# IBM 3746 Nways Multiprotocol Controller Models 900 and 950

- ***Premier gateway to the S/390 server for native TCP/IP, APPN/HPR and SNA subarea networks***
- ***Flexible intranet and Internet connectivity for access to new e-business applications***
- ***High network availability—ideal in a Parallel Sysplex® environment***
- ***Nondisruptive migration path for evolving customer requirements***
- ***ESCON® and parallel channel adapters for S/390 server access, with MPC+ support for improved performance in APPN/HPR and IP environments***
- ***Multiple high-speed connectivity options for both LAN and WAN, including 155-Mbps ATM and Primary Rate ISDN***
- ***Flexible TN3270E server support for IP access to SNA applications***

The IBM 3746 Nways® Multiprotocol Controllers Models 900 and 950 offer a manageable, reliable and cost-effective network that can grow with your network.

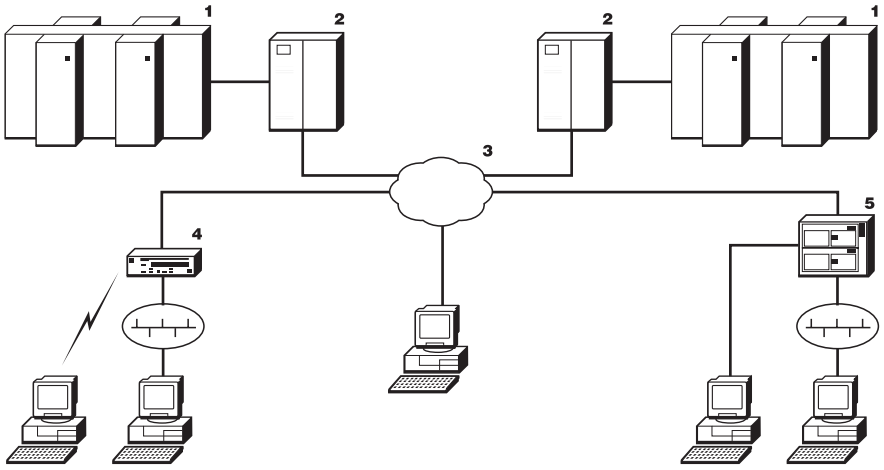
The IBM 3746 Nways Multiprotocol Controllers are designed to meet your data-center gateway needs. Link the System/390® (S/390) server to both the enterprise intranet and the external Internet with high-speed, native IP support. Take advantage of Advanced Peer-to-Peer Networking® (APPN®) and High Performance Routing (HPR) for predictable, high-performance networks, along with the full availability of S/390 server-based systems applications. Connect to public or private Frame Relay networks to transport multiple protocols over Frame Relay for cost-savings. Even add ISDN PRI for unbeatable but affordable flexibility.

# Positioning and Benefits

**Problem: A customer needs a medium-to-large SNA network to consolidate network infrastructure, reduce NCP costs and grow new TCP/IP applications.**

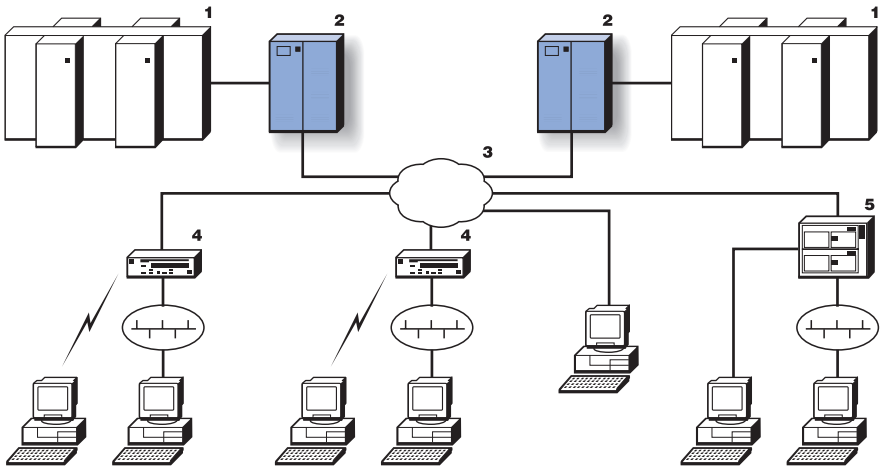
**Environment:** A large company has many SNA applications on S/390 servers. The network uses multiple 3745s (with NCP) as server gateways and has multiple S/390 servers.

1. *S/390*
2. *IBM 3745*
3. *SNA*
4. *IBM 2210*
5. *IBM 3174*




**Solution:** The stand-alone 3745s are migrated to a combined 3745 and 3746. Moving lines from the 3745 to the 3746 will lower the NCP tier and result in reduced NCP charges. Installing a Network Node Processor in the 3746 Model 900 will enable Tier C, which further reduces the NCP charge. Consolidation of the existing network using Frame Relay will result in better price/performance with NCP-controlled 3746 lines as growth occurs. The 3746 provides native IP routing for access to new TCP/IP applications.

1. *S/390*
2. *IBM 3745/3746-900*
3. *Frame Relay (TCP/IP, SNA, APPN/HPR)*
4. *IBM 2210 or IBM 2216*
5. *IBM 3174*

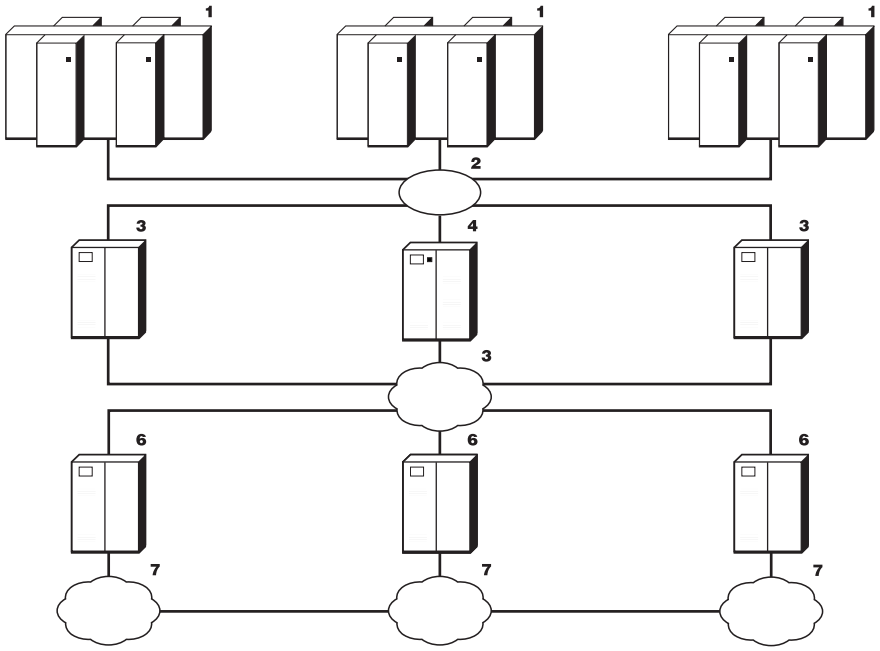



**Benefits**

- World-class TCP/IP support
- High performance for both SNA and TCP/IP traffic
- Smooth evolutionary migration
- Scalable solution
- Support for large subarea SNA connectivity in addition to IP routing
- A smooth upgrade from the installed 3745 platform preserving high availability
- Increased numbers of WAN connections and SNA physical units (PUs) and sessions
- Reduction in NCP charges achieved with a lower NCP Tier requirement

**Problem: Need for a large SNA network to migrate to ATM for increased high-speed capacity**

**Environment:** A large bank has many remote branches concentrated on a regional level. SNA subarea, dependent logical unit requester (DLUR) and APPN/HPR connectivity to the host center are provided by high-speed links into 3746s. S/390 Parallel Sysplex is implemented at the host for high availability.




