a fully defined server channel (see “Message channels” on page 8), this ID should be CKSG rather than CKSV. CKSV should be used only for requester-server channels that are to be initiated only by the requester.

APPLTYPE
Specifies that this is a CICS application.

USERDATA
Specifies the name of the sender channel to be started.

Following the definitions, the long-running trigger process, CKTI, must be started to monitor the initiation queue:

```
CKQC STARTCKTI MYINITQ
```

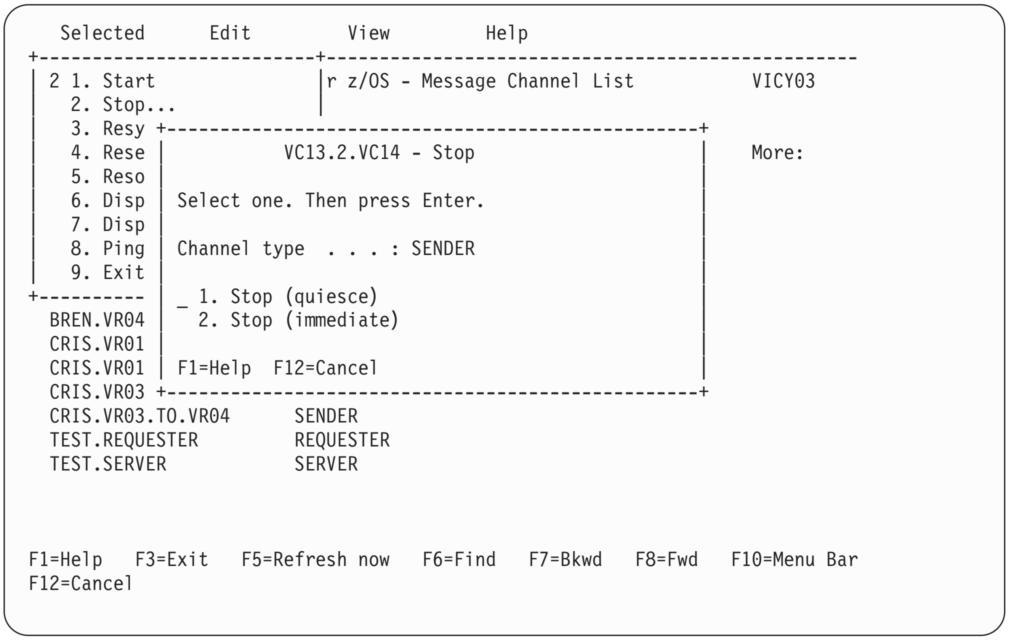
CKTI waits for trigger messages from the initiation queue, and starts an instance of CKSG for the sender channel in response to the trigger messages. If the channel experiences problems, the trigger control parameter on the transmission queue definition is set to NOTRIGGER by the MCA, and the transmission queue is set to GET(DISABLED). After diagnosis and correction and before you can restart triggering, you must reset the TRIGGER parameter, for example with the WebSphere MQ for z/OS operations and control panels, and must reset the transmission queue to GET(ENABLED).

Stop

Use the **Stop** option to request the channel to stop activity.

The **Stop** option presents an action window to allow you to confirm your intention to stop the channel, for all four types of channel. For sender and server channels only, you can select the type of stop you require: IMMEDIATE, or QUIESCE. See Figure 56 on page 436 and Figure 57 on page 437.

Message Channel List panel



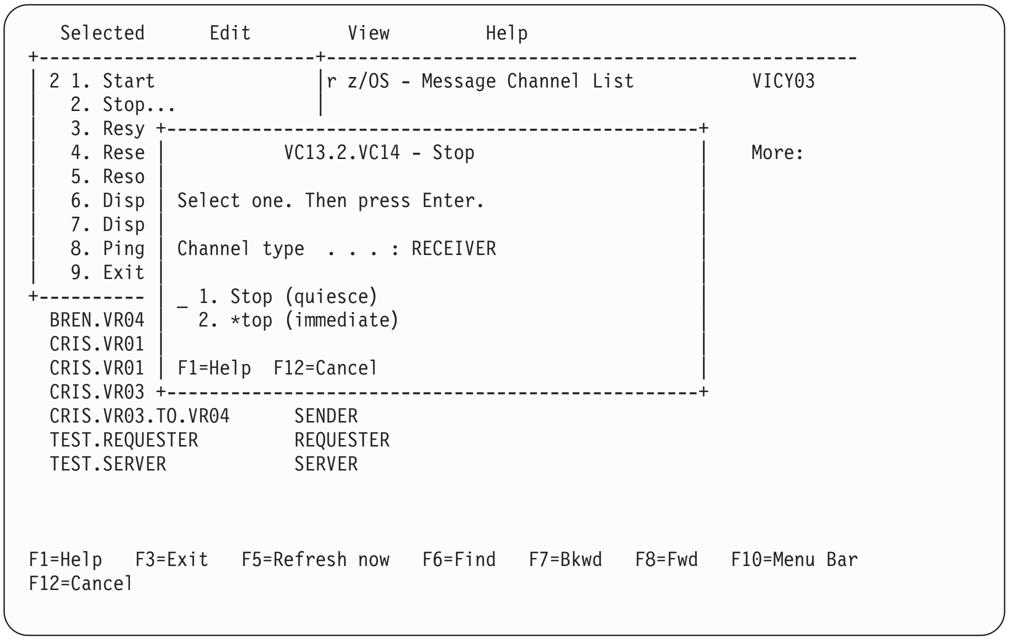
```
  Selected      Edit         View         Help
+--------------------------+-------------------------------------------------
| 2 1. Start               |r z/OS - Message Channel List           VICY03
|   2. Stop...             |
|   3. Resy +--------------------------------------------------+
|   4. Rese |           VC13.2.VC14 - Stop                     |    More:
|   5. Reso |                                                  |
|   6. Disp | Select one. Then press Enter.                    |
|   7. Disp |                                                  |
|   8. Ping | Channel type  . . . : SENDER                     |
|   9. Exit |                                                  |
+---------- | _ 1. Stop (quiesce)                              |
  BREN.VR04 |   2. Stop (immediate)                            |
  CRIS.VR01 |                                                  |
  CRIS.VR01 | F1=Help  F12=Cancel                              |
  CRIS.VR03 +--------------------------------------------------+
  CRIS.VR03.TO.VR04      SENDER
  TEST.REQUESTER         REQUESTER
  TEST.SERVER            SERVER



F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 56. Sender/server Stop action window

Stop immediate: This choice forces the channel to close down immediately, if necessary, without completing the current batch of messages, but an attempt is made to syncpoint with the other end of the channel.

Stop immediate is implemented by setting the channel's transmission queue to GET DISABLED. This means that if multiple channels are active against a transmission queue, issuing a stop immediate against one of the channels causes all channels to be stopped. You need to reset this queue to GET ENABLED using the WebSphere MQ for z/OS operations and control panels or MQSC commands before you attempt to restart the channels.

For more information, see the "Stopping and quiescing channels" on page 68.



```
  Selected      Edit         View        Help
+---------------------------+------------------------------------------------
| 2 1. Start               |r z/OS - Message Channel List          VICY03
|   2. Stop...             |
|   3. Resy +--------------------------------------------------+
|   4. Rese |           VC13.2.VC14 - Stop                     |    More:
|   5. Reso |                                                  |
|   6. Disp | Select one. Then press Enter.                    |
|   7. Disp |                                                  |
|   8. Ping | Channel type  . . . : RECEIVER                   |
|   9. Exit |                                                  |
+---------- | _ 1. Stop (quiesce)                              |
  BREN.VR04 |   2. *top (immediate)                            |
  CRIS.VR01 |                                                  |
  CRIS.VR01 | F1=Help  F12=Cancel                              |
  CRIS.VR03 +--------------------------------------------------+
  CRIS.VR03.TO.VR04      SENDER
  TEST.REQUESTER         REQUESTER
  TEST.SERVER            SERVER



F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 57. Requester/receiver Stop action window

Stop quiesce: This choice requests the channel to close down in an orderly way; the current batch of messages is completed, and the syncpoint procedure is carried out with the other end of the channel.

For more information, see “Stopping and quiescing channels” on page 68. For information about restarting stopped channels, see “Restarting stopped channels” on page 69.

Resync

A message channel is *synchronized* when there are no in-doubt messages. That is, the sending channel and the receiving channel are agreed on the current unit of work number. The **Resync** option is valid for sender and server channels, but server channels must be fully defined. The option allows the operator to request the channel to re-synchronize with the remote end by resolving any in-doubt messages.

There is no panel associated with this option.

It is to be used only where the channel is currently inactive and in-doubt messages exist. The channel starts up, resolves the in-doubt messages, and then terminates. It is not intended that the channel should send messages after the resolution has been completed.

If the re-synchronization of a channel is not successful, you may need to examine the content of the system sequence number queue, using the **Display Status** option from the Selected pull-down menu on the Message Channel List panel. Compare the sequence numbers, or LUWIDs, at the sending and receiving ends of the channel in order to ascertain what needs to be done to restore synchronization.

It may be necessary to reset sequence numbers, or resolve in-doubt message status, if a channel remains out of synchronization.

Message Channel List panel

If a channel terminates abnormally, the sender may be left in doubt as to whether the receiver has received and committed one message, or a batch of messages. When the channel is restarted, the channel program automatically re-synchronizes before sending any new messages.

However, there are times when you may want to re-synchronize the in-doubt messages, but not send any new ones. For example:

- You may want to reset sequence numbers before sending the next batch of messages.
- You may want to close out a batch, but hold the remaining messages for later transmission.

The channel program started by this option establishes a session with a partner. It then exchanges the re-synchronization flows. Then, instead of starting new message traffic, it sends a disconnect flow. The result is that the channel terminates normally, without any in-doubt messages. It is ready to be restarted or reset, as required.

For the re-synchronization to succeed:
- Channel definitions, local and remote must exist
- Transmission queue is available and usable
- CICS transactions, local (and remote if using z/OS with CICS) must exist
- CICS communication must be running
- Queue managers must be running, local and remote
- Sequence number queue must exist on the receiving system (if using z/OS with CICS)
- The channel must be inactive

A message is returned to the panel indicating whether the request to re-synchronize a channel has succeeded. If the Resync process was not successful, check the system console, or transient data queue (TDQ), for the CICS system hosting the MCA for error messages.

Reset

Use the **Reset** option to request the channel to reset the sequence number. For a view of the Reset Channel Sequence Number action window, see Figure 58 on page 439. The change must be made separately on each end of the link, with care, and can be done only on inactive channels that have no in-doubt units of work outstanding.

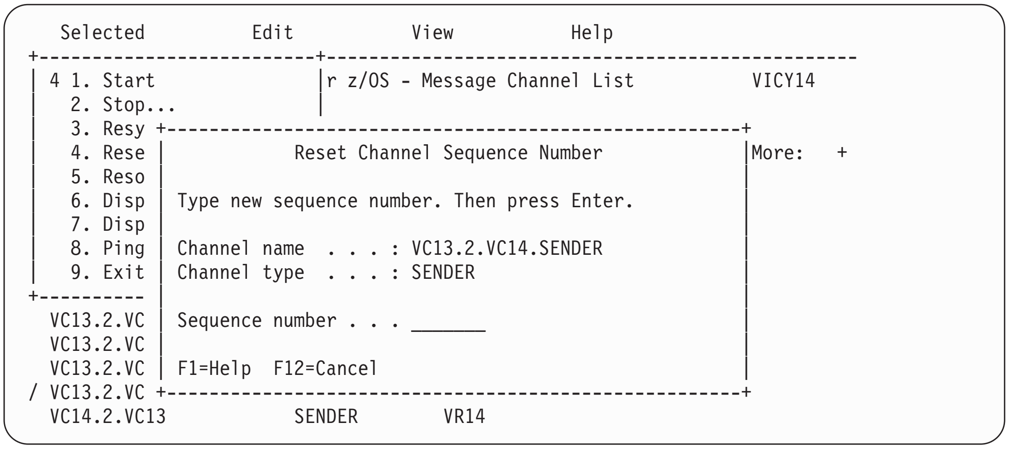
The current sequence number is retrieved and changed to the value requested by the user.

For the reset to succeed:
- The channel sequence number record must exist
- The channel must be inactive
- The channel must not be in doubt
- The channel definition, local, must exist
- CICS transactions, local, must exist
- The CICS system hosting the MCA must be connected to the queue manager

Notes:

1. To be effective, the sequence number must be reset in both the sender and the receiver channel definitions. The starting sequence number is not negotiated when a channel starts up, nor is there a default provided. Both ends of a channel definition must have the same sequence number value.

2. In WebSphere MQ for z/OS using CICS, DQM saves the last sequence number sent, which means that to start the next message with sequence number 100, for example, you need to reset the sequence number to 99.
3. If you delete the channel definition at the partner end of the channel (by deleting and recreating the partner queue manager), you must reset the channel sequence number to 0 at the z/OS end and to 1 at the partner end.



```
   Selected         Edit          View          Help
 +--------------------------+------------------------------------------------
 | 4 1. Start               |r z/OS - Message Channel List          VICY14
 |   2. Stop...             |
 |   3. Resy +------------------------------------------------------+
 |   4. Rese |             Reset Channel Sequence Number            |More:   +
 |   5. Reso |                                                      |
 |   6. Disp | Type new sequence number. Then press Enter.          |
 |   7. Disp |                                                      |
 |   8. Ping | Channel name  . . . : VC13.2.VC14.SENDER             |
 |   9. Exit | Channel type  . . . : SENDER                         |
 +---------- |                                                      |
   VC13.2.VC | Sequence number . . . _______                        |
   VC13.2.VC |                                                      |
   VC13.2.VC | F1=Help  F12=Cancel                                  |
 / VC13.2.VC +------------------------------------------------------+
   VC14.2.VC13            SENDER        VR14
```

Figure 58. The Reset Channel Sequence Number action window

Resolve

Use the **Resolve** option to request a channel to commit or back out in-doubt messages. This may be used when the other end of the link has terminated, and there is no prospect of it returning. Any outstanding units of work need to be resolved with either backout or commit. Backout restores messages to the transmission queue, while Commit discards them.

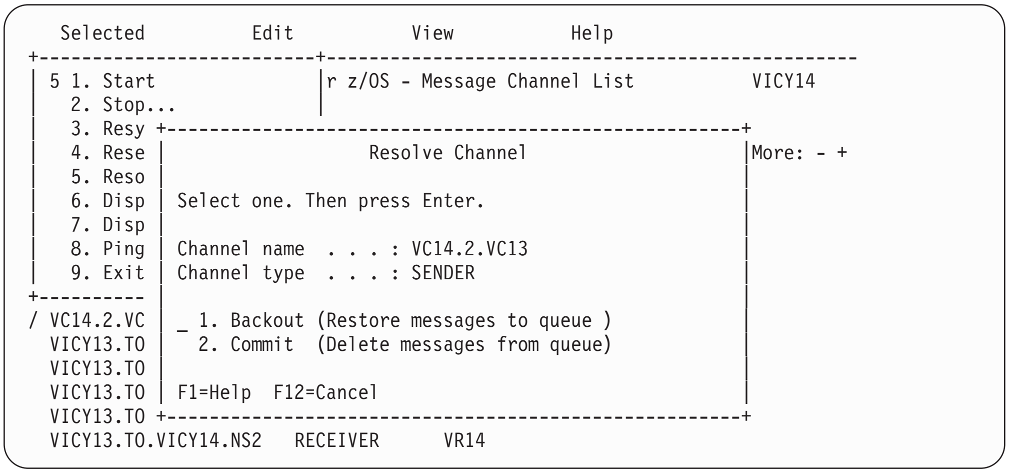
The **Resolve** option is needed when the **Resync** option is not available, or not effective, and messages are held in doubt by a sender or server. The option accepts one of two parameters: Backout or Commit. See Figure 59 on page 440.

The channel program does not try to establish a session with a partner. Instead, it determines the logical unit of work identifier (LUWID) which represents the in-doubt messages. It then issues, as requested, either:
- Backout to restore the messages to the transmission queue; or
- Commit to delete the messages from the transmission queue

For the resolution to succeed:
- The channel must be inactive
- The channel must be in doubt
- The channel type must be sender or server
- The channel definition, local, must exist
- CICS transactions, local, must exist
- Queue manager must be running, local
- The CICS system hosting the MCA must be connected to the queue manager

See “In-doubt channels” on page 70 for more information.

Message Channel List panel



```
  Selected         Edit          View          Help
+---------------------------+------------------------------------------------
| 5 1. Start                |r z/OS - Message Channel List          VICY14
|   2. Stop...              |
|   3. Resy +--------------------------------------------------------+
|   4. Rese |                   Resolve Channel                      |More: - +
|   5. Reso |                                                        |
|   6. Disp | Select one. Then press Enter.                          |
|   7. Disp |                                                        |
|   8. Ping | Channel name  . . . : VC14.2.VC13                      |
|   9. Exit | Channel type  . . . : SENDER                           |
+---------- |                                                        |
/ VC14.2.VC | _ 1. Backout (Restore messages to queue )              |
  VICY13.TO |   2. Commit  (Delete messages from queue)              |
  VICY13.TO |                                                        |
  VICY13.TO | F1=Help  F12=Cancel                                    |
  VICY13.TO +--------------------------------------------------------+
  VICY13.TO.VICY14.NS2   RECEIVER      VR14
```

Figure 59. The Resolve Channel action window

Display status

Use the **Display Status** option to display the current status of the channel. The following information is displayed:

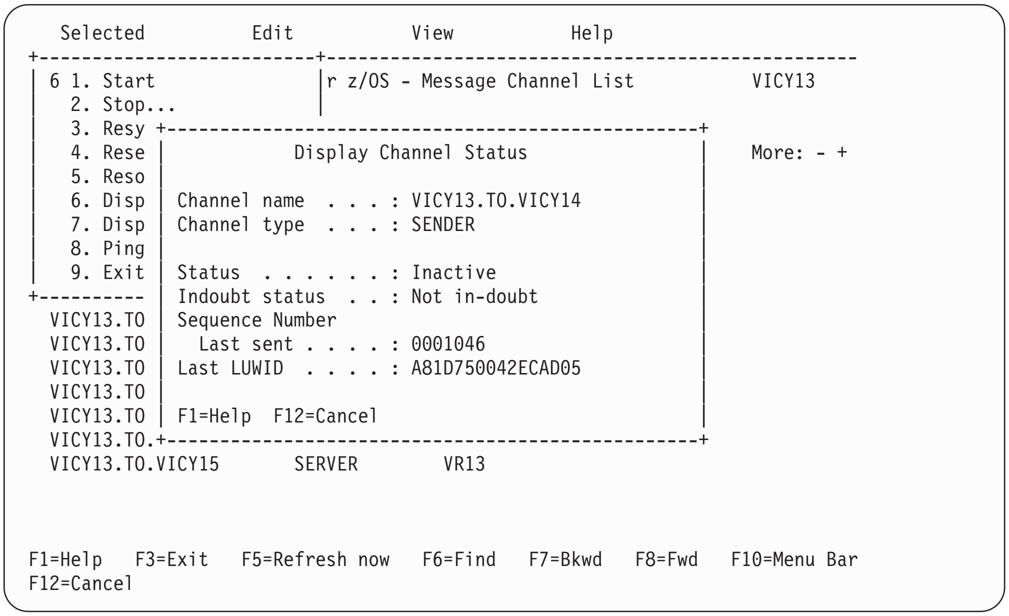
- Whether the channel is active or inactive
- The in-doubt status of sender and server channels
- The sequence number last sent, if sequence numbering is in effect
- The last LUWID number, if available. Available means:
  - Always available for receiver and requester channels
  - Available for sender and server channels when:
    - Sequence numbering is in effect
    - No sequence numbering in effect, but the channel is in doubt

    That is, the LUWID number is not available for sender and server channels when sequence numbering is not in effect and the channel is not in doubt

For an example of sender and server status panels, see Figure 60 on page 441, and for an example of receiver and requester status panels, see Figure 61 on page 441.

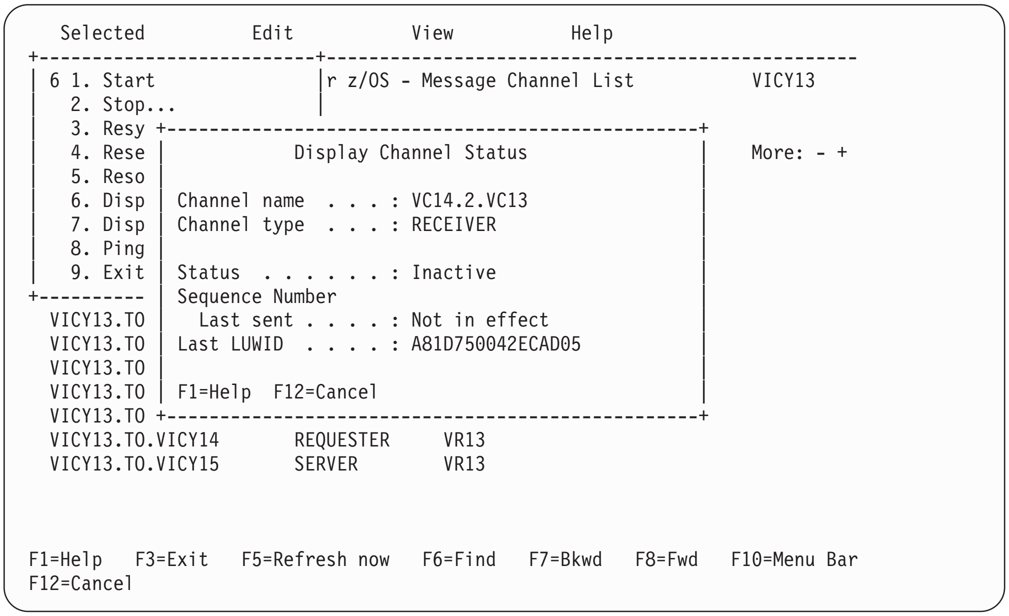
'Not available' status is acceptable when:
- Shown for a sequence number, if the channel is active
- Shown for an LUWID when the channel is not in doubt

Otherwise, if a 'Not available' status is shown in any of the fields, this indicates that an error has occurred, and you should refer to the console log to find the error messages associated with this problem.



```
   Selected         Edit          View          Help
+--------------------------+------------------------------------------------
| 6 1. Start               |r z/OS - Message Channel List          VICY13
|   2. Stop...             |
|   3. Resy +--------------------------------------------------+
|   4. Rese |            Display Channel Status                |    More: - +
|   5. Reso |                                                  |
|   6. Disp | Channel name  . . . : VICY13.TO.VICY14           |
|   7. Disp | Channel type  . . . : SENDER                     |
|   8. Ping |                                                  |
|   9. Exit | Status  . . . . . . : Inactive                   |
+---------- | Indoubt status  . . : Not in-doubt               |
  VICY13.TO | Sequence Number                                  |
  VICY13.TO |   Last sent . . . . : 0001046                    |
  VICY13.TO | Last LUWID  . . . . : A81D750042ECAD05           |
  VICY13.TO |                                                  |
  VICY13.TO | F1=Help  F12=Cancel                              |
  VICY13.TO.+--------------------------------------------------+
  VICY13.TO.VICY15       SERVER        VR13



F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 60. An example of a sender channel Display Channel Status window. The server channel Display Channel Status panel looks the same, except that the **Channel type** field is changed to SERVER.



```
   Selected         Edit          View          Help
+--------------------------+------------------------------------------------
| 6 1. Start               |r z/OS - Message Channel List          VICY13
|   2. Stop...             |
|   3. Resy +--------------------------------------------------+
|   4. Rese |            Display Channel Status                |    More: - +
|   5. Reso |                                                  |
|   6. Disp | Channel name  . . . : VC14.2.VC13                |
|   7. Disp | Channel type  . . . : RECEIVER                   |
|   8. Ping |                                                  |
|   9. Exit | Status  . . . . . . : Inactive                   |
+---------- | Sequence Number                                  |
  VICY13.TO |   Last sent . . . . : Not in effect              |
  VICY13.TO | Last LUWID  . . . . : A81D750042ECAD05           |
  VICY13.TO |                                                  |
  VICY13.TO | F1=Help  F12=Cancel                              |
  VICY13.TO +--------------------------------------------------+
  VICY13.TO.VICY14       REQUESTER     VR13
  VICY13.TO.VICY15       SERVER        VR13



F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 61. An example of a receiver channel Display Channel Status window. The requester channel Display Channel Status window looks the same, except that the **Channel type** field is changed to REQUESTER.

Display settings

Use the **Display Settings** option to display the current definitions for the channel. This choice displays the appropriate panel for the type of channel with the fields displaying the current values of the parameters, and protected against user input:

- Sender: see Figure 72 on page 452
- Receiver: see Figure 74 on page 453
- Server: see Figure 76 on page 454
- Requester: see Figure 78 on page 455

Protected input is shown with colon characters (:) at the end of field descriptions, and the **Save** option is not available on the Channel pull-down menu.

You can select this choice from the Message Channel List panel by choosing a channel and pressing Enter, without using the menu bar, ensuring that the cursor is not on the menu bar.

Ping

Use the **Ping** option to exchange a data message with the remote end. This gives you some confidence that the link is available and functioning. It can be issued from sender and server channels only, but server channels must be fully defined.

Ping does not involve the use of transmission queues and target queues. It uses channel definitions, the related CICS communication link, the network setup, and the queue managers at both ends.

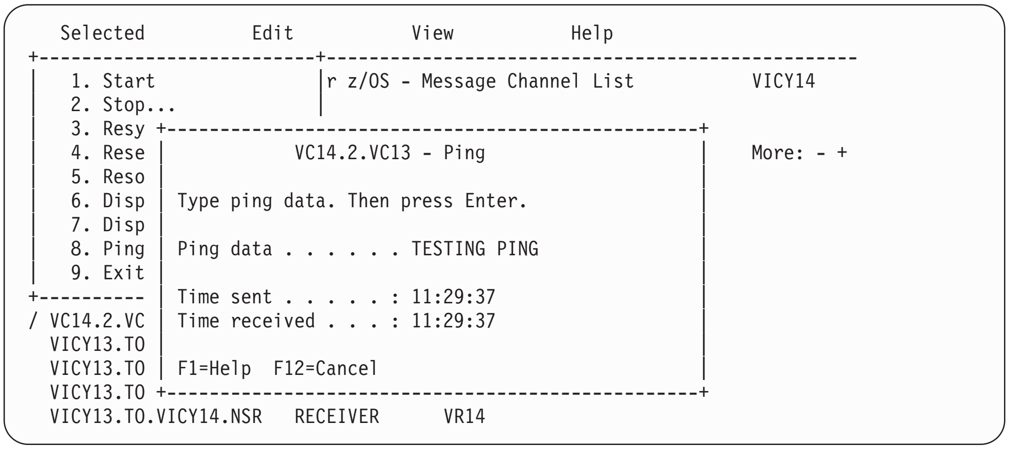
The corresponding channel is started at the far side of the link, and performs the startup parameter negotiation.

If an error occurs, an error message is displayed on the panel, and additional messages may be written to the console, or the CICS transient data queue.

The Ping panel offers you the opportunity to enter a message of up to 20 characters to be exchanged across the link. If you do not make use of this, a default message is used.

The result of the message exchange is presented in the Ping panel for you, and this is the returned message text, together with the time the message was sent, and the time the reply was received.

Installations may supply their own applications to exchange particular information, such as system identifiers. Figure 62 shows a view of the Ping action window.



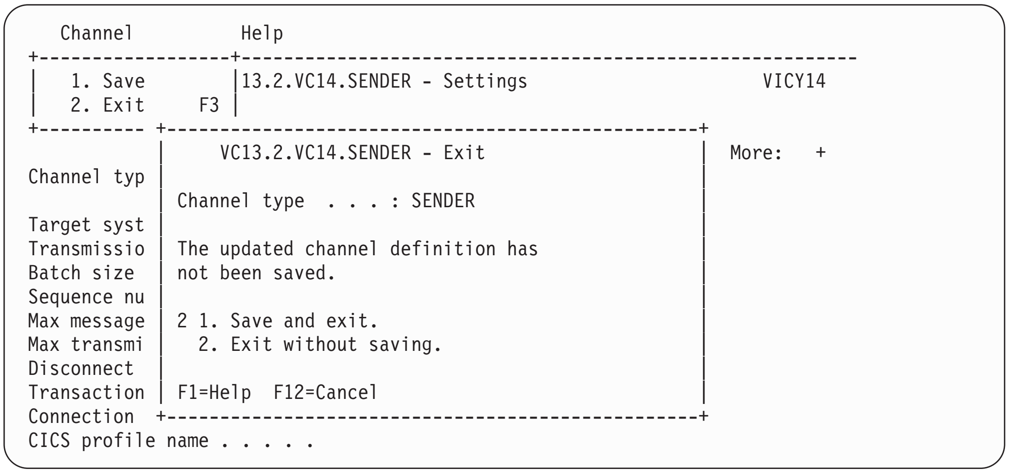
```
   Selected         Edit          View          Help
 +-------------------------+-----------------------------------------------
 |   1. Start              |r z/OS - Message Channel List          VICY14
 |   2. Stop...            |
 |   3. Resy +--------------------------------------------------+
 |   4. Rese |             VC14.2.VC13 - Ping                   |    More: - +
 |   5. Reso |                                                  |
 |   6. Disp | Type ping data. Then press Enter.                |
 |   7. Disp |                                                  |
 |   8. Ping | Ping data . . . . . . TESTING PING               |
 |   9. Exit |                                                  |
 +---------- | Time sent . . . . . : 11:29:37                   |
 / VC14.2.VC | Time received . . . : 11:29:37                   |
   VICY13.TO |                                                  |
   VICY13.TO | F1=Help  F12=Cancel                              |
   VICY13.TO +--------------------------------------------------+
   VICY13.TO.VICY14.NSR   RECEIVER      VR14
```

Figure 62. The Ping action window

Exit

Use the **Exit** option to exit the current function: channel settings, help, or message channel list.

A secondary window appears when you try to exit a channel settings panel without first saving any changed definitions. This is a safe exit to prevent inadvertent loss of data. The secondary window is shown in Figure 63.



```
   Channel          Help
+-----------------+---------------------------------------------------------
|   1. Save       |13.2.VC14.SENDER - Settings                      VICY14
|   2. Exit     F3 |
+---------- +---------------------------------------------------+
            |      VC13.2.VC14.SENDER - Exit                    |  More:   +
Channel typ |                                                   |
            | Channel type  . . . : SENDER                      |
Target syst |                                                   |
Transmissio | The updated channel definition has                |
Batch size  | not been saved.                                   |
Sequence nu |                                                   |
Max message | 2 1. Save and exit.                               |
Max transmi |   2. Exit without saving.                         |
Disconnect  |                                                   |
Transaction | F1=Help  F12=Cancel                               |
Connection  +---------------------------------------------------+
CICS profile name . . . . .
```

Figure 63. The Exit confirmation secondary window

Edit menu-bar choice

The options available in the Edit pull-down menu are:
- Copy
- Create
- Alter
- Delete
- Find

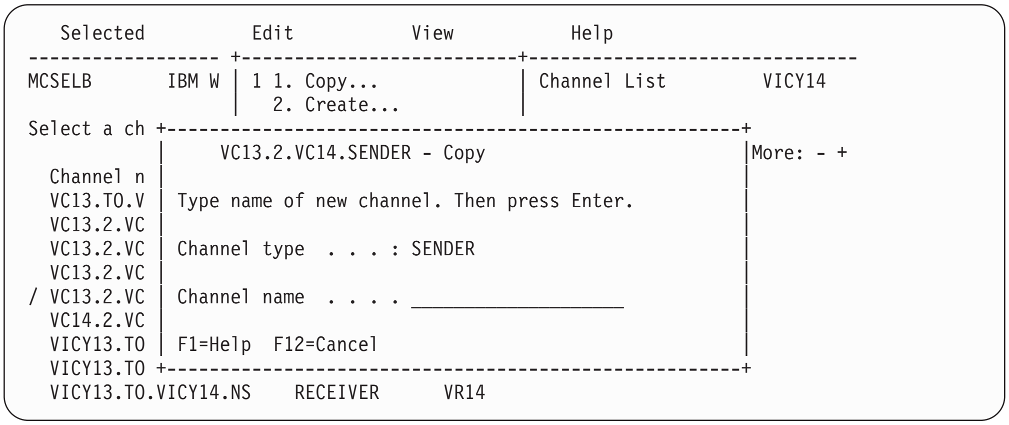
In any of the action windows and settings panels associated with Edit, you can type the channel name in uppercase or lowercase, but it may be converted to uppercase when you press the Enter key, depending upon your Typeterm definition.

Copy

Use the **Copy** option to copy an existing channel. The Copy action window (see Figure 64 on page 444) enables you to define the new channel name. You can use the characters shown in “Create” on page 444 in the name.

Press the Enter key on the Copy action window to display the channel settings panel with details of current system values. You can change any of the new channel settings. You save the new channel definition by selecting **Channel** from the menu bar, and selecting the **Save** option from the pull-down menu.

Message Channel List panel



```
   Selected         Edit          View          Help
 ------------------ +-------------------------+-------------------------------
 MCSELB       IBM W | 1 1. Copy...             | Channel List        VICY14
                    |   2. Create...           |
 Select a ch +-------------------------------------------------------+
             |     VC13.2.VC14.SENDER - Copy                         |More: - +
   Channel n |                                                       |
   VC13.TO.V | Type name of new channel. Then press Enter.           |
   VC13.2.VC |                                                       |
   VC13.2.VC | Channel type  . . . : SENDER                          |
   VC13.2.VC |                                                       |
 / VC13.2.VC | Channel name  . . . . ____________________            |
   VC14.2.VC |                                                       |
   VICY13.TO | F1=Help  F12=Cancel                                   |
   VICY13.TO +-------------------------------------------------------+
   VICY13.TO.VICY14.NS    RECEIVER      VR14
```

Figure 64. The Copy action window

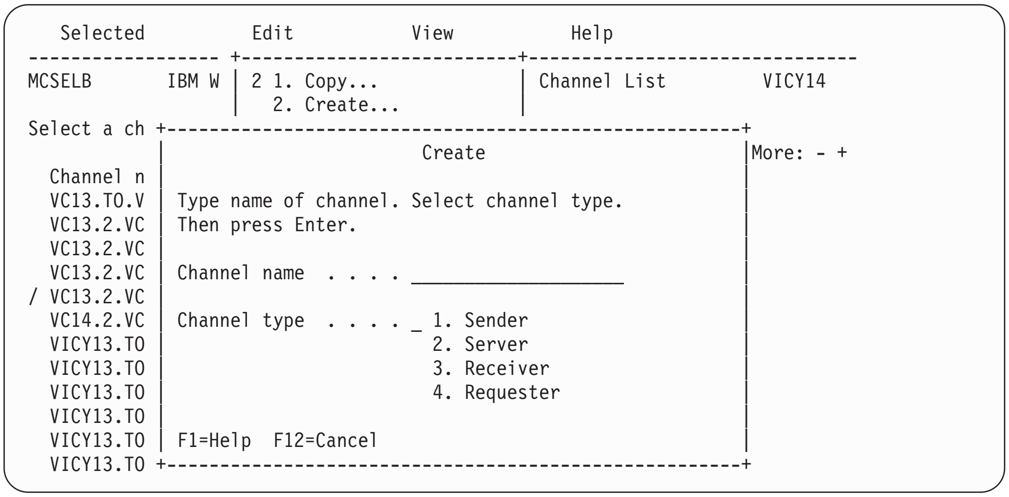
Create

Use the **Create** option to create a new channel definition from a screen of fields filled with default values supplied by WebSphere MQ for z/OS. Figure 65 on page 445 shows you where to type the name of the channel, and how to select the type of channel you are creating.

When you press the Enter key, the appropriate channel settings panel is displayed. Type information in all the necessary fields in this panel and then save the definition by selecting **Channel** from the menu bar, and selecting the **Save** option from the pull-down menu.

The channel name must be the same at both ends of the channel, and unique within the network. You can use the following characters in the name:

Uppercase	A-Z
Lowercase	a-z
Numerics	0-9
Period	’.’
Forward slash	’/’
Underscore	’_’
Percentage sign	’%’



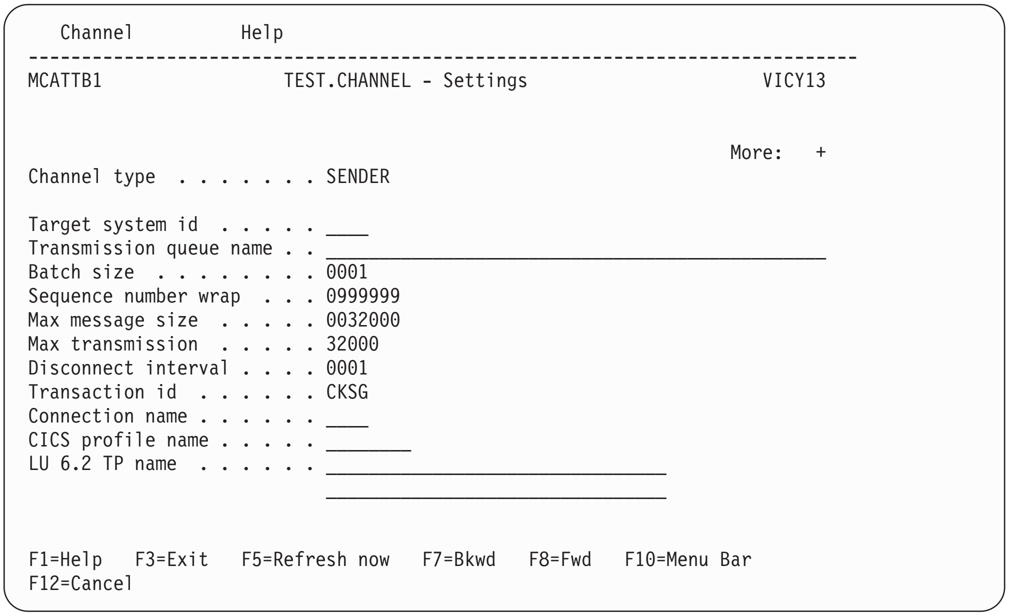
```
   Selected         Edit          View          Help
------------------ +-------------------------+-------------------------------
MCSELB       IBM W | 2 1. Copy...            | Channel List        VICY14
                   |   2. Create...          |
Select a ch +-------------------------------------------------------+
            |                        Create                         |More: - +
  Channel n |                                                       |
  VC13.TO.V | Type name of channel. Select channel type.            |
  VC13.2.VC | Then press Enter.                                     |
  VC13.2.VC |                                                       |
  VC13.2.VC | Channel name  . . . . ____________________            |
/ VC13.2.VC |                                                       |
  VC14.2.VC | Channel type  . . . . _ 1. Sender                     |
  VICY13.TO |                         2. Server                     |
  VICY13.TO |                         3. Receiver                   |
  VICY13.TO |                         4. Requester                  |
  VICY13.TO |                                                       |
  VICY13.TO | F1=Help  F12=Cancel                                   |
  VICY13.TO +-------------------------------------------------------+
```

Figure 65. The Create action window

All panels have default values supplied for some fields. You can change the values when you are creating or copying channels. For examples of the channel definition panels showing the default values, see Figure 66.

Press the Enter key on the Create action window to display the channel settings panel with details of default values.

You can create your own set of channel default values by setting up dummy channels with the required defaults for each channel type, and copying them each time you want to create new channel definitions.



```
   Channel         Help
------------------------------------------------------------------------------
MCATTB1                TEST.CHANNEL - Settings                       VICY13



                                                                  More:   +
Channel type  . . . . . . . SENDER

Target system id  . . . . . ____
Transmission queue name . . _______________________________________________
Batch size  . . . . . . . . 0001
Sequence number wrap  . . . 0999999
Max message size  . . . . . 0032000
Max transmission  . . . . . 32000
Disconnect interval . . . . 0001
Transaction id  . . . . . . CKSG
Connection name . . . . . . ____
CICS profile name . . . . . ________
LU 6.2 TP name  . . . . . . ________________________________
                            ________________________________


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

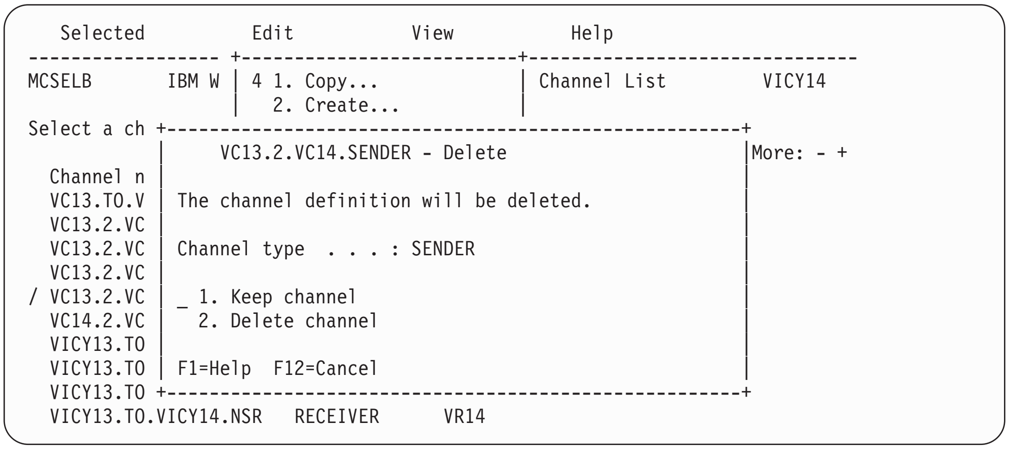
Figure 66. Example of default values during Create for a channel. The values supplied cannot be customized.

Alter

Use the **Alter** option to change an existing channel definition, except for the channel name. Simply type over the fields to be changed in the channel definition panel, and then save the updated definition by selecting **Channel** from the menu bar, and selecting the **Save** option from the pull-down menu.

Delete

Use the **Delete** option to delete the selected channel. For the secondary window requesting confirmation of your intention, see Figure 67.

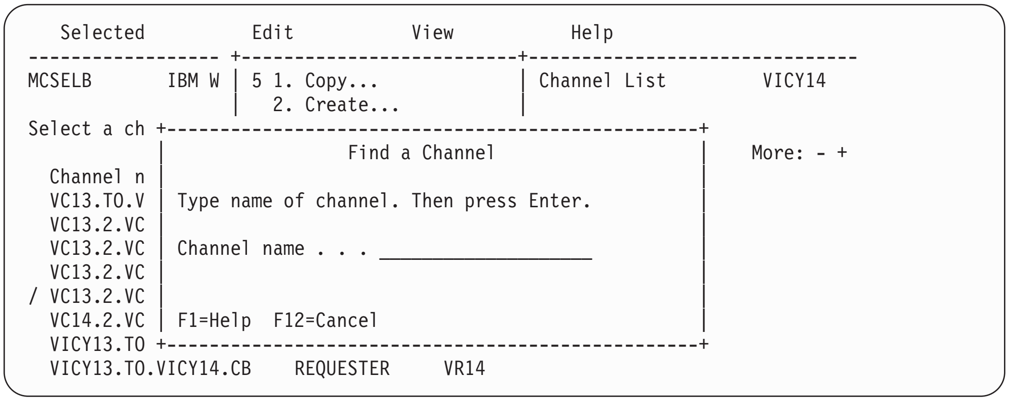


```
   Selected          Edit           View           Help
------------------ +--------------------------+-------------------------------
MCSELB       IBM W | 4 1. Copy...             | Channel List         VICY14
                   |   2. Create...           |
Select a ch +------------------------------------------------------+
            |     VC13.2.VC14.SENDER - Delete                      |More: - +
  Channel n |                                                      |
  VC13.TO.V | The channel definition will be deleted.              |
  VC13.2.VC |                                                      |
  VC13.2.VC | Channel type  . . . : SENDER                         |
  VC13.2.VC |                                                      |
/ VC13.2.VC | _ 1. Keep channel                                    |
  VC14.2.VC |   2. Delete channel                                  |
  VICY13.TO |                                                      |
  VICY13.TO | F1=Help  F12=Cancel                                  |
  VICY13.TO +------------------------------------------------------+
  VICY13.TO.VICY14.NSR   RECEIVER      VR14
```

Figure 67. The Delete action window

Find

Use the **Find** option to locate a particular channel name from the list of available channels. If the name of the channel you want is found, it is placed at the top of the list on the Message Channel List panel. The Find a Channel action window is shown in Figure 68.



```
   Selected          Edit           View           Help
------------------ +--------------------------+-------------------------------
MCSELB       IBM W | 5 1. Copy...             | Channel List         VICY14
                   |   2. Create...           |
Select a ch +--------------------------------------------------+
            |                 Find a Channel                   |    More: - +
  Channel n |                                                  |
  VC13.TO.V | Type name of channel. Then press Enter.          |
  VC13.2.VC |                                                  |
  VC13.2.VC | Channel name . . . ____________________          |
  VC13.2.VC |                                                  |
/ VC13.2.VC |                                                  |
  VC14.2.VC | F1=Help  F12=Cancel                              |
  VICY13.TO +--------------------------------------------------+
  VICY13.TO.VICY14.CB    REQUESTER     VR14
```

Figure 68. The Find a Channel action window

You can partially define the channel name using a terminating asterisk, for example, channel.lon*. This results in the first channel name to be found with these initial letters being placed at the top of the list.

View menu-bar choice

The options available in the View pull-down menu change the current view of the list shown on the Message Channel List panel; see Figure 69 on page 447.

Menu option
  Description

Include all
  All channels are included in the list.

Include...

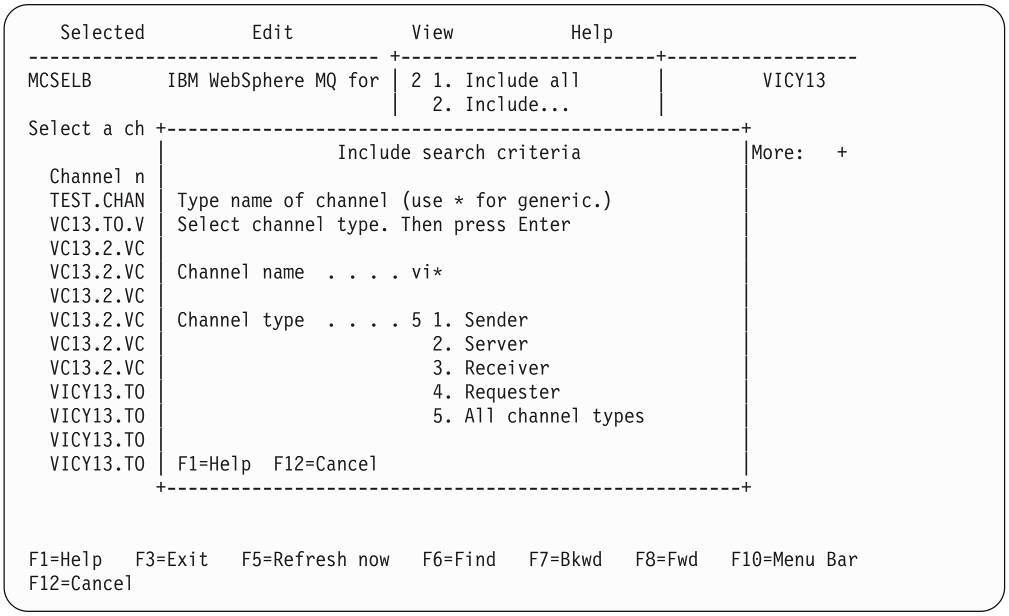
Select the channels to be included in the list, by means of an action window.

You can partially define the channel name using a terminating asterisk, for example, channel.lon*. This results in channel names found with these initial letters being included in the list.

Also in the action window is a field to allow you to specify a channel type, or all types of channel.

Refresh now F5

Updates the panel with fresh data from the system.

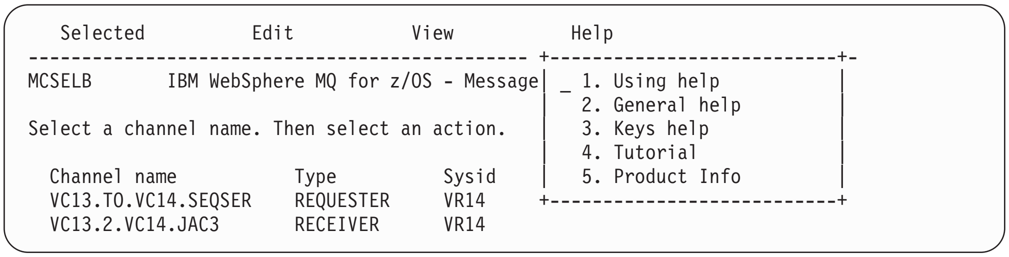


```
   Selected          Edit           View          Help
 -------------------------------- +------------------------+------------------
 MCSELB      IBM WebSphere MQ for | 2 1. Include all       |        VICY13
                                  |   2. Include...        |
 Select a ch +------------------------------------------------------+
             |                 Include search criteria              |More:   +
   Channel n |                                                      |
   TEST.CHAN | Type name of channel (use * for generic.)            |
   VC13.TO.V | Select channel type. Then press Enter                |
   VC13.2.VC |                                                      |
   VC13.2.VC | Channel name  . . . . vi*                            |
   VC13.2.VC |                                                      |
   VC13.2.VC | Channel type  . . . . 5 1. Sender                    |
   VC13.2.VC |                         2. Server                    |
   VC13.2.VC |                         3. Receiver                  |
   VICY13.TO |                         4. Requester                 |
   VICY13.TO |                         5. All channel types         |
   VICY13.TO |                                                      |
   VICY13.TO | F1=Help  F12=Cancel                                  |
             +------------------------------------------------------+


 F1=Help   F3=Exit   F5=Refresh now   F6=Find   F7=Bkwd   F8=Fwd   F10=Menu Bar
 F12=Cancel
```

Figure 69. The Include search criteria action window

Help menu-bar choice

The Help pull-down menu is shown in Figure 70.



```
   Selected         Edit          View          Help
 ---------------------------------------------- +----------------------------+-
 MCSELB       IBM WebSphere MQ for z/OS - Message| _ 1. Using help            |
                                                 |   2. General help          |
 Select a channel name. Then select an action.   |   3. Keys help             |
                                                 |   4. Tutorial              |
   Channel name          Type         Sysid      |   5. Product Info          |
   VC13.TO.VC14.SEQSER   REQUESTER    VR14      +----------------------------+
   VC13.2.VC14.JAC3      RECEIVER     VR14
```

Figure 70. The Help pull-down menu

The channel definition panels

The four channel Settings panels for defining channels (one for each of sender, receiver, server, and requester) have a menu bar with choices you can pull down to reveal various options you can select for these choices. See Table 39.

The menu-bar choices are:

Table 39. Menu-bar choices on channel panels

Channel	Help

The work area of the panels is used to present the fields of attributes or settings for the channel.

The function keys control the use of the panels to:
- Call help panels
- Move the cursor to the menu bar
- Refresh the panel
- Cancel a pull-down menu or a secondary window
- Exit from the panel
- Scroll forward and backward through settings

The method of using the panels is:
- For new channels, fill in the data fields, then select **Channel** from the menu bar, and select the **Save** option from the pull-down menu.

  Note: Default values supplied by WebSphere MQ for z/OS are presented in some fields. The defaults cannot be changed, but the values presented can be changed.
- For existing channels, type over the data presented in the fields with new data. Then select **Channel** from the menu bar, and select the **Save** option from the pull-down menu.

Channel menu-bar choice

The **Channel** menu-bar choice enables you to save any changes you have made to channel definitions, and to return to the Message Channel List panel.

Saving changes

If there are no errors, selecting the **Save** option from the Channel pull-down menu saves any changes you have made to channel definitions. You are returned to the Message Channel List panel.

If there are errors, you are returned to the Settings panel with an error message, and all fields containing errors are highlighted. The cursor is positioned on the first field in error. The changes are not saved.

Exit from the panel

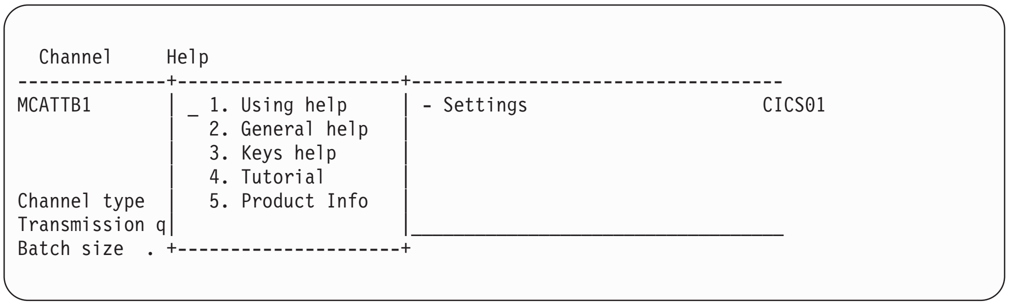
Selecting the **Save** option from the Channel pull-down menu saves the changes you have made and returns you to the Message Channel List panel.

Selecting the **Exit** option from the Channel pull-down menu, or pressing F3 or F12, returns you to the Message Channel List panel.

However, if you have not saved the changes you made, a secondary window requesting confirmation of your intention to exit without saving the data is presented; see Figure 63 on page 443. If you want to save the changes you have made, select **Save and exit**. If you have had second thoughts about the changes you have made, select **Exit without saving**.

Help menu-bar choice

The Help pull-down menu is shown in Figure 71.



```
  Channel     Help
--------------+---------------------+-----------------------------------
MCATTB1       | _ 1. Using help     | - Settings                      CICS01
              |   2. General help   |
              |   3. Keys help      |
              |   4. Tutorial       |
Channel type  |   5. Product Info   |
Transmission q|                     |___________________________________
Batch size  . +---------------------+
```

Figure 71. The Help choice pull-down menu

Channel settings panel fields

The fields in these panels define the attributes of the channels. The channel settings panel fields that you can change are shown in Table 40. You can find details for each field in Chapter 6, “Channel attributes”, on page 77.

A “✓” signifies that the field is available for use with the indicated type of channel, while an “O” means that these fields are only needed for server channels when they are to be used as sender channels.

Table 40. Channel attribute fields per channel type

Attribute field	**Sender**	**Server**	**Receiver**	**Requester**
Batch size	✓	✓	✓	✓
CICS profile name	✓	O		✓
Connection name	✓	O		✓
Disconnect interval	✓	✓		
LU62 TP name *(see Note)*	✓	O		✓
Maximum message size	✓	✓	✓	✓
Maximum transmission size	✓	✓	✓	✓
Message exit	✓	✓	✓	✓
PUT authority			✓	✓
Retry count	✓	O		✓
Retry fast interval	✓	O		✓
Retry slow interval	✓	O		✓
Receive exit	✓	✓	✓	✓
Sequence number wrap	✓	✓	✓	✓
Sequential delivery	✓	✓	✓	✓
Security exit	✓	✓	✓	✓
Send exit	✓	✓	✓	✓
Target system identifier	✓	✓	✓	✓
Transmission queue name	✓	✓		
Transaction identifier	✓	O		✓
Note: See also the *Multiplatform APPC Configuration Guide* (“Red Book”) and Table 41 for information.				

Table 41. Settings for LU 6.2 TP name on the local z/OS system for a remote queue manager platform

Remote platform	**Sender/server**	**Requester**
z/OS using CICS	CKRC	CKSV[1]
z/OS without CICS and UNIX systems	As specified in the side information on remote queue manager system	As specified in the side information on remote queue manager system
OS/2	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file

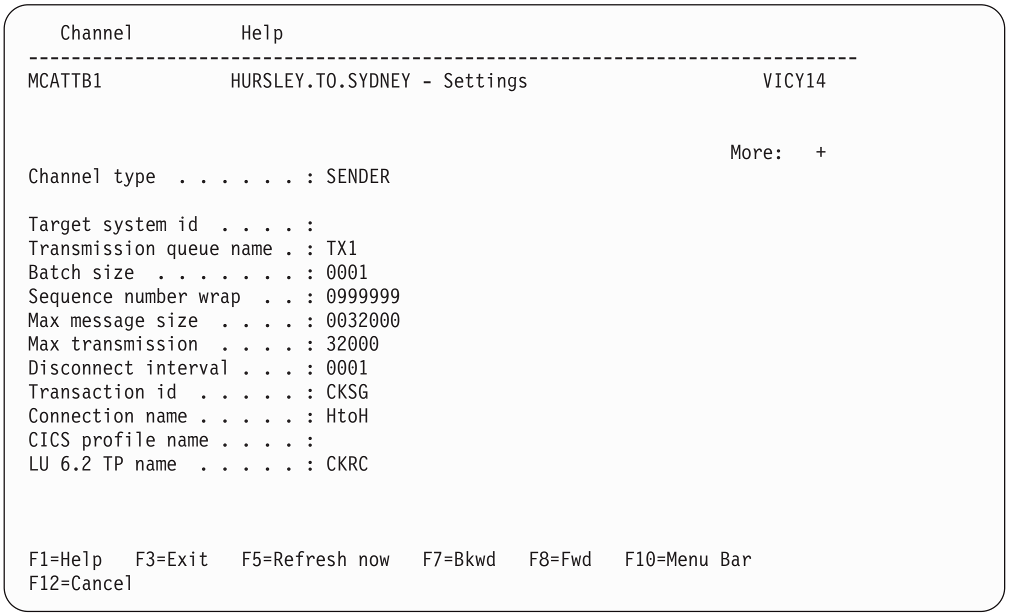
Table 41. Settings for LU 6.2 TP name on the local z/OS system for a remote queue manager platform (continued)

Remote platform	Sender/server	Requester
OS/400	The same as the compare value in the routing entry on the OS/400 system	The same as the compare value in the routing entry on the OS/400 system
Digital OVMS	As specified in the Digital OVMS Run Listener command	As specified in the Digital OVMS Run Listener command
Compaq NonStop Kernel	The same as the TPNAME specified in the receiver-channel definition	The same as the TPNAME specified in the receiver-channel definition
Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows
Note: [1] If you have a fully defined server channel, (see "Message channels" on page 8), its definition should specify a transaction ID of CKSG.		

If you have more than one queue manager on the same machine, ensure that the TPnames in the channel definitions are unique. To modify a TPname, use CSQ4SIDE or CKMC.

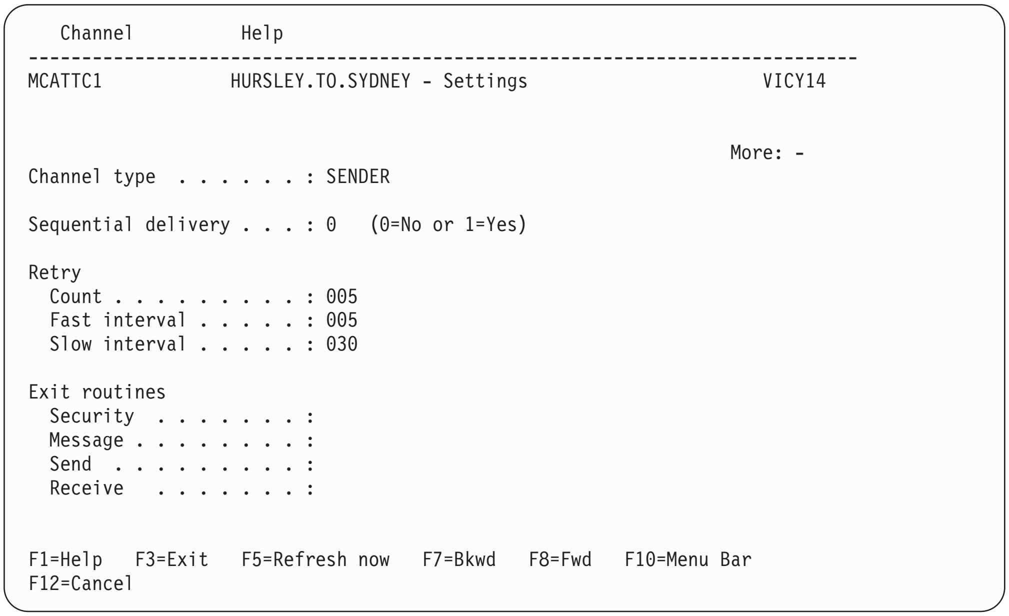
Details of sender channel settings panel

This section provides details of the sender channel settings panel, as shown in Figures 72 and 73.



```
   Channel          Help
------------------------------------------------------------------------------
MCATTB1            HURSLEY.TO.SYDNEY - Settings                      VICY14


                                                                  More:   +
Channel type  . . . . . . : SENDER

Target system id  . . . . :
Transmission queue name . : TX1
Batch size  . . . . . . . : 0001
Sequence number wrap  . . : 0999999
Max message size  . . . . : 0032000
Max transmission  . . . . : 32000
Disconnect interval . . . : 0001
Transaction id  . . . . . : CKSG
Connection name . . . . . : HtoH
CICS profile name . . . . :
LU 6.2 TP name  . . . . . : CKRC



F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 72. The sender channel settings panel

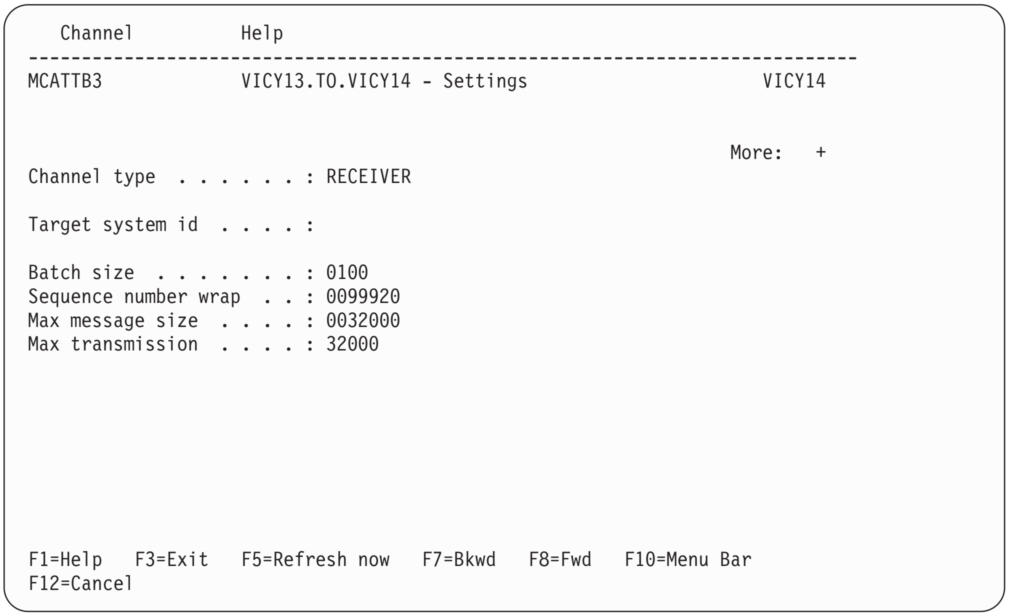


```
   Channel          Help
------------------------------------------------------------------------------
MCATTC1            HURSLEY.TO.SYDNEY - Settings                      VICY14


                                                                  More: -
Channel type  . . . . . . : SENDER

Sequential delivery . . . : 0   (0=No or 1=Yes)

Retry
  Count . . . . . . . . . : 005
  Fast interval . . . . . : 005
  Slow interval . . . . . : 030

Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive   . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 73. The sender channel settings panel - screen 2

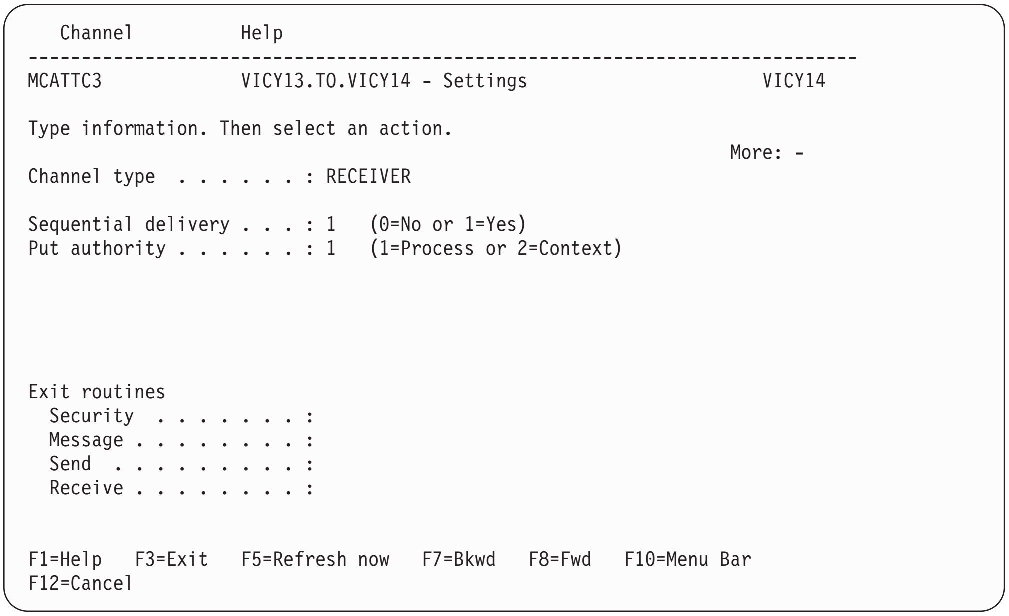
Details of receiver channel settings panel

This section provides details of the receiver channel settings panels, as shown in Figures 74 and 75.



```
   Channel          Help
------------------------------------------------------------------------------
MCATTB3             VICY13.TO.VICY14 - Settings                      VICY14



                                                                  More:   +
Channel type  . . . . . . : RECEIVER

Target system id  . . . . :

Batch size  . . . . . . . : 0100
Sequence number wrap  . . : 0099920
Max message size  . . . . : 0032000
Max transmission  . . . . : 32000









F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 74. The receiver channel settings panel

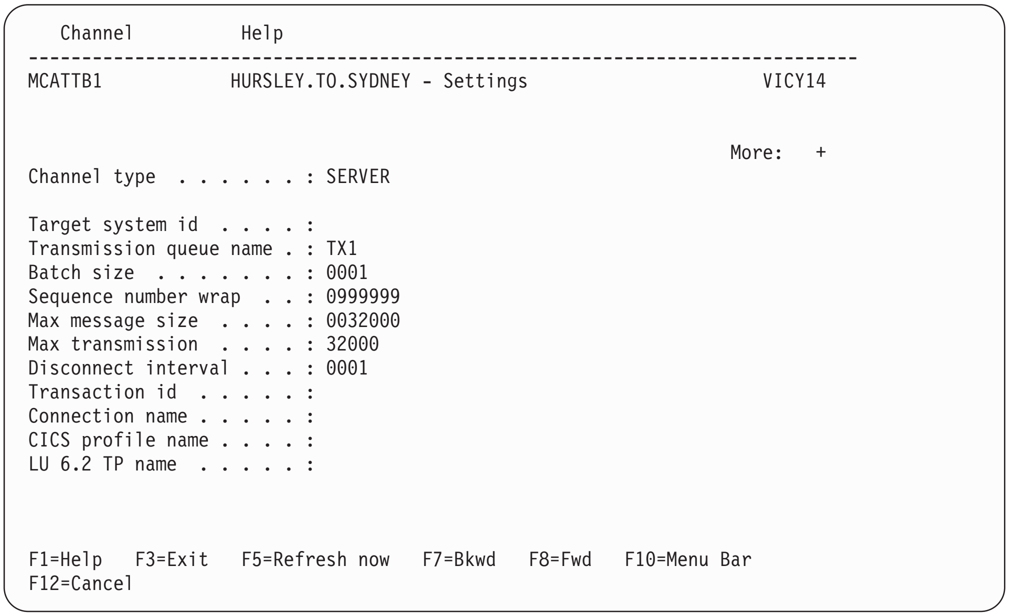


```
   Channel          Help
------------------------------------------------------------------------------
MCATTC3             VICY13.TO.VICY14 - Settings                      VICY14

Type information. Then select an action.
                                                                  More: -
Channel type  . . . . . . : RECEIVER

Sequential delivery . . . : 1   (0=No or 1=Yes)
Put authority . . . . . . : 1   (1=Process or 2=Context)







Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive . . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 75. The receiver channel settings panel - screen 2

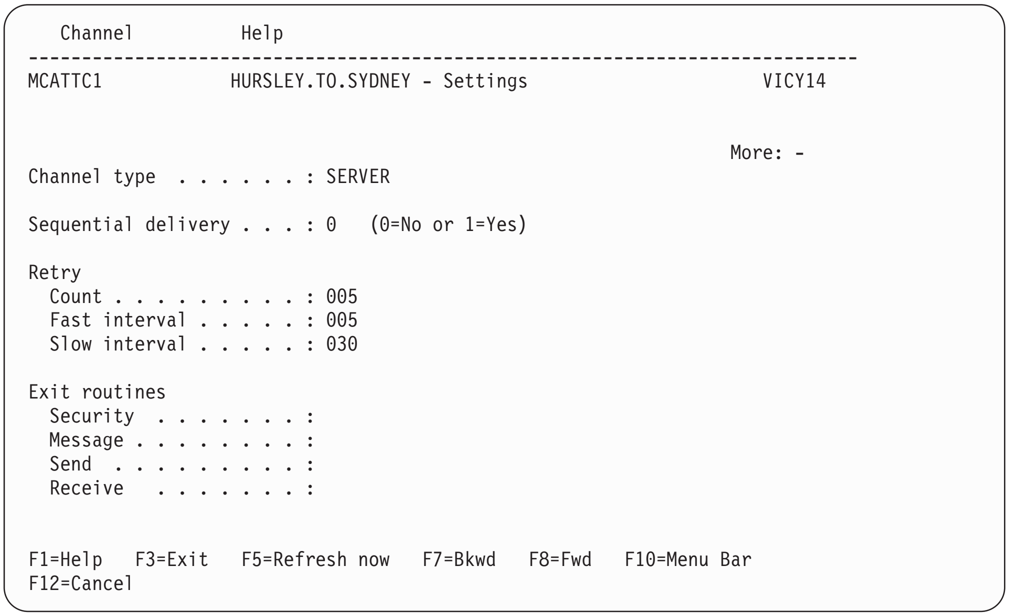
Details of server channel settings panel

This section provides details of the server channel settings panels, as shown in Figures 76 and 77.



```
   Channel         Help
------------------------------------------------------------------------------
MCATTB1           HURSLEY.TO.SYDNEY - Settings                      VICY14


                                                                 More:   +
Channel type  . . . . . . : SERVER

Target system id  . . . . :
Transmission queue name . : TX1
Batch size  . . . . . . . : 0001
Sequence number wrap  . . : 0999999
Max message size  . . . . : 0032000
Max transmission  . . . . : 32000
Disconnect interval . . . : 0001
Transaction id  . . . . . :
Connection name . . . . . :
CICS profile name . . . . :
LU 6.2 TP name  . . . . . :



F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 76. The server channel settings panel

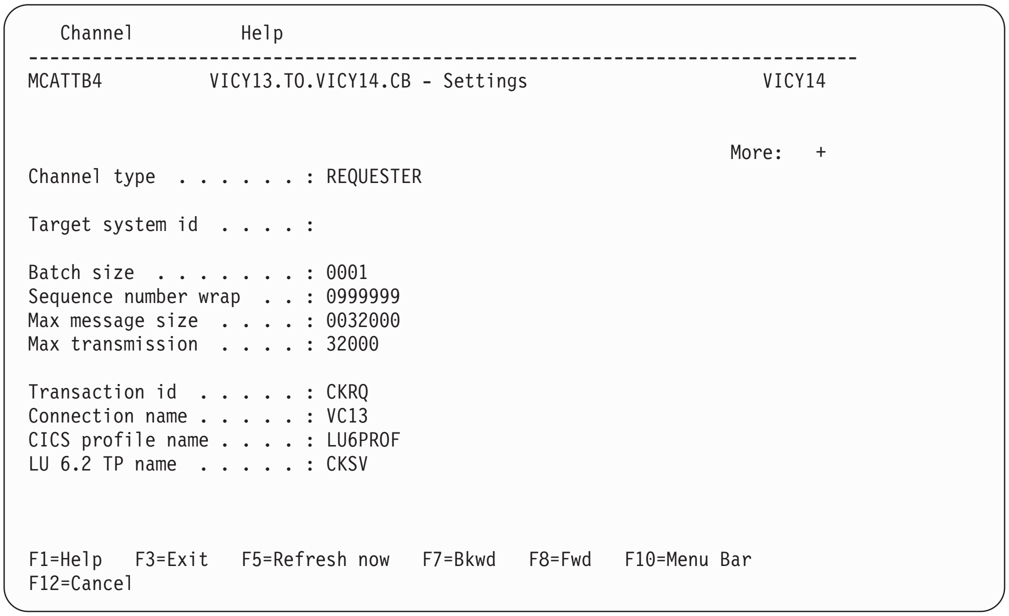


```
   Channel         Help
------------------------------------------------------------------------------
MCATTC1           HURSLEY.TO.SYDNEY - Settings                      VICY14


                                                                 More: -
Channel type  . . . . . . : SERVER

Sequential delivery . . . : 0   (0=No or 1=Yes)

Retry
  Count . . . . . . . . . : 005
  Fast interval . . . . . : 005
  Slow interval . . . . . : 030

Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive   . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 77. The server channel settings panel - screen 2

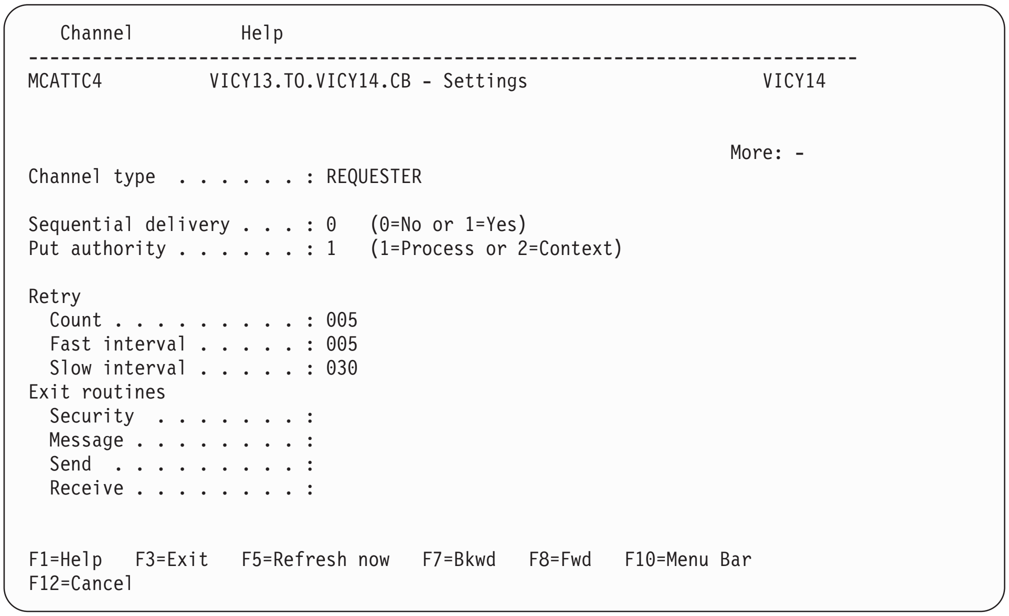
Details of requester channel settings panel

This section provides details of each field in the requester channel settings panels, as shown in Figures 78 and 79.



```
   Channel         Help
------------------------------------------------------------------------------
MCATTB4          VICY13.TO.VICY14.CB - Settings                       VICY14


                                                                  More:   +
Channel type  . . . . . . : REQUESTER

Target system id  . . . . :

Batch size  . . . . . . . : 0001
Sequence number wrap  . . : 0999999
Max message size  . . . . : 0032000
Max transmission  . . . . : 32000

Transaction id  . . . . . : CKRQ
Connection name . . . . . : VC13
CICS profile name . . . . : LU6PROF
LU 6.2 TP name  . . . . . : CKSV



F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 78. The requester channel settings panel



```
   Channel         Help
------------------------------------------------------------------------------
MCATTC4          VICY13.TO.VICY14.CB - Settings                       VICY14


                                                                  More: -
Channel type  . . . . . . : REQUESTER

Sequential delivery . . . : 0   (0=No or 1=Yes)
Put authority . . . . . . : 1   (1=Process or 2=Context)

Retry
  Count . . . . . . . . . : 005
  Fast interval . . . . . : 005
  Slow interval . . . . . : 030
Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive . . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 79. The requester channel settings panel - screen 2

Channel settings panel fields

Chapter 30. Preparing WebSphere MQ for z/OS when using CICS

This chapter describes the WebSphere MQ for z/OS and CICS preparations you need to make before you can start to use CICS for distributed queuing.

To enable distributed queuing, you must perform the following three tasks:

- Customize the distributed queuing facility and define the WebSphere MQ objects required; this is described in *WebSphere MQ for z/OS Concepts and Planning Guide* and *WebSphere MQ for z/OS System Setup Guide* .
- Define access security; this is described in *WebSphere MQ for z/OS Concepts and Planning Guide* and *WebSphere MQ for z/OS System Setup Guide* .
- Set up your communications; this is described in Chapter 31, "Setting up CICS communication for WebSphere MQ for z/OS", on page 461.

Defining DQM requirements to WebSphere MQ

In order to define your distributed-queuing requirements, you need to:

- Define WebSphere MQ programs and data sets as CICS resources
- Define the channel definitions
- Define the CKMQ transient data queue
- Define WebSphere MQ queues triggers and processes
- Define CICS resources used by distributed queuing
- Define access security

See the *WebSphere MQ for z/OS System Setup Guide* for information about these tasks.

Defining WebSphere MQ objects

Use the WebSphere MQ for z/OS operations and control panels, or one of the other WebSphere MQ for z/OS command input methods, to define WebSphere MQ for z/OS objects. Refer to the *WebSphere MQ Script (MQSC) Command Reference* book for details of defining objects.

You define:

- A local queue with the usage of (XMITQ) for each sending message channel.
- Remote queue definitions.

  A remote queue object has three distinct uses, depending upon the way the name and content are specified:
  - Remote queue definition
  - Queue manager alias definition
  - Reply-to queue alias definition

  This is shown in Table 2 on page 37.
- A process naming the MCA sender transaction, CKSG, as the application to be triggered by messages appearing on the transmission queue. The process definition parameter, USERDATA, must contain the name of the channel to be started by this process. See "How to trigger channels" on page 434.

The supplied sample CSQ4DISQ gives examples of the necessary definitions.

Multiple message channels per transmission queue

It is possible to define more than one channel per transmission queue, but only one of these channels needs to be active at any one time. The provision of multiple channels is recommended to provide alternative routes between queue managers for traffic balancing and link failure recovery.

You may start more than one channel to serve a transmission queue to increase message throughput, but when doing so, ensure that the queue has a SHARE attribute, and that there is not a need for sequential delivery of messages.

Channel operation considerations

Channels are designed to be active only when there is work for them to process. This mechanism allows for conservation of limited system resources such as active transactions and LU 6.2 sessions while at the same time delivering messages in a timely fashion determined by the application. The mechanisms which are used to determine when a channel is started and stopped are triggering and the disconnect interval respectively.

This mechanism works well unless the operator wishes to terminate a channel before the disconnect time interval expires. This can occur in the following situations:
- System quiesce
- Resource conservation
- Unilateral action at one end of a channel

In these cases it is necessary to stop the channel using the STOP option from the Message Channel List panel of the CKMC transaction. For information about what happens when a channel is stopped in this way, and how to restart the channel, see "Stopping and quiescing channels" on page 68.

Chapter 31. Setting up CICS communication for WebSphere MQ for z/OS

Distributed queue management (DQM) provides channel control programs which form the interface to CICS communication links, controllable by the system operator. The channel definitions held by DQM use these CICS connections.

When a channel is started, it tries to use the CICS connection specified in the channel definition. For this to succeed, it is necessary for the CICS connection to be defined and available. This section explains how to do this.

If more than one CICS system is associated with any one WebSphere MQ for z/OS, and each CICS system is running some DQM functions, you need to define connections between the CICS systems. This chapter also explains how to do this.

Connecting CICS systems

Part of the installation of DQM requires the definition and installation of CICS logical unit type 6.2 (LU 6.2) connections that provide the physical link between the CICS systems serving the local queue manager, and the systems serving the remote queue managers. To set up these connections, use the *CICS Intercommunication Guide*.

One z/OS system can be host to a number of CICS systems at the same time, and each CICS system is able to connect to one queue manager at any one time.

You provide communication links so that queue managers may use these links, through CICS intersystem communication (ISC) to reach other queue managers on z/OS systems (using CICS or not), and on other non-z/OS systems, provided they are using the standard queue manager intercommunication protocol, WebSphere MQ Message Channel Protocol.

Communication between queue managers

There are two forms of communication between CICS systems:

- Intersystem communication (ISC): communication between a CICS system and other systems in a data communication network that support the logical unit type 6.1 or logical unit type 6.2 protocols of IBM Systems Network Architecture (SNA).
- Multiregion operation (MRO): communication between CICS systems running in different address spaces of the same z/OS system.

Only ISC LU 6.2 protocols are used for connecting two queue managers over a DQM channel, even where they both reside in the same z/OS system.

Note: CICS for MVS/ESA Version 4 Release 1.0 or higher is required for WebSphere MQ distributed queue management.

Intersystem communication

The connection type must be ISC LU 6.2, but can be defined as one of the following:

- LU 6.2 single-session terminal

- LU 6.2 single-session connection
- LU 6.2 parallel-session connection

Before deciding the type of connection to be defined, you should consider the following points:
- The number of channels to be defined between the two systems
- The maximum number of channels that are to be active at any one time
- How often the connection is used
- The number of channels per transmission queue
- The number of channels that can be active per connection

Note: Multiple channels can be active on the same connection.

To define an LU 6.2 link between the two CICS systems, you should refer to the following books:
- *CICS Intercommunication Guide*, SC33-1695.
- *CICS Resource Definition Guide*, SC33-1684.

paying particular attention to the sections discussing communication resources.

Defining an LU 6.2 connection

When you decide which type of LU 6.2 connection is to be established between the local and remote CICS systems, the process of definition can take place.

Only one ISC connection can be active between any two CICS systems at the same time. However, a single CICS system can have connections to multiple remote CICS systems at the same time.

The sender and requester channel definitions require the provision of the LU 6.2 connection name and, optionally, the CICS profile name to be used.

The relationship between CICS profiles and connections is shown in Figure 80. The uppercase fields are the names of the CEDA transaction entry, and the lowercase values are fields within those definitions that are relevant to the example.

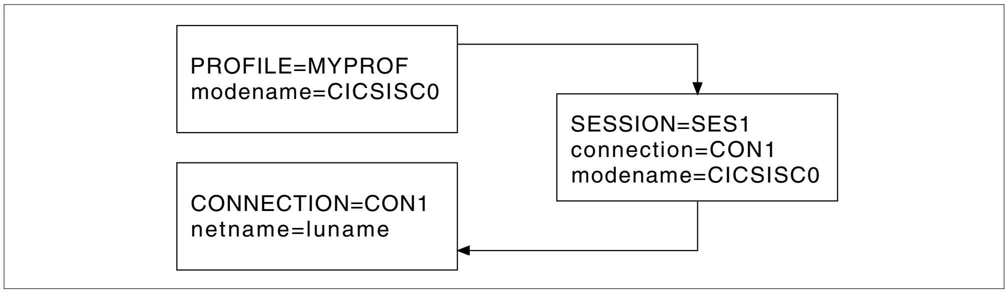


Figure 80. CICS LU 6.2 connection definition

If a sender channel is defined with the following characteristics, it causes a session to be allocated using a SES1 session on connection CON1:
- CHANNEL=MY.CHANNEL
- CONNECTION NAME=CON1
- CICS PROFILE NAME=MYPROF

If no CICS profile name is specified in the channel definition, DQM does not specify a profile when allocating a session.

Installing the connection

When you have defined the connection definitions on your CICS system definitions (CSDs), these can be installed using the CICS CEDA INSTALL command.

If you want to install these connections as part of the CICS initialization process, you can add the group that contains the connection definitions to the CICS startup list that is specified in the GRPLIST= parameter. You then need to cold start your CICS system for the entries to become effective.

Communications between CICS systems attached to one queue manager

DQM functions may be shared between more than one CICS system. When these CICS systems are connected to, or associated with, the same queue manager, then these CICS systems need to be set up correctly so that function shipping of EXEC CICS commands and program invocation occur correctly.

Connection names for function shipping

Although CICS does not require that a connection name is the same as the DFHSIT SYSIDNT name of the target CICS system, DQM requires that they are the same.

The type of connection can be either MRO or ISC.

Preparation on z/OS using CICS

Chapter 32. Example configuration - IBM WebSphere MQ for z/OS using CICS

This chapter gives an example of how to set up communication links using CICS from WebSphere MQ for z/OS or MQSeries for OS/390 or MVS/ESA to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- HP-UX
- AT&T GIS UNIX[9]
- OS/400

(You can also connect any of the following:

z/OS to z/OS
z/OS to MVS/ESA
MVS/ESA to MVS/ESA

with CICS.)

First it describes the parameters needed for an LU 6.2 connection; then it describes:

- "Establishing an LU 6.2 connection using CICS" on page 468

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for z/OS using CICS configuration" on page 470.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 42 on page 466 presents a worksheet listing all the parameters needed to set up communication from z/OS to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

---

[9] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

z/OS and LU 6.2

The steps required to set up an LU 6.2 connection are described in “Establishing an LU 6.2 connection using CICS” on page 468, with numbered cross references to the parameters on the worksheet.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in “Explanation of terms” on page 467.

Table 42. Configuration worksheet for z/OS using LU 6.2

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
1	Command prefix		**+cpf**	
2	Network ID		**NETID**	
3	Node name		**MVSPU**	
4	Local LU name		**MVSLU**	
5	Symbolic destination		**M1**	
6	Modename		**#INTER**	
7	Local Transaction Program name		**MQSERIES**	
8	LAN destination address		**400074511092**	
Connection to an OS/2 system using CICS The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
17	Connection name		**OS2**	
18	Group name		**EXAMPLE**	
19	Session name		**OS2SESS**	
20	Netname	**6**	**OS2LU**	
Connection to a Windows system using CICS The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
17	Connection name		**WNT**	
18	Group name		**EXAMPLE**	
19	Session name		**WNTSESS**	
20	Netname	**6**	**WINNTLU**	
Connection to an AIX system using CICS The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
17	Connection name		**AIX**	
18	Group name		**EXAMPLE**	
19	Session name		**AIXSESS**	
20	Netname	**4**	**AIXLU**	
Connection to an HP-UX system using CICS The values in this section of the table must match those used in Table 24 on page 231, as indicated.				
17	Connection name		**HPUX**	

Table 42. Configuration worksheet for z/OS using LU 6.2 (continued)

ID	Parameter Name	Reference	Example Used	User Value
18	Group name		**EXAMPLE**	
19	Session name		**HPUXSESS**	
20	Netname	5	**HPUXLU**	
Connection to an AT&T GIS UNIX system using CICS The values in this section of the table must match those used in Table 26 on page 257, as indicated.				
17	Connection name		**GIS**	
18	Group name		**EXAMPLE**	
19	Session name		**GISSESS**	
20	Netname	4	**GISLU**	
Connection to an OS/400 system using CICS The values in this section of the table must match those used in Table 50 on page 565, as indicated.				
17	Connection name		**AS4**	
18	Group name		**EXAMPLE**	
19	Session name		**AS4SESS**	
20	Netname	3	**AS400LU**	

Explanation of terms

1 Command prefix

This is the unique command prefix of your WebSphere MQ for z/OS queue-manager subsystem. The z/OS systems programmer defines this at installation time, in SYS1.PARMLIB(IEFSSNss), and will be able to tell you the value.

2 Network ID

The VTAM startup procedure in your installation is partly customized by the ATCSTRxx member of the data set referenced by the DDNAME VTAMLST. The Network ID is the value specified for the NETID parameter in this member. For Network ID you must specify the name of the NETID that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). Your network administrator will tell you the value.

3 Node name

VTAM, being a low-entry network node, does not have a Control Point name for Advanced Peer-to-Peer Networking (APPN) use. It does however have a system services control point name (SSCPNAME). For node name, you must specify the name of the SSCP that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). This is defined in the same ATCSTRxx member as the Network ID. Your network administrator will tell you the value.

4 Local LU name

A logical unit (LU) is software that serves as an interface or translator between a transaction program and the network. It manages the exchange of data between transaction programs. The local LU name is the unique VTAM APPLID of this WebSphere MQ subsystem. Your network administrator will tell you this value.

5 Symbolic destination
This is the name you give to the CPI-C side information profile. You need a side information entry for each LU 6.2 listener.

6 Modename
This is the name given to the set of parameters that control the LU 6.2 conversation. An entry with this name and similar attributes must be defined at each end of the session. In VTAM, this corresponds to a mode table entry. You network administrator will assign this to you.

7 Transaction Program name
WebSphere MQ applications trying to converse with this queue manager will specify a symbolic name for the program to be run at the receiving end. This will have been specified in the TPNAME attribute on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 34 on page 407 for more information. If the receiving end is z/OS using CICS, special values are required.

8 LAN destination address
This is the LAN destination address that your partner nodes will use to communicate with this host. When you are using a 3745 network controller, it will be the value specified in the LOCADD parameter for the line definition to which your partner is physically connected. If your partner nodes use other devices such as 317X or 6611 devices, the address will have been set during the customization of those devices. Your network administrator will tell you this value.

17 Connection name
(CICS only) This is a 4-character name by which each connection will be individually known in CICS RDO.

18 Group name
(CICS only) You choose your own 8-character name for this value. Your system may already have a group defined for connections to partner nodes. Your CICS administrator will give you a value to use.

19 Session name
(CICS only) This is an 8-character name by which each group of sessions will be individually known. For clarity we use the connection name, concatenated with 'SESS'.

20 Netname
(CICS only) This is the LU name of the WebSphere MQ queue manager on the system with which you are setting up communication.

Establishing an LU 6.2 connection using CICS

Note: This example is for a connection to an OS/2 system. The steps are the same whatever platform you are using; change the values as appropriate.

Defining a connection

1. At a CICS command line type:

```
CEDA DEF CONN(connection name)  17
     GROUP(group name)  18
```

For example:

```
CEDA DEF CONN(OS2) GROUP(EXAMPLE)
```

2. Press Enter to define the connection to CICS.

   A panel is displayed, as shown below.

