Bridge/Router
Sales Guide

Third Edition, Spring 1997

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Additional Guides
This sales guide is one of six in a series. Other guides include the *ATM Sales Guide*, *Remote Access Sales Guide, LAN Hub Sales Guide, LAN Switch Sales Guide*, and *Network Adapter Sales Guide*. To obtain copies of this *Bridge/Router Sales Guide* or any of the guides, call or send your requests with quantity desired, a complete address and phone number to:

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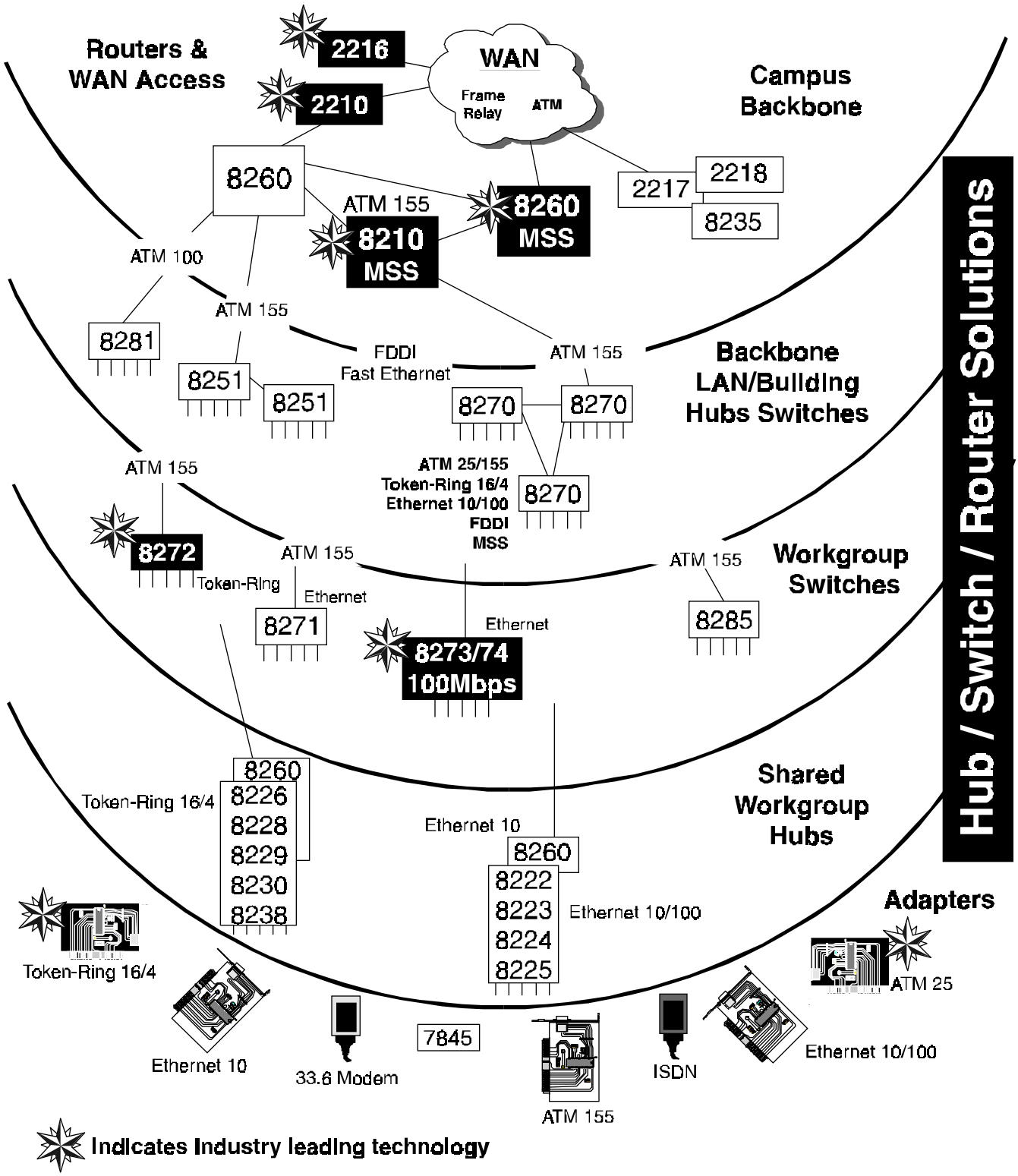
IBM Networking Portfolio Highlights



PLUS: End-to-end integrated Network Management, extensive education, service and support

Background

Internetworking

There are several types of products that enable users to access resources and data on networks other than the local area network to which they are directly attached. The establishment of a network to interconnect local area networks is called internetworking. The IBM internetworking products covered in this sales guide are:

- A **Bridge** enables the connection of two LAN segments that use the same Logical Link Control (LLC) procedure but can use different Medium Access Control (MAC) procedures.

- **Multiprotocol Routers** enable the internetworking of similar and dissimilar networks by forwarding packets from one network to another based on network-layer information. Routers are typically able to route multiple network protocols assuming the software logic exists to support a specific protocol. That software logic also enables routers to choose the most expedient route based on factors such as traffic load, line speeds and costs, and the existence of any network failures. Most multiprotocol routers include bridging functions.

- **Multiprotocol Concentrators** enable a customer to use a single backbone protocol (SNA and APPN) to interconnect LANs that support multiple protocols. Thus, LAN traffic can utilize SNA features such as traffic prioritization, data compression, and cost-effective bandwidth utilization.

- **Frame Relay Access Devices** (FRADs) enable a customer to take advantage of the cost-efficient, high performance transmission rate of frame relay. Frame relay was developed to answer the need for speed caused by today's more graphics-oriented, time-sensitive, burst-type applications.

Bridges

IBM offers several Token-Ring standalone bridges as well as a multiprotocol bridge. They are:

- IBM 8229 LAN Bridge (hardware bridge)
- IBM 8281 ATM LAN Bridge (hardware bridge)

In addition to these bridges, the IBM 8250 and 8260 also offer feature modules that provide bridging functions. See the *IBM Hub Sales Guide* for more information on these.

Routers

The worldwide market for routers is expected to grow from 316,000 units shipped in 1994 to 585,000 units shipped in 1996 (Source: IDC, 1994). Most of this growth is expected to be in low-end routers. IBM offers two Nways router product solutions to meet these market needs:

- IBM 6611 Nways Network Processor
- IBM 2210 Nways Multiprotocol Router
- IBM 2216 Nways Multiaccess Connector

Multiprotocol Concentrator

The IBM solution for multiprotocol concentration is the IBM Nways 2217 Multiprotocol Concentrator.

Frame Relay Access Device

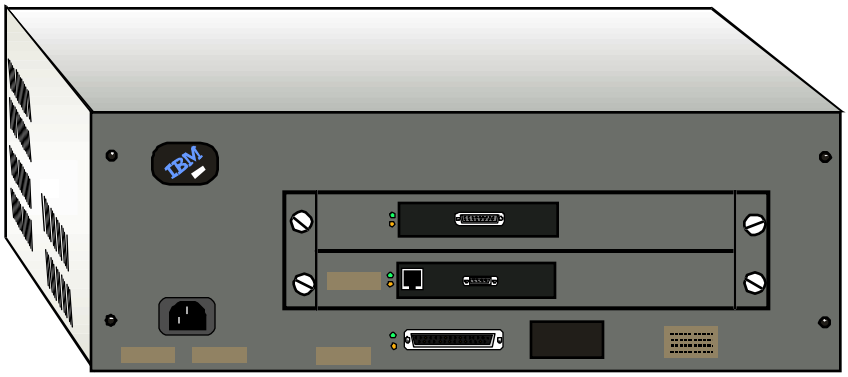
The IBM solution for frame relay connections is the IBM 2218 Nways FRAD (Frame Relay Access Device).

IBM 8229

Product Description The IBM 8229 LAN Bridge is a hardware bridge that connects local Token-Ring LAN segments, local Token-Ring and Ethernet segments and remote Token-Ring segments. Three models are available:

- Model 001 connects two local Token-Ring LAN segments.
- Model 002 connects a local Ethernet segment with a local Token-Ring segment and can perform Source Route Transparency Bridging.
- Model 003 connects two remote Token-Ring segments over a frame relay network (single PVC) or a point-to-point link. The IBM 8229 can connect two 8229s or an IBM 8229 and an IBM Remote Token-Ring Bridge/DOS v1.0 using IBM's “split-bridge” protocol.

The IBM 8229 supports STP and UTP attachment to Token-Ring networks with DB-9 and shielded RJ-45 connectors. In addition, it supports 10BASE2, 10BASE5 and 10BASE-T attachment to Ethernet with an AUI connector (for 10BASE2 and 10BASE5) and a shielded RJ-45 connector (for 10BASE-T).



IBM 8229 Bridge

Positioning The IBM 8229 is positioned as a LAN bridge for Token-Ring customers to connect local and remote LAN segments.

Attachment Modules

Customers need to order the appropriate attachment module in addition to the bridge.

Model	Attachment Model
001	2 single-port Token-Ring modules **OR** 1 dual-port Token-Ring module
002	1 single-port (or 1 dual-port) Token-Ring module **AND** 1 single-port Ethernet module
003	1 single-port (or 1 dual-port) Token-Ring module **AND** 1 single-port WAN module

Users may convert to other modules by a microcode upload and installing the appropriate attachment modules. A dual-port Token-Ring attachment module can be used (if already purchased) for a Model 002 or Model 003. One port on the dual-port Token-Ring module will become inactive, while the other port builds the bridge to the other function being implemented with the model change.

Features/Functions

The IBM 8229 offers the following features.

Feature	Function
Management	Supports management via SNMP (such as NetView®) or LLC type management (such as IBM LAN Network Manager).
Protocol Support	Communicates among workstations and systems using TCP/IP, SNA, NetWare, SPX/IPX and NetBIOS concurrently.
RS-232 Port	Supports out-of-band dial-up for code download and trouble shooting.
Flash Memory	Upgrades without hardware change.
Split Bridge Compression	Offers 4:1 compression to increase throughput for lower speed WAN connections.
User-Defined Filters	Using plain English, user-defined filters can be created having complex filtering and forwarding criteria (no need to compile code or software development tools).
SRTB	Source Route Transparent Bridging is available on the Model 002. This allows bridging between Ethernet and Token-Ring networks.
Diagnostics	Easy diagnostic displays (conveniently located on front of bridge).
Speed	Provides Token-Ring performance at near-media speeds.
Easy Installation	Installation time has been reduced to 10 minutes if no flash memory changes are necessary (or 20 minutes with flash memory changes).
Investment Protection	Users may choose to convert from one model to another by downloading the appropriate software into flash memory and installing the appropriate attachment module.
Power Supply	Provides universal, auto-ranging power supply.
Rack-Mountable	Cables and modules are conveniently accessed from the front of the bridge.
Warranty	One year warranty.

8229 Products and Options

Description
8229 LAN Bridge Token-Ring - Token-Ring Bridge
Token-Ring - Ethernet
Token-Ring - WAN
Single-port Token-Ring Module
Dual-port Token-Ring Module
Single-port Ethernet Module
Single-port WAN Module
X.21 Attachment Cable for 8229-003 (22 ft)
V.35 Attachment Cable for 8229-003 (22 ft)
V.24 Attachment Cable for 8229-003 (22 ft)

Target Market

The IBM 8229 is designed for customers with Token-Ring networks or a combination of Token-Ring and Ethernet networks and with a need to connect these. It is designed:

- to connect local Ethernet segments to Token-Ring backbones
- for demanding Token-Ring bridging (local or remote) where a hardware bridge is preferable, high traffic rates exist and high throughput and low response times are required

Sales Tools

The following spec sheet is available for the IBM 8229:

8229 Bridge G221-4129-00

On MKTTOOLS, the following information is available:

LAN8229	Technical presentation on the IBM 8229
8229PERF	Performance information
8229MAN	User's manual for IBM 8229

Key Selling Points

When selling the IBM 8229, the following points should be emphasized:

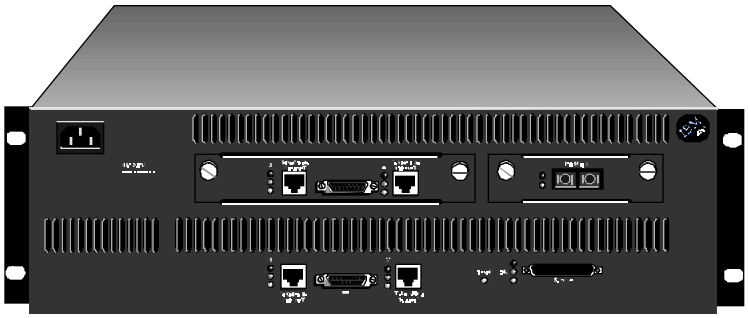
- Fast speed
- Flexibility in choice of connections
- Management options
- Software upgrade capability
- Ease of installation
- Investment protection
- Exterior access design
- User defined traffic control filters (English only)
- IBM service and support
- IBM's technology leadership in Token-Ring networking

IBM 8281

Product Description The IBM 8281 ATM LAN Bridge is a high-speed bridge that links traditional LANs with ATM networks. This product enables customers to migrate to ATM without disrupting their current networking environments. The 8281 is a multiport bridge that can bridge:

- LAN to LAN locally
- LAN to LAN across an ATM network
- LAN to ATM-attached workstation

The 8281 comes with two LAN interface ports (expandable to four ports) that can be configured as either Ethernet or Token-Ring. A 100 Mbps ATM connection can be added whenever needed as well as two more Ethernet/Token-Ring ports. RJ-45 connectors can be used for either Ethernet or Token-Ring and one AUI connector is provided for Ethernet.