**1.** *S/390*

**2.** *ESCON® Director*

**3.** *3745*

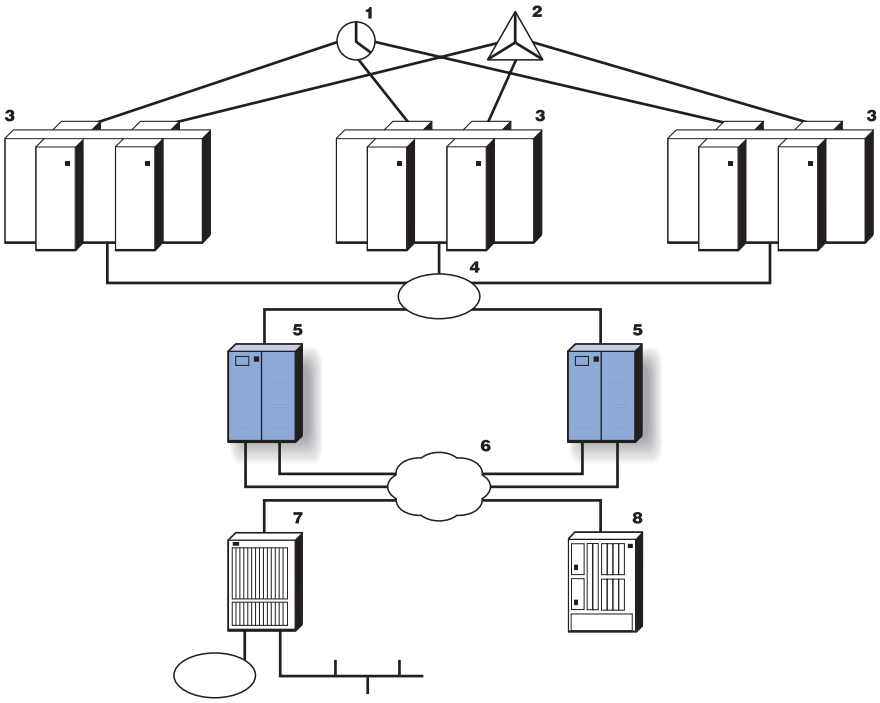
**4.** *3746 Model 900*

**5.** *SNA*

**6.** *Remote 3745*

**7.** *Branch LAN*

**Solution:** A 3746 Multiaccess Enclosure (MAE) provides support for ATM connectivity. Some Token-Ring traffic is transferred to the MAE to allow its connection. An ESCON channel in the MAE carries APPN/HPR and DLUR to the S/390 server using MPC+ channel protocols, which improves performance, saves valuable cycles in the host and complements the high-availability requirements of the Parallel Sysplex networks.




1. *Sysplex Timer®*
2. *Coupling Facility*
3. *S/390*
4. *ESCON Director*
5. *3746/900 with MAE*
6. *ATM*
7. *8260*
8. *2216*

**Benefits**

- High availability and scalability supporting the Parallel Sysplex objectives
- Platform support for high-speed technology such as ATM
- Smooth migration to ATM
- High performance
- Multiprotocol platform: TCP/IP, SNA, APPN/HPR
- A single platform, which is easier to manage and support
- MPC+ across the ESCON channel to save valuable S/390 cycles

# Product Overview

**Powerful networking solutions**
The 3746 Controllers are a high-performance solution for supporting distributed multiprotocol networks. They're designed to provide high connectivity and high throughput as APPN/HPR and IP routing nodes. Model 950 operates in stand-alone mode, without the need for an Networking Control Program (NCP), whereas the Model 900 attaches to a 3745 Communication Controller, enabling the transport of SNA subarea traffic as well as supporting all the advanced functions of Model 950.

**Investment protection**
IBM continues to improve the performance of the 3746 and add new functions. Recent additions include new processors for ESCON, LAN and WAN connectivity. Built with improved technology, these processors improve performance by up to 70%. The addition of the Multiaccess Enclosure (MAE) with its PowerPC technology and common code support not only increases the breadth of connectivity, but also makes available important new functions such as TN3270E, Network Dispatcher, and Enterprise Extender.

**IP routing**
The 3746 Controllers provide native support for many IP routing functions. IP traffic can be routed over:

- Token-Ring, Ethernet, Fast Ethernet, Fiber Distributed Data Interface (FDDI) and High-Speed Serial Interface (HSSI), and local area networks (LANs)
- Frame Relay, Asynchronous Transfer Mode (ATM), and Point-to-Point Protocol (PPP) links
- ESCON and parallel channels

As IP routers, the 3746 Controllers can be used to connect multiple networks, positioning the 3746 as a key gateway into the corporate intranet. The following protocols are provided to support intranet operation:

- Routing Information Protocol (RIP) V1 and V2..
- Open Shortest Path First (OSPF).
- Border Gateway Protocol (BGP).

RIP support reduces unnecessary loads on the host processor. RIP V2 is now available on adapters of the 3746 as well as the Multiaccess Enclosure (MAE) FC3000 and FC3001. RIP V2 allows full interoperability with other routing protocols, such as OSPF, with no constraints on network design.There is no longer a requirement to install the MAE to provide this function. A new feature for RIP routing definitions allows seperate links to be used for inbound and outbound traffic. This can significantly improve the performance when using applications such as File Transfer Protocal (FTP) on the S/390.

For WAN traffic, the Bandwidth Reservation System (BRS) function allows a percentage of the bandwidth to be reserved for different protocols, such as IP or APPN.

Adapters route the IP packets either port-to-port within an adapter, or adapter-to-adapter. IP traffic can share the same adapter with SNA and APPN/HPR data. The IP function operates without Advanced Communications Function (ACF)/NCP support.

The Network Dispatcher function provides a powerful solution for clustering Web servers. It allows multiple S/390 servers to be viewed from the network as a single systems image and provides load-balancing among different servers.This is particularly important in the S/390 Parallel Sysplex configuration, where the Network Dispatcher works with the OS/390® Work Load Manager to balance workloads among S/390 servers. Even though the MAE is required to run the Network Dispatcher, any adapter of the 3746 or the MAE can be used to connect to the IP nework and/or send traffic to the S/390, thus leveraging investment in the 3746.

*Enterprise Extender Technology*
The Enterprise Extender technology uses extensions to the APPN/HPR architecture to carry SNA applications across an IP backbone. The SNA Class of Service (CoS) is preserved, by mapping the priority to a UDP port number, thus allowing SNA traffic to be prioritized over the IP network. The Enterprise Extender enhances availability and performance for configurations using the S/390 Parallel Sysplex. The Parallel Sysplex availability feature Multinode Persistent Sessions (MNPS) can be enhanced when using the Enterprise Extender for SNA clients with an IP infrastructure. The Enterprise Extender function is provided by the MAE, although any adapter of the 3746 or MAE can use the function.