```
 DEF CONN(OS2) GROUP(EXAMPLE)
 OVERTYPE TO MODIFY                                        CICS RELEASE = 0520
  CEDA  DEFine
   Connection     : OS2
   Group          : EXAMPLE
   DEscription  ==>
  CONNECTION IDENTIFIERS
   Netname      ==> OS2LU
   INDsys       ==>
  REMOTE ATTRIBUTES
   REMOTESystem ==>
   REMOTEName   ==>
  CONNECTION PROPERTIES
   ACcessmethod ==> Vtam               Vtam | IRc | INdirect | Xm
   Protocol     ==> Appc               Appc | Lu61
   SInglesess   ==> No                 No | Yes
   DAtastream   ==> User               User | 3270 | SCs | STrfield | Lms
   RECordformat ==> U                  U | Vb
  OPERATIONAL PROPERTIES
+  AUtoconnect  ==> No                 No | Yes | All
  I New group EXAMPLE created.
                                                             APPLID=MVSLU

  DEFINE SUCCESSFUL                          TIME:  16.49.30  DATE: 95.065
PF 1 HELP 2 COM 3 END            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

3. On this panel, change the **Netname** field in the CONNECTION IDENTIFIERS section to be the LU name (**20**) of the target system. In the CONNECTION PROPERTIES section set the **ACcessmethod** field to `Vtam` and the **Protocol** to `Appc`.
4. Press Enter to make the change.

Defining the sessions

1. At a CICS command line type:

   ```
   CEDA DEF SESS(session name)  19
        GROUP(group name)  18
   ```

   For example:

   ```
   CEDA DEF SESS(OS2SESS) GROUP(EXAMPLE)
   ```

2. Press Enter to define the group of sessions for the connection.

   A panel is displayed, as shown below.

```
 DEF SESS(OS2SESS) GROUP(EXAMPLE)
 OVERTYPE TO MODIFY                                        CICS RELEASE = 0520
  CEDA  DEFine
   Sessions     ==> OS2SESS
   Group        ==> EXAMPLE
   DEscription  ==>
  SESSION IDENTIFIERS
   Connection   ==> OS2
   SESSName     ==>
   NETnameq     ==>
   MOdename     ==> #INTER
  SESSION PROPERTIES
   Protocol     ==> Appc             Appc | Lu61
   MAximum      ==> 008 , 004        0-999
   RECEIVEPfx   ==>
   RECEIVECount ==>                  1-999
   SENDPfx      ==>
   SENDCount    ==>                  1-999
   SENDSize     ==> 04096            1-30720
+  RECEIVESize  ==> 04096            1-30720
  S CONNECTION MUST BE SPECIFIED.
                                                               APPLID=MVSLU

PF 1 HELP 2 COM 3 END           6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

3. On this panel, in the SESSION IDENTIFIERS section, specify the Connection name (17) in the **Connection** field and set the **MOdename** to `#INTER`. In the SESSION PROPERTIES section set the **Protocol** to `Appc` and the **MAximum** field to `008 , 004`.
4. Press Enter to make the change.

Installing the new group definition

To install the new group definition, type:

```
CEDA INS GROUP(group name)  18
```

at a CICS command line, and press Enter.

Note: If this connection group is already in use, severe errors will be reported. If this occurs you must take the existing connections out of service, retry the group installation, and then set the connections in service again using the following commands:

1. `CEMT I CONN`
2. `CEMT S CONN(*) OUTS`
3. `CEDA INS GROUP(`*Group name*`)`
4. `CEMT S CONN(*) INS`

What next?

The connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for z/OS using CICS configuration”.

WebSphere MQ for z/OS using CICS configuration

WebSphere MQ channels will not initialize successfully if the channel negotiation detects that the message sequence number is different at each end. You may need to reset this manually.

Note that the z/OS product with CICS uses the message sequence number of the message it last sent, while all other platforms use the sequence number of the next message to be sent. This means you must reset the message sequence number to 0 at the z/OS (with CICS) end of a channel and to 1 everywhere else.

Channel configuration

The following sections detail the configuration to be performed on the z/OS queue manager to implement the channel described in Figure 32 on page 101.

Examples are given for connecting WebSphere MQ for z/OS and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 43. Configuration worksheet for WebSphere MQ for z/OS using CICS

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**MVS**	
B	Local queue name		**MVS.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.OS2.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**OS2.MVS.CICS**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	**A**	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	**B**	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.WINNT.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**WINNT.MVS.CICS**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name		**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	

Table 43. Configuration worksheet for WebSphere MQ for z/OS using CICS (continued)

ID	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	**B**	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.AIX.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**AIX.MVS.CICS**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name		**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	**B**	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.HPUX.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**HPUX.MVS.CICS**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name		**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	**B**	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.GIS.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**GIS.MVS.CICS**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in Table 51 on page 580, as indicated.				
C	Remote queue manager name		**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	**B**	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
K	Sender (LU 6.2 using CICS) channel name		**MVS.AS400.CICS**	
L	Receiver (LU 6.2 using CICS) channel name		**AS400.MVS.CICS**	

WebSphere MQ for z/OS sender-channel definitions using CICS

```
Local Queue
       Object type :   QLOCAL
              Name :   OS2              F
             Usage :   X (XmitQ)


Remote Queue
```

```
            Object type :   QREMOTE
                   Name :   OS2.REMOTEQ      D
  Name on remote system :   OS2.LOCALQ       E
     Remote system name :   OS2              C
     Transmission queue :   OS2              F

     Sender Channel
           Channel name :   MVS.OS2.CICS     K
           Channel type :   1 (Sender)
       Target system id :   <blank>
Transmission queue name :   OS2              F
         Transaction id :   CKSG
        Connection name :   OS2              17
           LU62 TP name :   MQSERIES
```

WebSphere MQ for z/OS receiver-channel definitions using CICS

```
     Local Queue
            Object type :   QLOCAL
                   Name :   MVS.LOCALQ       B
                  Usage :   N (Normal)
     Receiver Channel
           Channel name :   OS2.MVS.CICS     L
           Channel type :   3 (Receiver)
       Target system id :   <blank>
```

z/OS using CICS configuration

Chapter 33. Message channel planning example for z/OS using CICS

This chapter provides a detailed example of how to connect queue managers together to send messages from one to the other. The example gives you a step-by-step implementation of a unidirectional interconnection of two queue managers.

Figure 81 illustrates the interaction between all the system components used for transferring messages between queue managers.

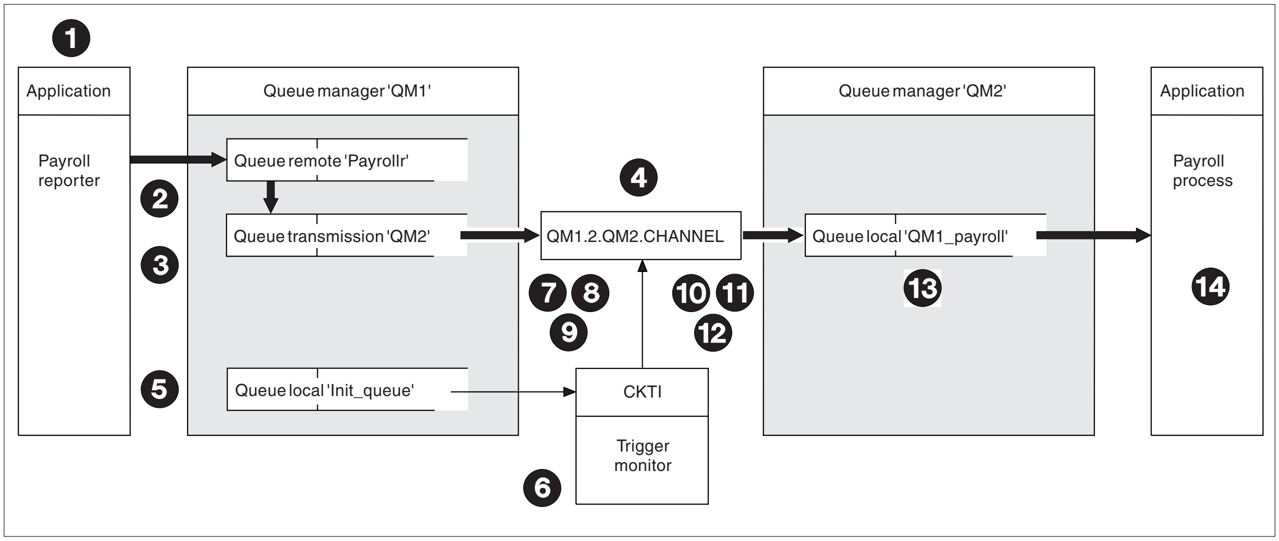


Figure 81. Connecting two queue managers in WebSphere MQ for z/OS using CICS

In the following list, the numbered items refer to the boxed index numbers in the figure.

1. The “Payroll reporter” application connects to queue manager “QM1”, opens a queue called “Payrollr”, and places messages on the queue.
2. The attributes of Payrollr in queue manager QM1 are:

QUEUE	Payrollr
TYPE	QREMOTE
DESCR	PAYROLL QUEUE ON QM2 QUEUE MANAGER
PUT	ENABLED
DEFPRTY	0
DEFPSIST	YES
RNAME	QM1_payroll
RQMNAME	QM2

From this information, the local queue manager QM1 determines that messages for this queue have to be transmitted to a remote queue manager QM2.

For QM1, QM2 is just a transmission queue on which messages have to be placed. A transmission queue is a local queue with its *usage* parameter set to XMITQ.

3. The attributes of the transmission queue, QM2, in queue manager QM1 are:

QUEUE	QM2
TYPE	LOCAL
DESCR	QUEUE MANAGER QM2 TRANSMISSION QUEUE
PUT	ENABLED
DEFPRTY	0
DEFPSIST	YES
OPPROCS	0
IPPROCS	0
CURDEPTH	0
MAXDEPTH	100000
PROCESS	QM2.PROCESS
TRIGGER	
MAXMSGL	4194304
BOTHRESH	0
BOQNAME	
STGCLASS	DEFAULT
INITQ	Init_queue
USAGE	XMITQ
SHARE	
DEFSOPT	EXCL
MSGDLVSQ	FIFO
RETINTVL	0
TRIGTYPE	FIRST
TRIGDPTH	1
TRIGMPRI	0
TRIGGERDATA	0
DEFTYPE	PREDEFINED
NOHARDENBO	
GET	ENABLED

Messages that the application puts to Payrollr are actually placed on the transmission queue QM2.

4. In this example, assume that the payroll message is the first message to be placed on the empty transmission queue, and because of the triggering attributes of the transmission queue, the queue manager determines that a trigger message is to be issued.

   The transmission queue definition refers to an initiation queue called Init_queue, and the queue manager places a trigger message on this queue. The transmission queue definition also refers to the trigger process definition, and information from this definition is included in the trigger message.

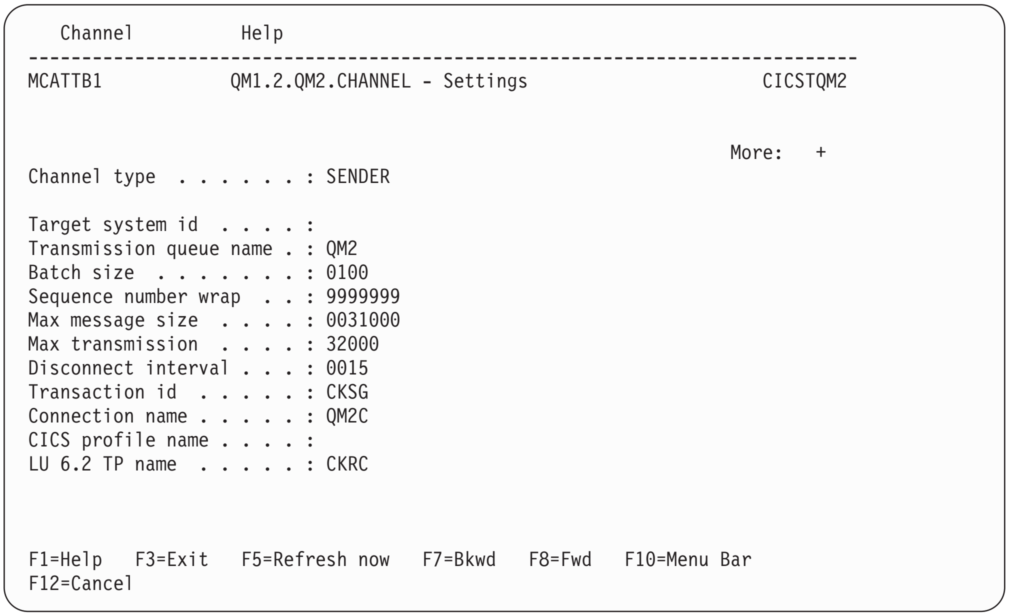
The definition of the process in queue manager QM1 is:

PROCESS	QM2.PROCESS
DESCR	PROCESS DEFINITION - TO TRIGGER CHANNEL QM1.2.QM2.CHANNEL
APPLTYPE	CICS
APPLICID	CKSG
USERDATA	QM1.2.QM2.CHANNEL
ENVRDATA	*environment information*

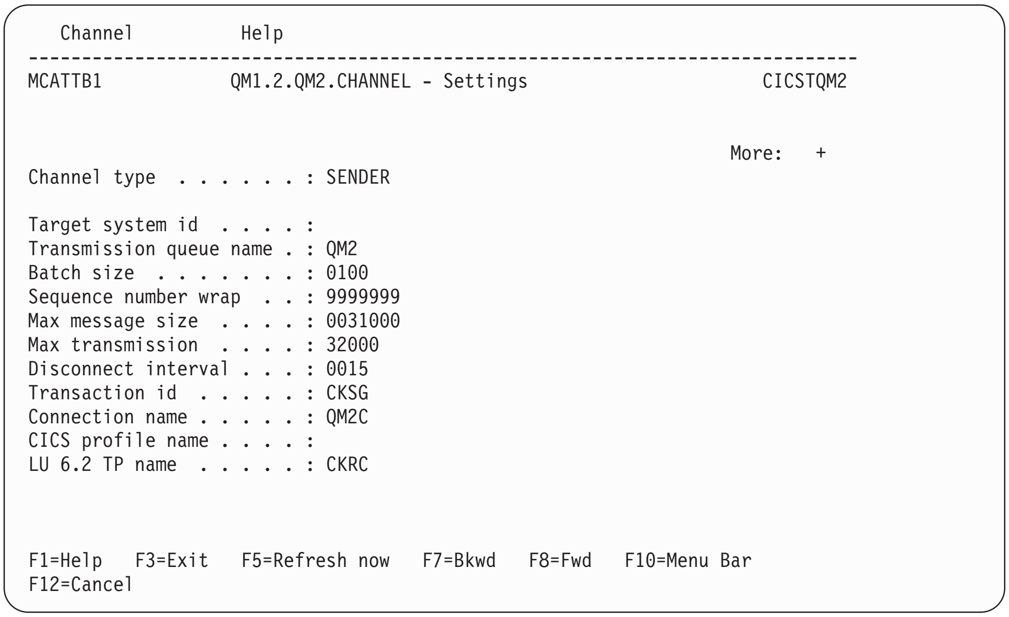
The result of this trigger processing is that a trigger message is placed on the initiation queue, Init_queue.

5. If you experience trigger messages failing to appear when expected, refer to the *WebSphere MQ Application Programming Guide*.
6. The CKTI transaction is a long-running task that monitors the initiation queue, Init_queue. CKTI processes the trigger message, an MQTM structure, to find that it must start CKSG. CKSG is the CICS name of the sender channel MCA transaction.
7. CKTI starts CKSG, passing the MQTM structure. The CKSG transaction starts processing, receives the MQTM structure, and extracts the name of the channel.
8. The channel name is used by CKSG to get the channel definition from the channel definition file on QM1. The DQM display settings panel of the channel in QM1.2.QM2.CHANNEL, is:

Planning example for z/OS using CICS

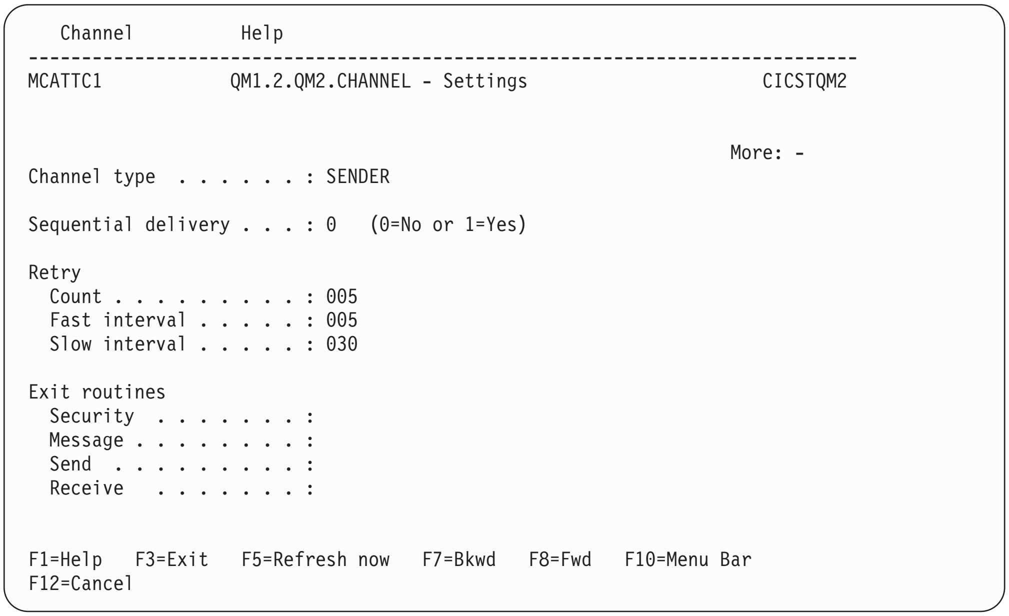


```
   Channel          Help
------------------------------------------------------------------------------
MCATTB1            QM1.2.QM2.CHANNEL - Settings                      CICSTQM2


                                                                  More:   +
Channel type  . . . . . . : SENDER

Target system id  . . . . :
Transmission queue name . : QM2
Batch size  . . . . . . . : 0100
Sequence number wrap  . . : 9999999
Max message size  . . . . : 0031000
Max transmission  . . . . : 32000
Disconnect interval . . . : 0015
Transaction id  . . . . . : CKSG
Connection name . . . . . : QM2C
CICS profile name . . . . :
LU 6.2 TP name  . . . . . : CKRC



F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```



```
   Channel          Help
------------------------------------------------------------------------------
MCATTB1            QM1.2.QM2.CHANNEL - Settings                      CICSTQM2


                                                                  More:   +
Channel type  . . . . . . : SENDER

Target system id  . . . . :
Transmission queue name . : QM2
Batch size  . . . . . . . : 0100
Sequence number wrap  . . : 9999999
Max message size  . . . . : 0031000
Max transmission  . . . . : 32000
Disconnect interval . . . : 0015
Transaction id  . . . . . : CKSG
Connection name . . . . . : QM2C
CICS profile name . . . . :
LU 6.2 TP name  . . . . . : CKRC



F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 82. Sender settings (1)

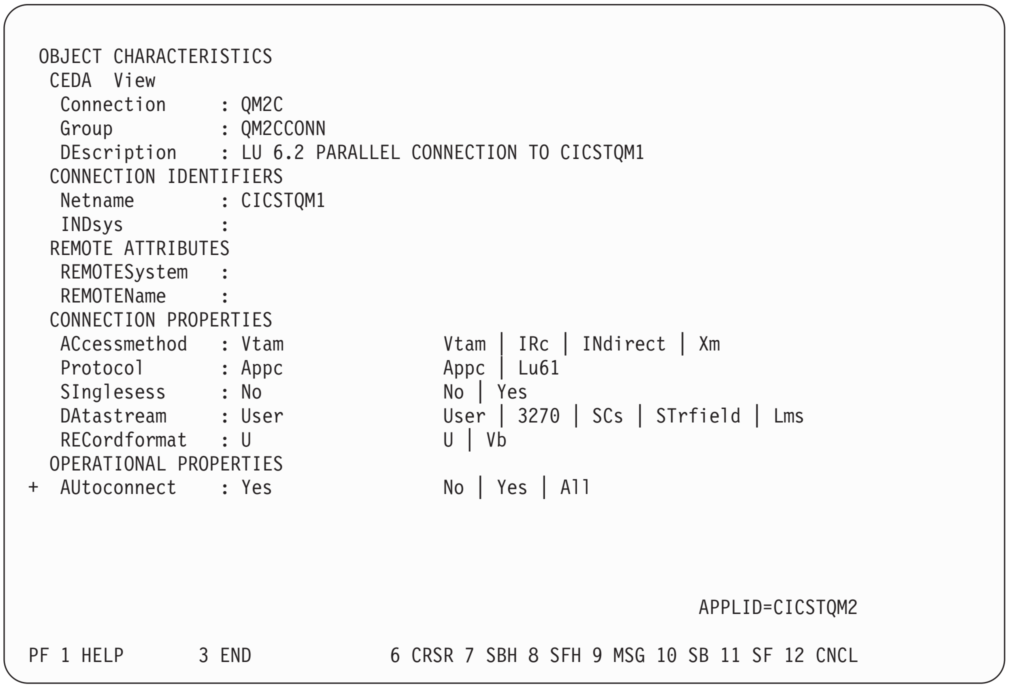


```
   Channel          Help
------------------------------------------------------------------------------
MCATTC1            QM1.2.QM2.CHANNEL - Settings                      CICSTQM2


                                                                  More: -
Channel type  . . . . . . : SENDER

Sequential delivery . . . : 0   (0=No or 1=Yes)

Retry
  Count . . . . . . . . . : 005
  Fast interval . . . . . : 005
  Slow interval . . . . . : 030

Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive   . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 83. Sender settings (2)

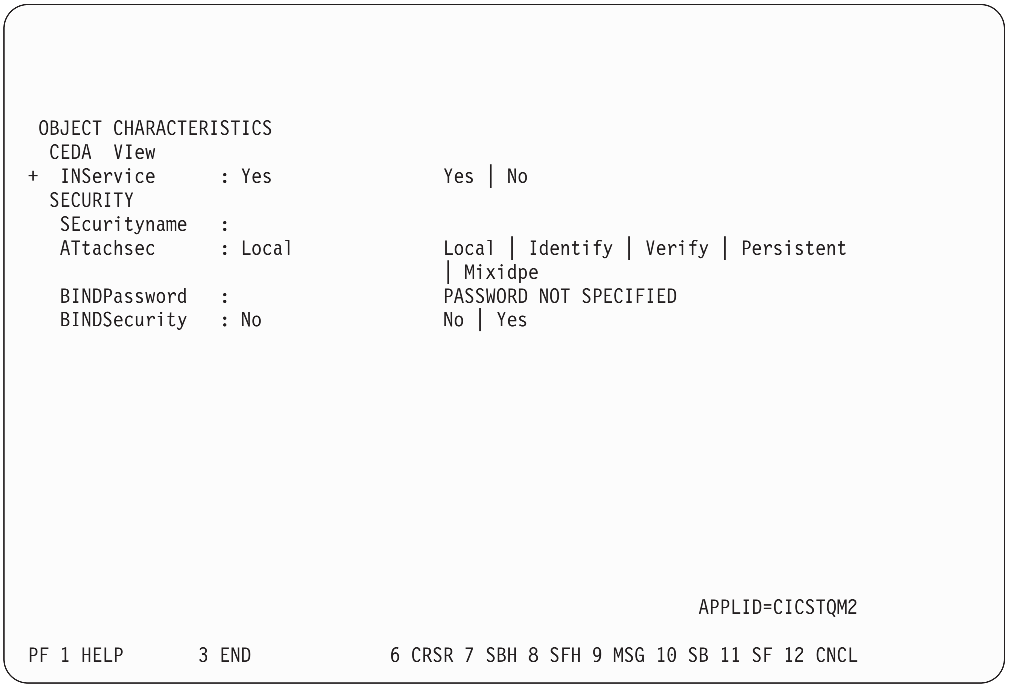
The channel definition shows that CKSG must allocate a session on the CICS QM2C connection and invoke the CKRC transaction at the destination CICS system.

9. The QM2C connection definition provides a communications link to the CICS system at the remote installation. The definition is as follows:



```
 OBJECT CHARACTERISTICS
  CEDA  View
   Connection     : QM2C
   Group          : QM2CCONN
   DEscription    : LU 6.2 PARALLEL CONNECTION TO CICSTQM1
  CONNECTION IDENTIFIERS
   Netname        : CICSTQM1
   INDsys         :
  REMOTE ATTRIBUTES
   REMOTESystem   :
   REMOTEName     :
  CONNECTION PROPERTIES
   ACcessmethod   : Vtam               Vtam | IRc | INdirect | Xm
   Protocol       : Appc               Appc | Lu61
   SInglesess     : No                 No | Yes
   DAtastream     : User               User | 3270 | SCs | STrfield | Lms
   RECordformat   : U                  U | Vb
  OPERATIONAL PROPERTIES
+  AUtoconnect    : Yes                No | Yes | All




                                                                APPLID=CICSTQM2

PF 1 HELP      3 END            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

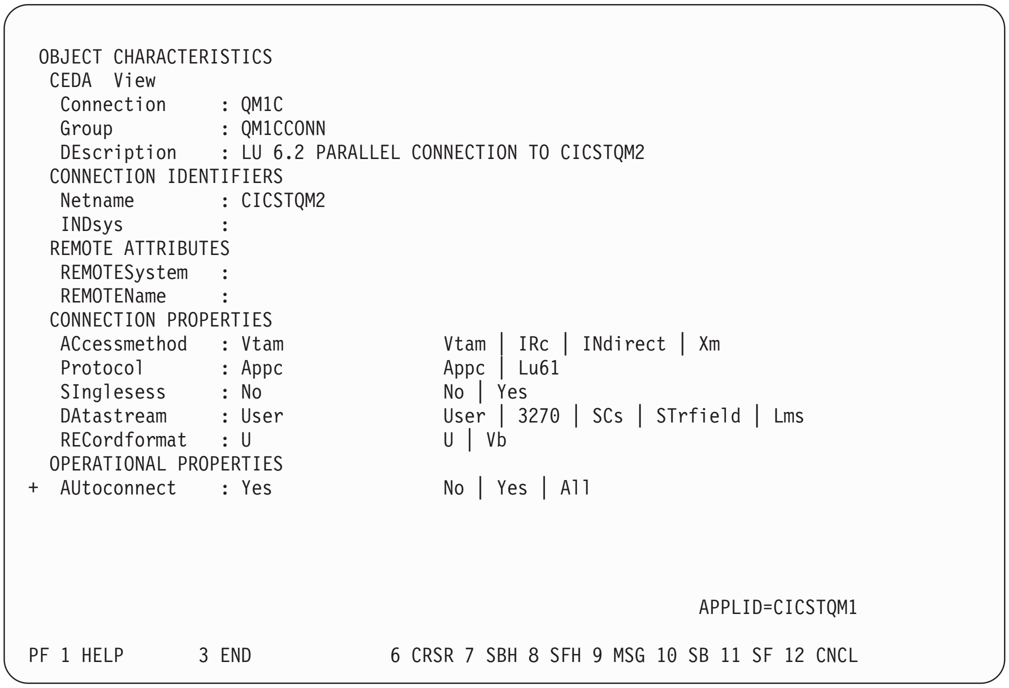
Figure 84. Connection definition (1)



```
 OBJECT CHARACTERISTICS
  CEDA  VIew
+  INService      : Yes                Yes | No
  SECURITY
   SEcurityname   :
   ATtachsec      : Local              Local | Identify | Verify | Persistent
                                       | Mixidpe
   BINDPassword   :                    PASSWORD NOT SPECIFIED
   BINDSecurity   : No                 No | Yes










                                                               APPLID=CICSTQM2

PF 1 HELP       3 END             6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

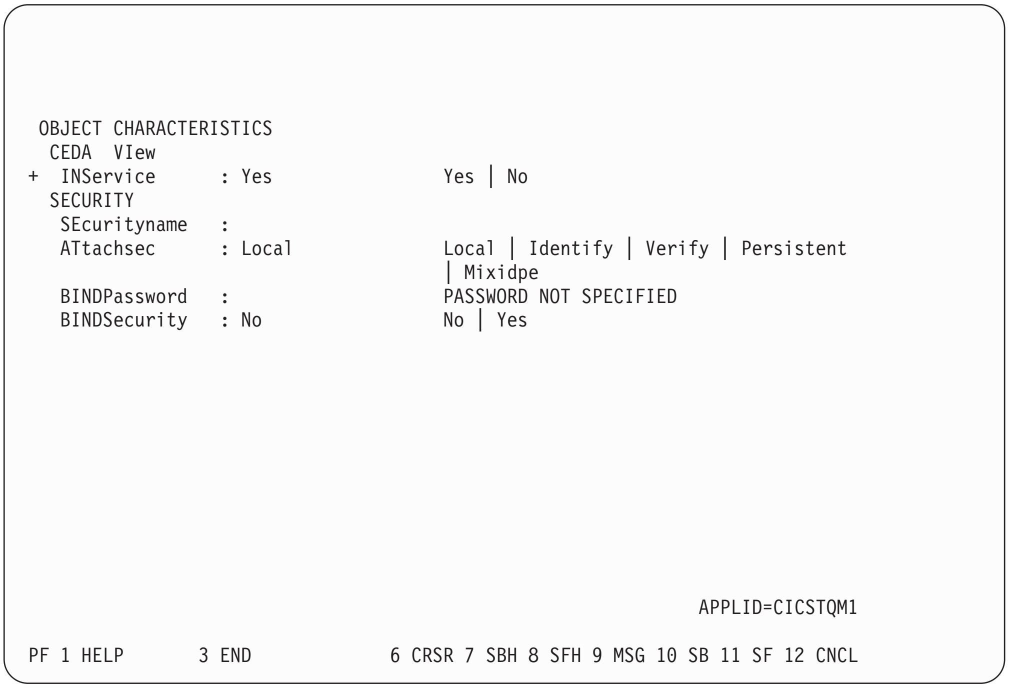
Figure 85. Connection definition (2)

10. The connection definition on the remote installation CICS system is called QM1C, and is defined as follows:



```
 OBJECT CHARACTERISTICS
  CEDA  View
   Connection     : QM1C
   Group          : QM1CCONN
   DEscription    : LU 6.2 PARALLEL CONNECTION TO CICSTQM2
  CONNECTION IDENTIFIERS
   Netname        : CICSTQM2
   INDsys         :
  REMOTE ATTRIBUTES
   REMOTESystem   :
   REMOTEName     :
  CONNECTION PROPERTIES
   ACcessmethod   : Vtam               Vtam | IRc | INdirect | Xm
   Protocol       : Appc               Appc | Lu61
   SIngless       : No                 No | Yes
   DAtastream     : User               User | 3270 | SCs | STrfield | Lms
   RECordformat   : U                  U | Vb
  OPERATIONAL PROPERTIES
+  AUtoconnect    : Yes                No | Yes | All



                                                               APPLID=CICSTQM1

PF 1 HELP       3 END             6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

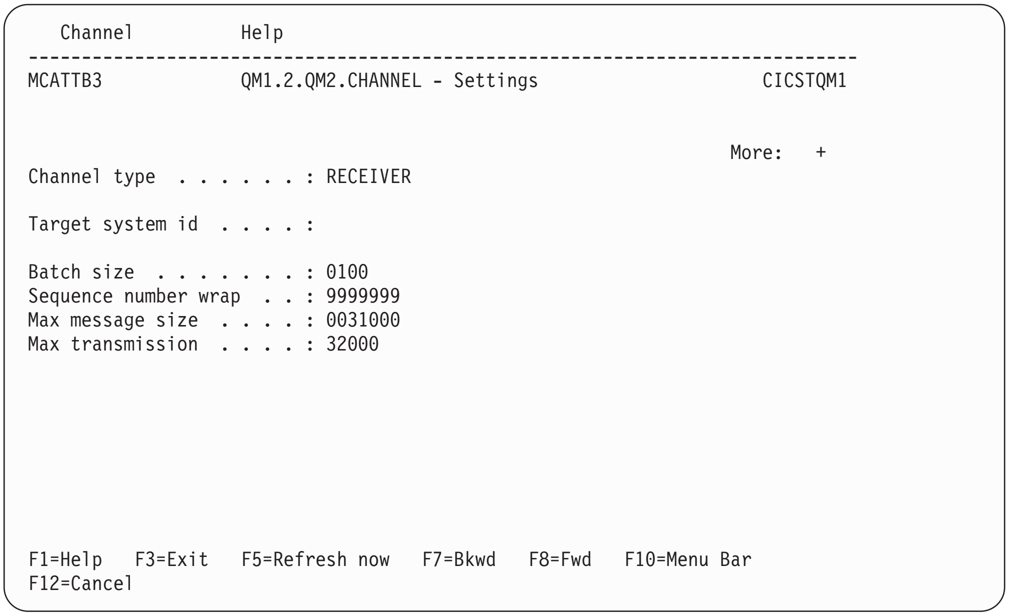
Figure 86. Connection definition (1)



```
 OBJECT CHARACTERISTICS
  CEDA  VIew
+  INService     : Yes                Yes | No
  SECURITY
   SEcurityname   :
   ATtachsec     : Local              Local | Identify | Verify | Persistent
                                      | Mixidpe
   BINDPassword   :                   PASSWORD NOT SPECIFIED
   BINDSecurity   : No                No | Yes




                                                        APPLID=CICSTQM1

PF 1 HELP       3 END            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

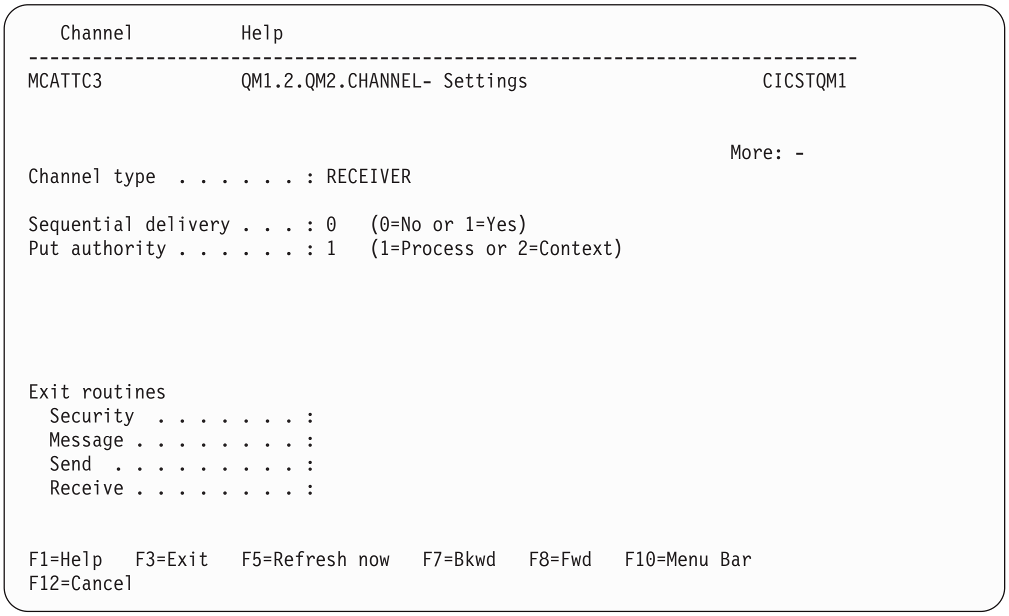
Figure 87. Connection definition (2)

11. CKRC is started by CICS on the remote system, and is passed the channel name during the initial data flows.
12. The transaction CKRC reads the definition for the receiver channel QM1.2.QM2.CHANNEL from the channel definition file, which contains:



```
   Channel          Help
------------------------------------------------------------------------------
MCATTB3             QM1.2.QM2.CHANNEL - Settings                    CICSTQM1


                                                                More:   +
Channel type  . . . . . . : RECEIVER

Target system id  . . . . :

Batch size  . . . . . . . : 0100
Sequence number wrap  . . : 9999999
Max message size  . . . . : 0031000
Max transmission  . . . . : 32000




F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 88. Receiver channel settings (1)



```
   Channel          Help
-----------------------------------------------------------------------------
MCATTC3             QM1.2.QM2.CHANNEL- Settings                      CICSTQM1


                                                                 More: -
Channel type  . . . . . . : RECEIVER

Sequential delivery . . . : 0   (0=No or 1=Yes)
Put authority . . . . . . : 1   (1=Process or 2=Context)






Exit routines
  Security  . . . . . . . :
  Message . . . . . . . . :
  Send  . . . . . . . . . :
  Receive . . . . . . . . :


F1=Help   F3=Exit   F5=Refresh now   F7=Bkwd   F8=Fwd   F10=Menu Bar
F12=Cancel
```

Figure 89. Receiver channel settings (2)

13. Once the message channel has completed the startup negotiation, the sender channel passes messages to the receiver channel. The receiver channel takes the name of the queue manager, queue name and message descriptor from the transmission header, and issues an MQPUT1 call to put the message on the local queue, QM1_payroll.

    When the batch limit of 100 is reached, or when the transmission queue is empty, the sender and receiver channels issue a syncpoint to commit the changes through the queue managers.
14. The commit action by the QM2 queue manager makes the messages available to the “Payroll process” application.

Chapter 34. Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups

This chapter describes the concept of distributed queuing with queue-sharing groups on WebSphere MQ for z/OS.

It also describes the components of distributed queuing in this environment and the WebSphere MQ preparations required before DQM can be used with queue-sharing groups, and the advantages of using DQM with queue-sharing groups.

For information on how to monitor and control channels when using queue-sharing groups, see Chapter 24, “Monitoring and controlling channels on z/OS”, on page 385.

Concepts

This section describes the concepts related to distributed queuing with queue-sharing groups. For additional information on the concepts of shared queues and queue-sharing groups, see *WebSphere MQ for z/OS Concepts and Planning Guide*, *"Shared queues"* .

Class of service

A shared queue is a type of local queue that offers a different class of service. Messages on a shared queue are stored in a coupling facility (CF), which allows them to be accessed by all queue managers in the queue-sharing group. A message on a shared queue must be a message of length no more than 63KB.

Generic interface

A queue-sharing group has a generic interface that allows the network to view the group as a single entity. This is achieved by having a single generic address that can be used to connect to any queue manager within the group.

Each queue manager in the queue-sharing group listens for inbound session requests on an address that is logically related to the generic address. For more information see “Listeners” below.

Components

What follows is a description of the components required to enable distributed queuing with queue-sharing groups.

Listeners

The group LU 6.2 and TCP/IP listeners listen on an address that is logically connected to the generic address.

For the LU 6.2 listener, the specified LUGROUP is mapped to the VTAM generic resource associated with the queue-sharing group. For an example of setting up this technology, see Table 34 on page 407.

For the TCP/IP listener, the specifed port has two mutually exclusive means of being connected to the generic address:

- In the case of a front-end router such as the IBM Network dispatcher (see *Network Dispatcher User's Guide, GC31–8496–03*), inbound connect requests are forwarded from the router to the members of the queue-sharing group.
- In the case of TCP/IP WLM/DNS, each listener registers as being part of the WLM group. This is a registration type model, similar to the VTAM generic resource for LU 6.2. For an example of setting up this technology, see "Using WLM/DNS" on page 497. WLM/DNS only maps hostname and does not map port numbers. This means that all the group listeners in a queue-sharing group must use the same port number. Use the WebSphere MQ command (MQSC) as shown in the following examples:
  - On queue manager QM1:

    ```
    START LSTR PORT(2424) INDISP(GROUP) +
    IPADDR(QM1.MACH.IBM.COM)
    ```
  - On queue manager QM2:

    ```
    START LSTR PORT(2424) INDISP(GROUP) +
    IPADDR(QM2.MACH.IBM.COM)
    ```

Transmission queues and triggering

A shared transmission queue is used to store messages before they are moved from the queue-sharing group to the destination. It is a shared queue and it is accessible to all queue managers in the queue-sharing group.

Triggering

A triggered shared queue can generate more than one trigger message for a satisfied trigger condition. There is one trigger message generated for each local initiation queue defined on a queue manager in the queue-sharing group associated with the triggered shared queue.

In the case of distributed queuing, each channel initiator receives a trigger message for a satisfied shared transmission queue trigger condition. However, only one channel initiator will actually process the triggered start, and the others will fail safely. The triggered channel is then started with a load balanced start (see "Load-balanced channel start" on page 485) that will be triggered to start channel `QSG.TO.QM2`. To create a shared transmission queue, use the WebSphere MQ commands (MQSC) as shown in the following example:

```
DEFINE QLOCAL(QM2) DESCR('Transmission queue to QM2') +
USAGE(XMITQ) QSGDISP(SHARED) +
CFSTRUCT(APPLICATION1) INITQ(SYSTEM.CHANNEL.INITQ) +
TRIGGER TRIGDATA(QSG.TO.QM2)
```

Message channel agents

A channel can only be started on a channel initiator if it has access to a channel definition for a channel with that name. A channel definition can be defined to be private to a queue manager or stored on the shared repository and available anywhere (a group definition). This means that a group defined channel is available on any channel initiator in the queue-sharing group.

Note: The private copy of the group definition can be changed or deleted.

To create group channel definitions, use the WebSphere MQ commands (MQSC) as shown in the following examples:

```
DEFINE CHL(QSG.TO.QM2) CHLTYPE(SDR) +
TRPTYPE(TCP) CONNAME(QM2.MACH.IBM.COM) +
XMITQ(QM2) QSGDISP(GROUP)

DEFINE CHL(QM2.TO.QSG) CHLTYPE(RCVR) TRPTYPE(TCP) +
QSGDISP(GROUP)
```

There are two perspectives from which to look at the message channel agents used for distributed queuing with queue-sharing groups:

- Inbound
- Outbound

Inbound

An inbound channel is a shared channel if it is connected to the queue manager through the group listener. It is connected either through the generic interface to the queue-sharing group, then directed to a queue manager within the group, or targeted at a specific queue manager’s group port or the luname used by the group listener.

Outbound

An outbound channel is a shared channel if it moves messages from a shared transmission queue. In the above example commands, sender channel `QSG.TO.QM2` is a shared channel because its transmission queue, QM2 is defined with QSGDISP(SHARED).

Synchronization queue

Shared channels have their own shared synchronization queue called SYSTEM.QSG.CHANNEL.SYNCQ, which is accessible to any member of the queue-sharing group. (Private channels continue to use the private synchronization queue. See “Synchronization queue” on page 402) This means that the channel can be restarted on a different queue manager and channel initiator instance within the queue-sharing group in the event of failure of the communications subsystem, channel initiator or queue manager. (See “Shared channel recovery” on page 486 for details.)

DQM with queue-sharing groups requires that a shared queue is available with the name SYSTEM.QSG.CHANNEL.SYNCQ. This queue must be available so that a group listener can successfully start.

If a group listener fails because the queue was not available, the queue can be defined and the listener can be restarted without recycling the channel initiator, and the non-shared channels are not affected.

Make sure that you define this queue using INDXTYPE(MSGID). This will improve the speed at which they can be accessed.

Benefits

The following section describes the benefits of shared queuing, which are:

- Load-balanced channel start
- Shared channel recovery
- Client channels

Load-balanced channel start

A shared transmission queue can be serviced by an outbound channel running on any channel initiator in the queue-sharing group. Load-balanced channel start determines where a start channel command is targeted. An appropriate channel initiator is chosen that has access to the necessary communications subsystem. For example, a channel defined with TRPTYPE(LU6.2) will not be started on a channel initiator that only has access to a TCP/IP subsystem.

The choice of channel initiator is dependant on the channel load and the headroom of the channel initiator. The channel load is the number of active channels as a percentage of the maximum number of active channels allowed as defined in the channel initiator parameters. The headroom is the difference between the number of active channels and the maximum number allowed.

Inbound shared channels can be load-balanced across the queue-sharing group by use of a generic address, as described in "Listeners" on page 483.

Shared channel recovery

The following table shows the types of shared-channel failure and how each type is handled.

Type of failure:	**What happens:**
Channel initiator communications subsystem failure	The channels dependent on the communications subsystem enter channel retry, and are restarted on an appropriate queue-sharing group channel initiator by a load-balanced start command.
Channel initiator failure	The channel initiator fails, but the associated queue manager remains active. The queue manager monitors the failure and initiates recovery processing.
Queue manager failure	The queue manager fails (failing the associated channel initiator). Other queue managers in the queue-sharing group monitor the event and initiate peer recovery.
Shared status failure	Channel state information is stored in DB2, so a loss of connectivity to DB2 becomes a failure when a channel state change occurs. Running channels can carry on running without access to these resources. On a failed access to DB2, the channel enters retry.

Client channels

Client connection channels can benefit from the high availability of messages in queue-sharing groups that are connected to the generic interface instead of being connected to a specific queue manger. (For more information about this, see the *WebSphere MQ Clients* manual.)

Clusters and queue-sharing groups

You can make your shared queue available to a cluster in a single definition. To do this you specify the name of the cluster when you define the shared queue.

Users in the network see the shared queue as being hosted by each queue manager within the queue-sharing group (the shared queue is not advertised as being hosted by the queue-sharing group). Clients can start sessions with all members of the queue-sharing group to put messages to the same shared queue

For more information, see *WebSphere MQ Queue Manager Clusters*.

Channels and serialization

If a queue manager in a queue-sharing group fails while a message channel agent is dealing with uncommitted messages on one or more shared queues, the channel and the associated channel initiator will end, and shared queue peer recovery will take place for the queue manager.

Because shared queue peer recovery is an asynchronous activity, peer channel recovery might try to simultaneously restart the channel in another part of the queue sharing group before shared queue peer recovery is complete. If this happens, committed messages might be processed ahead of the messages still being recovered. To ensure that messages are not processed out of sequence in this way, message channel agents that process messages on shared queues serialize their access to these queues by issuing the MQCONNX API call.

An attempt to start a channel for which shared queue peer recovery is still in progress might result in a failure. An error message indicating that recovery is in progress is issued, and the channel is put into retry state. Once queue manager peer recovery is complete, the channel can restart at the time of the next retry.

An attempt to RESOLVE, PING, or DELETE a channel can fail for the same reason.

Note: Serialized access to shared queues is not supported for MQI channels.

Intra-group queuing

Intra-group queuing (IGQ) can effect potentially fast and less-expensive small message transfer between queue managers within a queue-sharing group (QSG), without the need to define channels between the queue managers. That is, intra-group queuing can be used to deliver, more efficiently, small messages to queues residing on remote queue managers within a queue-sharing group. See Chapter 38, “Intra-group queuing”, on page 505 for more information.

Chapter 35. Setting up communication for WebSphere MQ for z/OS using queue-sharing groups

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This section explains how to do this.

You might also find it useful to refer to Chapter 36, “Example configuration - WebSphere MQ for z/OS using queue-sharing groups”, on page 491.

Deciding on a connection

There are two forms of communication protocol that can be used:
- TCP
- LU 6.2 through APPC/MVS

Defining a TCP connection

For information on setting up your TCP, see “Defining a TCP connection” on page 405.

Sending end

The connection name (CONNAME) field in the channel definition to connect to your queue sharing group should be set to the generic interface of your queue-sharing group (see “Generic interface” on page 483). If you are using DNS/WLM, the generic interface is the name in DNSGROUP in your channel initiator parameters. If it is not set, it is the queue-sharing group name. For details of DNSGROUP, see *WebSphere MQ for z/OS System Setup Guide*.

Receiving on TCP using a queue-sharing group

Receiving shared channel programs are started in response to a startup request from the sending channel. To do this, a listener has to be started to detect incoming network requests and start the associated channel. You start this listener program with the START LISTENER command, using the inbound disposition of the group, or using the operations and control panels.

All group listeners in the queue-sharing group must be listening on the same port. If you have more than one channel initiator running on a single MVS image you can define virtual IP addresses and start your TCP listener program to only listen on a specific address or hostname by specifying IPADDR in the START LISTENER command. (For more information, see Chapter 34, “Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups”, on page 483.)

Defining an LU6.2 connection

For information on setting up APPC/MVS, see Chapter 26, “Setting up communication for z/OS”, on page 405.

Connecting to APPC/MVS (LU 6.2)

The connection name (CONNAME) field in the channel definition to connect to your queue-sharing group should be set to the symbolic destination name, as specified in the side information data set for APPC/MVS. The partner LU specified in this symbolic destination should be the generic resource name. See "Defining yourself to the network using generic resources" on page 494 for more details.

Receiving on LU 6.2 using a generic interface

Receiving shared MCAs are started in response to a startup request from the sending channel. To do this, a group listener program has to be started to detect incoming network requests and start the associated channel. The listener program is an APPC/MVS server. You start it with the START LISTENER command, using an inbound disposition group, or using the operations and control panels. You must specify the LU name to use by means of a symbolic destination name defined in the side information data set. See "Defining yourself to the network using generic resources" on page 494 for more details.

Chapter 36. Example configuration - WebSphere MQ for z/OS using queue-sharing groups

This chapter gives an example of how to set up communication links into a queue-sharing group on WebSphere MQ for z/OS or MQSeries for OS/390 to WebSphere MQ products on the following platforms:
- OS/2
- Windows
- AIX

(You can also connect any of the following:
  z/OS to z/OS
  z/OS to MVS/ESA

Setting up communication links from a queue-sharing group to a distributed platform is the same as described in Chapter 27, “Example configuration - IBM WebSphere MQ for z/OS”, on page 409. There are examples to other platforms in that chapter.

First it describes the parameters needed for an LU 6.2 connection; then it describes:
- “Establishing an LU 6.2 connection into a queue-sharing group” on page 494
- “Establishing a TCP connection into a queue-sharing group” on page 497

When the connection is established, you need to define some channels to complete the configuration. This is described in “WebSphere MQ for z/OS shared channel configuration” on page 498.

See Chapter 7, “Example configuration chapters in this book”, on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 44 on page 492 presents a worksheet listing all the parameters needed to set up communication from z/OS to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

z/OS and LU 6.2

The steps required to set up an LU 6.2 connection are described in "Establishing an LU 6.2 connection into a queue-sharing group" on page 494, with numbered cross references to the parameters on the worksheet.

Configuration worksheet

Use this worksheet to record the values you use for your configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column. The entries in the Parameter Name column are explained in "Explanation of terms" on page 493.

Table 44. Configuration worksheet for z/OS using LU 6.2

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node using generic resources				
1	Command prefix		**+cpf**	
2	Network ID		**NETID**	
3	Node name		**MVSPU**	
6	Modename		**#INTER**	
7	Local Transaction Program name		**MQSERIES**	
8	LAN destination address		**400074511092**	
9	Local LU name		**MVSLU1**	
10	Generic resource name		**MVSGR**	
11	Symbolic destination		**G1**	
12	Symbolic destination for generic resource name		**G2**	
Connection to an OS/2 system The values in this section of the table must match those used in Table 15 on page 146, as indicated.				
13	Symbolic destination		**M2**	
14	Modename	**21**	**#INTER**	
15	Remote Transaction Program name	**8**	**MQSERIES**	
16	Partner LU name	**6**	**OS2LU**	
Connection to a Windows system The values in this section of the table must match those used in Table 17 on page 172, as indicated.				
13	Symbolic destination		**M3**	
14	Modename	**21**	**#INTER**	
15	Remote Transaction Program name	**7**	**MQSERIES**	
16	Partner LU name	**5**	**WINNTLU**	
21	Remote node ID	**4**	**05D 30F65**	
Connection to an AIX system The values in this section of the table must match those used in Table 21 on page 205, as indicated.				
13	Symbolic Destination		**M4**	
14	Modename	**18**	**#INTER**	
15	Remote Transaction Program name	**6**	**MQSERIES**	
16	Partner LU name	**4**	**AIXLU**	

Explanation of terms

1 Command prefix
This is the unique command prefix of your WebSphere MQ for z/OS queue-manager subsystem. The z/OS systems programmer defines this at installation time, in SYS1.PARMLIB(IEFSSNss), and will be able to tell you the value.

2 Network ID
The VTAM startup procedure in your installation is partly customized by the ATCSTRxx member of the data set referenced by the DDNAME VTAMLST. The Network ID is the value specified for the NETID parameter in this member. For Network ID you must specify the name of the NETID that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). Your network administrator will tell you the value.

3 Node name
VTAM, being a low-entry network node, does not have a Control Point name for Advanced Peer-to-Peer Networking (APPN) use. It does however have a system services control point name (SSCPNAME). For node name, you must specify the name of the SSCP that owns the WebSphere MQ communications subsystem (WebSphere MQ channel initiator or CICS for z/OS as the case may be). This is defined in the same ATCSTRxx member as the Network ID. Your network administrator will tell you the value.

9 Local LU name
A logical unit (LU) is software that serves as an interface or translator between a transaction program and the network. It manages the exchange of data between transaction programs. The local LU name is the unique VTAM APPLID of this WebSphere MQ subsystem. Your network administrator will tell you this value.

11 12 13 Symbolic destination
This is the name you give to the CPI-C side information profile. You need a side information entry for each LU 6.2 listener.

6 14 Modename
This is the name given to the set of parameters that control the LU 6.2 conversation. An entry with this name and similar attributes must be defined at each end of the session. In VTAM, this corresponds to a mode table entry. You network administrator will assign this to you.

7 15 Transaction Program name
WebSphere MQ applications trying to converse with this queue manager will specify a symbolic name for the program to be run at the receiving end. This will have been specified in the TPNAME attribute on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 34 on page 407 for more information. If the receiving end is z/OS using CICS, special values are required.

8 LAN destination address
This is the LAN destination address that your partner nodes will use to communicate with this host. When you are using a 3745 network controller, it will be the value specified in the LOCADD parameter for the line definition to which your partner is physically connected. If your

partner nodes use other devices such as 317X or 6611 devices, the address will have been set during the customization of those devices. Your network administrator will tell you this value.

10 Generic resource name
A generic resource name is a unique name assigned to a group of LU names used by the channel initiators in a queue-sharing group.

16 Partner LU name
This is the LU name of the WebSphere MQ queue manager on the system with which you are setting up communication. This value is specified in the side information entry for the remote partner.

21 Remote node ID
For a connection to Windows, this is the ID of the local node on the Windows system with which you are setting up communication.

Establishing an LU 6.2 connection into a queue-sharing group

To establish and LU 6.2 connection, there are two steps:

1. Define yourself to the network using generic resources.
2. Define a connection to the partner.

Defining yourself to the network using generic resources

This example describes how to use VTAM Generic Resources to have one connection name to connect to the queue-sharing group.

1. SYS1.PARMLIB(APPCPMxx) contains the start-up parameters for APPC. You must add a line to this file to define the local LU name you intend to use for the WebSphere MQ LU 6.2 group listener. The line you add should take the form

   ```
   LUADD ACBNAME(mvslu1)
         NOSCHED
         TPDATA(csq.appctp)
         GRNAME(mvsgr)
   ```

   Specify values for `ACBNAME` (9), `TPDATA` and `GRNAME(` 10 `)`.

   The NOSCHED parameter tells APPC that our new LU will not be using the LU 6.2 scheduler (ASCH), but has one of its own. TPDATA refers to the Transaction Program data set in which LU 6.2 stores information about transaction programs. Again, WebSphere MQ will not use this, but it is required by the syntax of the LUADD command.
2. Start the APPC subsystem with the command:

   ```
   START APPC,SUB=MSTR,APPC=xx
   ```

   where *xx* is the suffix of the PARMLIB member in which you added the LU in step 1.

   Note: If APPC is already running, it can be refreshed with the command:

   ```
   SET APPC=xx
   ```

   The effect of this is cumulative, that is, APPC will not lose its knowledge of objects already defined to it in this or another PARMLIB member.
3. Add the new LU to a suitable VTAM major node definition. These are typically in SYS1.VTAMLST. The APPL definition will look similar to the sample shown.

```
MVSLU APPL  ACBNAME=MVSLU1,      9
            APPXC=YES,
            AUTOSES=0,
            DDRAINL=NALLOW,
            DLOGMOD=#INTER,     6
            DMINWML=10,
            DMINWNR=10,
            DRESPL=NALLOW,
            DSESLIM=60,
            LMDENT=19,
            MODETAB=MTCICS,
            PARSESS=YES,
            VERIFY=NONE,
            SECACPT=ALREADYV,
            SRBEXIT=YES
```

4. Activate the major node. This can be done with the command:

   ```
   V,NET,ACT,majornode
   ```

5. Add entries defining your LU and generic resource name to the CPI-C side information data set. Use the APPC utility program ATBSDFMU to do this. Sample JCL is in *thlqual*.SCSQPROC(CSQ4SIDE) (where *thlqual* is the target library high-level qualifier for WebSphere MQ data sets in your installation.)

   The entries you add will look like this:

   ```
   SIADD
        DESTNAME(G1)             11
        MODENAME(#INTER)
        TPNAME(MQSERIES
        PARTNER_LU(MVSLU1)      9
   SIADD
        DESTNAME(G2)             12
        MODENAME(#INTER)
        TPNAME(MQSERIES)
        PARTNER_LU(MVSGR)        10
   ```

6. Create the channel-initiator parameter module for your queue manager. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4XPRM). You must specify the local LU (**9**) assigned to your queue manager in the LUGROUP= parameter of the CSQ6CHIP macro.

```
//SYSIN    DD *
        CSQ6CHIP ADAPS=8,                 X
              ACTCHL=200,                 X
              ADOPTMCA=NO,                X
              ADOPTCHK=ALL,               X
              CURRCHL=200,                X
              DISPS=5,                    X
              DNSGROUP=,                  X
              DNSWLM=NO,                  X
              LSTRTMR=60,                 X
              LUGROUP=MVSLU1              X
              LUNAME=MVSLU,               X
              LU62ARM=,                   X
              LU62CHL=200,                X
              OPORTMIN=0,                 X
              OPORTMAX=0,                 X
              TCPCHL=200,                 X
              TCPKEEP=NO,                 X
              TCPNAME=TCPIP,              X
              TCPTYPE=OESOCKET,           X
              TRAXSTR=YES,                X
              TRAXTBL=2,                  X
              SERVICE=0
          END
/*
```

Figure 90. Channel Initiator initialization parameters

7. Modify the job to assemble and link-edit the tailored version of the initiator macro to produce a new load module.
8. Submit the job and verify that it completes successfully.
9. Put the new initialization-parameters module in an APF-authorized user library. Include this library in the STEPLIB concatenation for the channel initiator's started-task procedure, ensuring that it precedes the library *thlqual*.SCSQAUTH.

Defining a connection to a partner

Note: This example is for a connection to an OS/2 system but the task is the same for other platforms.

Add an entry to the CPI-C side information data set to define the connection. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4SIDE).

The entry you add will look like this:

```
     SIADD
          DESTNAME(M2)            13
          MODENAME(#INTER)        14
          TPNAME(MQSERIES)        15
          PARTNER_LU(OS2LU)       16
```

What next?

The connection is now established. You are ready to complete the configuration. Go to "WebSphere MQ for z/OS shared channel configuration" on page 498.

Establishing a TCP connection into a queue-sharing group

Edit the channel initiator initialization parameters. Sample JCL to do this is in *thlqual*.SCSQPROC(CSQ4XPRM). You must add the name of the TCP address space to the TCPNAME= parameter.

Using WLM/DNS

Edit the channel initiator initialization parameters. You must set DNSWLM=YES; optionally you can add the name of the group name to be used as a hostname to the DNSGROUP= parameter. If you leave the name blank the queue-sharing group name is used.

```
//SYSIN    DD *
       CSQ6CHIP ADAPS=8,                X
            ACTCHL=200,                 X
            ADOPTMCA=NO,                X
            ADOPTCHK=ALL,               X
            CURRCHL=200,                X
            DISPS=5,                    X
            DNSGROUP=MYGROUP,           X
            DNSWLM=YES,                 X
            LSTRTMR=60,                 X
            LUGROUP=,                   X
            LUNAME=MVSLU,               X
            LU62ARM=,                   X
            LU62CHL=200,                X
            OPORTMIN=0,                 X
            OPORTMAX=0,                 X
            TCPCHL=200,                 X
            TCPKEEP=NO,                 X
            TCPNAME=TCPIP,              X
            TCPTYPE=OESOCKET,           X
            TRAXSTR=YES,                X
            TRAXTBL=2,                  X
            SERVICE=0
         END
/*
```

Figure 91. Channel Initiator initialization parameters

WLM/DNS does not offer any support for mapping one incoming port number to a different outgoing port number. This means that each channel initiator must use a different hostname, by one of the following methods:

- Run each channel initiator on a different MVS image
- Run each channel initiator with a different TCP stack on the same MVS image.
- Have multiple Virtual IP Addresses (VIPAs) on one TCP stack.

| See z/OS Communications server IP User's Guide, SC31-8780 for more information on VIPA.

| See ″Redbook: TCP/IP in a sysplex″, SG24–5235 for more information on WLM/DNS.

What next?

The TCP connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for z/OS shared channel configuration” on page 498.

WebSphere MQ for z/OS shared channel configuration

1. Start the channel initiator using the command:

```
+cpf START CHINIT PARM(xparms)    1
```

   where *xparms* is the name of the channel-initiator parameter module that you created.
2. Start an LU6.2 group listener using the command:

```
+cpf START LSTR LUNAME(G1) TRPTYPE(LU62)  INDISP(GROUP)
```

   The LUNAME of G1 refers to the symbolic name you gave your LU (**11**).
3. If you are using Virtual IP Addressing and wish to listen on a specific address, use the command:

```
+cpf START LSTR PORT(1555) INDISP(GROUP) IPADDR(mvsvipa)
```

WebSphere MQ channels will not initialize successfully if the channel negotiation detects that the message sequence number is different at each end. You may need to reset this manually.

Shared channel configuration

The following sections detail the configuration to be performed on the z/OS queue manager to implement the channel described in Figure 32 on page 101.

Examples are given for connecting WebSphere MQ for z/OS and MQSeries for OS/2 Warp. If you wish to connect to another WebSphere MQ product use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Table 45. Configuration worksheet for WebSphere MQ for z/OS using queue-sharing groups

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**QSG**	
B	Local queue name		**QSG.SHAREDQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (LU 6.2) channel name		**QSG.OS2.SNA**	
H	Sender (TCP) channel name		**QSG.OS2.TCP**	
I	Receiver (LU 6.2) channel name	**G**	**OS2.QSG.SNA**	
J	Receiver (TCP) channel name	**H**	**OS2.QSG.TCP**	

Table 45. Configuration worksheet for WebSphere MQ for z/OS using queue-sharing groups (continued)

ID	Parameter Name	Reference	Example Used	User Value
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (LU 6.2) channel name		**QSG.WINNT.SNA**	
H	Sender (TCP) channel name		**QSG.WINNT.TCP**	
I	Receiver (LU 6.2) channel name	G	**WINNT.QSG.SNA**	
J	Receiver (TCP/IP) channel name	H	**WINNT.QSG.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name		**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (LU 6.2) channel name		**QSG.AIX.SNA**	
H	Sender (TCP/IP) channel name		**QSG.AIX.TCP**	
I	Receiver (LU 6.2) channel name	G	**AIX.QSG.SNA**	
J	Receiver (TCP/IP) channel name	H	**AIX.QSG.TCP**	

WebSphere MQ for z/OS shared sender-channel definitions using LU 6.2

```
     Local Queue
            Object type :   QLOCAL
                   Name :   OS2               F
                  Usage :   X (XmitQ)
            Disposition :   SHARED

     Remote Queue
            Object type :   QREMOTE
                   Name :   OS2.REMOTEQ       D
  Name on remote system :   OS2.LOCALQ        E
     Remote system name :   OS2               C
     Transmission queue :   OS2               F
            Disposition :   GROUP

     Sender Channel
           Channel name :   MVS.OS2.SNA       G
         Transport type :   L (LU6.2)
Transmission queue name :   OS2               F
        Connection name :   M2                13
            Disposition :   GROUP
```

WebSphere MQ for z/OS shared receiver-channel definitions using LU 6.2

```
     Local Queue
            Object type :   QLOCAL
                   Name :   QSG.SHAREDQ        B
```

```
                  Usage :   N (Normal)
            Disposition :   SHARED

     Receiver Channel
           Channel name :   OS2.QSG.SNA        I
            Disposition :   GROUP
```

WebSphere MQ for z/OS shared sender-channel definitions using TCP

```
     Local Queue
            Object type :   QLOCAL
                   Name :   OS2                F
                  Usage :   X (XmitQ)
            Disposition :   SHARED

     Remote Queue
            Object type :   QREMOTE
                   Name :   OS2.REMOTEQ        D
  Name on remote system :   OS2.LOCALQ         E
     Remote system name :   OS2                C
     Transmission queue :   OS2                F
            Disposition :   GROUP

     Sender Channel
           Channel name :   QSG.OS2.TCP        H
         Transport type :   T (TCP)
Transmission queue name :   OS2                F
        Connection name :   os2.tcpip.hostname
            Disposition :   GROUP
```

WebSphere MQ for z/OS shared receiver-channel definitions using TCP

```
     Local Queue
            Object type :   QLOCAL
                   Name :   QSG.SHAREDQ        B
                  Usage :   N (Normal)
            Disposition :   SHARED

     Receiver Channel
           Channel name :   OS2.QSG.TCP       J
            Disposition :   GROUP
```

Chapter 37. Message channel planning example for z/OS using queue-sharing groups

This example illustrates the preparations needed to allow an application using queue manager QM3 to put a message on a queue in a queue-sharing group that has queue members QM4 and QM5.

It is recommended that you are familiar with the example in Chapter 28, “Message channel planning example for z/OS”, on page 421 before trying this example.

What this example shows

This example shows the WebSphere MQ commands (MQSC) that you can use in WebSphere MQ for z/OS for distributed queuing with queue-sharing groups. This example expands the payroll query scenario of the example in Chapter 28, “Message channel planning example for z/OS”, on page 421 to show how to add higher availability of query processing by adding more serving applications to serve a shared queue.

The payroll query application is now connected to queue manager QM3 and puts a query to the remote queue ’PAYROLL QUERY’ defined on QM3. This remote queue definition resolves to the shared queue ’PAYROLL’ hosted by the queue managers in the queue-sharing group QSG1. The payroll processing application now has two instances running, one connected to QM4 and one connected to QM5.

Planning examples for z/OS

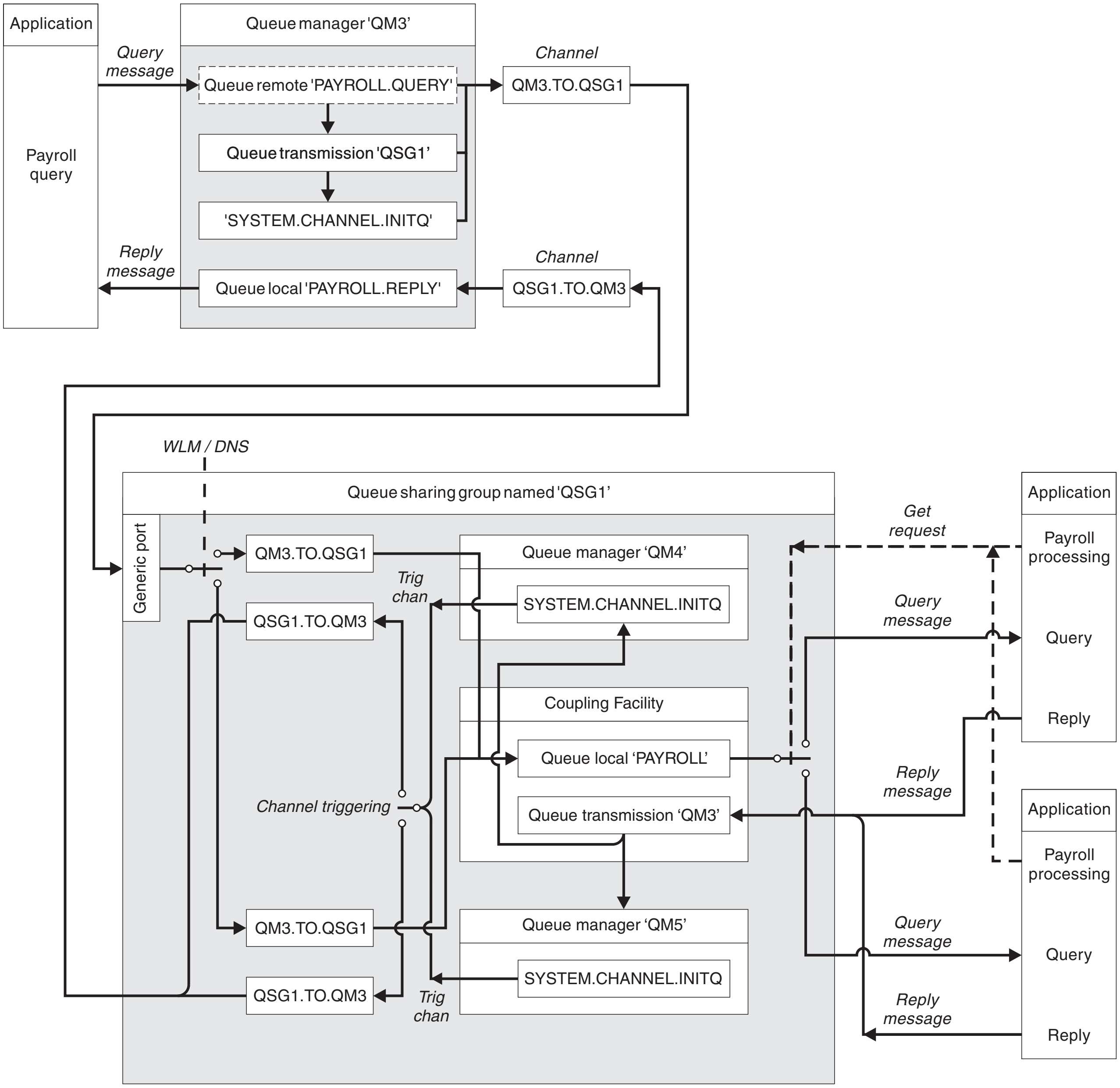


Figure 92. Message channel planning example for WebSphere MQ for z/OS using queue-sharing groups

All three queue managers are assumed to be running on z/OS. In the example definitions for TCP/IP, QM4 has a host name of MVSIP01 and QM5 has a host name of MVSIP02. Both queue managers are listening on port 1414 and have registered to use WLM/DNS. The generic address that WLM/DNS provides for this group is QSG1.MVSIP. QM3 has a host address of 9.20.9.31 and is listening on port 1411.

In the example definitions for LU6.2, QM3 is listening on a symbolic luname called LUNAME1. The name of the generic resource defined for VTAM for the lunames listened on by QM4 and QM5 is LUQSG1. The example assumes that these are already defined on your z/OS system and are available for use. To define them see "Defining yourself to the network using generic resources" on page 494.

In this example QSG1 is the name of a queue-sharing group, and queue managers QM4 and QM5 are the names of members of the group.

Queue-sharing group definitions

Producing the following object definitions for one member of the queue-sharing group makes them available to all the other members.

Queue managers QM4 and QM5 are members of the queue sharing group. The definitions produced for QM4 are also available for QM5.

It is assumed that the coupling facility list structure is called ′APPLICATION1′. If is not called ′APPLICATION1′, you must use your own coupling facility list structure name for the example.

Shared objects

The shared object definitions are stored in DB2 and their associated messages are stored within the Coupling Facility.

```
DEFINE QLOCAL(PAYROLL) QSGDISP(SHARED) REPLACE PUT(ENABLED) GET(ENABLED) +
CFSTRUCT(APPLICATION1) +
DESCR('Shared queue for payroll details')

DEFINE QLOCAL(QM3) QSGDISP(SHARED) REPLACE USAGE(XMITQ) PUT(ENABLED) +
CFSTRUCT(APPLICATION1) +
DESCR('Transmission queue to QM3') TRIGGER TRIGTYPE(FIRST) +
TRIGDATA(QSG1.TO.QM3) GET(ENABLED) INITQ(SYSTEM.CHANNEL.INITQ)
```

Group objects

The group object definitions are stored in DB2, and each queue manager in the queue-sharing group creates a local copy of the defined object.

Sender channel definition:

For a TCP/IP connection:

```
DEFINE CHANNEL(QSG1.TO.QM3) CHLTYPE(SDR) QSGDISP(GROUP) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QM3') XMITQ(QM3) +
CONNAME('9.20.9.31(1411)')
```

For an LU6.2 connection:

```
DEFINE CHANNEL(QSG1.TO.QM3) CHLTYPE(SDR) QSGDISP(GROUP) TRPTYPE(LU62) +
REPLACE DESCR('Sender channel to QM3') XMITQ(QM3) +
CONNAME('LUNAME1')
```

Receiver channel definition:

For a TCP/IP connection:

```
DEFINE CHANNEL(QM3.TO.QSG1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QM3') QSGDISP(GROUP)
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM3.TO.QSG1) CHLTYPE(RCVR) TRPTYPE(LU62) +
REPLACE DESCR('Receiver channel from QM3') QSGDISP(GROUP)
```

Queue manager QM3 example

QM3 is not a member of the queue-sharing group.

The following object definitions allow it to put messages to a queue in the queue-sharing group.

Sender channel definition

The conname for this channel is the generic address of the queue-sharing group.

For a TCP/IP connection:

```
DEFINE CHANNEL(QM3.TO.QSG1) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QSG1') XMITQ(QSG1) +
CONNAME('QSG1.MVSIP(1414)')
```

For an LU 6.2 connection:

```
DEFINE CHANNEL(QM3.TO.QSG1) CHLTYPE(SDR) TRPTYPE(LU62) +
REPLACE DESCR('Sender channel to QSG1') XMITQ(QSG1) +
CONNAME('LUQSG1) TPNAME('MQSERIES') MODENAME('#INTER')
```

Remaining definitions

These definitions are required for the same purposes as those in the first example.

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QSG1') REPLACE +
PUT(ENABLED) XMITQ(QSG1) RNAME(APPL) RQMNAME(QSG1)

DEFINE QLOCAL(QSG1) DESCR('Transmission queue to QSG1') REPLACE +
USAGE(XMITQ) PUT(ENABLED) GET(ENABLED) TRIGGER TRIGTYPE(FIRST) +
TRIGDATA(QM3.TO.QSG1) INITQ(SYSTEM.CHANNEL.INITQ)

DEFINE CHANNEL(QSG1.TO.QM3) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QSG1')

DEFINE CHANNEL(QSG1.TO.QM3) CHLTYPE(RCVR) TRPTYPE(LU62) +
REPLACE DESCR('Receiver channel from QSG1')

DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to query messages sent to QSG1')
```

Running the example

When you have created the required objects, you must do the following.

- Start the channel initiator for all three queue managers.
- Start the listeners for both queue managers in the queue-sharing group.

For a TCP/IP connection each member of the group must have a group listener started that is listening on port 1414.

```
STA LSTR PORT(1414) IPADDR(MVSIP01) INDISP(GROUP)
```

The above entry starts the listener on QM4, for example.

For an LU6.2 connection each member of the group must have a group listener started that is listening on a symbolic luname that corresponds to the generic resource LUQSG1.

- Start the listener on QM3

```
STA LSTR PORT(1411)
```

Chapter 38. Intra-group queuing

This chapter describes intra-group queuing on WebSphere MQ for z/OS. This function is only available to queue managers defined to a queue-sharing group.

For information about queue-sharing groups, see Chapter 34, “Preparing WebSphere MQ for z/OS for DQM with queue-sharing groups”, on page 483.

Concepts

This section describes the concepts of intra-group queuing.

Intra-group queuing (IGQ) can effect potentially fast and less-expensive small message transfer between queue managers within a queue-sharing group (QSG), without the need to define channels between the queue managers. That is, intra-group queuing can be used to deliver, more efficiently, small messages to queues residing on remote queue managers within a queue-sharing group.

Intra-group queuing and the intra-group queuing agent

An IGQ agent is started during queue manager initialization. When applications open and put messages to remote queues, the local queue manager determines whether intra-group queuing should be used for message transfer. If intra-group queuing is to be used, the local queue manager places the message on to the SYSTEM.QSG.TRANSMIT.QUEUE. The IGQ agent on the target remote queue manager retrieves the message and places it on to the destination queue.

The following diagram shows a typical example of intra-group queuing.

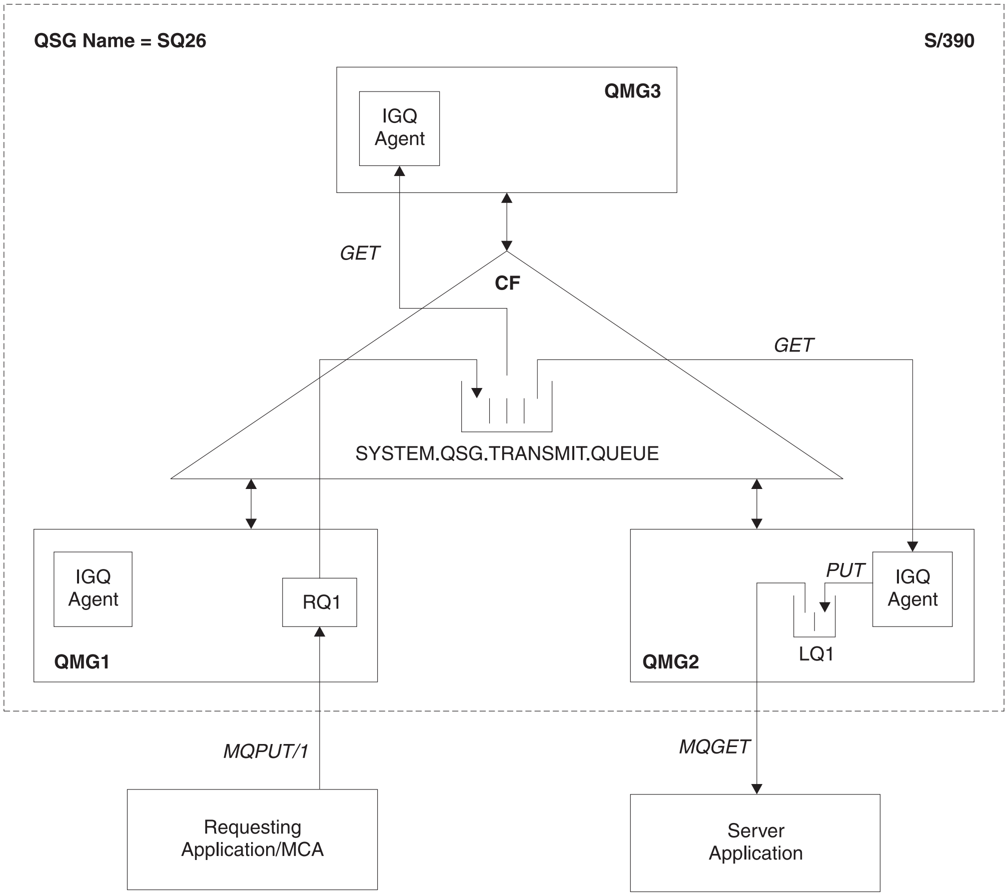


Figure 93. An example of intra-group queuing

The diagram shows:

- IGQ agents running on three queue managers (QMG1,QMG2 and QMG3) that are defined to a queue-sharing group called SQ26.
- Shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE that is defined in the Coupling Facility (CF).
- A remote queue definition that is defined in queue manager QMG1.
- A local queue that is defined in queue manager QMG2.
- A requesting application (this could be a Message Channel Agent (MCA)) that is connected to queue manager QMG1.
- A server application that is connected to queue manager QMG2.
- A request message being placed on to the SYSTEM.QSG.TRANSMIT.QUEUE.

Terminology

This section describes the terminology of intra-group queuing.

Intra-group queuing

Intra-group queuing can effect potentially fast and less expensive message transfer between queue managers in a queue-sharing group, without the need to define channels.

Shared transmission queue for use by intra-group queuing

Each queue-sharing group has a shared transmission queue called SYSTEM.QSG.TRANSMIT.QUEUE for use by intra-group queuing. If intra-group queuing is enabled, SYSTEM.QSG.TRANSMIT.QUEUE appears in the name resolution path when opening remote queues. When applications (including Message Channel Agents (MCAs)) put messages to a remote queue, the local queue manager determines the eligibility of messages for fast transfer and places them on SYSTEM.QSG.TRANSMIT.QUEUE.

Intra-group queuing agent

The IGQ agent is the task, started at queue manager initialization, that waits for suitable messages to arrive on the SYSTEM.QSG.TRANSMIT.QUEUE. The IGQ agent retrieves suitable messages from this queue and delivers them to the destination queue(s).

The IGQ agent for each queue manager is always started because intra-group queuing is used by the queue manager itself for its own internal processing.

Benefits

This section describes the benefits of intra-group queuing.

Reduced system definitions

Intra-group queuing removes the need to define channels between queue managers in a queue-sharing group.

Reduced system administration

Because there are no channels defined between queue managers in a queue-sharing group, there is no requirement for channel administration.

Improved performance

Because there is only one IGQ agent needed for the delivery of a message to a target queue (instead of two intermediate sender and receiver agents), the delivery of messages using intra-group queuing can be less expensive than the delivery of messages using channels. In intra-group queuing there is only a receiving component, because the need for the sending component has been removed. This saving is because the message is available to the IGQ agent at the destination queue manager for delivery to the destination queue once the put operation at the local queue manager has completed and, in the case of messages put in syncpoint scope, committed.

Supports migration

Applications external to a queue-sharing group can deliver messages to a queue residing on any queue manager in the queue-sharing group, while being connected only to a particular queue manager in the queue-sharing group. This is because messages arriving on a receiver channel, destined for a queue on a remote queue manager, can be transparently sent to the destination queue using intra-group queuing. This facility allows applications to be deployed among the queue-sharing group without the need to change any systems that are external to the queue-sharing group.

A typical configuration is illustrated by the following diagram, in which:

- A requesting application connected to queue manager QMG1 needs to send a message to a local queue on queue manager QMG3.
- Queue manager QMG1 is connected only to queue manager QMG2.
- Queue managers QMG2 and QMG3, which were previously connected using channels, are now members of queue-sharing group SQ26.

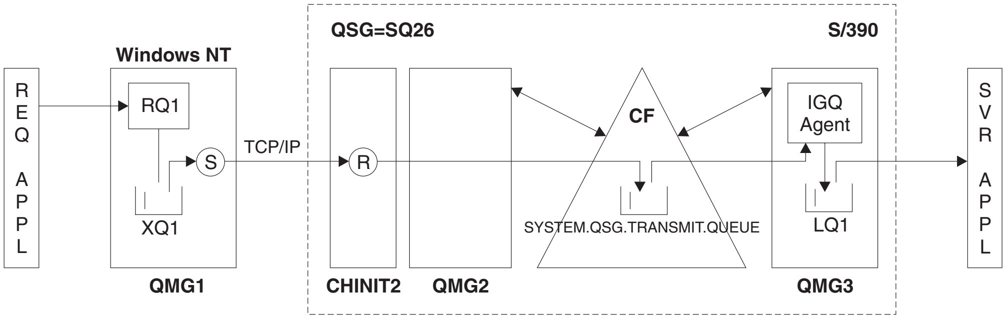


Figure 94. An example of migration support

The flow of operations is as follows:

1. The requesting application puts a message, destined for local queue LQ1 at remote queue manager QMG3, on to remote queue definition RQ1.
2. Queue manager QMG1, running on a Windows NT workstation, places the message on to the transmission queue XQ1.
3. Sender MCA (S) on QM1 transmits the message, via TCP/IP, to the receiver MCA (R) on channel initiator CHINIT2.
4. Receiver MCA (R) on channel initiator CHINIT2 places the message on to the shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.
5. IGQ agent on queue manager QMG3 retrieves the message from the SYSTEM.QSG.TRANSMIT.QUEUE and places it on to the target local queue LQ1.
6. The server application retrieves the message from the target local queue and processes it.

Transparent delivery of messages when multi-hopping between queue managers in a queue-sharing group

The above diagram also illustrates the transparent delivery of messages when multi-hopping between queue managers in a queue-sharing group. Messages arriving on a given queue manager within the queue-sharing group, but destined for a queue on another queue manager in the queue-sharing group, can be easily transmitted to the destination queue on the destination queue manager, using intra-group queuing.

Limitations

This section describes the limitations of intra-group queuing.

Messages eligible for transfer using intra-group queuing

Because intra-group queuing makes use of a shared transmission queue that is defined in the Coupling Facility (CF), intra-group queuing is limited to delivering messages of the maximum supported message length for shared queues minus the length of a transmission queue header (MQXQH).

Number of intra-group queuing agents per queue manager

Only one IGQ agent is started per queue manager in a queue-sharing group.

Starting and stopping the intra-group queuing agent

The IGQ agent is started during queue manager initialization and terminated during queue manager shut-down. It is designed to be a long running, self recovering (in the event of abnormal termination), task. If there is an error with the definition of the SYSTEM.QSG.TRANSMIT.QUEUE (for example, if this queue is Get inhibited) the IGQ agent keeps retrying. If the IGQ agent should encounter an error that results in normal termination of the agent while the queue manager is still active, it can be restarted by issuing an ALTER QMGR IGQ(ENABLED) command. This avoids the need to recycle the queue manager.

Getting started

This section describes getting started with intra-group queuing.

Enabling intra-group queuing

To enable intra-group queuing on your queue managers, you need to do the following :

- Define a shared transmission queue called SYSTEM.QSG.TRANSMIT.QUEUE. The definition of this queue can be found in thlqual.SCSQPROCS(CSQ4INSS), the CSQINP2 sample for SYSTEM objects for queue-sharing groups. This queue must be defined with the correct attributes, as stated in thlqual.SCSQPROCS(CSQ4INSS), for intra-group queuing to work properly.
- Because the IGQ agent is always started at queue manager initialization, intra-group queuing is always available for inbound message processing, that is, the IGQ agent processes any messages that are placed on the SYSTEM.QSG.TRANSMIT.QUEUE. However, to enable intra-group queuing for outbound processing, the queue manager attribute IGQ must be set to ENABLED.

Disabling intra-group queuing

To disable intra-group queuing for outbound message transfer, set the queue manager attribute IGQ to DISABLED. Note that if intra-group queuing is disabled for a given queue manager, the IGQ agent on that queue manager can still process inbound messages that have been placed on the SYSTEM.QSG.TRANSMIT.QUEUE by a queue manager that does have intra-group queuing enabled for outbound transfer.