IBM 8281 ATM LAN Bridge

Performance The 8281 ATM LAN Bridge offers extremely high performance as evidenced by the following data:

Latency

- 160 Microseconds Token-Ring to Token-Ring both attached to the 8281
- 500 Microseconds Ethernet to Ethernet both attached to the 8281
- 500 Microseconds Token-Ring to Token-Ring over ATM
- 800 Microseconds Ethernet to Ethernet over ATM

Maximum Throughput

- 64 Mbps (4 x 16 Mbps) Token-Ring
- 40 Mbps (4 x 10 Mbps) Ethernet

Maximum Packet Rate

- Token Ring - Token Ring = 45,000 packets per second
- Token Ring - ATM - Token Ring = 28,000 packets per second
- Ethernet - Ethernet = 24,000 packets per second
- Ethernet - ATM - Ethernet = 17,000 packets per second

Positioning The 8281 ATM LAN Bridge enables customers to migrate easily to ATM. It provides a connection between ATM and traditional LANs with very high throughput. It is an ideal solution for customers who want to move servers off current LAN segments onto an ATM backbone.

Features/Functions The IBM 8281 ATM LAN Bridge offers the following features.

Features	Functions
ATM Gateway	ATM Forum-compliant LAN Emulation lets LAN workstations communicate with ATM workstations as if they were both on bridged LANs. ATM workstations are addressed from Ethernet or Token-Ring with MAC addresses. These are mapped to an ATM address and sent over a Virtual Channel Connection between the bridge and the ATM workstation. With ATM LAN Emulation, LANs connected to ATM Networks via the 8281 can participate fully in MSS-based virtual LANs.
Bridging	Provides Source Route Bridging (SRB) for Token-Ring and Transparent Bridging for Ethernet.
Filtering	Provides extensive filtering to keep unnecessary traffic from congesting the network. **For Ethernet, the following inbound filtering is supported:** • MAC address • Source SAP • Ethertype **For Token-Ring, the following inbound filtering is supported:** • hop count • MAC address • ring number • source SAP • SNAP header
Management	Supports SNMP management.
RS-232 Port	Can be used for configuration, management or microcode upgrades.
Standards Support	Supports ATM Forum UNI 3.0 specification, SNMP, Ethernet v.2 , 802.3 and 802.5. Frames are transferred across ATM using AAL5.
Warranty	One year warranty.

Management Software

Customers have several management options including out-of-band management from the RS-232 port and remote management from an SNMP management station. IBM offers Nways Manager for Windows™, an SNMP-based management application that runs on NetView® for Windows with a graphical user interface.

8281 Products and Options

Description
ATM LAN Bridge Model
2-Port Ethernet/Token-Ring Adapter feature
100 Mbps ATM Adapter Feature
Nways Manager for Windows V2

Target Market

The 8281 is targeted at customers who are installing ATM backbones. The 8281 will provide the LAN to ATM connection.

Q's and A's

Q) How many virtual circuits does the 8281 support?
A) Today the 8281 supports 250 virtual circuits.

Q) Can I mix Ethernet and Token-Ring LAN connections on the 8281?
A) The 8281 requires that only one kind of LAN topology be connected to it.

Q) Will the 8281 support Forum-compliant LAN Emulation?
A) Yes, via a microcode update, available via FTP, the World Wide Web, or bulletin boards.

Sales Tools

The following brochures are available for the IBM 8281.
8281 ATM LAN Bridge G224-4423-00

Key Selling Points

When selling the IBM 8281 ATM LAN Bridge, the following points should be emphasized:

- IBM's complete ATM product family for high performance ATM networking
- 8281's support of industry standards especially ATM Forum standards
- 8281's ability to ease migration to ATM by preserving investment in existing systems, software and training
- 8281's extensive filtering capabilities
- 8281's management options
- IBM's customer support and service
- IBM's technology leadership and breadth of products

IBM 6611

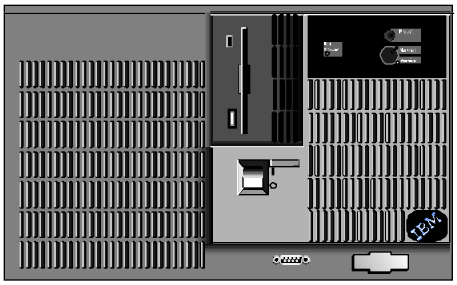
Product Description The IBM Nways 6611 Network Processor is used to build an end-to-end multiprotocol, internetworking solution that can link remote offices, regional, and central host sites. An integrated LAN and WAN internetwork can use all IBM 6611s or a combination of IBM 6611s and IBM 2210 Nways Multiprotocol Routers. In addition, the 6611 provides proven interoperability in many multivendor environments.

The IBM 6611 Network Processors can connect users of TCP/IP, NetWare (IPX), SNA, APPN, HPR, DECnet, Banyan, AppleTalk, NetBIOS and XNS. The base model of the 6611 is packaged in fixed configurations. The other models have two, four or seven open slots into which adapters can be inserted to tailor the connectivity needed. Adapter choices include:

- 1 or 2 LAN ports
- 2 or 4 serial ports
- 1 LAN and 2 serial ports (combination adapter)
- 4 SDLC ports
- 1 X.25 port

All 6611 models support communications via Frame Relay, Point-to-Point Protocol, X.25, OSPF and RIP -- with SDLC for downstream devices.

All of the 6611 models are shipped with the IBM Nways Multiprotocol Network Program (MPNP) software preloaded into the router. All models can be configured to provide the same level of software functionality. MPNP is a licensed program that contains support for the applicable protocols, LAN and WAN connectivity, routing and bridging, configuration, management and diagnostic capabilities.



IBM 6611 Nways Network Processor Model 145

6611 Models **Model 120** is the low-priced, **fixed configuration** 6611 model that is designed to provide any one of the 10 configurations that support some combination of the following port interfaces:

- 1 or 2 Ethernet ports
- 1 or 2 Token-Ring ports
- 2 multi-interface serial ports
- 4 SDLC ports
- 1 X.25 port

The following models of the 6611 are customer configurable through the selection of adapters at the time of purchase or after installation as network requirements expand and/or change.

- **Model 125** is a low- to mid-range, two slot model that can support the connection of a maximum of 4 LAN ports or 8 WAN ports or a combination of LAN and WAN ports, each at less than their maximum capacity.
- **Model 145** is a mid-range, four slot model that can support the connection of a maximum of 8 LAN ports or 16 WAN ports or a combination of LAN and WAN ports, each at less than their maximum capacity.
- **Model 175** is a high end, seven slot model that can support the connection of a maximum of 14 LAN ports or 28 WAN ports or a combination of LAN and WAN ports, each at less than their maximum capacity.

Positioning

The IBM 6611 provides an economical way to interconnect multiprotocol LANs, LANs to WANs, or even LANs to other LANs via WANs. It is the premier solution for SNA integration with LAN protocols although it is not limited to this environment. The 6611 is primarily used in three environments:

- **Central Site.** These sites are often a point of concentration for a large number of serial connections. The Model 175, with up to 28 serial connections, provides an excellent central site "catcher" for a large number of serial links. In addition, the Model 175 provides an alternative to using multiple 2210s at the central sites.
- **Regional Concentrator.** This type is similar to the central site environment but with a smaller number of serial connections required. The Model 145, with up to 16 serial connections makes an excellent regional concentrator for a medium number of serial links. As with the Model 175, the Model 145 also provides an alternative to using multiple 2210s at the regional or central site.
- **Router backbone for SNA traffic.** The 6611 provides a broad array of SNA capabilities including High Performance Routing (HPR), Dependent Logical Unit Requester (DLUR), APPN Intermediate Session Routing (ISR), and Data Link Switching (DLSw). The 6611 serial and LAN adapters each contain a RISC processor. Thus HPR (as well as other router functions) can be executed on the adapter rather than in the central processor to provide an outstanding SNA transport solution.

Adapters

The 6611 supports a variety of LAN and WAN adapters that customers select to fill the slots of the Models 125, 145 and 175. These adapters provide:

- increased port density with several adapters offering more than one port.
- LAN/WAN combinations.
- high performance.
- increased connectivity through the multi-interface serial ports that support any of the following interfaces: **CCITT V.25** (9600 bps to 2,048 Mbps); **CCITT V.36** (9600 bps to 2,048 Mbps); **EIA 422/449** (9600 bps to 2,048 Mbps); **EIA 232/CCITT V.24** (4800 bps to 19.2 Kbps); and, **CCITT X.21** (4800 bps to 2,048 Mbps). Selection of the interface is determined only by the adapter cable, providing flexibility for change later.
- a separate RISC processor, allowing the adapters to process protocols or bridged frames without sending the packets to the 6611 central processor.
- access to frame-relay services and leased line connections.
- support for downstream SDLC devices.
- attachment to an X.25 network.

Features/Functions The IBM 6611 offers the following features:

Feature	Function
MPNP	IBM's Multiprotocol Network Program (MPNP) is a licensed program which contains support for all 6611 protocols, LAN and WAN connectivity, routing and bridging, configuration, management and diagnostic capabilities. This gives the customer the flexibility to choose a model based on the degree of connectivity required.
Protocols Routed	Supports TCP/IP; IPX; DECnet (Phase IV); AppleTalk (Phase2); Banyan VINES; XNS; SNA (complete and comprehensive support); NetBIOS via DLSw; Downstream SDLC (PU2.0 and PU2.1).
SNA Support	Complete SNA support includes High Performance Routing (HPR); Dependent Logical Unit Requestor (DLUR); Advanced Peer-to-Peer Networking (APPN); Boundary Access Node (BAN); and Data Link Switching (DLSw) including DLSw data compression.
HPR	Combines the best features of the SNA and APPN architectures with connectionless technologies to provide improved network performance, enhanced network availability and state-of-the-art congestion control. HPR enables the native transport of SNA traffic in a multiprotocol environment. The MPNP implementation of HPR includes: • Automatic Network Routing (ANR) to provide improved performance. • Rapid Transport Protocol (RTP) to provide non-disruptive routing around problems. • Adaptive Rate-Based (ARB) congestion control to prevent congestion and packet loss.
DLUR	Provides investment protection and a seamless migration path from subarea APPN to HPR by enabling existing 3270 traffic (PU2.0 and PU 2.1) to utilize APPN and HPR transports.
APPN	Provides routing and directory services to Ethernet/802.3 and Token-Ring attached End Nodes in addition to Intermediate Session Routing (ISR) in the APPN backbone. With MPNP Release 2 and 3, the 6611 encapsulates the APPN protocol in TCP/IP packets utilizing DLSw prior to transport over the WAN.
APPN Direct DLC	With MPNP Release 4, APPN can utilize Ethernet, Token-Ring, Frame Relay and PPP to natively transport APPN in a multiprotocol environment via direct attachment to an 802.2 Logical Link Control (LLC) interface for Data Link Control.
BAN	Boundary Access Node (BAN) support provides the capability to transport SNA and TCP/IP traffic over a Frame Relay network directly to an IBM 3745/46 Communications Controller or SNA to an IBM AS/400 without requiring a 6611 at the Controller or AS/400 location. BAN is compliant with RFC 1490.
DLSw	Provides an industry-standard methodology for the transport of SNA and NetBIOS traffic over TCP/IP networks. The MPNP implementation of DLSw is compliant with the DLSw Standard Version 1.0, also known as RFC 1795. This implementation is interoperable with the prior standard RFC 1434.