*TNE3270E server function*
The TN3270E server function provides an alternative solution for transporting SNA traffic over an IP backbone. The TN3270E server supports both APPN and subarea SNA connectivity to the S/390 server, offering a flexible approach for 3270 access. The TN3270E server can be centralized or distributed across an IP, APPN or subarea SNA backbone.The TN3270E server is provided by the MAE, although any adapter of the 3746 or MAE can use the function. When combined with the Enterprise Extender function, TN3270E offers an even more powerful solution by enabling remote TN3270E servers to be supported over an IP backbone network. The use of APPN/HPR in this configuration provides availability enhancements in a Parallel Sysplex configuration.

Multi-Path Channel (MPC+) now provides IP support over both the MAE ESCON and parallel channels. User Datagram Protocol (UDP) is targeted initially for communications between DATABASE 2™ (DB2®) on OS/390 V2 R4 and SAP R/3 application servers. Using MPC+ on the ESCON or parallel channels will increase performance for access to TCP and UDP application on the S/390.

The new Virtual Router Redundancy Protocol (VRRP) provides a reliable solution for accessing TCP/IP hosts across a LAN. VRRP enables an IP router to act in standby mode and automatically take over another router's function should it fail. The backup router must be on the same logical LAN as the primary. The 2216 Nways Multiaccess Connector also supports VRRP.

Layer 2 Tunneling Protocol (L2TP) provides a standards-based method for tunneling PPP across an IP backbone (Public IP network and/or Internet), creating a multiprotocol virtual private network that allows private addresses, IP, IPX and AppleTalk communication. L2TP is supported over IP or UDP.

The new IP Security (IPSEC) functions provide the ability to transport traffic over insecure networks—such as the Internet—through an IP tunnel. This can reduce network costs by eliminating the reliance on expensive leased lines between sites.

**The benefits of APPN/HPR**

The most important characteristics of an APPN network are its dynamic capabilities. The APPN architecture allows nodes to dynamically connect and disconnect, and sessions are set up according to the state of the network.

Migration from SNA subarea to APPN/HPR will provide greater performance, availability and flexibility while reducing overall network costs.

The 3746 provides the following APPN/HPR benefits:

- Reduced system definition and network administration.
- Adaptability based on changes in the configuration workload.
- Nondisruptive data transfer rerouting around failed network components for 100% network availability.
- Adaptive Rate Base (ARB) congestion control for maximum line use. ARB monitors the data rates between HPR endpoints and regulates the traffic entering the network for significant performance improvements. ARB also eliminates network congestion and minimizes packet retransmissions.
- Automatic Network Routing (ANR) for efficient routing between nodes to reduce the amount of processing required in intermediate nodes.
- Interoperability with SNA subarea networks and applications.
- Centralized end-to-end network management and control.

The 3746 offers full-function APPN/HPR support, and can operate as either a regional concentrator for APPN and SNA traffic or a powerful routing node interfacing to S/390 servers.

On the 3746, HPR support is available for:

- Token-Ring, Ethernet, Fast Ethernet , FDDI and ATM LANs
- Frame Relay, ATM, X.25 and SDLC WAN links
- ESCON parallel channels

*APPN network node*

The 3746 Models 900 and 950 provide APPN network node services. As a network node, the 3746 automatically registers the topology of the network and updates this topology whenever it changes. The 3746 uses its dynamic knowledge of the network to automatically locate any resource and compute possible routes within the network.

*Session Services Extensions (SSE)*

SSE provides support for connecting to an APPN Extended Border Node to split very large APPN networks and restrict exchanges of topology information while preserving APPN's directory searches. The SSE function will also enable the 3746 Network Node Processor to act as a server for an attached VTAM® S/390 end node. SSE is available only on the MAE.

*Extended Border Node (EBN)*

EBN allows large APPN networks to be subdivided into smaller networks or subnetworks. It also provides the ability to connect to other APPN networks with different network IDs. This enables large subarea SNI configurations to migrate smoothly to APPN/HPR. EBN is available only through the MAE.

*Dependent Logical Unit Requester (DLUR)*

DLUR allows sessions from dependent LUs (LU0, LU1, LU2, LU3, LU6 or LU6.2) connected to devices such as the 3746 and 3174 Controllers, or the IBM 2210 or 2216, or the PS/2 system, to be carried natively using an optimum route over an APPN/HPR network.

The dependent LUs (DLUs) must reside on or be owned by an APPN node providing the DLUR function. The DLUR node requests the dependent logical unit server (DLUS) of a VTAM network to provide the system services control point (SSCP) services for its dependent LUs.

To establish dependent LU sessions, traditional SSCP-PU or SSCP-LU data flows through two LU 6.2 sessions between the DLUR node and the DLUS node. However, the LU-LU application session is always carried natively through the network, giving the user the benefit of APPN/HPR transport and performance.

*HPR MLTG functions*
HPR Multilink Transmission Group (MLTG) is provided for the base adapters of the 3746 and is supported over the following connections:

- Token-Ring and Ethernet LANs
- Frame Relay, X.25 and SDLC WAN links

MLTG enables the 3746 to use a variable bandwidth on a single logical transmission group (TG) composed of multiple physical links or LANs. MLTG can be used where single or multiple sessions require more bandwidth than a single physical link or LAN can provide.

**Multiaccess Enclosure**
The Multiaccess Enclosure (MAE) is available for both the 3746 Models 900 and 950.

The new high-speed MAE uses PowerPC® technology with a direct hardware connection to the connectivity switch of the 3746 Controller. This direct connection provides an impressive balance of price, performance and connectivity support for a broad range of high-speed LANs and WANs for improved IP traffic routing. It also offers ESCON and parallel channel connections to the S/390. The latest MAE offering presents the MAE IP and 3746 IP as a single IP router image, easing configuration, management, maintenance and network operations.

*Note*: Token-Ring connections are still required to carry APPN and NCP traffic between the MAE and the 3746 base.

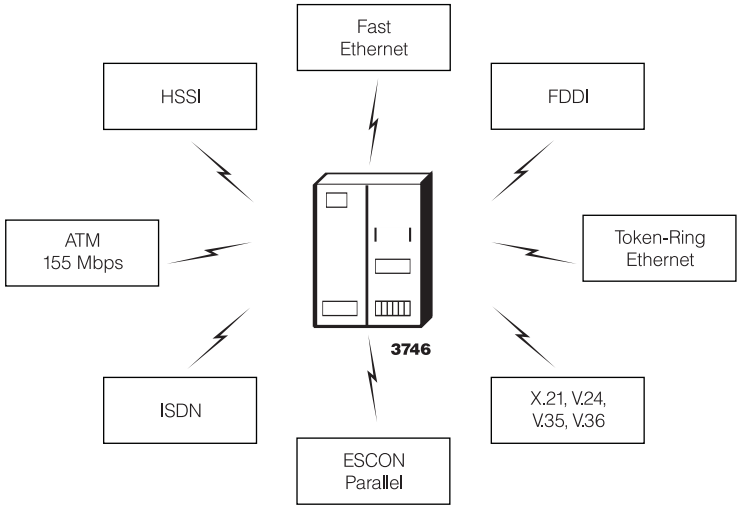
The ATM adapters in the 3746 MAE allow APPN/HPR traffic to flow natively over an ATM virtual channel (VC). Both switched and permanent connections are supported. The 3746 ATM adapter allows native HPR traffic to flow directly over an ATM backbone.