Using intra-group queuing

Once intra-group queuing is enabled, it is available for use and a queue manager uses it whenever possible. That is, when an application puts a message to a remote queue definition, to a fully qualified remote queue, or to a cluster queue, the queue manager determines if the message is eligible to be delivered using intra-group queuing and if it is, places the message on to SYSTEM.QSG.TRANSMIT.QUEUE. There is no need to make changes to user applications, or to application queues, because for eligible messages the queue manager makes use of the SYSTEM.QSG.TRANSMIT.QUEUE, in preference to any other transmission queue.

Configurations

In addition to the typical intra-group queuing configuration described in Figure 93 on page 506, other configurations are possible.

Distributed queuing with intra-group queuing (multiple delivery paths)

For applications that process short messages it might be feasible to configure only intra-group queuing for delivering messages between queue managers in a queue-sharing group. However, for applications that process large (greater than the maximum supported message length for shared queues minus the length of the MQXQH) messages, it may be necessary to configure distributed queuing with intra-group queuing. The following diagram illustrates this configuration.

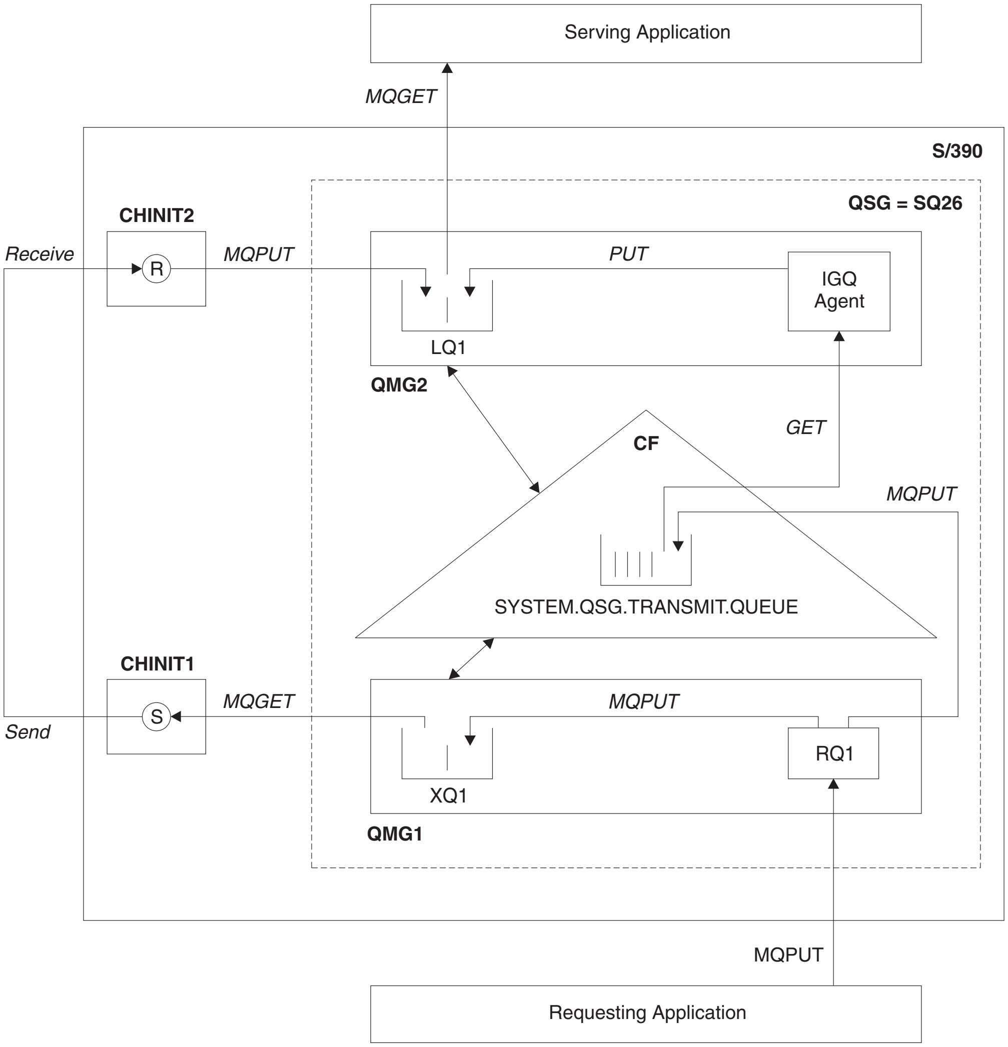


Figure 95. An example configuration

Open/Put processing

1. It is important to note that when the requesting application opens remote queue RQ1, name resolution occurs for both the non-shared transmission queue XQ1 and the shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.

2. When the requesting application puts a message on to the remote queue, the queue manager decides, based on whether intra-group queuing is enabled for outbound transfer and on the message characteristics, whether to put the message to transmission queue XQ1, or to transmission queue SYSTEM.QSG.TRANSMIT.QUEUE. The queue manager places all large messages on to transmission queue XQ1, and all small messages on to transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.
3. If transmission queue XQ1 is full, or is not available, put requests for large messages fail synchronously with a suitable return and reason code. However, put requests for small messages continue to succeed and are placed on transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.
4. If transmission queue SYSTEM.QSG.TRANSMIT.QUEUE is full, or cannot be put to, put requests for small messages fail synchronously with a suitable return and reason code. However, put requests for large messages continue to succeed and are placed on transmission queue XQ1. In this case, no attempt is made to put the small messages on to a transmission queue.

Flow for large messages

1. The requesting application puts large messages to remote queue RQ1.
2. Queue manager QMG1 puts the messages on to transmission queue XQ1.
3. Sender MCA (S) on queue manager QMG1 retrieves the messages from transmission queue XQ1 and sends them to queue manager QMG2.
4. Receiver MCA (R) on queue manager QMG2 receives the messages and places them on to destination queue LQ1.
5. The serving application retrieves and subsequently processes the messages from queue LQ1.

Flow for small messages

1. The requesting application puts small messages on to remote queue RQ1.
2. Queue manager QMG1 puts the messages on to transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.
3. IGQ on queue manager QMG2 retrieves the messages and places them on to the destination queue LQ1.
4. The serving application retrieves the messages from queue LQ1.

Points to note about such a configuration

1. The requesting application does not need to be aware of the underlying mechanism used for the delivery of messages.
2. A potentially faster message delivery mechanism can be achieved for small messages.
3. Multiple paths are available for message delivery (that is, the normal channel route and the intra-group queuing route).
4. The intra-group queuing route, being potentially faster, is selected in preference to the normal channel route. Depending on the message characteristics, message delivery may be divided across the two paths. Hence, messages may be delivered out of sequence (though this is also possible if messages are delivered using only the normal channel route).
5. Once a route has been selected, and messages have been placed on to the respective transmission queues, only the selected route will be used for message delivery. Any unprocessed messages on the SYSTEM.QSG.TRANSMIT.QUEUE are not diverted to transmission queue XQ1.

Clustering with intra-group queuing (multiple delivery paths)

It is possible to configure queue managers so that they are in a cluster as well as in a queue-sharing group. When messages are sent to a cluster queue and the local and remote destination queue managers are in the same queue-sharing group, intra-group queuing is used for the delivery of small messages (using the SYSTEM.QSG.TRANSMIT.QUEUE) , while the SYSTEM.CLUSTER.TRANSMIT.QUEUE is used for the delivery of large messages. Also, the SYSTEM.CLUSTER.TRANSMIT.QUEUE is used for the delivery of messages to any queue manager that is in the cluster, but outside the queue-sharing group. The following diagram illustrates this configuration (the channel initiators are not shown).

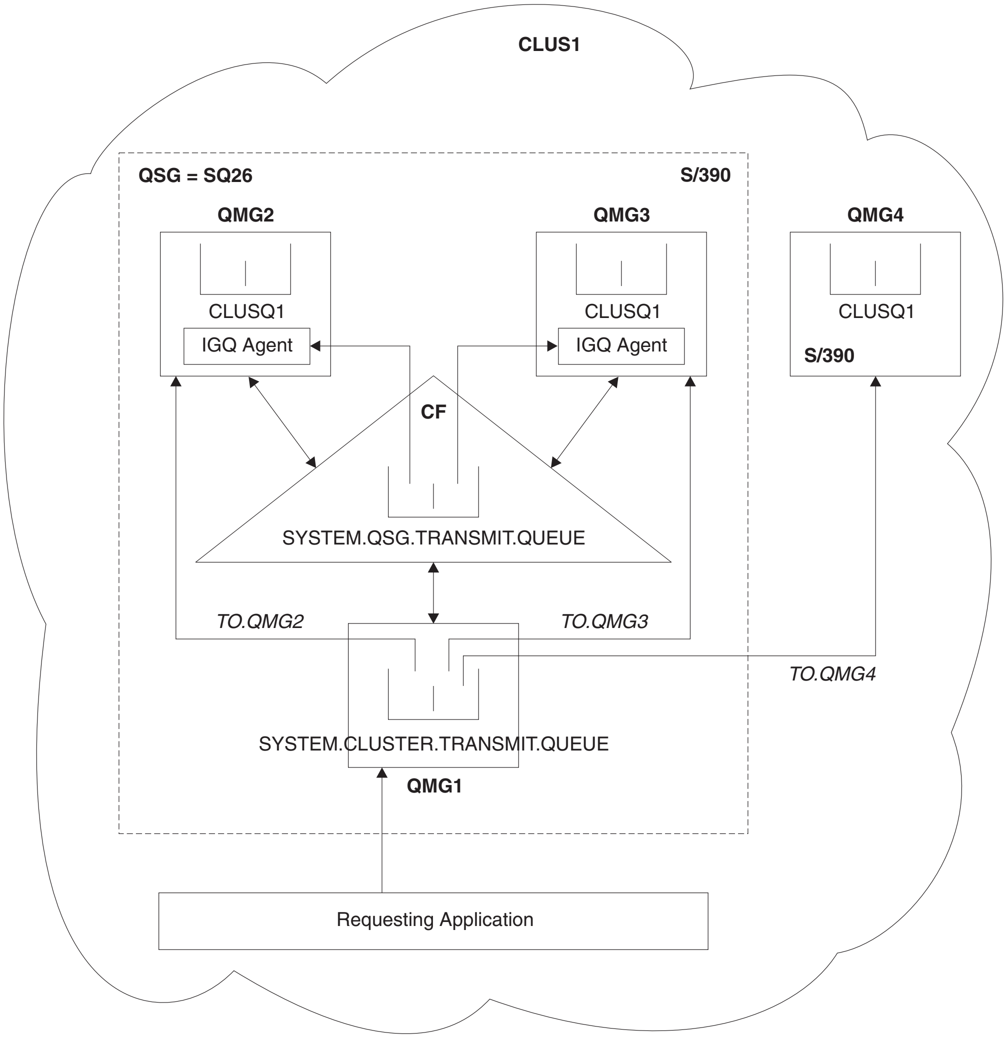


Figure 96. An example of clustering with intra-group queuing

The diagram shows:

- Four z/OS queue managers QMG1, QMG2, QMG3 and QMG4 configured in a cluster CLUS1.
- Queue managers QMG1, QMG2 and QMG3 configured in a queue-sharing group SQ26.
- IGQ agents running on queue managers QMG2 and QMG3.
- The local SYSTEM.CLUSTER.TRANSMIT.QUEUE defined in QMG1.

- The shared SYSTEM.QSG.TRANSMIT.QUEUE defined in the CF.
- Cluster channels TO.QMG2 (connecting QMG1 to QMG2), TO.QMG3 (connecting QMG1 to QMG3), and TO.QMG4 (connecting QMG1 to QMG4).
- Cluster queue CLUSQ1 being hosted on queue managers QMG2, QMG3 and QMG4.

Assume that the requesting application opens the cluster queue with the MQOO_BIND_NOT_FIXED option, so that the target queue manager for the cluster queue is selected at put time.

If the selected target queue manager is QMG2:

- All large messages put by the requesting application are
  - Put to the SYSTEM.CLUSTER.TRANSMIT.QUEUE on QMG1
  - Transferred to cluster queue CLUSQ1 on QMG2 using cluster channel TO.QMG2
- All small messages put by the requesting application are
  - Put to the shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE
  - Retrieved by the IGQ agent on QMG2
  - Put to the cluster queue CLUSQ1 on QMG2

If the selected target queue manager is QMG4:

- Because QMG4 is not a member of queue-sharing group SQ26, all messages put by the requesting application are
  - Put to the SYSTEM.CLUSTER.TRANSMIT.QUEUE on QMG1
  - Transferred to cluster queue CLUSQ1 on QMG4 using cluster channel TO.QMG4

Points to note about such a configuration

- The requesting application does not need to be aware of the underlying mechanism used for the delivery of messages.
- A potentially faster delivery mechanism is achieved for the transfer of small non-persistent messages between queue managers in a queue-sharing group (even if the same queue managers are in a cluster).
- Multiple paths are available for message delivery (that is, both the cluster route and the intra-group queuing route).
- The intra-group queuing route, being potentially faster, is selected in preference to the cluster route. Depending on the message characteristics, message delivery may be divided across the two paths. Hence, messages may be delivered out of sequence. It is important to note that this will be true irrespective of the MQOO_BIND_* option specified by the application. Intra-group queuing distributes messages in the same way as clustering does, depending on whether the MQOO_BIND_NOT_FIXED, MQOO_BIND_ON_OPEN, or MQOO_BIND_AS_Q_DEF is specified on open.
- Once a route has been selected, and messages have been placed on to the respective transmission queues, only the selected route is used for message delivery. Any unprocessed messages on the SYSTEM.QSG.TRANSMIT.QUEUE are not diverted to the SYSTEM.CLUSTER.TRANSMIT.QUEUE.

Clustering, intra-group queuing and distributed queuing

It is possible to configure a queue manager that is a member of a cluster as well as a queue-sharing group and is connected to a distributed queue manager using a sender/receiver channel pair. This configuration is a combination of distributed queuing with intra-group queuing, described in “Distributed queuing with intra-group queuing (multiple delivery paths)” on page 510, and clustering with intra-group queuing, described in “Clustering with intra-group queuing (multiple delivery paths)” on page 512.

Messages

This section describes the messages put to the SYSTEM.QSG.TRANSMIT.QUEUE.

Message structure

Like all other messages that are put to transmission queues, messages that are put to the SYSTEM.QSG.TRANSMIT.QUEUE are prefixed with the transmission queue header (MQXQH).

Message persistence

In WebSphere MQ Version 5 Release 3 and above, shared queues support both persistent and non-persistent messages.

If the queue manager terminates while the IGQ agent is processing non-persistent messages, or if the IGQ agent terminates abnormally while in the middle of processing messages, non-persistent messages being processed may be lost. Applications must make arrangements for the recovery of non-persistent messages if their recovery is required.

If a put request for a non-persistent message, issued by the IGQ agent, fails unexpectedly, the message being processed is lost.

Delivery of messages

The IGQ agent retrieves and delivers all nonpersistent messages outside of syncpoint scope, and all persistent messages within syncpoint scope. In this case, the IGQ agent acts as the syncpoint coordinator. The IGQ agent therefore processes nonpersistent messages in a way similar to the way fast, nonpersistent messages are processed on a message channel. See “Fast, nonpersistent messages” on page 22.

Batching of messages

The IGQ agent uses a fixed batchsize of 50 messages. Any persistent messages retrieved within a batch will be committed at intervals of 50 messages. The agent commits a batch consisting of persistent messages when there are no more messages available for retrieval on the SYSTEM.QSG.TRANSMIT.QUEUE.

Message size

The maximum size of message that can be put to the SYSTEM.QSG.TRANSMIT.QUEUE is the maximum supported message length for shared queues minus the length of a transmission queue header (MQXQH).

Default message persistence and default message priority

If the SYSTEM.QSG.TRANSMIT.QUEUE is in the queue name resolution path established at open time, then for messages that are put with default persistence and default priority (or with default persistence or default priority), the usual rules are applied in the selection of the queue whose default priority and persistence values are used. (Refer to *WebSphere MQ Application Programming Reference* for information on the rules of queue selection).

Undelivered/unprocessed messages

If an IGQ agent cannot deliver a message to the destination queue, the IGQ agent:

- Honours the MQRO_DISCARD_MSG report option (if the Report options field of the MQMD for the undelivered message indicates that it should) and discards the undelivered message.
- Attempts to place the undelivered message on to the dead letter queue for the destination queue manager, if the message has not already been discarded . The IGQ agent prefixes the message with a dead letter queue header (MQDLH).

If a dead letter queue is not defined, or if an undelivered message cannot be put to the dead letter queue, and if the undelivered message is:

- persistent, the IGQ agent backs out the current batch of persistent messages that it is processing, and enters a state of retry. For more information, see "Retry capability of the intra-group queuing agent" on page 517.
- non-persistent, the IGQ agent discards the message and continues to process the next message.

If a queue manager in a queue-sharing group is terminated before its associated IGQ agent has had time to process all its messages, the unprocessed messages remain on the SYSTEM.QSG.TRANSMIT.QUEUE until the queue manager is next started. The IGQ agent then retrieves and delivers the messages to the destination queues.

If the coupling facility fails before all the messages on the SYSTEM.QSG.TRANSMIT.QUEUE have been processed, any unprocessed non-persistent messages will be lost.

IBM recommends that applications do not put messages directly to transmission queues. If an application does put messages directly to the SYSTEM.QSG.TRANSMIT.QUEUE, the IGQ agent may not be able to process these messages and they will simply remain on the SYSTEM.QSG.TRANSMIT.QUEUE. Users will then have to use their own methods to deal with these unprocessed messages.

Report messages

This section describes report messages.

Confirmation of arrival (COA)/confirmation of delivery (COD) report messages

COA and COD messages are generated by the queue manager, when intra-group queuing is used.

Expiry report messages

Expiry report messages are generated by the queue manager, when intra-group queuing is used.

Exception report messages

Depending on the MQRO_EXCEPTION_* report option specified in the *Report options* field of the message descriptor for the undelivered message, the IGQ agent generates the required exception report and places it on the specified reply-to queue. (Note that intra-group queuing can be used to deliver the exception report to the destination reply-to queue).

The persistence of the report message is the same as the persistence of the undelivered message. If the IGQ agent fails to resolve the name of the destination reply-to queue, or if it fails to put the reply message to a transmission queue (for subsequent transfer to the destination reply-to queue) it attempts to put the exception report to the dead letter queue of the queue manager on which the report message is generated. If this is not possible, then if the undelivered message is:

- persistent, the IGQ agent discards the exception report, backs out the current batch of messages and enters a state of retry. For more information, see “Retry capability of the intra-group queuing agent” on page 517.
- non-persistent, the IGQ agent discards the exception report and continues processing the next message on the SYSTEM.QSG.TRANSMIT.QUEUE.

Security

This section describes the security arrangements for intra-group queuing.

Queue manager attributes IGQAUT (IGQ authority) and IGQUSER (IGQ agent user ID) can be set to control the level of security checking that is performed when the IGQ agent opens destination queues.

Intra-group queuing authority (IGQAUT)

The IGQAUT attribute can be set to indicate the type of security checks to be performed, and hence to determine the userids to be used by the IGQ agent when it establishes the authority to put messages on to the destination queue.

The IGQAUT attribute is analogous to the PUTAUT attribute that is available on channel definitions.

Intra-group queuing user indentifier (IGQUSER)

The IGQUSER attribute can be used to nominate a user ID to be used by the IGQ agent when it establishes the authority to put messages on to a destination queue.

The IGQUSER attribute is analogous to the MCAUSER attribute that is available on channel definitions.

Refer to *WebSphere MQ Script (MQSC) Command Reference* and *WebSphere MQ Application Programming Reference* for more information about the IGQAUT and IGQUSER queue manager attributes. Refer to the chapter on security in *WebSphere MQ for z/OS System Setup Guide* for a table of the userids checked for intra-group queuing.

Specific properties

This section describes the specific properties of intra-group queuing.

Queue name resolution

Refer to *WebSphere MQ Script (MQSC) Command Reference*, *WebSphere MQ Application Programming Reference* and *WebSphere MQ for z/OS System Setup Guide* for details of queue name resolution when intra-group queuing is used.

Invalidation of object handles (MQRC_OBJECT_CHANGED)

If the attributes of an object are found to have changed after the object is opened, the queue manager invalidates the object handle with MQRC_OBJECT_CHANGED on its next use.

Intra-group queuing introduces the following new rules for object handle invalidation :

- If the SYSTEM.QSG.TRANSMIT.QUEUE was included in the name resolution path during open processing because intra-group queuing was ENABLED at open time, but intra-group queuing is found to be DISABLED at put time, then the queue manager invalidates the object handle and fails the put request with MQRC_OBJECT_CHANGED.
- If the SYSTEM.QSG.TRANSMIT.QUEUE was not included in the name resolution path during open processing because intra-group queuing was DISABLED at open time, but intra-group queuing is found to be ENABLED at put time, then the queue manager invalidates the object handle and fails the put request with MQRC_OBJECT_CHANGED.
- If the SYSTEM.QSG.TRANSMIT.QUEUE was included in the name resolution path during open processing because intra-group queuing was enabled at open time, but the SYSTEM.QSG.TRANSMIT.QUEUE definition is found to have changed by put time, then the queue manager invalidates the object handle and fails the put request with MQRC_OBJECT_CHANGED.

Self recovery of the intra-group queuing agent

In the event that the IGQ agent terminates abnormally, message CSQM067E is issued and the IGQ agent performs self recovery.

Retry capability of the intra-group queuing agent

In the event that the IGQ agent encounters a problem accessing the SYSTEM.QSG.TRANSMIT.QUEUE (because it is not defined, for example, or is defined with incorrect attributes, or is inhibited for Gets, or for some other reason), the IGQ agent goes into the state of retry. The IGQ agent observes short and long retry counts and intervals. The values for these counts and intervals, which cannot be changed, are as follows:

Constant	**Value**
Short retry count	10
Short retry interval	60 secs = 1 min
Long retry count	999,999,999
Long retry interval	1200 secs = 20 min

The intra-group queuing agent and Serialization

If there is a failure of a queue manager in a queue-sharing group while the IGQ agent is dealing with uncommitted messages on a shared queue or queues, the IGQ agent ends, and shared queue peer recovery takes place for the failing queue manager. Because shared queue peer recovery is an asynchronous activity, this leaves the possibility for the failing queue manager, and also the IGQ agent for that queue manager, to restart before shared queue peer recovery is complete. This in turn leaves the possibility for any committed messages to be processed ahead of and out of sequence with the messages still being recovered. To ensure that messages are not processed out of sequence, the IGQ agent serializes access to shared queues by issuing the MQCONNX API call.

An attempt, by the IGQ agent to serialize access to shared queues while peer recovery is still in progress might fail. An error message is issued and the IGQ agent is put into retry state. When queue manager peer recovery is complete, for example at the time of the next retry, the IGQ agent can start.

Chapter 39. Example configuration — WebSphere MQ for z/OS using intra-group queuing

This section describes how a typical payroll query application, that currently uses distributed queuing to transfer small messages between queue managers, could be migrated to exploit queue sharing groups and shared queues.

Three configurations are described to illustrate the use of distributed queuing, intra-group queuing with shared queues, and shared queues. The associated diagrams show only the flow of data in one direction, that is, from queue manager QMG1 to queue manager QMG3.

Configuration 1

Configuration 1 describes how distributed queuing is currently used to transfer messages between queue managers QMG1 and QMG3.

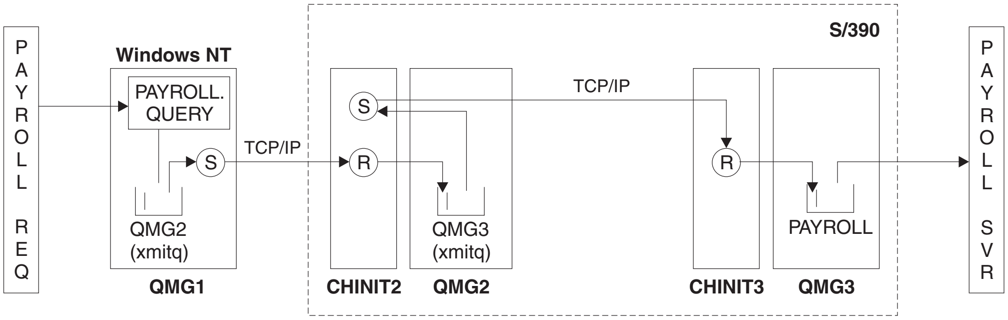


Figure 97. Configuration 1: z/OS using intra-group queuing

The flow of operations is as follows:

1. A query is entered using the payroll request application connected to queue manager QMG1.
2. The payroll request application puts the query on to remote queue PAYROLL.QUERY. As queue PAYROLL.QUERY resolves to transmission queue QMG2, the query is put on to transmission queue QMG2.
3. Sender channel (S) on queue manager QMG1 delivers the query to the partner receiver channel (R) on queue manager QMG2.
4. Receiver channel (R) on queue manager QMG2 puts the query on to queue PAYROLL on queue manager QMG3. As queue PAYROLL on QMG3 resolves to transmission queue QMG3, the query is put on to transmission queue QMG3.
5. Sender channel (S) on queue manager QMG2 delivers the query to the partner receiver channel (R) on queue manager QMG3.
6. Receiver channel (R) on queue manager QMG3 puts the query on to local queue PAYROLL.
7. The payroll server application connected to queue manager QMG3 retrieves the query from local queue PAYROLL, processes it, and generates a suitable reply.

Configuration 2

Configuration 2 describes how queue-sharing groups and intra-group queuing can be used, with no effect on the back end payroll server application, to transfer messages between queue managers QMG1 and QMG3. This configuration removes the need for channel definitions between queue managers QMG2 and QMG3 because intra-group queuing is used to transfer messages between these two queue managers.

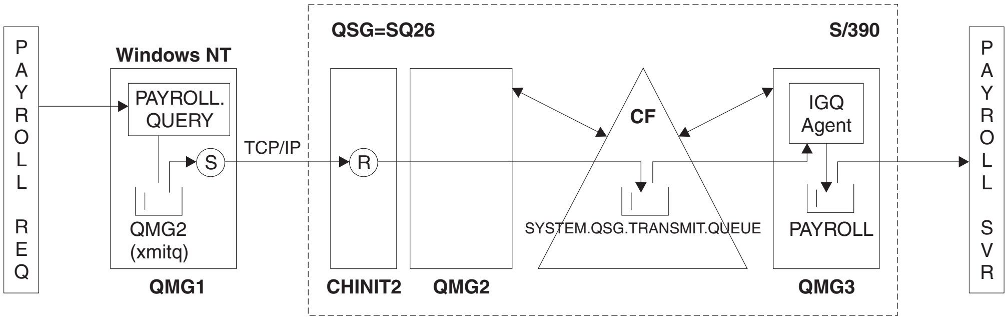


Figure 98. Configuration 2

The flow of operations is as follows:

1. A query is entered using the payroll request application connected to queue manager QMG1.
2. The payroll request application puts the query on to remote queue PAYROLL.QUERY. As queue PAYROLL.QUERY resolves to transmission queue QMG2, the query is put on to transmission queue QMG2.
3. Sender channel (S) on queue manager QMG1 delivers the query to the partner receiver channel (R) on queue manager QMG2.
4. Receiver channel (R) on queue manager QMG2 puts the query on to queue PAYROLL on queue manager QMG3. As queue PAYROLL on QMG3 resolves to shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE, the query is put on to shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE.
5. IGQ agent on queue manager QMG3 retrieves the query from shared transmission queue SYSTEM.QSG.TRANSMIT.QUEUE, and puts it on to local queue PAYROLL on queue manager QMG3.
6. The payroll server application connected to queue manager QMG3 retrieves the query from local queue PAYROLL, processes it, and generates a suitable reply.

Note: The payroll query example transfers small messages only. If you need to transfer both persistent and non-persistent messages, a combination of Configuration 1 and Configuration 2 can be established, so that large messages can be transferred using the distributed queuing route, while small messages can be transferred using the potentially faster intra-group queuing route.

Configuration 3

Configuration 3 describes how queue-sharing groups and shared queues can be used, with no effect on the backend payroll server application, to transfer messages between queue managers QMG1 and QMG3.

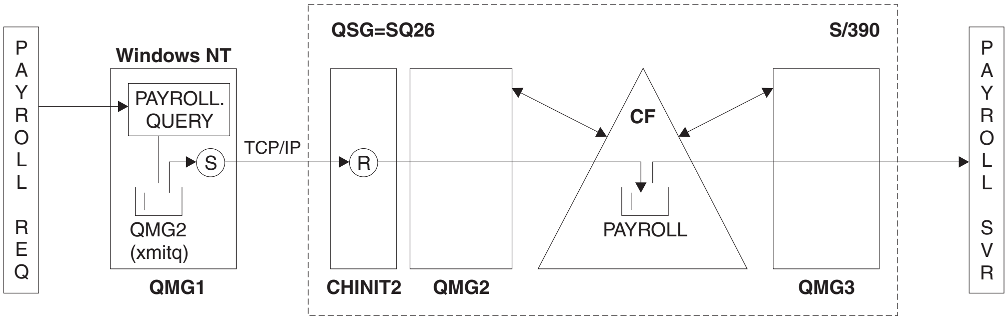


Figure 99. Configuration 3

The flow of operations is:

1. A query is entered using the payroll request application connected to queue manager QMG1.
2. The payroll request application puts the query on to remote queue PAYROLL.QUERY. As queue PAYROLL.QUERY resolves to transmission queue QMG2, the query is put on to transmission queue QMG2.
3. Sender channel (S) on queue manager QMG1 delivers the query to the partner receiver channel (R) on queue manager QMG2.
4. Receiver channel (R) on queue manager QMG2 puts the query on to shared queue PAYROLL.
5. The payroll server application connected to queue manager QMG3 retrieves the query from shared queue PAYROLL, processes it, and generates a suitable reply.

This configuration is certainly the simplest to configure. However, it should be noted that distributed queuing or intra-group queuing would need to be configured to transfer replies (generated by the payroll server application connected to queue manager QMG3) from queue manager QMG3 to queue manager QMG2, and then on to queue manager QMG1. (See “What this example shows” on page 501 for the configuration used to transfer replies back to the payroll request application.)

Configuration 1 definitions

The definitions required for Configuration 1 are as follows (please note that the definitions do not take into account triggering, and that only channel definitions for communication using TCP/IP are provided).

On QMG1

Remote queue definition

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QMG3') REPLACE +
PUT(ENABLED) RNAME(PAYROLL) RQMNAME(QMG3) XMITQ(QMG2)
```

Transmission queue definition

```
DEFINE QLOCAL(QMG2) DESCR('Transmission queue to QMG2') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(SDR) TRPTYPE(TCP)  REPLACE +
DESCR('Sender channel to QMG2') XMITQ(QMG2) CONNAME('MVSQMG2(1415)')
```

This is the place where you should replace MVSQMG2(1415) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG2')
```

Reply-to queue definition

```
DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to payroll queries sent to QMG3')
```

On QMG2

Transmission queue definition

```
DEFINE QLOCAL(QMG1) DESCR('Transmission queue to QMG1') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)

DEFINE QLOCAL(QMG3) DESCR('Transmission queue to QMG3') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definitions (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(SDR) TRPTYPE(TCP) REPLACE +
DESCR('Sender channel to QMG1') XMITQ(QMG1) CONNAME('WINTQMG1(1414)')
```

This is the place where you should replace WINTQMG1(1414) with your queue manager connection name and port.

```
DEFINE CHANNEL(QMG2.TO.QMG3) CHLTYPE(SDR) TRPTYPE(TCP) REPLACE +
DESCR('Sender channel to QMG3') XMITQ(QMG3) CONNAME('MVSQMG3(1416)')
```

This is the place where you should replace MVSQMG3(1416) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG1')

DEFINE CHANNEL(QMG3.TO.QMG2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG3')
```

On QMG3

Local queue definition

```
DEFINE QLOCAL(PAYROLL) DESCR('Payroll query request queue') REPLACE +
PUT(ENABLED) USAGE(NORMAL) GET(ENABLED) SHARE

DEFINE QLOCAL(QMG2) DESCR('Transmission queue to QMG2') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definitions (for TCP/IP)

```
DEFINE CHANNEL(QMG3.TO.QMG2) CHLTYPE(SDR) TRPTYPE(TCP) REPLACE +
DESCR('Sender channel to QMG2) XMITQ(QMG2) CONNAME('MVSQMG2(1415)')
```

This is the place where you should replace MVSQMG2(1415) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG3) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG2)
```

Configuration 2 definitions

The definitions required for Configuration 2 are as follows (please note that the definitions do not take into account triggering, and that only channel definitions for communication using TCP/IP are provided). It is assumed that queue managers QMG2 and QMG3 are already configured to be members of the same queue-sharing group.

On QMG1

Remote queue definition

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QMG3') REPLACE +
PUT(ENABLED) RNAME(PAYROLL) RQMNAME(QMG3) XMITQ(QMG2)
```

Transmission queue definition

```
DEFINE QLOCAL(QMG2) DESCR('Transmission queue to QMG2') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(SDR) TRPTYPE(TCP) REPLACE +
DESCR('Sender channel to QMG2') XMITQ(QMG2) CONNAME('MVSQMG2(1415)')
```

This is the place where you should replace MVSQMG2(1415) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG2')
```

Reply-to queue definition

```
DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to payroll queries sent to QMG3')
```

On QMG2

Transmission queue definition

```
DEFINE QLOCAL(QMG1) DESCR('Transmission queue to QMG1') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)

DEFINE QLOCAL(SYSTEM.QSG.TRANSMIT.QUEUE) QSGDISP(SHARED) +
DESCR('IGQ Transmission queue')  REPLACE PUT(ENABLED) USAGE(XMITQ) +
GET(ENABLED) INDXTYPE(CORRELID) CFSTRUCT('APPLICATION1') +
DEFSOPT(SHARED) DEFPSIST(NO)
```

This is the place where you should replace APPLICATION1 with your defined CF structure name. Also note that this queue, being a shared queue, need only be defined on one of the queue managers in the queue sharing group.

Sender channel definitions (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(SDR) TRPTYPE(TCP)  REPLACE +
DESCR('Sender channel to QMG1') XMITQ(QMG1)  CONNAME('WINTQMG1(1414)')
```

This is the place where you should replace WINTQMG1(1414) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG1')
```

Queue Manager definition

```
ALTER QMGR IGQ(ENABLED)
```

On QMG3

Local queue definition

```
DEFINE QLOCAL(PAYROLL) DESCR('Payroll query request queue') REPLACE +
PUT(ENABLED) USAGE(NORMAL) GET(ENABLED) SHARE
```

Queue Manager definition

```
ALTER QMGR IGQ(ENABLED)
```

Configuration 3 definitions

The definitions required for Configuration 3 are as follows (please note that the definitions do not take into account triggering, and that only channel definitions for communication using TCP/IP are provided). It is assumed that queue managers QMG2 and QMG3 are already configured to be members of the same queue-sharing group.

On QMG1

Remote queue definition

```
DEFINE QREMOTE(PAYROLL.QUERY) DESCR('Remote queue for QMG3') REPLACE +
PUT(ENABLED) RNAME(PAYROLL) RQMNAME(QMG3) XMITQ(QMG2)
```

Transmission queue definition

```
DEFINE QLOCAL(QMG2) DESCR('Transmission queue to QMG2') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QMG2') XMITQ(QMG2) CONNAME('MVSQMG2(1415)')
```

This is the place where you should replace MVSQMG2(1415) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG2')
```

Reply-to queue definition

```
DEFINE QLOCAL(PAYROLL.REPLY) REPLACE PUT(ENABLED) GET(ENABLED) +
DESCR('Reply queue for replies to payroll queries sent to QMG3')
```

On QMG2

Transmission queue definition

```
DEFINE QLOCAL(QMG1) DESCR('Transmission queue to QMG1') REPLACE +
PUT(ENABLED) USAGE(XMITQ) GET(ENABLED)
```

Sender channel definitions (for TCP/IP)

```
DEFINE CHANNEL(QMG2.TO.QMG1) CHLTYPE(SDR) TRPTYPE(TCP) +
REPLACE DESCR('Sender channel to QMG1') XMITQ(QMG1) CONNAME('WINTQMG1(1414)')
```

This is the place where you should replace WINTQMG1(1414) with your queue manager connection name and port.

Receiver channel definition (for TCP/IP)

```
DEFINE CHANNEL(QMG1.TO.QMG2) CHLTYPE(RCVR) TRPTYPE(TCP) +
REPLACE DESCR('Receiver channel from QMG1')
```

Local queue definition

```
DEFINE QLOCAL(PAYROLL) QSGDISP(SHARED) DESCR('Payroll query request queue') +
REPLACE  PUT(ENABLED) USAGE(NORMAL) GET(ENABLED) SHARE +
DEFSOPT(SHARED) DEFPSIST(NO) CFSTRUCT(APPLICATION1)
```

This is the place where you should replace APPLICATION1 with your defined CF structure name. Also note that this queue, being a shared queue, need only be defined on one of the queue managers in the queue sharing group.

On QMG3

No definitions are required on QMG3.

Running the example

For Configuration 1:

1. Start queue managers QMG1, QMG2 and QMG3.
2. Start channel initiators for QMG2 and QMG3.
3. Start the listeners on QMG1, QMG2 and QMG3 to listen on ports 1414, 1415 and 1416, respectively.
4. Start sender channel(s) on QMG1, QMG2 and QMG3.
5. Start the payroll query requesting application connected to QMG1.
6. Start the payroll server application connected to QMG3.
7. Submit a payroll query request to QMG3 and wait for the payroll reply.

For Configuration 2:

1. Start queue managers QMG1, QMG2, and QMG3.
2. Start the channel initiator for QMG2.
3. Start the listeners on QMG1, QMG2 to listen on ports 1414 and 1415, respectively.
4. Start the sender channel on QMG1 and QMG2.
5. Start the payroll query requesting application connected to QMG1.
6. Start the payroll server application connected to QMG3.
7. Submit a payroll query request to QMG3 and wait for the payroll reply.

For Configuration 3:

1. Start queue managers QMG1, QMG2 and QMG3.
2. Start the channel initiator for QMG2.
3. Start the listeners on QMG1, QMG2 to listen on ports 1414 and 1415, respectively.
4. Start sender channels on QMG1 and QMG2.
5. Start the payroll query requesting application connected to QMG1.
6. Start the payroll server application connected to QMG3.
7. Submit a payroll query request to QMG3 and wait for the payroll reply.

Expanding the example

The example can be:

- Expanded to make use of channel triggering as well as application (PAYROLL and PAYROLL.REPLY queue) triggering.
- Configured for communication using LU6.2.
- Expanded to configure more queue managers to the queue sharing group. Then the server application can be cloned to run on other queue manager instances to provide multiple servers for the PAYROLL query queue.
- Expanded to increase the number of instances of the payroll query requesting application to demonstrate the processing of requests from multiple clients.
- Expanded to make use of security (IGQAUT and IGQUSER).

Part 5. DQM in WebSphere MQ for iSeries

Chapter 40. Monitoring and controlling channels in WebSphere MQ for iSeries

Use the DQM commands and panels to create, monitor, and control the channels to remote queue managers. Each queue manager has a DQM program for controlling interconnections to compatible remote queue managers. See "Operator commands" on page 530 for a list of the commands you need when setting up and controlling message channels.

The DQM channel control function

The channel control function provides the interface and function for administration and control of message channels between WebSphere MQ for iSeries and compatible systems. See Figure 28 on page 58 for a conceptual picture.

The channel control function consists of WebSphere MQ for iSeries panels, commands, programs, a sequence number file, and a file for the channel definitions. The following is a brief description of the components of the channel control function:

- The channel definition file (CDF):
  - Is indexed on channel name
  - Holds channel definitions
- The channel commands are a subset of the WebSphere MQ for iSeries set of commands.

  Use the command GO CMDMQM to display the full set of WebSphere MQ for iSeries commands.
- You use channel definition panels, or commands to:
  - Create, copy, display, change, and delete channel definitions
  - Start and stop channels, ping, reset channel sequence numbers, and resolve in-doubt messages when links cannot be re-established
  - Display status information about channels
- Sequence numbers and *logical unit of work (LUW)* identifiers are stored in the synchronization file, and are used for channel synchronization purposes.

Operator commands

The following table shows the full list of WebSphere MQ for iSeries commands that you may need when setting up and controlling channels. In general, issuing a command results in the appropriate panel being displayed.

The commands can be grouped as follows:

- Channel commands
  CHGMQMCHL, Change MQM Channel
  CPYMQMCHL, Copy MQM Channel
  CRTMQMCHL, Create MQM Channel
  DLTMQMCHL, Delete MQM Channel
  DSPMQMCHL, Display MQM Channel
  ENDMQMCHL, End MQM Channel
  ENDMQMLSR, End MQM Listener
  PNGMQMCHL, Ping MQM Channel
  RSTMQMCHL, Reset MQM Channel
  RSVMQMCHL, Resolve MQM Channel
  STRMQMCHL, Start MQM Channel
  STRMQMCHLI, Start MQM Channel Initiator
  STRMQMLSR, Start MQM Listener
  WRKMQMCHL, Work with MQM Channel
  WRKMQMCHST, Work with MQM Channel Status
- Cluster commands
  RFRMQMCL, Refresh Cluster
  RSMMQMCLQM, Resume Cluster Queue Manager
  RSTMQMCL, Reset Cluster
  SPDMQMCLQM, Suspend Cluster Queue Manager
  WRKMQMCL, Work with Clusters
- Command Server commands
  DSPMQMCSVR, Display MQM Command Server
  ENDMQMCSVR, End MQM Command Server
  STRMQMCSVR, Start MQM Command Server
- Data Type Conversion Command
  CVTMQMDTA, Convert MQM Data Type Command
- Dead-Letter Queue Handler Command
  STRMQMDLQ, Start WebSphere MQ Dead-Letter Queue Handler
- Media Recovery Commands
  RCDMQMIMG, Record MQM Object Image
  RCRMQMOBJ, Recreate MQM Object
- WebSphere MQ commands
  STRMQMMQSC, Start MQSC Commands
- Name command
  DSPMQMOBJN, Display MQM Object Names
- Namelist commands
  CHGMQMNL, Change MQM Namelist
  CPYMQMNL, Copy MQM Namelist
  CRTMQMNL, Create MQM Namelist
  DLTMQMNL, Delete MQM Namelist
  DSPMQMNL, Display MQM Namelist
  WRKMQMNL, Work with MQM Namelists
- Process commands
  CHGMQMPRC, Change MQM Process

  - CPYMQMPRC, Copy MQM Process
  - CRTMQMPRC, Create MQM Process
  - DLTMQMPRC, Delete MQM Process
  - DSPMQMPRC, Display MQM Process
  - WRKMQMPRC, Work with MQM Processes
- Queue commands
  - CHGMQMQ, Change MQM Queue
  - CLRMQMQ, Clear MQM Queue
  - CPYMQMQ, Copy MQM Queue
  - CRTMQMQ, Create MQM Queue
  - DLTMQMQ, Delete MQM Queue
  - DSPMQMQ, Display MQM Queue
  - WRKMQMMSG, Work with MQM Messages
  - WRKMQMQ, Work with MQM Queues
- Queue Manager commands
  - CCTMQM, Connect Message Queue Manager
  - CHGMQM, Change Message Queue Manager
  - CRTMQM, Create Message Queue Manager
  - DLTMQM, Delete Message Queue Manager
  - DSCMQM, Disconnect Message Queue Manager
  - DSPMQM, Display Message Queue Manager
  - ENDMQM, End Message Queue Manager
  - STRMQM, Start Message Queue Manager
  - WRKMQM, Work with Message Queue managers
- Security commands
  - DSPMQMAUT, Display MQM Object Authority
  - GRTMQMAUT, Grant MQM Object Authority
  - RVKMQMAUT, Revoke MQM Object Authority
- Trace commands
  - TRCMQM, Trace MQM Job
- Transaction commands
  - RSVMQMTRN, Resolve MQSeries Transaction
  - WRKMQMTRN, Display MQSeries Transaction
- Trigger Monitor commands
  - STRMQMTRM, Start Trigger Monitor

Getting started

Use these commands and panels to:

1. Define message channels and associated objects
2. Monitor and control message channels

By using the F4=Prompt key, you can specify the relevant queue manager. If you do not use the prompt, the default queue manager is assumed. With F4=Prompt, an additional panel is displayed where you may enter the relevant queue manager name and sometimes other data.

The objects you need to define with the panels are:

- Transmission queues
- Remote queue definitions
- Queue manager alias definitions
- Reply-to queue alias definitions
- Reply-to local queues
- Processes for triggering (MCAs)
- Message channel definitions

See Chapter 2, “Making your applications communicate”, on page 17 for more discussion on the concepts involved in the use of these objects.

Channels must be completely defined, and their associated objects must exist and be available for use, before a channel can be started. This chapter shows you how to do this.

In addition, the particular communication link for each channel must be defined and available before a channel can be run. For a description of how LU 6.2 and TCP/IP links are defined, see the particular communication guide for your installation.

Creating objects

Use the CRTMQMQ command to create the queue and alias objects, such as: transmission queues, remote queue definitions, queue manager alias definitions, reply-to queue alias definitions, and reply-to local queues.

For a list of default objects, see the *WebSphere MQ for iSeries V5.3 System Administration Guide* book.

Creating a channel

To create a new channel:

1. Use F6 from the Work with MQM Channels panel (the second panel that displays channel details).

   Alternatively, use the CRTMQMCHL command from the command line.

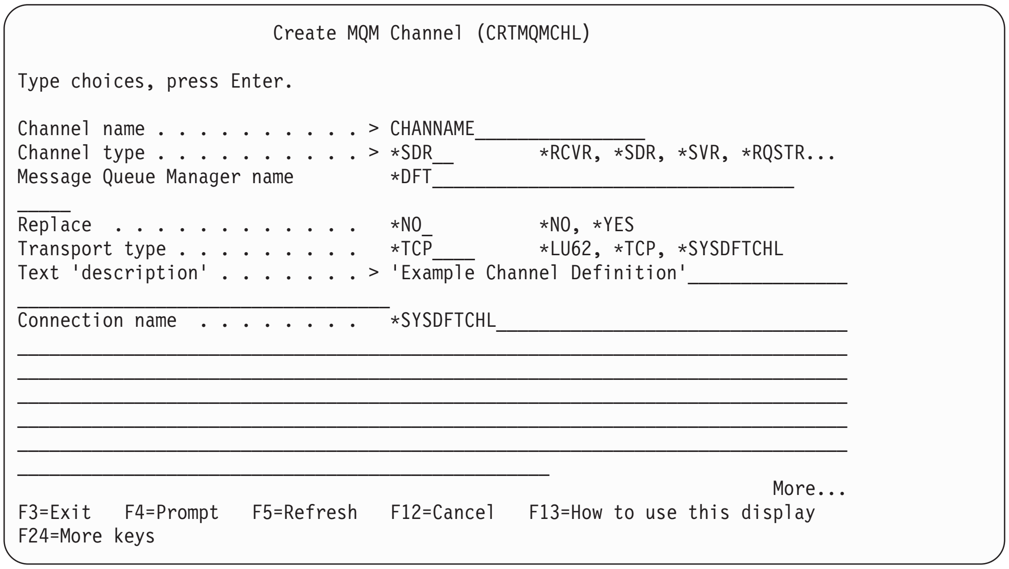
   Either way, this displays the Create Channel panel. Type:
   - The name of the channel in the field provided
   - The channel type for this end of the link
2. Press Enter.

Note: You are strongly recommended to name all the channels in your network uniquely. As shown in Table 1 on page 30, including the source and target queue manager names in the channel name is a good way to do this.

Your entries are validated and errors are reported immediately. Correct any errors and continue.

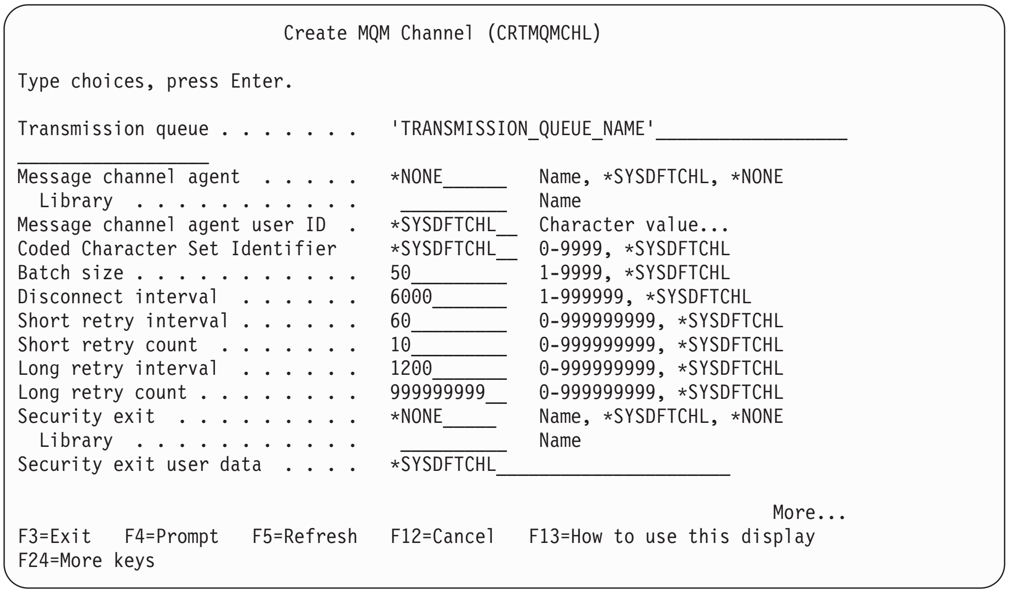
You are presented with the appropriate channel settings panel for the type of channel you have chosen. Fill in the fields with the information you have gathered previously. See Appendix A, “Channel planning form”, on page 747 for an example of how you might want to gather information. Press Enter to create the channel.

You are provided with help in deciding on the content of the various fields in the descriptions of the channel definition panels in the help panels, and in Chapter 6, “Channel attributes”, on page 77.



```
                         Create MQM Channel (CRTMQMCHL)

Type choices, press Enter.

Channel name . . . . . . . . . . . > CHANNAME________________
Channel type . . . . . . . . . . . > *SDR__        *RCVR, *SDR, *SVR, *RQSTR...
Message Queue Manager name           *DFT__________________________________
_____
Replace  . . . . . . . . . . . .     *NO_          *NO, *YES
Transport type . . . . . . . . .     *TCP____      *LU62, *TCP, *SYSDFTCHL
Text 'description' . . . . . . . > 'Example Channel Definition'_______________
___________________________________
Connection name  . . . . . . . .     *SYSDFTCHL_________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
__________________________________________________
                                                                       More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

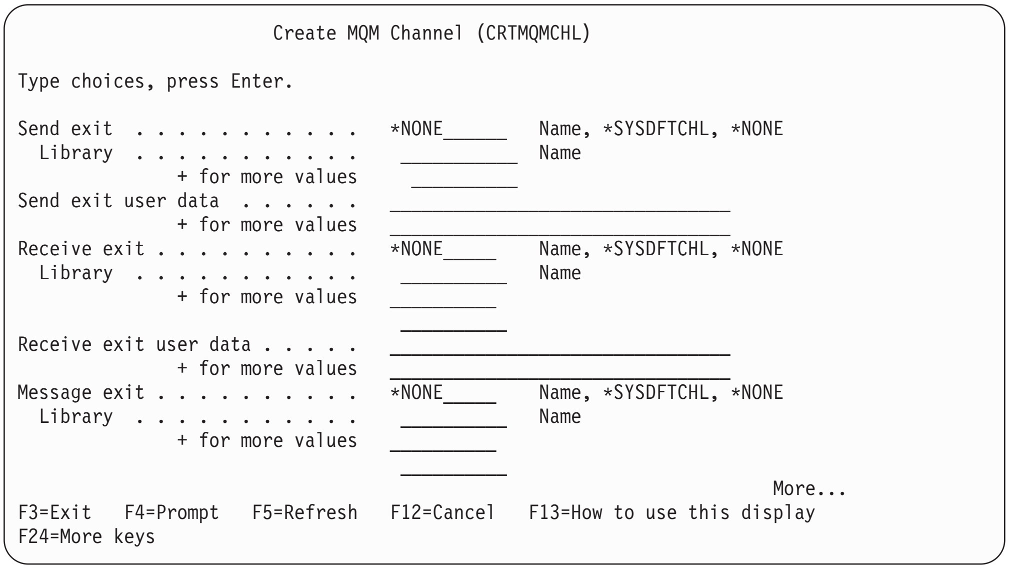
Figure 100. Create channel (1)



```
                          Create MQM Channel (CRTMQMCHL)

Type choices, press Enter.

Transmission queue . . . . . . .     'TRANSMISSION_QUEUE_NAME'__________________
__________________
Message channel agent  . . . . .     *NONE______   Name, *SYSDFTCHL, *NONE
  Library  . . . . . . . . . . .      __________   Name
Message channel agent user ID  .     *SYSDFTCHL__  Character value...
Coded Character Set Identifier       *SYSDFTCHL__  0-9999, *SYSDFTCHL
Batch size . . . . . . . . . . .     50_________   1-9999, *SYSDFTCHL
Disconnect interval  . . . . . .     6000_______   1-999999, *SYSDFTCHL
Short retry interval . . . . . .     60_________   0-999999999, *SYSDFTCHL
Short retry count  . . . . . . .     10_________   0-999999999, *SYSDFTCHL
Long retry interval  . . . . . .     1200_______   0-999999999, *SYSDFTCHL
Long retry count . . . . . . . .     999999999__   0-999999999, *SYSDFTCHL
Security exit  . . . . . . . . .     *NONE_____    Name, *SYSDFTCHL, *NONE
  Library  . . . . . . . . . . .      __________   Name
Security exit user data  . . . .     *SYSDFTCHL______________________


                                                                       More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

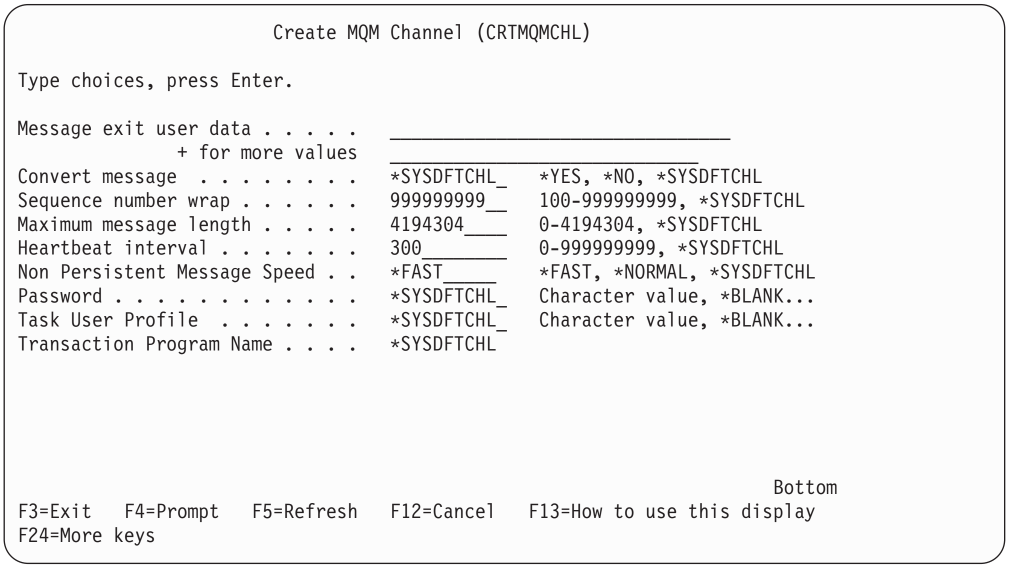
Figure 101. Create channel (2)

Creating a channel



```
                         Create MQM Channel (CRTMQMCHL)

Type choices, press Enter.

Send exit  . . . . . . . . . . .   *NONE______   Name, *SYSDFTCHL, *NONE
  Library  . . . . . . . . . . .    ___________  Name
               + for more values     __________
Send exit user data  . . . . . .   ________________________________
               + for more values   ________________________________
Receive exit . . . . . . . . . .   *NONE_____    Name, *SYSDFTCHL, *NONE
  Library  . . . . . . . . . . .    __________   Name
               + for more values   __________
                                    __________
Receive exit user data . . . . .   ________________________________
               + for more values   ________________________________
Message exit . . . . . . . . . .   *NONE_____    Name, *SYSDFTCHL, *NONE
  Library  . . . . . . . . . . .    __________   Name
               + for more values   __________
                                    __________
                                                                    More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Figure 102. Create channel (3)



```
                         Create MQM Channel (CRTMQMCHL)

Type choices, press Enter.

Message exit user data . . . . .   ________________________________
               + for more values   _____________________________
Convert message  . . . . . . . .   *SYSDFTCHL_   *YES, *NO, *SYSDFTCHL
Sequence number wrap . . . . . .   999999999__   100-999999999, *SYSDFTCHL
Maximum message length . . . . .   4194304____   0-4194304, *SYSDFTCHL
Heartbeat interval . . . . . . .   300_______    0-999999999, *SYSDFTCHL
Non Persistent Message Speed . .   *FAST_____    *FAST, *NORMAL, *SYSDFTCHL
Password . . . . . . . . . . . .   *SYSDFTCHL_   Character value, *BLANK...
Task User Profile  . . . . . . .   *SYSDFTCHL_   Character value, *BLANK...
Transaction Program Name . . . .   *SYSDFTCHL






                                                                    Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Figure 103. Create channel (4)

Starting a channel

Listeners are valid for TCP only. For SNA listeners, you must configure your communications subsystem.

For applications to be able to exchange messages you must start a listener program for inbound connections using the STRMQMLSR command.

For outbound connections you must start the channel in one of the following ways:

1. Use the CL command STRMQMCHL, specifying the channel name, to start the channel as a process or a thread, depending on the MCATYPE parameter. (If channels are started as threads, they are threads of a channel initiator.)

   ```
   STRMQMCHL CHLNAME(QM1.TO.QM2) MQNAME(MYQMGR)
   ```

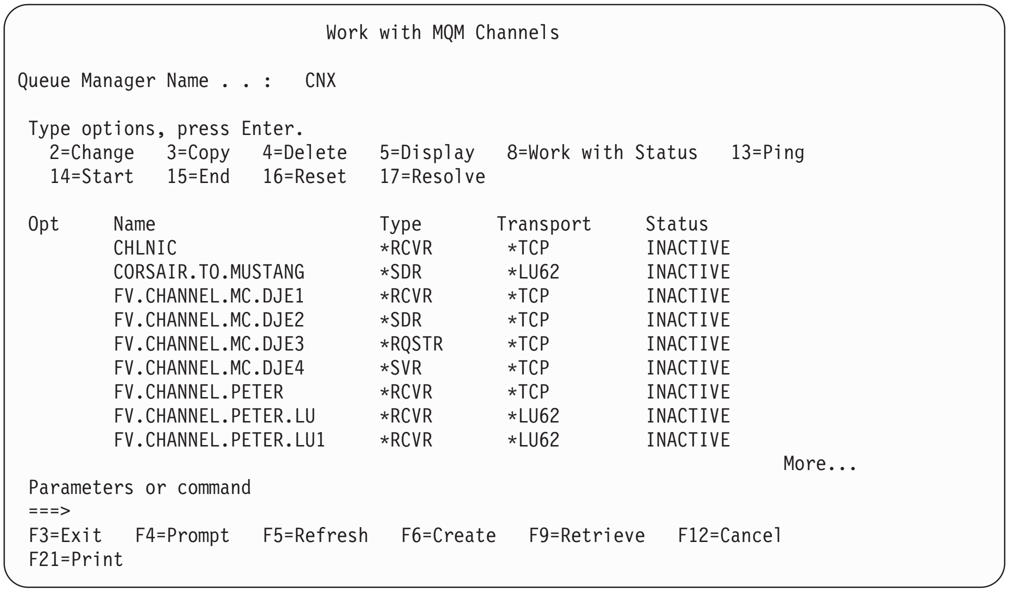
2. Use a channel initiator to trigger the channel. One channel initiator is started automatically when the queue manager is started. This can be eliminated by changing the chinit stanza in the qm.ini file for that queue manager.
3. Use the WRKMQMCHL command to begin the Work with Channels panel and choose option 14 to start a channel.

Selecting a channel

To select a channel, use the WRKMQMCHL command to begin at the Work with Channels panel:

1. Move the cursor to the option field at the left of the required channel name.
2. Type an option number.
3. Press Enter to activate your choice.

If you select more than one channel, the options are activated in sequence.



```
                              Work with MQM Channels

Queue Manager Name . . :   CNX

 Type options, press Enter.
   2=Change   3=Copy   4=Delete   5=Display   8=Work with Status   13=Ping
   14=Start   15=End   16=Reset   17=Resolve

 Opt     Name                     Type       Transport     Status
         CHLNIC                   *RCVR       *TCP         INACTIVE
         CORSAIR.TO.MUSTANG       *SDR        *LU62        INACTIVE
         FV.CHANNEL.MC.DJE1       *RCVR       *TCP         INACTIVE
         FV.CHANNEL.MC.DJE2       *SDR        *TCP         INACTIVE
         FV.CHANNEL.MC.DJE3       *RQSTR      *TCP         INACTIVE
         FV.CHANNEL.MC.DJE4       *SVR        *TCP         INACTIVE
         FV.CHANNEL.PETER         *RCVR       *TCP         INACTIVE
         FV.CHANNEL.PETER.LU      *RCVR       *LU62        INACTIVE
         FV.CHANNEL.PETER.LU1     *RCVR       *LU62        INACTIVE
                                                                        More...
 Parameters or command
 ===>
 F3=Exit   F4=Prompt   F5=Refresh   F6=Create   F9=Retrieve   F12=Cancel
 F21=Print
```

Figure 104. Work with channels

Browsing a channel

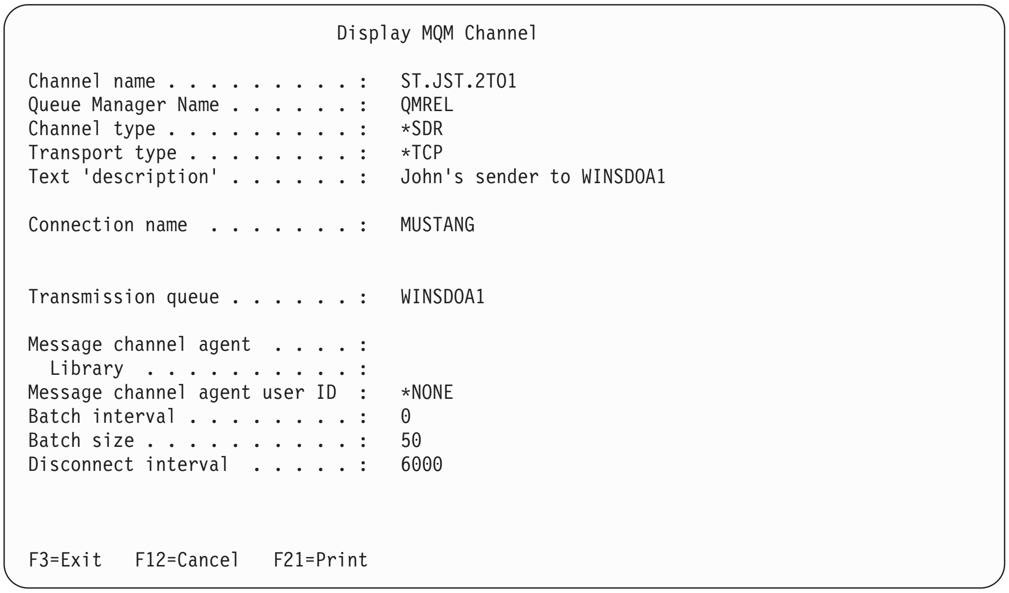
To browse the settings of a channel, use the WRKMQMCHL command to begin at the Display Channel panel:

1. Move the cursor to the left of the required channel name.
2. Type option 5 (Display).
3. Press Enter to activate your choice.

If you select more than one channel, they are presented in sequence.

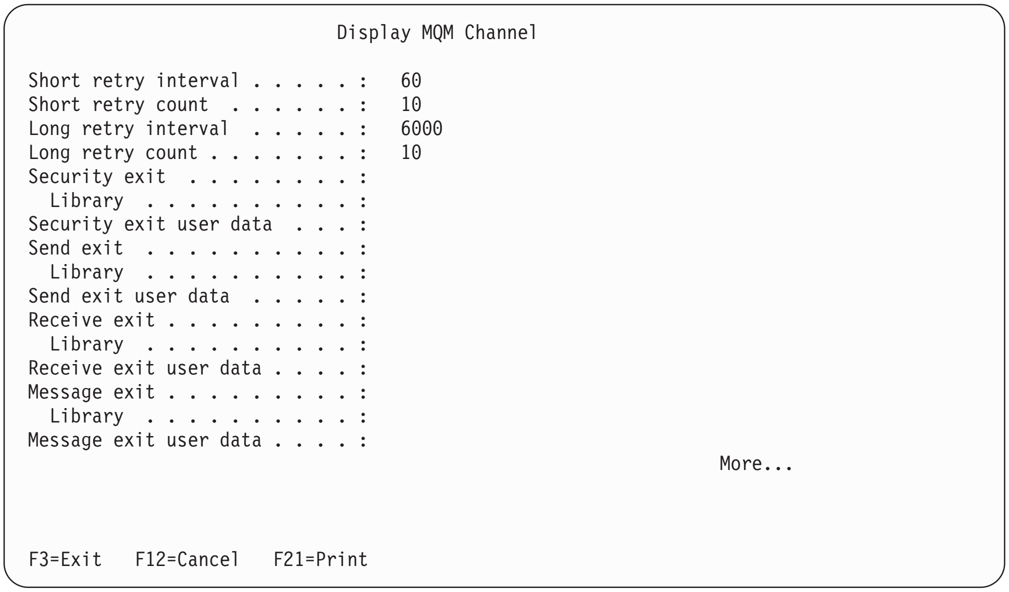
Alternatively, you can use the DSPMQMCHL command from the command line.

This results in the respective Display Channel panel being displayed with details of the current settings for the channel. The fields are described in Chapter 6, "Channel attributes", on page 77.



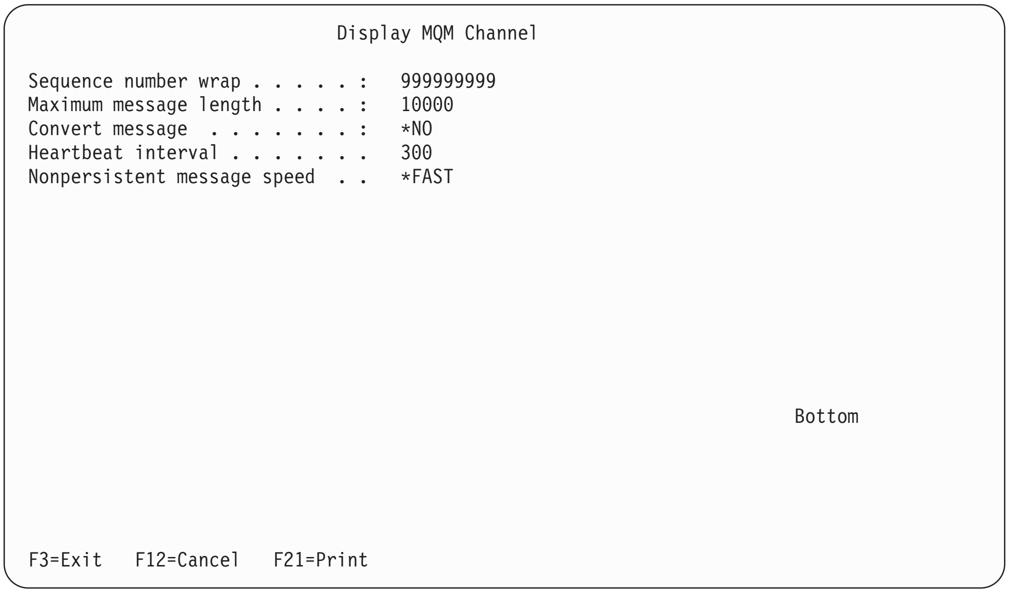
```
                              Display MQM Channel

Channel name . . . . . . . . . :   ST.JST.2TO1
Queue Manager Name . . . . . . :   QMREL
Channel type . . . . . . . . . :   *SDR
Transport type . . . . . . . . :   *TCP
Text 'description' . . . . . . :   John's sender to WINSDOA1

Connection name  . . . . . . . :   MUSTANG


Transmission queue . . . . . . :   WINSDOA1

Message channel agent  . . . . :
  Library  . . . . . . . . . . :
Message channel agent user ID  :   *NONE
Batch interval . . . . . . . . :   0
Batch size . . . . . . . . . . :   50
Disconnect interval  . . . . . :   6000



F3=Exit   F12=Cancel   F21=Print
```

Figure 105. Display a TCP/IP channel (1)



```
                              Display MQM Channel

Short retry interval . . . . . :   60
Short retry count  . . . . . . :   10
Long retry interval  . . . . . :   6000
Long retry count . . . . . . . :   10
Security exit  . . . . . . . . :
  Library  . . . . . . . . . . :
Security exit user data  . . . :
Send exit  . . . . . . . . . . :
  Library  . . . . . . . . . . :
Send exit user data  . . . . . :
Receive exit . . . . . . . . . :
  Library  . . . . . . . . . . :
Receive exit user data . . . . :
Message exit . . . . . . . . . :
  Library  . . . . . . . . . . :
Message exit user data . . . . :
                                                              More...



F3=Exit   F12=Cancel   F21=Print
```

Figure 106. Display a TCP/IP channel (2)



```
                              Display MQM Channel

Sequence number wrap . . . . . :   999999999
Maximum message length . . . . :   10000
Convert message  . . . . . . . :   *NO
Heartbeat interval . . . . . . .   300
Nonpersistent message speed  . .   *FAST












                                                                     Bottom









F3=Exit   F12=Cancel   F21=Print
```

Figure 107. Display a TCP/IP channel (3)

Renaming a channel

To rename a message channel, begin at the Work with Channels panel:

1. End the channel.
2. Use option 3 (Copy) to create a duplicate with the new name.
3. Use option 5 (Display) to check that it has been created correctly.
4. Use option 4 (Delete) to delete the original channel.

If you decide to rename a message channel, ensure that both channel ends are renamed at the same time.

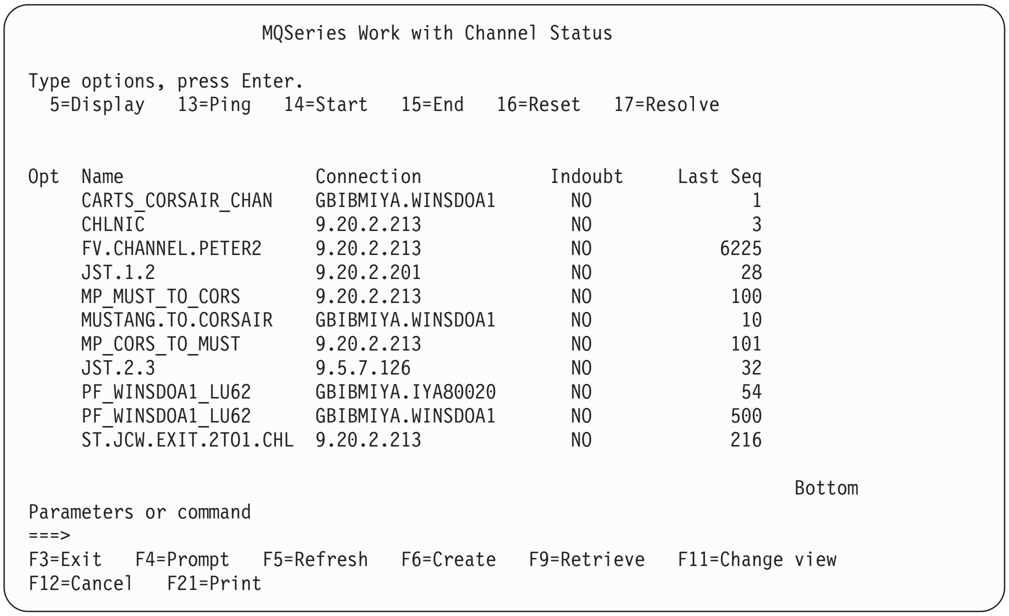
Work with channel status

Use the WRKMQMCHST command to bring up the first of three screens showing the status of your channels. You can view the three status screens in sequence when you select Change-view (F11).

Alternatively, selecting option 8 (Work with Status) from the Work with MQM Channels panel also brings up the first status panel.

Work with channel status applies to all message channels. It does not apply to MQI channels other than server-connection channels on WebSphere MQ for iSeries V5.1 and later.

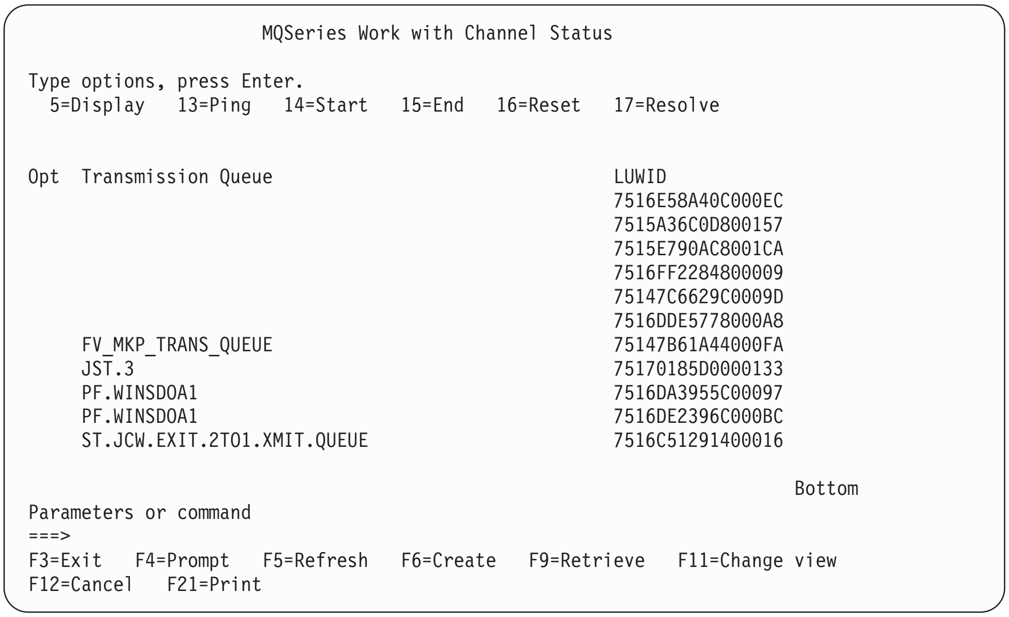
Note: The Work with Channel Status screens only show channels that are active after messages have been sent through the channel and the sequence number has been incremented.



```
                      MQSeries Work with Channel Status

Type options, press Enter.
  5=Display   13=Ping   14=Start   15=End   16=Reset   17=Resolve


Opt  Name                  Connection            Indoubt     Last Seq
     CARTS_CORSAIR_CHAN    GBIBMIYA.WINSDOA1       NO               1
     CHLNIC                9.20.2.213              NO               3
     FV.CHANNEL.PETER2     9.20.2.213              NO            6225
     JST.1.2               9.20.2.201              NO              28
     MP_MUST_TO_CORS       9.20.2.213              NO             100
     MUSTANG.TO.CORSAIR    GBIBMIYA.WINSDOA1       NO              10
     MP_CORS_TO_MUST       9.20.2.213              NO             101
     JST.2.3               9.5.7.126               NO              32
     PF_WINSDOA1_LU62      GBIBMIYA.IYA80020       NO              54
     PF_WINSDOA1_LU62      GBIBMIYA.WINSDOA1       NO             500
     ST.JCW.EXIT.2TO1.CHL  9.20.2.213              NO             216

                                                                        Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F6=Create   F9=Retrieve   F11=Change view
F12=Cancel   F21=Print
```

Figure 108. Channel status (1)

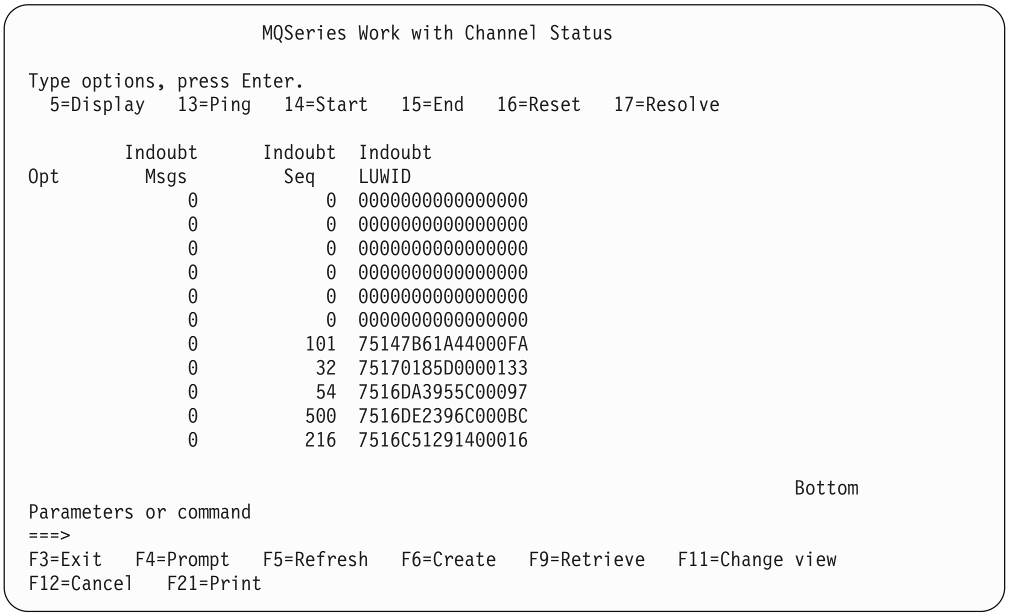
Change the view with F11.



```
                      MQSeries Work with Channel Status

Type options, press Enter.
  5=Display   13=Ping   14=Start   15=End   16=Reset   17=Resolve


Opt  Transmission Queue                                LUWID
                                                       7516E58A40C000EC
                                                       7515A36C0D800157
                                                       7515E790AC8001CA
                                                       7516FF2284800009
                                                       75147C6629C0009D
                                                       7516DDE5778000A8
     FV_MKP_TRANS_QUEUE                                75147B61A44000FA
     JST.3                                             75170185D0000133
     PF.WINSDOA1                                       7516DA3955C00097
     PF.WINSDOA1                                       7516DE2396C000BC
     ST.JCW.EXIT.2TO1.XMIT.QUEUE                       7516C51291400016

                                                                        Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F6=Create   F9=Retrieve   F11=Change view
F12=Cancel   F21=Print
```

Figure 109. Channel status (2)

Work with channel status



```
                      MQSeries Work with Channel Status

Type options, press Enter.
  5=Display   13=Ping   14=Start   15=End   16=Reset   17=Resolve

         Indoubt      Indoubt  Indoubt
Opt        Msgs         Seq    LUWID
               0            0  0000000000000000
               0            0  0000000000000000
               0            0  0000000000000000
               0            0  0000000000000000
               0            0  0000000000000000
               0            0  0000000000000000
               0          101  75147B61A44000FA
               0           32  75170185D0000133
               0           54  7516DA3955C00097
               0          500  7516DE2396C000BC
               0          216  7516C51291400016

                                                                        Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F6=Create   F9=Retrieve   F11=Change view
F12=Cancel   F21=Print
```

Figure 110. Channel status (3)

The options available in the Work with Channel Status panel are:

Menu option	Description
5=Display	Displays the channel settings.
13=Ping	Initiates a Ping action, where appropriate.
14=Start	Starts the channel.
15=End	Stops the channel.
16=Reset	Resets the channel sequence number.
17=Resolve	Resolves an in-doubt channel situation, manually.
F11=Change view	Cycles around the three status panels.

Note: When using the WRKMQMCHST command, the channel status shown is SAVED channel status not CURRENT channel status. To see CURRENT channel status, use the WRKMQMCHL command.

Work-with-channel choices

The Work with Channels panel is reached with the command WRKMQMCHL, and it allows you to monitor the status of all channels listed, and to issue commands against selected channels.

The options available in the Work with Channel panel are:

Menu option	Description
F6=Create	Creates a channel.
2=Change	Changes the attributes of a channel.
3=Copy	Copies the attributes of a channel to a new channel.
4=Delete	Deletes a channel.
5=Display	Displays the current settings for the channel.
8=Work with status	Displays the channel status panels.
13=Ping	Runs the Ping facility to test the connection to the adjacent system by exchanging a fixed data message with the remote end.
14=Start	Starts the selected channel, or resets a disabled receiver channel.
15=End	Requests the channel to close down.
16=Reset	Requests the channel to reset the sequence numbers on this end of the link. The numbers must be equal at both ends for the channel to start.
17=Resolve	Requests the channel to resolve in-doubt messages without establishing connection to the other end.

Panel choices

The following choices are provided in the Work with MQM channels panel and the Work with Channel Status panel.

F6=Create

Use the Create option, or enter the CRTMQMCHL command from the command line, to obtain the Create Channel panel. There are examples of Create Channel panels, starting at Figure 100 on page 533.

With this panel, you create a new channel definition from a screen of fields filled with default values supplied by WebSphere MQ for iSeries. Type the name of the channel, select the type of channel you are creating, and the communication method to be used.

When you press Enter, the panel is displayed. Type information in all the required fields in this panel, and the three pages making up the complete panel, and then save the definition by pressing Enter.

The channel name must be the same at both ends of the channel, and unique within the network. However, you should restrict the characters used to those that are valid for WebSphere MQ for iSeries object names; see Chapter 6, “Channel attributes”, on page 77.

All panels have default values supplied by WebSphere MQ for iSeries for some fields. You can customize these values, or you can change them when you are creating or copying channels. To customize the values, see the *WebSphere MQ for iSeries System Administration*.

You can create your own set of channel default values by setting up dummy channels with the required defaults for each channel type, and copying them each time you want to create new channel definitions.

Table 46 on page 542 shows the channel attributes for each type of channel. See Chapter 6, “Channel attributes”, on page 77 for details about the fields.

Panel choices

Table 46. Channel attribute fields per message channel type

Attribute field	**Sender**	**Server**	**Receiver**	**Requester**
Batch size	✓	✓	✓	✓
Channel name	✓	✓	✓	✓
Channel type	✓	✓	✓	✓
Connection name	✓	✓		✓
Context			✓	✓
Disconnect interval	✓	✓		
Heartbeat interval	✓	✓	✓	✓
Long retry wait interval	✓	✓		
Long retry count	✓	✓		
Maximum message length	✓	✓	✓	✓
Message channel agent name				✓
Message exit user data	✓	✓	✓	✓
Message retry exit count			✓	✓
Message retry exit data			✓	✓
Message retry exit interval			✓	✓
Message retry exit name			✓	✓
Nonpersistent message speed	✓	✓	✓	✓
Receive exit	✓	✓	✓	✓
Receive exit user data	✓	✓	✓	✓
Security exit	✓	✓	✓	✓
Security exit user data	✓	✓	✓	✓
Send exit	✓	✓	✓	✓
Send exit user data	✓	✓	✓	✓
Sequence number wrap	✓	✓	✓	✓
Short retry wait interval	✓	✓		
Short retry count	✓	✓		
Transport type	✓	✓	✓	✓
Transmission queue	✓	✓		
Message exit	✓	✓	✓	✓

2=Change

Use the Change option, or the CHGMQMCHL command, to change an existing channel definition, except for the channel name. Simply type over the fields to be changed in the channel definition panel, and then save the updated definition by pressing Enter.

3=Copy

Use the Copy option, or the CPYMQMCHL command, to copy an existing channel. The Copy panel enables you to define the new channel name. However, you should restrict the characters used to those that are valid for WebSphere MQ for iSeries object names; see the *WebSphere MQ for iSeries System Administration*.

Press Enter on the Copy panel to display the details of current settings. You can change any of the new channel settings. Save the new channel definition by pressing Enter.

4=Delete

Use the Delete option to delete the selected channel. A panel is displayed to confirm or cancel your request.

5=Display

Use the Display option to display the current definitions for the channel. This choice displays the panel with the fields showing the current values of the parameters, and protected against user input.

8=Work with Status

The status column tells you whether the channel is active or inactive, and is displayed continuously in the Work with MQM Channels panel. Use option 8 (Work with Status) to see more status information displayed. Alternatively, this can be displayed from the command line with the WRKMQMCHST command. See "Work with channel status" on page 538.

- Channel name
- Communication connection name
- In-doubt status of channel (where appropriate)
- Last sequence number
- Transmission queue name (where appropriate)
- The in-doubt identifier (where appropriate)
- The last committed sequence number
- Logical unit of work identifier

13=Ping

Use the Ping option to exchange a fixed data message with the remote end. This gives some confidence to the system supervisor that the link is available and functioning.

Ping does not involve the use of transmission queues and target queues. It uses channel definitions, the related communication link, and the network setup.

It is available from sender and server channels, only. The corresponding channel is started at the far side of the link, and performs the start up parameter negotiation. Errors are notified normally.

The result of the message exchange is presented in the Ping panel for you, and is the returned message text, together with the time the message was sent, and the time the reply was received.

Ping with LU 6.2

When Ping is invoked in WebSphere MQ for iSeries, it is run with the USERID of the user requesting the function, whereas the normal way that a channel program is run is for the QMQM USERID to be taken for channel programs. The USERID flows to the receiving side and it must be valid on the receiving end for the LU 6.2 conversation to be allocated.

14=Start

The Start option is available for sender, server, and requester channels. It should not be necessary where a channel has been set up with queue manager triggering.

The Start option is also used for receiver channels that have a DISABLED or STOPPED status. Starting a receiver channel that is in DISABLED or STOPPED state resets the channel and allows it to be started from the remote channel.

When started, the sending MCA reads the channel definition file and opens the transmission queue. A channel start-up sequence is executed, which remotely starts the corresponding MCA of the receiver or server channel. When they have been started, the sender and server processes await messages arriving on the transmission queue and transmit them as they arrive.

When you use triggering, you will need to start the continuously running trigger process to monitor the initiation queue. The STRMQMCHLI command can be used for this.

At the far end of a channel, the receiving process may be started in response to a channel startup from the sending end. The method of doing this is different for LU 6.2 and TCP/IP connected channels:

- LU 6.2 connected channels do not require any explicit action at the receiving end of a channel.
- TCP connected channels require a listener process to be running continuously. This process awaits channel startup requests from the remote end of the link and starts the process defined in the channel definitions for that connection.

  When the remote system is OS/400, you can use the STRMQMLSR command for this.

Use of the Start option always causes the channel to re-synchronize, where necessary.

For the start to succeed:

- Channel definitions, local and remote must exist. If there is no appropriate channel definition for a receiver or server-connection channel, a default one is created automatically if the channel is auto-defined. See "Channel auto-definition exit program" on page 631.
- The transmission queue must exist, be enabled for GETs, and have no other channels using it.
- MCAs, local and remote, must exist.
- The communication link must be available.
- The queue managers must be running, local and remote.
- The message channel must be inactive.

To transfer messages, remote queues and remote queue definitions ***must*** exist.

A message is returned to the panel confirming that the request to start a channel has been accepted. For confirmation that the Start process has succeeded, check the system log, or press F5 (refresh the screen).

15=End

Use the End option to request the channel to stop activity. The channel will not send any more messages until the operator starts the channel again. (For information about restarting stopped channels, see "Restarting stopped channels" on page 69.)

You can select the type of stop you require if you press F4 before Enter. You can choose IMMEDIATE, or CONTROLLED.

Stop immediate

Normally, this option should not be used. It terminates the channel process. The channel does not complete processing the current batch of messages, and cannot, therefore, leave the channel in doubt. In general, it is recommended that the operators use the controlled stop option.

Stop controlled

This choice requests the channel to close down in an orderly way; the current batch of messages is completed, and the syncpoint procedure is carried out with the other end of the channel.

16=Reset

The Reset option changes the message sequence number. Use it with care, and only after you have used the Resolve option to resolve any in-doubt situations. This option is available only at the sender or server channel. The first message starts the new sequence the next time the channel is started.

17=Resolve

Use the Resolve option when messages are held in-doubt by a sender or server, for example because one end of the link has terminated, and there is no prospect of it recovering. The Resolve option accepts one of two parameters: BACKOUT or COMMIT. Backout restores messages to the transmission queue, while Commit discards them.

The channel program does not try to establish a session with a partner. Instead, it determines the logical unit of work identifier (LUWID) which represents the in-doubt messages. It then issues, as requested, either:

- BACKOUT to restore the messages to the transmission queue; or
- COMMIT to delete the messages from the transmission queue.