Feature	Function
Router-to-Router Communications	Supports the following: RIP, OSPF, frame relay, PPP, X.25, and line speeds ranging from 4.8 Kbps through T1 (1.54 Mbps) or E1 (2.048 Mbps).
Dial Backup	Provides an availability feature that can be used to design redundancy into the network. Dial backup capability is provided via programmable modem support to enable one frame relay port to be backed up by one PPP link. Dial backup is supported for TCP/IP, IPX and DLSw.
Source Route Bridging (SRB)	Provides local and remote multiport source route bridging for transporting non-routed protocols among Token-Ring and 802.5 LANs. Supports connections to the IBM Token-Ring Network Bridge Program Version 2.2.4 or higher and to the new IBM Remote Token-Ring Bridge/DOS Version 1.0.1 or higher over WAN links and supports frame relay connections to the RouteXpander/2 for source-route bridging. Filters provided are: sliding window, ring number, bridge number, hop count, SAP, SNAP, and MAC address.
Transparent Bridging (TB)	Provides local and remote multiport transparent bridging for transporting non-routed protocols among Ethernet Version 2 and 802.3 LANs. TB is particularly useful for transporting DEC's LAT terminal protocols which is not routable. Filters provided are: SAP, Ethernet Type, MAC address and sliding window.
Source Route Translational Bridging (SR-TB)	Provides local and remote multiport translational bridging for transporting non-routed protocols between Ethernet Version 2 or IEEE 802.3 LANs and IEEE 802.5 Token-Ring LANs. It supports bridging of any protocols between systems on like LANs with an intervening dissimilar LAN. Supports user-defined translation modes and address mappings. Uses the TB and SRB filters.
EasyStart Support	Enables the 6611 to act as a relay agent for an IBM 2210 utilizing EasyStart to request a network download of its initial configuration.
Configuration Program	Provides the means to configure the ports and software function of the 6611. It is supported in DOS/Windows, AIX and OS/2 environments. A graphical user interface with point and shoot menus, windows, pop-ups, templates, and contextual help enables users to easily configure the 6611.
LAN Network Manager (NLM)	Collects and reports MAC ring topology changes to the LNM application, collects MAC error reports from ring stations, services MAC requests for ring parameter information, and provides limited LAN Bridge Server support.
Management	SNMP support includes: • all standard MIB-II MIBs • enterprise-specific 2210 MIBs for features like DLSw, APPN, and vital product data information (e.g., release level) • RFC MIBs for protocols such as frame relay and PPP • Trap generation and GET support
Management Software	Can be managed by any SNMP-compliant manager product such as NetView for AIX, or NetWare for Windows V2, or HP OpenView. Management applications exist for each platform.

Products and Options

Description
6611 Model 120 - fixed configurations: 2 Token-Ring ports 1 Token-Ring port/1 Ethernet port 1 Token-Ring port/2 multi-interface ports 1 Token-Ring port/4 SDLC ports 1 Token-Ring port/1 X.25 port 2 Ethernet ports 1 Ethernet port/2 multi-interface ports 1 Ethernet port/4 SDLC ports 1 Ethernet port/1 X.25 port 4 SDLC ports/ 2 multi-interface ports **Multiprotocol Network Program (MPNP) 5648-016** One-time Charge for Model 120 Monthly License Charge for Model 120
6611 Model 125 Adapters for Model 125 1-port Ethernet 2-port Ethernet 1-port Token-Ring 2-port Token-Ring 2-port multi-interface serial 4-port multi-interface serial 1-port Ethernet/2-port multi-interface combination 1-port Token-Ring/2-port multi-interface combination 4-port SDLC 1-port X.25 Additional Memory 8MB SCSI Device Attach Cable for tape drive attach **Multiprotocol Network Program (MPNP) 5648-016** One Time Charge for Model 125 Monthly License Charge for Model 125
6611 Model 145 **6611 Model 175** Adapters for Model 145 or 175 1-port Ethernet 2-port Ethernet 1-port Token-Ring 2-port Token-Ring 2-port Multi-Interface Serial 4-port Multi-Interface Serial 1-port Ethernet/2-port multi-interface combination 1-port Token-Ring/2-port multi-interface combination 4-port SDLC 1-port X.25 Additional Memory 8MB Additional Memory 16 MB SCSI Device Attach Cable for tape drive attachment Rack Mount Brackets Rack Mount Sliding Shelf **Multiprotocol Network Program (MPNP) 5648-016** One Time Charge for Model 145 Monthly License Charge for Model 145 One Time Charge for Model 175 Monthly License Charge for Model 175

1. Consult the Sales Manual or Configurator for a complete list of Feature Codes including the software preload features, power cords, cables and miscellaneous features. There are additional feature codes associated with both the 6611 and MPNP.

Target Market

The various models of the 6611 are targeted at specific customers:

- Model 120 is positioned for the small or remote office with a maximum of two LAN attachments. However, the 2210 may provide better price/performance. One item that must be considered in making a choice is the fact that some models of the 2210 provide only 1 LAN port, while the others provide 2 LAN ports.

- Model 125 is also targeted at the small or remote office but it can handle a maximum of 3 LAN attachments with two WAN ports. Alternatively, the Model 125 can be configured to provide two LAN ports and four WAN ports, or one LAN port with six WAN ports. Therefore, the Model 125 has a configuration flexibility and capacity that is not available in the 2210 with a maximum fixed capability of two LAN ports and four WAN ports.

- Model 145 is suitable for building a backbone in a location with a number of connections. It can handle 8 LANs or 16 serial connections. The Model 145 provides a regional concentration point for 2210s located in remote and branch offices.

- Model 175 has the largest capacity and provides a solution for a large regional headquarters or campus. It can handle a maximum of 14 LAN connections or 28 WAN connections and provides a large, central-site concentration point for remote 2210s.

Q's and A's

Q) The IBM 6611 has been available for several years. Is it still a good investment?

A) Yes -- definitely. IBM just shipped Release 4 of the Multiprotocol Network Program software for the 6611. It provides native transport of APPN and, we believe, the first shipment of High Performance Routing (HPR) in a multiprotocol router product. Executing HPR on the 6611's deep adapters provides extremely fast routing (up to 100 times faster that APPN/ISR or DLSw) through intermediate router nodes without using the 6611 central processor. As people move their SNA subarea networks to HPR, the 6611 continues to play an important role and provides a solid investment.

The role of routing, including the 6611, is changing at IBM. For central site collapsed LAN backbone router designs, IBM recommends an 8260-based ATM backbone with LAN switching as a superior design. That design does not require a large router with many LAN connections. For Wide Area connections, the 6611 capability spans from 6 to 26 T1 connections at a very competitive price per port, which meets most regional

concentration and central site requirements. IBM recommends the deployment of switching in both campus and private wide area backbones. Thus, the need to further enhance 6611 hardware connections has been superseded by the more current technology.

These same technology trends should be considered when buying any router for use in a backbone role. IBM investments in the 6611 will be primarily in enhancements to the software functionality, as customers combine switching as their backbone fabric and routers as access devices for attachment to the switching backbone. IBM is aligning the 6611 to be more focused and complementary to the switched campus and switched WAN backbone model.

Q) The IBM 6611 code is different than that of the 2210. Should I be concerned in regard to installing the two platforms?

A) We do not believe there is reason for concern. Yes, the code base for the two products is different. However, IBM has done extensive interoperability testing to ensure compatibility among the 6611 and 2210 models. The configuration utilities are being moved to a common look and feel. The 6611 models should be used in specific connectivity roles not provided by the 2210. This should provide customers with the range of price, connectivity and the protocol support they require.

Q) Are you addressing the fact that it takes too long to IPL the 6611?

A) Yes. In fact, with Release 4 of the Multiprotocol Network Program the 6611 IPL time has been improved by as much as 30%. Continual enhancements are being made to eliminate the need to IPL the 6611 for maintenance, whether planned or unplanned. That will minimize the exposure for re-IPL. The 6611 does not include flash memory. Thus, it does take some additional time to load its deep adapters. However each adapter has an on-board processor for higher performance.

Q) Does the 6611 use DLSw to transport APPN over the WAN?

A) With Release 4 of the 6611's Multiprotocol Network Program, both APPN/Intermediate Session Routing (ISR) and HPR are transported natively over Token-Ring, Ethernet, frame relay, and PPP. We believe the 6611 is the first router to ship HPR. In September, 1994, IBM was one of the first internetworking vendors to ship APPN ISR, and at that time DLSw provided the transport for APPN.

Sales Tools

The following brochures are available for the IBM 6611:

IBM 6611 Network Processor and Multiprotocol Network Program (spec sheet) (includes HPR)	G325-3436
IBM 6611 Network Processor (not updated with HPR)	G325-6503
6611 World-Class Multiprotocol Support	G325-6505
6611 Configuration Program and System Manager	G325-6507
Multiprotocol Convergence	G325-3434
Networking Boot Camps (brochure)	G325-3594
High Performance Routing	G325-5205

On the Internet, the 6611 Home Page can be found at:
http://www.networking.ibm.com/611/611prod.html

Competition

While the IBM 6611 competes against routers from major vendors such as Cisco, Bay Networks and 3Com, the broader competitive discussion should focus on each vendor's ability to respond to network-centric computing which is emerging as the next phase of computing.

The two main types of networks that exist today are host-based and router-based. Host-centric networks are characterized by the traditional corporate computing structure built around the use of large centralized processors. Router-centric networks emerged to support the growing use of personal computers and workstations interconnected via local area networks (LANs).

However, customers realize that to compete more effectively and to achieve marketplace differentiation, they must seek innovative ways to obtain, share, and retain information among employees, customers, suppliers, and partners. The need to communicate more effectively with a greater number of people has resulted in the demand for collaborative computing -- using computer networks to facilitate employee collaboration across organizational and geographical boundaries. The next phase of computing based on high-speed, high-bandwidth, switch-based networks we refer to as network-centric computing.

IBM's strategy for migration from existing networks to the new, switched-based networks is known as Switched Virtual Networking or SVN. Cisco has published a design for switched internetworks named CiscoFusion. The Bay Networks approach to switching is named BaySIS (Bay Switched Internetworking Services). Finally, 3Com has published a strategy known as High Performance Scalable Networking (HPSN). Thus, the competitive discussion must move beyond simply routers to also evaluate how these vendors are going to address customers' future internetworking requirements.

	Strengths	Weaknesses	Selling Against
Cisco	• wide array of products • effective in leveraging media • well-articulated network migration strategies • high profile in standards • ability to acquire technology • excellent relationship with carriers	• strong competition in high-speed switching • CiscoFusion switching strategy router-based • router vendor moving into switching • follows IBM's SNA lead • limited SNA implementation experience • challenge of integrating acquired technology	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of world class service and support • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions
Bay Networks	• broad product portfolio • good distribution channels • robust router hw architecture • synergistic merger of Wellfleet and Synoptics • effective media advertising • ability to acquire technology	• strong competition in high-speed switching • BaySIS switching strategy router-based • router vendor moving into switching • challenge of integrating acquired technology • limited SNA implementation experience	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of world class service and support • sell benefits of world class service and support • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions • sell IBM comprehensive ATM solution/strategy
3Com	• full campus product solution • leadership in Ethernet networking • robust product channel and distribution strategy • aggressive product pricing • ability to acquire technology	• strong competition in high-speed switching • HPSN switching strategy router-based • router vendor moving into switching • challenge of integrating acquired technology • limited SNA implementation experience	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions • sell IBM comprehensive ATM solution/strategy

Key Selling Points

When selling the IBM 6611, the following points should be emphasized:

- Industry leader in SNA and LAN integration with HPR available today and IBM's broad range of SNA solutions for the multiprotocol environment
- "Industrial strength" protocol support of TCP/IP, IPX and the other key router protocols
- Extensive systems management infrastructure including the MPNP Configuration Program, the Systems Management application, Nways Campus Manager LAN for AIX, Nways Manager for Windows, Nways Campus Manager LAN for HP-UX, synergy with NetView for AIX and NetView, and LNM support for Token-Ring management
- Media speed performance
- Open platform based on industry standards
- Efficient bandwidth utilization
- Token-Ring bridging synergy
- Its compatibility with total IBM networking product line
- IBM service and support

Management Software

IBM offers four management applications to provide Simple Network Management Protocol (SNMP) management of the 6611:

- Nways Enterprise Manager for AIX Version 1
- Nways Campus Manager LAN for AIX Version 3
- Nways Manager for Windows Version 2
- Nways Campus Manager LAN for HP-UX

IBM also offers the Nways Campus Manager Suite which contains the following IBM products:

- Nways Campus Manager LAN for AIX Version 3
- Nways Campus Manager ATM for AIX Version 2
- Nways Campus Manager Remote Monitor (ReMon) Advance for AIX, Version 2

Pricing of the Nways Campus Manager Suite provides a monetary savings compared to the purchase of separate IBM products to perform all the functions the suite offers. The equivalent Campus Manager Suite for the HP-UX platform will be available during the first quarter, 1997. It will have the same hardware support and features, but will not have the LAN Network Manager (LNM) for AIX component.

Both the Nways Enterprise Manager for AIX and the Nways Campus Manager LAN for AIX provide the proven IBM router and bridge manager (RABM) function. The Enterprise Manager packages RABM with the Nways Switch Manager and the SNA Alert Manager. The Campus Manager LAN packages RABM with the Intelligent Hub Manager for AIX, and the Campus Manager Suite adds additional programs.

Router and Bridge Manager Function

The router and bridge manager (RABM) function provides comprehensive management of routers and bridges that have SNMP agents and includes the following capabilities:

- Icon-based, single window "status-at-a-glance" of the network
- Specific router or bridge "status-at-a-glance"
- Displays the topology of DLSw and APPN networks using non-TCP/IP discovery techniques
- Manages DLSw and APPN protocols
- Dynamic discovery of router configurations
- Automated thresholding
- Variable polling rate
- Trap generation
- Set commands
- Automated graphing of performance data
- Automatic log file management
- Extensive and customizable defaults
- Access security

The router and bridge manager function also provides object-oriented data storage and support of large router networks via distributed polling. Program data is stored in an ObjectStore data base. This allows for client and server access to a common object model. It also maintains a persistent picture of managed nodes across restarts.