For improved performance in the APPN, DLSw and TN3270E environments, an MAE RAM expansion from 64 MB to 128 MB is also now available.

A new hardware connection between the MAE and the 3746 uses an empty processor slot in the 3746. This link improves performance for IP traffic routed from MAE interfaces to 3746 interfaces and removes the limitation of dual Token-Ring speed. A free field upgrade is available to customers with the earlier version of the MAE (FC 3000).

The MAE supports traffic protocols including TCP/IP, APPN/HPR, and SNA/DLUR. Supported WAN protocols include ATM, SDLC, PPP, Frame Relay and X.25. With eight adapter slots and up to eight ports per adapter, the MAE offers high WAN port density for cost-effective traffic concentration. New ATM multimode fiber (MMF) and single-mode fiber (SMF) adapters improve performance while holding down costs.

The MAE provides enhanced functions that can be used by its own adapters and those of the 3746. These enhanced functions include the Enterprise Extender, TN3270E server and the Network Dispatcher.




*3746 Multiaccess Enclosure*

**Connectivity options**

The following network/channel connectivity options are available:

- ATM, MMF and SMF adapters running at 155 Mbps and operating with SONET OC3 framing provide support for ATM Forum-compliant LAN Emulation client and Classical IP routing. Native HPR support allows APPN/HPR traffic to flow over an ATM VC.
- ESCON Channel Adapter for access to up to 32 servers for LSA, or up to 16 servers for LCS or MPC+ or up to 15 ESCON Multiple Image Facility (EMIF) S/390 logical paritions.
- New Parallel Channel Adapter to support byte or block multiplexor channel connectivity to the S/390; support is the same as the ESCON Channel Adapter. Up to four channel adapters (ESCON or parallel) can be installed in the MAE.
- Ethernet: 2-port Ethernet adapter, compliant with Ethernet 2.0, IEEE 802.3 and ISO 8802.3.
- Fast Ethernet: 1-port Fast Ethernet adapter operating at either 10 or 100 Mbps; compliant with IEEE 802.3 and 802.3U.
- Token-Ring: 2-port Token-Ring adapter operating at 4 or 16 Mbps with automatic sensing of ring speed; compliant with IEEE 820.5 and ISO 8802.5.
- FDDI: 1-port adapter operating at 100 Mbps as either a dual attachment station (DAS) or a single attachment station (SAS). It uses multimode fiber (MMF), SC media connector; compliant with ISO 9314-1, ISO 9314-2, ISO IEC 9314-3 and FDDI station management revision 7.3.
- ISDN PRI: 1-port adapter operating at either 1.544 Mbps or 2.048 Mbps, supporting 23 and 30 B-channels, respectively. ISDN support can be used for dial backup with the MAE lines dial-on-demand switched facility. Frame Relay and PPP framing are supported.
- New ISDN PRI 4-port adapters offer attachments to four ISDN Primary Rate lines. Optional 4-port daughter cards can be added to the base adapter, bringing the total to eight ports.
- Channelized E1/T1/J1 support allows the MAE ISDN Primary Rate adapters to be configured for channelized T1/E1/J1 operation. Support is provided for Frame Relay and PPP framing.

  *Note*: Channelized E1/T1/J1 and ISDN PRI support are mutually exclusive.
- HSSI: 1-port adapter compliant with ANSI/EIA/TIA 612 and ANSI/EIA/TIA 613 speeds up to 52 Mbps.
- V.35/V.36 WAN interface: 6-port V.35 or V.36 adapter; supports line speeds of 9.6 Kbps to 2.048 Mbps for modem clocking. Also line speeds of 9.6 Kbps to 460.8 Kbps and 1.544 Mbps and 2.048 Mbps for direct attachment on leased lines.
- X.21 WAN interface: 8-port X.21 adapter supports line speeds of 9.6 Kbps to 2.048 Mbps for modem clocking. Also line speeds of 9.6 Kbps to 460.8 Kbps and 1.544 Mbps and 2.048 Mbps for direct attachment on leased lines.
- V.24/EIA-232: 8-port V.24/EIA-232 WAN adapter supports line speeds of 9.6 Kbps to 64 Kbps with modem attachment.

**A wide range of adapters**

The latest Type 3 processors provide 3746 adapters with high-end functions at a midrange price. Type 2 processors are field-upgradable to Type 3 processors.

The following features are provided on the base 3746 Controllers and can be installed with or without the MAE.

*Communication line adapters*

- The communication line adapter consists of one communication line processor (CLP) Type 1, 2 or 3, and any combination of up to four line interface couplers (LICs), Type 11, 12 or 16. Communication line adapters support SDLC, PPP, X.25 and Frame Relay lines using two types of LICs. LIC 11 supports low-to-medium-speed lines (600 bps to 256 Kbps) and LIC 12 supports high-speed lines (56 Kbps to 2.048 Mbps). The CLPs connect up to four LICs (in any combination) and provide automatic backup capability between adjacent CLPs.
- CLP Type 3 supports up to 3000 PUs (1000 PUs over SDLC lines and 2000 PUs over Frame Relay, X.25 or ISDN), of which up to 2000 PUs with a total of 8000 APPN/DLU sessions can be controlled by the 3746 Network Node. Each CLP3 supports up to 2000 Frame Relay Data-Link Connection Identifiers (DLCIs). Any number of IP stations can be attached to the CLP through PPP and Frame Relay links. Compared with CLP2 adapters, CLP3 adapters support up to three times the connectivity with up to 100 percent improvement in throughput. There is no limit to the number of HPR/ANR sessions that can be routed through the CLP.
- CLP Types 1 and 2 are field-upgradable to CLP3 with up to 100 percent improvement in throughput. There is no limit to the number of HPR/ANR sessions that can be routed through the CLP.

*Euro-ISDN adapter (LIC 16)*

The 3746 Models 900 and 950 provide for a Euro-ISDN PRI adapter. The Euro-ISDN adapter can be used for backup, and will automatically recover interrupted sessions using Frame Relay protocols over a predefined ISDN B-channel at 64 Kbps. This adapter operates under NCP control only.

*ESCON adapters*

- The ESCON adaper consists of one ESCON Channel Processor Type 1, 2 or 3, and one ESCON Channel Coupler Type 2. ESCON Channel adapters enable communication with IBM S/390 servers. Native ESCON architecture support provides flexibility in the design of host front-end installations. IBM 3746 Models 900 and 950 equipped with ESCON channel adapters meet the high-availability, high-performance requirements set by a Parallel Sysplex processor. Compared with ESCON Type 2 adapters, ESCON Type 3 (ESCP3) adapters support up to three times more sessions with up to a 70% increase in throughput. The 3746 has the unique capability of sharing the adapter with all protocols available in the machine, including SNA and APPN intermediate session routing (ISR), HPR and APPN/ISR and IP.
- The ESCON Type 3 adapter provides channel data link control (CDLC) and supports 16 logical connections to the S/390 server partitions running VTAM or TCP/IP. The ESCON Channel Coupler Type 1 or 2 carries the interface to the ESCON MMF duplex optical fiber channel cable. ESCON Channel Couplers support the standard ESCON fiber distance of 3 km (1.86 mi). The ESCP3 can carry 15 000 APPN/DLU sessions. Type 1 and Type 2 ESCON processors are field-upgradable to ESCP3.