For the resolution to succeed:

- The channel must be inactive
- The channel must be in doubt
- The channel type must be sender or server
- The channel definition, local, must exist
- The queue manager must be running, local

Panel choices

Chapter 41. Preparing WebSphere MQ for iSeries

This chapter describes the WebSphere MQ for iSeries preparations required before DQM can be used. Communication preparations are described in Chapter 42, “Setting up communication for WebSphere MQ for iSeries”, on page 555.

Before a channel can be started, the transmission queue must be defined as described in this chapter, and must be included in the message channel definition.

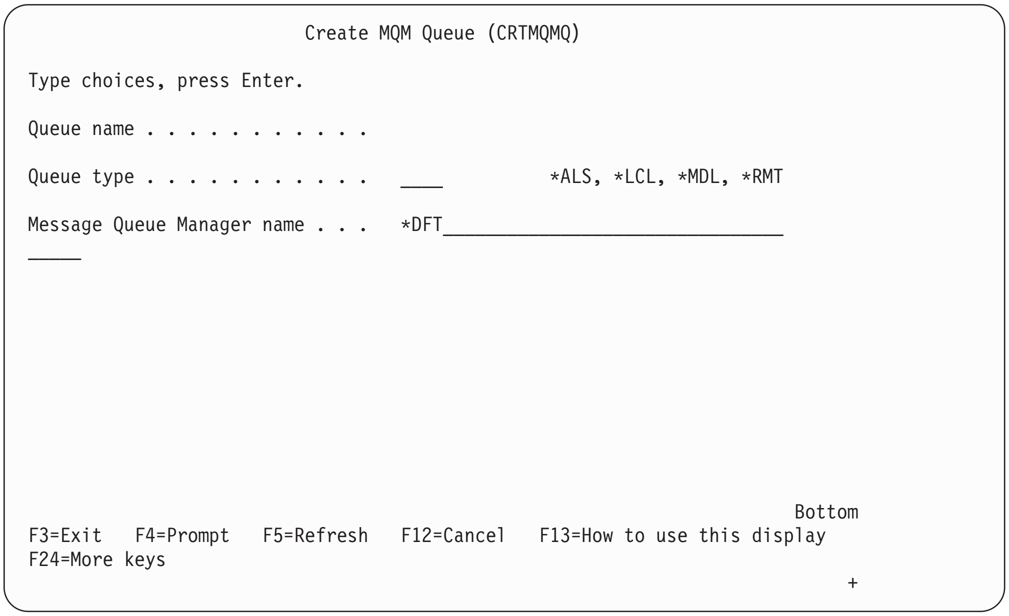
In addition, where needed, the triggering arrangement must be prepared with the definition of the necessary processes and queues.

Creating a transmission queue

You define a local queue with the Usage field attribute set to *TMQ, for each sending message channel.

If you want to make use of remote queue definitions, use the same command to create a queue of type *RMT, and Usage of *NORMAL.

To create a transmission queue, use the CRTMQMQ command from the command line to present you with the first queue creation panel; see Figure 111.



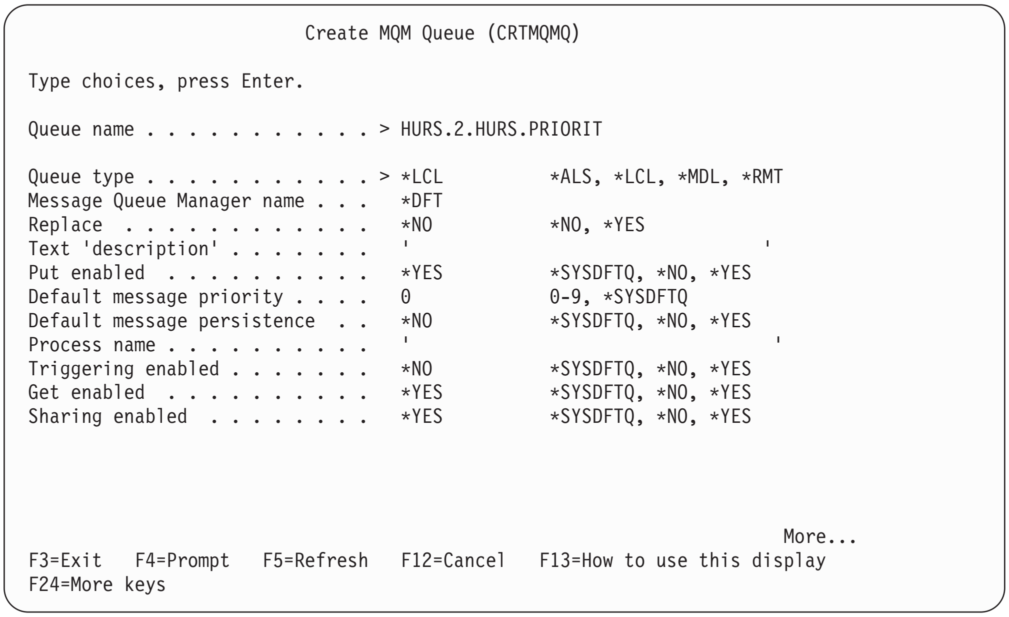
```
                        Create MQM Queue (CRTMQMQ)

 Type choices, press Enter.

 Queue name . . . . . . . . . . .

 Queue type . . . . . . . . . . .   ____          *ALS, *LCL, *MDL, *RMT

 Message Queue Manager name . . .   *DFT________________________________
 _____









                                                                      Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
                                                                          +
```

Figure 111. Create a queue (1)

Type the name of the queue and specify the type of queue that you wish to create: Local, Remote, or Alias. For a transmission queue, specify Local (`*LCL`) on this panel and press Enter.

Creating a transmission queue

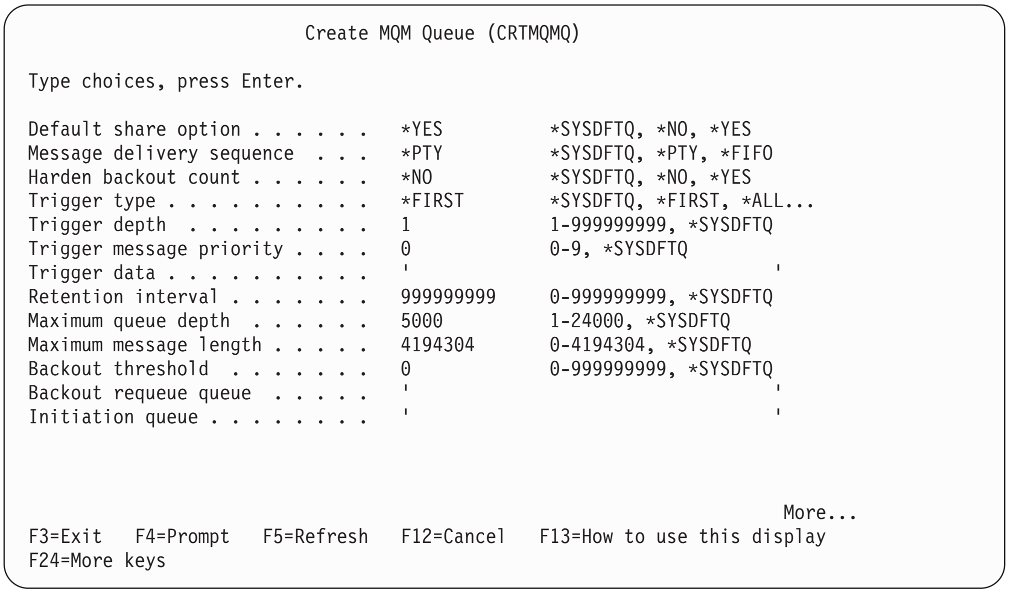
You are presented with the second page of the Create MQM Queue panel; see Figure 112.



```
                          Create MQM Queue (CRTMQMQ)

 Type choices, press Enter.

 Queue name . . . . . . . . . . . > HURS.2.HURS.PRIORIT

 Queue type . . . . . . . . . . . > *LCL          *ALS, *LCL, *MDL, *RMT
 Message Queue Manager name . . .   *DFT
 Replace  . . . . . . . . . . . .   *NO           *NO, *YES
 Text 'description' . . . . . . .   '                                      '
 Put enabled  . . . . . . . . . .   *YES          *SYSDFTQ, *NO, *YES
 Default message priority . . . .   0             0-9, *SYSDFTQ
 Default message persistence  . .   *NO           *SYSDFTQ, *NO, *YES
 Process name . . . . . . . . . .   '                                       '
 Triggering enabled . . . . . . .   *NO           *SYSDFTQ, *NO, *YES
 Get enabled  . . . . . . . . . .   *YES          *SYSDFTQ, *NO, *YES
 Sharing enabled  . . . . . . . .   *YES          *SYSDFTQ, *NO, *YES




                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 112. Create a queue (2)

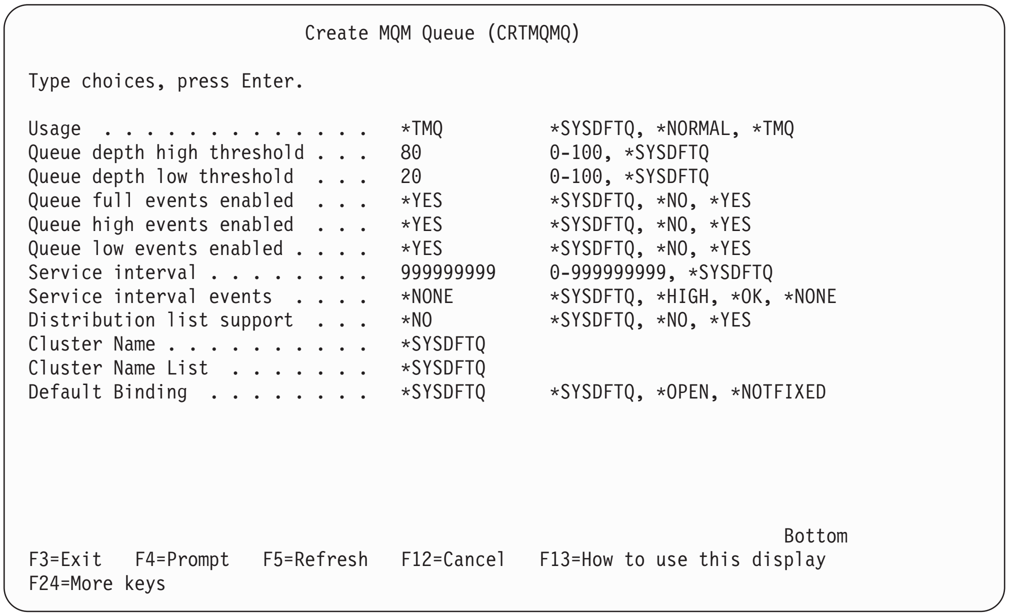
Change any of the default values shown. Press page down to scroll to the next screen; see Figure 113.



```
                          Create MQM Queue (CRTMQMQ)

 Type choices, press Enter.

 Default share option . . . . . .   *YES          *SYSDFTQ, *NO, *YES
 Message delivery sequence  . . .   *PTY          *SYSDFTQ, *PTY, *FIFO
 Harden backout count . . . . . .   *NO           *SYSDFTQ, *NO, *YES
 Trigger type . . . . . . . . . .   *FIRST        *SYSDFTQ, *FIRST, *ALL...
 Trigger depth  . . . . . . . . .   1             1-999999999, *SYSDFTQ
 Trigger message priority . . . .   0             0-9, *SYSDFTQ
 Trigger data . . . . . . . . . .   '                                       '
 Retention interval . . . . . . .   999999999     0-999999999, *SYSDFTQ
 Maximum queue depth  . . . . . .   5000          1-24000, *SYSDFTQ
 Maximum message length . . . . .   4194304       0-4194304, *SYSDFTQ
 Backout threshold  . . . . . . .   0             0-999999999, *SYSDFTQ
 Backout requeue queue  . . . . .   '                                       '
 Initiation queue . . . . . . . .   '                                       '



                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 113. Create a queue (3)

Type `*TMQ`, for transmission queue, in the Usage field of this panel, and change any of the default values shown in the other fields.



```
                          Create MQM Queue (CRTMQMQ)

 Type choices, press Enter.

 Usage  . . . . . . . . . . . . .   *TMQ          *SYSDFTQ, *NORMAL, *TMQ
 Queue depth high threshold . . .   80            0-100, *SYSDFTQ
 Queue depth low threshold  . . .   20            0-100, *SYSDFTQ
 Queue full events enabled  . . .   *YES          *SYSDFTQ, *NO, *YES
 Queue high events enabled  . . .   *YES          *SYSDFTQ, *NO, *YES
 Queue low events enabled . . . .   *YES          *SYSDFTQ, *NO, *YES
 Service interval . . . . . . . .   999999999     0-999999999, *SYSDFTQ
 Service interval events  . . . .   *NONE         *SYSDFTQ, *HIGH, *OK, *NONE
 Distribution list support  . . .   *NO           *SYSDFTQ, *NO, *YES
 Cluster Name . . . . . . . . . .   *SYSDFTQ
 Cluster Name List  . . . . . . .   *SYSDFTQ
 Default Binding  . . . . . . . .   *SYSDFTQ      *SYSDFTQ, *OPEN, *NOTFIXED






                                                                        Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 114. Create a queue (4)

When you are satisfied that the fields contain the correct data, press Enter to create the queue.

Triggering channels

An overview of triggering is given in “Triggering channels” on page 20, while it is described in depth in the *WebSphere MQ Application Programming Guide*. This section provides you with information specific to WebSphere MQ for iSeries.

Triggering in WebSphere MQ for iSeries is implemented with the channel initiator process, which is started with the STRMQMCHLI command that specifies the name of the initiation queue. For example:

```
STRMQMCHLI QNAME(MYINITQ)
```

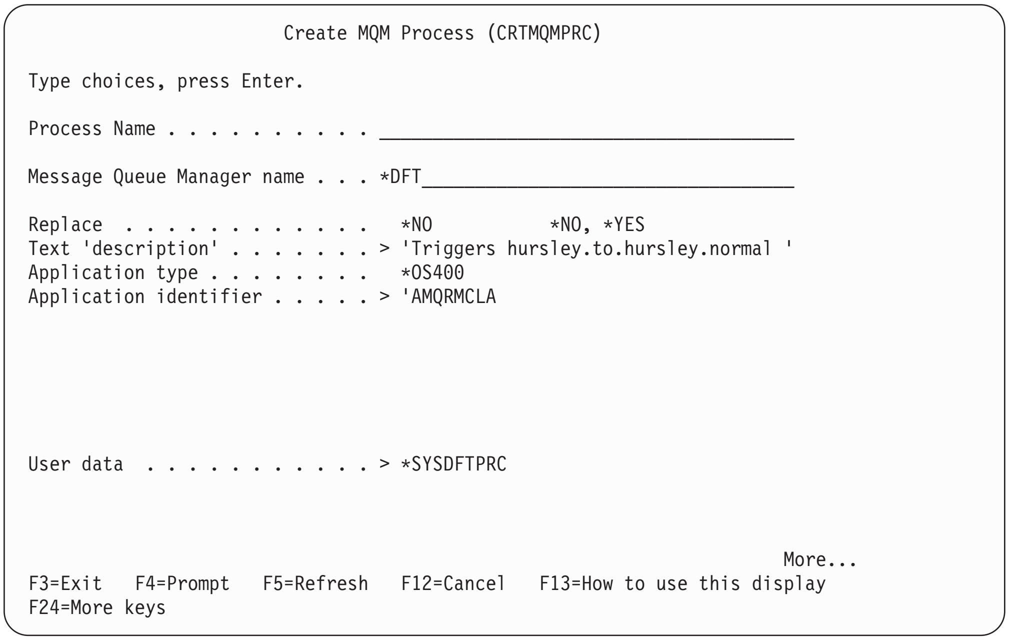
You need to set up the transmission queue for the channel specifying TRIGGER and specifying the channel name in the TRIGDATA field: For example:

```
CRTMQMQ QNAME(MYXMITQ) QTYPE(*LCL) MQMNAME(MYQMGR) +
   PRCNAME(MYPROCESS) TRGENBL(*YES) INITQNAME(MYINITQ) +
   USAGE(*TMQ)
```

Then define an initiation queue.

```
CRTMQMQ QNAME(MYINITQ) MQMNAME(MYQMGR)
```

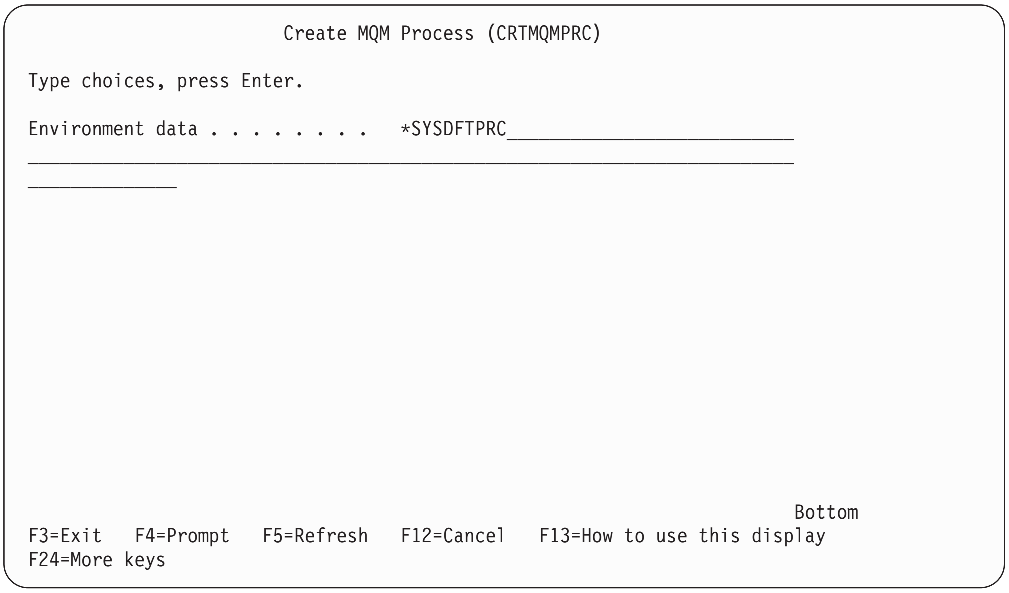
Next you define a process in WebSphere MQ for iSeries naming the MCA sender program, as the program to be triggered when messages arrive on the transmission queue. Type CRTMQMPRC on the command line to display the Create Process panel. Alternatively, select F6 (Create) from the Work with MQM Process panel. See Figure 115 on page 550 for the first page of the Create Process panel. The *WebSphere MQ for iSeries System Administration* contains details of defining processes to be triggered.



```
                        Create MQM Process (CRTMQMPRC)

 Type choices, press Enter.

 Process Name . . . . . . . . . . _______________________________________

 Message Queue Manager name . . . *DFT___________________________________

 Replace  . . . . . . . . . . . .   *NO           *NO, *YES
 Text 'description' . . . . . . . > 'Triggers hursley.to.hursley.normal '
 Application type . . . . . . . .   *OS400
 Application identifier . . . . . > 'AMQRMCLA





 User data  . . . . . . . . . . . > *SYSDFTPRC



                                                                   More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 115. Create process (1)

1. Type the name of the process definition in the field provided.
2. Enter a description in the **Text 'description'** field.
3. Set **Application type** to *OS400.
4. Set **Application identifier** to AMQRMCLA.
5. Set **User data** to the channel name so as to associate this definition with the transmission queue belonging to the channel.
6. Page down to show the second page (see Figure 116) and insert any environment data.



```
                        Create MQM Process (CRTMQMPRC)

 Type choices, press Enter.

 Environment data . . . . . . . .   *SYSDFTPRC___________________________
 ________________________________________________________________________
 ______________













                                                                    Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 116. Create process (2)

Channel programs

There are different types of channel programs (MCAs) available for use at the channels. The names are contained in the following table.

Table 47. Program and transaction names

Program name	Direction of connection	Communication
AMQCRSTA	Inbound	TCP
AMQCRS6A	Inbound	LU 6.2
AMQRMCLA	Outbound	Any

Channel states on OS/400

Channel states are displayed on the Work with Channels panel (described in Figure 104 on page 536). There are some differences between the names of channel states on different versions of WebSphere MQ for iSeries. In the following table, the state names shown for V4R2 correspond to the channel states described in Figure 30 on page 63. As shown in the table, some of these states have different names, or do not exist for earlier versions.

Table 48. Channel states on OS/400

State name (V3R6)	**State name (V3R2, V3R7, V4R2, V5R1)**	**Meaning**
-	STARTING	Channel is ready to begin negotiation with target MCA
BINDING	BINDING	Establishing a session and initial data exchange
REQUESTING	REQUESTING	Requester channel initiating a connection
READY	RUNNING	Transferring or ready to transfer
PAUSED	PAUSED	Waiting for message-retry interval
CLOSING	STOPPING	Establishing whether to retry or stop
RETRYING	RETRYING	Waiting until next retry attempt
DISABLED	STOPPED	Channel stopped because of an error or because an end-channel command is issued
STOPPED	INACTIVE	Channel ended processing normally or channel never started
-	*None	No state (for server-connection channels only)
Note: The state *None applies only to V3R2 and V3R7.		

Other things to consider

Here are some other topics that you should consider when preparing WebSphere MQ for distributed queue management.

Undelivered-message queue

It is advisable that you have an application available to process the messages arriving on the undelivered-message queue (also known as the dead-letter queue or DLQ). The program could be triggered, or run at regular intervals. For more details, see the *WebSphere MQ for iSeries System Administration* and the *WebSphere MQ Application Programming Guide*.

Queues in use

MCAs for receiver channels may keep the destination queues open even when messages are not being transmitted; this results in the queues appearing to be "in use".

Maximum number of channels

You can specify the maximum number of channels allowed in your system and the maximum number that can be active at one time. You do this in the qm.ini file in directory QIBM/UserData/mqm/qmgrs/*queue manager name*. See Appendix D, "Configuration file stanzas for distributed queuing", on page 763.

Security of WebSphere MQ for iSeries objects

This section deals with remote messaging aspects of security.

You need to provide users with authority to make use of the WebSphere MQ for iSeries facilities, and this is organized according to actions to be taken with respect to objects and definitions. For example:

- Queue managers can be started and stopped by authorized users
- Applications need to connect to the queue manager, and have authority to make use of queues
- Message channels need to be created and controlled by authorized users

Other things to consider

The message channel agent at a remote site needs to check that the message being delivered has derived from a user with authority to do so at this remote site. In addition, as MCAs can be started remotely, it may be necessary to verify that the remote processes trying to start your MCAs are authorized to do so. There are three possible ways for you to deal with this:

1. Decree in the channel definition that messages must contain acceptable *context* authority, otherwise they will be discarded.
2. Implement *user exit* security checking to ensure that the corresponding message channel is authorized. The security of the installation hosting the corresponding channel ensures that all users are properly authorized, so that you do not need to check individual messages.
3. Implement *user exit* message processing to ensure that individual messages are vetted for authorization.

Here are some facts about the way WebSphere MQ for iSeries operates security:

- Users are identified and authenticated by OS/400.
- Queue manager services invoked by applications are run with the authority of the queue manager user profile, but in the user's process.
- Queue manager services invoked by user commands are run with the authority of the queue manager user profile.

System extensions and user-exit programs

A facility is provided in the channel definition to allow extra programs to be run at defined times during the processing of messages. These programs are not supplied with WebSphere MQ for iSeries, but may be provided by each installation according to local requirements.

In order to run, such programs must have predefined names and be available on call to the channel programs. The names of the exit programs are included in the message channel definitions.

There is a defined control block interface for handing over control to these programs, and for handling the return of control from these programs.

The precise places where these programs are called, and details of control blocks and names, are to be found in Part 7, "Further intercommunication considerations", on page 615.

Chapter 42. Setting up communication for WebSphere MQ for iSeries

DQM is a remote queuing facility for WebSphere MQ for iSeries. It provides channel control programs for the WebSphere MQ for iSeries queue manager which form the interface to communication links, controllable by the system operator. The channel definitions held by distributed-queuing management use these communication links.

When a distributed-queuing management channel is started, it tries to use the connection specified in the channel definition. For this to succeed, it is necessary for the connection to be defined and available. This chapter explains how to do this.

Deciding on a connection

There are two forms of communication between WebSphere MQ for iSeries systems:

- OS/400 TCP

  For TCP, a host address may be used, and these connections are set up as described in the *OS/400 Communication Configuration Reference*.

  In the TCP environment, each distributed service is allocated a unique TCP address which may be used by remote machines to access the service. The TCP address consists of a host name/number and a port number. All queue managers will use such a number to communicate with each other via TCP.
- OS/400 SNA (LU 6.2)

  This form of communication requires the definition of an OS/400 SNA logical unit type 6.2 (LU 6.2) that provides the physical link between the OS/400 system serving the local queue manager and the system serving the remote queue manager. Refer to the *OS/400 Communication Configuration Reference* for details on configuring communications in OS/400.

Defining a TCP connection

The channel definition contains a field, CONNECTION NAME, that contains either the TCP network address of the target, in dotted decimal form (for example 9.20.9.30) or the host name (for example AS4HUR1). If the CONNECTION NAME is a host name, a name server or the OS/400 host table is used to convert the host name into a TCP host address.

A port number is required for a complete TCP address; if this is not supplied, the default port number 1414 is used. On the initiating end of a connection (sender, requester, and server channel types) it is possible to provide an optional port number for the connection, for example:

```
Connection name 9.20.9.30 (1555)
```

In this case the initiating end will attempt to connect to a receiving program at port 1555.

Receiving on TCP

Receiving channel programs are started in response to a startup request from the sending channel. To do this, a listener program has to be started to detect incoming network requests and start the associated channel. You start this listener program with the STRMQMLSR command.

You can start more than one listener for each queue manager. By default, the STRMQMLSR command uses port 1414 but you can override this. To override the default setting, add the following statements to the qm.ini file of the selected queue manager (in this example, the listener is required to use port 2500):

```
TCP:
  Port=2500
```

The qm.ini file is located in this IFS directory:
/QIBM/UserData/mqm/qmgrs/*queue manager name*.

This new value is read only when the TCP listener is started. If you have a listener already running, this change is not be seen by that program. To use the new value, stop the listener and issue the STRMQMLSR command again. Now, whenever you use the STRMQMLSR command, the listener defaults to the new port.

Alternatively, you can specify a different port number on the STRMQMLSR command. For example:

```
STRMQMLSR MQMNAME(queue manager name) PORT(2500)
```

This change makes the listener default to the new port for the duration of the listener job.

Using the TCP SO_KEEPALIVE option

If you want to use the SO_KEEPALIVE option (as discussed in "Checking that the other end of the channel is still available" on page 66) you must add the following entry to your queue manager configuration file (qm.ini in the IFS directory, /QIBM/UserData/mqm/qmgrs/*queue manager name*):

```
TCP:
   KeepAlive=yes
```

You must then issue the following command:

```
CFGTCP
```

Select option 3 (Change TCP Attributes). You can now specify a time interval in minutes. You can specify a value in the range 1 through 40320 minutes; the default is 120.

Using the TCP listener backlog option

When receiving on TCP, a maximum number of outstanding connection requests is set. This can be considered a *backlog* of requests waiting on the TCP port for the listener to accept the request.

The default listener backlog value on OS/400 is 255. If the backlog reaches this value, the TCP connection is rejected and the channel will not be TCP: able to start.

For MCA channels, this results in the channel going into a RETRY state and retrying the connection at a later time.

For client connections, the client receives an MQRC_Q_MGR_NOT_AVAILABLE reason code from MQCONN and should retry the connection at a later time.

However, to avoid this error, you can add an entry in the qm.ini file:

```
ListenerBacklog = n
```

This overrides the default maximum number of outstanding requests (255) for the TCP listener.

Note: Some operating systems support a larger value than the default. If necessary, this can be used to avoid reaching the connection limit.

Defining an LU 6.2 connection

In WebSphere MQ for iSeries, a mode name, TP name, and connection name of a fully-qualified LU 6.2 connection can be used.

For other versions of WebSphere MQ for iSeries, a communications side information (CSI) object is required to define the LU 6.2 communications details for the sending end of a message channel. It is referred to in the CONNECTION NAME field of the Sender or Server channel definition for LU 6.2 connections. Further information on the communications side object is available in the *AS/400® APPC Communications Programmer's Guide*.

The initiated end of the link must have a routing entry definition to complement this CSI object. Further information on managing work requests from remote LU 6.2 systems is available in the *AS/400 Programming: Work Management Guide*.

See the *Multiplatform APPC Configuration Guide* and the following table for information.

Table 49. Settings on the local OS/400 system for a remote queue manager platform

Remote platform	TPNAME
z/OS, or OS/390 or MVS/ESA without CICS	The same as in the corresponding side information on the remote queue manager.
z/OS or OS/390 or MVS/ESA using CICS	CKRC relates to a sender channel on the OS/400 system. CKSV relates to a requester channel on the OS/400 system. CKRC relates to a server channel on the OS/400 system.
OS/400	The same as the compare value in the routing entry on the OS/400 system.
OS/2	As specified in the OS/2 Run Listener command, or defaulted from the OS/2 queue manager configuration file.
Compaq OpenVMS Alpha	As specified in the Digital OVMS Run Listener command.
Compaq NonStop Kernel	The same as the TPNAME specified in the receiver-channel definition.
Other UNIX systems	The invokable Transaction Program defined in the remote LU 6.2 configuration.
Windows	As specified in the Windows Run Listener command, or the invokable Transaction Program that was defined using TpSetup on Windows.

If you have more than one queue manager on the same machine, ensure that the TPnames in the channel definitions are unique.

Defining an LU 6.2 connection

Initiating end (Sending)

Use the CRTMQMCHL command to define a channel of transport type *LU62. For versions previous to WebSphere MQ for iSeries V5.3, define the name of the CSI object that this channel will use in the CONNECTION NAME field. (See “Creating a channel” on page 532 for details of how to do this.) Use of the CSI object is optional in WebSphere MQ for iSeries V5.1 or later.

The initiating end panel is shown in Figure Figure 117. You press F10 from the first panel displayed to obtain the complete panel as shown.

```
                     Create Comm Side Information (CRTCSI)

Type choices, press Enter.

Side information . . . . . . . . > WINSDOA1      Name
  Library  . . . . . . . . . . . >   QSYS        Name, *CURLIB
Remote location  . . . . . . . . > WINSDOA1      Name
Transaction program  . . . . . . > MQSERIES

Text 'description' . . . . . . .   *BLANK


                           Additional Parameters

Device . . . . . . . . . . . . .   *LOC          Name, *LOC
Local location . . . . . . . . .   *LOC          Name, *LOC, *NETATR
Mode . . . . . . . . . . . . . .   JSTMOD92      Name, *NETATR
Remote network identifier  . . .   *LOC          Name, *LOC, *NETATR, *NONE
Authority  . . . . . . . . . . .   *LIBCRTAUT    Name, *LIBCRTAUT, *CHANGE...

                                                                       Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Figure 117. LU 6.2 communication setup panel - initiating end

Complete the initiating end fields as follows:

Side information
Give this definition a name that will be used to store the side information object to be created, for example, WINSDOA1.

Note: For LU 6.2, the link between the message channel definition and the communication connection is the **Connection name** field of the message channel definition at the sending end. This field contains the name of the CSI object.

Library
The name of the library where this definition will be stored.

The CSI object must be available in a library accessible to the program serving the message channel, for example, QSYS, QMQM, and QGPL.

If the name is incorrect, missing, or cannot be found then an error will occur on channel start up.

Remote location
Specifies the remote location name with which your program communicates.

In short, this required parameter contains the logical unit name of the partner at the remote system, as defined in the device description that is used for the communication link between the two systems.

The **Remote location** name can be found by issuing the command DSPNETA on the remote system and seeing the default local location name.

Transaction program
Specifies the name (up to 64 characters) of the transaction program on the remote system to be started. It may be a transaction process name, a program name, the channel name, or a character string that matches the **Compare value** in the routing entry.

This is a required parameter.

Note: To specify SNA service transaction program names, enter the hexadecimal representation of the service transaction program name. For example, to specify a service transaction program name whose hexadecimal representation is 21F0F0F1, you would enter X'21F0F0F1'.

More information on SNA service transaction program names is in the *SNA Transaction Programmer's Reference* manual for LU Type 6.2.

If the receiving end is another OS/400 system, the **Transaction program** name is used to match the CSI object at the sending end with the routing entry at the receiving end. This should be unique for each queue manager on the target OS/400 system. (See the **Program to call** parameter under "Initiated end (Receiver)" on page 561.) See also the **Comparison data: compare value** parameter in the Add Routing Entry panel.

Text description
A description (up to 50 characters) to remind you of the intended use of this connection.

Device
Specifies the name of the device description used for the remote system. The possible values are:

***LOC** The device is determined by the system.

Device-name
Specify the name of the device that is associated with the remote location.

Local location
Specifies the local location name. The possible values are:

***LOC** The local location name is determined by the system.

***NETATR**
The LCLLOCNAME value specified in the system network attributes is used.

Local-location-name
Specify the name of your location. Specify the local location if you want to indicate a specific location name for the remote location. The location name can be found by using the DSPNETA command.

Mode Specifies the mode used to control the session. This name is the same as the Common Programming Interface (CPI)- Communications Mode_Name. The possible values are:

***NETATR**
The mode in the network attributes is used.

BLANK
Eight blank characters are used.

Mode-name
Specify a mode name for the remote location.

Note: Because the mode determines the transmission priority of the communications session, it may be useful to define different modes depending on the priority of the messages being sent; for example MQMODE_HI, MQMODE_MED, and MQMODE_LOW. (You can have more than one CSI pointing to the same location.)

Remote network identifier
Specifies the remote network identifier used with the remote location. The possible values are:

***LOC** The remote network ID for the remote location is used.

***NETATR**
The remote network identifier specified in the network attributes is used.

***NONE**
The remote network has no name.

Remote-network-id
Specify a remote network ID. Use the DSPNETA command at the remote location to find the name of this network ID. It is the ‘local network ID’ at the remote location.

Authority
Specifies the authority you are giving to users who do not have specific authority to the object, who are not on an authorization list, and whose group profile has no specific authority to the object. The possible values are:

***LIBCRTAUT**
Public authority for the object is taken from the CRTAUT parameter of the specified library. This value is determined at create time. If the CRTAUT value for the library changes after the object is created, the new value does not affect existing objects.

***CHANGE**
Change authority allows the user to perform basic functions on the object, however, the user cannot change the object. Change authority provides object operational authority and all data authority.

***ALL** The user can perform all operations except those limited to the owner or controlled by authorization list management authority. The user can control the object’s existence and specify the security for the object, change the object, and perform basic functions on the object. The user can change ownership of the object.

***USE** Use authority provides object operational authority and read authority.

***EXCLUDE**
Exclude authority prevents the user from accessing the object.

Authorization-list

Specify the name of the authorization list whose authority is used for the side information.

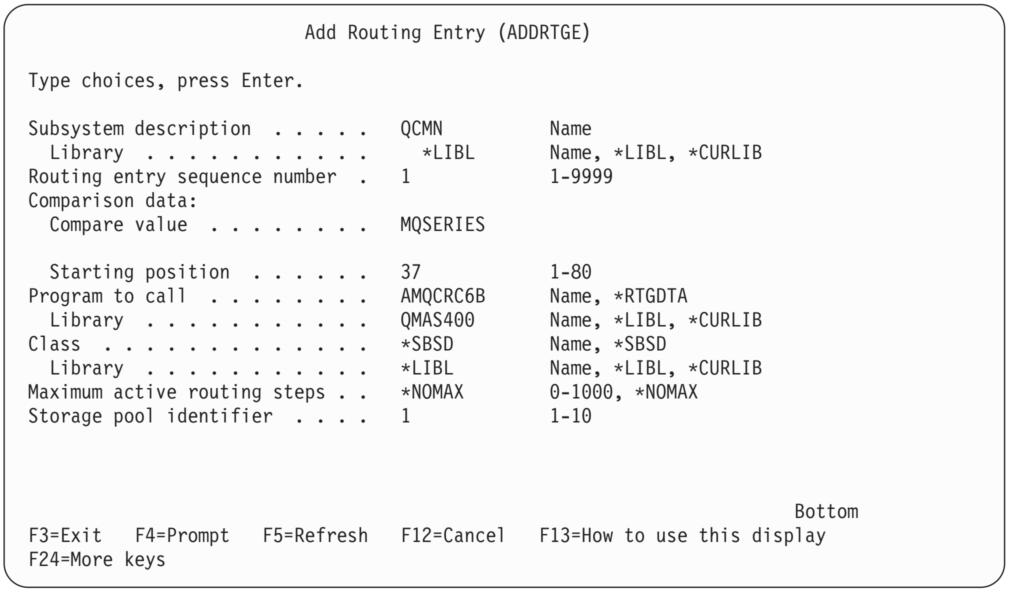
Initiated end (Receiver)

Use the CRTMQMCHL command to define the receiving end of the message channel link with transport type *LU62. Leave the CONNECTION NAME field blank and ensure that the corresponding details match the sending end of the channel. (See “Creating a channel” on page 532 for details of how to do this.)

To enable the initiating end to start the receiving channel, add a routing entry to a subsystem at the initiated end. The subsystem must be the one that allocates the APPC device used in the LU 6.2 sessions and, therefore, it must have a valid communications entry for that device. The routing entry calls the program that starts the receiving end of the message channel.

Use the OS/400 commands (for example, ADDRTGE) to define the end of the link that is initiated by a communication session.

The initiated end panel is shown in Figure Figure 118.



```
                          Add Routing Entry (ADDRTGE)

Type choices, press Enter.

Subsystem description  . . . . .   QCMN          Name
  Library  . . . . . . . . . . .     *LIBL       Name, *LIBL, *CURLIB
Routing entry sequence number  .   1             1-9999
Comparison data:
  Compare value  . . . . . . . .   MQSERIES

  Starting position  . . . . . .   37            1-80
Program to call  . . . . . . . .   AMQCRC6B      Name, *RTGDTA
  Library  . . . . . . . . . . .   QMAS400       Name, *LIBL, *CURLIB
Class  . . . . . . . . . . . . .   *SBSD         Name, *SBSD
  Library  . . . . . . . . . . .   *LIBL         Name, *LIBL, *CURLIB
Maximum active routing steps . .   *NOMAX        0-1000, *NOMAX
Storage pool identifier  . . . .   1             1-10



                                                                       Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Figure 118. LU 6.2 communication setup panel - initiated end

Subsystem description

The name of your subsystem where this definition resides. Use the OS/400 WRKSBSD command to view and update the appropriate subsystem description for the routing entry.

Routing entry sequence number

A unique number in your subsystem to identify this communication definition. You can use values in the range 1 to 9999.

Comparison data: Compare value

A text string to compare with that received when the session is started by a **Transaction program** parameter, as shown in Figure 117 on page 558. The character string is derived from the Transaction program field of the sender CSI.

Comparison data: Starting position
The character position in the string where the comparison is to start.

Note: The starting position field is the character position in the string for comparison, and this is always 37.

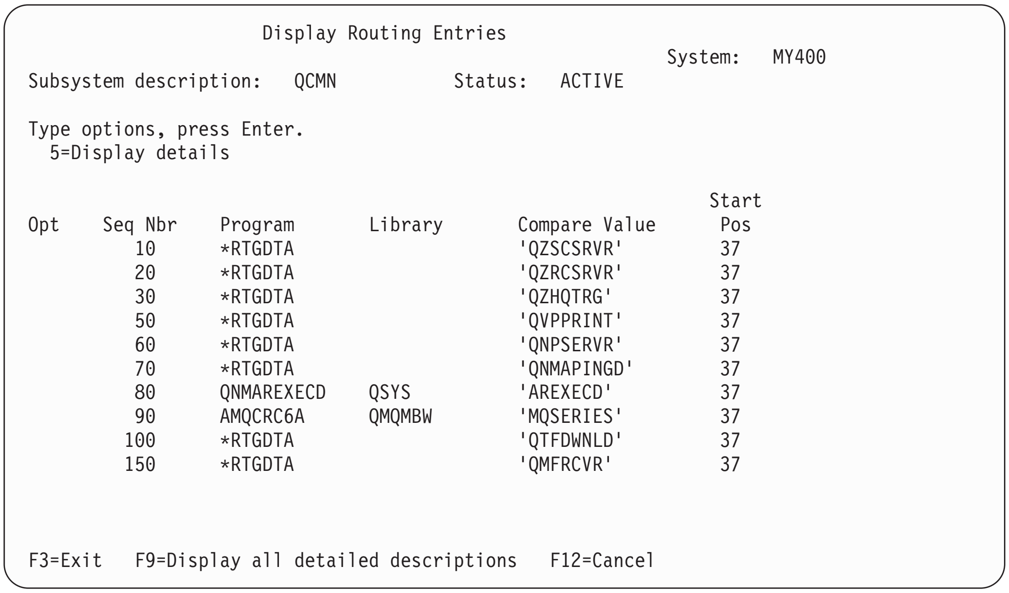
Program to call
The name of the program that runs the inbound message program to be called to start the session.

The program, AMQCRC6A, is called for the default queue manager. This is a program supplied with WebSphere MQ for iSeries that sets up the environment and then calls AMQCRS6A.

For additional queue managers:

- Each queue manager has a specific LU 6.2 invokable program located in its library. This program is called AMQCRC6B and is automatically generated when the queue manager is created.
- Each queue manager requires a specific routing entry with unique routing data to be added. This routing data should match the **Transaction program** name supplied by the requesting system (see "Initiating end (Sending)" on page 558).

An example of this is shown in Figure 119:



```
                      Display Routing Entries
                                                      System:   MY400
Subsystem description:   QCMN          Status:   ACTIVE

Type options, press Enter.
  5=Display details

                                                          Start
Opt    Seq Nbr    Program       Library       Compare Value     Pos
          10      *RTGDTA                     'QZSCSRVR'        37
          20      *RTGDTA                     'QZRCSRVR'        37
          30      *RTGDTA                     'QZHQTRG'         37
          50      *RTGDTA                     'QVPPRINT'        37
          60      *RTGDTA                     'QNPSERVR'        37
          70      *RTGDTA                     'QNMAPINGD'       37
          80      QNMAREXECD    QSYS          'AREXECD'         37
          90      AMQCRC6A      QMQMBW        'MQSERIES'        37
         100      *RTGDTA                     'QTFDWNLD'        37
         150      *RTGDTA                     'QMFRCVR'         37



F3=Exit   F9=Display all detailed descriptions   F12=Cancel
```

Figure 119. LU 6.2 communication setup panel - initiated end

In Figure 119 sequence number 90 represents the default queue manager and provides compatibility with configurations from previous releases (that is, V3R2, V3R6, V3R7, and V4R2) of WebSphere MQ for iSeries. These releases allow one queue manager only. Sequence numbers 92 and 94 represent two additional queue managers called ALPHA and BETA that are created with libraries QMALPHA and QMBETA.

Note: You can have more than one routing entry for each queue manager by using different routing data. This gives the option of different job priorities depending on the classes used.

Class The name and library of the class used for the steps started through this routing entry. The class defines the attributes of the routing step's running environment and specifies the job priority. An appropriate class entry must be specified. Use, for example, the WRKCLS command to display existing classes or to create a new class. Further information on managing work requests from remote LU 6.2 systems is available in the *AS/400 Programming: Work Management Guide*.

Note on Work Management

The AMQCRS6A job will not be able to take advantage of the normal OS/400 work management features that are documented in the *WebSphere MQ for iSeries V5.3 System Administration Guide* book because it is not started in the same way as other WebSphere MQ jobs. To change the run-time properties of the LU62 receiver jobs, you can do one of the following:

- Alter the class description that is specified on the routing entry for the AMQCRS6A job
- Change the job description on the communications entry

See the *AS/400 Programming: Work Management Guide* for more information about configuring Communication Jobs.

Chapter 43. Example configuration - IBM WebSphere MQ for iSeries

This chapter gives an example of how to set up communication links from WebSphere MQ for iSeries to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[10]
- Solaris
- Linux
- z/OS, OS/390, or MVS/ESA without CICS
- VSE/ESA

First it describes the parameters needed for an LU 6.2 connection, then it describes "Establishing an LU 6.2 connection" on page 571 and "Establishing a TCP connection" on page 576.

Once the connection is established, you need to define some channels to complete the configuration. This is described in "WebSphere MQ for iSeries configuration" on page 578.

See Chapter 7, "Example configuration chapters in this book", on page 101 for background information about this chapter and how to use it.

Configuration parameters for an LU 6.2 connection

Table 50 presents a worksheet listing all the parameters needed to set up communication from OS/400 system to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in "Explanation of terms" on page 568.

Table 50. Configuration worksheet for SNA on an OS/400 system

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				

---

[10] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

OS/400 and LU 6.2

Table 50. Configuration worksheet for SNA on an OS/400 system (continued)

ID	Parameter Name	Reference	Example Used	User Value
1	Local network ID		**NETID**	
2	Local control point name		**AS400PU**	
3	LU name		**AS400LU**	
4	LAN destination address		**10005A5962EF**	
5	Subsystem description		**QCMN**	
6	Line description		**TOKENRINGL**	
7	Resource name		**LIN041**	
8	Local Transaction Program name		**MQSERIES**	
Connection to an OS/2 system The values in this section must match those used in Table 15 on page 146, as indicated.				
9	Network ID	2	**NETID**	
10	Control point name	3	**OS2PU**	
11	LU name	6	**OS2LU**	
12	Controller description		**OS2PU**	
13	Device		**OS2LU**	
14	Side information		**OS2CPIC**	
15	Transaction Program	8	**MQSERIES**	
16	LAN adapter address	10	**10005AFC5D83**	
17	Mode	17	**#INTER**	
Connection to a Windows system The values in this section must match those used in Table 17 on page 172, as indicated.				
9	Network ID	2	**NETID**	
10	Control point name	3	**WINNTCP**	
11	LU name	5	**WINNTLU**	
12	Controller description		**WINNTCP**	
13	Device		**WINNTLU**	
14	Side information		**NTCPIC**	
15	Transaction Program	7	**MQSERIES**	
16	LAN adapter address	9	**08005AA5FAB9**	
17	Mode	17	**#INTER**	
Connection to an AIX system The values in this section must match those used in Table 21 on page 205, as indicated.				
9	Network ID	1	**NETID**	
10	Control point name	2	**AIXPU**	
11	LU name	4	**AIXLU**	
12	Controller description		**AIXPU**	
13	Device		**AIXLU**	
14	Side information		**AIXCPIC**	
15	Transaction Program	6	**MQSERIES**	

Table 50. Configuration worksheet for SNA on an OS/400 system (continued)

ID	Parameter Name	Reference	Example Used	User Value
16	LAN adapter address	8	**123456789012**	
17	Mode	14	**#INTER**	
Connection to an HP-UX system The values in this section must match those used in Table 24 on page 231, as indicated.				
9	Network ID	4	**NETID**	
10	Control point name	2	**HPUXPU**	
11	LU name	5	**HPUXLU**	
12	Controller description		**HPUXPU**	
13	Device		**HPUXLU**	
14	Side information		**HPUXCPIC**	
15	Transaction Program	7	**MQSERIES**	
16	LAN adapter address	8	**100090DC2C7C**	
17	Mode	17	**#INTER**	
Connection to an AT&T GIS UNIX system The values in this section must match those used in Table 26 on page 257, as indicated.				
9	Network ID	2	**NETID**	
10	Control point name	3	**GISPU**	
11	LU name	4	**GISLU**	
12	Controller description		**GISPU**	
13	Device		**GISLU**	
14	Side information		**GISCPIC**	
15	Transaction Program	5	**MQSERIES**	
16	LAN adapter address	8	**10007038E86B**	
17	Mode	15	**#INTER**	
Connection to a Solaris system The values in this section must match those used in Table 28 on page 274, as indicated.				
9	Network ID	2	**NETID**	
10	Control point name	3	**SOLARPU**	
11	LU name	7	**SOLARLU**	
12	Controller description		**SOLARPU**	
13	Device		**SOLARLU**	
14	Side information		**SOLCPIC**	
15	Transaction Program	8	**MQSERIES**	
16	LAN adapter address	5	**08002071CC8A**	
17	Mode	17	**#INTER**	
Connection to a Linux for Intel system The values in this section must match those used in Table 31 on page 313, as indicated.				
9	Network ID	4	**NETID**	
10	Control point name	2	**LINUXPU**	

Table 50. Configuration worksheet for SNA on an OS/400 system (continued)

ID	Parameter Name	Reference	Example Used	User Value
11	LU name	5	**LINUXLU**	
12	Controller description		**LINUXPU**	
13	Device		**LINUXLU**	
14	Side information		**LXCPIC**	
15	Transaction Program	7	**MQSERIES**	
16	LAN adapter address	8	**08005AC6DF33**	
17	Mode	6	**#INTER**	
Connection to an z/OS system without CICS The values in this section must match those used in Table 35 on page 410, as indicated.				
9	Network ID	2	**NETID**	
10	Control point name	3	**MVSPU**	
11	LU name	4	**MVSLU**	
12	Controller description		**MVSPU**	
13	Device		**MVSLU**	
14	Side information		**MVSCPIC**	
15	Transaction Program	7	**MQSERIES**	
16	LAN adapter address	8	**400074511092**	
17	Mode	6	**#INTER**	
Connection to a VSE/ESA system The values in this section must match those used in Table 52 on page 595, as indicated.				
9	Network ID	1	**NETID**	
10	Control point name	2	**VSEPU**	
11	LU name	3	**VSELU**	
12	Controller description		**VSEPU**	
13	Device		**VSELU**	
14	Side information		**VSECPIC**	
15	Transaction Program	4	**MQ01**	**MQ01**
16	LAN adapter address	5	**400074511092**	
17	Mode		**#INTER**	

Explanation of terms

1 2 3

See “How to find network attributes” on page 569 for the details of how to find the configured values.

4 **LAN destination address**

The hardware address of the iSeries system token-ring adapter. You can find the value using the command DSPLIND *Line description* (6).

5 Subsystem description
This is the name of any OS/400 subsystem that will be active while using the queue manager. The name QCMN has been used because this is the OS/400 communications subsystem.

6 Line description
If this has been specified it is indicated in the Description field of the resource Resource name. See "How to find the value of Resource name" on page 570 for details. If the value is not specified you will need to create a line description.

7 Resource name
See "How to find the value of Resource name" on page 570 for details of how to find the configured value.

8 Local Transaction Program name
WebSphere MQ applications trying to converse with this workstation will specify a symbolic name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. For simplicity, wherever possible use a transaction program name of MQSERIES, or in the case of a connection to VSE/ESA, where the length is limited to 4 bytes, use MQTP.

See Table 49 on page 557 for more information.

12 Controller description
This is an alias for the Control Point name (or Node name) of the partner system. For convenience we have used the actual name of the partner in this example.

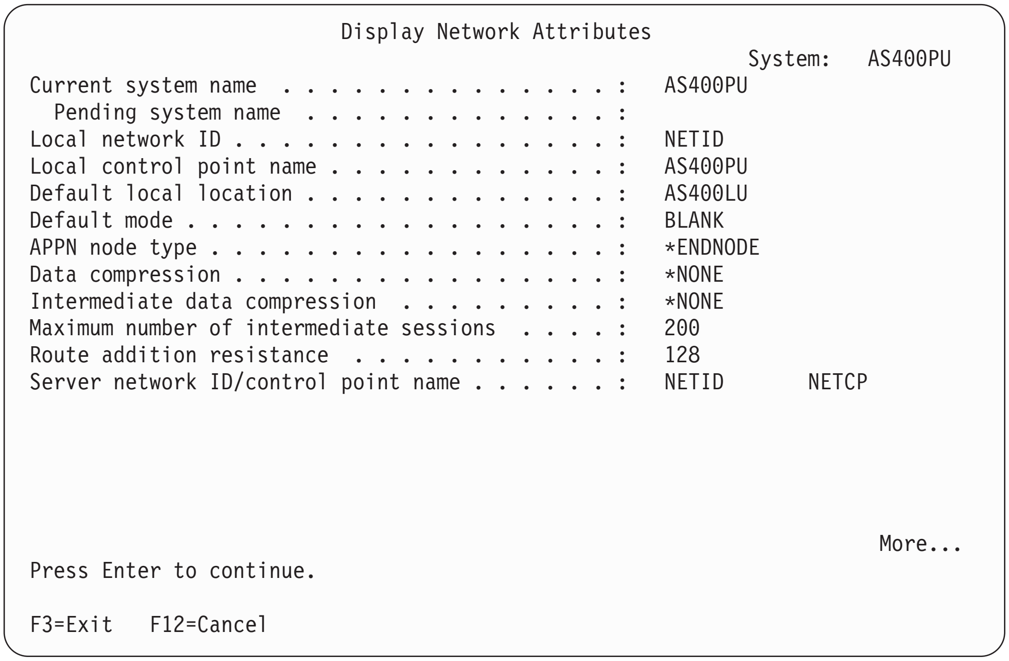
13 Device
This is an alias for the LU of the partner system. For convenience we have used the LU name of the partner in this example.

14 Side information
This is the name given to the CPI-C side information profile. You specify your own 8-character name for this.

How to find network attributes

The local node has been partially configured as part of the OS/400 installation. To display the current network attributes enter the command DSPNETA.

If you need to change these values use the command CHGNETA. An IPL may be required to apply your changes.

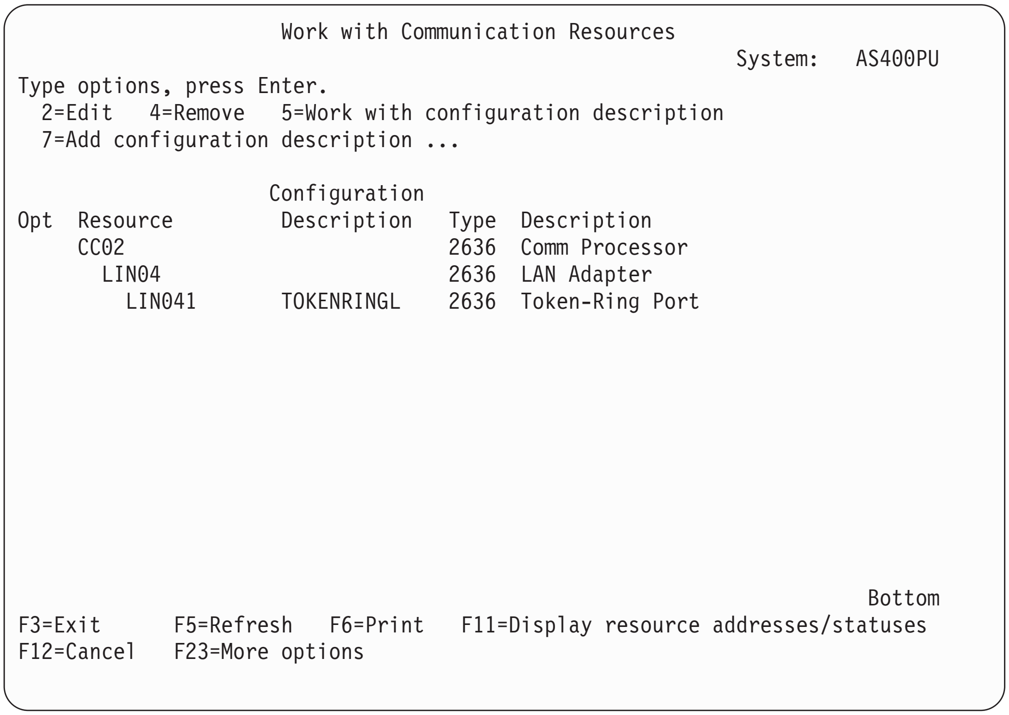


```
                            Display Network Attributes
                                                             System:   AS400PU
 Current system name  . . . . . . . . . . . . . . :   AS400PU
   Pending system name  . . . . . . . . . . . . . :
 Local network ID . . . . . . . . . . . . . . . . :   NETID
 Local control point name . . . . . . . . . . . . :   AS400PU
 Default local location . . . . . . . . . . . . . :   AS400LU
 Default mode . . . . . . . . . . . . . . . . . . :   BLANK
 APPN node type . . . . . . . . . . . . . . . . . :   *ENDNODE
 Data compression . . . . . . . . . . . . . . . . :   *NONE
 Intermediate data compression  . . . . . . . . . :   *NONE
 Maximum number of intermediate sessions  . . . . :   200
 Route addition resistance  . . . . . . . . . . . :   128
 Server network ID/control point name . . . . . . :   NETID       NETCP






                                                                        More...
 Press Enter to continue.

 F3=Exit   F12=Cancel
```

Check that the values for **Local network ID** (1), **Local control point name** (2), and **Default local location** (3), correspond to the values on your worksheet.

How to find the value of Resource name

Type `WRKHDWRSC TYPE(*CMN)` and press Enter. The Work with Communication Resources panel is displayed. The value for **Resource name** is found as the Token-Ring Port. It is LIN041 in this example.



```
                      Work with Communication Resources
                                                             System:   AS400PU
Type options, press Enter.
  2=Edit   4=Remove   5=Work with configuration description
  7=Add configuration description ...

                     Configuration
Opt  Resource        Description   Type  Description
     CC02                          2636  Comm Processor
       LIN04                       2636  LAN Adapter
         LIN041      TOKENRINGL    2636  Token-Ring Port











                                                                        Bottom
F3=Exit      F5=Refresh   F6=Print   F11=Display resource addresses/statuses
F12=Cancel   F23=More options
```

Establishing an LU 6.2 connection

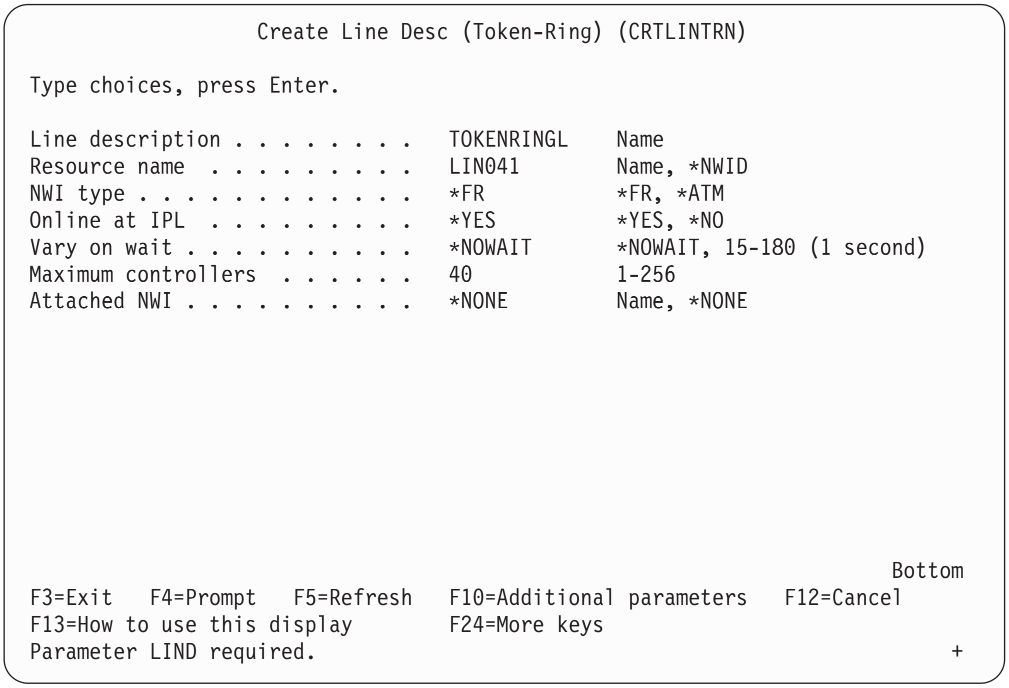
This section describes how to establish an LU 6.2 connection.

Local node configuration

To configure the local node, you need to:
1. Create a line description
2. Add a routing entry

Creating a line description

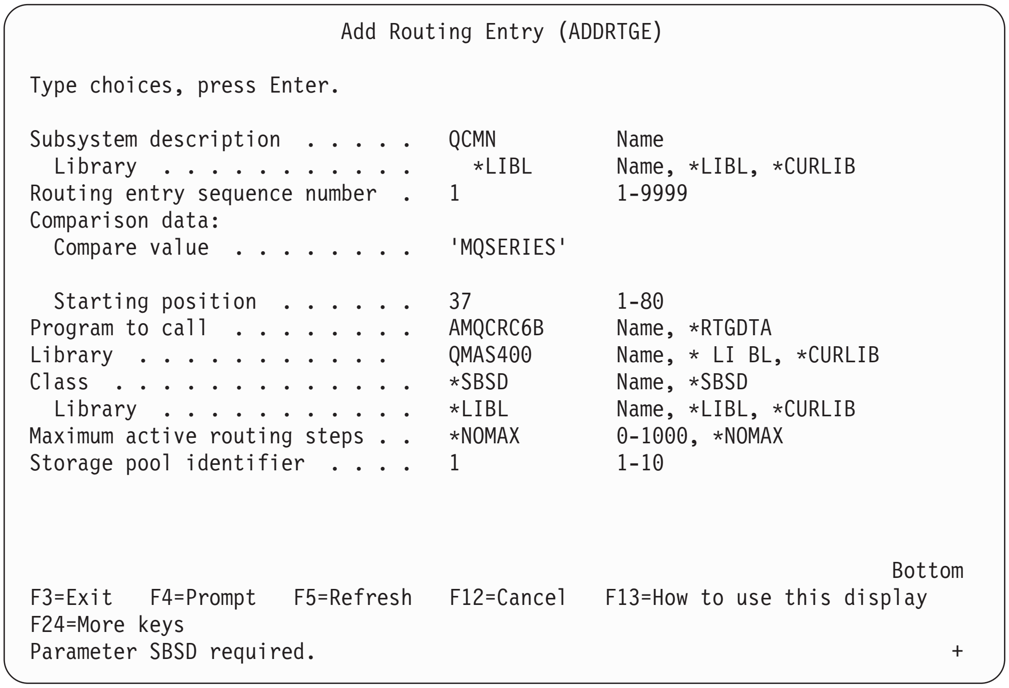
1. If the line description has not already been created use the command CRTLINTRN.
2. Specify values for **Line description** (6) and **Resource name** (7).



```
                  Create Line Desc (Token-Ring) (CRTLINTRN)

 Type choices, press Enter.

 Line description . . . . . . . .   TOKENRINGL    Name
 Resource name  . . . . . . . . .   LIN041        Name, *NWID
 NWI type . . . . . . . . . . . .   *FR           *FR, *ATM
 Online at IPL  . . . . . . . . .   *YES          *YES, *NO
 Vary on wait . . . . . . . . . .   *NOWAIT       *NOWAIT, 15-180 (1 second)
 Maximum controllers  . . . . . .   40            1-256
 Attached NWI . . . . . . . . . .   *NONE         Name, *NONE










                                                                         Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
 Parameter LIND required.                                                    +
```

Adding a routing entry

1. Type the command ADDRTGE and press Enter.



```
                          Add Routing Entry (ADDRTGE)

Type choices, press Enter.

Subsystem description  . . . . .   QCMN          Name
  Library  . . . . . . . . . . .     *LIBL       Name, *LIBL, *CURLIB
Routing entry sequence number  .   1             1-9999
Comparison data:
  Compare value  . . . . . . . .   'MQSERIES'

  Starting position  . . . . . .   37            1-80
Program to call  . . . . . . . .   AMQCRC6B      Name, *RTGDTA
Library  . . . . . . . . . . .     QMAS400       Name, * LI BL, *CURLIB
Class  . . . . . . . . . . . . .   *SBSD         Name, *SBSD
  Library  . . . . . . . . . . .   *LIBL         Name, *LIBL, *CURLIB
Maximum active routing steps . .   *NOMAX        0-1000, *NOMAX
Storage pool identifier  . . . .   1             1-10



                                                                      Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
Parameter SBSD required.                                                   +
```

2. Specify your value for **Subsystem description** (**5**), and the values shown here for **Routing entry sequence number**, **Compare value** (**8**), **Starting position**, **Program to call**, and the **Library** containing the program to call.
3. Type the command STRSBS *subsystem description* (**5**) and press Enter.

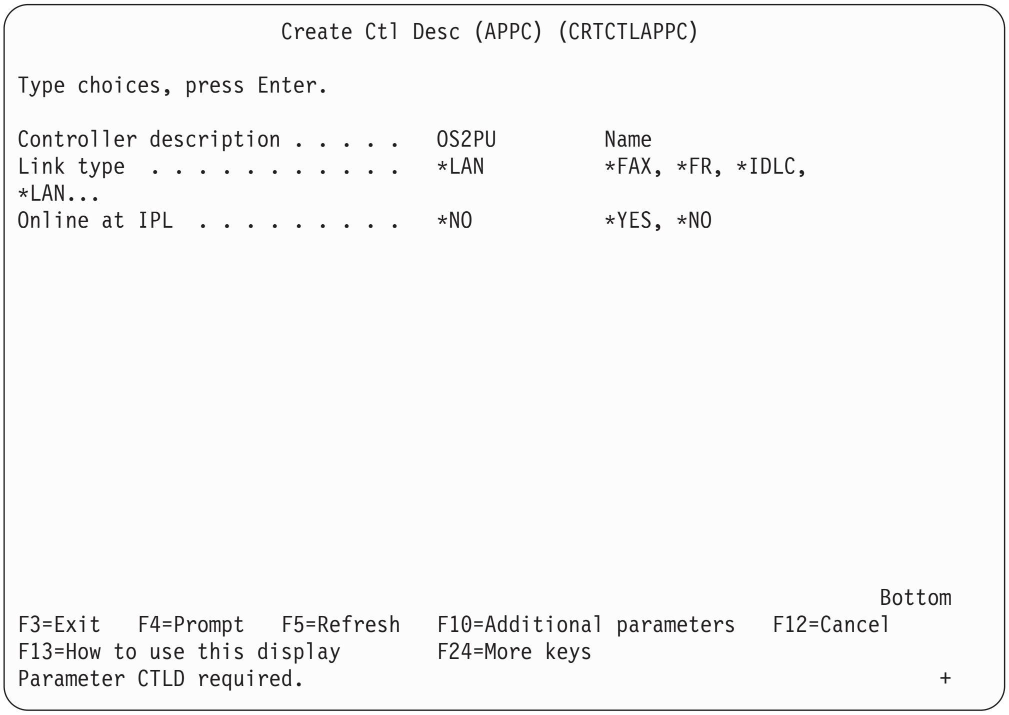
Connection to partner node

This example is for a connection to an OS/2 system, but the steps are the same for other nodes. The steps are:

1. Create a controller description.
2. Create a device description.
3. Create CPI-C side information.
4. Add a communications entry for APPC.
5. Add a configuration list entry.

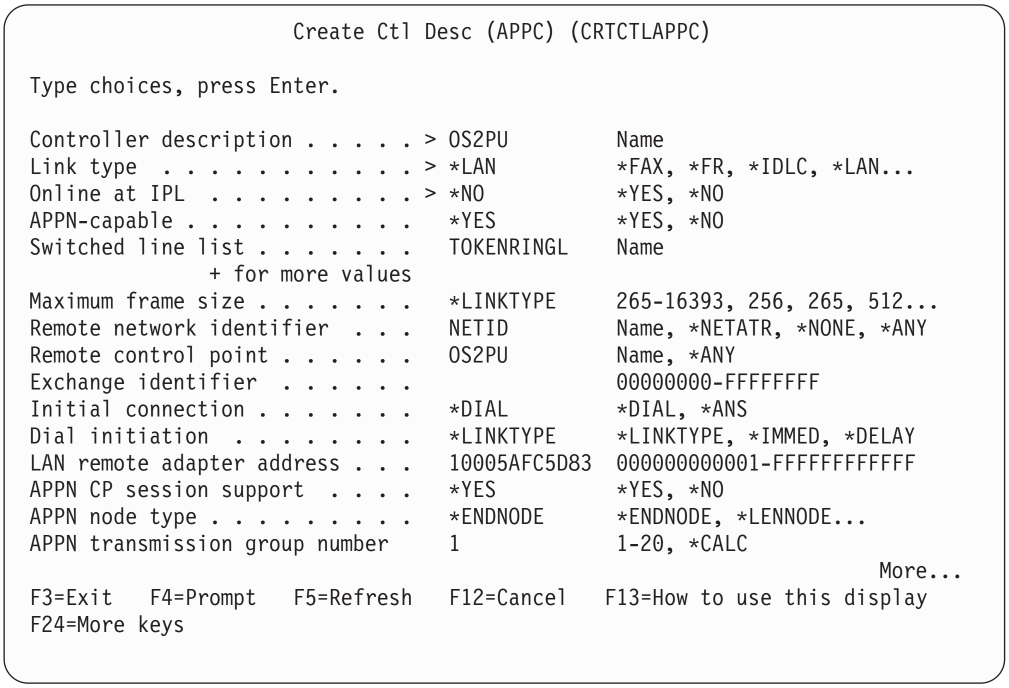
Creating a controller description

1. At a command line type `CRTCTLAPPC` and press Enter.



```
                      Create Ctl Desc (APPC) (CRTCTLAPPC)

Type choices, press Enter.

Controller description . . . . .   OS2PU         Name
Link type  . . . . . . . . . . .   *LAN          *FAX, *FR, *IDLC,
*LAN...
Online at IPL  . . . . . . . . .   *NO           *YES, *NO

























                                                                       Bottom
F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display        F24=More keys
Parameter CTLD required.                                                  +
```

2. Specify a value for **Controller description** (12), set **Link type** to *LAN, and set **Online at IPL** to *NO.
3. Press Enter twice, followed by F10.

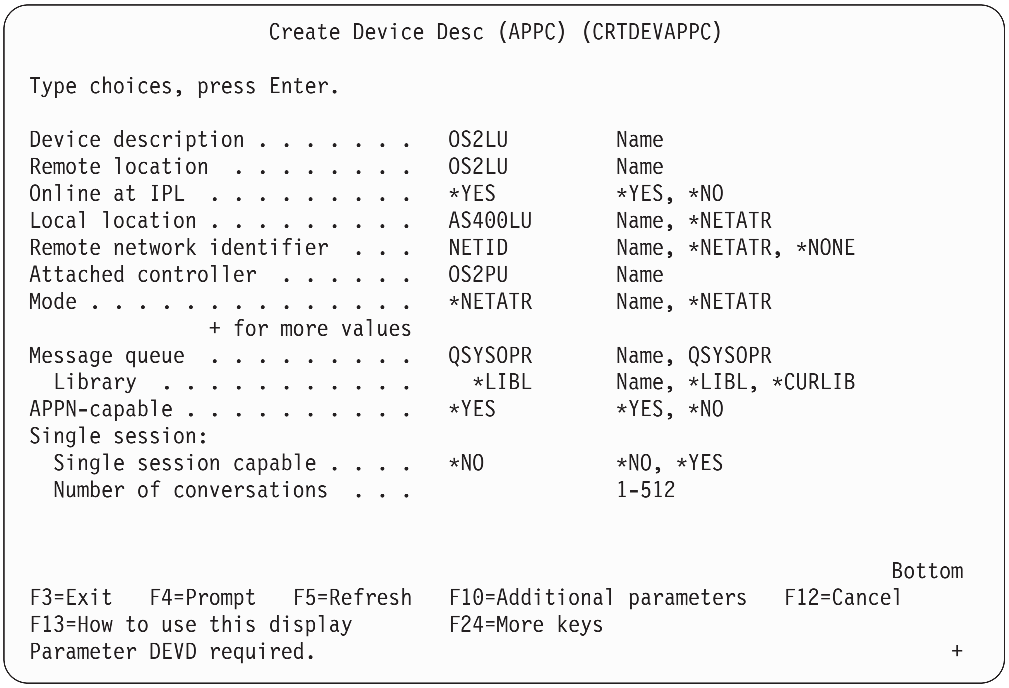


```
                      Create Ctl Desc (APPC) (CRTCTLAPPC)

Type choices, press Enter.

Controller description . . . . . > OS2PU         Name
Link type  . . . . . . . . . . . > *LAN          *FAX, *FR, *IDLC, *LAN...
Online at IPL  . . . . . . . . . > *NO           *YES, *NO
APPN-capable . . . . . . . . . .   *YES          *YES, *NO
Switched line list . . . . . . .   TOKENRINGL    Name
               + for more values
Maximum frame size . . . . . . .   *LINKTYPE     265-16393, 256, 265, 512...
Remote network identifier  . . .   NETID         Name, *NETATR, *NONE, *ANY
Remote control point . . . . . .   OS2PU         Name, *ANY
Exchange identifier  . . . . . .                 00000000-FFFFFFFF
Initial connection . . . . . . .   *DIAL         *DIAL, *ANS
Dial initiation  . . . . . . . .   *LINKTYPE     *LINKTYPE, *IMMED, *DELAY
LAN remote adapter address . . .   10005AFC5D83  000000000001-FFFFFFFFFFFF
APPN CP session support  . . . .   *YES          *YES, *NO
APPN node type . . . . . . . . .   *ENDNODE      *ENDNODE, *LENNODE...
APPN transmission group number     1             1-20, *CALC
                                                                      More...
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

4. Specify values for **Switched line list** (6), **Remote network identifier** (9), **Remote control point** (10), and **LAN remote adapter address** (16).
5. Press Enter.

Creating a device description

1. Type the command `CRTDEVAPPC` and press Enter.



```
                    Create Device Desc (APPC) (CRTDEVAPPC)

Type choices, press Enter.

Device description . . . . . . .   OS2LU         Name
Remote location  . . . . . . . .   OS2LU         Name
Online at IPL  . . . . . . . . .   *YES          *YES, *NO
Local location . . . . . . . . .   AS400LU       Name, *NETATR
Remote network identifier  . . .   NETID         Name, *NETATR, *NONE
Attached controller  . . . . . .   OS2PU         Name
Mode . . . . . . . . . . . . . .   *NETATR       Name, *NETATR
               + for more values
Message queue  . . . . . . . . .   QSYSOPR       Name, QSYSOPR
  Library  . . . . . . . . . . .     *LIBL       Name, *LIBL, *CURLIB
APPN-capable . . . . . . . . . .   *YES          *YES, *NO
Single session:
  Single session capable . . . .   *NO           *NO, *YES
  Number of conversations  . . .                 1-512



                                                                     Bottom
F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display        F24=More keys
Parameter DEVD required.                                                  +
```

2. Specify values for **Device description** (13), **Remote location** (11), **Local location** (3), **Remote network identifier** (9), and **Attached controller** (12).

Note: You can avoid having to create controller and device descriptions manually by taking advantage of OS/400's auto-configuration service. Consult the OS/400 documentation for details.

Creating CPI-C side information

1. Type `CRTCSI` and press F10.

```
                     Create Comm Side Information (CRTCSI)

Type choices, press Enter.

Side information . . . . . . . .   OS2CPIC       Name
  Library  . . . . . . . . . . .     *CURLIB     Name, *CURLIB
Remote location  . . . . . . . .   OS2LU         Name
Transaction program  . . . . . .   MQSERIES

Text 'description' . . . . . . .   *BLANK


                           Additional Parameters

Device . . . . . . . . . . . . .   *LOC          Name, *LOC
Local location . . . . . . . . .   AS400LU       Name, *LOC, *NETATR
Mode . . . . . . . . . . . . . .   #INTER        Name, *NETATR
Remote network identifier  . . .   NETID         Name, *LOC, *NETATR, *NONE
Authority  . . . . . . . . . . .   *LIBCRTAUT    Name, *LIBCRTAUT, *CHANGE...

                                                                      Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
Parameter CSI required.
```

2. Specify values for **Side information** (**14**), **Remote location** (**11**), **Transaction program** (**15**), **Local location** (**3**), **Mode**, and **Remote network identifier** (**9**).
3. Press Enter.

Adding a communications entry for APPC

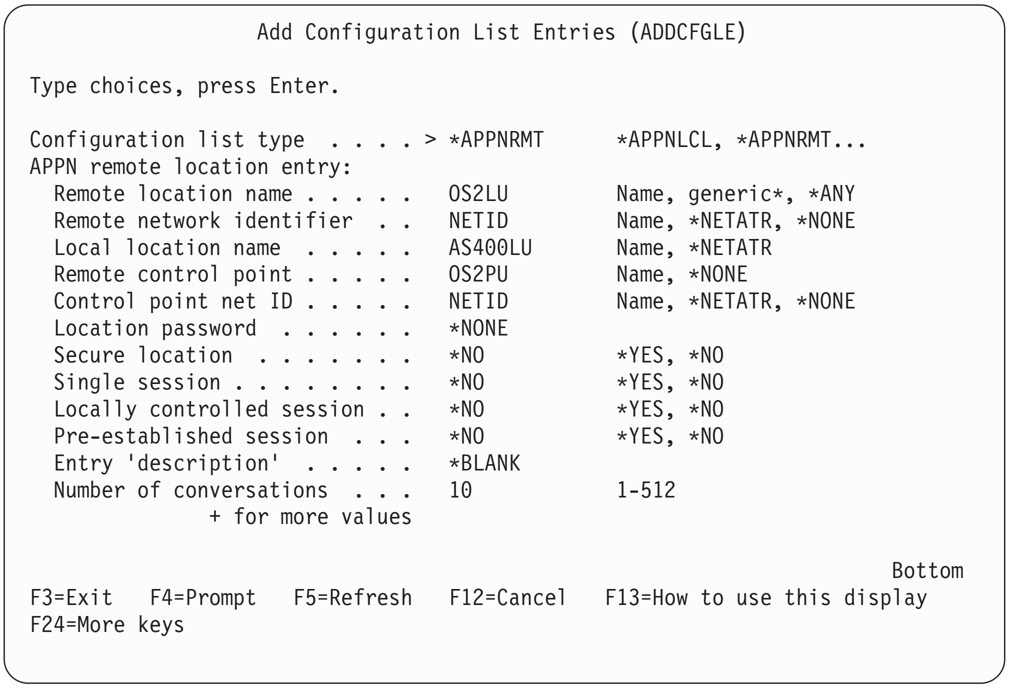
1. At a command line type `ADDCMNE` and press Enter.

```
                      Add Communications Entry (ADDCMNE)

Type choices, press Enter.

Subsystem description  . . . . .   QCMN          Name
  Library  . . . . . . . . . . .     *LIBL       Name, *LIBL, *CURLIB
Device . . . . . . . . . . . . .   OS2LU         Name, generic*, *ALL...
Remote location  . . . . . . . .                 Name
Job description  . . . . . . . .   *USRPRF       Name, *USRPRF, *SBSD
  Library  . . . . . . . . . . .                 Name, *LIBL, *CURLIB
Default user profile . . . . . .   *NONE         Name, *NONE, *SYS
Mode . . . . . . . . . . . . . .   *ANY          Name, *ANY
Maximum active jobs  . . . . . .   *NOMAX        0-1000, *NOMAX









                                                                      Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
Parameter SBSD required.
```

2. Specify values for **Subsystem description** (5) and **Device** (13), and press Enter.

Adding a configuration list entry

1. Type `ADDCFGLE *APPNRMT` and press F4.



```
                   Add Configuration List Entries (ADDCFGLE)

Type choices, press Enter.

Configuration list type  . . . . > *APPNRMT      *APPNLCL, *APPNRMT...
APPN remote location entry:
  Remote location name . . . . .   OS2LU         Name, generic*, *ANY
  Remote network identifier  . .   NETID         Name, *NETATR, *NONE
  Local location name  . . . . .   AS400LU       Name, *NETATR
  Remote control point . . . . .   OS2PU         Name, *NONE
  Control point net ID . . . . .   NETID         Name, *NETATR, *NONE
  Location password  . . . . . .   *NONE
  Secure location  . . . . . . .   *NO           *YES, *NO
  Single session . . . . . . . .   *NO           *YES, *NO
  Locally controlled session . .   *NO           *YES, *NO
  Pre-established session  . . .   *NO           *YES, *NO
  Entry 'description'  . . . . .   *BLANK
  Number of conversations  . . .   10            1-512
               + for more values

                                                                     Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

2. Specify values for **Remote location name** (11), **Remote network identifier** (9), **Local location name** (3), **Remote control point** (10), and **Control point net ID** (9).
3. Press Enter.

What next?

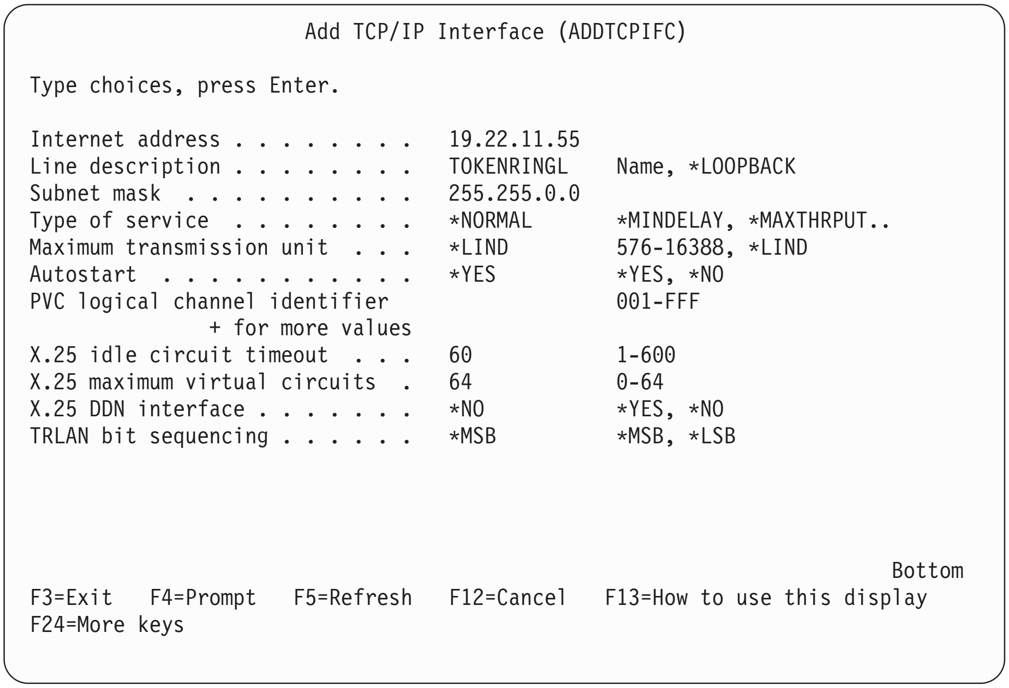
The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for iSeries configuration” on page 578.

Establishing a TCP connection

If TCP is already configured there are no extra configuration tasks. The following panels guide you through the steps that may be required if TCP/IP is not configured.

Adding a TCP/IP interface

1. At a command line type `ADDTCPIFC` and press Enter.

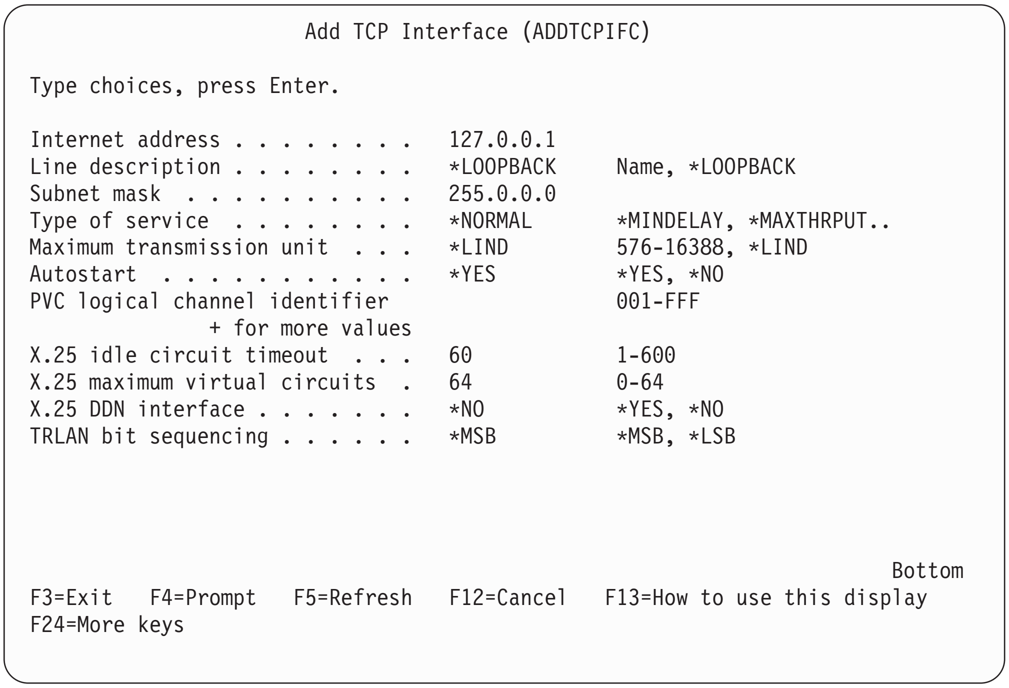


```
                       Add TCP/IP Interface (ADDTCPIFC)

 Type choices, press Enter.

 Internet address . . . . . . . .   19.22.11.55
 Line description . . . . . . . .   TOKENRINGL    Name, *LOOPBACK
 Subnet mask  . . . . . . . . . .   255.255.0.0
 Type of service  . . . . . . . .   *NORMAL       *MINDELAY, *MAXTHRPUT..
 Maximum transmission unit  . . .   *LIND         576-16388, *LIND
 Autostart  . . . . . . . . . . .   *YES          *YES, *NO
 PVC logical channel identifier                   001-FFF
               + for more values
 X.25 idle circuit timeout  . . .   60            1-600
 X.25 maximum virtual circuits  .   64            0-64
 X.25 DDN interface . . . . . . .   *NO           *YES, *NO
 TRLAN bit sequencing . . . . . .   *MSB          *MSB, *LSB





                                                                      Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

2. Specify this machine’s **Internet address** and **Line description**, and a **Subnet mask**.
3. Press Enter.

Adding a TCP/IP loopback interface

1. At a command line type `ADDTCPIFC` and press Enter.

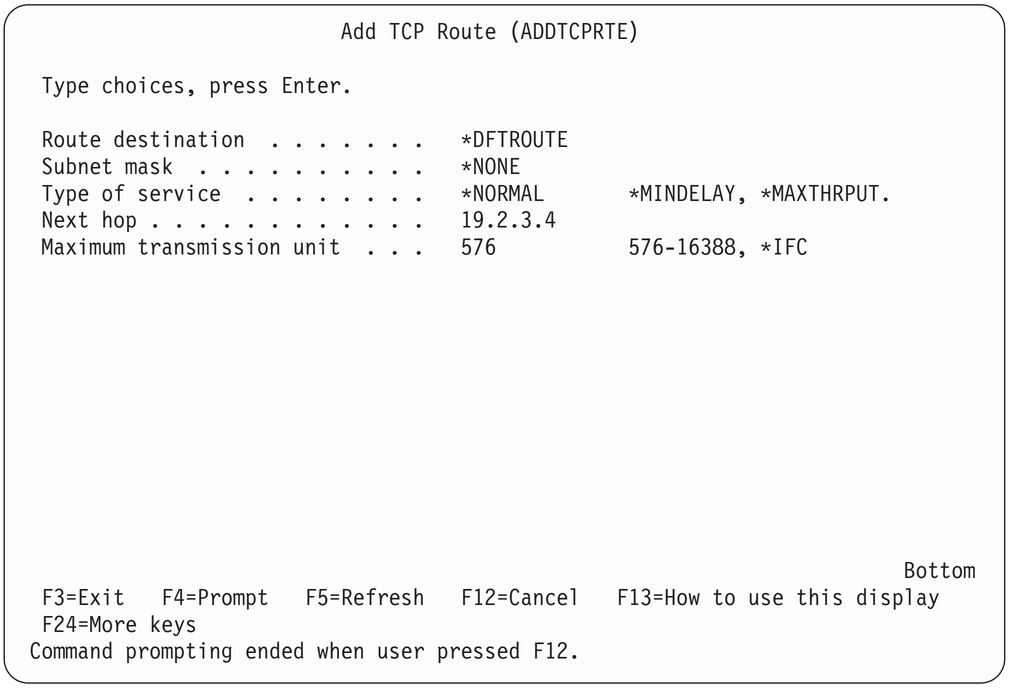


```
                       Add TCP Interface (ADDTCPIFC)

 Type choices, press Enter.

 Internet address . . . . . . . .   127.0.0.1
 Line description . . . . . . . .   *LOOPBACK     Name, *LOOPBACK
 Subnet mask  . . . . . . . . . .   255.0.0.0
 Type of service  . . . . . . . .   *NORMAL       *MINDELAY, *MAXTHRPUT..
 Maximum transmission unit  . . .   *LIND         576-16388, *LIND
 Autostart  . . . . . . . . . . .   *YES          *YES, *NO
 PVC logical channel identifier                   001-FFF
               + for more values
 X.25 idle circuit timeout  . . .   60            1-600
 X.25 maximum virtual circuits  .   64            0-64
 X.25 DDN interface . . . . . . .   *NO           *YES, *NO
 TRLAN bit sequencing . . . . . .   *MSB          *MSB, *LSB





                                                                      Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

2. Specify the values for **Internet address**, **Line description**, and **Subnet mask**.

Adding a default route

1. At a command line type `ADDTCPRTE` and press Enter.