Distributed polling uses the mid-level manager (MLM) function of TME 10 NetView distributed monitoring to reduce management loads on networks. Distributing discovery and status polling to an MLM reduces the demands placed on the management application which would otherwise have to poll every single node in the network. In addition, an MLM reports to the manager only when a problem occurs.

Devices Supported

The RABM function can be used to monitor and control the following devices:

- IBM 2210 Nways Multiprotocol Router
- IBM 2216 Nways Multiaccess Connector
- IBM 6611 Network Processor
- Router modules in the IBM 8260 Nways Mulitprotocol Switching Hub and the IBM 8250 Multprotocol Intelligent Hub
- Bridges with SNMP agents such as the IBM 8229 Bridge and the IBM RouteXpander/2 Version 2
- Selected routers from other equipment manufacturers

Nways Enterprise Manager

In addition to the RABM function, the Nways Enterprise Manager includes the BroadBand Switch Manager and the SNA Alert Manager. The Nways Switch Manager provides real-time performance monitoring of trunks, ports, and connections with graphic network topology discovery and display of up to one-hundred 2220 Nways BroadBand Switches. Additional capabilities of the Nways Enterprise Manager include operations management, problem management, and accounting management.

Nways Alert Manager

The SNA Alert Manager translates 3746 alerts into SNMP events which can be displayed and manipulated at the TME NetView event desk.

Nways Campus Manager LAN for AIX

Version 3 of Nways Campus Manager for AIX offers the following improvements for managing medium-to-large LANs:

- support for storing, searching and retrieving key network management information using an open ObjectStore database
- distributed polling using the TME 10 Mid-Level Manager
- virtual LAN management using ATM Forum-compliant LAN Emulation
- simpler LAN Emulation administration
- easy to use, graphical management of ATM networks, including topology management
- support for non-IBM devices that use ATM Forum-compliant MIBs
- support for the emerging RMON standard
- comprehensive device management for IBM networking hardware devices

The Nways Campus Manager LAN for AIX can be used to monitor and control the following devices:

- IBM 8235 Dial In Access to LANs (DIALs) Server (Models 001, 002, 011, 012, 021, 022, 031, 032, 051, 052)
- IBM 8224 Ethernet Stackable Hub
- IBM 8225 Fast Ethernet Stackable Hub
- IBM 8281 ATM LAN Bridge
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Intelligent Switching Hub and modules
- IBM 8271 Nways Ethernet LAN Switches (Models 001, 108, and 216)
- IBM 8272 Nways Token-Ring LAN Switches (Models 108 and 216)
- IBM 8229 LAN Bridge
- IBM RouteXpander/2
- IBM 6611 Network Processor
- IBM 2210 Nways Multiprotocol Router
- Selected OEM routers

Nways Manager for Windows

This product is an integrated suite of network management applications (packaged with NetView for Windows Version 2.1) that works seamlessly with the IBM NetView for Windows management platform to remotely control and monitor IBM networking devices. It provides integrated fault, configuration and performance management functions for IBM bridges, routers, hubs, and switches. It also provides basic management functions for other SNMP components.

The Nways Manager for Windows management product is for customers with small to medium networks up to 250 devices. These customers have one or more IBM campus networking products and want to combine management for several devices.

The Nways Manager for Windows provides remote control and coordination of IBM networking products through the following features:

- the ability to view and change subsystem configurations
- color-coded system status at a glance, with real-time problem detection and the ability to set thresholds for error notification
- realistic, graphical depictions of products to assist with component selection
- graphical network topologies with a library of elements for easy creation of customized configurations
- real-time event monitoring, with a time-stamped alarm log
- tools to select, display and analyze information in the event log
- microcode download for the supported products
- integrated trouble-ticketing to gather information about and track network problems to resolution
- a MIB browser to allow management of components not supported with a graphical interface
- inventory management
- collection and presentation of real-time and historical statistics
- drag and drop of ports and VLAN support provided
- telnet and FTP capabilities

The Nways Manager for Windows can be used to monitor and control the following devices:

IBM 8235 Dial In Access to LANs (DIALs) Server (Models 001, 002, 011, 012, 021, 022, 031, 032, 051, 052)
IBM 8271 Nways Ethernet LAN Switches (Models 001, 108, and 216)
IBM 8272 Nways Token-Ring LAN Switches (Models 108 and 216)
IBM 8224 Ethernet Stackable Hub
IBM 8225 Fast Ethernet Stackable Hub
IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
IBM 8238 Nways Token-Ring Stackable Hub
IBM 8250 Multiprotocol Intelligent Hub and modules
IBM 8260 Multiprotocol Switching Hub and modules
IBM 6611 Network Processor
IBM 2210 Nways Multiprotocol Router
IBM Turboways 8282 ATM Workgroup Concentrator
IBM 8281 ATM LAN Bridge
IBM 8285 Nways ATM Workgroup Switch
IBM 8210 Multiprotocol Switched Services (MSS) Server

Nways Campus Manager LAN for HP-UX

This suite of Nways Campus management applications is functionally the same as Nways Campus Manager LAN for AIX, only ported to run on the HP OpenView platform (V3.31). With this package of integrated network management applications, the network administrator has complete management of Ethernet, Token-Ring or FDDI-based networks composed of IBM hubs, switches, bridges and concentrators.

Nways Campus Manager LAN for HP-UX is targeted at customers who run the HP OpenView management platform.

Nways Campus Manager LAN for HP-UX provides some functions of the Nways Campus Manager LAN for AIX. These functions include:

- remote login via telnet
- the ability to view and change subsystem configurations
- color-coded system status at a glance, with real-time problem detection and the ability to set thresholds for error notification
- realistic, graphical depictions of products to assist with component selection
- graphical network topologies with a library of elements for easy creation of customized configurations
- real-time event monitoring with a time-stamped alarm log
- tools to select, display and analyze information in the event log
- microcode download for the supported products
- integrated trouble-ticketing to gather information about and track network problems to resolution

The Nways Campus Manager LAN for HP-UX can be used to monitor and control the following devices:

- IBM 8224 Ethernet Stackable Hub
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Intelligent Switching Hub and modules
- IBM 8271 Nways Ethernet LAN Switch
- IBM 8272 Nways Token-Ring LAN Switch
- IBM 6611 Network Processor (performance and health monitoring)
- IBM 2210 Nways Multiprotocol Router (performance and health monitoring)

Products and Options

Description
Management Software
Nways Campus Manager LAN for AIX V1.0 (5801-AAR) 8mm tape 1/4 inch tape
Nways Campus Manager for HP-UX (5801-AAR) 4mm tape
Nways Manager for Windows (5801-AAR) (one-time license)

IBM 2210

Introduction

Corporate computing is evolving to network computing to enable employees throughout a corporation to collaborate as though they were in the same office and to help companies connect their customers, suppliers and business partners. Network computing includes internal networks (or intranets) based on the Internet Protocol, links to the Internet or World Wide Web, and existing investments in multiprotocol LANS, ATM and switching technology, and core business applications that rely on Systems Network Architecture (SNA).

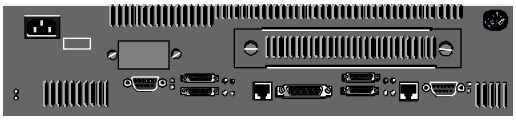
Product Description

The IBM 2210 Nways Multiprotocol Routers provide an extensive range of connectivity, protocols, and price granularity to enable you to cost-effectively implement network computing across a broad range of remote locations, branch offices and regional sites.

New, entry models of the 2210 offer one LAN port and either one serial wide area network (WAN) port or one ISDN Basic Rate Interface (BRI) port to provide the most economical 2210 solution for the smallest offices in your enterprise. The mid-range models of the 2210 offer one LAN port and two serial WAN ports for larger branch offices. Some mid-range models also provide a single ISDN BRI port.

The high-end models of the 2210 double the connectivity and performance of the mid-range models with up to two LAN ports and four serial WAN ports to support large branch offices and regional locations. In addition, the high-end models of the 2210 include an open adapter slot that supports any one of the following adapters: ISDN BRI, ISDN Primary Rate Interface (PRI), 25 Mbps ATM, and four- and eight-port WAN concentration.

IBM 2210 Nways Multiprotocol Router



Model 24M

Model 12E

All models of the 2210 use a common set of software functions called IBM Nways Multiprotocol Routing Services (Nways MRS). Nways MRS is a member of IBM's family of multiprotocol services products that includes the Nways Multiprotocol Access Services (Nways MAS) for the IBM 2216 Nways Multiaccess Connector and the Nways Multiprotocol Switched Services (Nways MSS) for IBM 8210 Nways MSS Server and the IBM 8260 Nways MSS Module. Together, the multiprotocol services products provide the benefits of switching, distributed routing, bridging, and virtual LANs and enable the implementation of Switched Virtual Networking or SVN. It is IBM's comprehensive, high-performance framework to implement enterprise-wide network computing.

IBM Nways Multiprotocol Routing Services (Nways MRS) succeeds IBM Nways Multiprotocol Routing Network Services (Nways MRNS) and includes most of the functions in Nways MRNS as well as new functions not currently available. The "Question and Answer" section of this document provides additional information comparing Nways MRS and Nways MRNS.

2210 Models

There are twelve models of the 2210, providing the following connectivity:

Entry Models

- Model 1S4, with 2MB of flash memory and 4MB of DRAM
- Model 1S8, with 4MB of flash memory and 8MB of DRAM
- Model 1U4, with 2MB of flash memory and 4MB of DRAM
- Model 1U8, with 4MB of flash memory and 8MB of DRAM

Each of the four entry models offers one Ethernet LAN port, one serial WAN port and one ISDN BRI port. At the time of configuration, the customer may choose to configure either the WAN or the ISDN BRI port. The Ethernet LAN port provides an RJ-45 interface conforming to IEEE 802.3. It runs at 10 Mbps.

The BRI port on the 1S4 and 1S8 models provides a twisted-pair "S/T" interface with an RJ-45 connector. The 1U4 and 1U8 models include a fully-integrated NT-1, which provides the "U" interface for North American ISDN switches. The connector for the 1U4 and 1U8 models is also an RJ-45. Integration of the NT-1 saves customers the expense that would be associated with the purchase of a standalone NT-1.

Mid-Range Models

- Model 12T offers one Token-Ring port and two multi-interface serial ports.
- Model 12E offers one Ethernet port and two multi-interface serial ports.
- Model 127 offers one Token-Ring port, two multi-interface serial ports, and one ISDN BRI port with an "S/T" interface.
- Model 128 offers one Ethernet port, two multi-interface serial ports, and one ISDN BRI port with an "S/T" interface.

All four models have a base memory configuration that includes 4MB of Flash memory and 4MB of DRAM. The Flash memory is a fixed amount, but the 4MB of DRAM can be replaced by 8 or 16MB of DRAM.

High-End Models

- Model 14T offers one Token-Ring port and four multi-interface serial ports
- Model 24T offers two Token-Ring ports and four multi-interface serial ports
- Model 24E offers two Ethernet ports and four multi-interface serial ports
- Model 24M offers one Ethernet port, one Token-Ring port, and four multi-interface serial ports

All four models have a base memory configuration that includes 4MB of Flash memory and 4MB of DRAM. The Flash memory can be expanded to 8MB or 12MB by adding a second Flash module. The 4MB of DRAM can be replaced by 8, 16, or 32MB of DRAM.

All high-end models include an adapter slot that, with the Adapter Enablement Feature, supports any one of the available 2210 adapters.

Positioning

The IBM 2210 models provide a connectivity solution for customers:

- with branch offices or remote sites that need to be linked into a cohesive, cost-effective, multiprotocol network
- who need regional site routers for network concentration
- who want economical entry-level models with full function
- looking for lower priced central site routers for frame relay or ISDN termination
- needing up to four serial interfaces at a branch router price
- needing dial backup
- requiring dial on demand when data arrives
- wanting simple installation and ease of management
- looking for a product that provides multiprotocol routing and a subset of the capabilities typically found in a frame relay access device (FRAD) including frame relay connectivity, SDLC support, and X.25 transport
- wanting higher performance in a branch office router
- choosing ISDN for direct or backup connectivity and requiring either a Basic Rate Interface or a Primary Rate Interface
- wanting redundancy in the network to maximize availability
- wanting complete and robust SNA solutions including High Performance Routing (HPR) and Dependent Logical Unit Requester (DLUR) (Note: HPR and DLUR are not available on the 1Sx and 1Ux models.)
- wanting a WAN access node for shared media and 25 Mbps ATM workgroups
- wanting a multiprotocol router that provides access services within IBM's Switched Virtual Network (SVN) strategy
- wanting a platform for growth with upgradeable Flash and DRAM, an adapter slot in the high-end models with a variety of adapter options, and broad connectivity support
- who want a competitively priced multiprotocol router

Features/Functions

Introduction

The new IBM Nways Multiprotocol Routing Services (Nways MRS) software for the 2210 provides functions currently available in MRNS and adds the following new capabilities:

- Support for the new entry models
- Support for the new adapters
- Expanded SNA capabilities including HPR, DLUR and APPN (Note: HPR, DLUR and APPN are not available on the 1Sx and 1Ux models)
- Enhanced capabilities for TCP/IP, IPX, AppleTalk, SNMP, DLSw, WAN Reroute and Bandwidth Reservation System functions

Software Packaging

All models of the 2210 are shipped with the IBM Nways MRS licensed program preloaded in memory. When ordering a 2210, the customer selects one of two available Nways MRS software suites, Base or Additional Routing, as well as a specific software functional package within the suite. Customers licensing a particular software suite are entitled to download from the Internet any of the other software functional packages available in a suite, or to upgrade to the other software suite and then download any of its associated functional packages. The Base and Additional Routing suites are separately priced for the entry, mid-range and high-end models. Software functional packages within a suite enable customers to choose functional capabilities based on specific network requirements and to utilize Flash and DRAM memory as effectively as possible.