*Token-Ring adapters*

Token-Ring adapters have two ports: the Token-Ring Processor Type 3 (TRP3), which provides IEEE 802.2 LLC, and the Token-Ring Interface Coupler Type 3 (TIC3), which handles the medium access control(MAC). Each Token-Ring adapter in the 3746 Model 900 supports up to 2000 active PUs. For PUs controlled by the 3746 Network Node Processor (NNP), up to 14000 APPN/DLU sessions can be supported, depending on the number of PUs configured. Compared with TRP2 adapters, TRP3 adapters support up to three times more sessions with a 70% increase in throughput.

*Ethernet attachment feauture*

Ethernet ports supporting IP, APPN/HPR and SNA traffic can be installed in the base 3746 Models 900 and 950. They are available through a bridge to the Token-Ring adapters.

### 3746 Models 900 and 950 box connectivity

With box connectivity improvements and the power of the Service Processor Type 2 the 3746 Models 900 and 950 can support any combination of 240 SDLC, Frame Relay, X.25 or PPP lines. Installing the Control Bus Service Processor Type 3 with the Network Node Processor (NNP) Type 2 will increase the number of APPN ISR and APPN/DLUR sessions supported at a box level from 15 000 to 30 000. Of these 30 000 session, up to 15 000 can be adjacent to the 3746 and the rest controlled by a remote network node.

The base 3746 Controller supports 16 adapters. When the MAE is attached with the IP hardware attachment feature (FC 3001), the total number of integrated adapters is 23 (one adapter of the 16 base adapters is used for the MAE hardware connection).

### Frame Relay support

The 3746 offers Frame Relay support based on RFC 1490 for boundary access node (BAN) and boundary network node (BNN).

As a Frame Relay terminating point, the 3746 supports a variety of Frame Relay devices, such as the 2216 Nways Multiaccess Connector, the 2218 Nways Frame Relay Access Device, and 3174 Controllers. They can be directly connected through leased lines or through a public or private Frame Relay network.

Frame Relay congestion management implemented by the 3746 Models 900 and 950 is based on Committed Information Rate (CIR) complying with ITU-T X.36. The 3746 recognizes congestion buildup through frame headers sent from the network and then reduces its transmission rate. Both models of the 3746 support the Frame Relay Frame Handler function.

In conjunction with CIR, BRS on Frame Relay links provides the capability to reserve a percentage of the bandwidth to individual protocols, for example APPN and IP flowing through the same VC.

Using Frame Relay with the 3746 gives you a single multiprotocol transport network that allows native routing of IP, SNA and APPN/HPR over the same WAN connection. You can use the same WAN link for multiple protocols. This reduces bandwidth consumption, network administration and management costs.

### Increased availability

The 3746 Controllers provide backup and redundant functions that increase availability of the products, including:

- Redundant power supply with automatic nondisruptive takeover
- DC-distributed power for adapters and couplers
- Communication line adapters with automatic backup
- Duplicate Token-Ring port addresses
- Hot-pluggable adapters for concurrent upgrades and maintenance
- Dual NNPs
- ISDN adapters for nondisruptive session backup (NCP traffic only)

### Systems management

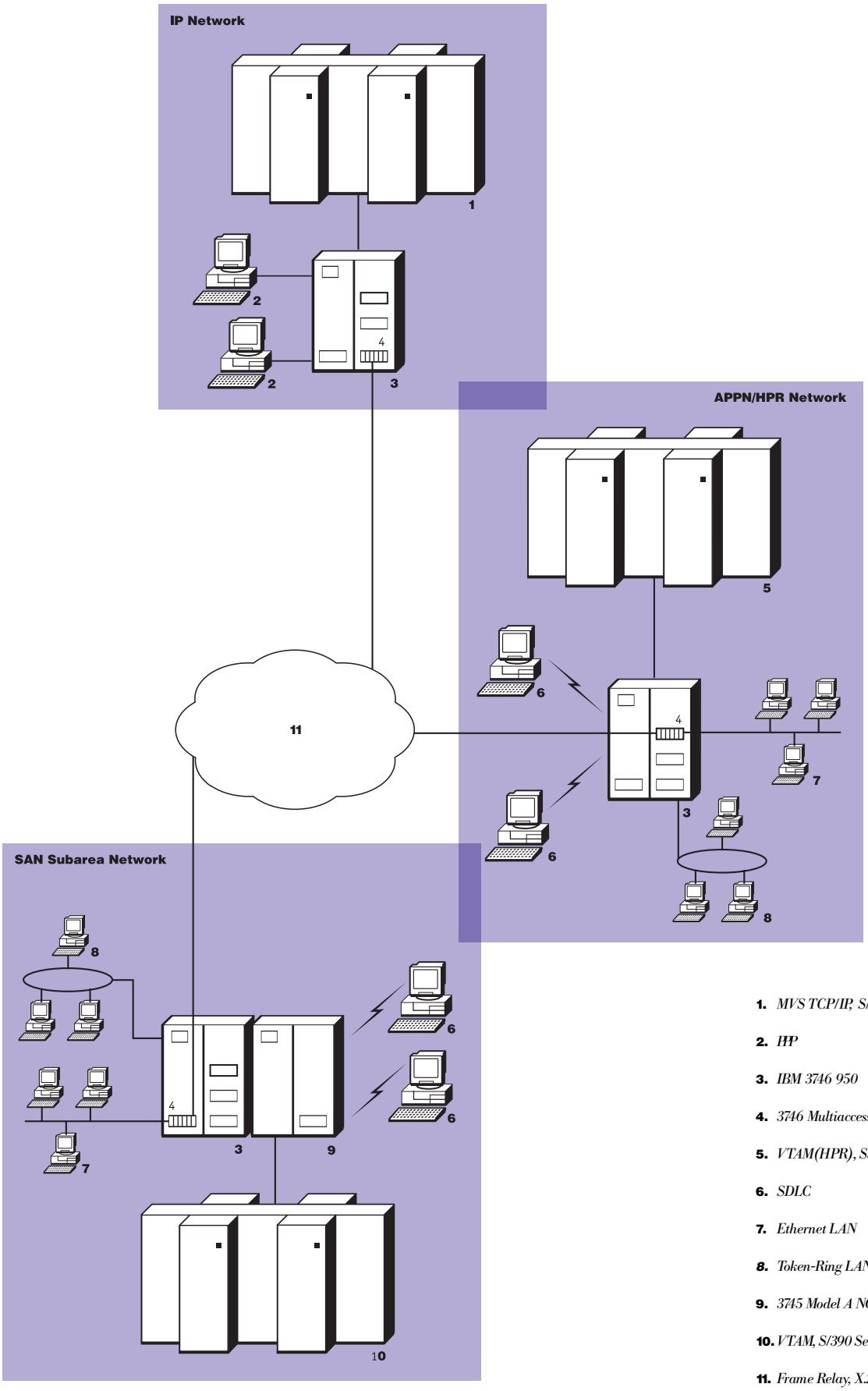
The Service Processor is connected directly to the 3746 Models 900 and 950 and provides a single user an interface to perform 3746 operator and service functions. The Service Processor can be used to:

- Perform maintenance on the 3746 Models 900 and 950 and operate the 3746 Network Node and IP Router
- Load the microcode of the 3746 Models 900 and 950
- Store the 3746 Models 900 and 950 configuration data files
- Report box errors as alerts to Tivoli® NetView® and send error codes to the IBM Remote Support Facility (RSF)

Controller Configuration and Management (CCM) is a utility tool resident in the NNP that is accessed through the Service Processor. CCM allows you to perform the following operations:

- Configure the 3746 Models 900 and 950 and all their resources. The APING function allows validity checking of configuration data.
- Manage 3746 Models 900 and 950 Network Node resources. Perform functions such as port and station activation and deactivation.
- Display information about 3746 Models 900 and 950 Network Node resources, for example, the current and local network topology.

Additional consoles can now access a remote 3746 using a simple Web browser. Access to the remote Service Processor is over an IP connection, using either a PPP switched connection or by using LAN protocols over the intranet. Any Java™ 1.1 enabled browser is supported, enabling simpler management by removing operating system prerequisites and the requirement for DCAF. The Java support is provided on the latest CD-ROM version of the 3746 microcode media. If DACF is still required, then it can be selected at installation time.




1. *MVS TCP/IP, S/390 Server*
2. *HP*
3. *IBM 3746 950*
4. *3746 Multiaccess Enclosure*
5. *VTAM(HPR), S390 Server*
6. *SDLC*
7. *Ethernet LAN*
8. *Token-Ring LAN*
9. *3745 Model A NCP*
10. *VTAM, S/390 Server*
11. *Frame Relay, X.25, ATM, ISDN*

*3746 Nways Controller connectivity*

It is also possible to access the 3746 IP Router using Telnet from any IP station for configuration and management.

Several host network management programs work with the 3746. For example, NetView/390 with its SNATAM function supports the following capabilities:

- APPN/HPR networking topology display, including the local topology of the 3746 network
- 3746 Models 900 and 950 problem alerts
- Operator commands such as activation and deactivation of the 3746 network node resources, including those that are triggered by alerts.
- NetView Performance Monitor (NPM) reports 3746 Models 900 and 950 configuration and traffic activity data for the resources used in APPN/HPR and DLUR traffic. It includes processor load and storage usage for all 3746 adapters and counters reporting for Token-Ring couplers, WAN lines, Frame Relay DLCIs and stations. This performance monitoring can be used for capacity planning in the 3746 Models 900 and 950.

The SNMP agent of the 3746 IP router supports the standard MIBs, including the MIB for ESCON. This enables the 3746 IP router to be managed from NetView for AIX® or other SNMP management platforms. NetView for AIX— in conjunction with the enhanced Router and Bridge Manager, a component of the IBM Nways Enterprise Manager and IBM Nways Campus Manager products—supports:

- IP alerts from the 3746
- IP router topology display including 3746 controllers
- IP traffic counters

### Cost savings

Bandwidth and administration are the most costly aspects of today's networks. APPN/HPR and IP networking using 3746 controllers will help you reduce these costs by reducing the number of WAN connections that result from the consolidation of IP, SNA or APPN/HPR routing over the same media. Installing the MAE will also significantly lower your cost per port. The 3746 does not require multiple-platform support skills.

Thanks to dynamic definition and total network self-discovery, the rigors and expenses of network administration can be reduced. As you migrate your network to the 3746 Model 900 or 950, you will eliminate the need for an NCP because of the controller's ability to recognize network topology and respond to usage demands. Decreased software expenses and increased performance make the IBM 3746 the right choice for any enterprise networking application.

### Choosing the 3746 Nways Controller

When you choose the 3746 Controller, you enable your networks to evolve at your pace, satisfying both your current and future requirements. Combining the benefits of APPN/HPR, IP, Frame Relay, ISDN and ATM, the 3746 will help you build a manageable, reliable platform of choice for data-center access. The latest Type 3 processors provide cost-effective enhancements. The improved technology combines increased connectivity with up to a 70% improvement in performance, all at a midrange price.

# 3746 Nways Multiprotocol Controller Specifications

| *Features* | *Benefits* |
|---|---|
| **A single platform that consolidates IP, SNA, and APPN/HPR routing over the same media** | Cost savings, reduced network administration, advantages of each native protocol. |
| **Migration to APPN/HPR** | High availability and performance, full availability of host-based SNA applications, high connectivity and throughput, reduced costs. |
| **Multiaccess Enclosure (MAE)** | High-speed connectivity with an excellent balance of price and performance for ATM, ISDN PRI, ESCON, Parallel channel, Token Ring, Ethernet, Fast Ethernet, and FDDI. Additional memory upgrade available for intensive environments. |
| **IP routing** | Connects multiple networks, gateway to corporate intranet. |
| **ESCON adapters** | Connection with S/390 servers for investment protection. |
| **Redundant power supply, hot-pluggable adapters and dual NNP** | High availability. |
| **Systems management with NetView/390 or NetView for AIX** | Cost and time savings. |

***IBM 3746 Nways Multiprotocol Controller Models 900 and 950 at a glance***

| | | | |
|---|---|---|---|
| **Physical specifications** | *Line Connection Box (Base or Expansion)* | *3746-950 with Controller Expansion ** | *Controller Expansion (stand-alone)* |
| Width | 450 mm (18 in.) | 1560 mm (61.4 in.) | 810 mm (32 in.) |
| Depth | 220 mm (9 in.) | 750 mm (29.5 in.) | 750 mm (29.5 in.) |
| Height | 130 mm (5.1 in.) | 1775 mm (70 in.) | 1775 mm (70 in.) |
| Weight | 10 kg (22 lb) | 632 kg (1393 lb) | 242 kg (533.5 lb) |
| **Operating environment** | Class B Extended<br>Operating temperature: 10° to 38°C (50° to 100°F)<br>Relative humidity: 8% to 80%<br>Maximum wet-bulb temperature: 23°C (73°F) | | |
| | | *3746-950 with Controller Expansion* | *Controller Expansion (stand-alone)* |
| | Noise level: | 7.5 bels | 5.7 bels |
| | Maximum heat output: | 2.7 kW (9.3 kBTU/hr) | 1.35 kW (4.65 kBTU/hr) |
| | Maximum exhaust capacity: | 24 $m^3$/min | 6 $m^3$/min |
| | Maximum electrical power: | 3.6 kVA | 1.8 kVA |
| | Starting current: | 256 amps for 10 ms | |
| | Leakage current: | Does not exceed 3.5 mA rms | |
| **Power requirements** | • The IBM 3746 Model 950 and the Controller Expansion are powered through separate power cords, with the following characteristics:<br>- Single phase<br>- Frequency 50 or 60 Hz<br>- Voltage 200 to 240 V<br>• The Line Connection Box (Base or Expansion) is powered from the 3746 Model 950 by the LIC 11 interface cable.<br>• The 3746 Model 900 is always attached to an IBM 3745 Communication Controller Model A.<br>• For details of the physical specification and the power requirements of both these products, see the following document:<br>- *IBM 3745 Communication Controller Model A, IBM 3746 Expansion Unit Model 900 and Model 950 Migration and Planning Guide*, GA33-0457 | | |
| **Note** | * Applies to the IBM 3746-950 at maximum configuration with 1 ac power supply | | |