```
                         Add TCP Route (ADDTCPRTE)

 Type choices, press Enter.

 Route destination  . . . . . . .   *DFTROUTE
 Subnet mask  . . . . . . . . . .   *NONE
 Type of service  . . . . . . . .   *NORMAL       *MINDELAY, *MAXTHRPUT.
 Next hop . . . . . . . . . . . .   19.2.3.4
 Maximum transmission unit  . . .   576           576-16388, *IFC













                                                                    Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
Command prompting ended when user pressed F12.
```

2. Fill in with values appropriate to your network and press Enter to create a default route entry.

What next?

The TCP connection is now established. You are ready to complete the configuration. Go to “WebSphere MQ for iSeries configuration”.

WebSphere MQ for iSeries configuration

Start the TCP channel listener using the command STRMQMLSR.

Start any sender channel using the command STRMQMCHL CHLNAME(*channel_name*).

Use the WRKMQMQ command to display the WebSphere MQ configuration menu.

Note: AMQ* errors are placed in the log relating to the job that found the error. Use the WRKACTJOB command to display the list of jobs. Under the subsystem name QSYSWRK, locate the job and enter 5 against it to work with that job. WebSphere MQ logs are prefixed ‘AMQ’.

Basic configuration

1. First you need to create a queue manager. To do this, type `CRTMQM` and press Enter.

```
                       Create Message Queue Manager (CRTMQM)

Type choices, press Enter.

Message Queue Manager name . . .

Text 'description' . . . . . . .   *BLANK

Trigger interval . . . . . . . .   999999999     0-999999999
Undelivered message queue  . . .   *NONE

Default transmission queue . . .   *NONE

Maximum handle limit . . . . . .   256           1-999999999
Maximum uncommitted messages . .   1000          1-10000
Default Queue manager  . . . . .   *NO           *YES, *NO




                                                                      Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

2. In the **Message Queue Manager name** field, type `AS400`. In the **Undelivered message queue** field, type `DEAD.LETTER.QUEUE`.
3. Press Enter.
4. Now start the queue manager by entering `STRMQM MQMNAME(AS400)`.
5. Create the undelivered message queue using the following parameters. (For details and an example refer to "Defining a queue" on page 583.)

```
Local Queue
     Queue name :   DEAD.LETTER.QUEUE
     Queue type :   *LCL
```

Channel configuration

This section details the configuration to be performed on the OS/400 queue manager to implement the channel described in Figure 32 on page 101.

Examples are given for connecting WebSphere MQ for iSeries and MQSeries for OS/2 Warp. If you wish connect to another WebSphere MQ product, use the appropriate values from the table in place of those for OS/2.

Notes:

1. The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.
2. The WebSphere MQ channel ping command (PNGMQMCHL) runs interactively, whereas starting a channel causes a batch job to be submitted. If a channel ping completes successfully but the channel will not start, this indicates that the network and WebSphere MQ definitions are probably correct, but that the OS/400 environment for the batch job is not. For example, make sure that QSYS2 is included in the system portion of the library list and not just your personal library list.

OS/400 configuration

For details and examples of how to create the objects listed refer to "Defining a queue" on page 583 and "Defining a channel" on page 584.

Table 51. Configuration worksheet for WebSphere MQ for iSeries

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**AS400**	
B	Local queue name		**AS400.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in Table 16 on page 164, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	
G	Sender (SNA) channel name		**AS400.OS2.SNA**	
H	Sender (TCP) channel name		**AS400.OS2.TCP**	
I	Receiver (SNA) channel name	**G**	**OS2.AS400.SNA**	
J	Receiver (TCP) channel name	**H**	**OS2.AS400.TCP**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in Table 18 on page 189, as indicated.				
C	Remote queue manager name	**A**	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	**B**	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender (SNA) channel name		**AS400.WINNT.SNA**	
H	Sender (TCP/IP) channel name		**AS400.WINNT.TCP**	
I	Receiver (SNA) channel name	**G**	**WINNT.AS400.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**WINNT.AS400.TCP**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in Table 22 on page 218, as indicated.				
C	Remote queue manager name	**A**	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	**B**	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender (SNA) channel name		**AS400.AIX.SNA**	
H	Sender (TCP/IP) channel name		**AS400.AIX.TCP**	
I	Receiver (SNA) channel name	**G**	**AIX.AS400.SNA**	
J	Receiver (TCP) channel name	**H**	**AIX.AS400.TCP**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in Table 23 on page 226, as indicated.				
C	Remote queue manager name	**A**	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	

Table 51. Configuration worksheet for WebSphere MQ for iSeries (continued)

ID	Parameter Name	Reference	Example Used	User Value
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.AS400.TCP**	
J	Receiver (TCP) channel name	H	**AS400.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in Table 25 on page 252, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender (SNA) channel name		**AS400.HPUX.SNA**	
H	Sender (TCP) channel name		**AS400.HPUX.TCP**	
I	Receiver (SNA) channel name	G	**HPUX.AS400.SNA**	
J	Receiver (TCP) channel name	H	**HPUX.AS400.TCP**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in Table 27 on page 267, as indicated.				
C	Remote queue manager name	A	**GIS**	
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender (SNA) channel name		**AS400.GIS.SNA**	
H	Sender (TCP) channel name		**AS400.GIS.TCP**	
I	Receiver (SNA) channel name	G	**GIS.AS400.SNA**	
J	Receiver (TCP/IP) channel name	H	**GIS.AS400.TCP**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in Table 30 on page 308, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender (SNA) channel name		**AS400.SOLARIS.SNA**	
H	Sender (TCP/IP) channel name		**AS400.SOLARIS.TCP**	
I	Receiver (SNA) channel name	G	**SOLARIS.AS400.SNA**	
J	Receiver (TCP/IP) channel name	H	**SOLARIS.AS400.TCP**	
Connection to WebSphere MQ for Linux The values in this section of the table must match those used in Table 32 on page 332, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	

Table 51. Configuration worksheet for WebSphere MQ for iSeries (continued)

ID	Parameter Name	Reference	Example Used	User Value
F	Transmission queue name		**LINUX**	
G	Sender (SNA) channel name		**AS400.LINUX.SNA**	
H	Sender (TCP/IP) channel name		**AS400.LINUX.TCP**	
I	Receiver (SNA) channel name	**G**	**LINUX.AS400.SNA**	
J	Receiver (TCP/IP) channel name	**H**	**LINUX.AS400.TCP**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in Table 36 on page 417, as indicated.				
C	Remote queue manager name	**A**	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	**B**	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender (SNA) channel name		**AS400.MVS.SNA**	
H	Sender (TCP) channel name		**AS400.MVS.TCP**	
I	Receiver (SNA) channel name	**G**	**MVS.AS400.SNA**	
J	Receiver (TCP) channel name	**H**	**MVS.AS400.TCP**	
Connection to MQSeries for VSE/ESA The values in this section of the table must match those used in Table 53 on page 601, as indicated.				
C	Remote queue manager name	**A**	**VSE**	
D	Remote queue name		**VSE.REMOTEQ**	
E	Queue name at remote system	**B**	**VSE.LOCALQ**	
F	Transmission queue name		**VSE**	
G	Sender channel name		**AS400.VSE.SNA**	
I	Receiver channel name	**G**	**VSE.AS400.SNA**	

WebSphere MQ for iSeries sender-channel definitions using SNA

```
 Local Queue
          Queue name :   OS2                              F
          Queue type :   *LCL
               Usage :   *TMQ

 Remote Queue
          Queue name :   OS2.REMOTEQ                      D
          Queue type :   *RMT
        Remote queue :   OS2.LOCALQ                       E
Remote Queue Manager :   OS2                              C
  Transmission queue :   OS2                              F

 Sender Channel
        Channel Name :   AS400.OS2.SNA                    G
        Channel Type :   *SDR
      Transport type :   *LU62
     Connection name :   OS2CPIC                          14
  Transmission queue :   OS2                              F
```

WebSphere MQ for iSeries receiver-channel definitions using SNA

```
 Local Queue
          Queue name :   AS400.LOCALQ                     B
          Queue type :   *LCL

 Receiver Channel
        Channel Name :   OS2.AS400.SNA                    I
        Channel Type :   *RCVR
      Transport type :   *LU62
```

WebSphere MQ for iSeries sender-channel definitions using TCP

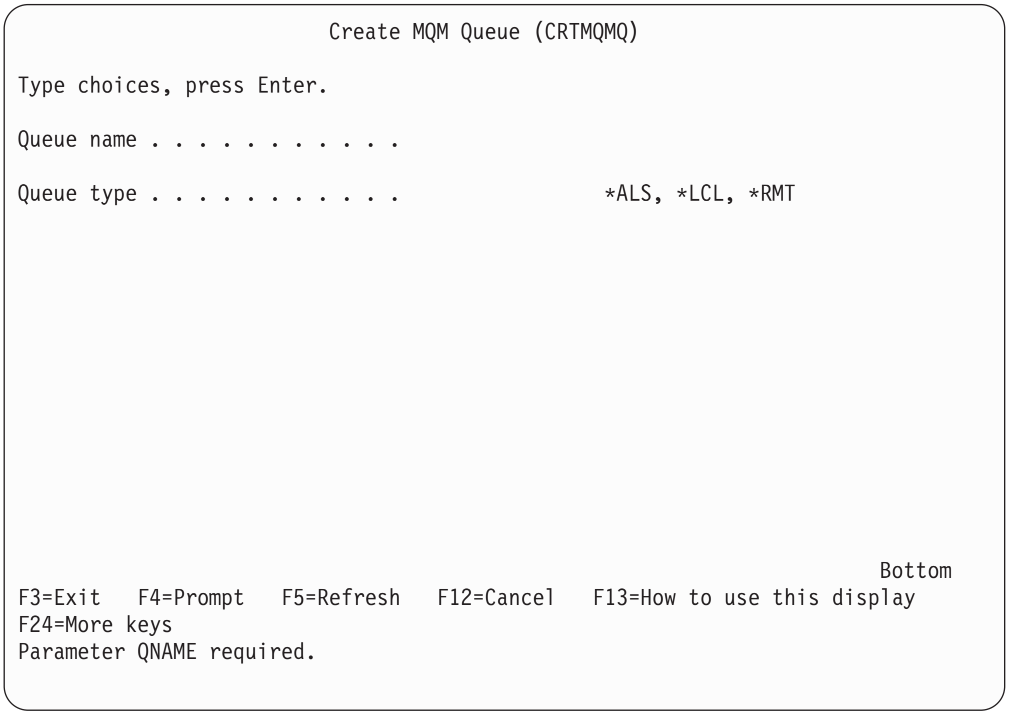
```
 Local Queue
          Queue name :   OS2                              F
          Queue type :   *LCL
               Usage :   *TMQ

 Remote Queue
          Queue name :   OS2.REMOTEQ                      D
          Queue type :   *RMT
        Remote queue :   OS2.LOCALQ                       E
Remote Queue Manager :   OS2                              C
  Transmission queue :   OS2                              F

 Sender Channel
        Channel Name :   AS400.OS2.TCP                    H
        Channel Type :   *SDR
      Transport type :   *TCP
     Connection name :   os2.tcpip.hostname
  Transmission queue :   OS2                              F
```

WebSphere MQ for iSeries receiver-channel definitions using TCP

```
 Local Queue
          Queue name :   AS400.LOCALQ                     B
          Queue type :   *LCL

 Receiver Channel
        Channel Name :   OS2.AS400.TCP                    J
        Channel Type :   *RCVR
      Transport type :   *TCP
```

Defining a queue

Type `CRTMQMQ` on the command line.

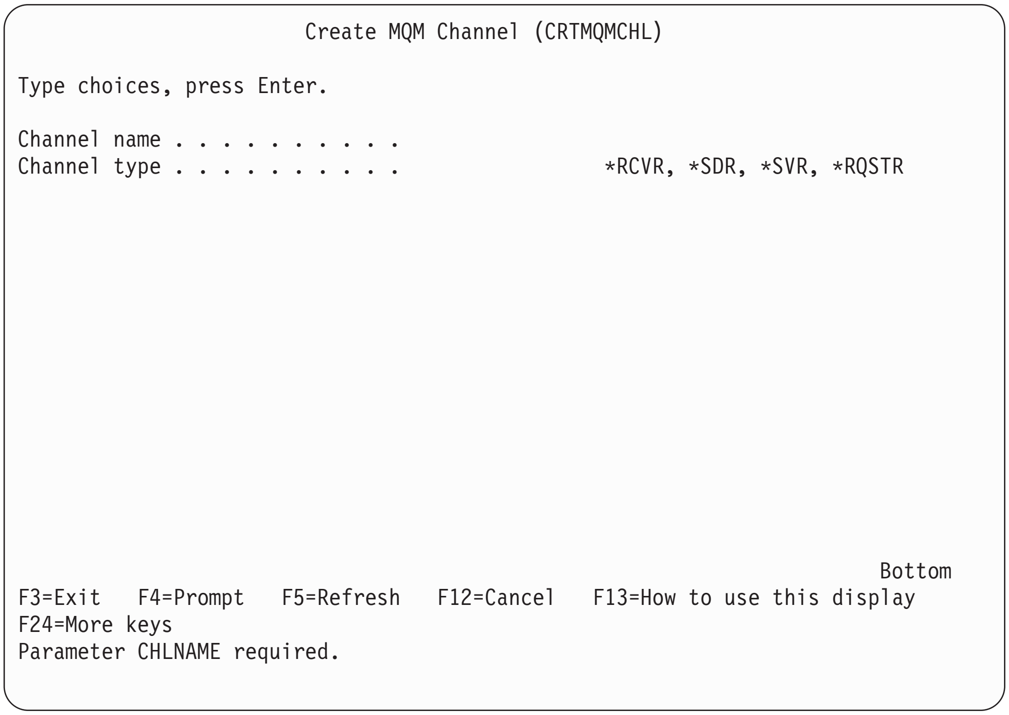


```
                          Create MQM Queue (CRTMQMQ)

Type choices, press Enter.

Queue name . . . . . . . . . . .

Queue type . . . . . . . . . . .                 *ALS, *LCL, *RMT













                                                                        Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
Parameter QNAME required.
```

Fill in the two fields of this panel and press Enter. This causes another panel to appear, with entry fields for the other parameters you have. Defaults can be taken for all other queue attributes.

Defining a channel

Type `CRTMQMCHL` on the command line.



```
                        Create MQM Channel (CRTMQMCHL)

Type choices, press Enter.

Channel name . . . . . . . . . .
Channel type . . . . . . . . . .                 *RCVR, *SDR, *SVR, *RQSTR















                                                                        Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
Parameter CHLNAME required.
```

Fill in the two fields of this panel and press Enter. Another panel is displayed on which you can specify the values for the other parameters given earlier. Defaults can be taken for all other channel attributes.

Chapter 44. Message channel planning example for WebSphere MQ for iSeries

This chapter provides a detailed example of how to connect two OS/400 queue managers together so that messages can be sent between them. The example illustrates the preparations needed to allow an application using queue manager QM1 to put messages on a queue at queue manager QM2. An application running on QM2 can retrieve these messages, and send responses to a reply queue on QM1.

The example illustrates the use of TCP/IP connections. The example assumes that channels are to be triggered to start when the first message arrives on the transmission queue they are servicing. You must start the channel initiator in order for triggering to work. To do this, use the STRMQMCHLI command.

This example uses SYSTEM.CHANNEL.INITQ as the initiation queue. This queue is already defined by WebSphere MQ. You can use a different initiation queue, but you will have to define it yourself and specify the name of the queue when you start the channel initiator.

What the example shows

The example uses the WebSphere MQ for iSeries command language.

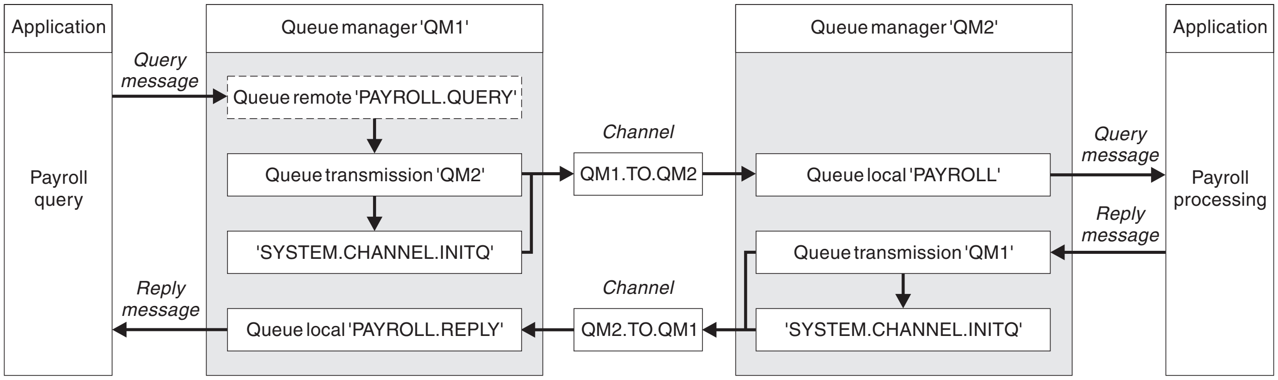


Figure 120. The message channel example for WebSphere MQ for iSeries

It involves a payroll query application connected to queue manager QM1 that sends payroll query messages to a payroll processing application running on queue manager QM2. The payroll query application needs the replies to its queries sent back to QM1. The payroll query messages are sent from QM1 to QM2 on a sender-receiver channel called QM1.TO.QM2, and the reply messages are sent back from QM2 to QM1 on another sender-receiver channel called QM2.TO.QM1. Both of these channels are triggered to start as soon as they have a message to send to the other queue manager.

The payroll query application puts a query message to the remote queue “PAYROLL.QUERY” defined on QM1. This remote queue definition resolves to the local queue “PAYROLL” on QM2. In addition, the payroll query application specifies that the reply to the query is sent to the local queue “PAYROLL.REPLY” on QM1. The payroll processing application gets messages from the local queue

"PAYROLL" on QM2, and sends the replies to wherever they are required; in this case, local queue "PAYROLL.REPLY" on QM1.

Both queue managers are assumed to be running on OS/400. In the example definitions, QM1 has a host address of 9.20.9.31 and is listening on port 1411, and QM2 has a host address of 9.20.9.32 and is listening on port 1412. The example assumes that these are already defined on your OS/400 system, and are available for use.

The object definitions that need to be created on QM1 are:
- Remote queue definition, PAYROLL.QUERY
- Transmission queue definition, QM2 (default=remote queue manager name)
- Sender channel definition, QM1.TO.QM2
- Receiver channel definition, QM2.TO.QM1
- Reply-to queue definition, PAYROLL.REPLY

The object definitions that need to be created on QM2 are:
- Local queue definition, PAYROLL
- Transmission queue definition, QM1 (default=remote queue manager name)
- Sender channel definition, QM2.TO.QM1
- Receiver channel definition, QM1.TO.QM2

The connection details are supplied in the CONNAME attribute of the sender channel definitions.

You can see a diagram of the arrangement in Figure 120 on page 587.

Queue manager QM1 example

The following object definitions allow applications connected to queue manager QM1 to send request messages to a queue called PAYROLL on QM2, and to receive replies on a queue called PAYROLL.REPLY on QM1.

All the object definitions have been provided with the TEXT attributes. The other attributes supplied are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM1.

Run the following commands on queue manager QM1:

Remote queue definition

The CRTMQMQ command with the following attributes:

QNAME	'PAYROLL.QUERY'
QTYPE	*RMT
TEXT	'Remote queue for QM2'
PUTENBL	*YES
TMQNAME	'QM2' (default = remote queue manager name)
RMTQNAME	'PAYROLL'
RMTMQMNAME	'QM2'

Note: The remote queue definition is not a physical queue, but a means of directing messages to the transmission queue, QM2, so that they can be sent to queue manager QM2.

Transmission queue definition

The CRTMQMQ command with the following attributes:

QNAME	QM2
QTYPE	*LCL
TEXT	‘Transmission queue to QM2’
USAGE	*TMQ
PUTENBL	*YES
GETENBL	*YES
TRGENBL	*YES
TRGTYPE	*FIRST
INITQNAME	SYSTEM.CHANNEL.INITQ
TRIGDATA	QM1.TO.QM2

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the named process.

Sender channel definition

The CRTMQMCHL command with the following attributes:

CHLNAME	QM1.TO.QM2
CHLTYPE	*SDR
TRPTYPE	*TCP
TEXT	‘Sender channel to QM2’
TMQNAME	QM2
CONNAME	‘9.20.9.32(1412)’

Receiver channel definition
The CRTMQMCHL command with the following attributes:

CHLNAME	QM2.TO.QM1
CHLTYPE	*RCVR
TRPTYPE	*TCP
TEXT	'Receiver channel from QM2'

Reply-to queue definition
The CRTMQMQ command with the following attributes:

QNAME	PAYROLL.REPLY
QTYPE	*LCL
TEXT	'Reply queue for replies to query messages sent to QM2'
PUTENBL	*YES
GETENBL	*YES

The reply-to queue is defined as PUT(ENABLED). This ensures that reply messages can be put to the queue. If the replies cannot be put to the reply-to queue, they are sent to the dead-letter queue on QM1 or, if this queue is not available, remain on transmission queue QM1 on queue manager QM2. The queue has been defined as GET(ENABLED) to allow the reply messages to be retrieved.

Queue manager QM2 example

The following object definitions allow applications connected to queue manager QM2 to retrieve request messages from a local queue called PAYROLL, and to put replies to these request messages to a queue called PAYROLL.REPLY on queue manager QM1.

You do not need to provide a remote queue definition to enable the replies to be returned to QM1. The message descriptor of the message retrieved from local queue PAYROLL contains both the reply-to queue and the reply-to queue manager names. Therefore, as long as QM2 can resolve the reply-to queue manager name to that of a transmission queue on queue manager QM2, the reply message can be sent. In this example, the reply-to queue manager name is QM1 and so queue manager QM2 simply requires a transmission queue of the same name.

All the object definitions have been provided with the TEXT attribute and are the minimum required to make the example work. The attributes that are not supplied take the default values for queue manager QM2.

Run the following commands on queue manager QM2:

Local queue definition
The CRTMQMQ command with the following attributes:

QNAME	PAYROLL
QTYPE	*LCL
TEXT	'Local queue for QM1 payroll details'
PUTENBL	*YES
GETENBL	*YES

This queue is defined as PUT(ENABLED) and GET(ENABLED) for the same reason as the reply-to queue definition on queue manager QM1.

Transmission queue definition
The CRTMQMQ command with the following attributes:

QNAME	QM1
QTYPE	*LCL
TEXT	'Transmission queue to QM1'
USAGE	*TMQ
PUTENBL	*YES
GETENBL	*YES
TRGENBL	*YES
TRGTYPE	*FIRST
INITQNAME	SYSTEM.CHANNEL.INITQ
TRIGDATA	QM2.TO.QM1

When the first message is put on this transmission queue, a trigger message is sent to the initiation queue, SYSTEM.CHANNEL.INITQ. The channel initiator gets the message from the initiation queue and starts the channel identified in the trigger data.

Sender channel definition
The CRTMQMCHL command with the following attributes:

CHLNAME	QM2.TO.QM1
CHLTYPE	*SDR
TRPTYPE	*TCP
TEXT	'Sender channel to QM1'
TMQNAME	QM1
CONNAME	'9.20.9.31(1411)'

Receiver channel definition
The CRTMQMCHL command with the following attributes:

CHLNAME	QM1.TO.QM2
CHLTYPE	*RCVR
TRPTYPE	*TCP
TEXT	'Receiver channel from QM1'

Running the example

When you have created the required objects, you must:
- Start the channel initiator for both queue managers
- Start the listener for both queue managers

The applications can then send messages to each other. The channels are triggered to start by the first message arriving on each transmission queue, so you do not need to issue the STRMQMCHL command.

For details about starting a channel initiator and a listener see Chapter 40, "Monitoring and controlling channels in WebSphere MQ for iSeries", on page 529.

Expanding this example

This example can be expanded by:
- Adding more queue and channel definitions to allow other applications to send messages between the two queue managers.

- Adding user exit programs on the channels to allow for link encryption, security checking, or additional message processing.
- Using queue manager aliases and reply-to queue aliases to understand more about how these can be used in the organization of your queue manager network.

For a version of this example that uses MQSC commands, see Chapter 28, “Message channel planning example for z/OS”, on page 421.

Part 6. DQM in MQSeries for VSE/ESA

Chapter 45. Example configuration - MQSeries for VSE/ESA

This chapter gives an example of how to set up communication links from MQSeries for VSE/ESA to WebSphere MQ products on the following platforms:

- OS/2
- Windows
- AIX
- Compaq Tru64 UNIX
- HP-UX
- AT&T GIS UNIX[11]
- Solaris
- Linux
- OS/400
- z/OS, OS/390, or MVS/ESA without CICS

It describes the parameters needed for an LU 6.2 and TCP connection. Once the connection is established, you need to define some channels to complete the configuration. This is described in "MQSeries for VSE/ESA configuration" on page 601.

Configuration parameters for an LU 6.2 connection

Table 52 presents a worksheet listing all the parameters needed to set up communication from VSE/ESA to one of the other WebSphere MQ platforms. The worksheet shows examples of the parameters, which have been tested in a working environment, and leaves space for you to fill in your own values. An explanation of the parameter names follows the worksheet. Use the worksheet in this chapter in conjunction with the worksheet in the chapter for the platform to which you are connecting.

Configuration worksheet

Use the following worksheet to record the values you will use for this configuration. Where numbers appear in the Reference column they indicate that the value must match that in the appropriate worksheet elsewhere in this book. The examples that follow in this chapter refer back to the values in the ID column of this table. The entries in the Parameter Name column are explained in "Explanation of terms" on page 597.

Table 52. Configuration worksheet for VSE/ESA using APPC

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
1	Network ID		**NETID**	
2	Node name		**VSEPU**	
3	Local LU name		**VSELU**	
4	Local Transaction Program name		**MQ01**	
5	LAN destination address		**400074511092**	

---

[11] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

Table 52. Configuration worksheet for VSE/ESA using APPC (continued)

ID	Parameter Name	Reference	Example Used	User Value
Connection to an OS/2 system The values in this section of the table must match those used in the table for OS/2, as indicated.				
6	Connection name		**OS2**	
7	Group name		**EXAMPLE**	
8	Session name		**OS2SESS**	
9	Netname	6	**OS2LU**	
Connection to a Windows system The values in this section of the table must match those used in the table for Windows, as indicated.				
6	Connection name		**WNT**	
7	Group name		**EXAMPLE**	
8	Session name		**WNTSESS**	
9	Netname	5	**WINNTLU**	
Connection to an AIX system The values in this section of the table must match those used in the table for AIX, as indicated.				
6	Connection name		**AIX**	
7	Group name		**EXAMPLE**	
8	Session name		**AIXSESS**	
9	Netname	4	**AIXLU**	
Connection to an HP-UX system The values in this section of the table must match those used in the table for HP-UX, as indicated.				
6	Connection name		**HPUX**	
7	Group name		**EXAMPLE**	
8	Session name		**HPUXSESS**	
9	Netname	5	**HPUXLU**	
Connection to an AT&T GIS UNIX system The values in this section of the table must match those used in the table for AT&T GIS UNIX (NCR UNIX), as indicated.				
6	Connection name		**GIS**	
7	Group name		**EXAMPLE**	
8	Session name		**GISSESS**	
9	Netname	4	**GISLU**	
Connection to a Solaris system The values in this section of the table must match those used in the table for Solaris, as indicated.				
6	Connection name		**SOL**	
7	Group name		**EXAMPLE**	
8	Session name		**SOLSESS**	
9	Netname	7	**SOLARLU**	

Table 52. Configuration worksheet for VSE/ESA using APPC (continued)

ID	Parameter Name	Reference	Example Used	User Value
Connection to a Linux for Intel system The values in this section of the table must match those used in the table for Linux for Intel, as indicated.				
6	Connection name		**LXI**	
7	Group name		**EXAMPLE**	
8	Session name		**LXISESS**	
9	Netname	5	**LINUXLU**	
Connection to an OS/400 system The values in this section of the table must match those used in the table for OS/400, as indicated.				
6	Connection name		**AS4**	
7	Group name		**EXAMPLE**	
8	Session name		**AS4SESS**	
9	Netname	3	**AS400LU**	
Connection to a z/OS system without CICS The values in this section of the table must match those used in the table for z/OS, as indicated.				
6	Connection name		**MVS**	
7	Group name		**EXAMPLE**	
8	Session name		**MVSSESS**	
9	Netname	4	**MVSLU**	

Explanation of terms

1 Network ID
This is the unique ID of the network to which you are connected. Your system administrator will tell you this value.

2 Node name
This is the name of the SSCP which owns the CICS/VSE region.

3 Local LU name
This is the unique VTAM APPLID of this CICS/VSE region.

4 Transaction Program name
WebSphere MQ applications trying to converse with this queue manager will specify a transaction name for the program to be run at the receiving end. This will have been defined on the channel definition at the sender. MQSeries for VSE/ESA uses a name of MQ01.

5 LAN destination address
This is the LAN destination address that your partner nodes will use to communicate with this host. It is usually the address of the 3745 on the same LAN as the partner node.

6 Connection name
This is a 4-character name by which each connection will be individually known in CICS RDO.

7 Group name
You choose your own 8-character name for this value. Your system may

already have a group defined for connections to partner nodes. Your system administrator will give you a value to use.

8 Session name
This is an 8-character name by which each session will be individually known. For clarity we use the connection name, concatenated with ’SESS’.

9 Netname
This is the LU name of the WebSphere MQ queue manager on the system with which you are setting up communication.

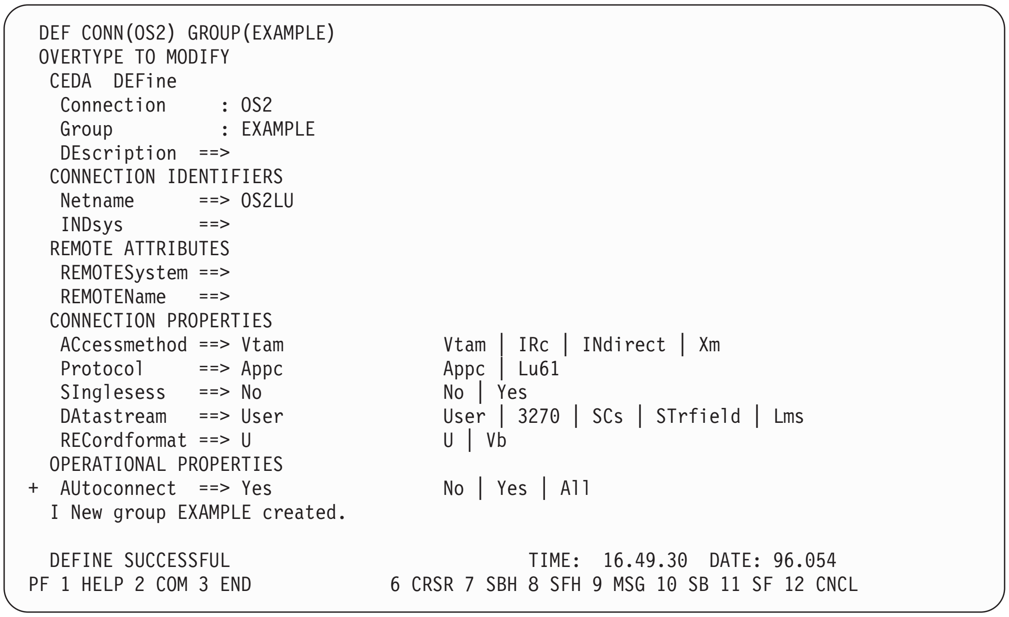
Establishing an LU 6.2 connection

This example is for a connection to an OS/2 system. The steps are the same whatever platform you are using; change the values as appropriate.

Defining a connection

1. At a CICS command line type `CEDA DEF CONN(`*`connection name`*`) GROUP(`*`group name`*`)` (where `connection name` is **6** and `group name` is **7**). For example:

   `CEDA DEF CONN(OS2) GROUP(EXAMPLE)`
2. Press Enter to define a connection to CICS.



```
 DEF CONN(OS2) GROUP(EXAMPLE)
 OVERTYPE TO MODIFY
  CEDA  DEFine
   Connection     : OS2
   Group          : EXAMPLE
   DEscription  ==>
  CONNECTION IDENTIFIERS
   Netname      ==> OS2LU
   INDsys       ==>
  REMOTE ATTRIBUTES
   REMOTESystem ==>
   REMOTEName   ==>
  CONNECTION PROPERTIES
   ACcessmethod ==> Vtam              Vtam | IRc | INdirect | Xm
   Protocol     ==> Appc              Appc | Lu61
   SInglesess   ==> No                No | Yes
   DAtastream   ==> User              User | 3270 | SCs | STrfield | Lms
   RECordformat ==> U                 U | Vb
  OPERATIONAL PROPERTIES
+  AUtoconnect  ==> Yes               No | Yes | All
  I New group EXAMPLE created.

  DEFINE SUCCESSFUL                           TIME:  16.49.30  DATE: 96.054
PF 1 HELP 2 COM 3 END            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

3. On the panel change the **Netname** field in the CONNECTION IDENTIFIERS section to be the LU name (**9**) of the target system.
4. In the CONNECTION PROPERTIES section set the **ACcessmethod** field to `Vtam` and the **Protocol** to `Appc`.
5. Press Enter to make the change.

Defining a session

1. At a CICS command line type `CEDA DEF SESS(`*`session name`*`) GROUP(`*`group name`*`)` (where `session name` is **8** and `group name` is **7**). For example:

   `CEDA DEF SESS(OS2SESS) GROUP(EXAMPLE)`
2. Press Enter to define a session for the connection.

```
 DEF SESS(OS2SESS) GROUP(EXAMPLE)
 OVERTYPE TO MODIFY
  CEDA  DEFine
   Sessions     ==> OS2SESS
   Group        ==> EXAMPLE
   DEscription  ==>
  SESSION IDENTIFIERS
   Connection   ==> OS2
   SESSName     ==>
   NETnameq     ==>
   MOdename     ==> #INTER
  SESSION PROPERTIES
   Protocol     ==> Appc              Appc | Lu61
   MAximum      ==> 008 , 004         0-999
   RECEIVEPfx   ==>
   RECEIVECount ==>                   1-999
   SENDPfx      ==>
   SENDCount    ==>                   1-999
   SENDSize     ==> 04096             1-30720
+  RECEIVESize  ==> 04096             1-30720
  S CONNECTION MUST BE SPECIFIED.

                                        TIME:  14.23.19   DATE:  96.054
PF 1 HELP 2 COM 3 END            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL
```

3. In the SESSION IDENTIFIERS section of the panel specify the Connection name (6) in the **Connection** field and set the **MOdename** to `#INTER`.
4. In the SESSION PROPERTIES section set the **Protocol** to `Appc` and the **MAximum** field to `008 , 004`.

Installing the new group definition

1. At a CICS command line type `CEDA INS GROUP(`*`group name`*`)` 7 .
2. Press Enter to install the new group definition.

   Note: If this connection group is already in use you may get severe errors reported. If this happens, take the existing connections out of service, retry the above group installation, and then set the connections in service using the following commands:
   a. `CEMT I CONN`
   b. `CEMT S CONN(*) OUTS`
   c. `CEDA INS GROUP(`*`group name`*`)`
   d. `CEMT S CONN(*) INS`

What next?

The LU 6.2 connection is now established. You are ready to complete the configuration. Go to “MQSeries for VSE/ESA configuration” on page 601.

Establishing a TCP connection

TCP connections do not require the configuration of additional profiles as does the LU 6.2 protocol. Instead, MQSeries for VSE/ESA processes the listener program during startup.

The listener program waits for remote TCP connection requests. As these are received, the listener starts the receiver MCA to process the remote connection. When the remote connection is received from a client program, the receiver MCA starts the server program.

Note: There is one server process for each client connection.

Provided that the listener is active and TCP is active in a VSE partition, TCP connections can be established.

MQSeries for VSE/ESA configuration

Configuring MQSeries for VSE/ESA involves the following tasks:
- Configuring channels
- Defining a local queue
- Defining a remote queue
- Defining a sender channel
- Defining a receiver channel

Configuring channels

Examples are given for connecting MQSeries for VSE/ESA and MQSeries for OS/2 Warp. If you wish connect to another WebSphere MQ platform use the appropriate set of values from the table in place of those for OS/2.

Note: The words in **bold** are user-specified and reflect the names of WebSphere MQ objects used throughout these examples. If you change the names used here, ensure that you also change the other references made to these objects throughout this book. All others are keywords and should be entered as shown.

Refer to the sections “Defining a local queue” on page 605 and “Defining a remote queue” on page 607 for details of how to create queue definitions, and “Defining a SNA LU 6.2 sender channel” on page 609 and “Defining a SNA LU6.2 receiver channel” on page 610 for details of how to create channels.

Table 53. Configuration worksheet for MQSeries for VSE/ESA

ID	Parameter Name	Reference	Example Used	User Value
Definition for local node				
A	Queue Manager Name		**VSE**	
B	Local queue name		**VSE.LOCALQ**	
Connection to MQSeries for OS/2 Warp The values in this section of the table must match those used in the worksheet table for OS/2, as indicated.				
C	Remote queue manager name	**A**	**OS2**	
D	Remote queue name		**OS2.REMOTEQ**	
E	Queue name at remote system	**B**	**OS2.LOCALQ**	
F	Transmission queue name		**OS2**	

VSE/ESA configuration

Table 53. Configuration worksheet for MQSeries for VSE/ESA (continued)

ID	Parameter Name	Reference	Example Used	User Value
G	Sender channel name		**VSE.OS2.SNA**	
I	Receiver channel name	G	**OS2.VSE.SNA**	
Connection to WebSphere MQ for Windows The values in this section of the table must match those used in the worksheet table for Windows, as indicated.				
C	Remote queue manager name	A	**WINNT**	
D	Remote queue name		**WINNT.REMOTEQ**	
E	Queue name at remote system	B	**WINNT.LOCALQ**	
F	Transmission queue name		**WINNT**	
G	Sender channel name		**VSE.WINNT.SNA**	
I	Receiver channel name	G	**WINNT.VSE.SNA**	
Connection to WebSphere MQ for AIX The values in this section of the table must match those used in the worksheet table for AIX, as indicated.				
C	Remote queue manager name	A	**AIX**	
D	Remote queue name		**AIX.REMOTEQ**	
E	Queue name at remote system	B	**AIX.LOCALQ**	
F	Transmission queue name		**AIX**	
G	Sender channel name		**VSE.AIX.SNA**	
I	Receiver channel name	G	**AIX.VSE.SNA**	
Connection to MQSeries for Compaq Tru64 UNIX The values in this section of the table must match those used in the worksheet table for Compaq Tru64 UNIX, as indicated.				
C	Remote queue manager name	A	**DECUX**	
D	Remote queue name		**DECUX.REMOTEQ**	
E	Queue name at remote system	B	**DECUX.LOCALQ**	
F	Transmission queue name		**DECUX**	
H	Sender (TCP) channel name		**DECUX.VSE.TCP**	
I	Receiver channel name	J	**VSE.DECUX.TCP**	
Connection to WebSphere MQ for HP-UX The values in this section of the table must match those used in the worksheet table for HP-UX, as indicated.				
C	Remote queue manager name	A	**HPUX**	
D	Remote queue name		**HPUX.REMOTEQ**	
E	Queue name at remote system	B	**HPUX.LOCALQ**	
F	Transmission queue name		**HPUX**	
G	Sender channel name		**VSE.HPUX.SNA**	
I	Receiver channel name	G	**HPUX.VSE.SNA**	
Connection to MQSeries for AT&T GIS UNIX The values in this section of the table must match those used in the worksheet table for AT&T GIS UNIX (NCR UNIX), as indicated.				
C	Remote queue manager name	A	**GIS**	

Table 53. Configuration worksheet for MQSeries for VSE/ESA (continued)

ID	Parameter Name	Reference	Example Used	User Value
D	Remote queue name		**GIS.REMOTEQ**	
E	Queue name at remote system	B	**GIS.LOCALQ**	
F	Transmission queue name		**GIS**	
G	Sender channel name		**VSE.GIS.SNA**	
I	Receiver channel name	G	**GIS.VSE.SNA**	
Connection to WebSphere MQ for Solaris The values in this section of the table must match those used in the worksheet table for Solaris, as indicated.				
C	Remote queue manager name	A	**SOLARIS**	
D	Remote queue name		**SOLARIS.REMOTEQ**	
E	Queue name at remote system	B	**SOLARIS.LOCALQ**	
F	Transmission queue name		**SOLARIS**	
G	Sender channel name		**VSE.SOLARIS.SNA**	
I	Receiver channel name	G	**SOLARIS.VSE.SNA**	
Connection to WebSphere MQ for Linux for Intel The values in this section of the table must match those used in the worksheet table for Linux, as indicated.				
C	Remote queue manager name	A	**LINUX**	
D	Remote queue name		**LINUX.REMOTEQ**	
E	Queue name at remote system	B	**LINUX.LOCALQ**	
F	Transmission queue name		**LINUX**	
G	Sender channel name		**VSE.LINUX.SNA**	
I	Receiver channel name	G	**LINUX.VSE.SNA**	
Connection to WebSphere MQ for iSeries The values in this section of the table must match those used in the worksheet table for OS/400, as indicated.				
C	Remote queue manager name	A	**AS400**	
D	Remote queue name		**AS400.REMOTEQ**	
E	Queue name at remote system	B	**AS400.LOCALQ**	
F	Transmission queue name		**AS400**	
G	Sender channel name		**VSE.AS400.SNA**	
I	Receiver channel name	G	**AS400.VSE.SNA**	
Connection to WebSphere MQ for z/OS without CICS The values in this section of the table must match those used in the worksheet table for z/OS, as indicated.				
C	Remote queue manager name	A	**MVS**	
D	Remote queue name		**MVS.REMOTEQ**	
E	Queue name at remote system	B	**MVS.LOCALQ**	
F	Transmission queue name		**MVS**	
G	Sender channel name		**VSE.MVS.SNA**	
I	Receiver channel name	G	**MVS.VSE.SNA**	

VSE/ESA configuration

For TCP, the sender channel name **G** and the receiver channel name **I**, in the preceding table, can be `VSE.sys.tcp` and `sys.VSE.TCP` respectively.

In both cases `sys` represents the remote system name, for example, `OS2`. Therefore, in this case, **G** becomes `VSE.OS2.TCP` and **I** becomes `OS2.VSE.TCP`.

MQSeries for VSE/ESA sender-channel definitions

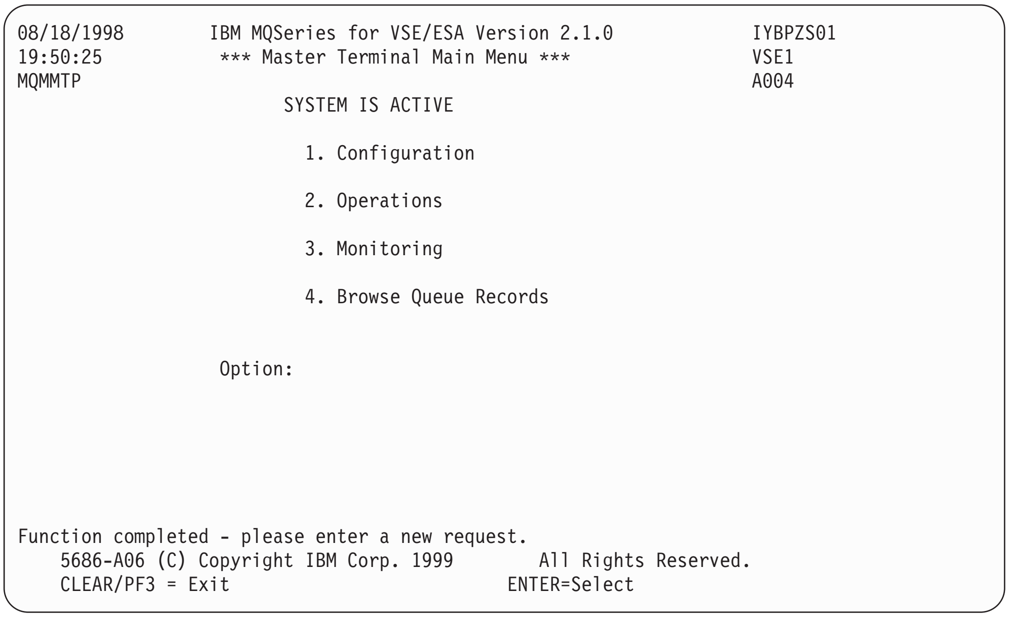
```
     Local Queue
            Object Type :   L
            Object Name :   OS2               F
              Usage Mode:   T (Transmission)

     Remote Queue
            Object Type :   R
            Object Name :   OS2.REMOTEQ       D
      Remote QUEUE Name :   OS2.LOCALQ        E
      Remote QM    Name :   OS2               C
      Transmission Name :   OS2               F

     Sender Channel
           Channel name :   VSE.OS2.SNA       G
           Channel type :   S (Sender)
Transmission queue name :   OS2               F
         Remote Task ID :   MQTP
        Connection name :   OS2               6
```

MQSeries for VSE/ESA receiver-channel definitions

```
     Local Queue
            Object type :   QLOCAL
            Object Name :   VSE.LOCALQ        B
             Usage Mode :   N (Normal)

     Receiver Channel
           Channel name :   OS2.VSE.SNA       I
           Channel type :   R (Receiver)
```

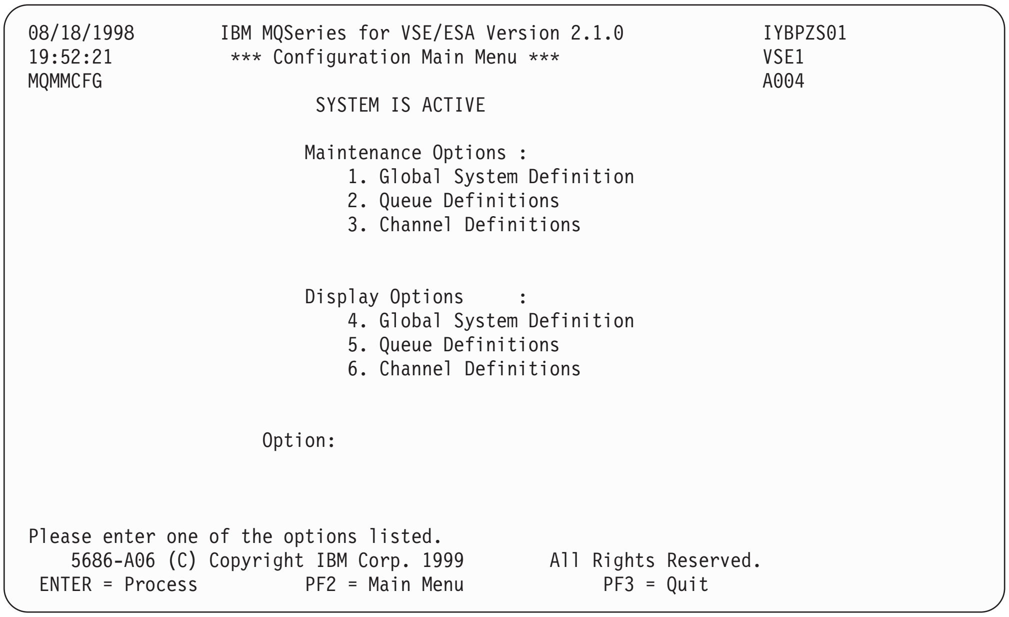
Defining a local queue

1. Run theMQSeries master terminal transaction MQMT.



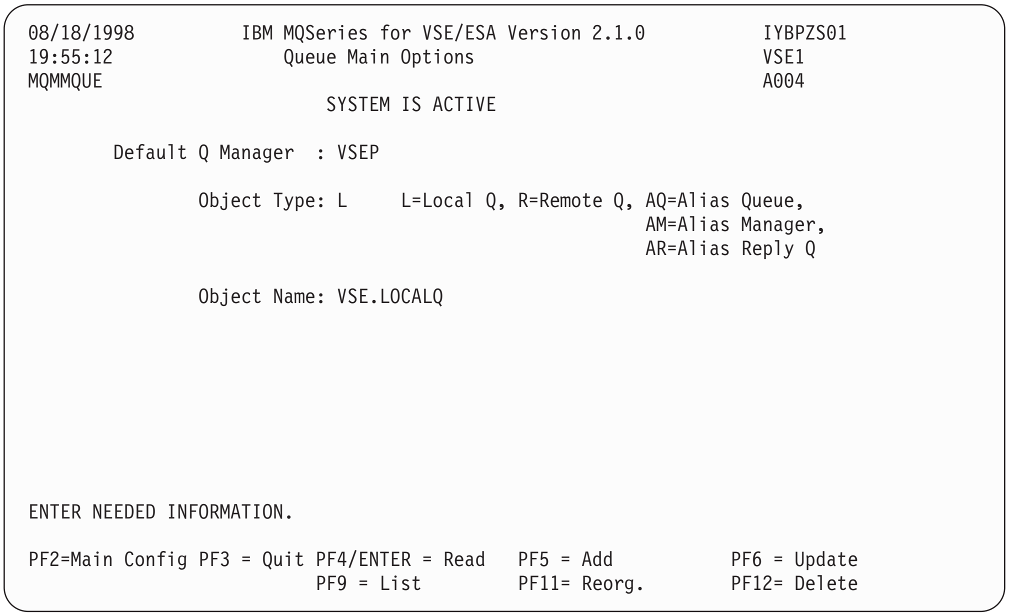
```
08/18/1998        IBM MQSeries for VSE/ESA Version 2.1.0            IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                VSE1
MQMMTP                                                              A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                   Option:







Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
    CLEAR/PF3 = Exit                         ENTER=Select
```

2. Select option 1 to configure.



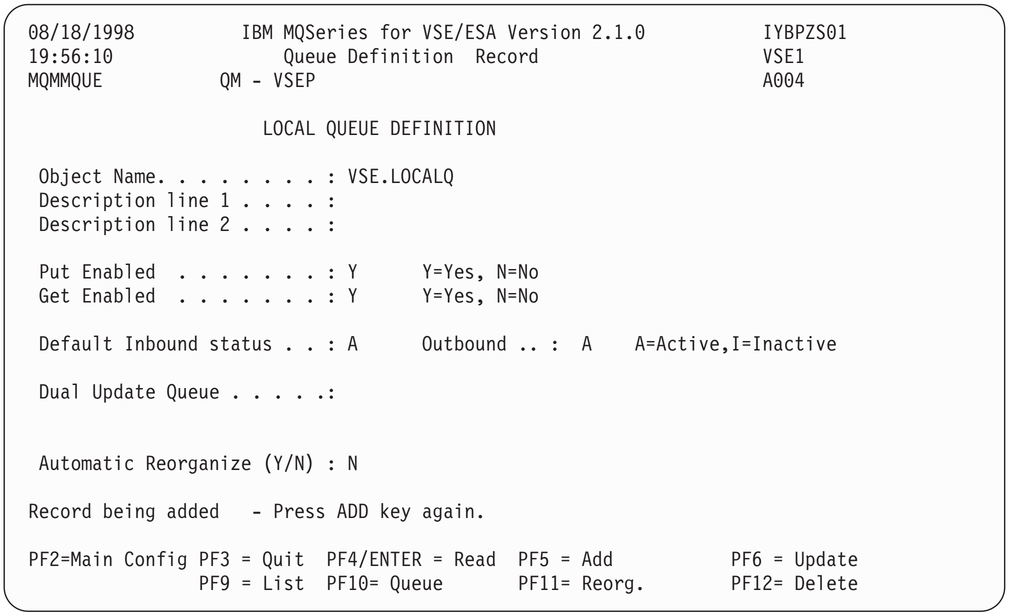
```
08/18/1998        IBM MQSeries for VSE/ESA Version 2.1.0            IYBPZS01
19:52:21           *** Configuration Main Menu ***                  VSE1
MQMMCFG                                                             A004
                           SYSTEM IS ACTIVE

                          Maintenance Options :
                              1. Global System Definition
                              2. Queue Definitions
                              3. Channel Definitions


                          Display Options     :
                              4. Global System Definition
                              5. Queue Definitions
                              6. Channel Definitions


                      Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 2 to work with queue definitions.



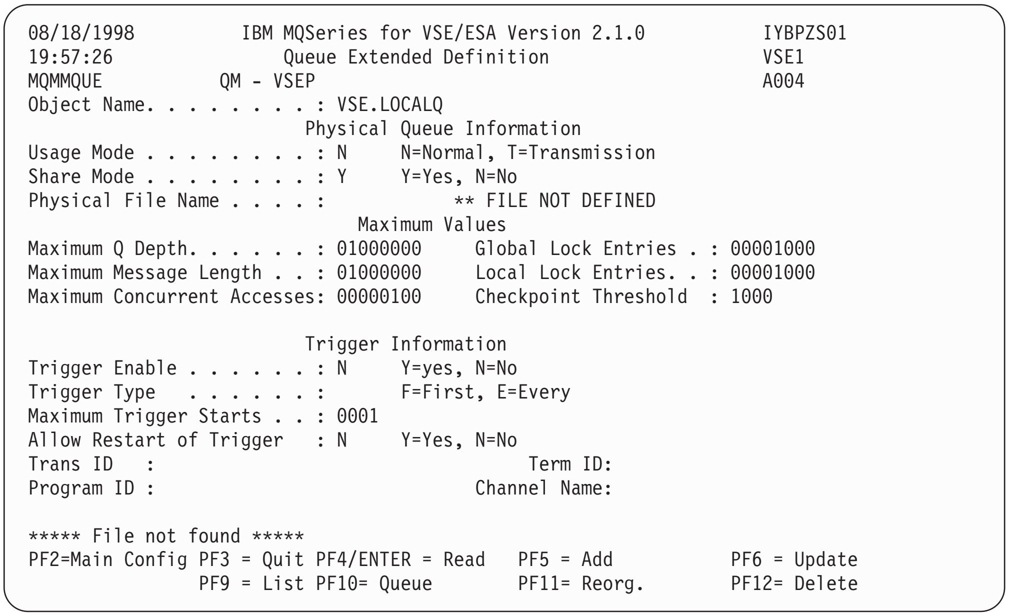
```
08/18/1998          IBM MQSeries for VSE/ESA Version 2.1.0           IYBPZS01
19:55:12                Queue Main Options                           VSE1
MQMMQUE                                                              A004
                            SYSTEM IS ACTIVE

        Default Q Manager  : VSEP

                Object Type: L     L=Local Q, R=Remote Q, AQ=Alias Queue,
                                                          AM=Alias Manager,
                                                          AR=Alias Reply Q

                Object Name: VSE.LOCALQ









ENTER NEEDED INFORMATION.

PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add           PF6 = Update
                           PF9 = List         PF11= Reorg.        PF12= Delete
```

4. Select an Object type of L and specify the name of the queue.
5. Press PF5.



```
08/18/1998          IBM MQSeries for VSE/ESA Version 2.1.0           IYBPZS01
19:56:10                Queue Definition  Record                     VSE1
MQMMQUE           QM - VSEP                                          A004

                      LOCAL QUEUE DEFINITION

 Object Name. . . . . . . . : VSE.LOCALQ
 Description line 1 . . . . :
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y      Y=Yes, N=No
 Get Enabled  . . . . . . . : Y      Y=Yes, N=No

 Default Inbound status . . : A      Outbound .. :  A    A=Active,I=Inactive

 Dual Update Queue . . . . .:


 Automatic Reorganize (Y/N) : N

Record being added   - Press ADD key again.

PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add           PF6 = Update
                PF9 = List  PF10= Queue       PF11= Reorg.        PF12= Delete
```

6. Press PF5 again.



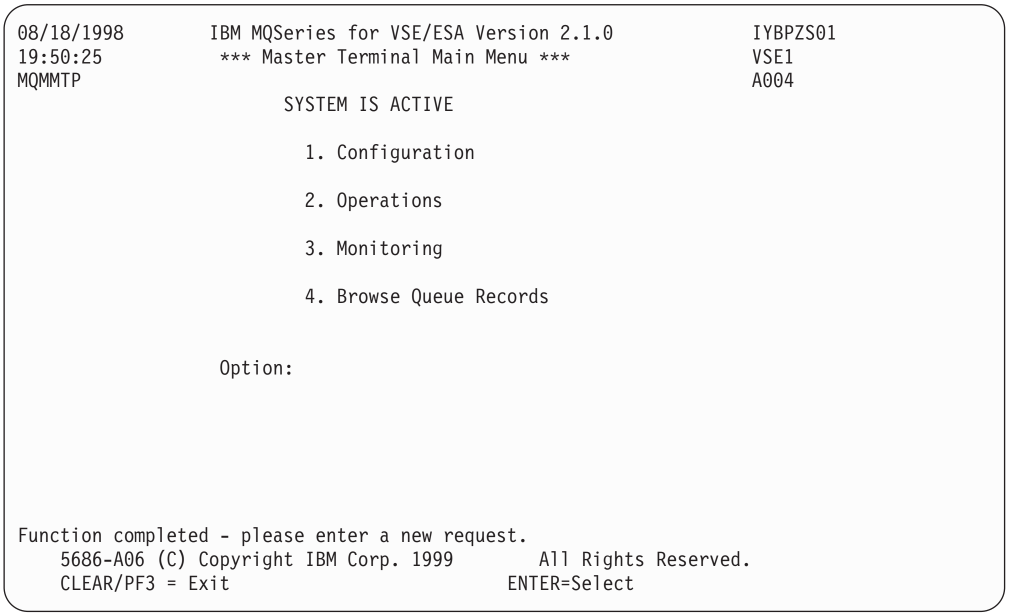
```
08/18/1998          IBM MQSeries for VSE/ESA Version 2.1.0           IYBPZS01
19:57:26                Queue Extended Definition                    VSE1
MQMMQUE           QM - VSEP                                          A004
Object Name. . . . . . . . : VSE.LOCALQ
                          Physical Queue Information
Usage Mode . . . . . . . . : N     N=Normal, T=Transmission
Share Mode . . . . . . . . : Y     Y=Yes, N=No
Physical File Name . . . . :            ** FILE NOT DEFINED
                               Maximum Values
Maximum Q Depth. . . . . . : 01000000     Global Lock Entries . : 00001000
Maximum Message Length . . : 01000000     Local Lock Entries. . : 00001000
Maximum Concurrent Accesses: 00000100     Checkpoint Threshold  : 1000

                          Trigger Information
Trigger Enable . . . . . . : N     Y=yes, N=No
Trigger Type   . . . . . . :       F=First, E=Every
Maximum Trigger Starts . . : 0001
Allow Restart of Trigger   : N     Y=Yes, N=No
Trans ID   :                                   Term ID:
Program ID :                              Channel Name:

***** File not found *****
PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add           PF6 = Update
                PF9 = List PF10= Queue        PF11= Reorg.        PF12= Delete
```

7. Specify the name of a CICS file to store messages for this queue.
8. If you are creating a transmission queue, specify a **Usage Mode** of `T`, a **Program ID** of `MQPSEND`, and a **Channel Name**< G >.

   For a normal queue specify a **Usage Mode** of `N`.
9. Press PF5 again.

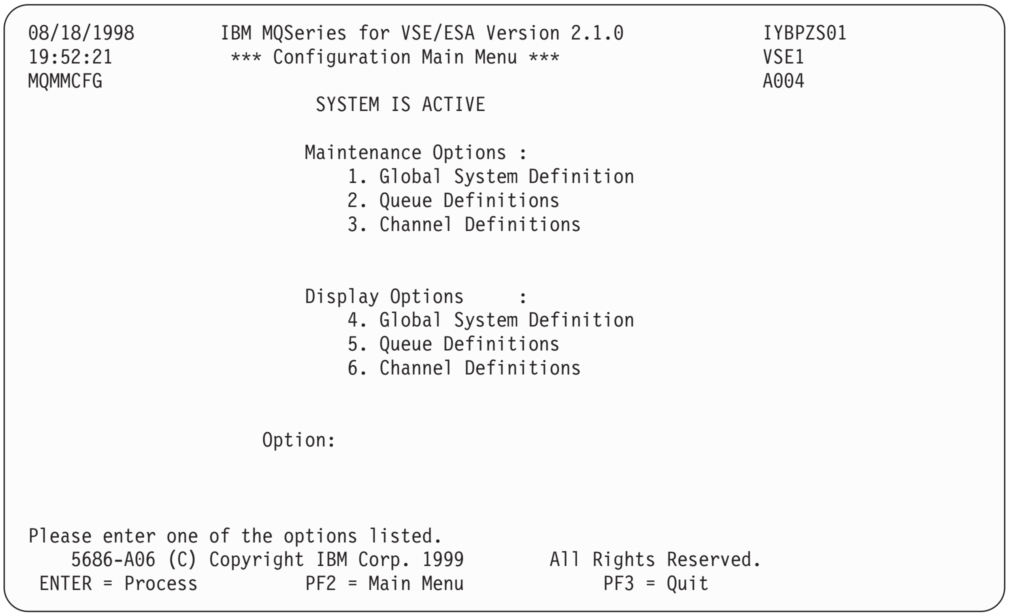
Defining a remote queue

1. Run the MQSeries master terminal transaction MQMT.



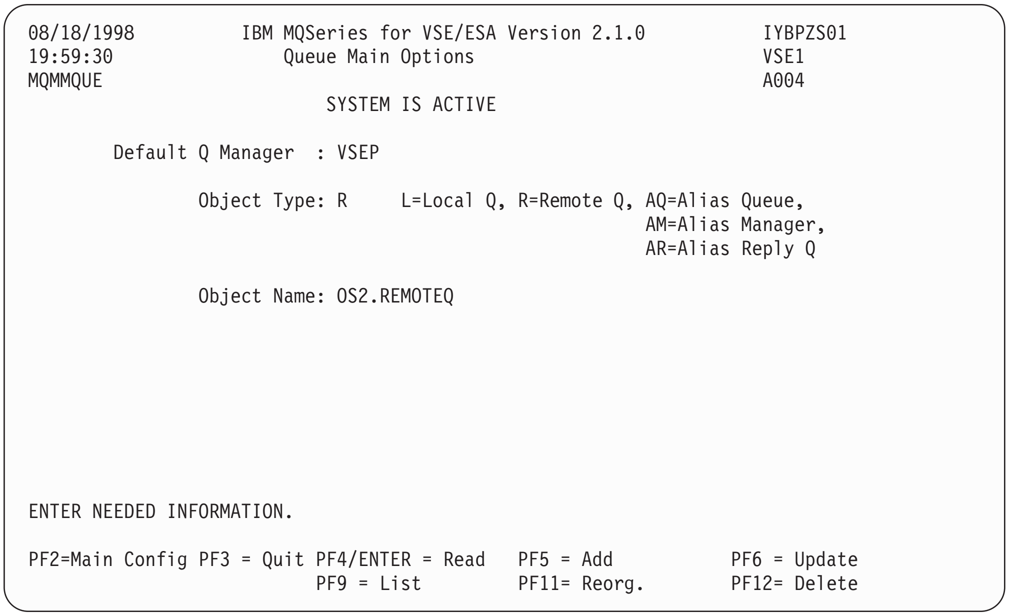
```
08/18/1998        IBM MQSeries for VSE/ESA Version 2.1.0             IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                 VSE1
MQMMTP                                                               A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                   Option:






Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.



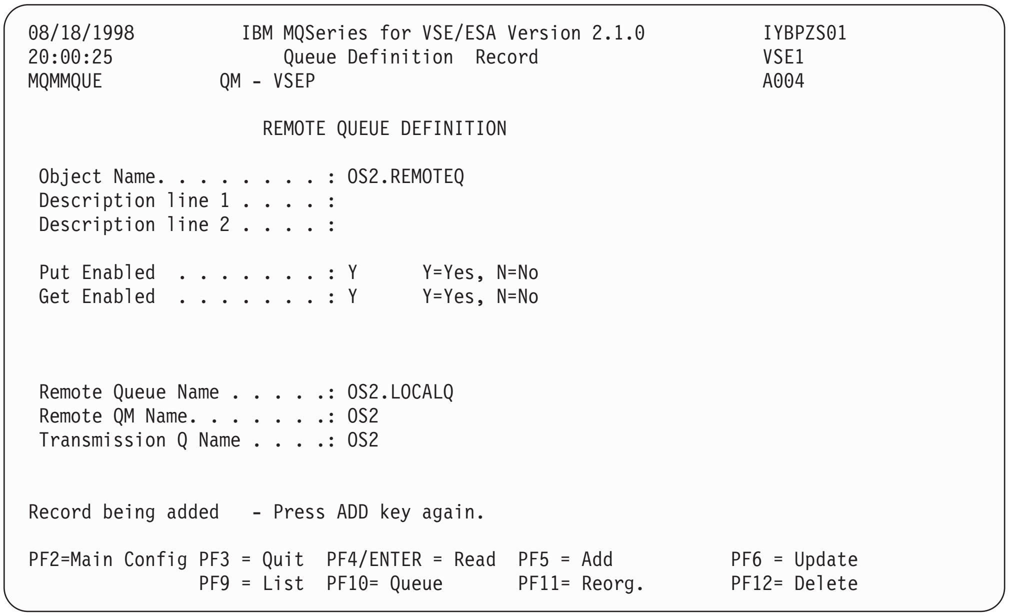
```
08/18/1998       IBM MQSeries for VSE/ESA Version 2.1.0            IYBPZS01
19:52:21          *** Configuration Main Menu ***                  VSE1
MQMMCFG                                                            A004
                           SYSTEM IS ACTIVE

                          Maintenance Options :
                              1. Global System Definition
                              2. Queue Definitions
                              3. Channel Definitions


                          Display Options     :
                              4. Global System Definition
                              5. Queue Definitions
                              6. Channel Definitions


                      Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 2 to work with queue definitions.



```
08/18/1998         IBM MQSeries for VSE/ESA Version 2.1.0          IYBPZS01
19:59:30               Queue Main Options                          VSE1
MQMMQUE                                                            A004
                            SYSTEM IS ACTIVE

        Default Q Manager  : VSEP

                Object Type: R     L=Local Q, R=Remote Q, AQ=Alias Queue,
                                                      AM=Alias Manager,
                                                      AR=Alias Reply Q

                Object Name: OS2.REMOTEQ








ENTER NEEDED INFORMATION.

PF2=Main Config PF3 = Quit PF4/ENTER = Read   PF5 = Add           PF6 = Update
                           PF9 = List         PF11= Reorg.        PF12= Delete
```

4. Select an **Object type** of **R** and specify the name of the queue.
5. Press PF5.

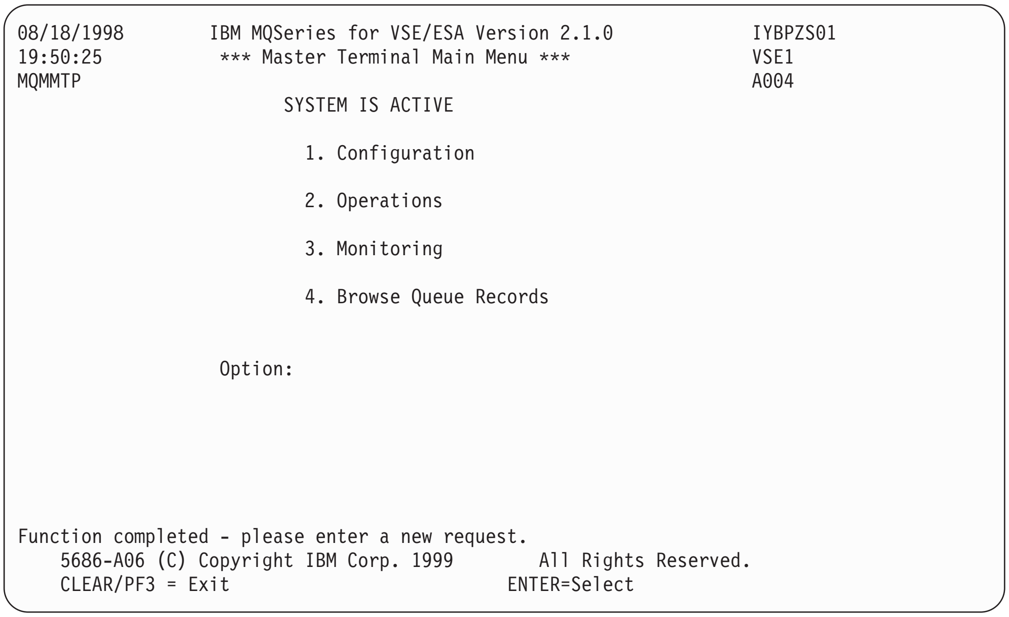


```
08/18/1998         IBM MQSeries for VSE/ESA Version 2.1.0           IYBPZS01
20:00:25                 Queue Definition  Record                   VSE1
MQMMQUE           QM - VSEP                                         A004

                      REMOTE QUEUE DEFINITION

 Object Name. . . . . . . . : OS2.REMOTEQ
 Description line 1 . . . . :
 Description line 2 . . . . :

 Put Enabled  . . . . . . . : Y      Y=Yes, N=No
 Get Enabled  . . . . . . . : Y      Y=Yes, N=No



 Remote Queue Name . . . . .: OS2.LOCALQ
 Remote QM Name. . . . . . .: OS2
 Transmission Q Name . . . .: OS2


Record being added   - Press ADD key again.

PF2=Main Config PF3 = Quit  PF4/ENTER = Read  PF5 = Add           PF6 = Update
                PF9 = List  PF10= Queue       PF11= Reorg.        PF12= Delete
```

6. Specify a remote queue name, remote queue manager name, and transmission queue name.
7. Press PF5.

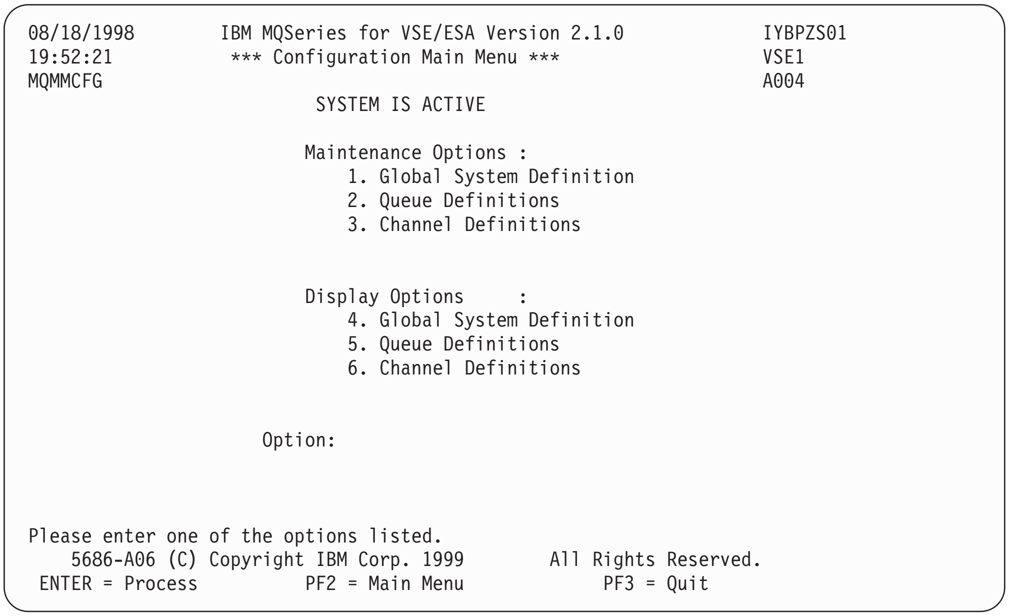
Defining a SNA LU 6.2 sender channel

1. Run the MQSeries master terminal transaction MQMT.



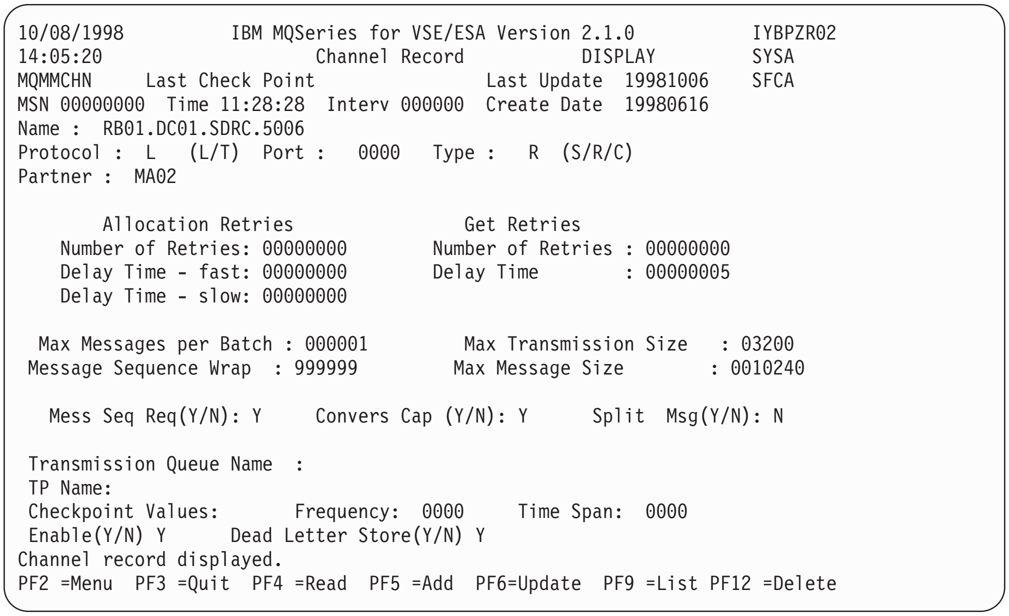
```
08/18/1998       IBM MQSeries for VSE/ESA Version 2.1.0            IYBPZS01
19:50:25          *** Master Terminal Main Menu ***                VSE1
MQMMTP                                                             A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                   Option:






Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.



```
08/18/1998       IBM MQSeries for VSE/ESA Version 2.1.0            IYBPZS01
19:52:21          *** Configuration Main Menu ***                  VSE1
MQMMCFG                                                            A004
                          SYSTEM IS ACTIVE

                         Maintenance Options :
                             1. Global System Definition
                             2. Queue Definitions
                             3. Channel Definitions


                         Display Options     :
                             4. Global System Definition
                             5. Queue Definitions
                             6. Channel Definitions


                     Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 3 to work with channel definitions.



```
10/08/1998         IBM MQSeries for VSE/ESA Version 2.1.0          IYBPZR02
14:05:20                    Channel Record           DISPLAY        SYSA
MQMMCHN     Last Check Point                Last Update  19981006    SFCA
MSN 00000000  Time 11:28:28  Interv 000000  Create Date  19980616
Name :  RB01.DC01.SDRC.5006
Protocol :  L   (L/T)  Port :   0000   Type :   R  (S/R/C)
Partner :  MA02

        Allocation Retries              Get Retries
    Number of Retries: 00000000       Number of Retries : 00000000
    Delay Time - fast: 00000000       Delay Time        : 00000005
    Delay Time - slow: 00000000

  Max Messages per Batch : 000001        Max Transmission Size   : 03200
 Message Sequence Wrap  : 999999        Max Message Size        : 0010240

   Mess Seq Req(Y/N): Y     Convers Cap (Y/N): Y      Split  Msg(Y/N): N

 Transmission Queue Name  :
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) Y
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

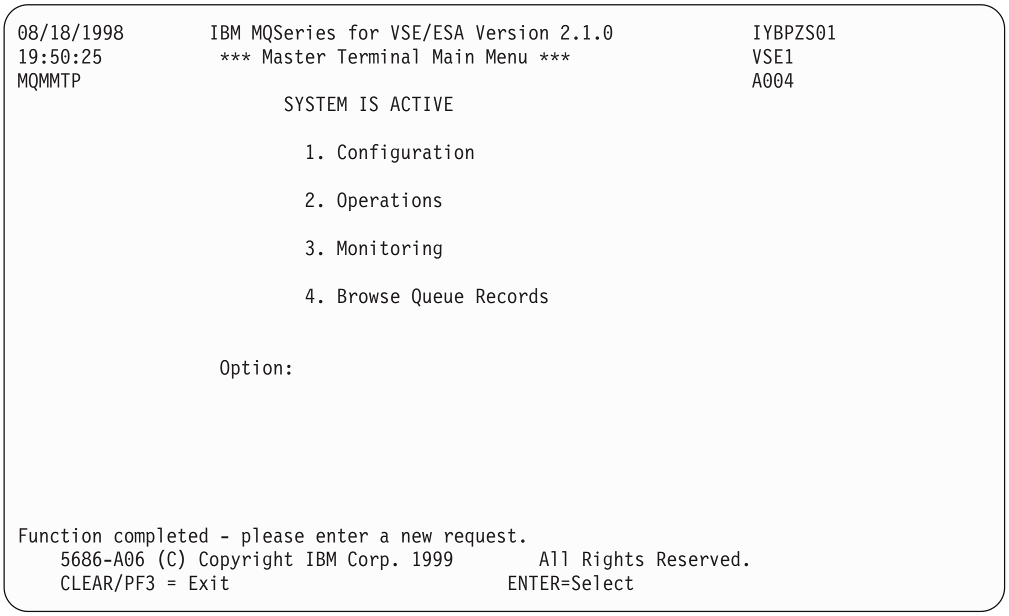
4. Complete the parameter fields as indicated, specifically the fields **Name**< G >, **Type**, **Partner**, **Transmission Queue Name**< F >, and **TP Name**.

   All other parameters can be entered as shown.

   Note that the default value for **sequence number wrap** is 999999, whereas for Version 2 products, this value defaults to 999999999.
5. Press PF5.

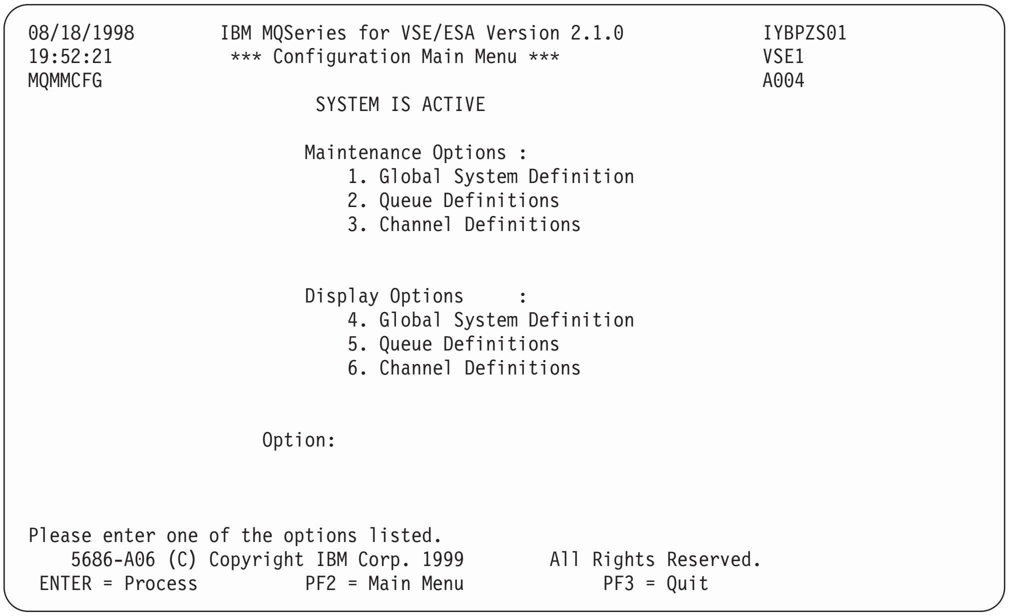
Defining a SNA LU6.2 receiver channel

1. Run the MQSeries master terminal transaction MQMT.



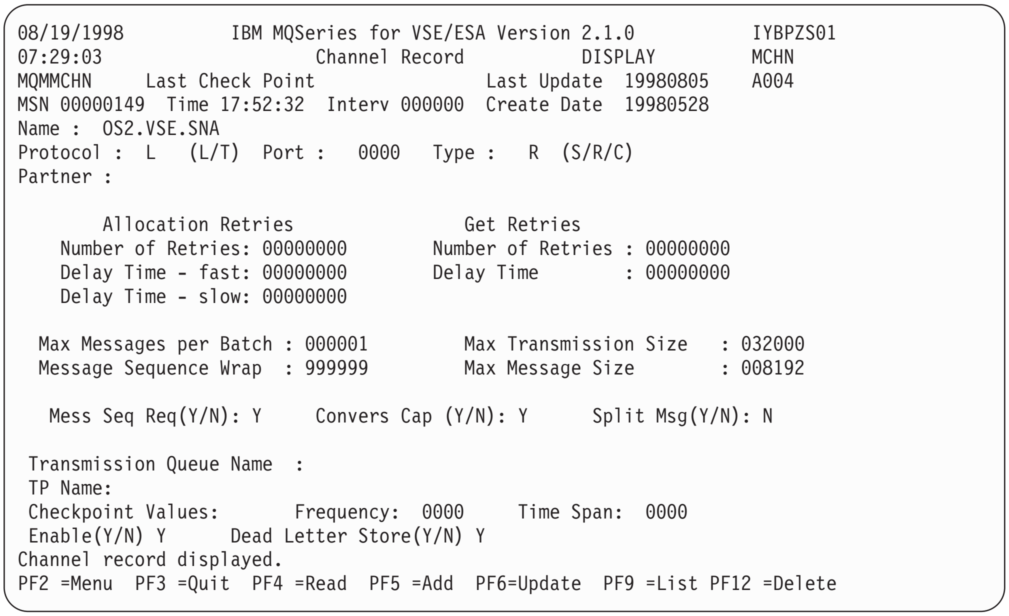
```
08/18/1998        IBM MQSeries for VSE/ESA Version 2.1.0             IYBPZS01
19:50:25           *** Master Terminal Main Menu ***                 VSE1
MQMMTP                                                               A004
                         SYSTEM IS ACTIVE

                           1. Configuration

                           2. Operations

                           3. Monitoring

                           4. Browse Queue Records


                   Option:






Function completed - please enter a new request.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
    CLEAR/PF3 = Exit                          ENTER=Select
```

2. Select option 1 to configure.



```
08/18/1998        IBM MQSeries for VSE/ESA Version 2.1.0             IYBPZS01
19:52:21           *** Configuration Main Menu ***                   VSE1
MQMMCFG                                                              A004
                           SYSTEM IS ACTIVE

                          Maintenance Options :
                              1. Global System Definition
                              2. Queue Definitions
                              3. Channel Definitions


                          Display Options     :
                              4. Global System Definition
                              5. Queue Definitions
                              6. Channel Definitions


                      Option:



Please enter one of the options listed.
    5686-A06 (C) Copyright IBM Corp. 1999        All Rights Reserved.
 ENTER = Process          PF2 = Main Menu             PF3 = Quit
```

3. Select option 3 to work with channel definitions.



```
08/19/1998         IBM MQSeries for VSE/ESA Version 2.1.0          IYBPZS01
07:29:03                   Channel Record           DISPLAY         MCHN
MQMMCHN     Last Check Point                Last Update  19980805    A004
MSN 00000149  Time 17:52:32  Interv 000000  Create Date  19980528
Name :  OS2.VSE.SNA
Protocol :  L   (L/T)  Port :   0000   Type :   R  (S/R/C)
Partner :

        Allocation Retries                Get Retries
    Number of Retries: 00000000        Number of Retries : 00000000
    Delay Time - fast: 00000000        Delay Time        : 00000000
    Delay Time - slow: 00000000

  Max Messages per Batch : 000001         Max Transmission Size   : 032000
  Message Sequence Wrap  : 999999         Max Message Size        : 008192

   Mess Seq Req(Y/N): Y     Convers Cap (Y/N): Y      Split Msg(Y/N): N

 Transmission Queue Name  :
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) Y
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

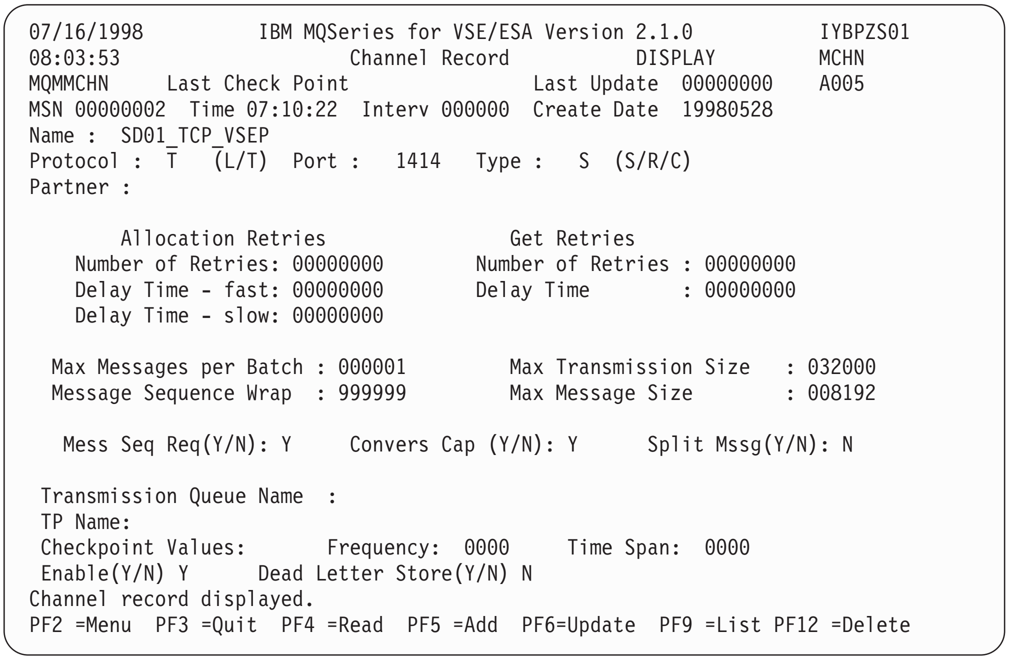
4. Complete the parameter fields as indicated, specifically the field **Channel name**< L >.

   All other parameters can be entered as shown.
5. Press PF5.

Defining a TCP/IP sender channel

To define a TCP/IP sender channel, carry out the following procedure:

1. Run the MQSeries master terminal transaction MQMT.
2. Select option 1 to configure.
3. Select option 3 to work with channel definitions. The screen shown in Figure 121 on page 613 is displayed. Follow the instructions after the figure to complete the required parameter fields:



```
07/16/1998          IBM MQSeries for VSE/ESA Version 2.1.0           IYBPZS01
08:03:53                    Channel Record           DISPLAY         MCHN
MQMMCHN     Last Check Point                Last Update  00000000    A005
MSN 00000002  Time 07:10:22  Interv 000000  Create Date  19980528
Name :  SD01_TCP_VSEP
Protocol :  T   (L/T)  Port :   1414   Type :   S  (S/R/C)
Partner :

        Allocation Retries                Get Retries
    Number of Retries: 00000000        Number of Retries : 00000000
    Delay Time - fast: 00000000        Delay Time        : 00000000
    Delay Time - slow: 00000000

  Max Messages per Batch : 000001         Max Transmission Size   : 032000
  Message Sequence Wrap  : 999999         Max Message Size        : 008192

   Mess Seq Req(Y/N): Y     Convers Cap (Y/N): Y      Split Mssg(Y/N): N

 Transmission Queue Name  :
 TP Name:
 Checkpoint Values:       Frequency:  0000     Time Span:  0000
 Enable(Y/N) Y      Dead Letter Store(Y/N) N
Channel record displayed.
PF2 =Menu  PF3 =Quit  PF4 =Read  PF5 =Add  PF6=Update  PF9 =List PF12 =Delete
```

Figure 121. Channel configuration panel

4. Complete the parameter fields as follows:
   - Channel name – **G** on the configuration worksheet.
   - Partner – should contain the IP address of the remote host, for example, 1.20.33.444.
   - Port – the port number must match the port number configured for the remote host. This is configured in the global system definition of the remote host. The default port number for MQSeries for VSE/ESA is 1414.
   - Transmission queue name – **F** on the configuration worksheet.
   - Protocol – enter `T` for TCP.
   - Channel type – enter `S` for sender.