Feature	Function
Base Suite of MRS	The following functional capabilities are available, depending on 2210 model and amount of available memory: • TCP/IP routing • NetBIOS transport via DLSw • SNA capabilities including HPR, DLUR, ISR, APPN BAN and SNA transport via DLSw • Bridging: Source Route (SRB) over Token-Ring, Transparent (TB) over Ethernet, Source Route Transparent (SRT) over Token-Ring and Ethernet, and Translational (SR-TB) over Token-Ring and Ethernet • Data link controls: PPP, frame relay, X.25 • SDLC primary and secondary and SDLC Relay • LAN protocols: Token-Ring and Ethernet • V.25bis • Bandwidth Reservation System (BRS) • EasyStart • WAN Reroute • Device Drivers such as ISDN BRI and PRI, and ATM • MAC filtering • NetBIOS name caching/filtering

Feature	Function
Additional Routing Suite of MRS	The additional routing suite of IBM's includes the functions of the base suite and the following additional functions: • Routing: IPX, AppleTalk (Phase 2), DECnet IV, DECnet V/OSI, Banyan VINES, BGP-4 • LAN Network Manager (LNM) • Border Gateway Protocol (BGP-4)
Nways MRS compared to Nways MRNS	The new IBM Nways Multiprotocol Routing Services (MRS) Version 1 Release 1 provides functions currently available in Nways MRNS and adds the following new capabilities: • Support for the new entry models • Support for the new adapters • Expanded SNA capabilities including HPR, DLUR and APPN (Note: HPR, DLUR and APPN are not available on the 1Sx and 1Ux models) • Enhanced capabilities for TCP/IP, IPX, AppleTalk, SNMP, DLSw, WAN Reroute and Bandwidth Reservation System functions
SNA Support	Complete SNA support includes High Performance Routing (HPR), Dependent Logical Unit Requester (DLUR), Intermediate Session Routing (ISR), Advanced Peer-to-Peer Networking (APPN), Boundary Access Node (BAN), and Data Link Switching (DLSw). The following paragraphs provide additional details on each of these SNA capabilities. (Note: HPR, DLUR, ISR, and APPN are not available on the 1Sx and 1Ux models.)
HPR	Combines the best features of the SNA and APPN architectures with connectionless technologies to provide improved network performance, enhanced network availability and state-of-the-art congestion control. HPR enables the native transport of SNA traffic in a multiprotocol environment. The MRS implementation of HPR includes: • Automatic Network Routing (ANR) to provide improved performance. • Rapid Transport Protocol (RTP) to provide non-disruptive routing around problems. • Adaptive Rate-Based (ARB) congestion control to prevent congestion and packet loss.
DLUR	Provides investment protection and a seamless migration path from subarea APPN to HPR by enabling existing 3270 traffic (PU2.0 and PU2.1) to utilize APPN and HPR transports.
ISR	If session partners reside on non-adjacent nodes, session data will pass through intermediate network nodes. Intermediate session routing enables session data to be forwarded between intermediate nodes.
APPN	Provides routing and directory services to Ethernet/802.3 and Token-Ring attached End Nodes. APPN Network Nodes are able to exchange network topology and resource information.

Feature	Function
BAN	Boundary Access Node (BAN) support provides the capability to transport SNA and TCP/IP traffic over a frame relay network directly to an IBM 3745/46 Communications Controller or SNA to an IBM AS/400 without requiring a 2210 at the Controller or AS/400 location. BAN is compliant with RFC 1490.
DLSw	Data Link Switching is IBM's industry-leading technology to transport SNA and NetBIOS traffic over TCP/IP router networks. The 2210 implementation of DLSw is compliant with the DLSw Standard Version 1.0 also known as RFC 1795. This implementation is interoperable with the prior standard, RFC 1434, for the transport of SNA.
Router-to-Router Communications	The 2210 supports the following: frame relay, PPP, X.25, RIP, OSPF, BGP-4, and line speeds ranging from 4.8 Kbps through T1 (1.54 Mbps) or E1 (2.048 Mbps).
Dial Capabilities	Extensive dial capabilities provide a range of availability features that can be used to design redundancy into the network. Dial capability is available on any WAN port by using a V.25bis modem for connection to the public switched network or an ISDN terminal adapter for connection to an ISDN network. Models 1Sx, 1Ux, 127 and 128 each include an ISDN port for direct attachment to an ISDN network. An ISDN BRI Adapter and an ISDN PRI Adapter are both available for 2210 Models 14T, 24T, 24E, and 24M. Dial capabilities across all models include dial on demand, dial backup WAN restoral, and dial backup-WAN reroute. The following sections provide additional details on each of those dial capabilities. Finally, the addition of an ISDN PRI adapter to the high-end 2210 models provides customers with a cost-effective, switched network consolidation point.
Dial on Demand	Establishes a link when required to send data and disconnects after a specified idle time.
Dial Backup	Enables an alternate communication link to be established when the primary link fails. (Note: Models 1Sx and 1Ux have either an ISDN port OR a WAN port, and thus dial backup is not available.
Dial Backup (WAN Restoral)	Enables the specification of a dial circuit to be used when the primary link fails. The dial circuit must connect the same end points as the primary link, and the entire PPP configuration for the primary interface is moved to the dial circuit.
Dial Backup (WAN Reroute)	Enables the specification of a dial circuit to be used when the primary link fails. WAN Reroute is more flexible than WAN Restoral because the primary link can be PPP frame relay, or X.25 and the alternate link may have a different termination point than the primary link. WAN Reroute uses the dynamic routing abilities of the routing protocols to find alternate paths through the new network topology.

Feature	Function
Base ATM Support	Provides ATM Forum UNI 3.1 compliance; ATM Forum Interim Local Management Interface (ILMI); PVC and SVC; RFC 1483 encapsulation for IP and IPX; and standard ATM MIB - RFC 1695.
ATM Forum-compliant LAN Emulation client	Allows ATM networks to provide the appearance of an Ethernet (Version 2 or IEEE 802.3) or Token-Ring (IEEE 802.5) LAN. This enables customers to incrementally add ATM-attached workstations for applications with high bandwidth requirements while continuing to use their current LAN investment.
Multiprotocol Encapsulation over ATM (Classical IP)	Enables "classical" IP and IPX to be transported over an ATM Network. This function provides the same support for IP, the TCP/IP Address Resolution Protocol (ARP), and IPX in an ATM environment that previously existed on "classical" or traditional Ethernet or Token-Ring LANs.
Source Route Bridging (SRB)	Provides local and remote bridging for transporting non-routed protocols among Token-Ring and 802.5 LANs. Filters include port, and source and destination addresses.
Transparent Bridging (TB)	Provides local and remote bridging for transporting non-routed protocols among Ethernet Version 2 and 802.3 LANs. Filters include port, and source and destination addresses.
Source Route Translational Bridging (SR-TB)	Provides local and remote translational bridging for transporting non-routed protocols between Ethernet Version 2 or IEEE 802.3 LANs and IEEE 802.5 Token-Ring LANs. It supports bridging of any protocols between systems on like LANs with an intervening dissimilar LAN. Supports user-defined translation modes and address mappings. Uses the SRB and TB filters.
Source Route Transparent Bridging (SRT)	Provides MAC layer bridging that performs source routing when source routing frames with routing information are received. It is also capable of performing transparent bridging when frames are received without routing information.
IP Bridging Tunnel	Uses IP encapsulation to transport any protocol across any backbone media that is supported for IP routing by the 2210. Thus, users can take any type of data coming from any type of bridge and encapsulate it in IP (an IP "tunnel").
SDLC Relay	Enables the connection of two disjoint SDLC links using a form of IP encapsulation to pass the SNA traffic through the network without regard to the media types in between.

Feature	Function
Bandwidth Reservation and Priority Queuing	Bandwidth Reservation allocates percentages of total connection bandwidth for specified traffic classes. Priority queuing assigns one of four priority level settings to each bandwidth class. By combining priority queuing with Bandwidth Reservation, packet transmission can be allocated to all bandwidth.
PAP/CHAP Password Security	Enables the establishment of passwords at each end of a PPP link and a procedure to check those passwords before bringing up the link.
EasyStart	Provides the capability for a new 2210 to request a network download of its initial configuration. This "plug-and-play" capability enables 2210s to be installed with minimal enduser intervention in remote sites that typically do not have resident networking expertise.
Configuration	Provides the means to configure the ports and software function of the 2210. It is supported in DOS/Windows, AIX and OS/2 environments. A graphical user interface with point and click menus, windows, pop-ups, templates, and contextual help enable users to easily configure the 2210.
LAN Network Manager	LNM collects and reports MAC ring topology changes to the LNM application, collects MAC error reports from ring stations, services MAC requests for ring parameter information, and provides limited LAN Bridge Server support.
Management	SNMP support includes: • all standard MIB-II MIBs • enterprise-specific 2210 MIBs for features such as DLSw and vital product data (VPD) information (e.g., release level) • RFC MIBs for protocols such as frame relay and PPP • Trap generation and GET support
Management Software	Can be managed by any SNMP-compliant manager product (such as NetView for AIX or NetView for Windows Version 2, or HP OpenView). Management applications exist for each of those platforms including Nways Enterprise Manager, Nways Campus Manager LAN for AIX, the Nways Manager for Windows, and the Nways Campus Manager LAN for HP-UX.
Warranty	One year warranty.

2210 Products and Options– Hardware Only

Description
Entry Models **Models 1S4, 1S8, 1U4, and 1U8 with 1 Ethernet and either 1 WAN serial port OR 1 ISDN BRI port with:** 2 MB flash memory and 4 MB DRAM, twisted-pair S/T interface 4 MB flash memory and 8 MB DRAM, twisted-pair S/T interface 2 MB flash memory and 4 MB DRAM, U interface 4 MB flash memory and 8 MB DRAM, U interface
Mid-Range Models **Models 12T and 12E with:** 2 multi-interface ports, 1 Token-Ring port 2 multi-interface ports, 1 Ethernet port Optional 8 MB Memory Expansion (DRAM) Optional 16 MB Memory Expansion (DRAM) **Models 127 and 128 with ISDN and:** 2 multi-interface ports, 1 Token-Ring port 2-multi-interface ports, 1 Ethernet port Optional 8 MB Memory Expansion (DRAM) Optional 16 MB Memory Expansion (DRAM)
High-End Models **Models 14T, 24T, 24E, and 24M with open adapter slot and:** 4 multi-interface ports, 1 Token-Ring Port 4 multi-interface ports, 2 Token-Ring Ports 4 multi-interface ports, 2 Ethernet Ports 4 multi-interface ports, 1 Ethernet and 1 Token-Ring port **Optional Features for Models 14T, 24T, 24E and 24M** 8 MB Memory Expansion (DRAM) 16 MB Memory Expansion (DRAM) 32 MB Memory Expansion (DRAM) 4 MB Additional Flash Memory 8 MB Additional Flash Memory Adapter Enablement Second Service Port Integrated Modem (US Only) **Adapters** ISDN Basic Rate Interface (BRI) T1/J1 ISDN Primary Rate Interface (PRI) 25 Mbps ATM 4-port WAN Concentrator 8-port WAN Concentrator Note: an E1 ISDN PRI Adapter is available outside North America

1. The 2210 and MRS Sales Manuals and Configurators contain a complete list of Feature Codes for both products including items such as power cords, cables, and additional software specification codes.

Nways Multiprotocol Routing Services (Nways MRS)

Description
MRS 5765-B86 for Models 1S4, 1S8, 1U4, 1U8
Base Suite
Additional Routing Suite
MRS 5765-B86 for Models 12T, 12E, 127 128
Base Suite
Additional Routing Suite
MRS 5765-B86 for Models 14T, 24T, 24E, 24M
Base Suite
Additional Routing Suite

Nways Multiprotocol Routing Network Services (Nways MRNS)

Description
MRNS 5765-368 for Models 12T, 12E, 127, 128
Base Suite
Additional Routing Suite
MRNS 5765-368 for Models 14T, 24T, 24E, 24M
Base Suite
Additional Routing Suite

IBM has introduced a no-charge feature which allows the customer to choose to have the hardware with preloaded software, configuration program and documentation delivered to the same address in a single package. Alternatively, the customer may choose to have the configuration program and software documentation shipped to one location (for instance, a central site), and the hardware with preloaded software along with the hardware publications to another location (for instance, a branch office).