***3746 Features***

| Feature Code | Description |
|---|---|
| **3000** | *Multiaccess Enclosure (MAE)*<br>Initial MAE shipped for the 3746 Models 900 and 950. |
| **3001** | *Multiaccess Enclosure Direct Attachment*<br>This feature ships the latest MAE for the 3746 Models 900/950. It provides a direct hardware connection between the MAE and the 3746 high-speed switch for IP traffic. SNA traffic is supported using Token-Ring connectivity. |
| The following features apply to the MAE: | |
| **3251** | 4-port daughter card attachment to FN 3297 that extends ISDN capacity from 4 to 8 ports. |
| **3252** | 4-port daughter card to attachment to FN 3298 to extend ISDN PRI adapter capacity from 4 to 8 ports. |
| **3280** | *2-port Token-Ring: LIC280*<br>Maximum of 6 adapters. Each provides two attachments to Token-Ring LANs. |
| **3281** | *2-port Ethernet: LIC281*<br>Maximum of 5 adapters. Each provides two attachments to Ethernet LANs. It supports the use of either 10BASE-T or 10BASE2 cable. |
| **3282** | *8-port EIA 232-E/V.24 Adapter: LIC282*<br>Maximum of 7 adapters. Each provides eight discrete attachments to EIA-232-E/V.24 WANs using a fanout cable (FC 3701). Supports line speeds of 2.4 to 64 Kbps. Provides support for both modem and direct-attach. |
| **3283** | *1-port ISDN PRI (T1/J1) Adapter: LIC283*<br>Maximum of 4 adapters. Each provides one attachment to an ISDN PRI service at T1/J1 speeds. Provides support for T1/J1 line speed of 1.544 Mbps. It also provides twenty-three 64-Kbps B-channels for data and one 64-Kbps D-channel for signaling. |
| **3286** | *1-port FDDI Adapter: LIC286*<br>Maximum of 8 adapters. Each provides one FDDI attachment on multimode fiber (MMF). |
| **3287** | *1-port ESCON Channel Adapter: LIC287*<br>Maximum of 4 adapters. Each provides one attachment to an ESCON switch or direct attachment to an S/390 server. |
| **3288** | *1-port Fast Ethernet Adapter: LIC288*<br>Maximum of 8 adapters. Each provides one 10-Mbps or one 100-Mbps Fast Ethernet attachment using an RJ-45 connector. |
| **3289** | *1-port HSSI Adapter: LIC289*<br>Maximum of 8 adapters. Each provides one High-Speed Serial Interface attachment with 15.25-m (50-ft) cable and 50-pin connector for attachment to DCE device operating at speeds up to 52 Mbps. |
| **3290** | *6-port V.35/V.36 Adapter: LIC290*<br>Maximum of 8 adapters. Each provides six attachments to ITU-T V.35 or V.36 WANs using a fanout cable. Supports line speeds of 2.4 Kbps to 2.048 Mbps. Provides support for both modem and direct-attach. |
| **3291** | *8-port X.21 Adapter: LIC291*<br>Maximum of 7 adapters. Each provides attachment to ITU-T X.21 WANs using a fanout cable. Provides for receiving clocking (modem-attached) at a line speed from 2.4 Kbps to 2.048 Mbps. Support for providing clocking (directly attached) at speeds from 9.6 Kbps to 460.8 Kbps as well as 1.544 Mbps and 2.048 Mbps. |
| **3292** | *1-port ISDN PRI (E1) Adapter: LIC292*<br>Maximum of 4 adapters. Each provides one attachment to a ISDN PRI service at E1 speeds. Provides support for E1 line speed of 2.048 Mbps. It also provides thirty 64-Kbps B-channels for data and one 64-Kbps D-channel for signaling. |

| ***3746 Features (continued)*** | |
|---|---|
| **3294** | *1-port ATM Multimode Fiber Adapter: LIC 294*<br>Maximum of 2 adapters. Each provides one attachment to an ATM switch over an MMF optical fiber cable. Each attachment provides SONET OC3c framing and support for UNI 3.0/3.1. Enhanced ATM adapter offering increased throughput, especially at small packet sizes. |
| **3295** | *1-port ATM Single-Mode Fiber Adapter: LIC 295*<br>Maximum of 2 adapters. Each provides one attachment to an ATM switch over an SMF optical fiber cable. Each attachment provides SONET OC3c framing and support for UNI 3.0/3.1. Enhanced ATM adapter offering increased throughput, especially at small packet sizes. |
| **3297** | *4-port ISDN PRI (T1/J1) Adapter*<br>Provides connections to four ISDN Primary Rate Services at T1/J1 speeds. Each port connects to a T1/J1 line running at 1.544 Mbps, and can be configured to support an ISDN Primary link, or T1/J1 channelized operation. |
| **3298** | *4-port ISDN PRI (E1) Adapter*<br>Provides connections to four ISDN Primary Rate Services at E1 speeds. Each port connects to an E1 line running at 2.048 Mbps, and can be configured to support an ISDN Primary link, or E1 channelized operation. |
| **3299** | *1-port Parallel Channel Adapter*<br>Maximum of 4 adapters. Each provides a single connection to the S/390 server. Supports both byte and block multiplex. Can install up to 4 channel adapters of any combination of ESCON or Parallel in the Multiaccess Enclosure. |
| **3520** | *Multiaccess Enclosure: 64 MB Additional System Memory*<br>Provides a 64-MB DIMM for a total memory of 128 MB. |
| **3720** | *Upstream bus and tag cable for the Parallel Channel Adapter* |
| **3721** | *Downstream bus and tag cables for the Parallel Channel Adapter* |
| **No feature code** | *MAE power supply*<br>The 3746 MAE can have 1 or 2 power supplies. A single power supply can provide power for a fully configured unit. |
| The following features apply to the 3746: | |
| **5015** | *Expansion Enclosure 1*<br>The Expansion Enclosure has 6 processor slots in the front and 12 coupler slots in the rear. This feature increases the capacity of the 3746 Model 900 or 950 to 10 processors and 21 couplers. |
| **5016** | *Expansion Enclosure 2*<br>The Expansion Enclosure has 6 processor slots in the front and 12 coupler slots in the rear. This feature increases the capacity of the 3746 Model 900 or 950 to 16 processors and 33 couplers. |
| **5022** | *Network Node Processor (NNP)*<br>NNP is mandatory to control the 3746 Models 900 and 950 operating as IP routers or APPN/HPR network nodes. It provides the NNP hardware and the licensed internal code required to support the APPN/HPR network node control point and the IP router. For high availability a second NNP can be installed. |
| **5023** | *Controller Expansion*<br>This feature is an extension of the 3746 Models 900 and 950. It can also be installed as a stand-alone unit. It is required to house the NNPs and the Ethernet attachment features. It is recommended for the installation of the Service Processor (including the keyboard, the display, the RSF modem, and the service processor access unit). The line connection box can also be housed in the Controller Expansion. The MAE is installed in the Controller Expansion. |
| **5024** | *Side Covers*<br>This feature provides side covers for the Controller Expansion. It is required for a stand-alone Controller Expansion. |