   Notes:

   a. The TP Name is not used by TCP channels.
   b. Ensure that the parameter field values match the values of the receiver channel definition of the same name on the remote host.
5. Press PF5 (Add) to add the new channel definition.

Defining a TCP receiver channel

To define a TCP receiver channel, carry out the following procedure:

1. Run the MQSeries master terminal transaction MQMT.
2. Select option 1 to configure.
3. Select option 3 to work with channel definitions. The screen shown in Figure 121 is displayed.
4. Complete the parameter fields as follows:
   - Channel name – **G** on the configuration worksheet.
   - Protocol – enter `T` for TCP.
   - Channel type – enter `R` for receiver.

Notes:

- a. The Partner and Port are not required for a TCP receiver channel.
- b. The TP Name is not used by TCP channels.
- c. Ensure that the parameter field values match the values of the sender channel definition of the same name on the remote host.

5. Press PF5 (Add) to add the new channel definition.

Part 7. Further intercommunication considerations

Chapter 46. Channel-exit programs

This chapter discusses WebSphere MQ channel-exit programs. This is product-sensitive programming interface information. The following topics are covered:

- "What are channel-exit programs?"
- "Writing and compiling channel-exit programs" on page 633
- "Supplied channel-exit programs using DCE security services" on page 652

Message channel agents (MCAs) can also call data-conversion exits; these are discussed in the *WebSphere MQ Application Programming Guide*.

Note: Channel exit programs are not supported on DOS or VSE/ESA.

What are channel-exit programs?

Channel-exit programs are called at defined places in the processing carried out by MCA programs.

Some of these user-exit programs work in complementary pairs. For example, if a user-exit program is called by the sending MCA to encrypt the messages for transmission, the complementary process must be functioning at the receiving end to reverse the process.

The different types of channel-exit program are described below. Table 54 shows the types of channel exit that are available for each channel type.

Note: The only channels available in the reduced function form of WebSphere MQ for z/OS supplied with WebSphere Application Server are server-connection channels.

Table 54. Channel exits available for each channel type

Channel Type	Message exit	Message-retry exit	Receive exit	Security exit	Send exit	Auto-definition exit	Transport-retry exit
Sender channel	✓		✓	✓	✓		✓
Server channel	✓		✓	✓	✓		✓
Cluster-sender channel	✓		✓	✓	✓	✓	
Receiver channel	✓	✓	✓	✓	✓	✓	✓
Requester channel	✓	✓	✓	✓	✓		✓
Cluster-receiver channel	✓	✓	✓	✓	✓	✓	

Table 54. Channel exits available for each channel type (continued)

Channel Type	Message exit	Message-retry exit	Receive exit	Security exit	Send exit	Auto-definition exit	Transport-retry exit
Client-connection channel			✓	✓	✓		
Server-connection channel			✓	✓	✓	✓	

Notes:

1. The message-retry exit does not apply to WebSphere MQ for z/OS.
2. The auto-definition exit applies to WebSphere MQ for AIX, HP-UX, iSeries, Solaris, Windows, and z/OS (cluster-sender channels only), and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp V5.1 and WebSphere MQ for.
3. The transport-retry exit only applies to WebSphere MQ for AIX.

If you are going to run channel exits on a client, you cannot use the MQSERVER environment variable. Instead, create and reference a client channel definition table as described in the *WebSphere MQ Clients* book.

Processing overview

On startup, the MCAs exchange a startup dialog to synchronize processing. Then they switch to a data exchange that includes the security exits; these must end successfully for the startup phase to complete and to allow messages to be transferred.

The security check phase is a loop, as shown in Figure 122.

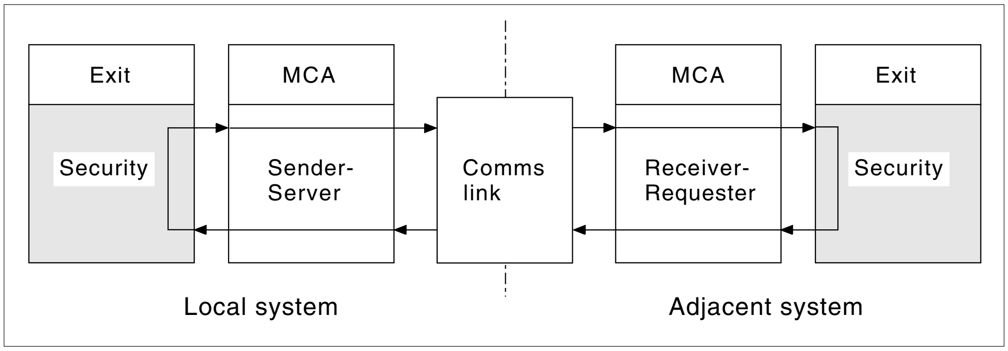


Figure 122. Security exit loop

During the message transfer phase, the sending MCA gets messages from a transmission queue, calls the message exit, calls the send exit, and then sends the message to the receiving MCA, as shown in Figure 123 on page 621.

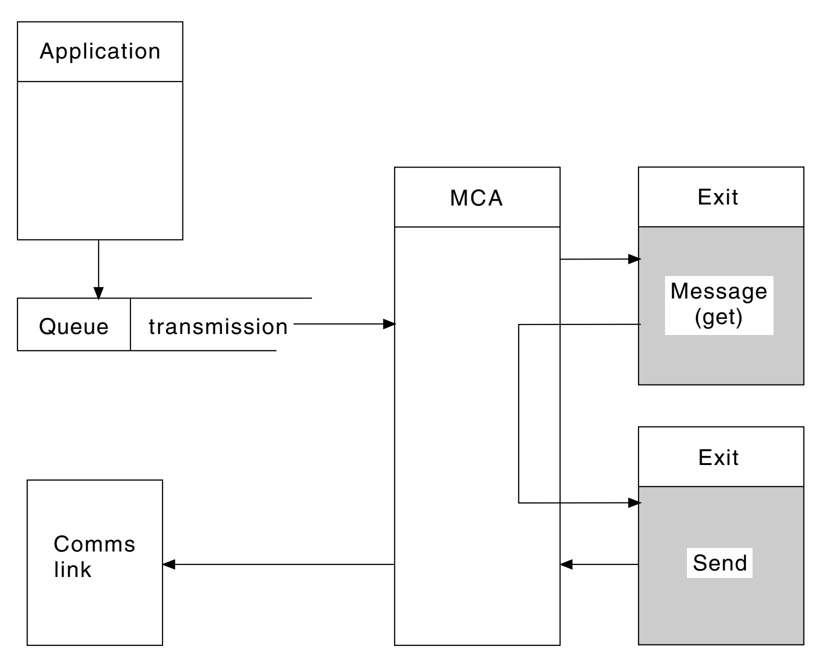


Figure 123. Example of a send exit at the sender end of message channel

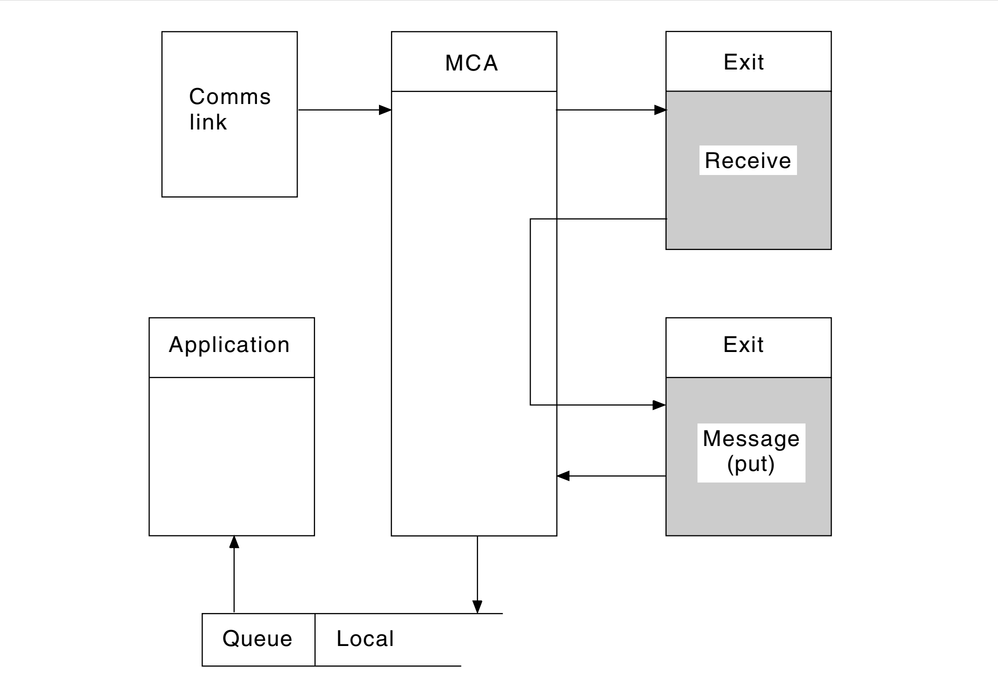


Figure 124. Example of a receive exit at the receiver end of message channel

The receiving MCA receives a message from the communications link, calls the receive exit, calls the message exit, and then puts the message on the local queue, as shown in Figure 124. (The receive exit can be called more than once before the message exit is called.)

Channel security exit programs

You can use security exit programs to verify that the partner at the other end of a channel is genuine.

Channel security exit programs are called at the following places in an MCA's processing cycle:

- At MCA initiation and termination.
- Immediately after the initial data negotiation is finished on channel startup. The receiver or server end of the channel may initiate a security message exchange with the remote end by providing a message to be delivered to the security exit at the remote end. It may also decline to do so. The exit program is re-invoked to process any security message received from the remote end.
- Immediately after the initial data negotiation is finished on channel startup. The sender or requester end of the channel processes a security message received from the remote end, or initiates a security exchange when the remote end cannot. The exit program is re-invoked to process all subsequent security messages that may be received.

A requester channel never gets called with MQXCC_INIT_SEC. The channel notifies the server that it has a security exit program, and the server then has the opportunity to initiate a security exit. If it does not have one, it sends a null security flow to allow the requester to call its exit program.

Note: You are recommended to avoid sending zero-length security messages.

WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, and the WebSphere MQ client for Windows 95 and Windows 98 supply a security exit program that uses the DCE security services. See "Supplied channel-exit programs using DCE security services" on page 652.

Examples of the data exchanged by security-exit programs are illustrated in figures 125 through 128. These examples show the sequence of events that occur involving the receiver's security exit (left-hand column) and the sender's security exit (right-hand column). Successive rows in the figures represent the passage of time. In some cases, the events at the receiver and sender are not correlated, and therefore can occur at the same time or at different times. In other cases, an event at one exit program results in a complementary event occurring later at the other exit program. For example, in Figure 125 on page 623:

1. The receiver and sender are each invoked with MQXR_INIT, but these invocations are not correlated and can therefore occur at the same time or at different times.
2. The receiver is next invoked with MQXR_INIT_SEC, but returns MQXCC_OK which requires no complementary event at the sender exit.
3. The sender is next invoked with MQXR_INIT_SEC. This is not correlated with the invocation of the receiver with MQXR_INIT_SEC. The sender returns MQXCC_SEND_SEC_MSG, which causes a complementary event at the receiver exit.
4. The receiver is subsequently invoked with MQXR_SEC_MSG, and returns MQXCC_SEND_SEC_MSG, which causes a complementary event at the sender exit.
5. The sender is subsequently invoked with MQXR_SEC_MSG, and returns MQXCC_OK which requires no complementary event at the receiver exit.

Receiver exit	**Sender exit**
Invoked with MQXR_INIT Responds with MQXCC_OK	Invoked with MQXR_INIT Responds with MQXCC_OK
Invoked with MQXR_INIT_SEC Responds with MQXCC_OK	
	Invoked with MQXR_INIT_SEC Responds with MQXCC_SEND_SEC_MSG
Invoked with MQXR_SEC_MSG Responds with MQXCC_SEND_SEC_MSG	
	Invoked with MQXR_SEC_MSG Responds with MQXCC_OK
Message transfer begins	

Figure 125. Sender-initiated exchange with agreement

Receiver exit	**Sender exit**
Invoked with MQXR_INIT Responds with MQXCC_OK	Invoked with MQXR_INIT Responds with MQXCC_OK
Invoked with MQXR_INIT_SEC Responds with MQXCC_OK	
	Invoked with MQXR_INIT_SEC Responds with MQXCC_SEND_SEC_MSG
Invoked with MQXR_SEC_MSG Responds with MQXCC_OK	
	Invoked with MQXR_SEC_MSG Responds with MQXCC_SUPPRESS_FUNCTION
Channel closes	
Invoked with MQXR_TERM Responds with MQXCC_OK	Invoked with MQXR_TERM Responds with MQXCC_OK

Figure 126. Sender-initiated exchange with no agreement

Receiver exit	**Sender exit**
Invoked with MQXR_INIT Responds with MQXCC_OK	Invoked with MQXR_INIT Responds with MQXCC_OK
Invoked with MQXR_INIT_SEC Responds with MQXCC_SEND_SEC_MSG	
	Invoked with MQXR_SEC_MSG Responds with MQXCC_SEND_SEC_MSG
Invoked with MQXR_SEC_MSG Responds with MQXCC_OK	
Message transfer begins	
Invoked with MQXR_TERM Responds with MQXCC_OK	Invoked with MQXR_TERM Responds with MQXCC_OK

Figure 127. Receiver-initiated exchange with agreement

Receiver exit	**Sender exit**
Invoked with MQXR_INIT Responds with MQXCC_OK	Invoked with MQXR_INIT Responds with MQXCC_OK
Invoked with MQXR_INIT_SEC Responds with MQXCC_SEND_SEC_MSG	
	Invoked with MQXR_SEC_MSG Responds with MQXCC_OK
Invoked with MQXR_SEC_MSG Responds with MQXCC_SUPRESS_FUNCTION	
Channel closes	

Figure 128. Receiver-initiated exchange with no agreement

Channel-exit programs

The channel security exit program is passed an agent buffer containing the security data, excluding any transmission headers, generated by the security exit. This may be any suitable data so that either end of the channel is able to perform security validation.

The security exit program at both the sending and receiving end of the message channel may return one of four response codes to any call:
- Security exchange ended with no errors
- Suppress the channel and close down
- Send a security message to the corresponding security exit at the remote end
- Send a security message and demand a reply (this does not apply on z/OS when using CICS)

Notes:
1. The channel security exits usually work in pairs. When you define the appropriate channels, make sure that compatible exit programs are named for both ends of the channel.
2. In OS/400, security exit programs that have been compiled with "Use adopted authority" (USEADPAUT=*YES) have the ability to adopt QMQM or QMQMADM authority. Take care that the exit does not exploit this feature to pose a security risk to your system.

Channel send and receive exit programs

You can use the send and receive exits to perform tasks such as data compression and decompression. WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, z/OS without CICS, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, and with WebSphere MQ clients, you can specify a list of send and receive exit programs to be run in succession.

Channel send and receive exit programs are called at the following places in an MCA's processing cycle:
- The send and receive exit programs are called for initialization at MCA initiation and for termination at MCA termination.
- The send exit program is invoked at either end of the channel, immediately before a transmission is sent over the link.
- The receive exit program is invoked at either end of the channel, immediately after a transmission has been taken from the link.

Note: For WebSphere MQ for z/OS using CICS, only the security exit is called at MCA initiation; other exits are called with the *ExitReason* parameter set to MQXR-INIT when the first message is sent across the channel.

There may be many transmissions for one message transfer, and there could be many iterations of the send and receive exit programs before a message reaches the message exit at the receiving end.

The channel send and receive exit programs are passed an agent buffer containing the transmission data as sent or received from the communications link. For send exit programs, the first eight bytes of the buffer are reserved for use by the MCA, and must not be changed. If the program returns a different buffer, then these first eight bytes must exist in the new buffer. The format of data presented to the exit programs is not defined.

A good response code must be returned by send and receive exit programs. Any other response will cause an MCA abnormal end (abend).

Note: Do not issue an MQGET, MQPUT, or MQPUT1 call within syncpoint from a send or receive exit.

WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, and the WebSphere MQ client for Windows 95 and Windows 98 supply send and receive exit programs that use the DCE encryption security services. See “Supplied channel-exit programs using DCE security services” on page 652.

Notes:

1. Send and receive exits usually work in pairs. For example a send exit may compress the data and a receive exit decompress it, or a send exit may encrypt the data and a receive exit decrypt it. When you define the appropriate channels, make sure that compatible exit programs are named for both ends of the channel.
2. Channel send and receive exits may be called for message segments other than for application data, for example, status messages. They are not called during the startup dialog, nor the security check phase.
3. Although message channels send messages in one direction only, channel-control data flows in both directions, and these exits are available in both directions, also. However, some of the initial channel startup data flows are exempt from processing by any of the exits.
4. There are circumstances in which send and receive exits could be invoked out of sequence; for example, if you are running a series of exit programs or if you are also running security exits. Then, when the receive exit is first called upon to process data, it may receive data that has not passed through the corresponding send exit. If the receive exit were just to perform the operation, for example decompression, without first checking that it was really required, the results would be unexpected.

   You should code your send and receive exits in such a way that the receive exit can check that the data it is receiving has been processed by the corresponding send exit. The recommended way to do this is to code your exit programs so that:

   - The send exit sets the value of the ninth byte of data to 0 and shifts all the data along one byte, before performing the operation. (The first eight bytes are reserved for use by the MCA.)
   - If the receive exit receives data that has a 0 in byte 9, it knows that the data has come from the send exit. It removes the 0, performs the complementary operation, and shifts the resulting data back by one byte.
   - If the receive exit receives data that has something other than 0 in byte 9, it assumes that the send exit has not run, and sends the data back to the caller unchanged.

   When using security exits, if the channel is ended by the security exit it is possible that a send exit may be called without the corresponding receive exit. One way to prevent this from being a problem is to code the security exit to set a flag, in MQCD.SecurityUserData or MQCD.SendUserData, for example, when the exit decides to end the channel. Then the send exit should check this field, and process the data only if the flag is not set. This prevents the send exit from unnecessarily altering the data, and thus prevents any conversion errors that could occur if the security exit received altered data.

5. In the case of MQI channels for clients, byte 10 of the agent buffer identifies the API call in use when the send or receive exit is called. This is useful for identifying which channel flows include user data and may require processing such as encryption or digital signing.

   Table 55 shows the data that appears in byte 10 of the channel flow when an API call is being processed.

   Note: These are not the only values of this byte. There are other ***reserved*** values.

Table 55. Identifying API calls

API call	Value of byte 10
MQCONN request (5a, 5b)	X'81'
MQCONN reply (5a, 5b)	X'91'
MQDISC request (5a)	X'82'
MQDISC reply (5a)	X'92'
MQOPEN request (5c)	X'83'
MQOPEN reply (5c)	X'93'
MQCLOSE request	X'84'
MQCLOSE reply	X'94'
MQGET request (5d)	X'85'
MQGET reply (5d)	X'95'
MQPUT request (5d)	X'86'
MQPUT reply (5d)	X'96'
MQPUT1 request (5d)	X'87'
MQPUT1 reply (5d)	X'97'
MQSET request	X'88'
MQSET reply	X'98'
MQINQ request	X'89'
MQINQ reply	X'99'
MQCMIT request	X'8A'
MQCMIT reply	X'9A'
MQBACK request	X'8B'
MQBACK reply	X'9B'

Notes™:

a. The connection between the client and server is initiated by the client application using MQCONN. Therefore, for this command in particular, there will be several other network flows. This also applies to MQDISC that terminates the network connection.

b. MQCONNX is treated in the same way as MQCONN for the purposes of the client-server connection.

c. If a large distribution list is opened, there may be more than one network flow per MQOPEN call in order to pass all of the required data to the SVRCONN MCA.

d. If the message data exceeds the transmission segment size, there may be a large number of network flows per single API call.

Channel send exit programs — reserving space

You can use send and receive exits to transform the data before transmission. Channel send exit programs can add their own data about the transformation by reserving space in the transmission buffer. This data is processed by the receive exit program and then removed from the buffer. For example, you might want to encrypt the data and add a security key for decryption.

How you reserve space and use it

When the send exit program is called for initialization, set the `ExitSpace` field of MQXCP to the number of bytes to be reserved. See "MQCXP – Channel exit parameter" on page 714 for details. `ExitSpace` can be set only during initialization, that is when `ExitReason` has the value MQXR_INIT. When the send exit is invoked immediately before transmission, with `ExitReason` set to MQXR_XMIT, `ExitSpace` bytes are reserved in the transmission buffer. `ExitSpace` is not supported on z/OS

The send exit need not use all of the reserved space. It can use less than `ExitSpace` bytes or, if the transmission buffer is not full, the exit can use more than the amount reserved. When setting the value of `ExitSpace`, you must leave at least 1 KB for message data in the transmission buffer. Note that channel performance can be affected if reserved space is used for large amounts of data.

What happens at the receiving end of the channel

Channel receive exit programs must be set up to be compatible with the corresponding send exits. Receive exits must know the number of bytes in the reserved space and must remove the data in that space.

Multiple send exits

You can specify a list of send and receive exit programs to be run in succession. WebSphere MQ maintains a total for the space reserved by all of the send exits. This total space must leave at least 1 KB for message data in the transmission buffer.

The following example shows how space is allocated for three send exits, called in succession:

1. When called for initialization:
   - Send exit A reserves 1 KB.
   - Send exit B reserves 2 KB.
   - Send exit C reserves 3 KB.
2. The maximum transmission size is 32 KB and the user data is 5 KB long.
3. Exit A is called with 5 KB of data; up to 27 KB are available, because 5KB is reserved for exits B and C. Exit A adds 1KB, the amount it reserved.
4. Exit B is called with 6 KB of data; up to 29 KB are available, because 3KB is reserved for exit C. Exit B adds 1KB, less than the 2KB it reserved.
5. Exit C is called with 7 KB of data; up to 32 KB are available. Exit C adds 10K, more than the 3KB it reserved. This is valid, because the total amount of data, 17 KB, is less than the 32KB maximum.

Channel message exit programs

You can use the channel message exit for the following:

- Encryption on the link
- Validation of incoming user IDs
- Substitution of user IDs according to local policy
- Message data conversion
- Journaling
- Reference message handling

Channel-exit programs

WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, z/OS without CICS, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp, and with WebSphere MQ clients, you can specify a list of message exit programs to be run in succession.

Channel message exit programs are called at the following places in an MCA's processing cycle:
- At MCA initiation and termination
- Immediately after a sending MCA has issued an MQGET call
- Before a receiving MCA issues an MQPUT call

The message exit is passed an agent buffer containing the transmission queue header, MQXQH, and the application message text as retrieved from the queue. (The format of MQXQH is given in the *WebSphere MQ Application Programming Reference* book.) If you use reference messages, that is messages that contain only a header which points to some other object that is to be sent, the message exit recognizes the header, MQRMH. It identifies the object, retrieves it in whatever way is appropriate appends it to the header, and passes it to the MCA for transmission to the receiving MCA. At the receiving MCA, another message exit recognizes that this is a reference message, extracts the object, and passes the header on to the destination queue. See the *WebSphere MQ Application Programming Guide* for more information about reference messages and some sample message exits that handle them.

Message exits can return the following responses:
- Send the message (GET exit). The message may have been changed by the exit. (This returns MQXCC_OK.)
- Put the message on the queue (PUT exit). The message may have been changed by the exit. (This returns MQXCC_OK.)
- Do not process the message. The message is placed on the dead-letter queue (undelivered message queue) by the MCA.
- Close the channel.
- Bad return code, which causes the MCA to abend.

Notes:
1. Message exits are called just once for every complete message transferred, even when the message is split into parts.
2. In UNIX systems, if you provide a message exit for any reason the automatic conversion of user IDs to lowercase characters does not operate. See "User IDs on UNIX systems, Compaq OpenVMS Alpha" on page 127.
3. An exit runs in the same thread as the MCA itself. It also runs inside the same unit of work (UOW) as the MCA because it uses the same connection handle. Therefore, any calls made under syncpoint are committed or backed out by the channel at the end of the batch. For example, one channel message exit program can send notification messages to another and these messages will only be committed to the queue when the batch containing the original message is committed.

   Therefore, it is possible to issue syncpoint MQI calls from a channel message exit program.

WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp supplies a message exit program that uses the DCE security services. See "Supplied channel-exit programs using DCE security services" on page 652.

Channel message retry exit program

The channel message-retry exit is called when an attempt to open the target queue is unsuccessful. You can use the exit to determine under which circumstances to retry, how many times to retry, and how frequently. (This exit is not available on WebSphere MQ for z/OS.)

This exit is also called at the receiving end of the channel at MCA initiation and termination.

The channel message-retry exit is passed an agent buffer containing the transmission queue header, MQXQH, and the application message text as retrieved from the queue. The format of MQXQH is given in the *WebSphere MQ Application Programming Reference* book.

The exit is invoked for all reason codes; the exit determines for which reason codes it wants the MCA to retry, for how many times, and at what intervals. (The value of the message-retry count set when the channel was defined is passed to the exit in the MQCD, but the exit can ignore this.)

The MsgRetryCount field in MQCXP is incremented by the MCA each time the exit is invoked, and the exit returns either MQXCC_OK with the wait time contained in the MsgRetryInterval field of MQCXP, or MQXCC_SUPPRESS_FUNCTION. Retries continue indefinitely until the exit returns MQXCC_SUPPRESS_FUNCTION in the ExitResponse field of MQCXP. See "MQCXP – Channel exit parameter" on page 714 for information about the action taken by the MCA for these completion codes.

If all the retries are unsuccessful, the message is written to the dead-letter queue. If there is no dead-letter queue available, the channel stops.

If you do not define a message-retry exit for a channel and a failure occurs that is likely to be temporary, for example MQRC_Q_FULL, the MCA uses the message-retry count and message-retry intervals set when the channel was defined. If the failure is of a more permanent nature and you have not defined an exit program to handle it, the message is written to the dead-letter queue.

Channel auto-definition exit program

The channel auto-definition exit can be called when a request is received to start a receiver or server-connection channel but no channel definition exists. The exit applies to WebSphere MQ for AIX, HP-UX, iSeries, Solaris, and Windows, and MQSeries for Compaq Tru64 UNIX, and OS/2 Warp V5.1. You can use it to modify the supplied default definition for an automatically defined receiver or server-connection channel, SYSTEM.AUTO.RECEIVER or SYSTEM.AUTO.SVRCON. See "Auto-definition of receiver and server-connection channels" on page 60 for a description of how channel definitions can be created automatically.

The channel auto-definition exit can also be called when a request is received to start a cluster-sender channel. It can be called for cluster-sender and cluster-receiver channels to allow definition modification for this instance of the channel. In this case, the exit applies to WebSphere MQ for z/OS as well as WebSphere MQ for AIX, HP-UX, iSeries, Solaris, and Windows, and MQSeries for Compaq Tru64 UNIX, Compaq NonStop Kernel, Compaq OpenVMS Alpha, and OS/2 Warp V5.1. For more information about this, see the *WebSphere MQ Queue Manager Clusters* book.

As with other channel exits, the parameter list is:

```
MQ_CHANNEL_AUTO_DEF_EXIT (ChannelExitParms, ChannelDefinition)
```

`ChannelExitParms` are described in "MQCXP – Channel exit parameter" on page 714. `ChannelDefinition` is described in "MQCD – Channel definition" on page 674.

MQCD contains the values that are used in the default channel definition if they are not altered by the exit. The exit may modify only a subset of the fields; see "MQ_CHANNEL_AUTO_DEF_EXIT – Channel auto-definition exit" on page 667. However, attempting to change other fields does not cause an error.

The channel auto-definition exit returns a response of either MQXCC_OK or MQXCC_SUPPRESS_FUNCTION. If neither of these is returned, the MCA continues processing as though MQXCC_SUPPRESS_FUNCTION were returned. That is, the auto-definition is abandoned, no new channel definition is created and the channel cannot start.

Transport-retry exit program

The transport-retry exit applies to WebSphere MQ for AIX and is supported on UDP only. It allows you to write a C-language retry exit. The exit allows your application to suspend data being sent on a channel when communication is not possible (for example, when a mobile user is traveling through a tunnel or is temporarily out of range of a transmitter).

The transport-retry exit can be associated with a monitor program that can assess whether the IP connection is available for sending data. The exit has to be built into a library that is included in the path in which you are operating.

The exit is normally called before a datagram is about to be sent but is also called to provide other useful signals.

The retry exit is called under five different conditions:

- When the WebSphere MQ channel is first initialized; the *ExitReason* variable is set to a value of MQXR_INIT.
- When the WebSphere MQ channel is shut down; the *ExitReason* variable is set to a value of MQXR_TERM.
- Before each datagram is sent; the *ExitReason* variable is set to a value of MQXR_RETRY.
- When the end of a batch of messages occurs; the *ExitReason* variable is set to a value of MQXR_END_BATCH.
- When an information datagram is received from the remote end of the link; the `ExitReason` variable is set to a value of MQXR_ACK_RECEIVED.

If you want to postpone sending a datagram in response to an `ExitReason` of MQXR_RETRY, you need to block returning from the exit until it is safe to send the datagram. In all other cases, the return from the exit should be immediate.

There are three possible return codes that can be set when returning from the exit:

- MQXCC_OK — this is the normal response.
- MQXCC_CLOSE_CHANNEL — in response to an `ExitReason` of MQXR_RETRY, this will cause the channel to be closed.

- MQXCC_REQUEST_ACK — in response to an `ExitReason` of MQXR_RETRY, this will cause the datagram about to be sent to be modified so that it requests the remote end of the link to send an information datagram back to indicate that the node can be reached. If this datagram arrives the exit will be invoked again with an `ExitReason` of MQXR_ACK_RECEIVED.

  Note: If the datagram fails to arrive at the remote node, for any reason, you must repeat the request on the next datagram that is sent.

The transport-retry exit name can be defined by the user, who can also change the name of the library that contains the exit. You configure the retry exit by editing the qm.ini file. For more information about editing these files, see the *WebSphere MQ System Administration Guide* book.

Writing and compiling channel-exit programs

Channel exits must be named in the channel definition. You can do this when you first define the channels, or you can add the information later using, for example, the MQSC command ALTER CHANNEL. You can also give the channel exit names in the MQCD channel data structure. The format of the exit name depends on your WebSphere MQ platform; see “MQCD – Channel definition” on page 674 or the *WebSphere MQ Script (MQSC) Command Reference* book for information.

If the channel definition does not contain a user-exit program name, the user exit is not called.

The channel auto-definition exit is the property of the queue manager, not the individual channel. In order for this exit to be called, it must be named in the queue manager definition. To alter a queue manager definition, use the MQSC command ALTER QMGR.

User exits and channel-exit programs are able to make use of all MQI calls, except as noted in the sections that follow. To get the connection handle, an MQCONN must be issued, even though a warning, MQRC_ALREADY_CONNECTED, is returned because the channel itself is connected to the queue manager.

For exits on client-connection channels, the queue manager to which the exit tries to connect, depends on how the exit was linked. If the exit was linked with MQM.LIB (or QMQM/LIBMQM on OS/400) and you do not specify a queue manager name on the MQCONN call, the exit will try to connect to the default queue manager on your system. If the exit was linked with MQM.LIB (or QMQM/LIBMQM on OS/400) and you specify the name of the queue manager that was passed to the exit through the QMgrName field of MQCD, the exit tries to connect to that queue manager. If the exit was linked with MQIC.LIB or any other library, the MQCONN call will fail whether you specify a queue manager name or not.

Note: You are recommended to avoid issuing the following MQI calls in channel-exit programs:

- MQCMIT
- MQBACK
- MQBEGIN
- MQDISC

Channel-exit programs

An exit runs in the same thread as the MCA itself and uses the same connection handle. So, it runs inside the same UOW as the MCA and any calls made under syncpoint are committed or backed out by the channel at the end of the batch.

Therefore, a channel message exit could send notification messages that will only be committed to that queue when the batch containing the original message is committed. So, it is possible to issue syncpoint MQI calls from a channel message exit.

Channel-exit programs should not modify the Channel data structure (MQCD). They can actually change the `BatchSize` parameter and a security exit can set the `MCAUserIdentifier` parameter, but `ChannelType` and `ChannelName` must not be changed.

Also, for programs written in C, non-reentrant C library function should not be used in a channel-exit program.

All exits are called with a channel exit parameter structure (MQCXP), a channel definition structure (MQCD), a prepared data buffer, data length parameter, and buffer length parameter. The buffer length must not be exceeded:

- For message exits, you should allow for the largest message required to be sent across the channel, plus the length of the MQXQH structure.
- For send and receive exits, the largest buffer you should allow for is as follows:

  LU 6.2:
  OS/2 64 KB
  Others 32 KB

  TCP:
  OS/400 16 KB
  Others 32 KB

  Note: The maximum usable length may be 2 bytes less than this. Check the value returned in MaxSegmentLength for details. For more information on MaxSegmentLength, see "MaxSegmentLength (MQLONG)" on page 721.

  UDP:
  32 KB

  NetBIOS:
  DOS 4 KB
  Others 64 KB

  SPX:
  64 KB

  Note: Receive exits on sender channels and sender exits on receiver channels use 2 KB buffers for TCP.
- For security exits, the distributed queuing facility allocates a buffer of 4000 bytes.
- On z/OS using CICS, all exits use the maximum transmission length for the channel, defined in the channel definition.

It is permissible for the exit to return an alternate buffer, together with the relevant parameters. See Chapter 46, "Channel-exit programs", on page 619 for call details.

Note: Before using a channel-exit program for the first time on WebSphere MQ for AIX, iSeries, HP-UX, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, Compaq OpenVMS Alpha, and OS/2 Warp, you should relink it with threaded libraries to make it thread-safe.

WebSphere MQ for z/OS without CICS

The exits are invoked as if by an z/OS LINK, in:

- Non-authorized problem program state
- Primary address space control mode
- Non-cross-memory mode
- Non-access register mode
- 31-bit addressing mode

The link-edited modules must be placed in the data set specified by the CSQXLIB DD statement of the channel initiator address space procedure; the names of the load modules are specified as the exit names in the channel definition.

When writing channel exits for z/OS without CICS, the following rules apply:

- Exits must be written in assembler or C; if C is used, it must conform to the C systems programming environment for system exits, described in the *z/OS C/C++ Programming Guide*.
- Exits are loaded from the non-authorized libraries defined by a CSQXLIB DD statement. Providing CSQXLIB has DISP=SHR, exits can be updated while the channel initiator is running, with the new version used when the channel is restarted.
- Exits must be reentrant, and capable of running anywhere in virtual storage.
- Exits must reset the environment, on return, to that at entry.
- Exits must free any storage obtained, or ensure that it will be freed by a subsequent exit invocation.

  For storage that is to persist between invocations, use the z/OS STORAGE service; there is no suitable service in C.
- All MQI calls except MQCMIT/CSQBCMT and MQBACK/CSQBBAK are allowed. They must be contained after MQCONN (with a blank queue manager name). If these calls are used, the exit must be link-edited with the stub CSQXSTUB.

  The exception to this rule is that security channel exits may issue commit and backout MQI calls. To do this, code the verbs CSQXCMT and CSQXBAK in place of MQCMIT/CSQBCMT and MQBACK/CSQBBAK.

Channel-exit programs

- Exits should not use any system services that could cause a wait, because this would severely impact the handling of some or all of the other channels. Many channels are run under a single TCB typically, if you do something in an exit that causes a wait and you do not use MQXWAIT, it will cause ***all*** these channels to wait. This will not give any functional problems, but might have an adverse effect on performance. Most SVCs involve waits, so you should avoid them, except for the following:
  - GETMAIN/FREEMAIN/STORAGE
  - LOAD/DELETE

  In general, therefore, SVCs, PCs, and I/O should be avoided. Instead, the MQXWAIT call should be used.
- Exits should not issue ESTAEs or SPIEs, apart from in any subtasks they attach. This is because their error handling might interfere with the error handling performed by WebSphere MQ. This means that WebSphere MQ might not be able to recover from an error, or that your exit program might not receive all the error information.
- The MQXWAIT call (see "MQXWAIT – Wait in exit" on page 672) provides a wait service that allows waiting for I/O and other events; if this service is used, exits must not use the linkage stack.

  For I/O and other facilities that do not provide non-blocking facilities or an ECB to wait on, a separate subtask should be ATTACHed, and its completion waited for by MQXWAIT; because of the overhead that this technique incurs, it is recommended that this be used only by the security exit.
- The MQDISC MQI call will not cause an implicit commit to occur within the exit program. A commit of the channel process is performed only when the channel protocol dictates.

The following exit samples are provided with WebSphere MQ for z/OS:

CSQ4BAX0
This sample is written in assembler, and illustrates the use of MQXWAIT.

CSQ4BCX1 and **CSQ4BCX2**
These samples are written in C and illustrate how to access the parameters.

WebSphere MQ for z/OS using CICS

In WebSphere MQ for z/OS using CICS, an exit program must be written in Assembler, C, COBOL, or PL/I. In CICS, the exits are invoked with EXEC CICS LINK with the parameters passed by pointers (addresses) in the CICS communication area (COMMAREA). The exit programs, named in the channel definitions, reside in a library in the DFHRPL concatenation. They must be defined in the CICS system definition file CSD, and must be enabled.

User-exit programs can also make use of CICS API calls, but you should not issue syncpoints because the results could influence units of work declared by the MCA.

Do not update any resources controlled by a resource manager other than WebSphere MQ for z/OS, including those controlled by CICS Transaction Server for z/OS.

Any non-WebSphere MQ for z/OS resources updated by an exit are committed, or backed out, at the next syncpoint issued by the channel program. If a sender is unable to synchronize with its partner, these CICS Transaction Server for z/OS resources are backed out even though WebSphere MQ for z/OS resources are held in-doubt until the next opportunity to re-synchronize.

WebSphere MQ for iSeries

The exit is a program object written in the C/400®, Integrated Language Environment® (ILE) COBOL/400® or ILE RPG/400® language. The exit program names and their libraries are named in the channel definition.

Observe the following conditions when creating and compiling an exit program:

- The program must be made thread safe and created with the C/400, ILE RPG/400, or ILE COBOL/400 compiler. For ILE RPG you must specify the THREAD(*SERIALIZE) control specification, and for ILE COBOL you must specify SERIALIZE for the THREAD option of the PROCESS statement. The programs must also be bound to the threaded WebSphere MQ libraries: QMQM/LIBMQM_R in the case of C/400 and ILE RPG/400, and AMQ0STUB_R in the case of ILE COBOL/400. For additional information about making RPG or COBOL applications thread safe, refer to the appropriate Programmer's Guide for the language.
- WebSphere MQ for iSeries requires that the exit programs are enabled for teraspace support. (Teraspace is a form of shared memory introduced in OS/400 V4R4.) In the case of the ILE RPG and COBOL compilers, any programs compiled on OS/400 V4R4 or later are so enabled. In the case of C, the programs must be compiled with the TERASPACE(*YES *TSIFC) options specified on CRTCMOD or CRTBNDC commands.
- An exit returning a pointer to its own buffer space must ensure that the object pointed to exists beyond the timespan of the channel-exit program. In other words, the pointer cannot be the address of a variable on the program stack, nor of a variable in the program heap. Instead, the pointer must be obtained from the system. An example of this is a user space created in the user exit. To ensure that any data area allocated by the channel-exit program is still available for the MCA when the program ends, the channel exit must run in the caller's activation group or a named activation group. Do this by setting the ACTGRP parameter on CRTPGM to a user-defined value or *CALLER. If the program is created in this way, the channel-exit program can allocate dynamic memory and pass a pointer to this memory back to the MCA.

MQSeries for OS/2 Warp

The exit is a DLL that must be written in C. To ensure that it can be loaded when required, specify the full path name in the DEFINE CHANNEL command, or if you are using Version 5.1 or later, enter the path name in the ExitPath stanza of the QM.INI file. The value in the ExitPath stanza of the QM.INI file defaults to c:\mqm\exits. You can change this value in QM.INI or you can override it by specifying a full path name on the DEFINE CHANNEL command.

Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the shared library. Figure 129 on page 638 shows how to set up entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 129. Sample source code for a channel exit on OS/2

Figure 130 shows a sample definition file that gives the entry point to the exit program.

```
LIBRARY csqos2it INITINSTANCE TERMINSTANCE

PROTMODE

DESCRIPTION 'channel exit '

CODE SHARED LOADONCALL
DATA NONSHARED MULTIPLE

HEAPSIZE  4096
STACKSIZE 8192

EXPORTS
        csqos2it;
```

Figure 130. Sample DEF file for a channel exit on OS/2

Use a make file like the one shown in Figure 131 on page 639 to compile and link your program to create the DLL.

```
# MAKE FILE TO CREATE AN MQSERIES EXIT

# Make File Creation run in directory:
#   D:\EXIT;

.SUFFIXES:

.SUFFIXES: .c .cpp .cxx

CSQOS2IT.DLL:  \
  csqos2it.OBJ \
  MAKEOS2
   ICC.EXE @<<
 /Fe"CSQOS2IT.DLL" mqm.lib csqos2it.def
csqos2it.OBJ
<<
  IMPLIB CSQOS2IT.LIB CSQOS2IT.DLL

{.}.c.obj:
   ICC.EXE /Ge- /G5 /C   .\$*.c

{.}.cpp.obj:
   ICC.EXE /Ge- /G5 /C   .\$*.cpp

{.}.cxx.obj:
   ICC.EXE /Ge- /G5 /C   .\$*.cxx

!include MAKEOS2.DEP
```

Figure 131. Sample make file for a channel exit on OS/2

Windows 3.1 client

The exit is a DLL that must be written in C. It must be placed in a directory pointed to by LIBPATH to ensure it can be loaded when required. Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the shared library. Figure 132 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 132. Sample source code for a channel exit on Windows 3.1

WebSphere MQ for Windows server, WebSphere MQ client for Windows

The exit is a DLL that must be written in C.

- On a WebSphere MQ for Windows server, specify the path name of the directory that holds the exit program on the Exits page of the queue manager properties (accessed from the WebSphere MQ Services snap-in).

  If the exit is on a Windows client, specify the path name on the All Queue Managers page of the WebSphere MQ properties (accessed from the WebSphere MQ services snap-in).

  The WebSphere MQ Services snap-in is described in the *WebSphere MQ System Administration Guide* manual.

  The default exit path is c:\WINNT\Profiles\All Users\Application Data\MQSeries\EXITS. You can change this value or you can override it by specifying a full path name on the DEFINE CHANNEL command.
- On a WebSphere MQ client for Windows 95, specify the path name in the ExitPath stanza of the MQS.INI file You can change this value or you can override it by specifying a full path name on the DEFINE CHANNEL command.

Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the library. Figure 133 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQCXP  pChannelExitParms,
                           PMQCD   pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 133. Sample source code for a channel exit on Windows

In order to access the fields pointed to by pChannelExitParms and pChannelDefinition you need to insert the following lines in your exit program:

```
⋮
/* Variable definitions  */
⋮
   PMQCXP        pParms;
   PMQCD         pChDef;
⋮
/* Code                           */
⋮
  pParms   = (PMQCXP)pChannelExitParms;
  pChDef   = (PMQCD)pChannelDefinition;
```

The pointers pParms and pChDef can then be dereferenced to access individual fields.

When writing channel exits for these products using Visual C++, you should do the following:

- Add MQMVX.LIB to project as a source file[12].

---

[12] MQMVX.LIB is used for data conversion and is not available on client products.

- Change the box labelled “Use Run-Time Library” from “Multithreaded” to “Multithreaded using DLL” in the project settings under C/C++ code generation.
- Do not change the box labelled “Entry-Point Symbol”. This box can be found in the project settings, under the Link tab, when you select Category and then Output.
- Write your own .DEF file; an example of this is shown in Figure 134.

```
LIBRARY exit

PROTMODE

DESCRIPTION 'Provides Retry and Channel exits'

CODE SHARED    LOADONCALL
DATA NONSHARED MULTIPLE

HEAPSIZE   4096
STACKSIZE  8192

EXPORTS  Retry
```

Figure 134. Sample DEF file for Windows, Windows 95, or Windows 98

WebSphere MQ for AIX

Note: Before you use an existing user exit for the first time on WebSphere MQ for AIX, you must recompile it to enable it to take advantage of thread-safe system calls. If your user exits use thread-unsafe system calls, you will need to modify them before using them on this platform.

The exit is a dynamically loaded object that must be written in C. To ensure that it can be loaded when required, specify the full path name in the DEFINE CHANNEL command or enter the path name in the ExitPath stanza of the QM.INI file. If the exit is on an AIX client, specify the path name in the ClientExitPath stanza of the MQS.INI file. The value in the ExitPath stanza of the QM.INI file or the ClientExitPath stanza of the MQS.INI file defaults to /var/mqm/exits. You can change this value or you can override it by specifying a full path name on the DEFINE CHANNEL command.

Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the module. Figure 135 on page 642 shows how to set up an entry to your program:

Channel-exit programs

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 135. Sample source code for a channel exit on AIX

Figure 136 shows the compiler and loader commands for channel-exit programs on AIX.

```
$ cc -c exit.c
$ ld -o exit exit.o -bE:exit.exp -H512 -T512 -e MQStart -bM:SRE
$ cp exit /usr/xmp/lib # (or wherever you require)
```

Figure 136. Sample compiler and loader commands for channel exits on AIX

Figure 138 shows a sample make file that can be used to build a WebSphere MQ exit program, and Figure 137 shows a sample export file for this make file.

| **Note:** All functions that will be called by WebSphere MQ must be exported.

```
#!
csqaixit
MQStart
```

Figure 137. Sample export file for AIX

```
# MAKE FILE TO BUILD A WEBSPHERE MQ EXIT ON AIX

MQIDIR    = /usr/mqm
MQILIBDIR = $(MQIDIR)/lib
MQIINCDIR = $(MQIDIR)/inc

LIBEXIT   = -lmqm

CFLAGS   = -g -bloadmap:muck

ALL :  CSQAIXIT

csqaixit: csqaixit.o
 xlc -L $(MQILIBDIR) $(LIBEXIT) csqaixit.o -o csqaixit  \
        -bE:csqaixit.exp -H512 -T512 -e MQStart -bM:SRE

csqaixit.o : csqaixit.c
 xlc -c csqaixit.c  \
 -I $(MQIINCDIR)
```

Figure 138. Sample make file for AIX

MQSeries for Compaq OpenVMS Alpha

The user exit is a dynamically loaded image that can be shared, with its name taken from the format of the message. It must be written in C. The object's name must be in uppercase, for example `MYFORMAT`. The shareable image must be placed in `sys$share` or a location defined by a logical name at executive level for it to be loaded.

User exits must be installed as known images. Figure 139 on page 644 shows how to set up an entry to your program:

Channel-exit programs

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 139. Sample source code for a channel exit on Compaq OpenVMS Alpha

In the example, MQSTART is the initialization routine entry point for the MYFORMAT shareable image. The names of the routines that are called by the exit must be made universal.

```
$ CC /INCLUDE_DIRECTORY=MQS_INCLUDE exitname.C
$ LINK /SHARE=SYS$SHARE:[SYSLIB]MYFORMAT exitname.OBJ,MYFORMAT/OPTIONS
```

The contents of MYFORMAT.OPT vary depending on what platform you are working on:

On AXP:

```
SYS$SHARE:MQM/SHAREABLE
SYMBOL_VECTOR=(MQSTART=PROCEDURE)
```

On VAX:

```
SYS$SHARE:MQM/SHAREABLE
UNIVERSAL=MQSTART
```

If you are using threaded applications linked with the pthread library, you must also build a second copy of the exit with the thread options and libraries:

```
$ CC /INCLUDE_DIRECTORY=MQS_INCLUDE exitname.C
$ LINK /SHARE=SYS$SHARE:MYFORMAT exitname.OBJ,MYFORMAT/OPTIONS
```

Again, the contents of MYFORMAT.OPT vary depending on what platform you are working on:

On AXP:

```
SYS$SHARE:MQM_R/SHAREABLE
SYS$SHARE:CMA$OPEN_RTL.EXE/SHAREABLE
SYMBOL_VECTOR'-(MQSTART=PROCEDURE)
```

On VAX:

```
SYS$SHARE:MQM_R/SHAREABLE
SYS$SHARE:CMA$OPEN_RTL.EXE/SHAREABLE
UNIVERSAL=MQSTART
```

MQSeries for Compaq Tru64 UNIX

The exit is a dynamically loaded object that must be written in C. To ensure that it can be loaded when required, link and copy the exit to the /usr/lib directory. Define a dummy MQStart() routine in the exit and specify MQStart as the entry point in the module. Figure 140 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 140. Sample source code for a channel exit on Compaq Tru64 UNIX

Figure 141 shows the compiler and loader commands for channel-exit programs on Compaq Tru64 UNIX.

```
$ cc -stdl -c -I/opt/mqm/inc exit.c
$ ld -o exit exit.o -shared -L/opt/mqm/lib -lmqm -e MQStart -lc
$ cp exit /usr/lib
```

Figure 141. Sample compiler and loader commands for channel exits on Compaq Tru64 UNIX

WebSphere MQ for HP-UX

Note: Before you use an existing user exit for the first time on WebSphere MQ for HP-UX, you must recompile it to enable it to take advantage of thread-safe system calls. If your user exits use thread-unsafe system calls, you will need to modify them before using them on this platform.

The exit is a dynamically loaded object that must be written in C. To ensure that it can be loaded when required, specify the full path name in the DEFINE CHANNEL command or enter the path name in the ExitPath stanza of the QM.INI file. If the exit is on an HP-UX client, specify the path name in the ClientExitPath stanza of the MQS.INI file. The value in the ExitPath stanza of the QM.INI file or the ClientExitPath stanza of the MQS.INI file defaults to /var/mqm/exits. You can change this value or you can override it by specifying a full path name on the DEFINE CHANNEL command.

Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the module. Figure 142 on page 646 shows how to set up an entry to your program:

Channel-exit programs

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point - for consistency only */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 142. Sample source code for a channel exit on HP-UX

Figure 143 shows the compiler and loader commands for channel-exit programs on HP-UX.

```
$ c89 -c +z +e exit.c
$ ld -o exit exit.o +b : -c exit.exp +IMQStart +eMQStart -b
$ cp exit /usr/xmp/lib # (or wherever you require)
```

Figure 143. Sample compiler and loader commands for channel exits on HP-UX

MQSeries for AT&T GIS UNIX

The exit is a dynamically loaded object that must be written in C. Specify the full path name in the DEFINE CHANNEL command. Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the module. Figure 144 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 144. Sample source code for a channel exit on AT&T GIS UNIX

Figure 145 on page 647 shows the compiler and loader commands for channel-exit programs on AT&T GIS UNIX[13].

---

[13] This platform has become NCR UNIX SVR4 MP-RAS, R3.0

```
$ cc -c PIC exit.c
$ ld -o exit -G exit.o
$ cp exit /usr/xmp/lib # (or wherever you require)
```

Figure 145. Sample compiler and loader commands for channel exits on AT&T GIS UNIX

WebSphere MQ for Solaris

Note: Before you use an existing user exit for the first time on WebSphere MQ for Solaris, you must recompile it to enable it to take advantage of thread-safe system calls. If your user exits use thread-unsafe system calls, you will need to modify them before using them on this platform. If you have DCE installed, your channel exits must be threaded with DCE threading. If you do not have DCE installed, your channel exits must be threaded with Posix V10 threading.

The exit is a dynamically loaded object that must be written in C. To ensure that it can be loaded when required, specify the full path name in the DEFINE CHANNEL command or enter the path name in the ExitPath stanza of the QM.INI file. If the exit is on a Solaris client, specify the path name in the ClientExitPath stanza of the MQS.INI file. The value in the ExitPath stanza of the QM.INI file or the ClientExitPath stanza of the MQS.INI file defaults to /var/mqm/exits. You can change this value or you can override it by specifying a full path name on the DEFINE CHANNEL command.

Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the module. Figure 146 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 146. Sample source code for a channel exit on Solaris

Figure 147 shows the compiler and loader commands for channel-exit programs on Solaris.

```
$ cc -c -KPIC exit.c
$ ld -G exit.o -o exit
$ cp exit /usr/xmp/lib # (or wherever you require)
```

Figure 147. Sample compiler and loader commands for channel exits on Solaris

MQSeries for SINIX and DC/OSx

The exit is a dynamically loaded object that must be written in C. Specify the full path name in the DEFINE CHANNEL command. Define a dummy MQStart() routine in the exit and specify `MQStart` as the entry point in the module. Figure 148 shows how to set up an entry to your program:

```
#include <cmqc.h>
#include <cmqxc.h>

void MQStart() {;} /* dummy entry point */
void MQENTRY ChannelExit ( PMQVOID pChannelExitParms,
                           PMQVOID pChannelDefinition,
                           PMQLONG pDataLength,
                           PMQLONG pAgentBufferLength,
                           PMQVOID pAgentBuffer,
                           PMQLONG pExitBufferLength,
                           PMQPTR  pExitBufferAddr)
{
... Insert code here
}
```

Figure 148. Sample source code for a channel exit on SINIX and DC/OSx

Figure 149 shows the compiler and loader commands for channel-exit programs on SINIX and DC/OSx.

```
$ cc -Kpic exit.c -G -o exit -lmqm -lmqmcs
$ cp exit /opt/mqm/lib # (or wherever you require)
```

Figure 149. Sample compiler and loader commands for channel exits on SINIX and DC/OSx

For DC/OSx, version cd087 and later, append the following to the cc line:

```
-liconv -lresolv
```

For earlier versions of DC/OSx, append the following to the cc line:

```
-liconv
```

MQSeries for Compaq NonStop Kernel

MQSeries for Compaq NonStop Kernel supports a single, statically bound channel-exit program, whose entry point is MQ_CHANNEL_EXIT(). The exit must be written in C. MQSeries for Compaq NonStop Kernel provides a stub function for this exit that acts as a placeholder for user-supplied exit code. In the supplied stub function, the *ExitResponse* field in MQCXP (channel exit parameter structure) is set to MQXCC_CLOSE_CHANNEL, which causes the MCA to close the channel. No other fields in MQCXP are modified.

You replace the supplied stub function in the MCA executable images with your own user exit code using the Tandem BIND utility BEXITE. Only the Tandem Common Runtime Environment (CRE) interface for the WIDE memory model is supported.

In MQSeries for Compaq NonStop Kernel, there is a single entry point for all channel exits. In other MQSeries Version 5 products, there are entry points specific to each channel type and function. It is possible to use channel-exit programs written for other MQSeries Version 5 products by calling those programs from MQ_CHANNEL_EXIT(). To determine the type of exit being called, examine the

`ExitId` field of MQCXP, then extract the associated exit-program name from the `MsgExit`, `MsgRetryExit`, `ReceiveExit`, `SendExit`, or `SecurityExit` field of MQCD.

The channel attributes that define the names of user exits are:
- Security exit name (SCYEXIT)
- Message-retry exit name (MREXIT)
- Message exit name (MSGEXIT)
- Send exit name (SENDEXIT)
- Receive exit name (RCVEXIT)

If these channel attributes are left blank, the channel user exit is not invoked. If any of the channel attributes is nonblank, the MQ_CHANNEL_EXIT() user exit program is invoked for the corresponding function. Note that the text-string value of the channel attribute is not used to determine the name of the user exit program, since only a single entry point, MQ_CHANNEL_EXIT(), is supported in MQSeries for Compaq NonStop Kernel. However, the values of these channel attributes are passed to MQ_CHANNEL_EXIT() in the MQCD (channel data) structure. The function of the channel exit (that is, whether the exit corresponds to a Message, Message-retry, Receive, Security or Send Exit) is passed to MQ_CHANNEL_EXIT() in the `ExitId` field of the MQCXP (Channel Exit Parameters) structure.

MQSeries for Compaq NonStop Kernel does not support the following channel attributes:
- CICS Profile Name
- Sequential delivery
- Target system identifier
- Transaction identifier
- Maximum transmission size

Building and using channel exit functions

Dynamically bound libraries are not supported by WebSphere MQ for Compaq NonStop Kernel. Channel exits (and data-conversion exits) are implemented by including statically bound stub functions in the WebSphere MQ libraries and executables which can be replaced using the REPLACE bind option.

A channel exit function must be written in C, **must** be called CHANNELEXIT (see sample MQSVCHX), and can be bound into the chosen executable (or library) using the TACL macro BEXITE.

Note: This procedure modifies the target executable. Therefore, you are recommended to make a backup copy of the target executable or library before using the macro.

The function CHANNELEXIT must handle each of the possible exit calls (security, message-retry, message, send, and receive). You may write your own functions to do this.

Use the TACL macro BCHXALL to bind the data conversion exit into all required WebSphere MQ processes. For example:

```
BCHXALL source-exit-file-or-library
```

Sample channel exit:

```
/********************************************************************/
/*                                                                  */
/* Program name: MQSVCHXE                                           */
```

```
 /*                                                                  */
 /* Description: Sample C skeleton of a Channel Exit controlling     */
 /*              function                                            */
 /*                                                                  */
 /* Statement:     Licensed Materials - Property of IBM              */
 /*                                                                  */
 /*                33H2205, 5622-908                                 */
 /*                33H2267, 5765-623                                 */
 /*                29H0990, 5697-176                                 */
 /*                (C) Copyright IBM Corp. 1994, 1995                */
 /*                                                                  */
 /********************************************************************/
 /*                                                                  */
 /* Function:                                                        */
 /*                                                                  */
 /*   MQSVCHXE is a sample C skeleton of a Channel Exit controlling  */
 /*   function                                                       */
 /*                                                                  */
 /*   The function controls the calls to user-defined channel exits  */
 /*                                                                  */
 /*                                                                  */
 /*   Once complete the code should be compiled into a loadable      */
 /*   object, the name of the object should be the name of the       */
 /*   format to be converted. Instructions on how to do this are     */
 /*   contained in the README file in the current directory.         */
 /*                                                                  */
 /********************************************************************/
 /*                                                                  */
 /*  MQSVFCXE takes the parameters defined for a Data Conversion     */
 /*  exit routine in the CMQXC.H header file.                        */
 /*                                                                  */
 /********************************************************************/
 #include <cmqc.h>              /* For MQI datatypes                 */
 #include <cmqxc.h>             /* For MQI exit-related definitions  */
 #include <amqsvmht.h>          /* For sample macro definitions      */

 /********************************************************************/
 /* Insert the function prototypes for the functions produced by     */
 /* the data conversion utility program.                             */
 /********************************************************************/

 MQDATACONVEXIT CHANNELEXIT;

 /********************************************************************/
 /* On some Unix systems, the name of this function is not important */
 /* as it is not actually used to call the conversion exit but it    */
 /* must be an exported symbol or the entry point to the module.  On */
 /* the TANDEM NSK this function MUST be called CHANNELEXIT          */
 /********************************************************************/
void
MQENTRY CHANNELEXIT(
     PMQVOID  pChannelExitParms,   /* Channel exit parameter block */
     PMQVOID  pChannelDefinition,  /* Channel definition */
     PMQLONG  pDataLength,         /* Length of data */
     PMQLONG  pAgentBufferLength,  /* Length of agent buffer */
     PMQVOID  pAgentBuffer,        /* Agent buffer */
     PMQLONG  pExitBufferLength,   /* Length of exit buffer */
     PMQPTR   pExitBufferAddr)    /* Address of exit buffer */
 {
   PMQCXP    pCEP       = pChannelExitParms;
   PMQCD     pCD        = pChannelDefinition;
   MQLONG    ExitId     = pCEP->ExitId;
   MQLONG    ExitReason = pCEP->ExitReason;

   pCEP->ExitResponse = MQXCC_OK ;

   /* Call the handling function according to the ExitId */
```

```
  /* By default, there are no exits. If there are, then */
  /* this function will have been replaced by a bind    */

  switch (ExitId)
  {
  case MQXT_CHANNEL_SEC_EXIT:
       if (strlen(pCD->SecurityExit) == 0)
       {
         pCEP->ExitResponse = MQXCC_SUPPRESS_FUNCTION ;
       }
       else
       {
         /* Call the security exit function here */
       }
       break;
  case MQXT_CHANNEL_MSG_EXIT:
       /* Call the channel message exit function here */
       if (strlen(pCD->MsgExit) == 0)
       {
         pCEP->ExitResponse = MQXCC_SUPPRESS_FUNCTION ;
       }
       else
       {
         /* Call the message exit function here */
       }
       break;
  case MQXT_CHANNEL_SEND_EXIT:
       /* Call the channel send exit function here */
       if (strlen(pCD->SendExit) == 0)
       {
         pCEP->ExitResponse = MQXCC_SUPPRESS_FUNCTION ;
       }
       else
       {
         /* Call the send exit function here */
       }
       break;
  case MQXT_CHANNEL_RCV_EXIT:
       /* Call the channel receive exit function here */
       if (strlen(pCD->ReceiveExit) == 0)
       {
         pCEP->ExitResponse = MQXCC_SUPPRESS_FUNCTION ;
       }
       else
       {
         /* Call the receive exit function here */
       }
       break;
  case MQXT_CHANNEL_MSG_RETRY_EXIT:
       /* Call the channel retry exit function here */
       if (strlen(pCD->MsgRetryExit) == 0)
       {
         pCEP->ExitResponse = MQXCC_SUPPRESS_FUNCTION ;
       }
       else
       {
         /* Call the message retry exit function here */
       }
       break;
  default:
       /* if the exit isn't recognized, stop it from being called again */
       pCEP->ExitResponse = MQXCC_SUPPRESS_EXIT ;
       break;
  }
  return;
}
/********************************************************************/
```

```
/*                                                                  */
/* END OF MQSVCHXE                                                  */
/*                                                                  */
/********************************************************************/
```

Supplied channel-exit programs using DCE security services

WebSphere MQ for AIX, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp supply channel-exit programs for the security exit, the message exit, and the send and receive exits. The WebSphere MQ client for Windows 95 supplies channel-exit programs for the security exit and the send and receive exits. These programs take advantage of the Distributed Computing Environment (DCE) security services and encryption facilities. Before using the supplied exit programs from a WebSphere MQ client for Windows 95, see the note under "How to use the DCE channel-exit programs" on page 655.

The programs are supplied in source and object format. You can use the objects as they stand, or can use the source as the basis for creating your own user-exit programs. You should bear in mind that whereas the objects are supplied as working programs, the source code does not include any provision for tracing or error handling. If you chose to modify and use the source code, you should add your own tracing and error-handling routines.

You cannot use the supplied channel-exit programmes on a queue manager that also has SSL parameters set. This applies to queue managers on AIX, HP-UX, and Solaris.

The object has two entry points:

DCE_SEC_SCY_CHANNELEXIT
For the security exit, which can be used to access authentication services.

DCE_SEC_SRM_CHANNELEXIT
For the send, receive, and message exits, which can be used to access data encryption services.

What do the DCE channel-exit programs do?

The supplied channel-exit programs address the Distributed Computing Environment (DCE) considerations for security in the areas of data encryption, and of authentication of a partner system when establishing a session. For a particular channel, each exit program has an associated *DCE principal* (similar to a user ID). A connection between two exit programs is an association between the two principals.

A secure connection between two security exit programs, one for the sending MCA and one for the receiving MCA, is established after the underlying session has been established. The sequence of operations is as follows:

1. Each program is associated with a particular principal, for example due to an explicit DCE Login.
2. The program that initiates the secure connection, that is the first program to get control after the MCA session has been established, is known as the *Context Initiator*. The context initiator requests a secure connection with the named partner from the DCE security server and receives a token. The token (called token1 in Figure 150 on page 653) is sent, using the already established underlying session, to the partner program.
3. The partner program (known as the *Context Acceptor*) passes token1 to the DCE security server, which verifies that the Context Initiator is authentic. For mutual

authentication, as implemented by the supplied security exit, the DCE security server also generates a second token (called token2 in Figure 150), which the Context Acceptor returns to the Context Initiator using the underlying session.

4. The Context Initiator uses token2 to verify that the Context Acceptor is authentic.

   At this stage, if both applications are satisfied with the authenticity of the partner’s token, then the secure (authenticated) connection is established.
5. The token exchange described above establishes a *Security Context* for each security exit program. This context enables the subsequent send, receive, and message exits to encrypt and decrypt data passed on the connection.

   DCE Security provides an API to ‘seal’ and ‘unseal’ data and hence to selectively protect specified elements of a datastream. The supplied message, send, and receive exits encrypt and decrypt messages using these DCE Security API calls.

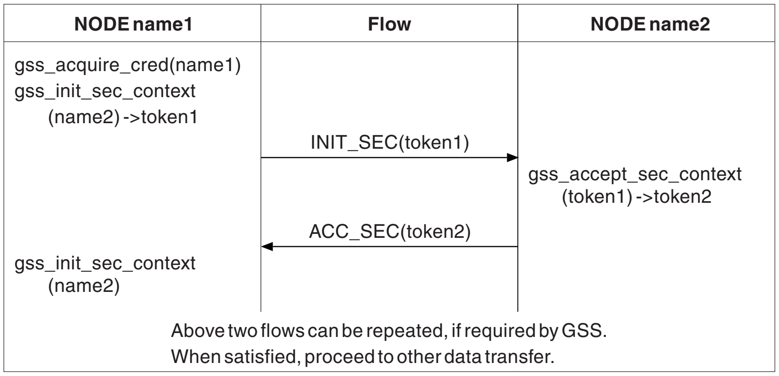


Figure 150. Security exit flows

The encryption algorithm used by the send exit must match the decryption algorithm used by the receive exit. The supplied send, receive, and message exits use the gss_seal() and gss_unseal() calls to encrypt and decrypt data. The qop_req parameter on the gss_seal() call is set to GSS_C_QOP_DEFAULT. The encryption provided by DCE depends on the DCE product installed.

The send, receive, and message exits are all used for encryption. The difference is that the message exit encrypts only the content of the message, whereas the send and receive exits also encrypt the message headers. Therefore, the message exit offers slightly better performance but at the expense of unencrypted header data.

How do the DCE channel-exit programs work?

The supplied code implements a security exit and message, send, and receive exits. Note that the message exit does not encrypt the WebSphere MQ header. The security exit provides mutual (two-way) authentication. The message, send, and receive exits provide encryption facilities based on a key managed by the security context set up by the security exit. Therefore, the message, send, and receive exits will not work unless the security exit has been called previously.

The code interfaces to DCE through the DCE GSS API provided as part of OSF DCE 1.1. This API provides a superset of the standard GSS API calls as specified in Internet RFCs 1508 and 1509. Some DCE-specific GSS calls have been added to the API by OSF.

Channel-exit programs

The principal of a WebSphere MQ system that has a queue manager is the queue manager name.

A WebSphere MQ client does not have a queue manager. The principal used for a client is as follows:

- On Solaris, AIX, HP-UX, Windows 95, and Windows clients:
  - If the login user ID of the user who started the WebSphere MQ client application can be obtained and is defined as a principal to DCE, this user ID is used.
  - If the login user ID of the user who started the WebSphere MQ client application cannot be obtained or is not defined to DCE, and a DCE default login context exists, the DCE default credential is used.

    Note: When a principal logs in to DCE, a default login context is established. In this case the principal used in association with the DCE default credential is that of the principal logged in to DCE.
  - If the login user ID of the user who started the WebSphere MQ client application cannot be obtained or is not defined to DCE, and no DCE default login context exists, there is no principal name available and the security exit rejects the attempt to start the channel.
- On OS/2 clients, user IDs cannot be used as principals.
  - If a principal has logged in to DCE, the name of this logged in principal is used.
  - If a principal has not logged in to DCE, and a DCE default login context exists, the DCE default credential is used.
  - If a principal has not logged in to DCE, and no DCE default login context exists, there is no principal name available and the security exit rejects the attempt to start the channel.

It is important that queue manager names or user IDs that are to be used as DCE principals are syntactically acceptable to DCE; see your DCE documentation for information about valid DCE principal names. If the name is to be used only within the local cell directory, the only mismatch between the allowable characters in a queue manager name and the allowable characters in a principal name is that a principal name cannot contain a '/'. If there is any likelihood that the name will also need to be reflected in a global directory, you are recommended to restrict principal names to alphanumeric characters. As with any DCE principal, when you create it you must define it to the DCE security server and must also put an entry for it in the relevant keytable file. Therefore, when you delete a queue manager that is also a DCE principal you must remember to delete both its entries.

Remote queue manager names are transferred across a channel at channel initialization. When the security exit is called, if the remote WebSphere MQ system is not a client, the remote queue manager name (which is also the remote principal) is passed to the security exit in the WebSphere MQ MQCXP parameter list. The initiator exit uses the name provided. If the channel is being established between a WebSphere MQ client and a WebSphere MQ server, the client always initiates the first security flow. In all cases, the initiator exit's remote principal name is a queue manager name.

The flows shown in Figure 150 on page 653 occur to establish the security context. As a part of these flows the initiator's principal is transferred to the acceptor.

It is possible to establish multiple security contexts between the same pair of principals, and hence to allow parallel channels to use the security exit.

You can set up *restricted* channels. The system administrator supplies a value in the Channel Security Exit User Data when defining this end of the channel. The presence of this value causes the security exit to check the remote principal name. If this check shows a mismatch the channel is not established. Note that the remote principals (queue manager names and default DCE principals) may be longer than the 32 characters allowed in the Channel Security Exit User Data. Only the first 32 characters of the remote principal are considered significant.

If the MCA forms part of a WebSphere MQ server system connected to a client, the security exchange will have caused the client principal to flow to the server. If the value is valid with regard to the optional restricted-channel check and the MCAUserIdentifier variable is not already defined, the client principal is copied into the server's MCAUserIdentifier variable. Note that client principals may be longer than the 12-character MCAUserIdentifier. Only the first 12 characters of such a remote principal are copied.

Thus the first 12 characters of the WebSphere MQ client's DCE principal name can become the user identifier to be used by the server's MCA for authorization for that client to access WebSphere MQ resources. The server system must be set up appropriately to allow this to work.

How to use the DCE channel-exit programs

Do not run the supplied DCE message exit in combination with the supplied DCE send and receive exits on the same channel.

To use the supplied channel-exit programs you need to install DCE and define some channels. For installation information, see the *Quick Beginnings* book for your platform:

- The *WebSphere MQ for AIX, V5.3 Quick Beginnings* book.
- The *WebSphere MQ for HP-UX, V5.3 Quick Beginnings* book.
- The *WebSphere MQ for Solaris, V5.3 Quick Beginnings* book.
- The *MQSeries for OS/2 Warp, V5.1 Quick Beginnings* book.
- The *WebSphere MQ for Windows, V5.3 Quick Beginnings* book.

Note: Using IBM DCE for Windows 95 V1, you cannot use the supplied DCE security exit from a Windows 95 client connected to a WebSphere MQ for HP-UX server or a WebSphere MQ for Solaris server. Nor can you use the supplied send and receive exits from a Windows 95 client when using IBM DCE for Windows 95 V1.

Setup for DCE

The supplied channel-exit programs are intended for use between systems operating within a single DCE cell. The setup of a DCE cell is described in the documentation provided with the DCE packages for the platforms incorporated in the cell. The exit programs operate the same way whether they are running on a system with a DCE security client installed or with a DCE security server installed.

Once the DCE cell has been configured, it is necessary to define the principals that the exit is going to use to DCE. DCE setup samples are provided on all the supported platforms. The samples are primarily intended for setting up DCE for the DCE Names installable component. They also contain comments indicating how they can be modified to set up the DCE security principals instead of, or as well as, the Names principal.

Each DCE security principal has its own keytable. On UNIX systems that support DCE security, the keytable is a file within the directory /var/mqm/dce/keytabs. On OS/2 and Windows it is a file within the directory *MQM*\DCE\KEYTABS, where *MQM* is the name of your work path.

When the supplied channel-exit programs are called for a particular principal, they look in a keytable file that has the same name as the principal itself. Therefore, the keytable file for a particular principal must have the same name as that principal.

The use of separate keytables for each principal is recommended in the OSF DCE literature. On systems that support file access controls (UNIX systems and Windows) keytable access should be limited to:

- Superuser/administrator: no restriction
- Other user IDs:
  - read only access, given only to the user IDs under which the processes that call the security exits run, and only to the relevant keytables.

In the case of queue manager WebSphere MQ systems, the processes that interface to the security exits at the sending end of the channel are runmqchl (and runmqchi on OS/2 and Windows NT). amqcrsta, amqcrs6a or runmqlsr interface to the security exits at the receiving end of the channel. On most systems these all run under the mqm user ID; in this case, non-supervisor/administrator access to the keytables relating to queue manager principals should be restricted to read access for the mqm user ID.

On client systems the user ID under which the security exit is called is the user ID under which the client application runs (often the login user ID of the user of the client system). Again, non-supervisor/administrator access to the relevant keytable should be restricted to read access by that user ID only.

The supplied exit code

The supplied exit code is in two formats: object and source.

Object: The object is called amqrdsc0 on UNIX systems and amqrdsc0.DLL on OS/2, and Windows. It is installed as a standard part of the WebSphere MQ product for your platform and is loaded as a standard user exit. If you wish to run the supplied security channel exit to make use of authentication services then in your definition of the channel, specify:

```
SCYEXIT('<path>amqrdsc0(DCE_SEC_SCY_CHANNELEXIT)')
```

If you also wish to use the message exit to support data encryption, then in your definition of the channel, specify:

```
MSGEXIT('<path>amqrdsc0(DCE_SEC_SRM_CHANNELEXIT)')
```

Or you can use the send and receive exits to support data encryption by specifying the following in your definition of the channel:

```
SENDEXIT('<path>amqrdsc0(DCE_SEC_SRM_CHANNELEXIT)')
RCVEXIT('<path>amqrdsc0(DCE_SEC_SRM_CHANNELEXIT)')
```

<path> is the path to the directory containing the exit.

See page 635 through page 648 for information about how to call user exits on the platform you are using.

Source: The exit source file is called amqsdsc0.c. It can be found in <*mqmtop*>/samp on UNIX systems and in <*bootdrive*>:\mqm\tools\c\samples on OS/2, and Windows. If you choose to modify the source versions, rather than running the objects as they stand, you will need to recompile the modified source. It is compiled and linked in the same way as any other channel exit for the platform concerned, except that DCE headers need to be accessed at compile time, and the DCE libraries, together with any recommended associated libraries, need to be accessed at link time. Refer to the documentation for the DCE product for the platform you are using, to find out about the DCE and associated libraries.

OS/2

```
icc /DIBMOS2 /DINTEL80x86 /Fe amqsdsc0.dll /I \
   c:\mqclient\tools\c\include /I \
   c:\ibmcppw\include /I c:\opt\dcelocal\include\dce \
   /W3 /Sa /Ge- /Gm+ amqsdsc0.c amqsdsc0.def dceos2.lib
```

Using the following definition file:

```
LIBRARY AMQSDSC0
PROTMODE
DESCRIPTION 'DCE Security Exit'
CODE SHARED LOADONCALL
DATA NONSHARED MULTIPLE
HEAPSIZE 4096
STACKSIZE 8192
EXPORTS
   DCE_SEC_SCY_CHANNELEXIT
   DCE_SEC_SRM_CHANNELEXIT
```

Solaris

```
cc -I/opt/dce/share/include/dce \
   -I/opt/mqm/inc -KPIC -c amqsdsc0.c
```

followed by:

```
ld -G -L/opt/dce/share/usr/lib -ldce amqsdsc0.o -o srm
```

HP-UX

```
cc -D_HPUX_SOURCE -Dhpux -DICOL -D_REENTRANT \
  -Dsigaction=cma_sigaction +ESlit +DA1.0 -c +z \
  amqsdsc0.c -I /opt/mqm/include -I /opt/dce/include/dce \
  -Aa && ld -o amqsdsc0 amqsdsc0.o -z +b : -b +I MQStart \
  -ldce -lmqm_r -lndbm -lM -lc_r
```

Windows 95, Windows 98, and Windows NT

```
c:\msdevstd\bin\cl /DAMQ_PC /VERBOSE /LD /MT \
  /Ic:\msdevstd\include /ID:\MQCLIENT\TOOLS\C\INCLUDE \
  /IC:\OPT\DIGITAL\DCE\INCLUDE\DCE amqsdsc0.c \
  -link /DLL /EXPORT:DCE_SEC_SCY_CHANNELEXIT  \
  /EXPORT:DCE_SEC_SRM_CHANNELEXIT /STACK:8192 libdce.lib \
  advapi32.lib libcmt.lib
```

AIX

```
xlC_r -c /usr/mqm/samp/amqsdsc0.c -I/usr/include/dce

ld -e MQStart -bnoquiet -o amqsdsc0 amqsdsc0.o \
-L/usr/lib/dce -T512 -H512 -ldce -bE:amqsdsc0.exp \
-lpthreads -lc_r -liconv -ls
```

Using DCE channel exits with the runmqlsr listener program

On WebSphere MQ for Windows, the exit dll name must be `amqrdsc0.dll` or `amqsdsc0.dll`.

SSPI security exit

WebSphere MQ for Windows supplies a security exit for both the WebSphere MQ client and the WebSphere MQ server. This is a channel-exit program that provides authentication for WebSphere MQ channels by using the Security Services Programming Interface (SSPI). The SSPI provides the integrated security facilities of Windows.

The security packages are loaded from either security.dll or secur32.dll. These DLLs are supplied with your operating system.

One-way authentication is provided on Windows, using NTLM authentication services. Two way authentication is provided on Windows 2000, using Kerberos authentication services.

The security exit program is supplied in source and object format. You can use the object code as it is, or you can use the source code as a starting point to create your own user-exit programs. For more information on using the object or source code of the SSPI security exit, see *WebSphere MQ Application Programming Guide*

Chapter 47. Channel-exit calls and data structures

This chapter provides reference information about the special WebSphere MQ calls and data structures used when writing channel exit programs. This is product-sensitive programming interface information. You can write WebSphere MQ user exits in the following programming languages:

Platform	Programming languages
WebSphere MQ for z/OS without CICS	Assembler and C (which must conform to the C system programming environment for system exits, described in the *OS/390 C/C++ Programming Guide*.)
WebSphere MQ for z/OS using CICS	Assembler, C, COBOL, and PL/I
WebSphere MQ for iSeries	C, COBOL, and RPG II
All other WebSphere MQ platforms	C

| You cannot write WebSphere MQ user exits in TAL or Visual Basic. However, a declaration for the MQCD structure is provided in Visual Basic for use on the MQCONNX call from an MQ client program.

In a number of cases, parameters are arrays or character strings whose size is not fixed. For these, a lowercase "n" is used to represent a numeric constant. When the declaration for that parameter is coded, the "n" must be replaced by the numeric value required. For further information about the conventions used in these descriptions, see the *WebSphere MQ Application Programming Reference* book.

The calls are:
- "MQ_CHANNEL_EXIT – Channel exit" on page 662
- "MQ_CHANNEL_AUTO_DEF_EXIT – Channel auto-definition exit" on page 667
- "MQ_TRANSPORT_EXIT – Transport retry exit" on page 670
- "MQXWAIT – Wait in exit" on page 672

The data structures are:
- "MQCD – Channel definition" on page 674
- "MQCXP – Channel exit parameter" on page 714
- "MQTXP – Transport exit parameter" on page 729
- "MQXWD – Exit wait descriptor" on page 733

Note: Channel exit programs are not supported on DOS or VSE/ESA.

Data definition files

The data definition files supplied with the products for each of the supported programming languages are shown in the following tables.

Table 56. C header files

File name	Contents
CMQC	Function prototypes, data types, and named constants for the main MQI
CMQXC	Function prototypes, data types, and named constants for channel exits

Table 57. COBOL COPY files

File name (with initial values)	File name (without initial values)	Contents
CMQV	–	Named constants for main MQI
CMQXV	–	Named constants for channel exits
CMQCDV	CMQCDL	Channel definition structure
CMQCXPV	CMQCXPL	Channel exit parameter structure
CMQDLHV	CMQDLHL	Dead letter header structure
CMQXPV	CMQXPL	CICS API exit parameter structure
CMQXQHV	CMQXQHL	Transmission queue header structure

Table 58. PL/I INCLUDE files

File name	Contents
CMQP	Structures and named constants for main MQI
CMQEPP	Entry-point declarations for main MQI
CMQXP	Structures and named constants for channel exits

Table 59. RPG (ILE) COPY files

File name (with initial values)	File name (without initial values)	Contents
CMQG	–	Named constants for main MQI
CMQXG	–	Named constants for channel exits
CMQCDG	CMQCDH	Channel definition structure
CMQCXPG	CMQCXPH	Channel exit parameter structure
CMQDLHG	CMQDLHH	Dead letter header structure
CMQXQHG	CMQXQHH	Transmission queue header structure

Table 60. RPG (OPM) COPY files

File name	Contents
CMQR	Named constants for main MQI
CMQXR	Named constants for channel exits
CMQCDR	Channel definition structure
CMQCXPR	Channel exit parameter structure
CMQDLHR	Dead letter header structure
CMQXQHR	Transmission queue header structure

Table 61. System/390® assembler macros

File name	Contents
CMQA	Named constants (“equates”) for main MQI
CMQXA	Named constants for channel exits
CMQVERA	Structure version control
CMQCDA	Channel definition structure
CMQCXPA	Channel exit parameter structure
CMQDLHA	Dead letter header structure
CMQXPA	CICS API exit parameter structure
CMQXQHA	Transmission queue header structure

For a list of the complete set of header files for the product, see the *WebSphere MQ Application Programming Guide*.

MQ_CHANNEL_EXIT – Channel exit

This call definition is provided solely to describe the parameters that are passed to each of the channel exits called by the Message Channel Agent. No entry point called MQ_CHANNEL_EXIT is actually provided by the queue manager; the name MQ_CHANNEL_EXIT is of no special significance since the names of the channel exits are provided in the channel definition MQCD.

This definition is part of the WebSphere MQ Security Enabling Interface (SEI), which is one of the WebSphere MQ framework interfaces.

There are five types of channel exit:
- Channel security exit
- Channel message exit
- Channel send exit
- Channel receive exit
- Channel message-retry exit

The parameters are similar for each type of exit, and the description given here applies to all of them, except where specifically noted.

Syntax

MQ_CHANNEL_EXIT *(ChannelExitParms, ChannelDefinition, DataLength, AgentBufferLength, AgentBuffer, ExitBufferLength, ExitBufferAddr)*

Parameters

The MQ_CHANNEL_EXIT call has the following parameters.

ChannelExitParms (MQCXP) – input/output

Channel exit parameter block.

This structure contains additional information relating to the invocation of the exit. The exit sets information in this structure to indicate how the MCA should proceed.

ChannelDefinition (MQCD) – input/output

Channel definition.

This structure contains parameters set by the administrator to control the behavior of the channel.

DataLength (MQLONG) – input/output

Length of data.

When the exit is invoked, this contains the length of data in the *AgentBuffer* parameter. The exit must set this to the length of the data in either the *AgentBuffer* or the *ExitBufferAddr* (as determined by the *ExitResponse2* field in the *ChannelExitParms* parameter) that is to proceed.

The data depends on the type of exit:
- For a channel security exit, when the exit is invoked this contains the length of any security message in the *AgentBuffer* field, if *ExitReason* is MQXR_SEC_MSG. It is zero if there is no message. The exit must set this field to the length of any security message to be sent to its partner if it sets

ExitResponse to MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG. The message data is in either *AgentBuffer* or *ExitBufferAddr*.

The content of security messages is the sole responsibility of the security exits.

- For a channel message exit, when the exit is invoked this contains the length of the message (including the transmission queue header). The exit must set this field to the length of the message in either *AgentBuffer* or *ExitBufferAddr* that is to proceed.
- For a channel send or channel receive exit, when the exit is invoked this contains the length of the transmission. The exit must set this field to the length of the transmission in either *AgentBuffer* or *ExitBufferAddr* that is to proceed.

If a security exit sends a message, and there is no security exit at the other end of the channel, or the other end sets an *ExitResponse* of MQXCC_OK, the initiating exit is re-invoked with MQXR_SEC_MSG and a null response (*DataLength*=0).

AgentBufferLength (MQLONG) – input

Length of agent buffer.

This can be greater than *DataLength* on invocation.

For channel message, send, and receive exits, any unused space on invocation can be used by the exit to expand the data in place. If this is done, the *DataLength* parameter must be set appropriately by the exit.

In the C programming language, this parameter is passed by address.

AgentBuffer (MQBYTE×AgentBufferLength) – input/output

Agent buffer.

The contents of this depend upon the exit type:

- For a channel security exit, on invocation of the exit it contains a security message if *ExitReason* is MQXR_SEC_MSG. If the exit wishes to send a security message back, it can either use this buffer or its own buffer (*ExitBufferAddr*).
- For a channel message exit, on invocation of the exit this contains:
  - The transmission queue header (MQXQH), which includes the message descriptor (which itself contains the context information for the message), immediately followed by
  - The message data

  If the message is to proceed, the exit can do one of the following:
  - Leave the contents of the buffer untouched
  - Modify the contents in place (returning the new length of the data in *DataLength*; this must not be greater then *AgentBufferLength*)
  - Copy the contents to the *ExitBufferAddr*, making any required changes

  Any changes that the exit makes to the transmission queue header are not checked; however, erroneous modifications may mean that the message cannot be put at the destination.
- For a channel send or receive exit, on invocation of the exit this contains the transmission data. The exit can do one of the following:
  - Leave the contents of the buffer untouched
  - Modify the contents in place (returning the new length of the data in *DataLength*; this must not be greater then *AgentBufferLength*)
  - Copy the contents to the *ExitBufferAddr*, making any required changes

Note that the first 8 bytes of the data must not be changed by the exit.

ExitBufferLength (MQLONG) – input/output

Length of exit buffer.

On the first invocation of the exit, this is set to zero. Thereafter whatever value is passed back by the exit, on each invocation, is presented to the exit next time it is invoked. The value is not used by the MCA (except in WebSphere MQ for z/OS using CICS for distributed queue management, where a check is made that *DataLength* does not exceed *ExitBufferLength*, if the exit is returning data in *ExitBufferAddr*).

Note: This parameter should not be used by exits written in programming languages which do not support the pointer data type.

ExitBufferAddr (MQPTR) – input/output

Address of exit buffer.

This is a pointer to the address of a buffer of storage managed by the exit, where it can choose to return message or transmission data (depending upon the type of exit) to the agent if the agent's buffer is or may not be large enough, or if it is more convenient for the exit to do so.

On the first invocation of the exit, the address passed to the exit is null. Thereafter whatever address is passed back by the exit, on each invocation, is presented to the exit the next time it is invoked.

Note: This parameter should not be used by exits written in programming languages that do not support the pointer data type.

Usage notes

1. The function performed by the channel exit is defined by the provider of the exit. The exit, however, must conform to the rules defined here and in the associated control block, the MQCXP.
2. The *ChannelDefinition* parameter passed to the channel exit may be one of several versions. See the *Version* field in the MQCD structure for more information.
3. If the channel exit receives an MQCD structure with the *Version* field set to a value greater than MQCD_VERSION_1, the exit should use the *ConnectionName* field in MQCD, in preference to the *ShortConnectionName* field.
4. In general, channel exits are allowed to change the length of message data. This may arise as a result of the exit adding data to the message, or removing data from the message, or compressing or encrypting the message. However, special restrictions apply if the message is a segment that contains only part of a logical message. In particular, there must be no net change in the length of the message as a result of the actions of complementary sending and receiving exits.

   For example, it is permissible for a sending exit to shorten the message by compressing it, but the complementary receiving exit must restore the original length of the message by decompressing it, so that there is no net change in the length of the message.

   This restriction arises because changing the length of a segment would cause the offsets of later segments in the message to be incorrect, and this would inhibit the queue manager's ability to recognize that the segments formed a complete logical message.