Target Market

The 2210 is a remote, branch-office router that provides competitive function at a competitive price and addresses a number of markets:

- **Wide Area Access.** These customers need WAN access to facilitate communications with regional and corporate offices. Usually, there is a need for multiprotocol support and maximum availability.
- **Device Concentration.** The 2210's support for X.25 DTE concentration and SDLC concentration, make it a very flexible and competitively priced solution for this market.
- **Small remote sites.** The new, economical entry models extend intranet and Internet access to the smallest remote sites in the enterprise while providing more function than most competitive offerings in this price range.
- **Regional Router.** The high-end models of the 2210 are capable of fulfilling the requirement for a regional router. They can be used at regional or even central sites to concentrate data from multiple mid-range models at remote branches.

- **Complement to switched infrastructure.** Customers are making a significant investment in frame relay for its flexibility and economy. In addition, customers are deploying LAN switches for improved performance. The 2210 naturally complements those trends by providing infrastructure interconnection plus WAN connectivity.
- **Higher availability levels.** The 2210 can be configured to add redundancy – and thus add reliability – to the network. The dial on d emand and dial backup features are supported on both V.25bis and ISDN connections. The new WAN reroute function permits the mapping of a failed link to the activation of another leased or dialed link.

Q's and A's

Q) What are the key distinguishing features that make the IBM 2210 Multiprotocol Router stand out in its category?

A) The 2210 family of routers provides an extensive range of connectivity, protocol and price granularity that can be tailored to fit your network design. New entry models of the 2210 offer one Ethernet port and either one serial WAN port or one ISDN BRI port to provide the most economical 2210 solution for the smallest offices in the customer enterprise. Mid-range solutions include the 2210 Models 12T and 12E which offer one LAN and two WAN serial ports, while models 127 and 128 each provide an ISDN BRI port in addition to LAN/WAN connections.

The high-end 2210 models – 14T, 24T, 24E and 24M – can double the connectivity and performance of entry level models with up to two LANs and four serial ports at a price that equals a per-port price decrease. In addition, the new models provide a high degree of hardware design adaptability. The four serial ports can be used in any combination of primary wide area network attachment, backup network attachment, or device attachment, allowing maximum flexibility in network design.

The 2210 hardware and software is designed to be employed in designing networks that provide outstanding network integrity and maximum network availability. The 2210 offers a number of dial options: V.25bis supported on any serial port, an ISDN Basic Rate Interface (BRI) is included on the four entry models and two of the mid-range models and ISDN adapters -- both basic rate (BRI) and primary rate (PRI) -- are available for the high-end models. Coupled with robust network backup functions in the 2210 software, customers can create more highly available network designs.

The 2210 offers features that allow for staged growth and migration. The optional flash and DRAM features enable the addition of memory as the size and complexity of networks grow. The optional, field-installable adapter capability provides customers the assurance that the 2210 platform they are purchasing today can be expanded to add an additional, or alternate, network interface as the needs of their network change.

Finally, the 2210 with its MRS software, offers an extensive range of software capabilities including exclusives in the following areas:

- Complete SNA support including HPR, DLUR, ISR and APPN as well as DLSw and BAN.
- ISDN PRI support in a multiprotocol router in the price range of the 2210.
- ATM support including ATM Forum-compliant LAN Emulation client and multiprotocol encapsulation over ATM to provide “classical" IP and IPX.

Q) How does the new Nways MRS software relate to the previous Nways MRNS software?

A) MRS succeeds MRNS and includes functions currently available in MRNS Release 3 Enhanced, as well as new functions not currently available. Nways MRS is a member of IBM's family of multiprotocol services products, including Nways Multiprotocol Access Services (Nways MAS) for the IBM 2216 Nways Multiaccess Connector and Nways Multiprotocol Switched Services (Nways MSS) for the IBM 8210 Nways MSS Server and IBM 8260 Nways MSS Module. The common development of a family of multiprotocol services products provides customers with a consistent implementation of function across multiple IBM hardware platforms.

Q) Are there any MRNS functions not included in the new MRS?

A) MRS provides Border Gateway Protocol (BGP) Version 4 and does not support the Exterior Gateway Protocol (EGP). The latter is an old technology and essentially no longer in use. In addition, MRS does not support DECnet V/OSI over X.25. Customers who may still require either EGP or DECnet V/OSI over X.25 can continue to use MRNS at the Release 3 Enhanced level of function to support mid-range and high-end 2210 models.

Q) What are the customer values in the recent 2210 enhancements?

A) Customer values include:

- Reduced initial investment (less expensive entry model)
- Platform consolidation (the 2210 can provide a link between emerging 25Mbps ATM workgroups, as well as providing network access and routing function)
- New network consolidation capabilities with ISDN PRI and BRI
- Expanded connectivity (greater that 4 WAN ports on a single 2210)
- Improved network backup functionality
- Future flexibility with a broad range of adapter options including 25 Mbps ATM, ISDN PRI and BRI, and WAN Concentration. Changes in future networking requirements can be satisfied by an adapter change instead of installation of a new 2210.

- HPR and DLUR enable customers to leverage their investments in SNA networking equipment and applications while serving the needs of TCP/IP and other multiprotocol client/server LAN users
- The standards-based routing software in the 2210 is continually enhanced to the latest industry standards to maintain a high degree of multivendor interoperability. In addition, new management capabilities enhance the ability of network operators to effectively and efficiently manage a multiprotocol router network.

Sales Tools

The following brochures are available for the IBM 2210:

IBM 2210 Nways Multiprotocol Router and MRS (spec sheet)	G325-3435-02
IBM 2210 Nways Multiprotocol Router Description and Configuration Scenarios (Redbook)	SG24-4446-01
Moving to Network Computing – A Smooth Path	G325-3669-00
IBM Nways Enterprise Manager for AIX Version 1	G224-4534-00
Nways Campus Manager LAN for AIX Version 3	G325-3632-01
Nways Manager for Windows, Version 2	G325-3634-01
Networking Boot Camps (brochure)	G325-3594-00

On the Internet, the 2210 home page can be found at:
http:/www.networking.ibm.com/220/220prod.html

Competition

While the IBM 2210 Multiprotocol Router competes against routers from major vendors such as Cisco, Bay Networks and 3Com, the broader competitive discussion should focus on each vendor's ability to respond to network-centric computing which is emerging as the next phase of computing.

The two main types of networks that exist today are host-based and router-based. Host-centric networks are characterized by the traditional corporate computing structure built around the use of large centralized processors. Router-centric networks emerged to support the growing use of personal computers and workstations interconnected via local area networks (LANs).

However, customers realize that to compete more effectively and to achieve marketplace differentiation, they must seek innovative ways to obtain, share, and retain information among employees, customers, suppliers, and partners. The need to communicate more effectively with a greater number of people has resulted in the demand for collaborative computing -- using computer networks to facilitate employee collaboration across organizational and geographical boundaries. The next phase of computing based on high-speed, high-bandwidth, switch-based networks we refer to as network-centric computing.

IBM's strategy for migration from existing networks to the new, switched-based networks is known as Switched Virtual Networking or SVN. Cisco has published a design for switched internetworks named CiscoFusion.

The Bay Networks approach to switching is named BaySIS (Bay Switched Internetworking Services). Finally, 3Com has published a strategy known as High Performance Scalable Networking (HPSN). Thus, the competitive discussion must move beyond simply routers to also evaluate how these vendors are going to address customers' future internetworking requirements.

	Strengths	Weaknesses	Selling Against
Cisco	• wide array of products • effective in leveraging media • well-articulated network migration strategies • high profile in standards • ability to acquire technology • excellent relationship with carriers	• strong competition in high-speed switching • CiscoFusion switching strategy router-based • router vendor moving into switching • follows IBM's SNA lead • limited SNA implementation experience • challenge of integrating acquired technology	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of world class service and support • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions
Bay Networks	• broad product portfolio • good distribution channels • robust router hw architecture • synergistic merger of Wellfleet and Synoptics • effective media advertising • ability to acquire technology	• strong competition in high-speed switching • BaySIS switching strategy router-based • router vendor moving into switching • challenge of integrating acquired technology • limited SNA implementation experience	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of world class service and support • sell benefits of world class service and support • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions • sell IBM comprehensive ATM solution/strategy
3Com	• full campus product solution • leadership in Ethernet networking • robust product channel and distribution strategy • aggressive product pricing • ability to acquire technology	• strong competition in high-speed switching • HPSN switching strategy router-based • router vendor moving into switching • challenge of integrating acquired technology • limited SNA implementation experience	• sell IBM's strength in delivering solutions • sell IBM's leadership in SNA and mission-critical applications • sell benefits of switchcentric over routercentric networks • compare total cost of ownership (hw, sw and service) of router solutions • sell IBM comprehensive ATM solution/strategy

Key Selling Points When selling the IBM 2210, the following points should be emphasized:

- **Price competitive access router**
  - √ Scalable connectivity, price and performance
  - √ Higher performance models with 2 LAN ports, 4 serial ports, and new adapters that support ISDN BRI, ISDN PRI, 25 Mbps ATM, and four- and eight-port WAN concentration.
  - √ "Future-proof" packaging with open adapter slot
  - √ Rich level of function
  - √ New economical entry models provide more functions than most competitive offerings in this price range
- **Extensive protocol support**
  - √ The broadest possible range of SNA support including High Performance Routing (HPR), Dependent Logical Unit Requester (DLUR), Intermediate Session Routing (ISR), Advanced Peer-to-Peer Networking (APPN), Boundary Access Node (BAN) and Data Link Switching (DLSw) -- both RFC 1795 and RFC 1434.
  - √ IP, IPX, AppleTalk, DECnet IV & V, Banyan VINES, NetBIOS (DLSw)
  - √ Bandwidth Reservation System to prioritize protocols over serial links
  - √ Robust local and remote bridging support
- **Strong switched services support**
  - √ Excellent frame relay support
  - √ Network availability enhanced by extensive dial support
    - ■ ISDN support includes North America, Europe and Japan
    - ■ Dial on demand and dial backup via ISDN and V.25bis
- **Superior installation and management capabilities**
  - √ Ease of installation
    - ■ Manufacturing preload
    - ■ EasyStart for "plug and play" installation
    - ■ Graphical configuration program
  - √ Management applications for AIX, Windows and HP OpenView as well as LAN Network Manager support
  - √ Integrated modem option for out-of-band management
- **Migration capabilities**
  - √ The new 25 Mbps ATM Adapter for Models 14T, 24T, 24E, and 24M, along with LAN Emulation and Classical IP, provides a means for customers to justify beginning the migration to ATM where required while continuing to derive benefits from their investment in 2210s and LAN hardware. The Adapter provides a connection to an ATM Workgroup Switch, such as the IBM 8285, and provides WAN access and LAN-to-LAN communication.
  - √ Flexible hardware design allows customer to pick the lowest priced network service now (for example, frame relay, ISDN or X.25) and migrate to another service later with only a software configuration change.

- **Enhanced protocol and management capabilities**
  - √ The MRS software is based on the open, industry standards and protocols users need to build robust internetworks that can accommodate continuing network growth, expanding diversity and a high degree of multivendor interoperability.
  - √ RFC and MIB currency ensures that the MRS protocol and management support are continually refreshed to include the latest industry standards.
- **Position within IBM networking**
  - √ Key role as access platform to IBM Switched Virtual Networking
  - √ Compatibility with IBM networking product line
  - √ IBM service and support

Management Software

IBM offers four management applications to provide Simple Network Management Protocol (SNMP) management of the 2210:

- Nways Enterprise Manager for AIX Version 1
- Nways Campus Manager LAN for AIX Version 3
- Nways Manager for Windows Version 2
- Nways Campus Manager LAN for HP-UX

IBM also offers the Nways Campus Manager Suite which provides the functions of the following products at a single price that is lower than the combined price of each of these products purchased individually:

- Nways Campus Manager LAN for AIX Version 3
- Nways Campus Manager ATM for AIX Version 2
- Nways Campus Manager Remote Monitor (ReMon) Advance for AIX, Version 2

The comparable suite product for the HP environment is Nways Campus Manager Suite for HP-UX. It has the same hardware support and features as the Nways Campus Manager Suite for the IBM environment, but does not have the LAN Network Manager (LNM) for AIX component.

Both the Nways Enterprise Manager for AIX and the Nways Campus Manager LAN for AIX provide the proven IBM router and bridge manager (RABM) function. The Enterprise Manager packages RABM with the Nways Switch Manager and the SNA Alert Manager. The Campus Manager LAN packages RABM with the Intelligent Hub Manager for AIX, and the Campus Manager Suite adds additional programs.