***3746 Features (continued)***

| | |
|---|---|
| **5027** | *Network Node Processor Memory Expansion*<br>64-MB memory expansion allowing the NNP (FC 5022 or 5122) to support more than 3000 PUs and more than 9000 APPN and DLUR sessions. |
| **5030** | *X.25 Support*<br>X.25 Support allows the CLP to perform X.25 DLC and Data Packet functions over permanent virtual channels (PVCs) and switched virtual channels (SVCs). In the 3746 Model 900, the X.25 support feature supports SNA Qualified Logical Link Control (QLLC) for NCP subarea and peripheral traffic, without the need for NCP packet switching interface (NPSI) in the 3745 to which the 3746 Model 900 is attached. |
| **5033** | *IP Licensed Internal Code*<br>IP Licensed Internal Code is required to operate the 3746 Model 900 or 950 as an IP router. It supports the IP function of the processors and the IP management functions of the NNP. |
| **5052** | *Service Processor Type 2*<br>Supports up to 30 000 APPN ISR and APPN/DLUR sessions. |
| **5122** | *Network Node Processor Type 2*<br>When installed with the Service Processor Type 2 (FC 5052) and NNP Memory Expansion (FC 5072), supports from 120 to 240 lines of any combination: SDLC, Frame Relay, X.25, PPP. Also required to support up to 30 000 APPN/DLUR sessions in mixed configuration. |
| **5202** | *Line Connection Box Expansion (LCBE)*<br>The LCBE is an optional feature. It is connected to the LCBB, which is part of LIC11. The LCBE can house up to 15 ARCs and connects to the LCBB with a 350-mm (13.8-in.) cable. |
| **5203** | *Communication Line Processor Type 3 (CLP3)*<br>CLP3 supports 4 LICs and provides the DLC for Frame Relay, SDLC and PPP links, and Frame Relay, and X.25 network connections. |
| **5210** | *Line Interface Coupler Type 11 (LIC11)*<br>LIC11 consists of the LIC itself, plus the line connection base box (LCBB), which connects to the LIC11. Up to 15 active remote connectors (ARCs) can be plugged into the LCBB. The LCBB can be housed in the 3746-900, the 3746-950, the Controller Expansion or a standard 19-inch rack. |
| **5212** | *Line Interface Coupler 12 (LIC12)*<br>LIC12 supports leased-line operation at speeds from 56 Kbps up to 2.048 Mbps. LIC12 has one port which, depending on the external cable used, provides either a V.35 or an X.21 interface. X.21 switched operation is supported by NCP-controlled lines for attachment of an ISDN PRI terminal adapter. |
| **5216** | *Line Interface Coupler 16(LIC16)*<br>LIC 16 supports PRI for Euro-ISDN. LIC 16 operates under NCP control only. It supports SNA traffic over 30 ISDN B-channels at 64 Kbps flowing over Frame Relay links. |
| **5502** | *ESCON Channel Coupler Type 2 (ESCC2)*<br>The ESCC2 contains the interface to the ESCON MMF, duplex optical fiber channel cable. There is one ESCC2 per ESCON channel processor. |
| **5523** | *ESCON Channel Processor Type 3 (ESCP3)*<br>The ESCP3 supports 16 logical connections to S/390 server partitions running VTAM or TCP/IP. For traffic routed by the 3746 Models 900 and 950 NNP, supports 15 000 APPN sessions. |
| **5601** | *Token-Ring Interface Coupler Type 3 (TIC3)*<br>One or two TIC3s can be connected to each Token-Ring Processor. The TIC3 handles the MAC. |

| ***3746 Features (continued)*** | |
|---|---|
| **5713** | *Multiaccess Enclosure APPN/HPR Kit*<br>Provides Token-Ring connectivity inside the 3746 for non-IP traffic (APPN/HPR, NCP) between the Multiaccess Enclosure (FC 3001) adapters and adapters in the base 3746. |
| The following features apply to both the 3746 and the MAE: | |
| **5800** | *3746 Extended Function 1*<br>Licensed Internal Code that enables microcode function not provided for in base code. |
| **5802** | *3746 Extended Function 2*<br>Licensed Internal Code that provides Session Services Extension (SSE) function. |
| **5804** | *3746 Multiaccess Enclosure Extended Function*<br>Provides a set of multiprotocol routing protocols and transport software to enable scalability and load-balancing capabilities for S/390 IP and Web servers connected to the Internet or intranet. |
| **5805** | *3746 Multiaccess Enclosure Extended Functions 2*<br>Provides an additional set of multiprotocol routing protocols and transport software support for the 3746 Models 900 and 950 Multiaccess Enclosure. |
| **5806** | *Multiaccess Enclosure TN3270E server*<br>Provides a TN3270 gateway function for TN3270 clients downstream from an SNA/VTAM® S/390. |
| **5807** | *Multiaccess Enclosure Extended Functions 3*<br>Provides enhanced APPN/HPR and IP features announced in May 1998 including: TN3270E subarea, IPSec, L2TP, NAT, NAPT AND VRRP. |
| **64xx, 65xx, 66xx** | *Active Remote Connector (ARC)*<br>ARCs are electronic cards housed in the line connection boxes (LCBs). The cable and connector carry the necessary physical and electrical interface to connect to DCE (or modem) or DTE. |

# Key Customer Benefits

- The IBM 3746 Nways Multiprotocol Controller Models 900 and 950 have been enhanced to provide flexible TN3270E server support for IP access to SNA applications.
- The RIP protocol reduces unnecessary loads on the host processor. RIP V2 support allows full interoperability with other routing protocols.
- The 3746 Models 900 and 950 enable your networks to evolve at your pace, satisfying both your current and future requirements.
- A single platform consolidates IP, APPN/HPR and SNA sub-area traffic over the same media, providing cost savings and reduced network administration. Migration to APPN/HPR provides high availability of host-based SNA applications coupled with excellent performance, multiple connectivity options, high throughput and reduced costs. The 3746 Nways Multiprotocol Controllers serve as IP routers to connect multiple networks, positioning the 3746 as a key gateway for the corporate intranet.
- The MAE provides high-speed connectivity and increased price/performance for ATM, ISDN PRI, ESCON, Token-Ring and Ethernet LANs and WANs.
- To protect your investment in the 3746 Controller, IBM continues to improve performance and provide additional connectivity options. Function includes new processors for ESCON, LAN and WAN. Fast Ethernet, HSSI and FDDI technologies have been added to a long list of connectivity options.
- A redundant power supply, hot-pluggable adapters and dual NNP support high availability.
- Systems management with NetView/390 or NetView for AIX provide cost- and time-savings.

# Supplementary Information

The following sales tools are available for the 3746:

- Specification sheet:
  *IBM 3746 Nways Multiprotocol Controller Models 900 and 950*, G224-4546-03
- Information on the 3746 is available at:
  *www.networking.ibm.com*
  *www.networking.ibm.com/376/376prod.html*