C invocation

```
exitname (&ChannelExitParms, &ChannelDefinition,
         &DataLength, &AgentBufferLength, AgentBuffer,
         &ExitBufferLength, &ExitBufferAddr);
```

The parameters passed to the exit are declared as follows:

```
MQCXP   ChannelExitParms;   /* Channel exit parameter block */
MQCD    ChannelDefinition;  /* Channel definition */
MQLONG  DataLength;         /* Length of data */
MQLONG  AgentBufferLength;  /* Length of agent buffer */
MQBYTE  AgentBuffer[n];     /* Agent buffer */
MQLONG  ExitBufferLength;   /* Length of exit buffer */
MQPTR   ExitBufferAddr;     /* Address of exit buffer */
```

COBOL invocation

```
     CALL 'exitname' USING CHANNELEXITPARMS, CHANNELDEFINITION,
                           DATALENGTH, AGENTBUFFERLENGTH, AGENTBUFFER,
                           EXITBUFFERLENGTH, EXITBUFFERADDR.
```

The parameters passed to the exit are declared as follows:

```
**   Channel exit parameter block
 01  CHANNELEXITPARMS.
     COPY CMQCXPV.
**   Channel definition
 01  CHANNELDEFINITION.
     COPY CMQCDV.
**   Length of data
 01  DATALENGTH         PIC S9(9) BINARY.
**   Length of agent buffer
 01  AGENTBUFFERLENGTH  PIC S9(9) BINARY.
**   Agent buffer
 01  AGENTBUFFER        PIC X(n).
**   Length of exit buffer
 01  EXITBUFFERLENGTH   PIC S9(9) BINARY.
**   Address of exit buffer
 01  EXITBUFFERADDR     POINTER.
```

PL/I invocation

```
call exitname (ChannelExitParms, ChannelDefinition, DataLength,
              AgentBufferLength, AgentBuffer, ExitBufferLength,
              ExitBufferAddr);
```

The parameters passed to the exit are declared as follows:

```
dcl ChannelExitParms   like MQCXP;     /* Channel exit parameter
                                          block */
dcl ChannelDefinition  like MQCD;      /* Channel definition */
dcl DataLength         fixed bin(31);  /* Length of data */
dcl AgentBufferLength  fixed bin(31);  /* Length of agent buffer */
dcl AgentBuffer        char(n);        /* Agent buffer */
dcl ExitBufferLength   fixed bin(31);  /* Length of exit buffer */
dcl ExitBufferAddr     pointer;        /* Address of exit buffer */
```

RPG invocation (ILE)

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                     CALLP     exitname(MQCXP : MQCD : DATLEN :
     C                                        ABUFL : ABUF : EBUFL :
     C                                        EBUF)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
Dexitname        PR                 EXTPROC('exitname')
D* Channel exit parameter block
D MQCXP                       160A
D* Channel definition
D MQCD                       1328A
D* Length of data
D DATLEN                        10I 0
D* Length of agent buffer
D ABUFL                         10I 0
D* Agent buffer
D ABUF                            *   VALUE
D* Length of exit buffer
D EBUFL                         10I 0
D* Address of exit buffer
D EBUF                            *
```

RPG invocation (OPM)

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALL 'exitname'
C* Channel exit parameter block
C                     PARM           MQCXP
C* Channel definition
C                     PARM           MQCD
C* Length of data
C                     PARM           DATLEN  90
C* Length of agent buffer
C                     PARM           ABUFL   90
C* Agent buffer
C                     PARM           ABUF    n
C* Length of exit buffer
C                     PARM           EBUFL   90
C* Address of exit buffer
C                     PARM           EBUF   16
```

Declare the structure parameters as follows:

```
I*..1....:....2....:....3....:....4....:....5....:....6....:....7..
I* Channel exit parameter block
IMQCXP       DS
I/COPY CMQCXPR
I* Channel definition
IMQCD        DS
I/COPY CMQCDR
```

System/390 assembler invocation

```
    CALL EXITNAME,(CHANNELEXITPARMS,CHANNELDEFINITION,DATALENGTH, X
          AGENTBUFFERLENGTH,AGENTBUFFER,EXITBUFFERLENGTH,         X
          EXITBUFFERADDR)
```

The parameters passed to the exit are declared as follows:

```
CHANNELEXITPARMS   CMQCXPA  ,      Channel exit parameter block
CHANNELDEFINITION  CMQCDA   ,      Channel definition
DATALENGTH         DS       F      Length of data
AGENTBUFFERLENGTH  DS       F      Length of agent buffer
AGENTBUFFER        DS       CL(n)  Agent buffer
EXITBUFFERLENGTH   DS       F      Length of exit buffer
EXITBUFFERADDR     DS       F      Address of exit buffer
```

MQ_CHANNEL_AUTO_DEF_EXIT – Channel auto-definition exit

This call definition is provided solely to describe the parameters that are passed to the channel auto-definition exit called by the Message Channel Agent. No entry point called MQ_CHANNEL_AUTO_DEF_EXIT is actually provided by the queue manager; the name MQ_CHANNEL_AUTO_DEF_EXIT is of no special significance because the names of the auto-definition exits are provided in the queue manager.

The MQ_CHANNEL_AUTO_DEF_EXIT call definition is part of the WebSphere MQ Security Enabling Interface (SEI), which is one of the WebSphere MQ framework interfaces.

This exit is supported in the following environments: AIX, HP-UX, Linux, z/OS, OS/2, OS/400, Solaris, Windows.

Syntax

MQ_CHANNEL_AUTO_DEF_EXIT *(ChannelExitParms*, *ChannelDefinition)*

Parameters

The MQ_CHANNEL_AUTO_DEF_EXIT call has the following parameters.

ChannelExitParms (MQCXP) – input/output

Channel exit parameter block.

This structure contains additional information relating to the invocation of the exit. The exit sets information in this structure to indicate how the MCA should proceed.

ChannelDefinition (MQCD) – input/output

Channel definition.

This structure contains parameters set by the administrator to control the behavior of channels which are created automatically. The exit sets information in this structure to modify the default behavior set by the administrator.

The MQCD fields listed below must not be altered by the exit:

ChannelName
ChannelType
StrucLength
Version

If other fields are changed, the value set by the exit must be valid. If the value is not valid, an error message is written to the error log file or displayed on the console (as appropriate to the environment).

Usage notes

1. The function performed by the channel exit is defined by the provider of the exit. The exit, however, must conform to the rules defined here and in the associated control block, the MQCXP.
2. The *ChannelExitParms* parameter passed to the channel auto-definition exit is an MQCXP structure. The version of MQCXP passed depends on the environment in which the exit is running; see the description of the *Version* field in "MQCXP – Channel exit parameter" on page 714 for details.

3. The *ChannelDefinition* parameter passed to the channel auto-definition exit is an MQCD structure. The version of MQCD passed depends on the environment in which the exit is running; see the description of the *Version* field in “MQCD – Channel definition” on page 674 for details.

C invocation

```
exitname (&ChannelExitParms, &ChannelDefinition);
```

The parameters passed to the exit are declared as follows:

```
MQCXP  ChannelExitParms;   /* Channel exit parameter block */
MQCD   ChannelDefinition;  /* Channel definition */
```

COBOL invocation

```
     CALL 'exitname' USING CHANNELEXITPARMS, CHANNELDEFINITION.
```

The parameters passed to the exit are declared as follows:

```
**   Channel exit parameter block
 01  CHANNELEXITPARMS.
     COPY CMQCXPV.
**   Channel definition
 01  CHANNELDEFINITION.
     COPY CMQCDV.
```

RPG invocation (ILE)

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                     CALLP     exitname(MQCXP : MQCD)
```

The prototype definition for the call is:

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     Dexitname         PR                  EXTPROC('exitname')
     D* Channel exit parameter block
     D MQCXP                        160A
     D* Channel definition
     D MQCD                        1328A
```

RPG invocation (OPM)

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                     CALL 'exitname'
     C* Channel exit parameter block
     C                     PARM           MQCXP
     C* Channel definition
     C                     PARM           MQCD
```

Declare the structure parameters as follows:

```
     I*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     I* Channel exit parameter block
     IMQCXP       DS
     I/COPY CMQCXPR
     I* Channel definition
     IMQCD        DS
     I/COPY CMQCDR
```

System/390 assembler invocation

```
         CALL EXITNAME,(CHANNELEXITPARMS,CHANNELDEFINITION)
```

The parameters passed to the exit are declared as follows:

```
CHANNELEXITPARMS   CMQCXPA  ,  Channel exit parameter block
CHANNELDEFINITION  CMQCDA   ,  Channel definition
```

MQ_TRANSPORT_EXIT – Transport retry exit

This call definition is provided solely to describe the parameters that are passed to the transport retry exit called by the message channel agent (MCA). No entry point called MQ_TRANSPORT_EXIT is actually provided by the MCA; the name MQ_TRANSPORT_EXIT is of no special significance because the name of the transport retry exit is provided by the queue-manager's configuration file.

This exit is supported in the following environments: AIX.

Syntax

MQ_TRANSPORT_EXIT *(ExitParms, DestAddressLength, DestAddress)*

Parameters

The MQ_TRANSPORT_EXIT call has the following parameters.

ExitParms (MQTXP) – input/output

Exit parameter block.

This structure contains information relating to the invocation of the exit. The exit sets information in this structure to indicate how processing should continue.

DestAddressLength (MQLONG) – input

Length in bytes of destination IP address.

This is the length of the destination IP address *DestAddress*. The value is always greater than zero.

DestAddress (MQCHAR×DestAddressLength) – input

Destination IP address.

This is the IP address of the destination. Its length is given by the *DestAddressLength* parameter.

Usage notes

1. The function performed by the exit is defined by the provider of the exit. The exit, however, must conform to the rules defined in the associated control block MQTXP.
2. The transport retry exit allows a channel to be paused based on criteria that are external to WebSphere MQ.

   If configured, the exit is called before each attempt to resend a failing data packet. When called, the exit can wait based on some external criterion, and not return control to the MCA until the exit decides that the resend of the data packet is likely to succeed. If the exit decides that transmission should be discontinued, the exit can instruct the MCA to close the channel.

C invocation

```
exitname (&ExitParms, DestAddressLength, DestAddress);
```

The parameters passed to the exit are declared as follows:

```
MQTXP   ExitParms;          /* Exit parameter block */
MQLONG  DestAddressLength;  /* Length in bytes of destination IP
                               address */
MQCHAR  DestAddress[n];     /* Destination IP address */
```

MQXWAIT – Wait in exit

The MQXWAIT call waits for an event to occur. It can be used only from a channel exit on z/OS when not using CICS.

Syntax

MQXWAIT *(Hconn, WaitDesc, CompCode, Reason)*

Parameters

The MQXWAIT call has the following parameters.

Hconn (MQHCONN) – input

Connection handle.

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN call issued in the same or earlier invocation of the exit.

WaitDesc (MQXWD) – input/output

Wait descriptor.

This describes the event to wait for. See “MQXWD – Exit wait descriptor” on page 733 for details of the fields in this structure.

CompCode (MQLONG) – output

Completion code.

It is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (MQLONG) – output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

MQRC_NONE
(0, X’000’) No reason to report.

If *CompCode* is MQCC_FAILED:

MQRC_ADAPTER_NOT_AVAILABLE
(2204, X’89C’) Adapter not available.

MQRC_OPTIONS_ERROR
(2046, X’7FE’) Options not valid or not consistent.

MQRC_XWAIT_CANCELED
(2107, X’83B’) MQXWAIT call canceled.

MQRC_XWAIT_ERROR
(2108, X’83C’) Invocation of MQXWAIT call not valid.

For more information on these reason codes, see the *WebSphere MQ Application Programming Reference*.

C invocation

```
MQXWAIT (Hconn, &WaitDesc, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQXWD    WaitDesc;  /* Wait descriptor */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

System/390 assembler invocation

```
CALL MQXWAIT,(HCONN,WAITDESC,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS       F  Connection handle
WAITDESC  CMQXWDA  ,  Wait descriptor
COMPCODE  DS       F  Completion code
REASON    DS       F  Reason code qualifying COMPCODE
```

MQCD – Channel definition

The following table summarizes the fields in the structure.

Table 62. Fields in MQCD

Field	Description	Page
ChannelName	Channel definition name	676
Version	Structure version number	677
ChannelType	Channel type	678
TransportType	Transport type	678
Desc	Channel description	679
QMgrName	Queue manager name	679
XmitQName	Transmission queue name	679
ShortConnectionName	First 20 bytes of connection name	679
MCAName	Reserved	680
ModeName	LU 6.2 mode name	680
TpName	LU 6.2 transaction program name	680
BatchSize	Batch size	680
DiscInterval	Disconnect interval	680
ShortRetryCount	Short retry count	681
ShortRetryInterval	Short retry wait interval	681
LongRetryCount	Long retry count	681
LongRetryInterval	Long retry wait interval	681
SecurityExit	Channel security exit name	682
MsgExit	Channel message exit name	682
SendExit	Channel send exit name	682
ReceiveExit	Channel receive exit name	683
SeqNumberWrap	Highest allowable message sequence number	683
MaxMsgLength	Maximum message length	683
PutAuthority	Put authority	683
DataConversion	Data conversion	683
SecurityUserData	Channel security exit user data	684
MsgUserData	Channel message exit user data	684
SendUserData	Channel send exit user data	684
ReceiveUserData	Channel receive exit user data	685
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_2.		
UserIdentifier	User identifier	685
Password	Password	685
MCAUserIdentifier	First 12 bytes of MCA user identifier	685
MCAType	Message channel agent type	686
ConnectionName	Connection name	687
RemoteUserIdentifier	First 12 bytes of user identifier from partner	687
RemotePassword	Password from partner	688

Table 62. Fields in MQCD (continued)

Field	Description	Page
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_3.		
MsgRetryExit	Channel message retry exit name	688
MsgRetryUserData	Channel message retry exit user data	689
MsgRetryCount	Number of times MCA will try to put the message after the first attempt has failed	689
MsgRetryInterval	Minimum interval in milliseconds after which the open or put operation will be retried	690
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_4.		
HeartbeatInterval	Time in seconds between heartbeat flows	690
BatchInterval	Batch duration	691
NonPersistentMsgSpeed	Speed at which nonpersistent messages are sent	691
StrucLength	Length of MQCD structure	692
ExitNameLength	Length of exit name	692
ExitDataLength	Length of exit user data	692
MsgExitsDefined	Number of message exits defined	693
SendExitsDefined	Number of send exits defined	693
ReceiveExitsDefined	Number of receive exits defined	693
MsgExitPtr	Address of first *MsgExit* field	693
MsgUserDataPtr	Address of first *MsgUserData* field	693
SendExitPtr	Address of first *SendExit* field	694
SendUserDataPtr	Address of first *SendUserData* field	694
ReceiveExitPtr	Address of first *ReceiveExit* field	695
ReceiveUserDataPtr	Address of first *ReceiveUserData* field	695
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_5.		
ClusterPtr	Address of a list of clusters	696
ClustersDefined	Number of cluster records	696
NetworkPriority	Network priority	696
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_6.		
LongMCAUserIdLength	Length of long MCA user identifier	696
LongRemoteUserIdLength	Length of long remote user identifier	696
LongMCAUserIdPtr	Address of long MCA user identifier	697
LongRemoteUserIdPtr	Address of long remote user identifier	697
MCASecurityId	MCA security identifier	697
RemoteSecurityId	Remote security identifier	698
Note: The remaining fields are not present if *Version* is less than MQCD_VERSION_7.		
SSLCipherSpec	SSL Cipher Specification	698
SSLPeerNamePtr	SSL Peer Name Pointer	698
SSLPeerNameLength	SSL Peer Name Length	698
SSLClientAuth	SSL Client Authentication	699
KeepAliveInterval	Keepalive interval	699

Table 62. Fields in MQCD (continued)

Field	Description	Page
LocalAddress	Local communications address for the channel	699
BatchHeartbeat	Batch heartbeat interval	700

The MQCD structure contains the parameters which control execution of a channel. It is passed to each channel exit that is called from a Message Channel Agent (MCA). See MQ_CHANNEL_EXIT.

Exit name fields

When an exit is called, the relevant field from *SecurityExit*, *MsgExit*, *SendExit*, *ReceiveExit*, and *MsgRetryExit* contains the name of the exit currently being invoked. The meaning of the name in these fields depends on the environment in which the MCA is running. Except where noted below, the name is left-justified within the field, with no embedded blanks; the name is padded with blanks to the length of the field. In the descriptions that follow, square brackets ([ ]) denote optional information:

UNIX systems

The exit name is the name of a dynamically-loadable module or library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path:

```
[path]library(function)
```

The name is limited to a maximum of 128 characters.

z/OS not using CICS for distributed queuing

The exit name is the name of a load module that is valid for specification on the EP parameter of the LINK or LOAD macro. The name is limited to a maximum of 8 characters.

z/OS using CICS for distributed queuing

The exit name is a 4-character transaction identifier.

OS/2, Windows, and DOS

The exit name is the name of a dynamic-link library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path and drive:

```
[d:][path]library(function)
```

The name is limited to a maximum of 128 characters.

OS/400

The exit name is a 10-byte program name followed by a 10-byte library name. If the names are less than 10 bytes long, each name is padded with blanks to make it 10 bytes. The library name can be `*LIBL` except when calling a channel auto-definition exit, in which case a fully qualified name is required.

Fields

ChannelName (MQCHAR20)

Channel definition name.

There must be a channel definition of the same name at the remote machine to be able to communicate.

The name must use only the characters:
- Uppercase A–Z
- Lowercase a–z
- Numerics 0–9
- Period (.)
- Forward slash (/)
- Underscore (_)
- Percent sign (%)

and be padded to the right with blanks. Leading or embedded blanks are not allowed.

The length of this field is given by MQ_CHANNEL_NAME_LENGTH.

Version (MQLONG)

Structure version number.

The value depends on the environment:

MQCD_VERSION_1
Version-1 channel definition structure.

The field has this value on WebSphere MQ for z/OS when CICS is used for distributed queuing. Note, however, that the MQCD passed to the exit is in fact a version-2 structure.

MQCD_VERSION_2
Version-2 channel definition structure.

This value is not used by any current WebSphere MQ product.

MQCD_VERSION_3
Version-3 channel definition structure.

The field has this value on MQSeries Version 2 in the following environments: Compaq OpenVMS Alpha, Compaq NonStop Kernel, UNIX systems not listed elsewhere, Windows systems.

MQCD_VERSION_4
Version-4 channel definition structure.

The field has this value on MQSeries Version 5 Release 0 in the following environments: AIX, HP-UX, OS/2, Solaris, Windows, and on MQSeries for MVS/ESA V1.2 when CICS is not used for distributed queuing.

MQCD_VERSION_5
Version-5 channel definition structure.

The field has this value on MQSeries for OS/390 Version 2 Release 1 and Version 5 Release 2 when CICS is not used for distributed queuing.

MQCD_VERSION_6
Version-6 channel definition structure.

The field has this value on MQSeries Version 5 Release 1 and Version 5 Release 2 in the following environments: AIX, HP-UX, OS/2, OS/400, Solaris, Windows, plus WebSphere MQ clients connected to these systems.

MQCD_VERSION_7
Version-7 channel definition structure.

The field has this value on Websphere MQ Version 5 Release 3 in the following environments: AIX, HP-UX, Solaris, Windows, and on Websphere MQ for z/OS Version 5 Release 3 (and above) when CICS is not used for distributed queuing.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

MQCD_CURRENT_VERSION
Current® version of channel definition structure.

The value of this constant depends on the environment (see above).

Note: When a new version of the MQCD structure is introduced, the layout of the existing part is not changed. The exit should therefore check that the version number is equal to or greater than the lowest version which contains the fields that the exit needs to use.

ChannelType (MQLONG)

Channel type.

It is one of the following:

MQCHT_SENDER
Sender.

MQCHT_SERVER
Server.

MQCHT_RECEIVER
Receiver.

MQCHT_REQUESTER
Requester.

MQCHT_CLNTCONN
Client connection.

MQCHT_SVRCONN
Server-connection (for use by clients).

MQCHT_CLUSSDR
Cluster sender.

MQCHT_CLUSRCVR
Cluster receiver.

TransportType (MQLONG)

Transport type.

Transmission protocol to be used.

Note that the value will not have been checked if the channel was initiated from the other end.

The value is one of the following:

MQXPT_LU62
LU 6.2 transport protocol.

MQXPT_TCP
TCP/IP transport protocol.

MQXPT_NETBIOS
NetBIOS transport protocol.

This value is supported in the following environments: OS/2, Windows.

MQXPT_SPX
SPX transport protocol.

This value is supported in the following environments: OS/2, Windows, plus WebSphere MQ clients connected to these systems.

MQXPT_DECNET
DECnet transport protocol.

This value is supported in the following environment: Compaq OpenVMS Alpha.

MQXPT_UDP
UDP transport protocol.

This value is supported in the following environments: AIX.

Desc (MQCHAR64)

Channel description.

This is a field that may be used for descriptive commentary. The content of the field is of no significance to Message Channel Agents. However, it should contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

Note: If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters may be translated incorrectly if this field is sent to another queue manager.

The length of this field is given by MQ_CHANNEL_DESC_LENGTH.

QMgrName (MQCHAR48)

Queue-manager name.

For channels with a *ChannelType* other than MQCHT_CLNTCONN, this is the name of the queue manager that an exit can connect to, which on OS/2, UNIX systems, and Windows, is always nonblank.

The length of this field is given by MQ_Q_MGR_NAME_LENGTH.

XmitQName (MQCHAR48)

Transmission queue name.

The name of the transmission queue from which messages are retrieved.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER or MQCHT_SERVER.

The length of this field is given by MQ_Q_NAME_LENGTH.

ShortConnectionName (MQCHAR20)

First 20 bytes of connection name.

If the *Version* field is MQCD_VERSION_1, *ShortConnectionName* contains the full connection name.

MQCD – ShortConnectionName field

If the *Version* field is MQCD_VERSION_2 or greater, *ShortConnectionName* contains the first 20 characters of the connection name. The full connection name is given by the *ConnectionName* field; *ShortConnectionName* and the first 20 characters of *ConnectionName* are identical.

See *ConnectionName* for details of the contents of this field.

Note: The name of this field was changed for MQCD_VERSION_2 and subsequent versions of MQCD; the field was previously called *ConnectionName*.

The length of this field is given by MQ_SHORT_CONN_NAME_LENGTH.

MCAName (MQCHAR20)

Reserved.

This is a reserved field; its value is blank.

The length of this field is given by MQ_MCA_NAME_LENGTH.

ModeName (MQCHAR8)

LU 6.2 Mode name.

This field is relevant only if the transmission protocol (*TransportType*) is MQXPT_LU62, and the *ChannelType* is not MQCHT_SVRCONN or MQCHT_RECEIVER.

On OS/400, z/OS without CICS, UNIX systems, and MQSeries for Windows, this field is always blank. The information is contained in the communications Side Object instead.

The length of this field is given by MQ_MODE_NAME_LENGTH.

TpName (MQCHAR64)

LU 6.2 transaction program name.

This field is relevant only if the transmission protocol (*TransportType*) is MQXPT_LU62, and the *ChannelType* is not MQCHT_SVRCONN or MQCHT_RECEIVER.

On OS/400, z/OS without CICS, UNIX systems, and MQSeries for Windows, this field is always blank. The information is contained in the communications Side Object instead.

The length of this field is given by MQ_TP_NAME_LENGTH.

BatchSize (MQLONG)

Batch size.

The maximum number of messages that can be sent through a channel before synchronizing the channel.

This field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_CLNTCONN.

DiscInterval (MQLONG)

Disconnect interval.

The maximum time in seconds for which the channel waits for a message to arrive on the transmission queue, before terminating the channel. A value of zero causes the MCA to wait indefinitely.

This field is relevant only for channels with a `ChannelType` of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

ShortRetryCount (MQLONG)

Short retry count.

This is the maximum number of attempts that are made to connect to the remote machine, at intervals specified by `ShortRetryInterval`, before the (normally longer) `LongRetryCount` and `LongRetryInterval` are used.

This field is relevant only for channels with a `ChannelType` of MQCHT_REQUESTER (only for WebSphere MQ for z/OS using CICS distributed queuing), MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

ShortRetryInterval (MQLONG)

Short retry wait interval.

This is the maximum number of seconds to wait before reattempting connection to the remote machine. Note that the interval between retries may be extended if the channel has to wait to become active.

This field is relevant only for channels with a `ChannelType` of MQCHT_REQUESTER (only for WebSphere MQ for z/OS using CICS distributed queuing), MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

LongRetryCount (MQLONG)

Long retry count.

This count is used after the count specified by `ShortRetryCount` has been exhausted. It specifies the maximum number of further attempts that are made to connect to the remote machine, at intervals specified by `LongRetryInterval`, before logging an error to the operator.

This field is relevant only for channels with a `ChannelType` of MQCHT_REQUESTER (only for WebSphere MQ for z/OS using CICS distributed queuing), MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

LongRetryInterval (MQLONG)

Long retry wait interval.

This is the maximum number of seconds to wait before reattempting connection to the remote machine. Note that the interval between retries may be extended if the channel has to wait to become active.

This field is relevant only for channels with a `ChannelType` of MQCHT_REQUESTER (only for WebSphere MQ for z/OS using CICS distributed queuing), MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

SecurityExit (MQCHARn)

Channel security exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately after establishing a channel.

  Before any messages are transferred, the exit is given the opportunity to instigate security flows to validate connection authorization.
- Upon receipt of a response to a security message flow.

  Any security message flows received from the remote processor on the remote machine are given to the exit.
- At initialization and termination of the channel.

See“Exit name fields” on page 676 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

Note: The value of this constant is environment specific.

MsgExit (MQCHARn)

Channel message exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately after a message has been retrieved from the transmission queue (sender or server), or immediately before a message is put to a destination queue (receiver or requester).

  The exit is given the entire application message and transmission queue header for modification.
- At initialization and termination of the channel.

This field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_CLNTCONN; a message exit is never invoked for such channels.

See “Exit name fields” on page 676 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

Note: The value of this constant is environment specific.

SendExit (MQCHARn)

Channel send exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately before data is sent out on the network.

  The exit is given the complete transmission buffer before it is transmitted. The contents of the buffer can be modified as required.
- At initialization and termination of the channel.

See “Exit name fields” on page 676 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

Note: The value of this constant is environment specific.

ReceiveExit (MQCHARn)

Channel receive exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately before the received network data is processed.

  The exit is given the complete transmission buffer as received. The contents of the buffer can be modified as required.
- At initialization and termination of the channel.

See "Exit name fields" on page 676 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

Note: The value of this constant is environment specific.

SeqNumberWrap (MQLONG)

Highest allowable message sequence number.

When this value is reached, sequence numbers wrap to start again at 1.

This value is non-negotiable and must match in both the local and remote channel definitions.

This field is not relevant for channels with a `ChannelType` of MQCHT_SVRCONN or MQCHT_CLNTCONN.

MaxMsgLength (MQLONG)

Maximum message length.

Specifies the maximum message length that can be transmitted on the channel. This is compared with the value for the remote channel and the actual maximum is the lower of the two values.

PutAuthority (MQLONG)

Put authority.

Specifies whether the user identifier in the context information associated with a message should be used to establish authority to put the message to the destination queue.

This field is relevant only for channels with a `ChannelType` of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR. It is one of the following:

MQPA_DEFAULT
Default user identifier is used.

MQPA_CONTEXT
Context user identifier is used.

DataConversion (MQLONG)

Data conversion.

This specifies whether the sending message channel agent should attempt conversion of the application message data if the receiving message channel agent is unable to perform this conversion. This applies only to messages that are not segments of logical messages; the MCA never attempts to convert messages which are segments.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR. It is one of the following:

MQCDC_SENDER_CONVERSION
Conversion by sender.

MQCDC_NO_SENDER_CONVERSION
No conversion by sender.

SecurityUserData (MQCHAR32)

Channel security exit user data.

This is passed to the channel security exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes have no effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

MsgUserData (MQCHAR32)

Channel message exit user data.

This is passed to the channel message exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes have no effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

SendUserData (MQCHAR32)

Channel send exit user data.

This is passed to the channel send exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes have no effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

ReceiveUserData (MQCHAR32)

Channel receive exit user data.

This is passed to the channel receive exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes have no effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_2.

UserIdentifier (MQCHAR12)

User identifier.

This is used by the message channel agent when attempting to initiate a secure SNA session with a remote message channel agent.

This field can be nonblank only on OS/2, UNIX systems, and Windows, and is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER or MQCHT_CLNTCONN. On z/OS this field is not relevant.

The length of this field is given by MQ_USER_ID_LENGTH, however only the first 10 characters are used.

This field is not present when *Version* is less than MQCD_VERSION_2.

Password (MQCHAR12)

Password.

This is used by the message channel agent when attempting to initiate a secure SNA session with a remote message channel agent.

This field can be nonblank only on OS/2, UNIX systems, and Windows, and is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER or MQCHT_CLNTCONN. On z/OS this field is not relevant.

The length of this field is given by MQ_PASSWORD_LENGTH, however only the first 10 characters are used.

This field is not present if *Version* is less than MQCD_VERSION_2.

MCAUserIdentifier (MQCHAR12)

First 12 bytes of MCA user identifier.

There are two fields that contain the MCA user identifier:

- *MCAUserIdentifier* contains the first 12 bytes of the MCA user identifier, and is padded with blanks if the identifier is shorter than 12 bytes. *MCAUserIdentifier* can be completely blank.
- *LongMCAUserIdPtr* points to the full MCA user identifier, which can be longer than 12 bytes. Its length is given by *LongMCAUserIdLength*. The full identifier contains no trailing blanks, and is not null-terminated. If the identifier is completely blank, *LongMCAUserIdLength* is zero, and the value of *LongMCAUserIdPtr* is undefined.

  Note: *LongMCAUserIdPtr* is not present if *Version* is less than MQCD_VERSION_6.

If the MCA user identifier is nonblank, it specifies the user identifier to be used by the message channel agent for authorization to access WebSphere MQ resources, including (if *PutAuthority* is MQPA_DEFAULT) authorization to put the message to the destination queue for receiver or requester channels.

If the MCA user identifier is blank, the message channel agent uses its default user identifier.

The MCA user identifier can be set by a security exit to indicate the user identifier that the message channel agent should use. The exit can change either *MCAUserIdentifier*, or the string pointed at by *LongMCAUserIdPtr*. If both are changed but differ from each other, the MCA uses *LongMCAUserIdPtr* in preference to *MCAUserIdentifier*. If the exit changes the length of the string addressed by *LongMCAUserIdPtr*, *LongMCAUserIdLength* must be set correspondingly. If the exit wishes to increase the length of the identifier, the exit must allocate storage of the required length, set that storage to the required identifier, and place the address of that storage in *LongMCAUserIdPtr*. The exit is responsible for freeing that storage when the exit is later invoked with the MQXR_TERM reason.

For channels with a *ChannelType* of MQCHT_SVRCONN, if *MCAUserIdentifier* in the channel definition is blank, any user identifier transferred from the client is copied into it. This user identifier (after any modification by the security exit at the server) is the one which the client application is assumed to be running under.

The MCA user identifier is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

This is an input/output field to the exit. The length of this field is given by MQ_USER_ID_LENGTH. This field is not present when *Version* is less than MQCD_VERSION_2.

MCAType (MQLONG)

Message channel agent type.

This is the type of the message channel agent program.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The value is one of the following:

MQMCAT_PROCESS
Process.

The message channel agent runs as a separate process.

MQMCAT_THREAD
Thread (OS/2, OS/400, UNIX, and Windows).

The message channel agent runs as a separate thread.

This value is supported in the following environments: OS/2, Windows.

This field is not present when *Version* is less than MQCD_VERSION_2.

ConnectionName (MQCHAR264)

Connection name.

This is the full connection name of the partner. The type of name depends on the transmission protocol (*TransportType*) to be used:

- For MQXPT_LU62, it is the fully-qualified name of the partner Logical Unit.
- For MQXPT_NETBIOS, it is the NetBIOS name defined on the remote machine.
- For MQXPT_TCP, it is either the host name, or the network address of the remote machine.
- For MQXPT_SPX, it is an SPX-style address comprising a 4-byte network address, a 6-byte node address, and a 2-byte socket number.

When defining a channel, this field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_RECEIVER. However, when the channel definition is passed to an exit, this field contains the address of the partner, whatever the channel type.

The length of this field is given by MQ_CONN_NAME_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_2.

RemoteUserIdentifier (MQCHAR12)

First 12 bytes of user identifier from partner.

There are two fields that contain the remote user identifier:

- *RemoteUserIdentifier* contains the first 12 bytes of the remote user identifier, and is padded with blanks if the identifier is shorter than 12 bytes. *RemoteUserIdentifier* can be completely blank.
- *LongRemoteUserIdPtr* points to the full remote user identifier, which can be longer than 12 bytes. Its length is given by *LongRemoteUserIdLength*. The full identifier contains no trailing blanks, and is not null-terminated. If the identifier is completely blank, *LongRemoteUserIdLength* is zero, and the value of *LongRemoteUserIdPtr* is undefined.

  LongRemoteUserIdPtr is not present if *Version* is less than MQCD_VERSION_6.

The remote user identifier is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

- For a security exit on an MQCHT_CLNTCONN channel, this is a user identifier that has been obtained from the environment (from an environment variable on OS/2 or from the system on UNIX platforms and Windows.) The exit can choose to send it to the security exit at the server.
- For a security exit on an MQCHT_SVRCONN channel, this field may contain a user identifier which has been obtained from the environment at the client, if there is no client security exit. The exit may validate this user ID (possibly in conjunction with the password in *RemotePassword*) and update the value in *MCAUserIdentifier*.

If there is a security exit at the client, then this information can be obtained in a security flow from the client.

The length of this field is given by MQ_USER_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_2.

RemotePassword (MQCHAR12)

Password from partner.

This field contains valid information only if *ChannelType* is MQCHT_CLNTCONN or MQCHT_SVRCONN.

- For a security exit at an MQCHT_CLNTCONN channel, this is a password which has been obtained from the environment from an environment variable on OS/2 and Windows. The exit can choose to send it to the security exit at the server.
- For a security exit at an MQCHT_SVRCONN channel, this field may contain a password which has been obtained from the environment at the client, if there is no client security exit. The exit may use this to validate the user identifier in *RemoteUserIdentifier*.

  If there is a security exit at the client, then this information can be obtained in a security flow from the client.

| The length of this field is given by MQ_PASSWORD_LENGTH. This field is not
| present if *Version* is less than MQCD_VERSION_2.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_3.

MsgRetryExit (MQCHARn)

Channel message retry exit name.

The message retry exit is an exit that is invoked by the MCA when the MCA receives a completion code of MQCC_FAILED from an MQOPEN or MQPUT call. The purpose of the exit is to specify a time interval for which the MCA should wait before retrying the MQOPEN or MQPUT operation. Alternatively, the exit can decide that the operation should not be retried.

The exit is invoked for all reason codes that have a completion code of MQCC_FAILED — it is up to the exit to decide which reason codes it wants the MCA to retry, for how many attempts, and at what time intervals.

When the exit decides that the operation should not be retried any more, the MCA performs its normal failure processing; this includes generating an exception report message (if specified by the sender), and either placing the original message on the dead-letter queue or discarding the message (according to whether the sender specified MQRO_DEAD_LETTER_Q or MQRO_DISCARD_MSG, respectively). Note that failures involving the dead-letter queue (for example, dead-letter queue full) do not cause the message-retry exit to be invoked.

If the exit name is nonblank, the exit is called at the following times:
- Immediately before performing the wait prior to retrying a message
- At initialization and termination of the channel.

See "Exit name fields" on page 676 for a description of the content of this field in various environments.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

Notes:

1. The value of this constant is environment specific.
2. On z/OS this field is not relevant.

This field is not present when *Version* is less than MQCD_VERSION_3.

MsgRetryUserData (MQCHAR32)

Channel message retry exit user data.

This is passed to the channel message-retry exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes have no effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_EXIT_DATA_LENGTH. This field is not present when *Version* is less than MQCD_VERSION_3.

On z/OS this field is always blank.

MsgRetryCount (MQLONG)

Number of times MCA will try to put the message, after the first attempt has failed.

This indicates the number of times that the MCA will retry the open or put operation, if the first MQOPEN or MQPUT fails with completion code MQCC_FAILED. The effect of this attribute depends on whether *MsgRetryExit* is blank or nonblank:

- If *MsgRetryExit* is blank, the *MsgRetryCount* attribute controls whether the MCA attempts retries. If the attribute value is zero, no retries are attempted. If the attribute value is greater than zero, the retries are attempted at intervals given by the *MsgRetryInterval* attribute.

  Retries are attempted only for the following reason codes:

  MQRC_PAGESET_FULL
  MQRC_PUT_INHIBITED
  MQRC_Q_FULL

  For other reason codes, the MCA proceeds immediately to its normal failure processing, without retrying the failing message.
- If *MsgRetryExit* is nonblank, the *MsgRetryCount* attribute has no effect on the MCA; instead it is the message-retry exit which determines how many times the retry is attempted, and at what intervals; the exit is invoked even if the *MsgRetryCount* attribute is zero.

The *MsgRetryCount* attribute is made available to the exit in the MQCD structure, but the exit it not required to honor it — retries continue indefinitely until the exit returns MQXCC_SUPPRESS_FUNCTION in the *ExitResponse* field of MQCXP.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

This field is not present when *Version* is less than MQCD_VERSION_3.

On z/OS this field is always zero.

MsgRetryInterval (MQLONG)

Minimum interval in milliseconds after which the open or put operation will be retried.

The effect of this attribute depends on whether *MsgRetryExit* is blank or nonblank:

- If *MsgRetryExit* is blank, the *MsgRetryInterval* attribute specifies the minimum period of time that the MCA will wait before retrying a message, if the first MQOPEN or MQPUT fails with completion code MQCC_FAILED. A value of zero means that the retry will be performed as soon as possible after the previous attempt. Retries are performed only if *MsgRetryCount* is greater than zero.

  This attribute is also used as the wait time if the message-retry exit returns an invalid value in the *MsgRetryInterval* field in MQCXP.
- If *MsgRetryExit* is not blank, the *MsgRetryInterval* attribute has no effect on the MCA; instead it is the message-retry exit which determines how long the MCA should wait. The *MsgRetryInterval* attribute is made available to the exit in the MQCD structure, but the exit it not required to honor it.

The value is in the range 0 through 999 999 999.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

This field is not present when *Version* is less than MQCD_VERSION_3.

On z/OS this field is always zero.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_4.

HeartbeatInterval (MQLONG)

Time in seconds between heartbeat flows.

The interpretation of this field depends on the channel type, as follows:

- For a channel type of MQCHT_SENDER, MQCHT_SERVER, MQCHT_RECEIVER MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR, this is the time in seconds between heartbeat flows passed from the sending MCA when there are no messages on the transmission queue. This gives the receiving MCA the opportunity to quiesce the channel. To be useful, *HeartbeatInterval* should be significantly less than *DiscInterval*.

  This type of heartbeat is supported in the following environments: AIX, HP-UX, Linux, z/OS, OS/2, OS/400, Solaris, Windows.

- For a channel type of MQCHT_CLNTCONN or MQCHT_SVRCONN, this is the time in seconds between heartbeat flows passed from the server MCA when that MCA has issued an MQGET call with the MQGMO_WAIT option on behalf of a client application. This allows the server MCA to handle situations where the client connection fails during an MQGET with MQGMO_WAIT.

  This type of heartbeat is supported in the following environments: AIX, HP-UX, Linux, OS/2, OS/400, Solaris, Windows.

The value is in the range 0 through 999 999. A value of 0 means that no heartbeat exchange occurs. The value that is actually used is the larger of the values specified at the sending side and receiving side.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

BatchInterval (MQLONG)

Batch duration.

This is the approximate time in milliseconds that a channel will keep a batch open, if fewer than *BatchSize* messages have been transmitted in the current batch.

If *BatchInterval* is greater than zero, the batch is terminated by whichever of the following occurs first:
- *BatchSize* messages have been sent, or
- *BatchInterval* milliseconds have elapsed since the start of the batch.

If *BatchInterval* is zero, the batch is terminated by whichever of the following occurs first:
- *BatchSize* messages have been sent, or
- the transmission queue becomes empty.

BatchInterval must be in the range zero through 999 999 999.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present when *Version* is less than MQCD_VERSION_4.

NonPersistentMsgSpeed (MQLONG)

Speed at which nonpersistent messages are sent.

This specifies the speed at which nonpersistent messages travel through the channel.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_RECEIVER, MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The value is one of the following:

MQNPMS_NORMAL

Normal speed.

If a channel is defined to be MQNPMS_NORMAL, nonpersistent messages travel through the channel at normal speed. This has the advantage that these messages will not be lost if there is a channel failure. Also, persistent and nonpersistent messages on the same transmission queue maintain their order relative to each other.

MQNPMS_FAST
Fast speed.

If a channel is defined to be MQNPMS_FAST, nonpersistent messages travel through the channel at fast speed. This improves the throughput of the channel, but means that nonpersistent messages will be lost if there is a channel failure. Also, it is possible for nonpersistent messages to jump ahead of persistent messages waiting on the same transmission queue, that is, the order of nonpersistent messages is not maintained relative to persistent messages. However the order of nonpersistent messages relative to each other is maintained. Similarly, the order of persistent messages relative to each other is maintained.

StrucLength (MQLONG)

Length of MQCD structure.

This is the length in bytes of the MQCD structure. The length does not include any of the strings addressed by pointer fields contained within the structure. The value is one of the following:

MQCD_LENGTH_4
Length of version-4 channel definition structure.

MQCD_LENGTH_5
Length of version-5 channel definition structure.

MQCD_LENGTH_6
Length of version-6 channel definition structure.

MQCD_LENGTH_7
Length of version-7 channel definition structure.

The following constant specifies the length of the current version:

MQCD_CURRENT_LENGTH
Length of current version of channel definition structure.

Note: These constants have values that are environment specific.

The field is not present if `Version` is less than MQCD_VERSION_4.

ExitNameLength (MQLONG)

Length of exit name.

This is the length in bytes of each of the names in the lists of exit names addressed by the `MsgExitPtr`, `SendExitPtr`, and `ReceiveExitPtr` fields. This length is not necessarily the same as MQ_EXIT_NAME_LENGTH.

This is an input field to the exit. The field is not present if `Version` is less than MQCD_VERSION_4.

ExitDataLength (MQLONG)

Length of exit user data.

This is the length in bytes of each of the user data items in the lists of exit user data items addressed by the *MsgUserDataPtr*, *SendUserDataPtr*, and *ReceiveUserDataPtr* fields. This length is not necessarily the same as MQ_EXIT_DATA_LENGTH.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

MsgExitsDefined (MQLONG)

Number of message exits defined.

This is the number of channel message exits in the chain. It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

SendExitsDefined (MQLONG)

Number of send exits defined.

This is the number of channel send exits in the chain. It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

ReceiveExitsDefined (MQLONG)

Number of receive exits defined.

This is the number of channel receive exits in the chain. It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

MsgExitPtr (MQPTR)

Address of first *MsgExit* field.

If *MsgExitsDefined* is greater than zero, this is the address of the list of names of each channel message exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another – one for each exit.

Any changes made to these names by an exit are preserved, although the message channel exit takes no explicit action – it does not change which exits are invoked.

If *MsgExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

MsgUserDataPtr (MQPTR)

Address of first *MsgUserData* field.

If *MsgExitsDefined* is greater than zero, this is the address of the list of user data items for each channel message exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another – one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely, if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *MsgExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

SendExitPtr (MQPTR)

Address of first *SendExit* field.

If *SendExitsDefined* is greater than zero, this is the address of the list of names of each channel send exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *SendExitsDefined* fields adjoining one another – one for each exit.

Any changes made to these names by an exit are preserved, although the message send exit takes no explicit action – it does not change which exits are invoked.

If *SendExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

SendUserDataPtr (MQPTR)

Address of first *SendUserData* field.

If *SendExitsDefined* is greater than zero, this is the address of the list of user data items for each channel message exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another – one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely, if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *SendExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

ReceiveExitPtr (MQPTR)

Address of first *ReceiveExit* field.

If *ReceiveExitsDefined* is greater than zero, this is the address of the list of names of each channel receive exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *ReceiveExitsDefined* fields adjoining one another – one for each exit.

Any changes made to these names by an exit are preserved, although the message channel exit takes no explicit action – it does not change which exits are invoked.

If *ReceiveExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

ReceiveUserDataPtr (MQPTR)

Address of first *ReceiveUserData* field.

If *ReceiveExitsDefined* is greater than zero, this is the address of the list of user data item for each channel receive exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *ReceiveExitsDefined* fields adjoining one another – one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely, if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *ReceiveExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_5.

ClusterPtr (MQPTR)

Address of a list of cluster names.

If *ClustersDefined* is greater than zero, this is the address of a list of cluster names. The channel belongs to each cluster listed.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

ClustersDefined (MQLONG)

Number of clusters to which the channel belongs.

This is the number of cluster names pointed to by *ClusterPtr*. It is zero or greater.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

NetworkPriority (MQLONG)

Network priority.

This is the priority of the network connection for this channel. When multiple paths to a particular destination are available, the path with the highest priority is chosen. The value is in the range 0 through 9; 0 is the lowest priority.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_6.

LongMCAUserIdLength (MQLONG)

Length of long MCA user identifier.

This is the length in bytes of the full MCA user identifier pointed to by *LongMCAUserIdPtr*.

This field is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

LongRemoteUserIdLength (MQLONG)

Length of long remote user identifier.

This is the length in bytes of the full remote user identifier pointed to by *LongRemoteUserIdPtr*.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

LongMCAUserIdPtr (MQPTR)

Address of long MCA user identifier.

If *LongMCAUserIdLength* is greater than zero, this is the address of the full MCA user identifier. The length of the full identifier is given by *LongMCAUserIdLength*. The first 12 bytes of the MCA user identifier are also contained in the field *MCAUserIdentifier*.

See the description of the *MCAUserIdentifier* field for details of the MCA user identifier.

This field is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

LongRemoteUserIdPtr (MQPTR)

Address of long remote user identifier.

If *LongRemoteUserIdLength* is greater than zero, this is the address of the full remote user identifier. The length of the full identifier is given by *LongRemoteUserIdLength*. The first 12 bytes of the remote user identifier are also contained in the field *RemoteUserIdentifier*.

See the description of the *RemoteUserIdentifier* field for details of the remote user identifier.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

MCASecurityId (MQBYTE40)

MCA security identifier.

This is the security identifier for the MCA.

This field is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

The following special value indicates that there is no security identifier:

MQSID_NONE

No security identifier specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQSID_NONE_ARRAY is also defined; this has the same value as MQSID_NONE, but is an array of characters instead of a string.

This is an input/output field to the exit. The length of this field is given by MQ_SECURITY_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_6.

RemoteSecurityId (MQBYTE40)

Remote security identifier.

This is the security identifier for the remote user.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

The following special value indicates that there is no security identifier:

MQSID_NONE

No security identifier specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQSID_NONE_ARRAY is also defined; this has the same value as MQSID_NONE, but is an array of characters instead of a string.

This is an input field to the exit. The length of this field is given by MQ_SECURITY_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_6.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_7.

SSLCipherSpec (MQCHAR32)

SSL CipherSpec is an optional field.

This parameter is valid for all channel types. It is supported on AIX, HP-UX, Linux, OS/400, Solaris, Windows, and z/OS. It is valid only for channel types of a transport type (TRPTYPE) of TCP.

This is an input field to the exit. The length of this field is given by MQ_SSL_CIPHER_SPEC_LENGTH. The field is not present if *Version* is less than MQCD_VERSION_7.

SSLPeerNamePtr (MQPTR)

Address of the SSL peer name.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

SSLPeerNameLength (MQLONG)

Length of SSL peer name.

This is the length in bytes of SSL peer name pointed to by *SSLPeerNamePtr*.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

SSLClientAuth (MQLONG)

Determines whether SSL client authentication is required.

The value is one of the following:

MQSCA_REQUIRED
Client authentication required.

MQSCA_OPTIONAL
Client authentication optional.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

KeepAliveInterval (MQLONG)

Keepalive interval.

This is the value passed to the communications stack for keepalive timing for the channel. The value is applicable for the TCP/IP and SPX communications protocols, though not all implementations support this parameter.

The value is in the range 0 through 99 999; the units are seconds. A value of zero indicates that channel keepalive is not enabled, although keepalive may still occur if TCP/IP keepalive (rather than channel keepalive) is enabled. The following special value is also valid:

MQKAI_AUTO
Automatic.

This indicates that the keepalive interval is calculated from the negotiated heartbeat interval, as follows:

- If the negotiated heartbeat interval is greater than zero, the keepalive interval that is used is the heartbeat interval plus 60 seconds.
- If the negotiated heartbeat interval is zero, the keepalive interval that is used is zero.

- On z/OS, TCP/IP keepalive occurs when TCPKEEP=YES is specified in CSQ6CHIP.
- In other environments, TCP/IP keepalive occurs when the `KEEPALIVE=YES` parameter is specified in the TCP stanza in the distributed queuing configuration file.

This field is relevant only for channels that have a *TransportType* of MQXPT_TCP or MQXPT_SPX.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

LocalAddress (MQCHAR48)

Local communications address.

This is the local TCP/IP address defined for the channel for outbound communications, or blank if no specific address is defined for outbound communications. The address can optionally include a port number or range of port numbers. The format of this address is:

```
[ip-addr][(low-port[,high-port])]
```

where square brackets ([ ]) denote optional information, `ip-addr` is specified in dotted decimal or alphanumeric form, and `low-port` and `high-port` are port numbers enclosed in parentheses. All are optional.

A specific IP address, port, or port range for outbound communications is useful in recovery scenarios where a channel is restarted on a different TCP/IP stack.

LocalAddress is similar in form to *ConnectionName*, but should not be confused with it. *LocalAddress* specifies the characteristics of the local communciations, whereas *ConnectionName* specifies how to reach a remote queue manager.

This field is relevant only for channels with a *TransportType* of MQXPT_TCP, and a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, MQCHT_CLNTCONN, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_LOCAL_ADDRESS_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_7.

BatchHeartbeat (MQLONG)

Batch heartbeat interval.

This specifies the time interval that is used to trigger a batch heartbeat for the channel. Batch hearbeating allows sender channels to determine whether the remote channel instance is still active before going indoubt. A batch heatbeat occurs if a sender channel has not communicated with the remote channel instance within the specified time interval.

The value is in the range 0 through 999 999; the units are milliseconds. A value of zero indicates that batch heartbeating is not enabled.

This field is relevant only for channels that have a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

C declaration

```
typedef struct tagMQCD MQCD;
struct tagMQCD {
  MQCHAR    ChannelName[20];          /* Channel definition name */
  MQLONG    Version;                  /* Structure version number */
  MQLONG    ChannelType;              /* Channel type */
  MQLONG    TransportType;            /* Transport type */
  MQCHAR    Desc[64];                 /* Channel description */
  MQCHAR    QMgrName[48];             /* Queue-manager name */
  MQCHAR    XmitQName[48];            /* Transmission queue name */
  MQCHAR    ShortConnectionName[20];  /* First 20 bytes of connection
                                         name */
  MQCHAR    MCAName[20];              /* Reserved */
  MQCHAR    ModeName[8];              /* LU 6.2 Mode name */
  MQCHAR    TpName[64];               /* LU 6.2 transaction program
                                         name */
  MQLONG    BatchSize;                /* Batch size */
  MQLONG    DiscInterval;             /* Disconnect interval */
  MQLONG    ShortRetryCount;          /* Short retry count */
  MQLONG    ShortRetryInterval;       /* Short retry wait interval */
  MQLONG    LongRetryCount;           /* Long retry count */
  MQLONG    LongRetryInterval;        /* Long retry wait interval */
```

```
MQCHAR    SecurityExit[n];           /* Channel security exit name */
MQCHAR    MsgExit[n];                /* Channel message exit name */
MQCHAR    SendExit[n];               /* Channel send exit name */
MQCHAR    ReceiveExit[n];            /* Channel receive exit name */
MQLONG    SeqNumberWrap;             /* Highest allowable message
                                        sequence number */
MQLONG    MaxMsgLength;              /* Maximum message length */
MQLONG    PutAuthority;              /* Put authority */
MQLONG    DataConversion;            /* Data conversion */
MQCHAR    SecurityUserData[32];      /* Channel security exit user
                                        data */
MQCHAR    MsgUserData[32];           /* Channel message exit user
                                        data */
MQCHAR    SendUserData[32];          /* Channel send exit user data */
MQCHAR    ReceiveUserData[32];       /* Channel receive exit user
                                        data */
MQCHAR    UserIdentifier[12];        /* User identifier */
MQCHAR    Password[12];              /* Password */
MQCHAR    MCAUserIdentifier[12];     /* First 12 bytes of MCA user
                                        identifier */
MQLONG    MCAType;                   /* Message channel agent type */
MQCHAR    ConnectionName[264];       /* Connection name */
MQCHAR    RemoteUserIdentifier[12];  /* First 12 bytes of user
                                        identifier from partner */
MQCHAR    RemotePassword[12];        /* Password from partner */
MQCHAR    MsgRetryExit[n];           /* Channel message retry exit
                                        name */
MQCHAR    MsgRetryUserData[32];      /* Channel message retry exit
                                        user data */
MQLONG    MsgRetryCount;             /* Number of times MCA will try
                                        to put the message, after the
                                        first attempt has failed */
MQLONG    MsgRetryInterval;          /* Minimum interval in
                                        milliseconds after which the
                                        open or put operation will be
                                        retried */
MQLONG    HeartbeatInterval;         /* Time in seconds between
                                        heartbeat flows */
MQLONG    BatchInterval;             /* Batch duration */
MQLONG    NonPersistentMsgSpeed;     /* Speed at which nonpersistent
                                        messages are sent */
MQLONG    StrucLength;               /* Length of MQCD structure */
MQLONG    ExitNameLength;            /* Length of exit name */
MQLONG    ExitDataLength;            /* Length of exit user data */
MQLONG    MsgExitsDefined;           /* Number of message exits
                                        defined */
MQLONG    SendExitsDefined;          /* Number of send exits
                                        defined */
MQLONG    ReceiveExitsDefined;       /* Number of receive exits
                                        defined */
MQPTR     MsgExitPtr;                /* Address of first MsgExit
                                        field */
MQPTR     MsgUserDataPtr;            /* Address of first MsgUserData
                                        field */
MQPTR     SendExitPtr;               /* Address of first SendExit
                                        field */
MQPTR     SendUserDataPtr;           /* Address of first SendUserData
                                        field */
MQPTR     ReceiveExitPtr;            /* Address of first ReceiveExit
                                        field */
MQPTR     ReceiveUserDataPtr;        /* Address of first
                                        ReceiveUserData field */
MQPTR     ClusterPtr;                /* Address of a list of cluster
                                        names */
MQLONG    ClustersDefined;           /* Number of clusters to which
                                        the channel belongs */
MQLONG    NetworkPriority;           /* Network priority */
```

```
  MQLONG    LongMCAUserIdLength;       /* Length of long MCA user
                                          identifier */
  MQLONG    LongRemoteUserIdLength;    /* Length of long remote user
                                          identifier */
  MQPTR     LongMCAUserIdPtr;          /* Address of long MCA user
                                          identifier */
  MQPTR     LongRemoteUserIdPtr;       /* Address of long remote user
                                          identifier */
  MQBYTE40  MCASecurityId;             /* MCA security identifier */
  MQBYTE40  RemoteSecurityId;          /* Remote security identifier */
  MQCHAR    SSLCipherSpec[32];         /* SSL CipherSpec */
  MQPTR     SSLPeerNamePtr;            /* Address of SSL peer name */
  MQLONG    SSLPeerNameLength;         /* Length of SSL peer name */
  MQLONG    SSLClientAuth;             /* Whether SSL client
                                          authentication is required */
  MQLONG    KeepAliveInterval;         /* Keepalive interval */
  MQCHAR    LocalAddress[48];          /* Local communications
                                          address */
  MQLONG    BatchHeartbeat;            /* Batch heartbeat interval */
};
```

COBOL declaration

```
**   MQCD structure
  10 MQCD.
**    Channel definition name
   15 MQCD-CHANNELNAME            PIC X(20).
**    Structure version number
   15 MQCD-VERSION                PIC S9(9) BINARY.
**    Channel type
   15 MQCD-CHANNELTYPE            PIC S9(9) BINARY.
**    Transport type
   15 MQCD-TRANSPORTTYPE          PIC S9(9) BINARY.
**    Channel description
   15 MQCD-DESC                   PIC X(64).
**    Queue-manager name
   15 MQCD-QMGRNAME               PIC X(48).
**    Transmission queue name
   15 MQCD-XMITQNAME              PIC X(48).
**    First 20 bytes of connection name
   15 MQCD-SHORTCONNECTIONNAME    PIC X(20).
**    Reserved
   15 MQCD-MCANAME                PIC X(20).
**    LU 6.2 Mode name
   15 MQCD-MODENAME               PIC X(8).
**    LU 6.2 transaction program name
   15 MQCD-TPNAME                 PIC X(64).
**    Batch size
   15 MQCD-BATCHSIZE              PIC S9(9) BINARY.
**    Disconnect interval
   15 MQCD-DISCINTERVAL           PIC S9(9) BINARY.
**    Short retry count
   15 MQCD-SHORTRETRYCOUNT        PIC S9(9) BINARY.
**    Short retry wait interval
   15 MQCD-SHORTRETRYINTERVAL     PIC S9(9) BINARY.
**    Long retry count
   15 MQCD-LONGRETRYCOUNT         PIC S9(9) BINARY.
**    Long retry wait interval
   15 MQCD-LONGRETRYINTERVAL      PIC S9(9) BINARY.
**    Channel security exit name
   15 MQCD-SECURITYEXIT           PIC X(n).
**    Channel message exit name
   15 MQCD-MSGEXIT                PIC X(n).
**    Channel send exit name
   15 MQCD-SENDEXIT               PIC X(n).
**    Channel receive exit name
   15 MQCD-RECEIVEEXIT            PIC X(n).
```

```
**    Highest allowable message sequence number
   15 MQCD-SEQNUMBERWRAP          PIC S9(9) BINARY.
**    Maximum message length
   15 MQCD-MAXMSGLENGTH           PIC S9(9) BINARY.
**    Put authority
   15 MQCD-PUTAUTHORITY           PIC S9(9) BINARY.
**    Data conversion
   15 MQCD-DATACONVERSION         PIC S9(9) BINARY.
**    Channel security exit user data
   15 MQCD-SECURITYUSERDATA       PIC X(32).
**    Channel message exit user data
   15 MQCD-MSGUSERDATA            PIC X(32).
**    Channel send exit user data
   15 MQCD-SENDUSERDATA           PIC X(32).
**    Channel receive exit user data
   15 MQCD-RECEIVEUSERDATA        PIC X(32).
**    User identifier
   15 MQCD-USERIDENTIFIER         PIC X(12).
**    Password
   15 MQCD-PASSWORD               PIC X(12).
**    First 12 bytes of MCA user identifier
   15 MQCD-MCAUSERIDENTIFIER      PIC X(12).
**    Message channel agent type
   15 MQCD-MCATYPE                PIC S9(9) BINARY.
**    Connection name
   15 MQCD-CONNECTIONNAME         PIC X(264).
**    First 12 bytes of user identifier from partner
   15 MQCD-REMOTEUSERIDENTIFIER   PIC X(12).
**    Password from partner
   15 MQCD-REMOTEPASSWORD         PIC X(12).
**    Channel message retry exit name
   15 MQCD-MSGRETRYEXIT           PIC X(n).
**    Channel message retry exit user data
   15 MQCD-MSGRETRYUSERDATA       PIC X(32).
**    Number of times MCA will try to put the message, after the first
**    attempt has failed
   15 MQCD-MSGRETRYCOUNT          PIC S9(9) BINARY.
**    Minimum interval in milliseconds after which the open or put
**    operation will be retried
   15 MQCD-MSGRETRYINTERVAL       PIC S9(9) BINARY.
**    Time in seconds between heartbeat flows
   15 MQCD-HEARTBEATINTERVAL      PIC S9(9) BINARY.
**    Batch duration
   15 MQCD-BATCHINTERVAL          PIC S9(9) BINARY.
**    Speed at which nonpersistent messages are sent
   15 MQCD-NONPERSISTENTMSGSPEED  PIC S9(9) BINARY.
**    Length of MQCD structure
   15 MQCD-STRUCLENGTH            PIC S9(9) BINARY.
**    Length of exit name
   15 MQCD-EXITNAMELENGTH         PIC S9(9) BINARY.
**    Length of exit user data
   15 MQCD-EXITDATALENGTH         PIC S9(9) BINARY.
**    Number of message exits defined
   15 MQCD-MSGEXITSDEFINED        PIC S9(9) BINARY.
**    Number of send exits defined
   15 MQCD-SENDEXITSDEFINED       PIC S9(9) BINARY.
**    Number of receive exits defined
   15 MQCD-RECEIVEEXITSDEFINED    PIC S9(9) BINARY.
**    Address of first MSGEXIT field
   15 MQCD-MSGEXITPTR             POINTER.
**    Address of first MSGUSERDATA field
   15 MQCD-MSGUSERDATAPTR         POINTER.
**    Address of first SENDEXIT field
   15 MQCD-SENDEXITPTR            POINTER.
**    Address of first SENDUSERDATA field
   15 MQCD-SENDUSERDATAPTR        POINTER.
**    Address of first RECEIVEEXIT field
```

```
   15 MQCD-RECEIVEEXITPTR         POINTER.
**    Address of first RECEIVEUSERDATA field
   15 MQCD-RECEIVEUSERDATAPTR     POINTER.
**    Address of a list of cluster names
   15 MQCD-CLUSTERPTR             POINTER.
**    Number of clusters to which the channel belongs
   15 MQCD-CLUSTERSDEFINED        PIC S9(9) BINARY.
**    Network priority
   15 MQCD-NETWORKPRIORITY        PIC S9(9) BINARY.
**    Length of long MCA user identifier
   15 MQCD-LONGMCAUSERIDLENGTH    PIC S9(9) BINARY.
**    Length of long remote user identifier
   15 MQCD-LONGREMOTEUSERIDLENGTH PIC S9(9) BINARY.
**    Address of long MCA user identifier
   15 MQCD-LONGMCAUSERIDPTR       POINTER.
**    Address of long remote user identifier
   15 MQCD-LONGREMOTEUSERIDPTR    POINTER.
**    MCA security identifier
   15 MQCD-MCASECURITYID          PIC X(40).
**    Remote security identifier
   15 MQCD-REMOTESECURITYID       PIC X(40).
**    SSL CipherSpec
   15 MQCD-SSLCIPHERSPEC          PIC X(32).
**    Address of SSL peer name
   15 MQCD-SSLPEERNAMEPTR         POINTER.
**    Length of SSL peer name
   15 MQCD-SSLPEERNAMELENGTH      PIC S9(9) BINARY.
**    Whether SSL client authentication is required
   15 MQCD-SSLCLIENTAUTH          PIC S9(9) BINARY.
**    Keepalive interval
   15 MQCD-KEEPALIVEINTERVAL      PIC S9(9) BINARY.
**    Local communications address
   15 MQCD-LOCALADDRESS           PIC X(48).
**    Batch heartbeat interval
   15 MQCD-BATCHHEARTBEAT         PIC S9(9) BINARY.
```

PL/I declaration

```
dcl
 1 MQCD based,
  3 ChannelName           char(20),      /* Channel definition name */
  3 Version               fixed bin(31), /* Structure version number */
  3 ChannelType           fixed bin(31), /* Channel type */
  3 TransportType         fixed bin(31), /* Transport type */
  3 Desc                  char(64),      /* Channel description */
  3 QMgrName              char(48),      /* Queue-manager name */
  3 XmitQName             char(48),      /* Transmission queue name */
  3 ShortConnectionName   char(20),      /* First 20 bytes of
                                            connection name */
  3 MCAName               char(20),      /* Reserved */
  3 ModeName              char(8),       /* LU 6.2 Mode name */
  3 TpName                char(64),      /* LU 6.2 transaction program
                                            name */
  3 BatchSize             fixed bin(31), /* Batch size */
  3 DiscInterval          fixed bin(31), /* Disconnect interval */
  3 ShortRetryCount       fixed bin(31), /* Short retry count */
  3 ShortRetryInterval    fixed bin(31), /* Short retry wait
                                            interval */
  3 LongRetryCount        fixed bin(31), /* Long retry count */
  3 LongRetryInterval     fixed bin(31), /* Long retry wait interval */
  3 SecurityExit          char(n),       /* Channel security exit
                                            name */
  3 MsgExit               char(n),       /* Channel message exit
                                            name */
  3 SendExit              char(n),       /* Channel send exit name */
  3 ReceiveExit           char(n),       /* Channel receive exit
                                            name */
```

```
3 SeqNumberWrap          fixed bin(31), /* Highest allowable message
                                           sequence number */
3 MaxMsgLength           fixed bin(31), /* Maximum message length */
3 PutAuthority           fixed bin(31), /* Put authority */
3 DataConversion         fixed bin(31), /* Data conversion */
3 SecurityUserData       char(32),      /* Channel security exit user
                                           data */
3 MsgUserData            char(32),      /* Channel message exit user
                                           data */
3 SendUserData           char(32),      /* Channel send exit user
                                           data */
3 ReceiveUserData        char(32),      /* Channel receive exit user
                                           data */
3 UserIdentifier         char(12),      /* User identifier */
3 Password               char(12),      /* Password */
3 MCAUserIdentifier      char(12),      /* First 12 bytes of MCA user
                                           identifier */
3 MCAType                fixed bin(31), /* Message channel agent
                                           type */
3 ConnectionName         char(264),     /* Connection name */
3 RemoteUserIdentifier   char(12),      /* First 12 bytes of user
                                           identifier from partner */
3 RemotePassword         char(12),      /* Password from partner */
3 MsgRetryExit           char(n),       /* Channel message retry exit
                                           name */
3 MsgRetryUserData       char(32),      /* Channel message retry exit
                                           user data */
3 MsgRetryCount          fixed bin(31), /* Number of times MCA will
                                           try to put the message,
                                           after the first attempt has
                                           failed */
3 MsgRetryInterval       fixed bin(31), /* Minimum interval in
                                           milliseconds after which
                                           the open or put operation
                                           will be retried */
3 HeartbeatInterval      fixed bin(31), /* Time in seconds between
                                           heartbeat flows */
3 BatchInterval          fixed bin(31), /* Batch duration */
3 NonPersistentMsgSpeed  fixed bin(31), /* Speed at which
                                           nonpersistent messages are
                                           sent */
3 StrucLength            fixed bin(31), /* Length of MQCD structure */
3 ExitNameLength         fixed bin(31), /* Length of exit name */
3 ExitDataLength         fixed bin(31), /* Length of exit user data */
3 MsgExitsDefined        fixed bin(31), /* Number of message exits
                                           defined */
3 SendExitsDefined       fixed bin(31), /* Number of send exits
                                           defined */
3 ReceiveExitsDefined    fixed bin(31), /* Number of receive exits
                                           defined */
3 MsgExitPtr             pointer,       /* Address of first MsgExit
                                           field */
3 MsgUserDataPtr         pointer,       /* Address of first
                                           MsgUserData field */
3 SendExitPtr            pointer,       /* Address of first SendExit
                                           field */
3 SendUserDataPtr        pointer,       /* Address of first
                                           SendUserData field */
3 ReceiveExitPtr         pointer,       /* Address of first
                                           ReceiveExit field */
3 ReceiveUserDataPtr     pointer,       /* Address of first
                                           ReceiveUserData field */
3 ClusterPtr             pointer,       /* Address of a list of
                                           cluster names */
3 ClustersDefined        fixed bin(31), /* Number of clusters to which
                                           the channel belongs */
3 NetworkPriority        fixed bin(31), /* Network priority */
```

```
  3 LongMCAUserIdLength    fixed bin(31), /* Length of long MCA user
                                             identifier */
  3 LongRemoteUserIdLength fixed bin(31), /* Length of long remote user
                                             identifier */
  3 LongMCAUserIdPtr       pointer,       /* Address of long MCA user
                                             identifier */
  3 LongRemoteUserIdPtr    pointer,       /* Address of long remote user
                                             identifier */
  3 MCASecurityId          char(40),      /* MCA security identifier */
  3 RemoteSecurityId       char(40),      /* Remote security
                                             identifier */
| 3 SSLCipherSpec          char(32),      /* SSL CipherSpec */
| 3 SSLPeerNamePtr         pointer,       /* Address of SSL peer name */
| 3 SSLPeerNameLength      fixed bin(31), /* Length of SSL peer name */
| 3 SSLClientAuth          fixed bin(31), /* Whether SSL client
|                                            authentication is
|                                            required */
| 3 KeepAliveInterval      fixed bin(31), /* Keepalive interval */
| 3 LocalAddress           char(48),      /* Local communications
|                                            address */
| 3 BatchHeartbeat         fixed bin(31); /* Batch heartbeat interval */
```

RPG declaration (ILE)

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQCD Structure
D*
D* Channel definition name
D  CDCHN                  1     20
D* Structure version number
D  CDVER                 21     24I 0
D* Channel type
D  CDCHT                 25     28I 0
D* Transport type
D  CDTRT                 29     32I 0
D* Channel description
D  CDDES                 33     96
D* Queue-manager name
D  CDQM                  97    144
D* Transmission queue name
D  CDXQ                 145    192
D* First 20 bytes of connection name
D  CDSCN                193    212
D* Reserved
D  CDMCA                213    232
D* LU 6.2 Mode name
D  CDMOD                233    240
D* LU 6.2 transaction program name
D  CDTP                 241    304
D* Batch size
D  CDBS                 305    308I 0
D* Disconnect interval
D  CDDI                 309    312I 0
D* Short retry count
D  CDSRC                313    316I 0
D* Short retry wait interval
D  CDSRI                317    320I 0
D* Long retry count
D  CDLRC                321    324I 0
D* Long retry wait interval
D  CDLRI                325    328I 0
D* Channel security exit name
D  CDSCX                329    348
D* Channel message exit name
D  CDMSX                349    368
D* Channel send exit name
D  CDSNX                369    388
```

```
D* Channel receive exit name
D  CDRCX               389    408
D* Highest allowable message sequence number
D  CDSNW               409    412I 0
D* Maximum message length
D  CDMML               413    416I 0
D* Put authority
D  CDPA                417    420I 0
D* Data conversion
D  CDDC                421    424I 0
D* Channel security exit user data
D  CDSCD               425    456
D* Channel message exit user data
D  CDMSD               457    488
D* Channel send exit user data
D  CDSND               489    520
D* Channel receive exit user data
D  CDRCD               521    552
D* User identifier
D  CDUID               553    564
D* Password
D  CDPW                565    576
D* First 12 bytes of MCA user identifier
D  CDAUI               577    588
D* Message channel agent type
D  CDCAT               589    592I 0
D* Connection name (characters 1 through 256)
D  CDCON               593    848
D* Connection name (characters 257 through 264)
D  CDCN2               849    856
D* First 12 bytes of user identifier from partner
D  CDRUI               857    868
D* Password from partner
D  CDRPW               869    880
D* Channel message retry exit name
D  CDMRX               881    900
D* Channel message retry exit user data
D  CDMRD               901    932
D* Number of times MCA will try to put the message, after the first
D* attempt has failed
D  CDMRC               933    936I 0
D* Minimum interval in milliseconds after which the open or put
D* operation will be retried
D  CDMRI               937    940I 0
D* Time in seconds between heartbeat flows
D  CDHBI               941    944I 0
D* Batch duration
D  CDBI                945    948I 0
D* Speed at which nonpersistent messages are sent
D  CDNPM               949    952I 0
D* Length of MQCD structure
D  CDLEN               953    956I 0
D* Length of exit name
D  CDXNL               957    960I 0
D* Length of exit user data
D  CDXDL               961    964I 0
D* Number of message exits defined
D  CDMXD               965    968I 0
D* Number of send exits defined
D  CDSXD               969    972I 0
D* Number of receive exits defined
D  CDRXD               973    976I 0
D* Address of first CDMSX field
D  CDMXP               977    992*
D* Address of first CDMSD field
D  CDMUP               993   1008*
D* Address of first CDSNX field
```

```
D  CDSXP               1009   1024*
D* Address of first CDSND field
D  CDSUP               1025   1040*
D* Address of first CDRCX field
D  CDRXP               1041   1056*
D* Address of first CDRCD field
D  CDRUP               1057   1072*
D* Address of a list of cluster names
D  CDCLP               1073   1088*
D* Number of clusters to which the channel belongs
D  CDCLD               1089   1092I 0
D* Network priority
D  CDNP                1093   1096I 0
D* Length of long MCA user identifier
D  CDLML               1097   1100I 0
D* Length of long remote user identifier
D  CDLRL               1101   1104I 0
D* Address of long MCA user identifier
D  CDLMP               1105   1120*
D* Address of long remote user identifier
D  CDLRP               1121   1136*
D* MCA security identifier
D  CDMSI               1137   1176
D* Remote security identifier
D  CDRSI               1177   1216
D* SSL CipherSpec
D  CDSCS               1217   1248
D* Address of SSL peer name
D  CDSPP               1249   1264*
D* Length of SSL peer name
D  CDSPL               1265   1268I 0
D* Whether SSL client authentication is required
D  CDSCA               1269   1272I 0
D* Keepalive interval
D  CDKAI               1273   1276I 0
D* Local communications address
D  CDLAD               1277   1324
D* Batch heartbeat interval
D  CDBHB               1325   1328I 0
```

RPG declaration (OPM)

```
I*..1....:....2....:....3....:....4....:....5....:....6....:....7..
I* MQCD Structure
I*
I* Channel definition name
I                                        1  20 CDCHN
I* Structure version number
I                                    B  21  240CDVER
I* Channel type
I                                    B  25  280CDCHT
I* Transport type
I                                    B  29  320CDTRT
I* Channel description
I                                       33  96 CDDES
I* Queue-manager name
I                                       97 144 CDQM
I* Transmission queue name
I                                      145 192 CDXQ
I* First 20 bytes of connection name
I                                      193 212 CDSCN
I* Reserved
I                                      213 232 CDMCA
I* LU 6.2 Mode name
I                                      233 240 CDMOD
I* LU 6.2 transaction program name
I                                      241 304 CDTP
```

```
I* Batch size
I                                    B 305 3080CDBS
I* Disconnect interval
I                                    B 309 3120CDDI
I* Short retry count
I                                    B 313 3160CDSRC
I* Short retry wait interval
I                                    B 317 3200CDSRI
I* Long retry count
I                                    B 321 3240CDLRC
I* Long retry wait interval
I                                    B 325 3280CDLRI
I* Channel security exit name
I                                      329 348 CDSCX
I* Channel message exit name
I                                      349 368 CDMSX
I* Channel send exit name
I                                      369 388 CDSNX
I* Channel receive exit name
I                                      389 408 CDRCX
I* Highest allowable message sequence number
I                                    B 409 4120CDSNW
I* Maximum message length
I                                    B 413 4160CDMML
I* Put authority
I                                    B 417 4200CDPA
I* Data conversion
I                                    B 421 4240CDDC
I* Channel security exit user data
I                                      425 456 CDSCD
I* Channel message exit user data
I                                      457 488 CDMSD
I* Channel send exit user data
I                                      489 520 CDSND
I* Channel receive exit user data
I                                      521 552 CDRCD
I* User identifier
I                                      553 564 CDUID
I* Password
I                                      565 576 CDPW
I* First 12 bytes of MCA user identifier
I                                      577 588 CDAUI
I* Message channel agent type
I                                    B 589 5920CDCAT
I* Connection name (characters 1 through 256)
I                                      593 848 CDCON
I* Connection name (characters 257 through 264)
I                                      849 856 CDCN2
I* First 12 bytes of user identifier from partner
I                                      857 868 CDRUI
I* Password from partner
I                                      869 880 CDRPW
I* Channel message retry exit name
I                                      881 900 CDMRX
I* Channel message retry exit user data
I                                      901 932 CDMRD
I* Number of times MCA will try to put the message, after the first
I* attempt has failed
I                                    B 933 9360CDMRC
I* Minimum interval in milliseconds after which the open or put
I* operation will be retried
I                                    B 937 9400CDMRI
I* Time in seconds between heartbeat flows
I                                    B 941 9440CDHBI
I* Batch duration
I                                    B 945 9480CDBI
I* Speed at which nonpersistent messages are sent
```

```
I                                    B 949 9520CDNPM
I* Length of MQCD structure
I                                    B 953 9560CDLEN
I* Length of exit name
I                                    B 957 9600CDXNL
I* Length of exit user data
I                                    B 961 9640CDXDL
I* Number of message exits defined
I                                    B 965 9680CDMXD
I* Number of send exits defined
I                                    B 969 9720CDSXD
I* Number of receive exits defined
I                                    B 973 9760CDRXD
I* Address of first CDMSX field
I                                      977 992 CDMXP
I* Address of first CDMSD field
I                                      9931008 CDMUP
I* Address of first CDSNX field
I                                     10091024 CDSXP
I* Address of first CDSND field
I                                     10251040 CDSUP
I* Address of first CDRCX field
I                                     10411056 CDRXP
I* Address of first CDRCD field
I                                     10571072 CDRUP
I* Address of a list of cluster names
I                                     10731088 CDCLP
I* Number of clusters to which the channel belongs
I                                    B108910920CDCLD
I* Network priority
I                                    B109310960CDNP
I* Length of long MCA user identifier
I                                    B109711000CDLML
I* Length of long remote user identifier
I                                    B110111040CDLRL
I* Address of long MCA user identifier
I                                     11051120 CDLMP
I* Address of long remote user identifier
I                                     11211136 CDLRP
I* MCA security identifier
I                                     11371176 CDMSI
I* Remote security identifier
I                                     11771216 CDRSI
I* SSL CipherSpec
I                                     12171248 CDSCS
I* Address of SSL peer name
I                                     12491264 CDSPP
I* Length of SSL peer name
I                                    B126512680CDSPL
I* Whether SSL client authentication is required
I                                    B126912720CDSCA
I* Keepalive interval
I                                    B127312760CDKAI
I* Local communications address
I                                     12771324 CDLAD
I* Batch heartbeat interval
I                                    B132513280CDBHB
```

System/390 assembler declaration

```
MQCD                         DSECT
MQCD_CHANNELNAME             DS   CL20   Channel definition name
MQCD_VERSION                 DS   F      Structure version number
MQCD_CHANNELTYPE             DS   F      Channel type
MQCD_TRANSPORTTYPE           DS   F      Transport type
MQCD_DESC                    DS   CL64   Channel description
MQCD_QMGRNAME                DS   CL48   Queue-manager name
```

```
MQCD_XMITQNAME               DS   CL48   Transmission queue name
MQCD_SHORTCONNECTIONNAME     DS   CL20   First 20 bytes of connection
*                                        name
MQCD_MCANAME                 DS   CL20   Reserved
MQCD_MODENAME                DS   CL8    LU 6.2 Mode name
MQCD_TPNAME                  DS   CL64   LU 6.2 transaction program name
MQCD_BATCHSIZE               DS   F      Batch size
MQCD_DISCINTERVAL            DS   F      Disconnect interval
MQCD_SHORTRETRYCOUNT         DS   F      Short retry count
MQCD_SHORTRETRYINTERVAL      DS   F      Short retry wait interval
MQCD_LONGRETRYCOUNT          DS   F      Long retry count
MQCD_LONGRETRYINTERVAL       DS   F      Long retry wait interval
MQCD_SECURITYEXIT            DS   CLn    Channel security exit name
MQCD_MSGEXIT                 DS   CLn    Channel message exit name
MQCD_SENDEXIT                DS   CLn    Channel send exit name
MQCD_RECEIVEEXIT             DS   CLn    Channel receive exit name
MQCD_SEQNUMBERWRAP           DS   F      Highest allowable message
*                                        sequence number
MQCD_MAXMSGLENGTH            DS   F      Maximum message length
MQCD_PUTAUTHORITY            DS   F      Put authority
MQCD_DATACONVERSION          DS   F      Data conversion
MQCD_SECURITYUSERDATA        DS   CL32   Channel security exit user data
MQCD_MSGUSERDATA             DS   CL32   Channel message exit user data
MQCD_SENDUSERDATA            DS   CL32   Channel send exit user data
MQCD_RECEIVEUSERDATA         DS   CL32   Channel receive exit user data
MQCD_USERIDENTIFIER          DS   CL12   User identifier
MQCD_PASSWORD                DS   CL12   Password
MQCD_MCAUSERIDENTIFIER       DS   CL12   First 12 bytes of MCA user
*                                        identifier
MQCD_MCATYPE                 DS   F      Message channel agent type
MQCD_CONNECTIONNAME          DS   CL264  Connection name
MQCD_REMOTEUSERIDENTIFIER    DS   CL12   First 12 bytes of user
*                                        identifier from partner
MQCD_REMOTEPASSWORD          DS   CL12   Password from partner
MQCD_MSGRETRYEXIT            DS   CLn    Channel message retry exit name
MQCD_MSGRETRYUSERDATA        DS   CL32   Channel message retry exit user
*                                        data
MQCD_MSGRETRYCOUNT           DS   F      Number of times MCA will try to
*                                        put the message, after the
*                                        first attempt has failed
MQCD_MSGRETRYINTERVAL        DS   F      Minimum interval in
*                                        milliseconds after which the
*                                        open or put operation will be
*                                        retried
MQCD_HEARTBEATINTERVAL       DS   F      Time in seconds between
*                                        heartbeat flows
MQCD_BATCHINTERVAL           DS   F      Batch duration
MQCD_NONPERSISTENTMSGSPEED   DS   F      Speed at which nonpersistent
*                                        messages are sent
MQCD_STRUCLENGTH             DS   F      Length of MQCD structure
MQCD_EXITNAMELENGTH          DS   F      Length of exit name
MQCD_EXITDATALENGTH          DS   F      Length of exit user data
MQCD_MSGEXITSDEFINED         DS   F      Number of message exits defined
MQCD_SENDEXITSDEFINED        DS   F      Number of send exits defined
MQCD_RECEIVEEXITSDEFINED     DS   F      Number of receive exits defined
MQCD_MSGEXITPTR              DS   F      Address of first MSGEXIT field
MQCD_MSGUSERDATAPTR          DS   F      Address of first MSGUSERDATA
*                                        field
MQCD_SENDEXITPTR             DS   F      Address of first SENDEXIT field
MQCD_SENDUSERDATAPTR         DS   F      Address of first SENDUSERDATA
*                                        field
MQCD_RECEIVEEXITPTR          DS   F      Address of first RECEIVEEXIT
*                                        field
MQCD_RECEIVEUSERDATAPTR      DS   F      Address of first
*                                        RECEIVEUSERDATA field
MQCD_CLUSTERPTR              DS   F      Address of a list of cluster
*                                        names
```

```
MQCD_CLUSTERSDEFINED         DS   F      Number of clusters to which the
*                                        channel belongs
MQCD_NETWORKPRIORITY         DS   F      Network priority
MQCD_LONGMCAUSERIDLENGTH     DS   F      Length of long MCA user
*                                        identifier
MQCD_LONGREMOTEUSERIDLENGTH  DS   F      Length of long remote user
*                                        identifier
MQCD_LONGMCAUSERIDPTR        DS   F      Address of long MCA user
*                                        identifier
MQCD_LONGREMOTEUSERIDPTR     DS   F      Address of long remote user
*                                        identifier
MQCD_MCASECURITYID           DS   XL40   MCA security identifier
MQCD_REMOTESECURITYID        DS   XL40   Remote security identifier
MQCD_SSLCIPHERSPEC           DS   CL32   SSL CipherSpec
MQCD_SSLPEERNAMEPTR          DS   F      Address of SSL peer name
MQCD_SSLPEERNAMELENGTH       DS   F      Length of SSL peer name
MQCD_SSLCLIENTAUTH           DS   F      Whether SSL client
*                                        authentication is required
MQCD_KEEPALIVEINTERVAL       DS   F      Keepalive interval
MQCD_LOCALADDRESS            DS   CL48   Local communications address
MQCD_BATCHHEARTBEAT          DS   F      Batch heartbeat interval
*
MQCD_LENGTH                  EQU  *-MQCD
                             ORG  MQCD
MQCD_AREA                    DS   CL(MQCD_LENGTH)
```

Visual Basic declaration

In Visual Basic, the MQCD structure can be used with the MQCNO structure on the MQCONNX call.