Router and Bridge Manager Function

The router and bridge manager (RABM) function provides comprehensive management of routers and bridges that have SNMP agents and includes the following capabilities:

- Icon-based, single window "status-at-a-glance" of the network
- Specific router or bridge "status-at-a-glance"
- Displays the topology of DLSw and APPN networks using non-TCP/IP discovery techniques
- Manages DLSw and APPN protocols
- Dynamic discovery of router configurations
- Automated thresholding
- Variable polling rate
- Trap generation
- Set commands
- Automated graphing of performance data
- Automatic log file management
- Extensive and customizable defaults
- Access security

The router and bridge manager function also provides object-oriented data storage and support of large router networks via distributed polling. Program data is stored in an ObjectStore data base. This allows for client and server access to a common object model. It also maintains a persistent picture of managed nodes across restarts.

Distributed polling uses the mid-level manager (MLM) function of TME 10 NetView distributed monitoring to reduce management loads on networks. Distributing discovery and status polling to an MLM reduces the demands placed on the management application which would otherwise have to poll every single node in the network. In addition, an MLM reports to the manager only when a problem occurs.

Devices Supported

The RABM function can be used to monitor and control the following devices:

- IBM 2210 Nways Multiprotocol Router
- IBM 2216 Nways Multiaccess Connector
- IBM 6611 Network Processor
- Router modules in the IBM 8260 Nways Mulitprotocol Switching Hub and the IBM 8250 Multprotocol Intelligent Hub
- Bridges with SNMP agents such as the IBM 8229 Bridge and the IBM RouteXpander/2 Version 2
- Selected routers from other equipment manufacturers

Nways Enterprise Manager

In addition to the RABM function, the Nways Enterprise Manager includes the BroadBand Switch Manager and the SNA Alert Manager. The Nways Switch Manager provides real-time performance monitoring of trunks, ports, and connections with graphic network topology discovery and display of up to one-hundred 2220 Nways BroadBand Switches. Additional capabilities of the Nways Enterprise Manager include operations management, problem management, and accounting management.

Nways Alert Manager

The SNA Alert Manager translates 3746 alerts into SNMP events which can be displayed and manipulated at the TME NetView event desk.

Nways Campus Manager LAN for AIX

Version 3 of Nways Campus Manager for AIX offers the following improvements for managing medium-to-large LANs:

- support for storing, searching and retrieving key network management information using an open ObjectStore database
- distributed polling using the TME 10 Mid-Level Manager
- virtual LAN management using ATM Forum-compliant LAN Emulation
- simpler LAN Emulation administration
- easy to use, graphical management of ATM networks, including topology management
- support for non-IBM devices that use ATM Forum-compliant MIBs
- support for the emerging RMON standard
- comprehensive device management for IBM networking hardware devices

The Nways Campus Manager LAN for AIX can be used to monitor and control the following devices:

- IBM 8235 Dial In Access to LANs (DIALs) Server (Models 001, 002, 011, 012, 021, 022, 031, 032, 051, 052)
- IBM 8224 Ethernet Stackable Hub
- IBM 8225 Fast Ethernet Stackable Hub
- IBM 8281 ATM LAN Bridge
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Intelligent Switching Hub and modules
- IBM 8271 Nways Ethernet LAN Switches (Models 001, 108, and 216)
- IBM 8272 Nways Token-Ring LAN Switches (Models 108 and 216)
- IBM 8229 LAN Bridge
- IBM RouteXpander/2
- IBM 6611 Network Processor
- IBM 2210 Nways Multiprotocol Router
- Selected OEM routers

Nways Manager for Windows

This product is an integrated suite of network management applications (packaged with NetView for Windows Version 2.1) that works seamlessly with the IBM NetView for Windows management platform to remotely control and monitor IBM networking devices. It provides integrated fault, configuration and performance management functions for IBM bridges, routers, hubs, and switches. It also provides basic management functions for other SNMP components.

The Nways Manager for Windows management product is for customers with small to medium networks up to 250 devices. These customers have one or more IBM campus networking products and want to combine management for several devices.

The Nways Manager for Windows provides remote control and coordination of IBM networking products through the following features:

- the ability to view and change subsystem configurations
- color-coded system status at a glance, with real-time problem detection and the ability to set thresholds for error notification
- realistic, graphical depictions of products to assist with component selection
- graphical network topologies with a library of elements for easy creation of customized configurations
- real-time event monitoring, with a time-stamped alarm log
- tools to select, display and analyze information in the event log
- microcode download for the supported products
- integrated trouble-ticketing to gather information about and track network problems to resolution
- a MIB browser to allow management of components not supported with a graphical interface
- inventory management
- collection and presentation of real-time and historical statistics
- drag and drop of ports and VLAN support provided
- telnet and FTP capabilities

The Nways Manager for Windows can be used to monitor and control the following devices:

- IBM 8235 Dial In Access to LANs (DIALs) Server (Models 001, 002, 011, 012, 021, 022, 031, 032, 051, 052)
- IBM 8271 Nways Ethernet LAN Switches (Models 001, 108, and 216)
- IBM 8272 Nways Token-Ring LAN Switches (Models 108 and 216)
- IBM 8224 Ethernet Stackable Hub
- IBM 8225 Fast Ethernet Stackable Hub
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Switching Hub and modules
- IBM 6611 Network Processor
- IBM 2210 Nways Multiprotocol Router
- IBM Turboways 8282 ATM Workgroup Concentrator
- IBM 8281 ATM LAN Bridge
- IBM 8285 Nways ATM Workgroup Switch
- IBM 8210 Multiprotocol Switched Services (MSS) Server

Nways Campus Manager LAN for HP-UX

This suite of Nways Campus management applications is functionally the same as Nways Campus Manager LAN for AIX, only ported to run on the HP OpenView platform (V3.31). With this package of integrated network management applications, the network administrator has complete management of Ethernet, Token-Ring or FDDI-based networks composed of IBM hubs, switches, bridges and concentrators.

Nways Campus Manager LAN for HP-UX is targeted at customers who run the HP OpenView management platform.

Nways Campus Manager LAN for HP-UX provides some functions of the Nways Campus Manager LAN for AIX. These functions include:

- remote login via telnet
- the ability to view and change subsystem configurations
- color-coded system status at a glance, with real-time problem detection and the ability to set thresholds for error notification
- realistic, graphical depictions of products to assist with component selection
- graphical network topologies with a library of elements for easy creation of customized configurations
- real-time event monitoring with a time-stamped alarm log
- tools to select, display and analyze information in the event log
- microcode download for the supported products
- integrated trouble-ticketing to gather information about and track network problems to resolution

The Nways Campus Manager LAN for HP-UX can be used to monitor and control the following devices:

- IBM 8224 Ethernet Stackable Hub
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Intelligent Switching Hub and modules
- IBM 8271 Nways Ethernet LAN Switch
- IBM 8272 Nways Token-Ring LAN Switch
- IBM 6611 Network Processor (performance and health monitoring)
- IBM 2210 Nways Multiprotocol Router (performance and health monitoring)

Management Software Products and Options

Description
Management Software
Nways Enterprise Manager (5777-AAK) (one time charge)
Nways Enterprise Manager (5777-AAK) (one time charge)
Nways Campus Manager LAN for AIX V3.0
8mm tape
1/4 inch tape
Nways Campus Manager for HP-UX (5801-AAR)
(4mm tape)
Nways Manager for Windows (5801-AAR) (one-time license)

IBM 2216

Product Description

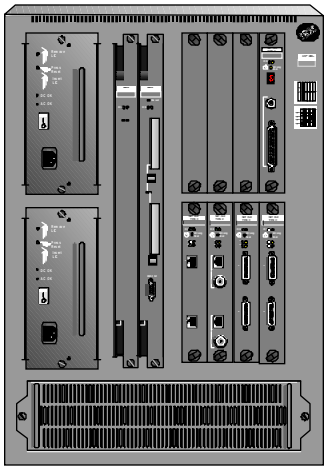
The new IBM 2216 Nways Multiaccess Connector Model 400 is a multiservice product that fills the gap between branch office routers and high-capacity switches. By providing a network computing platform that is flexible, scalable and reliable, the IBM 2216 plays a vital role in interconnecting sites to exploit network computing. It lets customers optimize their networks by consolidating traffic and linking multiple sites to create an intranet or build a flexible connection to the Internet. For improved access to business critical SNA and IP applications, the IBM 2216 also provides Enterprise Systems Connection Channel Support (ESCON).

The 2216 uses the same robust routing, bridging and SNA capabilities as the 2210 Nways router. Multiprotocol Access Services (MAS) software provides the functionality of a multiprotocol router, FRAD and SNA remote controller in a single, compact component. The software supports advanced SNA Data Transport and all common bridging techniques and routing protocols, including IP, IPX, AppleTalk 2, Banyan VINES, DECNet IV and DECNet V/OSI.

The 2216 has eight adapter slots with up to eight interfaces per adapter, for a total of up to 64 attachments for device access or network consolidation. This gives the 2216 more than five times the WAN capacity of the largest 2210 Nways router, making it an excellent choice for data center access or regional concentration of remote branch offices. With a wide range of adapters currently available and more high-speed interfaces planned, the 2216 is a solid platform to build upon for future network expansion.

Customers can choose from among the following attachments:

- 2-port Token-Ring
- 2-port Ethernet
- 8-port EIA-232
- 6-port V.35 or V.36
- 8-port X.21
- 1-port ISDN PRI for E1 (30B + D) or J1/T1 (23B +D)
- 1-port 155 Mbps ATM (single mode or multimode fiber)
- 1-port ESCON adapter



IBM 2216 Nways Multiaccess Connector Model 400

Positioning

The 2216 is optimized toward wide-area connectivity, particularly in areas of remote concentration and data center access. Its common routing code base makes it a natural choice as a complementary component in an end-to-end wide area solution. It is ideal for customers who want:

- to interconnect multiple sites to create an intranet or establish a flexible connection to the Internet
- to optimize networks by consolidating branch office traffic, frame relay connections from multiple FRADs or APPN HPR traffic from remote SNA controllers
- to complement 3720s and 3725s and provide a logical transition to a higher performing infrastructure which enables multi-protocol networking
- to implement new technologies like frame relay BAN, Data Link Switching, or APPN HPR
- an access point for a data center accommodating frame relay, IP, IPX, SNA, APPN, HPR and ATM individually or in combination
- to consolidate SNA and IP networks within a single network that supports both efficiently
- a platform with growth capabilities that eases the transition to future high speed networks
- access to SNA and TCP/IP host applications from LANs, WANs, and ATM via ESCON

Features/Functions The IBM 2216 offers the following features:

Feature	Function
Dial Backup	Enables an alternate communication link to be established when the primary link fails.
Dial on Demand	Establishes a link when required to send data and disconnects after a specified idle time.
WAN Restoral (Dial Backup)	Enables the specification of a dial circuit to be used when the primary link fails. The dial circuit must connect the same end points as the primary link, and the entire configuration for the primary interface is moved to the dial circuit.
WAN Reroute (Dial Backup)	Enables the specification of a dial circuit to be used when the primary PPP link fails. WAN Reroute is more flexible than Restoral because the alternate link may have a different termination point than the primary link. WAN Reroute uses the dynamic routing abilities of the routing protocols to find alternate paths through the network topology.
Base ATM Support	Provides ATM Forum UNI 3.1 compliance; ATM Forum Interim Local Management Interface (ILMI); PVC and SVC; RFC 1483 encapsulation for IP and IPX; and standard ATM MIB - RFC 1695.
LAN Emulation	Allows ATM networks to provide the appearance of LANS like Ethernet or Token Ring. Although LAN Emulation does not exploit all of ATM's benefits, it is useful in migrating to ATM technology and lowering network management costs.
Classical IP	Support for IP with ATM as a replacement for a local LAN with routers operating as they do in "classical" LANs.
Source Route Bridging (SRB)	Provides local and remote bridging for transporting non-routed protocols among Token Ring and 802.5 LANs. Filters include port, and source and destination addresses.
Transparent Bridging(TB)	Provides local and remote bridging for transporting non-routed protocols among Ethernet Version 2 and 802.3 LANs. Filters include port, and source and destination addresses.
Source Route Translational Bridging (SR-TB)	Provides local and remote translational bridging for transporting non-routed protocols between Ethernet Version 2 or IEEE 802.3 LANs and IEEE 802.5 Token Ring LANs. It supports bridging of any protocols between systems on like LANs with an intervening dissimilar LAN. Supports user-defined translation modes and address mappings. Uses the SRB and TB filters.
Source Route Transparent Bridging (SRT)	Provides MAC layer bridging that performs source routing when source routing frames with routing information are received. It is also capable of performing transparent bridging when frames are received without routing information.