```
Type MQCD
  ChannelName            As String*20  'Channel definition name'
  Version                As Long       'Structure version number'
  ChannelType            As Long       'Channel type'
  TransportType          As Long       'Transport type'
  Desc                   As String*64  'Channel description'
  QMgrName               As String*48  'Queue-manager name'
  XmitQName              As String*48  'Transmission queue name'
  ShortConnectionName    As String*20  'First 20 bytes of connection'
                                       'name'
  MCAName                As String*20  'Reserved'
  ModeName               As String*8   'LU 6.2 Mode name'
  TpName                 As String*64  'LU 6.2 transaction program name'
  BatchSize              As Long       'Batch size'
  DiscInterval           As Long       'Disconnect interval'
  ShortRetryCount        As Long       'Short retry count'
  ShortRetryInterval     As Long       'Short retry wait interval'
  LongRetryCount         As Long       'Long retry count'
  LongRetryInterval      As Long       'Long retry wait interval'
  SecurityExit           As String*n   'Channel security exit name'
  MsgExit                As String*n   'Channel message exit name'
  SendExit               As String*n   'Channel send exit name'
  ReceiveExit            As String*n   'Channel receive exit name'
  SeqNumberWrap          As Long       'Highest allowable message'
                                       'sequence number'
  MaxMsgLength           As Long       'Maximum message length'
  PutAuthority           As Long       'Put authority'
  DataConversion         As Long       'Data conversion'
  SecurityUserData       As String*32  'Channel security exit user data'
  MsgUserData            As String*32  'Channel message exit user data'
  SendUserData           As String*32  'Channel send exit user data'
  ReceiveUserData        As String*32  'Channel receive exit user data'
  UserIdentifier         As String*12  'User identifier'
  Password               As String*12  'Password'
  MCAUserIdentifier      As String*12  'First 12 bytes of MCA user'
                                       'identifier'
  MCAType                As Long       'Message channel agent type'
  ConnectionName         As String*264 'Connection name'
  RemoteUserIdentifier   As String*12  'First 12 bytes of user'
                                       'identifier from partner'
  RemotePassword         As String*12  'Password from partner'
  MsgRetryExit           As String*n   'Channel message retry exit name'
  MsgRetryUserData       As String*32  'Channel message retry exit user'
                                       'data'
  MsgRetryCount          As Long       'Number of times MCA will try to'
                                       'put the message, after the'
                                       'first attempt has failed'
  MsgRetryInterval       As Long       'Minimum interval in'
                                       'milliseconds after which the'
                                       'open or put operation will be'
                                       'retried'
  HeartbeatInterval      As Long       'Time in seconds between'
                                       'heartbeat flows'
  BatchInterval          As Long       'Batch duration'
  NonPersistentMsgSpeed  As Long       'Speed at which nonpersistent'
                                       'messages are sent'
  StrucLength            As Long       'Length of MQCD structure'
  ExitNameLength         As Long       'Length of exit name'
  ExitDataLength         As Long       'Length of exit user data'
  MsgExitsDefined        As Long       'Number of message exits defined'
  SendExitsDefined       As Long       'Number of send exits defined'
  ReceiveExitsDefined    As Long       'Number of receive exits defined'
  MsgExitPtr             As String*4   'Address of first MsgExit field'
  MsgUserDataPtr         As String*4   'Address of first MsgUserData'
                                       'field'
  SendExitPtr            As String*4   'Address of first SendExit field'
  SendUserDataPtr        As String*4   'Address of first SendUserData'
                                       'field'
  ReceiveExitPtr         As String*4   'Address of first ReceiveExit'
                                       'field'
  ReceiveUserDataPtr     As String*4   'Address of first'
                                       'ReceiveUserData field'
  ClusterPtr             As String*4   'Address of a list of cluster'
                                       'names'
  ClustersDefined        As Long       'Number of clusters to which the'
                                       'channel belongs'
  NetworkPriority        As Long       'Network priority'
  LongMCAUserIdLength    As Long       'Length of long MCA user'
                                       'identifier'
  LongRemoteUserIdLength As Long       'Length of long remote user'
                                       'identifier'
  LongMCAUserIdPtr       As String*4   'Address of long MCA user'
                                       'identifier'
  LongRemoteUserIdPtr    As String*4   'Address of long remote user'
                                       'identifier'
  MCASecurityId          As String*40  'MCA security identifier'
  RemoteSecurityId       As String*40  'Remote security identifier'
  SSLCipherSpec          As String*32  'SSL CipherSpec'
  SSLPeerNamePtr         As String*4   'Address of SSL peer name'
  SSLPeerNameLength      As Long       'Length of SSL peer name'
  SSLClientAuth          As Long       'Whether SSL client'
                                       'authentication is required'
  KeepAliveInterval      As Long       'Keepalive interval'
  LocalAddress           As String*48  'Local communications address'
  BatchHeartbeat         As Long       'Batch heartbeat interval'
End Type
```

MQCXP – Channel exit parameter

The following table summarizes the fields in the structure.

Table 63. Fields in MQCXP

Field	Description	Page
StrucId	Structure identifier	714
Version	Structure version number	715
ExitId	Type of exit	715
ExitReason	Reason for invoking exit	716
ExitResponse	Response from exit	718
ExitResponse2	Secondary response from exit	719
Feedback	Feedback code	721
MaxSegmentLength	Maximum segment length	721
ExitUserArea	Exit user area	721
ExitData	Exit data	722
MsgRetryCount	Number of times the message has been retried	722
MsgRetryInterval	Minimum interval in milliseconds after which the put operation should be retried	722
MsgRetryReason	Reason code from previous attempt to put the message	722
HeaderLength	Length of header	723
PartnerName	Partner name	723
FAPLevel	Negotiated Formats and Protocols level	723
CapabilityFlags	Capability flags	723
ExitNumber	Exit number	724
ExitSpace	Number of bytes in transmission header reserved for exit to use	724

The MQCXP structure is passed to each type of exit called by a Message Channel Agent (MCA). See MQ_CHANNEL_EXIT.

The fields described as “input to the exit” in the descriptions that follow are ignored by the MCA when the exit returns control to the MCA. The exit should not expect that any input fields that it changes in the channel exit parameter block will be preserved for its next invocation. Changes made to input/output fields (for example, the *ExitUserArea* field), are preserved for invocations of that instance of the exit only. Such changes cannot be used to pass data between different exits defined on the same channel, or between the same exit defined on different channels.

Fields

StrucId (MQCHAR4)

Structure identifier.

The value must be:

MQCXP_STRUC_ID
Identifier for channel exit parameter structure.

For the C programming language, the constant MQCXP_STRUC_ID_ARRAY is also defined; this has the same value as MQCXP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the exit.

Version (MQLONG)

Structure version number.

The value depends on the environment:

MQCXP_VERSION_1
Version-1 channel exit parameter structure.

The field has this value on z/OS using CICS for distributed queuing.

MQCXP_VERSION_2
Version-2 channel exit parameter structure.

The field has this value in the following environments: Compaq OpenVMS Alpha, Compaq NonStop Kernel.

MQCXP_VERSION_3
Version-3 channel exit parameter structure.

The field has this value in the following environments: UNIX systems not listed elsewhere.

MQCXP_VERSION_4
Version-4 channel exit parameter structure.

The field has this value in the following environments: z/OS not using CICS for distributed queuing, OS/2.

MQCXP_VERSION_5
Version-5 channel exit parameter structure.

The field has this value in the following environments: AIX, HP-UX, Linux, OS/400, Solaris, Windows.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

MQCXP_CURRENT_VERSION
Current version of channel exit parameter structure.

The value of this constant depends on the environment (see above).

Note: When a new version of the MQCXP structure is introduced, the layout of the existing part is not changed. The exit should therefore check that the version number is equal to or greater than the lowest version which contains the fields that the exit needs to use.

This is an input field to the exit.

ExitId (MQLONG)

Type of exit.

MQCXP – ExitId field

This indicates the type of exit being called, and is set on entry to the exit routine. Possible values are:

MQXT_CHANNEL_SEC_EXIT
Channel security exit.

MQXT_CHANNEL_MSG_EXIT
Channel message exit.

MQXT_CHANNEL_SEND_EXIT
Channel send exit.

MQXT_CHANNEL_RCV_EXIT
Channel receive exit.

MQXT_CHANNEL_MSG_RETRY_EXIT
Channel message-retry exit.

This type of exit is not supported on: z/OS.

MQXT_CHANNEL_AUTO_DEF_EXIT
Channel auto-definition exit.

On z/OS, this type of exit is supported only for channels of type MQCHT_CLUSSDR and MQCHT_CLUSRCVR.

This is an input field to the exit.

ExitReason (MQLONG)

Reason for invoking exit.

This indicates the reason why the exit is being called, and is set on entry to the exit routine. It is not used by the auto-definition exit. Possible values are:

MQXR_INIT
Exit initialization.

This indicates that the exit is being invoked for the first time. It allows the exit to acquire and initialize any resources that it may need (for example: main storage).

MQXR_TERM
Exit termination.

This indicates that the exit is about to be terminated. The exit should free any resources that it may have acquired since it was initialized (for example: main storage).

MQXR_MSG
Process a message.

This indicates that the exit is being invoked to process a message. This occurs for channel message exits only.

MQXR_XMIT
Process a transmission.

This occurs for channel send and receive exits only.

MQXR_SEC_MSG
Security message received.

This occurs for channel security exits only.

MQXR_INIT_SEC
Initiate security exchange.

This occurs for channel security exits only.

The receiver’s security exit is always invoked with this reason immediately after being invoked with MQXR_INIT, to give it the opportunity to initiate a security exchange. If it declines the opportunity (by returning MQXCC_OK instead of MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG), the sender’s security exit is invoked with MQXR_INIT_SEC.

If the receiver’s security exit does initiate a security exchange (by returning MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG), the sender’s security exit is never invoked with MQXR_INIT_SEC; instead it is invoked with MQXR_SEC_MSG to process the receiver’s message. (In either case it is first invoked with MQXR_INIT.)

Unless one of the security exits requests termination of the channel (by setting *ExitResponse* to MQXCC_SUPPRESS_FUNCTION or MQXCC_CLOSE_CHANNEL), the security exchange must complete at the side that initiated the exchange. Therefore, if a security exit is invoked with MQXR_INIT_SEC and it does initiate an exchange, the next time the exit is invoked it will be with MQXR_SEC_MSG. This happens whether or not there is a security message for the exit to process. There will be a security message if the partner returns MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG, but not if the partner returns MQXCC_OK or there is no security exit at the partner. If there is no security message to process, the security exit at the initiating end is re-invoked with a *DataLength* of zero.

MQXR_RETRY

Retry a message.

This occurs for message-retry exits only.

On z/OS, this is not supported.

MQXR_AUTO_CLUSSDR

Automatic definition of a cluster-sender channel.

This occurs for channel auto-definition exits only.

MQXR_AUTO_RECEIVER

Automatic definition of a receiver channel.

This occurs for channel auto-definition exits only.

MQXR_AUTO_SVRCONN

Automatic definition of a server-connection channel.

This occurs for channel auto-definition exits only.

MQXR_AUTO_CLUSRCVR

Automatic definition of a cluster-receiver channel.

This occurs for channel auto-definition exits only.

Notes:

1. If you have more than one exit defined for a channel, they will each be invoked with MQXR_INIT when the MCA is initialized, and will each be invoked with MQXR_TERM when the MCA is terminated.
2. For the channel auto-definition exit, *ExitReason* is not set if *Version* is less than MQCXP_VERSION_4. The value MQXR_AUTO_SVRCONN is implied in this case.

MQCXP – ExitResponse field

This is an input field to the exit.

ExitResponse (MQLONG)

Response from exit.

This is set by the exit to communicate with the MCA. It must be one of the following:

MQXCC_OK

Exit completed successfully.

- For the channel security exit, this indicates that message transfer should now proceed normally.
- For the channel message retry exit, this indicates that the MCA should wait for the time interval returned by the exit in the *MsgRetryInterval* field in MQCXP, and then retry the message.

The *ExitResponse2* field may contain additional information.

MQXCC_SUPPRESS_FUNCTION

Suppress function.

- For the channel security exit, this indicates that the channel should be terminated.
- For the channel message exit, this indicates that the message is not to proceed any further towards its destination. Instead the MCA generates an exception report message (if one was requested by the sender of the original message), and places the message contained in the original buffer on the dead-letter queue (if the sender specified MQRO_DEAD_LETTER_Q), or discards it (if the sender specified MQRO_DISCARD_MSG).

  For persistent messages, if the sender specified MQRO_DEAD_LETTER_Q, but the put to the dead-letter queue fails, or there is no dead-letter queue, the original message is left on the transmission queue and the report message is not generated. The original message is also left on the transmission queue if the report message cannot be generated successfully.

  The *Feedback* field in the MQDLH structure at the start of the message on the dead-letter queue indicates why the message was put on the dead-letter queue; this feedback code is also used in the message descriptor of the exception report message (if one was requested by the sender).
- For the channel message retry exit, this indicates that the MCA should not wait and retry the message; instead, the MCA continues immediately with its normal failure processing (the message is placed on the dead-letter queue or discarded, as specified by the sender of the message).
- For the channel auto-definition exit, either MQXCC_OK or MQXCC_SUPPRESS_FUNCTION must be specified. If neither of these is specified, MQXCC_SUPPRESS_FUNCTION is assumed by default and the auto-definition is abandoned.

This response is not supported for the channel send and receive exits.

MQXCC_SEND_SEC_MSG

Send security message.

This value can be set only by a channel security exit. It indicates that the exit has provided a security message which should be transmitted to the partner.

MQXCC_SEND_AND_REQUEST_SEC_MSG
Send security message that requires a reply.

This value can be set only by a channel security exit. It indicates

- that the exit has provided a security message which should be transmitted to the partner, and
- that the exit requires a response from the partner. If no response is received, the channel must be terminated, because the exit has not yet decided whether communications can proceed.

This is not valid on z/OS if you are using CICS for distributed queuing.

MQXCC_SUPPRESS_EXIT
Suppress exit.

- This value can be set by all types of channel exit other than a security exit or an auto-definition exit. It suppresses any further invocation of that exit (as if its name had been blank in the channel definition), until termination of the MCA, when the exit is again invoked with an *ExitReason* of MQXR_TERM.
- If a message retry exit returns this value, message retries for subsequent messages are controlled by the *MsgRetryCount* and *MsgRetryInterval* channel attributes as normal. For the current message, the MCA performs the number of outstanding retries, at intervals given by the *MsgRetryInterval* channel attribute, but only if the reason code is one that the MCA would normally retry (see the *MsgRetryCount* field described in “MQCD – Channel definition” on page 674). The number of outstanding retries is the value of the *MsgRetryCount* attribute, less the number of times the exit returned MQXCC_OK for the current message; if this number is negative, no further retries are performed by the MCA for the current message.

This is not valid on z/OS if you are using CICS for distributed queuing.

MQXCC_CLOSE_CHANNEL
Close channel.

This value can be set by any type of channel exit except an auto-definition exit. It causes the message channel agent (MCA) to close the channel.

This is not valid on z/OS if you are using CICS for distributed queuing.

This is an input/output field from the exit.

ExitResponse2 (MQLONG)

Secondary response from exit.

This is set to zero on entry to the exit routine. It can be set by the exit to provide further information to the MCA. It is not used by the auto-definition exit.

The exit can set one or more of the following. If more than one is required, the values are added together. Combinations that are not valid are noted; other combinations are allowed.

MQXR2_PUT_WITH_DEF_ACTION
Put with default action.

This is set by the receiver's channel message exit. It indicates that the message is to be put with the MCA's default action, that is either the MCA's default user ID, or the context *UserIdentifier* in the MQMD (message descriptor) of the message.

The value of this constant is zero, which corresponds to the initial value set when the exit is invoked. The constant is provided for documentation purposes.

MQXR2_PUT_WITH_DEF_USERID

Put with default user identifier.

This can only be set by the receiver's channel message exit. It indicates that the message is to be put with the MCA's default user identifier.

MQXR2_PUT_WITH_MSG_USERID

Put with message's user identifier.

This can only be set by the receiver's channel message exit. It indicates that the message is to be put with the context *UserIdentifier* in the MQMD (message descriptor) of the message (this may have been modified by the exit).

Only one of MQXR2_PUT_WITH_DEF_ACTION, MQXR2_PUT_WITH_DEF_USERID, and MQXR2_PUT_WITH_MSG_USERID should be set.

MQXR2_USE_AGENT_BUFFER

Use agent buffer.

This indicates that any data to be passed on is in *AgentBuffer*, not *ExitBufferAddr*.

The value of this constant is zero, which corresponds to the initial value set when the exit is invoked. The constant is provided for documentation purposes.

MQXR2_USE_EXIT_BUFFER

Use exit buffer.

This indicates that any data to be passed on is in *ExitBufferAddr*, not *AgentBuffer*.

Only one of MQXR2_USE_AGENT_BUFFER and MQXR2_USE_EXIT_BUFFER should be set.

MQXR2_DEFAULT_CONTINUATION

Default continuation.

Continuation with the next exit in the chain depends on the response from the last exit invoked:

- If MQXCC_SUPPRESS_FUNCTION or MQXCC_CLOSE_CHANNEL are returned, no further exits in the chain are called.
- Otherwise, the next exit in the chain is invoked.

MQXR2_CONTINUE_CHAIN

Continue with the next exit.

MQXR2_SUPPRESS_CHAIN

Skip remaining exits in chain.

This is an input/output field to the exit.

Feedback (MQLONG)

Feedback code.

This is set to MQFB_NONE on entry to the exit routine.

If a channel message exit sets the `ExitResponse` field to MQXCC_SUPPRESS_FUNCTION, the `Feedback` field specifies the feedback code that identifies why the message was put on the dead-letter (undelivered-message) queue, and is also used to send an exception report if one has been requested. In this case, if the `Feedback` field is MQFB_NONE, the following feedback code is used:

MQFB_STOPPED_BY_MSG_EXIT
Message stopped by channel message exit.

The value returned in this field by channel security, send, receive, and message-retry exits is not used by the MCA.

The value returned in this field by auto-definition exits is not used if `ExitResponse` is MQXCC_OK, but otherwise is used for the *AuxErrorDataInt1* parameter in the event message.

This is an input/output field from the exit.

MaxSegmentLength (MQLONG)

Maximum segment length.

This is the maximum length in bytes that can be sent in a single transmission. It is not used by the auto-definition exit. It is of interest to a channel send exit, because this exit must ensure that it does not increase the size of a transmission segment to a value greater than `MaxSegmentLength`. The length includes the initial 8 bytes that the exit must not change. The value is negotiated between the message channel agents when the channel is initiated. See “Writing and compiling channel-exit programs” on page 633 for more information about segment lengths.

The value in this field is not meaningful if `ExitReason` is MQXR_INIT.

This is an input field to the exit.

ExitUserArea (MQBYTE16)

Exit user area.

This is a field that is available for the exit to use. (It is not used by the auto-definition exit.) It is initialized to binary zero before the first invocation of the exit (which has an `ExitReason` set to MQXR_INIT), and thereafter any changes made to this field by the exit are preserved across invocations of the exit.

The following value is defined:

MQXUA_NONE
No user information.

The value is binary zero for the length of the field.

For the C programming language, the constant MQXUA_NONE_ARRAY is also defined; this has the same value as MQXUA_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_EXIT_USER_AREA_LENGTH. This is an input/output field to the exit.

ExitData (MQCHAR32)

Exit data.

This is set on entry to the exit routine to information that the MCA took from the channel definition. If no such information is available, this field is all blanks.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This is an input field to the exit.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_2.

MsgRetryCount (MQLONG)

Number of times the message has been retried.

The first time the exit is invoked for a particular message, this field has the value zero (no retries yet attempted). On each subsequent invocation of the exit for that message, the value is incremented by one by the MCA. On z/OS, the value is always zero.

This is an input field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

MsgRetryInterval (MQLONG)

Minimum interval in milliseconds after which the put operation should be retried.

The first time the exit is invoked for a particular message, this field contains the value of the *MsgRetryInterval* channel attribute. The exit can leave the value unchanged, or modify it to specify a different time interval in milliseconds. If the exit returns MQXCC_OK in *ExitResponse*, the MCA will wait for at least this time interval before retrying the MQOPEN or MQPUT operation. The time interval specified must be zero or greater.

The second and subsequent times the exit is invoked for that message, this field contains the value returned by the previous invocation of the exit.

If the value returned in the *MsgRetryInterval* field is less than zero or greater than 999 999 999, and *ExitResponse* is MQXCC_OK, the MCA ignores the *MsgRetryInterval* field in MQCXP and waits instead for the interval specified by the *MsgRetryInterval* channel attribute. On z/OS, the value of this field is always zero.

This is an input/output field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

MsgRetryReason (MQLONG)

Reason code from previous attempt to put the message.

This is the reason code from the previous attempt to put the message; it is one of the MQRC_* values. On z/OS the value of this field is always zero.

This is an input field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_3.

HeaderLength (MQLONG)

Length of header information.

This field is relevant only for a message exit. The value is the length of the routing header structures at the start of the message data; these are the MQXQH structure, and (for a distribution-list message) the MQDH structure and arrays of MQOR and MQPMR records that follow the MQXQH structure.

The message exit can examine this header information, and modify it if necessary, but the data that the exit returns must still be in the correct format. The exit must not, for example, encrypt or compress the header data at the sending end, even if the message exit at the receiving end makes compensating changes.

If the message exit modifies the header information in such a way as to change its length (for example, by adding another destination to a distribution-list message), it must change the value of *HeaderLength* correspondingly before returning.

This is an input/output field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_3.

PartnerName (MQCHAR48)

Partner Name.

The name of the partner, as follows:

- For SVRCONN channels, it is the logged-on user ID at the client.
- For all other types of channel, it is the queue-manager name of the partner.

When the exit is initialized this field is blank because the queue manager does not know the name of the partner until after initial negotiation has taken place.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

FAPLevel (MQLONG)

Negotiated Formats and Protocols level.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

CapabilityFlags (MQLONG)

Capability flags.

The following are defined:

MQCF_NONE
No flags.

MQCF_DIST_LISTS
Distribution lists supported.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

ExitNumber (MQLONG)

Exit number.

The ordinal number of the exit, within the type defined in *ExitId*. For example, if the exit being invoked is the third message exit defined, this field contains the value 3. If the exit type is one for which a list of exits cannot be defined (for example, a security exit), this field has the value 1.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_5.

ExitSpace (MQLONG)

Number of bytes in transmission buffer reserved for exit to use.

This field is relevant only for a send exit. It specifies the amount of space in bytes that the MCA will reserve in the transmission buffer for the exit to use. This allows the exit to add to the transmission buffer a small amount of data (typically not exceeding a few hundred bytes) for use by a complementary receive exit at the other end. The data added by the send exit must be removed by the receive exit.

Note: This facility should not be used to send large amounts of data, as this may degrade performance, or even inhibit operation of the channel.

By setting *ExitSpace* the exit is guaranteed that there will always be at least that number of bytes available in the transmission buffer for the exit to use. However, the exit can use less than the amount reserved, or more than the amount reserved if there is space available in the transmission buffer. The exit space in the buffer is provided following the existing data.

ExitSpace can be set by the exit only when *ExitReason* has the value MQXR_INIT; in all other cases the value returned by the exit is ignored. On input to the exit, *ExitSpace* is zero for the MQXR_INIT call, and is the value returned by the MQXR_INIT call in other cases.

If the value returned by the MQXR_INIT call is negative, or there are fewer than 1024 bytes available in the transmission buffer for message data after reserving the requested exit space for all of the send exits in the chain, the MCA outputs an error message and closes the channel. Similarly, if during data transfer the exits in the send exit chain allocate more user space than they reserved such that fewer than 1024 bytes remain in the transmission buffer for message data, the MCA outputs an error message and closes the channel. The limit of 1024 allows the channel’s control and administrative flows to be processed by the chain of send exits, without the need for the flows to be segmented.

This is an input/output field to the exit if *ExitReason* is MQXR_INIT, and an input field in all other cases. The field is not present if *Version* is less than MQCXP_VERSION_5.

C declaration

```
typedef struct tagMQCXP MQCXP;
struct tagMQCXP {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    ExitId;            /* Type of exit */
  MQLONG    ExitReason;        /* Reason for invoking exit */
  MQLONG    ExitResponse;      /* Response from exit */
  MQLONG    ExitResponse2;     /* Secondary response from exit */
  MQLONG    Feedback;          /* Feedback code */
  MQLONG    MaxSegmentLength;  /* Maximum segment length */
  MQBYTE16  ExitUserArea;      /* Exit user area */
  MQCHAR32  ExitData;          /* Exit data */
  MQLONG    MsgRetryCount;     /* Number of times the message has been
                                  retried */
  MQLONG    MsgRetryInterval;  /* Minimum interval in milliseconds after
                                  which the put operation should be
                                  retried */
  MQLONG    MsgRetryReason;    /* Reason code from previous attempt to
                                  put the message */
  MQLONG    HeaderLength;      /* Length of header information */
  MQCHAR48  PartnerName;       /* Partner Name */
  MQLONG    FAPLevel;          /* Negotiated Formats and Protocols
                                  level */
  MQLONG    CapabilityFlags;   /* Capability flags */
  MQLONG    ExitNumber;        /* Exit number */
  MQLONG    ExitSpace;         /* Number of bytes in transmission buffer
                                  reserved for exit to use */
};
```

COBOL declaration

```
**   MQCXP structure
  10 MQCXP.
**    Structure identifier
   15 MQCXP-STRUCID          PIC X(4).
**    Structure version number
   15 MQCXP-VERSION          PIC S9(9) BINARY.
**    Type of exit
   15 MQCXP-EXITID           PIC S9(9) BINARY.
**    Reason for invoking exit
   15 MQCXP-EXITREASON       PIC S9(9) BINARY.
**    Response from exit
   15 MQCXP-EXITRESPONSE     PIC S9(9) BINARY.
**    Secondary response from exit
   15 MQCXP-EXITRESPONSE2    PIC S9(9) BINARY.
**    Feedback code
   15 MQCXP-FEEDBACK         PIC S9(9) BINARY.
**    Maximum segment length
   15 MQCXP-MAXSEGMENTLENGTH PIC S9(9) BINARY.
**    Exit user area
   15 MQCXP-EXITUSERAREA     PIC X(16).
**    Exit data
   15 MQCXP-EXITDATA         PIC X(32).
**    Number of times the message has been retried
   15 MQCXP-MSGRETRYCOUNT    PIC S9(9) BINARY.
**    Minimum interval in milliseconds after which the put operation
**    should be retried
   15 MQCXP-MSGRETRYINTERVAL PIC S9(9) BINARY.
**    Reason code from previous attempt to put the message
   15 MQCXP-MSGRETRYREASON   PIC S9(9) BINARY.
**    Length of header information
   15 MQCXP-HEADERLENGTH     PIC S9(9) BINARY.
**    Partner Name
   15 MQCXP-PARTNERNAME      PIC X(48).
**    Negotiated Formats and Protocols level
```

```
   15 MQCXP-FAPLEVEL         PIC S9(9) BINARY.
**    Capability flags
   15 MQCXP-CAPABILITYFLAGS  PIC S9(9) BINARY.
**    Exit number
   15 MQCXP-EXITNUMBER       PIC S9(9) BINARY.
**    Number of bytes in transmission buffer reserved for exit to use
   15 MQCXP-EXITSPACE        PIC S9(9) BINARY.
```

PL/I declaration

```
dcl
 1 MQCXP based,
  3 StrucId          char(4),       /* Structure identifier */
  3 Version          fixed bin(31), /* Structure version number */
  3 ExitId           fixed bin(31), /* Type of exit */
  3 ExitReason       fixed bin(31), /* Reason for invoking exit */
  3 ExitResponse     fixed bin(31), /* Response from exit */
  3 ExitResponse2    fixed bin(31), /* Secondary response from exit */
  3 Feedback         fixed bin(31), /* Feedback code */
  3 MaxSegmentLength fixed bin(31), /* Maximum segment length */
  3 ExitUserArea     char(16),      /* Exit user area */
  3 ExitData         char(32),      /* Exit data */
  3 MsgRetryCount    fixed bin(31), /* Number of times the message has
                                       been retried */
  3 MsgRetryInterval fixed bin(31), /* Minimum interval in milliseconds
                                       after which the put operation
                                       should be retried */
  3 MsgRetryReason   fixed bin(31), /* Reason code from previous attempt
                                       to put the message */
  3 HeaderLength     fixed bin(31), /* Length of header information */
  3 PartnerName      char(48),      /* Partner Name */
  3 FAPLevel         fixed bin(31), /* Negotiated Formats and Protocols
                                       level */
  3 CapabilityFlags  fixed bin(31), /* Capability flags */
  3 ExitNumber       fixed bin(31), /* Exit number */
  3 ExitSpace        fixed bin(31); /* Number of bytes in transmission
                                       buffer reserved for exit to
                                       use */
```

RPG declaration (ILE)

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     D* MQCXP Structure
     D*
     D* Structure identifier
     D  CXSID                  1      4
     D* Structure version number
     D  CXVER                  5      8I 0
     D* Type of exit
     D  CXXID                  9     12I 0
     D* Reason for invoking exit
     D  CXREA                 13     16I 0
     D* Response from exit
     D  CXRES                 17     20I 0
     D* Secondary response from exit
     D  CXRE2                 21     24I 0
     D* Feedback code
     D  CXFB                  25     28I 0
     D* Maximum segment length
     D  CXMSL                 29     32I 0
     D* Exit user area
     D  CXUA                  33     48
     D* Exit data
     D  CXDAT                 49     80
     D* Number of times the message has been retried
     D  CXMRC                 81     84I 0
     D* Minimum interval in milliseconds after which the put operation
```

```
D* should be retried
D  CXMRI                 85     88I 0
D* Reason code from previous attempt to put the message
D  CXMRR                 89     92I 0
D* Length of header information
D  CXHDL                 93     96I 0
D* Partner Name
D  CXPNM                 97    144
D* Negotiated Formats and Protocols level
D  CXFAP                145    148I 0
D* Capability flags
D  CXCAP                149    152I 0
D* Exit number
D  CXEXN                153    156I 0
D* Number of bytes in transmission buffer reserved for exit to use
D  CXHDL                157    160I 0
```

RPG declaration (OPM)

```
I*..1....:....2....:....3....:....4....:....5....:....6....:....7..
I* MQCXP Structure
I*
I* Structure identifier
I                                        1   4 CXSID
I* Structure version number
I                                    B   5   80CXVER
I* Type of exit
I                                    B   9  120CXXID
I* Reason for invoking exit
I                                    B  13  160CXREA
I* Response from exit
I                                    B  17  200CXRES
I* Secondary response from exit
I                                    B  21  240CXRE2
I* Feedback code
I                                    B  25  280CXFB
I* Maximum segment length
I                                    B  29  320CXMSL
I* Exit user area
I                                       33  48 CXUA
I* Exit data
I                                       49  80 CXDAT
I* Number of times the message has been retried
I                                    B  81  840CXMRC
I* Minimum interval in milliseconds after which the put operation
I* should be retried
I                                    B  85  880CXMRI
I* Reason code from previous attempt to put the message
I                                    B  89  920CXMRR
I* Length of header information
I                                    B  93  960CXHDL
I* Partner Name
I                                       97 144 CXPNM
I* Negotiated Formats and Protocols level
I                                    B 145 1480CXFAP
I* Capability flags
I                                    B 149 1520CXCAP
I* Exit number
I                                    B 153 1560CXEXN
I* Number of bytes in transmission buffer reserved for exit to use
I                                    B 157 1600CXHDL
```

System/390 assembler declaration

```
MQCXP                  DSECT
MQCXP_STRUCID          DS   CL4   Structure identifier
MQCXP_VERSION          DS   F     Structure version number
```

MQCXP – Language declarations

```
MQCXP_EXITID            DS   F     Type of exit
MQCXP_EXITREASON        DS   F     Reason for invoking exit
MQCXP_EXITRESPONSE      DS   F     Response from exit
MQCXP_EXITRESPONSE2     DS   F     Secondary response from exit
MQCXP_FEEDBACK          DS   F     Feedback code
MQCXP_MAXSEGMENTLENGTH  DS   F     Maximum segment length
MQCXP_EXITUSERAREA      DS   XL16  Exit user area
MQCXP_EXITDATA          DS   CL32  Exit data
MQCXP_MSGRETRYCOUNT     DS   F     Number of times the message has been
*                                  retried
MQCXP_MSGRETRYINTERVAL  DS   F     Minimum interval in milliseconds
*                                  after which the put operation should
*                                  be retried
MQCXP_MSGRETRYREASON    DS   F     Reason code from previous attempt to
*                                  put the message
MQCXP_HEADERLENGTH      DS   F     Length of header information
MQCXP_PARTNERNAME       DS   CL48  Partner Name
MQCXP_FAPLEVEL          DS   F     Negotiated Formats and Protocols
*                                  level
MQCXP_CAPABILITYFLAGS   DS   F     Capability flags
MQCXP_EXITNUMBER        DS   F     Exit number
MQCXP_EXITSPACE         DS   F     Number of bytes in transmission
*                                  buffer reserved for exit to use
*
MQCXP_LENGTH            EQU  *-MQCXP
                        ORG  MQCXP
MQCXP_AREA              DS   CL(MQCXP_LENGTH)
```

MQTXP – Transport exit parameter

The following table summarizes the fields in the structure.

Table 64. Fields in MQTXP

Field	Description	Page
StrucId	Structure identifier	729
Version	Structure version number	729
ExitReason	Reason for invoking exit	730
ExitUserArea	Exit user area	730
TransportType	Transport type	730
RetryCount	Number of times data has been retried	731
DataLength	Length of data to be sent	731
SessionId	Session identifier	731
GroupId	Group identifier	731
DataId	Data identifier	731
ExitResponse	Response from exit	731

The MQTXP structure describes the information that is passed to the transport retry exit.

This structure is supported in the following environments: AIX.

Fields

StrucId (MQCHAR4)

Structure identifier.

The value is:

MQTXP_STRUC_ID
Identifier for transport retry exit parameter structure.

For the C programming language, the constant MQTXP_STRUC_ID_ARRAY is also defined; this has the same value as MQTXP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the exit.

Version (MQLONG)

Structure version number.

The value is:

MQTXP_VERSION_1
Version-1 transport retry exit parameter structure.

The following constant specifies the version number of the current version:

MQTXP_CURRENT_VERSION
Current version of transport retry exit parameter structure.

This is an input field to the exit.

Reserved (MQLONG)

Reserved.

This is a reserved field. The value is zero.

ExitReason (MQLONG)

Reason for invoking exit.

This indicates the reason why the exit is being called. Possible values are:

MQXR_INIT
Exit initialization.

This indicates that the exit is being invoked for the first time. It allows the exit to acquire and initialize any resources that it may need (for example: main storage).

MQXR_TERM
Exit termination.

This indicates that the exit is about to be terminated. The exit should free any resources that it may have acquired since it was initialized (for example: main storage).

MQXR_RETRY
Retry a message.

MQXR_END_BATCH
Called from MCA when batch completed.

MQXR_ACK_RECEIVED
Called from MCA when an acknowledgement has been received.

This is an input field to the exit.

ExitUserArea (MQBYTE16)

Exit user area.

This is a field that is available for the exit to use. It is initialized to MQXUA_NONE (binary zero) before the first invocation of the exit, and thereafter any changes made to this field by the exit are preserved across invocations of the exit. The first invocation of the exit has `ExitReason` set to MQXR_INIT.

The following value is defined:

MQXUA_NONE
No user information.

The value is binary zero for the length of the field.

For the C programming language, the constant MQXUA_NONE_ARRAY is also defined; this has the same value as MQXUA_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_EXIT_USER_AREA_LENGTH. This is an input/output field to the exit.

TransportType (MQLONG)

Transport type.

This is the type of transport being used. The value is:

MQXPT_UDP
UDP transport protocol.

This is an input field to the exit.

RetryCount (MQLONG)

Number of times data has been retried.

This is the number of previous attempts that have been made to send the current data. It is zero on first invocation of the exit for the current data.

This is an input field to the exit.

DataLength (MQLONG)

Length of data to be sent.

This is always greater than zero. For MQXPT_UDP, it is one complete encoded datagram.

This is an input field to the exit.

SessionId (MQLONG)

Session identifier.

This is the identifier of the session of channel. For MQXPT_UDP, it is the `UdpHandle`.

This is an input field to the exit.

GroupId (MQLONG)

Group identifier.

This is the identifier of the group, bunch, or message to which the data belongs. For MQXPT_UDP, it identifies the bunch.

This is an input field to the exit.

DataId (MQLONG)

Data identifier.

For MQXPT_UDP, this is the datagram identifier.

This is an input field to the exit.

ExitResponse (MQLONG)

Response from exit.

This is set by the exit to indicate how processing should continue. It must be one of the following:

MQXCC_OK
Exit completed successfully.

This indicates that processing should continue normally.

MQXCC_REQUEST_ACK
Request acknowledgement.

This indicates that processing should continue normally, but that the datagram about to be sent should request that an acknowledgement be returned by the receiver of the datagram.

MQXCC_CLOSE_CHANNEL
Close channel.

This indicates that processing should be discontinued and the channel closed.

If any other value is returned by the exit, processing continues as if MQXCC_CLOSE_CHANNEL had been specified.

This is an output field from the exit.

Feedback (MQLONG)

Reserved.

This is a reserved field. The value is zero.

C declaration

```
typedef struct tagMQTXP MQTXP;
struct tagMQTXP {
  MQCHAR4   StrucId;        /* Structure identifier */
  MQLONG    Version;        /* Structure version number */
  MQLONG    Reserved;       /* Reserved */
  MQLONG    ExitReason;     /* Reason for invoking exit */
  MQBYTE16  ExitUserArea;   /* Exit user area */
  MQLONG    TransportType;  /* Transport type */
  MQLONG    RetryCount;     /* Number of times data has been retried */
  MQLONG    DataLength;     /* Length of data to be sent */
  MQLONG    SessionId;      /* Session identifier */
  MQLONG    GroupId;        /* Group identifier */
  MQLONG    DataId;         /* Data identifier */
  MQLONG    ExitResponse;   /* Response from exit */
  MQLONG    Feedback;       /* Reserved */
};
```

MQXWD – Exit wait descriptor

The following table summarizes the fields in the structure.

Table 65. Fields in MQXWD

Field	Description	Page
`StrucId`	Structure identifier	733
`Version`	Structure version number	733
`ECB`	Event control block to wait on	734

The MQXWD structure is an input/output parameter on the MQXWAIT call.

This structure is supported only on z/OS.

Fields

StrucId (MQCHAR4)

Structure identifier.

The value must be:

MQXWD_STRUC_ID
Identifier for exit wait descriptor structure.

For the C programming language, the constant MQXWD_STRUC_ID_ARRAY is also defined; this has the same value as MQXWD_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQXWD_STRUC_ID.

Version (MQLONG)

Structure version number.

The value must be:

MQXWD_VERSION_1
Version number for exit wait descriptor structure.

The initial value of this field is MQXWD_VERSION_1.

Reserved1 (MQLONG)

Reserved.

This is a reserved field; its value must be zero.

This is an input field.

Reserved2 (MQLONG)

Reserved.

This is a reserved field; its value must be zero.

This is an input field.

Reserved3 (MQLONG)

Reserved.

This is a reserved field; its value must be zero.

This is an input field.

ECB (MQLONG)

Event control block to wait on.

This is the event control block (ECB) to wait on. It should be set to zero before the MQXWAIT call is issued; on successful completion it will contain the post code.

This is an input/output field.

C declaration

```
typedef struct tagMQXWD MQXWD;
struct tagMQXWD {
  MQCHAR4  StrucId;    /* Structure identifier */
  MQLONG   Version;    /* Structure version number */
  MQLONG   Reserved1;  /* Reserved */
  MQLONG   Reserved2;  /* Reserved */
  MQLONG   Reserved3;  /* Reserved */
  MQLONG   ECB;        /* Event control block to wait on */
};
```

System/390 assembler declaration

```
MQXWD            DSECT
MQXWD_STRUCID    DS   CL4  Structure identifier
MQXWD_VERSION    DS   F    Structure version number
MQXWD_RESERVED1  DS   F    Reserved
MQXWD_RESERVED2  DS   F    Reserved
MQXWD_RESERVED3  DS   F    Reserved
MQXWD_ECB        DS   F    Event control block to wait on
*
MQXWD_LENGTH     EQU  *-MQXWD
                 ORG  MQXWD
MQXWD_AREA       DS   CL(MQXWD_LENGTH)
```

Chapter 48. Problem determination in DQM

This chapter explains the various aspects of problem determination and suggests methods of resolving problems. Some of the problems mentioned in this chapter are platform and installation specific. Where this is the case, it is made clear in the text.

Problem determination for the following scenarios is discussed:

- "Error message from channel control"
- "Ping"
- "Dead-letter queue considerations" on page 736
- "Validation checks" on page 736
- "In-doubt relationship" on page 737
- "Channel startup negotiation errors" on page 737
- "When a channel refuses to run" on page 737
- "Retrying the link" on page 740
- "Data structures" on page 740
- "User exit problems" on page 740
- "Disaster recovery" on page 741
- "Channel switching" on page 741
- "Connection switching" on page 742
- "Client problems" on page 742
- "Error logs" on page 742

Error message from channel control

Problems found during normal operation of the channels are reported to the system console and to the system log. In WebSphere MQ for z/OS using CICS, they are reported to the CICS *Transient Data Queue* CKMQ, if that is defined and available. In WebSphere MQ for Windows they are reported to the channel log. Problem diagnosis starts with the collection of all relevant information from the log, and analysis of this information to identify the problem.

However, this could be difficult in a network where the problem may arise at an intermediate system that is staging some of your messages. An error situation, such as transmission queue full, followed by the dead-letter queue filling up, would result in your channel to that site closing down.

In this example, the error message you receive in your error log will indicate a problem originating from the remote site, but may not be able to tell you any details about the error at that site.

You need to contact your counterpart at the remote site to obtain details of the problem, and to receive notification of that channel becoming available again.

Ping

Ping is useful in determining whether the communication link and the two message channel agents that make up a message channel are functioning across all interfaces.

Ping makes no use of transmission queues, but it does invoke some user exit programs. If any error conditions are encountered, error messages are issued.

Ping

To use ping, you can issue the MQSC command PING CHANNEL (you cannot do this if you are using CICS for distributed queuing on z/OS). On z/OS and OS/400, you can also use the panel interface to select this option.

On UNIX platforms, OS/2, Windows, and OS/400, you can also use the MQSC command PING QMGR to test whether the queue manager is responsive to commands. See the *WebSphere MQ Script (MQSC) Command Reference* for more information about this.

Dead-letter queue considerations

In some WebSphere MQ products the dead-letter queue is referred to as an *undelivered-message queue*.

If a channel ceases to run for any reason, applications will probably continue to place messages on transmission queues, creating a potential overflow situation. Applications can monitor transmission queues to find the number of messages waiting to be sent, but this would not be a normal function for them to carry out.

When this occurs in a message-originating node, and the local transmission queue is full, the application's PUT fails.

When this occurs in a staging or destination node, there are three ways that the MCA copes with the situation:

1. By calling the message-retry exit, if one is defined.
2. By directing all overflow messages to a *dead-letter queue* (DLQ), returning an exception report to applications that requested these reports.

   Note: In distributed-queuing management, if the message is too big for the DLQ, the DLQ is full, or the DLQ is not available, the channel stops and the message remains on the transmission queue. Ensure your DLQ is defined, available, and sized for the largest messages you handle.
3. By closing down the channel, if neither of the previous options succeeded.
4. By returning the undelivered messages back to the sending end and returning a full report to the reply-to queue (MQRC_EXCEPTION_WITH_FULL_DATA and MQRO_DISCARD_MSG).

If an MCA is unable to put a message on the DLQ:

- The channel stops
- Appropriate error messages are issued at the system consoles at both ends of the message channel
- The unit of work is backed out, and the messages reappear on the transmission queue at the sending channel end of the channel
- Triggering is disabled for the transmission queue

Validation checks

A number of validation checks are made when creating, altering, and deleting channels, and where appropriate, an error message returned.

Errors may occur when:

- A duplicate channel name is chosen when creating a channel
- Unacceptable data is entered in the channel parameter fields
- The channel to be altered is in doubt, or does not exist

In-doubt relationship

If a channel is in doubt, it is usually resolved automatically on restart, so the system operator does not need to resolve a channel manually in normal circumstances. See "In-doubt channels" on page 70 for information about this.

Channel startup negotiation errors

During channel startup, the starting end has to state its position and agree channel running parameters with the corresponding channel. It may happen that the two ends cannot agree on the parameters, in which case the channel closes down with error messages being issued to the appropriate error logs.

When a channel refuses to run

If a channel refuses to run:

- Check that DQM and the channels have been set up correctly. This is a likely problem source if the channel has never run. Reasons could be:
  - A mismatch of names between sending and receiving channels (remember that uppercase and lowercase letters are significant)
  - Incorrect channel types specified
  - The sequence number queue (if applicable) is not available, or is damaged
  - The dead-letter queue is not available
  - The sequence number wrap value is different on the two channel definitions
  - A queue manager, CICS system, or communication link is not available
  - Following a restart, the wrong queue manager may have been attached to CICS
  - A receiver channel might be in STOPPED state
  - The connection might not be defined correctly
  - There might be a problem with the communications software (for example, is TCP running?)
  - In z/OS using CICS, check that the DFHSIT SYSIDNT name of the target CICS system matches the connection name that you have specified for that system
- It is possible that an in-doubt situation exists, if the automatic synchronization on startup has failed for some reason. This is indicated by messages on the system console, and the status panel may be used to show channels that are in doubt.

  The possible responses to this situation are:
  - Issue a Resolve channel request with Backout or Commit.

    You need to check with your remote link supervisor to establish the number of the last message or unit of work committed. Check this against the last number at your end of the link. If the remote end has committed a number, and that number is not yet committed at your end of the link, then issue a RESOLVE COMMIT command.

    In all other cases, issue a RESOLVE BACKOUT command.

    The effect of these commands is that backed out messages reappear on the transmission queue and are sent again, while committed messages are discarded.

    If in doubt yourself, perhaps backing out with the probability of duplicating a sent message would be the safer decision.

  - Issue a RESET command.

    This command is for use when sequential numbering is in effect, and should be used with care. Its purpose is to reset the sequence number of messages and you should use it only after using the RESOLVE command to resolve any in-doubt situations.
- On WebSphere MQ for iSeries, Windows, UNIX systems, and z/OS without CICS, and MQSeries for OS/2 Warp, there is no need for the administrator to choose a particular sequence number to ensure that the sequence numbers are put back in step. When a sender channel starts up after being reset, it informs the receiver that it has been reset and supplies the new sequence number that is to be used by both the sender and receiver.

  Note: If the sender is WebSphere MQ for z/OS using CICS, the sequence number should be reset to the same number as any receiving queue managers.
- If the status of a receiver end of the channel is STOPPED, it can be reset by starting the receiver end.

  Note: This does not start the channel, it merely resets the status. The channel must still be started from the sender end.

Triggered channels

If a triggered channel refuses to run, the possibility of in-doubt messages should be investigated as described above.

Another possibility is that the trigger control parameter on the transmission queue has been set to NOTRIGGER by the channel. This happens when:
- There is a channel error
- The channel was stopped because of a request from the receiver
- The channel was stopped because of a problem on the sender that requires manual intervention

After diagnosing and fixing the problem, you must start the channel manually.

An example of a situation where a triggered channel fails to start is as follows:
1. A transmission queue is defined with a trigger type of FIRST.
2. A message arrives on the transmission queue, and a trigger message is produced.
3. The channel is started, but stops immediately because the communications to the remote system are not available.
4. The remote system is made available.
5. Another message arrives on the transmission queue.
6. The second message does not increase the queue depth from zero to one, so no trigger message is produced (unless the channel is in RETRY state). If this happens, the channel must be started manually.

   On WebSphere MQ for z/OS, if the queue manager is stopped using MODE(FORCE) during channel initiator shutdown, it may be necessary to manually restart some channels after channel initiator restart.

Conversion failure

Another reason for the channel refusing to run could be that neither end is able to carry out necessary conversion of message descriptor data between ASCII and EBCDIC, and integer formats. In this instance, communication is not possible.

Network problems

When using LU 6.2, make sure that your definitions are consistent throughout the network. For example, if you have increased the RU sizes in your CICS Transaction Server for z/OS or Communications Manager definitions, but you have a controller with a small MAXDATA value in its definition, the session may fail if you attempt to send large messages across the network. A symptom of this may be that channel negotiation takes place successfully, but the link fails when message transfer occurs.

When using TCP, if your channels are unreliable and your connections break, you can set a KEEPALIVE value for your system or channels. You do this using the SO_KEEPALIVE option to set a system-wide value, and on WebSphere MQ for z/OS, you can also use the KeepAlive Interval channel attribute (KAINT) to set channel-specific keepalive values. On WebSphere MQ for z/OS you can alternatively use the RCVTIME and RCVTMIN channel initiator parameters. These options are discussed in “Checking that the other end of the channel is still available” on page 66, and “KeepAlive Interval (KAINT)” on page 87.

Adopting an MCA

The Adopt MCA function enables WebSphere MQ to cancel a receiver channel and to start a new one in its place.

For more information about this function, see “Adopting an MCA” on page 68. For details of its parameters, see *WebSphere MQ for z/OS System Setup Guide*.

Registration time for DDNS

When a group TCP/IP listener is started, it registers with DDNS. But there may be a delay until the address is available to the network. A channel that is started in this period, and which targets the newly registered generic name, fails with an ’error in communications configuration’ message. The channel then goes into retry until the name becomes available to the network. The length of the delay will be dependent on the name server configuration used.

Dial-up problems

WebSphere MQ supports connection over dial-up lines but you should be aware that with TCP, some protocol providers assign a new IP address each time you dial in. This can cause channel synchronization problems because the channel cannot recognize the new IP addresses and so cannot ensure the authenticity of the partner. If you encounter this problem, you need to use a security exit program to override the connection name for the session.

This problem does not occur when a WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows, or MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp product is communicating with another product at the same level, because the queue manager name is used for synchronization instead of the IP address.

Retrying the link

An error scenario may occur that is difficult to recognize. For example, the link and channel may be functioning perfectly, but some occurrence at the receiving end causes the receiver to stop. Another unforeseen situation could be that the receiver system has run out of storage and is unable to complete a transaction.

You need to be aware that such situations can arise, often characterized by a system that appears to be busy but is not actually moving messages. You need to work with your counterpart at the far end of the link to help detect the problem and correct it.

Retry considerations

If a link failure occurs during normal operation, a sender or server channel program will itself start another instance, provided that:

1. Initial data negotiation and security exchanges are complete
2. The retry count in the channel definition is greater than zero

Note: For OS/2, OS/400, UNIX systems, and Windows, to attempt a retry a channel initiator must be running. In platforms other than WebSphere MQ for AIX, iSeries, HP-UX, Linux, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, this channel initiator must be monitoring the initiation queue specified in the transmission queue that the channel in using.

Shared channel recovery on z/OS

See "Shared channel recovery" on page 486, which includes a table that shows the types of shared-channel failure and how each type is handled.

Data structures

Data structures are needed for reference when checking logs and trace entries during problem diagnosis. Details can be found in Chapter 47, "Channel-exit calls and data structures", on page 659 and in the *WebSphere MQ Application Programming Reference* book.

User exit problems

The interaction between the channel programs and the user-exit programs has some error-checking routines, but this facility can only work successfully when the user exits obey the rules described in Part 7, "Further intercommunication considerations", on page 615. When errors occur, the most likely outcome will be that the channel stops and the channel program issues an error message, together with any return codes from the user exit. Any errors detected on the user exit side of the interface can be determined by scanning the messages created by the user exit itself.

You might need to use a trace facility of your host system to identify the problem.

Disaster recovery

Disaster recovery planning is the responsibility of individual installations, and the functions performed may include the provision of regular system ‘snapshot’ dumps that are stored safely off-site. These dumps would be available for regenerating the system, should some disaster overtake it. If this occurs, you need to know what to expect of the messages, and the following description is intended to start you thinking about it.

First a recap on system restart. If a system fails for any reason, it may have a system log that allows the applications running at the time of failure to be regenerated by replaying the system software from a syncpoint forward to the instant of failure. If this occurs without error, the worst that can happen is that message channel syncpoints to the adjacent system may fail on startup, and that the last batches of messages for the various channels will be sent again. Persistent messages will be recovered and sent again, nonpersistent messages may be lost.

If the system has no system log for recovery, or if the system recovery fails, or where the disaster recovery procedure is invoked, the channels and transmission queues may be recovered to an earlier state, and the messages held on local queues at the sending and receiving end of channels may be inconsistent.

Messages may have been lost that were put on local queues. The consequence of this happening depends on the particular WebSphere MQ implementation, and the channel attributes. For example, where strict message sequencing is in force, the receiving channel detects a sequence number gap, and the channel closes down for manual intervention. Recovery then depends upon application design, as in the worst case the sending application may need to restart from an earlier message sequence number.

Channel switching

A possible solution to the problem of a channel ceasing to run would be to have two message channels defined for the same transmission queue, but with different communication links. One message channel would be preferred, the other would be a replacement for use when the preferred channel is unavailable.

If triggering is required for these message channels, the associated process definitions must exist for each sender channel end.

To switch message channels:

- If the channel is triggered, set the transmission queue attribute NOTRIGGER.
- Ensure the current channel is inactive.
- Resolve any in-doubt messages on the current channel.
- If the channel is triggered, change the process attribute in the transmission queue to name the process associated with the replacement channel.

  In this context, some implementations allow a channel to have a blank process object definition, in which case you may omit this step as the queue manager will find and start the appropriate process object.
- Restart the channel, or if the channel was triggered, set the transmission queue attribute TRIGGER.

Connection switching

Another solution would be to switch communication connections from the transmission queues.

To do this:

- If the sender channel is triggered, set the transmission queue attribute NOTRIGGER.
- Ensure the channel is inactive.
- Change the connection and profile fields to connect to the replacement communication link.
- Ensure that the corresponding channel at the remote end has been defined.
- Restart the channel, or if the sender channel was triggered, set the transmission queue attribute TRIGGER.

Client problems

A client application may receive an unexpected error return code, for example:

- Queue manager not available
- Queue manager name error
- Connection broken

Look in the client error log for a message explaining the cause of the failure. There may also be errors logged at the server, depending on the nature of the failure.

Terminating clients

Even though a client has terminated, it is still possible for its surrogate process to be holding its queues open. Normally this will only be for a short time until the communications layer notifies that the partner has gone.

Error logs

WebSphere MQ error messages are placed in different error logs depending on the platform. There are error logs for:

- OS/2 and Windows
- UNIX systems
- VSE/ESA
- DOS, Windows 3.1, Windows 95, and Windows 98 clients
- z/OS
- MQSeries for Compaq NonStop Kernel
- MQSeries for Compaq OpenVMS Alpha

Error logs for OS/2, Windows and Windows 98 client

MQSeries for OS/2 Warp and WebSphere MQ for Windows use a number of error logs to capture messages concerning the operation of WebSphere MQ itself, any queue managers that you start, and error data coming from the channels that are in use.

The location the error logs are stored in depends on whether the queue manager name is known and whether the error is associated with a client.

- If the queue manager name is known and the queue manager is available:

  ```
  C:\MQM\QMGRS\QMgrName\ERRORS\AMQERR01.LOG
  ```

- If the queue manager is not available:

```
C:\MQM\QMGRS\@SYSTEM\ERRORS\AMQERR01.LOG
```

- If an error has occurred with a client application:

```
C:\MQM\ERRORS\AMQERR01.LOG
```

Note: The above examples assume that you have installed WebSphere MQ on the C: drive and in the MQM directory. On Windows, the default data path is C:\WINNT\Profiles\All Users\Application Data\MQSeries\.

On Windows, you should also examine the Windows application event log for relevant messages.

Error logs on UNIX systems

WebSphere MQ on UNIX systems uses a number of error logs to capture messages concerning the operation of WebSphere MQ itself, any queue managers that you start, and error data coming from the channels that are in use. The location the error logs are stored in depends on whether the queue manager name is known and whether the error is associated with a client.

- If the queue manager name is known and the queue manager is available:

```
/var/mqm/qmgrs/QMgrName/errors/AMQERR01.LOG
```

- If the queue manager is not available:

```
/var/mqm/qmgrs/@SYSTEM/errors/AMQERR01.LOG
```

- If an error has occurred with a client application:

```
/var/mqm/errors/AMQERR01.LOG
```

Error logs on DOS, Windows 3.1, and Windows 95 clients

WebSphere MQ clients use two error logs, stored in a location set by the environment variable MQDATA (the default is the root drive of the client).

- Error messages:

```
AMQERR01.LOG
```

- FFDC messages:

```
AMQERR01.FDC
```

These files are not readable. See the *WebSphere MQ Clients* book for information about formatting the information.

Error logs on z/OS

If you are not using CICS, error messages are written to:
- The z/OS system console
- The channel-initiator job log

If you are using the z/OS message processing facility to suppress messages, the console messages may be suppressed. See the *WebSphere MQ for z/OS Concepts and Planning Guide* for more information.

If you are using CICS, error messages are written to the z/OS system console or the CKMQ extrapartition transient data queue. See the*WebSphere MQ for z/OS Concepts and Planning Guide* for more information.

Error logs on MQSeries for VSE/ESA

All WebSphere MQ-generated error messages are written to SYSTEM.LOG.

Error logs on MQSeries for Compaq NonStop Kernel

On MQSeries for Compaq NonStop Kernel, the location of the error logs depends on whether the queue manager name is known and whether the error is associated with a client.

- If the queue manager name is known and the queue manager is available:
  `<QMVOL>.<SUBVOL>L.MQERRLG1`
- If the queue manager is not available:
  `<MQSVOL>.ZMQSSYS.MQERRLG1`
- First Failure Symptom Trap (FFST) in:
  `<QMVOL>.<SUBVOL>.FDnnnnn`

Log files

The error log subvolume can contain up to three error log files named:
MQERRLG1
MQERRLG2
MQERRLG3

After you have created a queue manager, three error log files are created when they are needed by the queue manager. These files are called MQERRLG1, MQERRLG2, and MQERRLG3, and are placed in the subvolume of each queue manager that you create.

As error or log messages are generated they are placed in MQERRLG1. When MQERRLG1 is filled, it is copied to MQERRLG2. Before the copy, MQERRLG2 is copied to MQERRLG3. The previous contents, if any, of MQERRLG3 are discarded.

The latest error messages are thus always placed in MQERRLG1, the other files being used to maintain a history of error messages.

All messages relating to channels are also placed in the appropriate queue manager's errors files unless the name of their queue manager is unknown or the queue manager is unavailable. When the queue manager name is unavailable or its name cannot be determined, channel-related messages are placed in the system error log (ZMQSSYS.MQERRLG1).

To examine the contents of any error log file, you can use either the **fup** copy command or your usual Compaq NonStop Kernel editor in read-only mode. (If you open the error log in update mode, error messages might be lost.)

Error logs on MQSeries for Compaq OpenVMS Alpha

On MQSeries for Compaq OpenVMS Alpha, the location of the error logs depends on whether the queue manager name is known and whether the error is associated with a client.

- If the queue manager name is known and the queue manager is available:
  `MQS_ROOT:[MQM.QMGRS.QMgrName.ERRORS]AMQERR01.LOG`
- If the queue manager is not available:
  `MQS_ROOT:[MQM.QMGRS.$SYSTEM.ERRORS]AMQERR01.LOG`
- If an error has occurred with a client application:
  `MQS_ROOT:[MQM.ERRORS]AMQERR01.LOG`

Note: In the case of clients, the errors are stored on the client's root drive.

Log files

At installation time an `[MQM.QMGRS.$SYSTEM.ERRORS]` directory is created in the QMGRS file path. The errors subdirectory can contain up to three error log files named:

AMQERR01.LOG
AMQERR02.LOG
AMQERR03.LOG

After you have created a queue manager, three error log files are created when they are needed by the queue manager. These files have the same names as the $SYSTEM ones, that is AMQERR01, AMQERR02, and AMQERR03, and each has a capacity of 256 KB. The files are placed in the errors subdirectory of each queue manager that you create.

As error messages are generated they are placed in AMQERR01. When AMQERR01 gets bigger than 256 KB it is copied to AMQERR02. Before the copy, AMQERR02 is copied to AMQERR03.LOG. The previous contents, if any, of AMQERR03 are discarded.

The latest error messages are thus always placed in AMQERR01, the other files being used to maintain a history of error messages.

All messages relating to channels are also placed in the appropriate queue manager’s errors files unless the name of their queue manager is unknown or the queue manager is unavailable. When the queue manager name is unavailable or its name cannot be determined, channel-related messages are placed in the [MQM.QMGRS.$SYSTEM.ERRORS] subdirectory.

To examine the contents of any error log file, use your usual Compaq OpenVMS Alpha editor.

Appendix A. Channel planning form

The form shown in Table 66 on page 749 is supplied for you to create and maintain a list of all message channels for each queue manager in your system. Do not fill in the form in this book. Instead, photocopy it as many times as required to hold the definitions of all the channels in your system. The filled-in form, see Table 67 on page 750, is included to illustrate how the two examples in Chapter 33, "Message channel planning example for z/OS using CICS", on page 475 and Chapter 44, "Message channel planning example for WebSphere MQ for iSeries", on page 587 could be shown.

How to use the form

The channel planning form allows you to keep an overview of the channels and associated objects in your system. It will help to prevent you from making errors when changing your channel configuration.

One of the more obvious errors is to allocate items more than once:

Communications connections identifiers
Allocate only once. It may be possible to share connections between channels when using LU 6.2.

Channel names
Allocate only once.

Transmission queues
Allocate to only one channel. It is possible to allocate to more than one channel for standby purposes, but ensure that only one is active, unless the host environment is WebSphere MQ for z/OS, and there is no sequential delivery of messages selected.

Remote queue definition
The name must be unique.

Queue manager alias name
The name must be unique.

Reply-to queue name
The name must be unique.

Reply-to queue alias name
The name must be unique.

Adjacent channel system name
The name must be unique.

One method of completing the form would be to allocate, systematically, in this order:

- Channels to adjacent systems
- Transmission queues to channels
- Remote queue definitions to queue names and queue manager names, and to transmission queues
- Reply-to queue aliases to reply-to queue names and route names
- Queue manager aliases to remote queue managers and transmission queues

Channel planning form

Proceed as follows:

1. Start with one adjacent system, define the first outward channel to that system, and give it a name.
2. Fill in the channel name on the form with the channel type, transmission queue name, adjacent system name, and remote queue manager name.
3. For each class-of-service, logically-named connection, fill in the logical queue manager name to list the queue manager name resolutions using this channel.
4. Allocate a communication connection and fill in the name and profile, where applicable.
5. Record the names of all the queues that your applications are going to use on this channel, using the columns provided on the form. This is necessary where remote queue definitions are used, so that the name resolutions are listed.
6. Do not forget to include the reply-to alias queue names in this list.
7. Move to the next channel and continue until all outward channels have been completed for this adjacent system.
8. When this has been completed, repeat from the beginning for incoming channels from this adjacent system.
9. Move on to the next adjacent system, and repeat.
10. Check the complete list for unwanted multiple assignments of names, objects and connections.

When the list is complete and checked out, use it as an aid in creating the objects, and defining the channels listed.

Table 66. Channel planning form. System name: Queue manager name: Page no:

Channel name	Channel type	CICS system ID (where needed)	Transmission queue name	Connection name	Profile, or mode, name	Adjacent system name	Logical queue manager name	Logical queue name	Physical queue manager name	Physical queue name

Channel planning form

Table 67. Channel planning form. System name: QM2 Queue manager name: QM2 Page no: 1

Channel name	Channel type	CICS system ID (where needed)	Transmission queue name	Connection name	Profile, or mode, name	Adjacent system name	Logical queue manager name	Logical queue name	Physical queue manager name	Physical queue name
QM1.T.QM2. CHANNEL	SENDER	(default)	QM2	QM2C	(none)	QM2	QM2	Payrollr	QM2	Payroll
QM1.to.QM2	SENDER	(none)	QM2	QM2D	(none)	QM2	QM2	Payroll	QM2	Payroll
QM2.to.QM1	RECEIVER	(none)	(none)	(none)	(none)	QM2	(none)	(none)	(none)	(none)

Appendix B. Constants for channels and exits

This appendix specifies the values of the named constants that apply to channels and exits.

The constants are grouped according to the parameter or field to which they relate. All of the names of the constants in a group begin with a common prefix of the form “`MQ`*`xxxxx`*`_`”, where *`xxxxx`* represents a string of 0 through 5 characters that indicates the parameter or field to which the values relate. The constants are ordered alphabetically by this prefix.

Notes:

1. For constants with numeric values, the values are shown in both decimal and hexadecimal forms.
2. Hexadecimal values are represented using the notation `X'hhhh'`, where each “`h`” denotes a single hexadecimal digit.
3. Character values are shown delimited by single quotation marks; the quotation marks are not part of the value.
4. Blanks in character values are represented by one or more occurrences of the symbol “`ƀ`”.
5. If the value is shown as “`(variable)`”, it indicates that the value of the constant depends on the environment in which the application is running.

List of constants

The following sections list all of the named constants that are mentioned in this book, and show their values.

MQ_* (Lengths of character string and byte fields)

MQ_CHANNEL_DESC_LENGTH	64	X'00000040'
MQ_CHANNEL_NAME_LENGTH	20	X'00000014'
MQ_CONN_NAME_LENGTH	264	X'00000108'
MQ_EXIT_DATA_LENGTH	32	X'00000020'
MQ_EXIT_NAME_LENGTH	(variable)	
MQ_EXIT_USER_AREA_LENGTH	16	X'00000010'
MQ_LOCAL_ADDRESS_LENGTH	48	X'00000030'
MQ_MAX_EXIT_NAME_LENGTH	128	X'00000080'
MQ_MAX_MCA_USER_ID_LENGTH	64	X'00000040'
MQ_MCA_NAME_LENGTH	20	X'00000014'
MQ_MCA_USER_ID_LENGTH	(variable)	
MQ_MODE_NAME_LENGTH	8	X'00000008'
MQ_PASSWORD_LENGTH	12	X'0000000C'
MQ_Q_MGR_NAME_LENGTH	48	X'00000030'
MQ_Q_NAME_LENGTH	48	X'00000030'
MQ_SECURITY_ID_LENGTH	40	X'00000028'
MQ_SHORT_CONN_NAME_LENGTH	20	X'00000014'
MQ_SSL_CIPHER_SPEC_LENGTH	32	X'00000020'
MQ_TOTAL_EXIT_DATA_LENGTH	999	X'000003E7'
MQ_TOTAL_EXIT_NAME_LENGTH	999	X'000003E7'
MQ_TP_NAME_LENGTH	64	X'00000040'
MQ_USER_ID_LENGTH	12	X'0000000C'

MQCC_* (Completion code)

MQCC_OK	0	X'00000000'
MQCC_FAILED	2	X'00000002'

MQCD_* (Channel definition structure length)

See the *StrucLength* field described in "MQCD – Channel definition" on page 674.

MQCD_LENGTH_4	(variable)
MQCD_LENGTH_5	(variable)
MQCD_LENGTH_6	(variable)
MQCD_LENGTH_7	(variable)
MQCD_CURRENT_LENGTH	(variable)

MQCD_* (Channel definition structure version)

See the *Version* field described in "MQCD – Channel definition" on page 674.

MQCD_VERSION_1	1	X'00000001'
MQCD_VERSION_2	2	X'00000002'
MQCD_VERSION_3	3	X'00000003'
MQCD_VERSION_4	4	X'00000004'
MQCD_VERSION_5	5	X'00000005'
MQCD_VERSION_6	6	X'00000006'
MQCD_VERSION_7	7	X'00000007'
MQCD_CURRENT_VERSION	(variable)	

MQCDC_* (Channel data conversion)

See the *DataConversion* field described in "MQCD – Channel definition" on page 674.

MQCDC_NO_SENDER_CONVERSION	0	X'00000000'
MQCDC_SENDER_CONVERSION	1	X'00000001'

MQCF_* (Channel capability flags)

See the *CapabilityFlags* field described in "MQCXP – Channel exit parameter" on page 714.

MQCF_NONE	0	X'00000000'
MQCF_DIST_LISTS	1	X'00000001'

MQCHT_* (Channel type)

See the *ChannelType* field described in "MQCD – Channel definition" on page 674.

MQCHT_SENDER	1	`X'00000001'`
MQCHT_SERVER	2	`X'00000002'`
MQCHT_RECEIVER	3	`X'00000003'`
MQCHT_REQUESTER	4	`X'00000004'`
MQCHT_CLNTCONN	6	`X'00000006'`
MQCHT_SVRCONN	7	`X'00000007'`
MQCHT_CLUSRCVR	8	`X'00000008'`
MQCHT_CLUSSDR	9	`X'00000009'`

MQCXP_* (Channel-exit parameter structure identifier)

See the *StrucId* field described in “MQCXP – Channel exit parameter” on page 714.

MQCXP_STRUC_ID	`'CXPƀ'`

For the C programming language, the following array version is also defined:

MQCXP_STRUC_ID_ARRAY	`'C','X','P','ƀ'`

MQCXP_* (Channel-exit parameter structure version)

See the *Version* field described in “MQCXP – Channel exit parameter” on page 714.

MQCXP_VERSION_1	1	`X'00000001'`
MQCXP_VERSION_2	2	`X'00000002'`
MQCXP_VERSION_3	3	`X'00000003'`
MQCXP_VERSION_4	4	`X'00000004'`
MQCXP_VERSION_5	5	`X'00000005'`
MQCXP_CURRENT_VERSION	(variable)	

MQFB_* (Feedback)

See the *Feedback* field described in “MQCXP – Channel exit parameter” on page 714.

MQFB_NONE	0	`X'00000000'`
MQFB_STOPPED_BY_MSG_EXIT	268	`X'0000010C'`

| ## MQKAI_* (Keepalive interval)

|	MQKAI_AUTO	-1	`X'FFFFFFFF'`

MQMCAT_* (MCA type)

See the *MCAType* field described in “MQCD – Channel definition” on page 674.

MQMCAT_PROCESS	1	`X'00000001'`
MQMCAT_THREAD	2	`X'00000002'`

MQNPMS_* (Nonpersistent message speed)

See the *NonPersistentMsgSpeed* field described in “MQCD – Channel definition” on page 674.

MQNPMS_NORMAL	1	X'00000001'
MQNPMS_FAST	2	X'00000002'

MQPA_* (Put authority)

See the *PutAuthority* field described in “MQCD – Channel definition” on page 674.

MQPA_DEFAULT	1	X'00000001'
MQPA_CONTEXT	2	X'00000002'

MQRC_* (Reason code)

See the *Reason* parameter described in “MQXWAIT – Wait in exit” on page 672.

MQRC_NONE	0	X'00000000'
MQRC_OPTIONS_ERROR	2046	X'000007FE'
MQRC_PUT_INHIBITED	2051	X'00000803'
MQRC_Q_FULL	2053	X'00000805'
MQRC_XWAIT_CANCELED	2107	X'0000083B'
MQRC_XWAIT_ERROR	2108	X'0000083C'
MQRC_PAGESET_FULL	2192	X'00000890'
MQRC_ADAPTER_NOT_AVAILABLE	2204	X'0000089C'

MQSCA_* (SSL client authentication)

See the *SSLClientAuth* field described in “MQCD – Channel definition” on page 674.

MQSCA_REQUIRED	0	X'00000000'
MQSCA_OPTIONAL	1	X'00000001'

MQSID_* (Security identifier)

See the *MCASecurityId* and *RemoteSecurityId* fields described in “MQCD – Channel definition” on page 674.

MQSID_NONE	X'00...00' (40 nulls)

For the C programming language, the following array version is also defined:

MQSID_NONE_ARRAY	'\0','\0',...'\0','\0'

MQSIDT_* (Security identifier type)

See the `MCASecurityId` and `RemoteSecurityId` fields described in “MQCD – Channel definition” on page 674.

MQSIDT_NONE	X'00'
MQSIDT_NT_SECURITY_ID	X'01'

MQTXP_* (Transport retry exit structure identifier)

See the `StrucId` field described in “MQTXP – Transport exit parameter” on page 729.

MQTXP_STRUC_ID	'TXPƀ'

For the C programming language, the following array version is also defined:

MQTXP_STRUC_ID_ARRAY	'T','X','P','ƀ'

MQTXP_* (Transport retry exit structure version)

See the `Version` field described in “MQTXP – Transport exit parameter” on page 729.

MQTXP_VERSION_1	1	X'00000001'
MQTXP_CURRENT_VERSION	1	X'00000001'

MQXCC_* (Exit response)

See the `ExitResponse` field described in “MQCXP – Channel exit parameter” on page 714.

MQXCC_REQUEST_ACK	-7	X'FFFFFFF9'
MQXCC_CLOSE_CHANNEL	-6	X'FFFFFFFA'
MQXCC_SUPPRESS_EXIT	-5	X'FFFFFFFB'
MQXCC_SEND_SEC_MSG	-4	X'FFFFFFFC'
MQXCC_SEND_AND_REQUEST_SEC_MSG	-3	X'FFFFFFFD'
MQXCC_SUPPRESS_FUNCTION	-1	X'FFFFFFFF'
MQXCC_OK	0	X'00000000'

MQXPT_* (Transmission protocol type)

See the `TransportType` field described in “MQCD – Channel definition” on page 674.

MQXPT_LU62	1	X'00000001'
MQXPT_TCP	2	X'00000002'
MQXPT_NETBIOS	3	X'00000003'
MQXPT_SPX	4	X'00000004'
MQXPT_DECNET	5	X'00000005'
MQXPT_UDP	6	X'00000006'

MQXR_* (Exit reason)

See the *ExitReason* field described in "MQCXP – Channel exit parameter" on page 714.

MQXR_INIT	11	`X'0000000B'`
MQXR_TERM	12	`X'0000000C'`
MQXR_MSG	13	`X'0000000D'`
MQXR_XMIT	14	`X'0000000E'`
MQXR_SEC_MSG	15	`X'0000000F'`
MQXR_INIT_SEC	16	`X'00000010'`
MQXR_RETRY	17	`X'00000011'`
MQXR_AUTO_CLUSSDR	18	`X'00000012'`
MQXR_AUTO_RECEIVER	19	`X'00000013'`
MQXR_END_BATCH	25	`X'00000019'`
MQXR_ACK_RECEIVED	26	`X'0000001A'`
MQXR_AUTO_SVRCONN	27	`X'0000001B'`
MQXR_AUTO_CLUSRCVR	28	`X'0000001C'`

MQXR2_* (Secondary exit response)

See the *ExitResponse2* field described in "MQCXP – Channel exit parameter" on page 714.

MQXR2_PUT_WITH_DEF_ACTION	0	`X'00000000'`
MQXR2_USE_AGENT_BUFFER	0	`X'00000000'`
MQXR2_DEFAULT_CONTINUATION	0	`X'00000000'`
MQXR2_PUT_WITH_DEF_USERID	1	`X'00000001'`
MQXR2_PUT_WITH_MSG_USERID	2	`X'00000002'`
MQXR2_USE_EXIT_BUFFER	4	`X'00000004'`
MQXR2_CONTINUE_CHAIN	8	`X'00000008'`
MQXR2_SUPPRESS_CHAIN	16	`X'00000010'`

MQXT_* (Exit identifier)

See the *ExitId* field described in "MQCXP – Channel exit parameter" on page 714.

MQXT_CHANNEL_SEC_EXIT	11	`X'0000000B'`
MQXT_CHANNEL_MSG_EXIT	12	`X'0000000C'`
MQXT_CHANNEL_SEND_EXIT	13	`X'0000000D'`
MQXT_CHANNEL_RCV_EXIT	14	`X'0000000E'`
MQXT_CHANNEL_MSG_RETRY_EXIT	15	`X'0000000F'`
MQXT_CHANNEL_AUTO_DEF_EXIT	16	`X'00000010'`

MQXUA_* (Exit user area)

See the *ExitUserArea* field described in "MQCXP – Channel exit parameter" on page 714.

MQXUA_NONE	`X'00...00' (16 nulls)`

For the C programming language, the following array version is also defined:

MQXUA_NONE_ARRAY	`'\0','\0',...'\0','\0'`

MQXWD_* (Exit wait descriptor structure identifier)

See the *StrucId* field described in "MQXWD – Exit wait descriptor" on page 733.

MQXWD_STRUC_ID	`'XWDƀ'`

For the C programming language, the following array version is also defined:

MQXWD_STRUC_ID_ARRAY	`'X','W','D','ƀ'`

MQXWD_* (Exit wait descriptor version)

See the *Version* field described in "MQXWD – Exit wait descriptor" on page 733.

MQXWD_VERSION_1	`1`	`X'00000001'`

Constants

Appendix C. Queue name resolution

This appendix describes queue name resolution as performed by queue managers at both sending and receiving ends of a channel.

In larger networks, the use of queue managers has a number of advantages over other forms of communication. These advantages derive from the name resolution function in DQM and the main benefits are:
- Applications do not need to make routing decisions
- Applications do not need to know the network structure
- Network links are created by systems administrators
- Network structure is controlled by network planners
- Multiple channels can be used between nodes to partition traffic

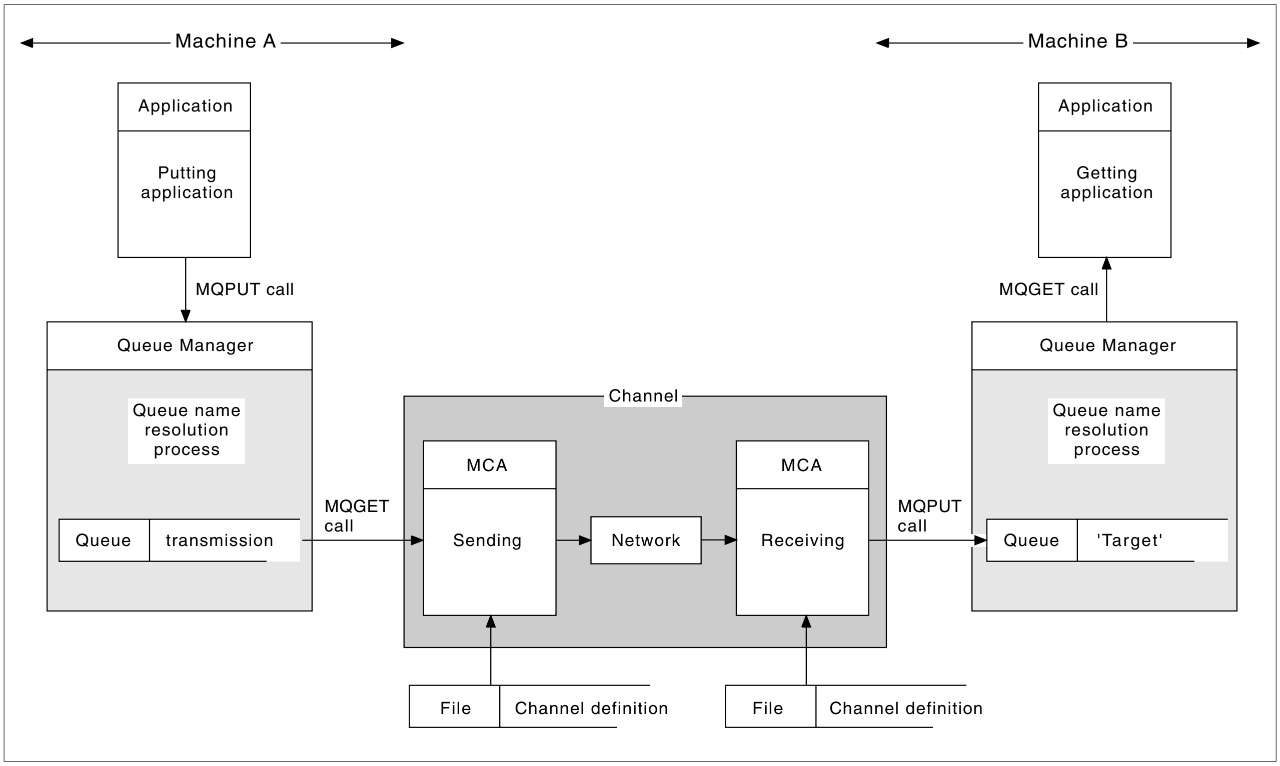


Figure 151. Name resolution

Referring to Figure 151, the basic mechanism for putting messages on a remote queue, as far as the application is concerned, is the same as for putting messages on a local queue:
- The application putting the message issues MQOPEN and MQPUT calls to put messages on the target queue.
- The application getting the messages issues MQOPEN and MQGET calls to get the messages from the target queue.

Queue name resolution

If both applications are connected to the same queue manager then no inter-queue manager communication is required, and the target queue is described as *local* to both applications.

However, if the applications are connected to different queue managers, two MCAs and their associated network connection are involved in the transfer, as shown in the figure. In this case, the target queue is considered to be a *remote queue* to the putting application.

The sequence of events is as follows:

1. The putting application issues MQOPEN and MQPUT calls to put messages to the target queue.
2. During the MQOPEN call, the *name resolution* function detects that the target queue is not local, and decides which transmission queue is appropriate. Thereafter, on the MQPUT calls associated with the MQOPEN call, all messages are placed on this transmission queue.
3. The sending MCA gets the messages from the transmission queue and passes them to the receiving MCA at the remote computer.
4. The receiving MCA puts the messages on the target queue, or queues.
5. The getting application issues MQOPEN and MQGET calls to get the messages from the target queue.

Note: Only step 1 and step 5 involve application code; steps 2 through 4 are performed by the local queue managers and the MCA programs. The putting application is unaware of the location of the target queue, which could be in the same processor, or in another processor on another continent.

The combination of sending MCA, the network connection, and the receiving MCA, is called a *message channel*, and is inherently a unidirectional device. Normally, it is necessary to move messages in both directions, and two channels are set up for this, one in each direction.

What is queue name resolution?

Queue name resolution is vital to DQM. It removes the need for applications to be concerned with the physical location of queues, and insulates them against the details of networks. A systems administrator can move queues from one queue manager to another, and change the routing between queue managers without applications needing to know anything about it.

In order to uncouple from the application design the exact path over which the data travels, it is necessary to introduce a level of indirection between the name used by the application when it refers to the target queue, and the naming of the channel over which the flow occurs. This indirection is achieved using the queue name resolution mechanism.

In essence, when an application refers to a queue name, the name is mapped by the resolution mechanism either to a transmission queue or to a local queue that is not a transmission queue. In the case of mapping to a transmission queue, a second name resolution is needed at the destination, and the received message is placed on the target queue as intended by the application designer. The application remains unaware of the transmission queue and channel used for moving the message.

Note: The definition of the queue and channel is a system management responsibility and can be changed by an operator or a system management utility, without the need to change applications.

An important requirement for the system management of message flows is that alternative paths should be provided between queue managers. For example, business requirements might dictate that different *classes of service* should be sent over different channels to the same destination. This is a system management decision and the queue name resolution mechanism provides a very flexible way to achieve it. The next section describes in detail how this is done, but the basic idea is to use queue name resolution at the sending queue manager to map the queue name supplied by the application to the appropriate transmission queue for the type of traffic involved. Similarly at the receiving end, queue name resolution maps the name in the message descriptor to a local (not a transmission) queue or again to an appropriate transmission queue.

Not only is it possible for the forward path from one queue manager to another to be partitioned into different types of traffic, but the return message that is sent to the reply-to queue definition in the outbound message can also use the same traffic partitioning. Queue name resolution satisfies this requirement and the application designer need not be involved in these traffic partitioning decisions.

The point that the mapping is carried out at both the sending and receiving queue managers is an important aspect of the way name resolution works. This allows the queue name supplied by the putting application to be mapped to a local queue or a transmission queue at the sending queue manager, and again remapped to a local queue or a transmission queue at the receiving queue manager.

Reply messages from receiving applications or MCAs have the name resolution carried out in exactly the same way, allowing return routing over specific paths by means of queue definitions at all the queue managers on route.

How queue name resolution works

The *WebSphere MQ Application Programming Guide* provides the rules for queue name resolution.

Appendix D. Configuration file stanzas for distributed queuing

This appendix shows the stanzas in the queue manager configuration file that relate to distributed queuing. It applies to:

- The queue manager configuration file for MQSeries for OS/2 Warp, called qm.ini
- The queue manager configuration file for WebSphere MQ on UNIX systems, called qm.ini
- The queue manager initialization file for WebSphere MQ for iSeries, called qm.ini.

Notes:

1. The stanzas in the QMINI file for Compaq NonStop Kernel are different and are described in the *MQSeries for Compaq NonStop Kernel System Administration* manual.
2. WebSphere MQ for Windows uses the registry. Use the WebSphere MQ Services snap-in within the Microsoft Management Console (MMC) to make equivalent changes to the configuration information.

The stanzas that relate to distributed queuing are:

- CHANNELS
- TCP
- LU62
- NETBIOS
- SPX
- EXITPATH
- UDP (WebSphere MQ for AIX only)
- Transport (WebSphere MQ for AIX only)

Figure 152 on page 764 shows the values that you can set using these stanzas. When you are defining one of these stanzas, you do not need to start each item on a new line. You can use either a semicolon (;) or a hash character (#) to indicate a comment.

```
CHANNELS:
  MAXCHANNELS=n        ; Maximum number of channels allowed, the
                       ; default value is 100
  MAXACTIVECHANNELS=n  ; Maximum number of channels allowed to be active at
                       ; any time, the default is the value of MaxChannels
  MAXINITIATORS=n      ; Maximum number of initiators allowed, the
                       ; default value is 3
```

(see note 1)

```
  MQIBINDTYPE=type     ; Whether the binding for applications is to be
                       ; "fastpath" or "standard".
                       ;The default is "standard".
```

(see note 2)

```
  ADOPTNEWMCA=chltype  ; Stops previous process if channel fails to start.
                       ; The default is "NO".
  ADOPTNEWMCATIMEOUT=n ; Specifies the amount of time that the new
                       ; process should wait for the old process to end.
                       ; The default is 60.
  ADOPTNEWMCACHECK=    ; Specifies the type checking required.
            typecheck  ; For FAP1, FAP2, and FAP3, "NAME" and
                       ; "ADDRESS" is the default.
                       ; For FAP4 and later, "NAME",
                       ; "ADDRESS", and "QM" is the
                       ; default.
TCP:                   ; TCP entries
  PORT=n               ; Port number, the default is 1414
  LIBRARY1=DLLName1    ; Name of TCP Sockets DLL (OS/2 only)
  LIBRARY2=DLLName2    ; Same as above if code is in two libraries (OS/2 only)
  KEEPALIVE=Yes        ; Switch TCP/IP KeepAlive on
  IPADDR=Addr/Name     ; TCP/IP address or name for Listener
LU62:                  ; LU 6.2 entries (OS/2 only)
  TPNAME=name          ; TP Name to start on remote side
  LIBRARY1=DLLName1    ; Name of APPC DLL
```

(see note 3)

```
LIBRARY2=DLLName2    ; Same as above if code is in two libraries )
```

(see note 3)

```
  LOCALLU=name         ; LU to use on local system (OS/2 only)

NETBIOS:               ; NetBIOS entries (OS/2 only)
  LOCALNAME=name       ; The name this machine will be known as on the LAN
  ADAPTERNUM=n         ; LAN adapter number, the default is adapter 0
  NUMSESS=n            ; Number of sessions to allocate, the default is 1
  NUMCMDS=n            ; Number of commands to allocate, the default is 1
  NUMNAMES=n           ; Number of names to allocate, the default is 1
  LIBRARY1=DLLName1    ; Name of NetBIOS DLL
  LIBRARY2=DLLName2    ; Same as above if code is in two libraries (OS/2 only)

SPX:                   ; SPX entries (OS/2 only)
  SOCKET=n             ; The socket number, the default is 5E86
  BOARDNUM=0           ; LAN adapter number, the default is adapter 0 (OS/2 only)
  KEEPALIVE=Yes        ; Switch on "watchdog" to monitor sessions (OS/2 only)
  LIBRARY1=DLLName1    ; Name of SPX DLL
  LIBRARY2=DLLName2    ; Same as above if code is in two libraries (OS/2 only)
EXITPATH:              ; Location of user exits (MQSeries for AIX,
                       ; HP-UX, OS/2 Warp, and Solaris only)
  EXITPATHS=           ; String of directory paths
```

Figure 152. qm.ini stanzas for distributed queuing (Part 1 of 3)

```
UDP:                    ; UDP entries (AIX only)
  ACKREQ_TIMEOUT=n      ; request for acknowledgement timeout
                        ; attribute specifies the time, in
                        ; seconds, that the internal state
                        ; machines will wait for a protocol
                        ; datagram before assuming that the
                        ; datagram has been lost and retrying.
                        ; The default is 5.
  ACKREQ_RETRY=n        ; request for acknowledgment retry
                        ; attribute specifies the number of times
                        ; that the internal state machines will
                        ; resend protocol datagrams before giving
                        ; up completely and causing a channel to
                        ; close.  (All the counts are reset to
                        ; zero after success and thus are not
                        ; cumulative.)  The default is 60.
  CONNECT_TIMEOUT=n     ; connect request timeout attribute
                        ; specifies the time, in seconds, that
                        ; the internal state machines will wait
                        ; for a protocol datagram before assuming
                        ; that the datagram has been lost and
                        ; retrying.  The default is 5.
  CONNECT_RETRY=n       ; connect request retry attribute
                        ; specifies the number of times that the
                        ; internal state machines will resend
                        ; protocol datagrams before giving up
                        ; completely and causing a channel to
                        ; close.  (All the counts are reset to
                        ; zero after success and thus are not
                        ; cumulative.)  The default is 60.
  ACCEPT_TIMEOUT=n      ; accept connection timeout attribute
                        ; specifies the time, in seconds, that
                        ; the internal state machines will wait
                        ; for a protocol datagram before assuming
                        ; that the datagram has been lost and
                        ; retrying.  The default is 5.
  ACCEPT_RETRY=n        ; accept connection retry attribute
                        ; specifies the number of times that the
                        ; internal state machines will resend
                        ; protocol datagrams before giving up
                        ; completely and causing a channel to
                        ; close.  (All the counts are reset to
                        ; zero after success and thus are not
                        ; cumulative.)  The default is 60.
  DROPPACKETS=n         ; tests for the robustness of the
                        ; protocols against lost datagrams
                        ; Changing the value to something other
                        ; than 0 causes datagrams to be thrown
                        ; away and the protocol will cause them
                        ; to be resent.  Therefore, you are
                        ; advised not to change the value of this
                        ; attribute to anything other than 0 for
                        ; normal usage.
  BUNCHSIZE=n           ; specifies the number of datagrams that
                        ; are sent before an acknowledgement
                        ; datagram is sent from the receiving
                        ; node.  The default is 8.  Changing the
                        ; default to a value higher than 8 may
                        ; reduce the number of datagrams sent but
                        ; may also affect other aspects of
                        ; performance.
  PACKETSIZE=n          ; specifies the maximum size of UDP
                        ; datagrams sent overthe IP network.  The
                        ; default value is 2048.
```

Figure 152. qm.ini stanzas for distributed queuing (Part 2 of 3)

```
TRANSPORT:              ; The Transport stanza (AIX only) is used
                        ; to tailor User Datagram Protocol (UDP)
                        ; support on your MQSeries system and
                        ; must be coded in conjunction with the
                        ; UDP stanza above.
  RETRYEXIT=            ; specifies the name of the library that
                        ; contains the retry exit. The retry exit
                        ; allows your application to suspend data
                        ; being sent on a channel when
                        ; communication is not possible.  For AIX
                        ; systems, the retry exit name takes the
                        ; form xyz(myexit).
QUEUEMANAGERSTARTUP:
  CHINIT=Yes            ; Start the CHINIT"
```

Figure 152. qm.ini stanzas for distributed queuing (Part 3 of 3)

Notes:

1. MAXINITIATORS applies only to WebSphere MQ for AIX, WebSphere MQ for iSeries, WebSphere MQ for HP-UX, MQSeries for OS/2 Warp, and WebSphere MQ for Solaris.
2. MQIBINDTYPE applies only to WebSphere MQ for AIX, WebSphere MQ for iSeries, WebSphere MQ for HP-UX, MQSeries for OS/2 Warp, and WebSphere MQ for Solaris.
3. The default values for LIBRARY1 and LIBRARY2 are as follows:

TCP	SO32DLL and TCP32DLL (OS/2)
LU 6.2	APPC and ACSSVC (OS/2)
NetBIOS	ACSNETB (OS/2)
SPX	IPXCALLS.DLL and SPXCALLS.DLL (OS/2)

Second extra line

For more information about the qm.ini file and the other stanzas in it, refer to the *WebSphere MQ System Administration Guide* book for WebSphere MQ for AIX, HP-UX, Solaris, and Windows, and MQSeries V5.1 for Compaq Tru64 UNIX, and OS/2 Warp, and to the *WebSphere MQ for iSeries V5.3 System Administration Guide* book for WebSphere MQ for iSeries.

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