Feature	Function
IP Bridging Tunnel	Uses IP encapsulation to transport any protocol across any backbone media that is supported for IP routing by the 2216. Thus, users can take any type of data coming from any type of bridge and encapsulate it in IP (an IP "tunnel").
SDLC Relay	Enables the connection of two disjoint SDLC links using a form of IP encapsulation to pass the SNA traffic through the network without regard to the media types in between.
Bandwidth Reservation and Priority Queuing	Bandwidth Reservation, supported over frame relay and PPP links, allocates percentages of total connection bandwidth for specified traffic classes. Priority queuing assigns one of four priority level settings to each bandwidth class.
EasyStart	Provides the capability for a new 2216 to request a network download of its initial configuration. This "plug-and-play" capability enables 2216s to be installed with minimal enduser intervention in remote sites that typically do not have resident networking expertise.
LAN Network Manager	LNM collects and reports MAC ring topology changes to the LNM application, collects MAC error reports from ring stations, services MAC requests for ring parameter information, and provides limited LAN Bridge Server support.
System Availability	• Optional dual power supplies, each with its own power cord, that share the 2216 power load. • Individually powered adapters that can be inserted or removed while the 2216 is operational. Failed adapters can be replaced without taking down the system or rebooting the software. New adapters can be added and activated at a convenient time. • Extensive environmental monitoring tracks system operation and allows the operator to correct potentially critical situations before they cause outages.
Installation and Configuration	The 2216 takes only 115 minutes on average to install. Initial configuration connecting the 2216 to a network is done using either a local ASCII terminal or an ASCII terminal connected via a modem. Subsequent configuration can be done using a graphical configuration program running on AIX, OS/2 or Windows.
Channel Connectivity	Up to 4 ESCON channels are supported providing support for up to 32 LPARs. Three access methods are supported: LCS, LSA, and the new MpC+ which provides dramatic CPU savings.

Products and Options

Description
2216 Nways Multiaccess Connector Model 400
Dual AC Power Supply
2-port Token-Ring adapter
2-port Ethernet adapter
8-port EIA-232/V.24 adapter
1-port ISDN PRI T1/J1 adapter
1-port 155 Mbps ATM MMF adapter
6-port V.35/V.36 adapter
8-port X.21 adapter
1-port 155 Mbps ATM SMF adapter
1-port ESCON adapter
Service Kit
Ship software publications and configuration program with hardware
Base systems card with 32 MB memory
Base Power Supply
2216 Nways Multiprotocol Access Services Release 1.0 without APPN
2216 Nways Multiprotocol Access Services Release 1.0 with APPN

Target Market

The 2216 addresses multiple network design challenges in the areas of remote concentration and data center access. It is targeted at meeting regional site connectivity needs or for connection to a larger campus backbone:

Higher-End Router Platform
Support for HPR makes the 2216 ideal as a regional or data concentration site for consolidating traffic from downstream 2210s and 2217s.

Backbone Transport
Using multiprotocol and SNA functionality to/from the wide area network backbone.

Remote SNA Controllers
Broad WAN connectivity allows the 2216 to replace aging sub-area remote devices, providing the opportunity to upgrade the transport infrastructure.

S/390 Access
The ESCON adapter feature provides access to business critical SNA and IP host applications.

Key Selling Points The following features should be emphasized when selling the 2216:

Price Performance:
• Industry leading price performance for ESCON host application access
• Cost-effective solution across a wide variety of configurations

Superior scalability:
• High WAN port density for cost-effective device concentration
• Large adapter capacity allows expansion and migration to new technologies

Adaptability:
•Wide range of WAN, LAN and ATM configurations for flexible network consolidation

Broad range of network connectivity choices using Multiprotocol Access Services software:
• Rich routing and bridging functions maximize interoperability
• Multiple SNA options including Frame Relay BAN, DLSw and APPN HPR
• LAN emulation and classical IP enable ATM data handling
• Functions of a multiprotocol router, FRAD and SNA remote controller in a single component reduces acquisition and operating costs
• Compatibility with the IBM 2210 and campus MSS solutions

High System Availability:
• Dual Power Supplies for redundancy and non-disruptive operation
• Individually powered adapters can be inserted while the 2216 is operational
• Environmental monitoring to correct critical situations before they cause outages

Maximum Network Availability:
• V.25bis and ISDN PRI switched network access for maximum network availability
• Dial Backup to bypass failed connections
• Routing around failed frame relay, PPP or X.25 links

Ease of Configuration, Installation and Maintenance:
• Installation in less than two hours
• Configuration using local terminal or modem
• SNMP management software with graphical interface
• Adapters, cables, power supplies and processor card accessible from front panel

Future Enhancements:
• IBM will add additional LAN and WAN interfaces including:
• 100-Mbps Fast Ethernet for campus attachment
• FDDI
• HSSI for wide area attachment at E3 and T3 speeds
• APPN HPR over ATM
• TN3270e server

Management Software

IBM offers four management applications to provide Simple Network Management Protocol (SNMP) management of the 2216.

- Nways Enterprise Manager
- Nways Campus Manager LAN for AIX
- Nways Manager for Windows
- Nways Campus Manager LAN for HP-UX

The Nways Enterprise Manager provides an efficient way to collectively manage a network comprised of the IBM 2210 Nways Multiprocol Router, the IBM 6611 Network Processor, the IBM 2220 Nways Broadband Switch, the IBM 2216 Nways Multiaccess Connector, and the IBM 3746 Nways Switch Controller in TCP/IP Mode.

The Nways Campus Manager LAN for AIX package provides an integration of proven network management applications that include the Router and Bridge Manager/6000 product and the Intelligent Hub Manager for AIX that were previously sold as separate software packages.

The Nways Manager for Windows and Nways Campus Manager LAN for HP-UX include product-specific modules (PSMs) to provide device-specific SNMP management of the 2216 with a fully graphical management interface. The Router and Bridge Manager/6000 product has not been ported to the Nways Campus Manager LAN for HP-UX.

Nways Enterprise Manager

The Nways Enterprise Manager packages the Router and Bridge Manager, Nways BroadBand Switch Manager, and the SNA Alert Manager into a single program that runs on top of the TME NetView or on top of TMN/6000.

The Nways Enterprise Manager manages IBM 2216 switches by providing:

- graphic network topology discovery and display of up to one-hundred 2220 switches of medium size
- detail resource display of switch, adapters, power supplies, fans, trunks, and ATM trunks
- operations management, including activation, deactivation, lock and unlock of resources, and reloading the 2220 with a current or previous configuration
- dynamic resource configuration of the Nways switches, including the ATM layer
- problem management, displaying alarms and state changes
- real-time performance monitoring of trunks, ports, and connections
- performance management for ATM, frame relay, and Voice Server Adapter (VSA) with specific routers
- account management, including logging of NBBS and ATM connections traffic information in an accounting file for billing
- on-line documentation and help

Routers and bridges are managed through Data Link Switching (DLSw) topology, providing transport of SNA, NetBIOS, and Advanced Peer-to-Peer Networking (APPN) across an IP network. Participating APPN resources and their status are seen as color-coded icons.

The Nways Enterprise Manager receives SNMP traps containing SNA alerts and translates them into a SNMP event that can be displayed and manipulated in the TME NetView event desk.

Devices supported by the Nways Enterprise Manager are:
- IBM 2220 Nways BroadBand Switch
- IBM 2216 Nways Multiaccess Connector
- IBM 6611 Network Processor
- IBM 3746 Switch Controller in TCP/IP mode

Nways Campus Manager LAN for AIX

This product is an advanced package of integrated network management applications that enables complete management of Ethernet, Token-Ring or FDDI-based networks composed of IBM hubs, switches, bridges and concentrators. It also provides complete management of IBM (and selected OEM) routers.

Nways Campus Manager LAN for AIX is positioned for large-scale LAN management. Management applications on NetView for AIX provide the most comprehensive set of applications and support the largest networks.

Nways Campus Manager LAN for AIX V3.0 provides management for networks of hubs, switches, bridges and routers, including device, media, topology and performance management. It integrates management functions for several components, and its functions integrate in turn with other management applications running on the TME 10 NetView platform. The Nways Campus Manager LAN will automatically invoke other applications, such as the Nways Campus Manager ATM and ReMon, as needed, allowing operators to remain focused on the task at hand.

Other features of Nways CampusManager LAN for AIX include:

- advanced graphical user interface
- SNMP support and capabilities
- support for virtual LANs NetView for AIX topology maps and expanded views
- OSF/Motif™-based user interface
- X Window System™ support
- microcode updates
- remote login via Telnet
- multiple levels of alarms
- TCP/IP device faults are isolated to simplify problem determination and error correction
- automatic discovery of 8250 hub models and installed modules
- compatibility with IBM 6611 configuration tools
- access control by MAC address list
- context-sensitive help
- coupling of physical topology with emulated LAN topology
- permanent storage of user-customized LNM subnet maps
- improved storage and retrieval, database import and export, and searching by using the ObjectStore database
- polling information added to Critical Resource Monitoring
- graphical management applications for device configuration and fault, performance, accounting and security management
- support for Advanced Peer-to-Peer Networking (APPN) and Data Link Switching (DLSw) topologies
- support for large networks, including client-server support, distributed polling, and object-oriented data storage

The Nways Campus Manager LAN for AIX can be used to monitor and control the following devices:

- IBM 8224 Ethernet Stackable Hub
- IBM 8225 Fast Ethernet Stackable Hub
- IBM 8230 (Models 3/13, 213, 4A/4P) family of Token-Ring hubs
- IBM DIALs Remote Access Server Models 001/002, 011/012, 021/022, 031/032, 051/052
- IBM 8238 Nways Token-Ring Stackable Hub
- IBM 8250 Multiprotocol Intelligent Hub and modules
- IBM 8260 Multiprotocol Intelligent Switching Hub and modules
- IBM 8271 Nways Ethernet LAN Switch
- IBM 8272 Nways Token- Ring LAN Switch
- IBM 6611 Network Processor
- IBM Nways 2210 Multiprotocol Router
- IBM 2216 Nways Multiaccess Connector

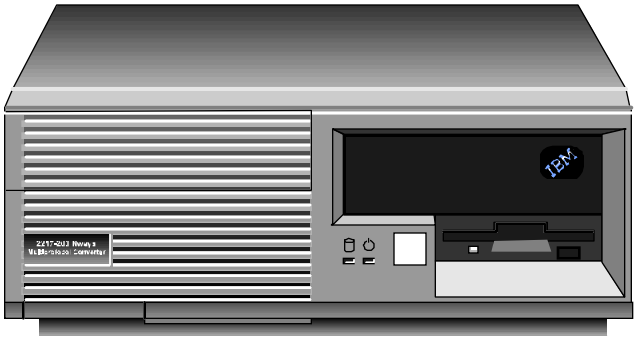
IBM 2217

Product Description

The IBM Nways 2217 Multiprotocol Concentrator (MpC) is a unique, SNA-oriented, multiprotocol solution for high speed LAN interconnection across frame relay, SDLC or X.25 WAN backbones. The 2217 differs from all other routers in that it offers a powerful multiprotocol routing capability that is not based on routing each protocol separately across the WAN. Instead, **multiprotocol support is realized by using a common "SNA-centric" routing protocol** — initially SNA or APPN and soon to be followed by High Performance Routing (HPR). The availability of the Nways 2217 MpC is staged:

- The current release provides multiprotocol routing capability over SNA and APPN backbone networks and supports TCP/IP, IPX, and NetBIOS traffic. Frame relay, X.25 and SDLC WAN connections are supported. Frame relay also allows bridging of other non-routed protocols (e.g., VINES).
- The next release will add HPR backbone support as well as DLUR support for downstream 3270 devices.

The base 2217 Model 200 hardware platform consists of a system board with two available slots, a 50 MHz 486 DX2 processor, 16 MB memory, a fixed disk with pre-loaded microcode, a 3.5" diskette drive and a chassis with a power supply and cooling fan that is packaged in a standalone unit. For US and Canada shipments, a high-performance 14.4 Kbps internal data modem is installed in the 2217-200 to provide configuration support, hardfile maintenance and remote service. The customer can select the LAN and WAN adapters required for specific configurations. This model offers 1 LAN attachment and 2 WAN attachments.



IBM 2217 Nways Multiprotocol Concentrator

Positioning

The IBM 2217 MpC is a WAN concentrator that will transport a significant number of non-SNA protocols across a customer's existing SNA/APPN WAN backbone, taking advantage of the congestion control and class of service inherent in an SNA network.

Adapters

The IBM 2217 MpC can use standard Token- Ring (4 or 16 Mbps) adapters as well as IEEE 802.3/Ethernet V2 adapters. WAN adapters supported include X.21, V.35, RS422/449, and RS232.

Features/Functions The IBM 2217 offers the following features:

Feature	Function
Single Backbone	Uses a single backbone for interconnecting multiprotocol LANs. The MpC transforms non-SNA protocols to SNA at the edge of the WAN and reroutes them across the WAN. At the other side, it converts them back into their native protocols. Only SNA is routed across the WAN. This results in improved performance and reliability.
HPR	High Performance Routing is a third-generation networking technology that is equivalent or surpasses current LAN interconnection technologies in performance, dynamic rerouting, priority, class of service, congestion avoidance, scalability and economy.
DLUR	Provides Dependent Logical Unit Requesters (DLUR) support for downstream 3270 terminals and printers. Customers can preserve investments in 3270 applications and still take advantage of new SNA technologies such as HPR.
Protocol Concentration	Provides the following types of protocol concentration: • IPX over SNA, APPN and HPR • TCP/IP over SNA, APPN and HPR • NetBIOS over SNA, APPN and HPR • Source Route Bridging of additional protocols over frame relay
WAN Protocols	Supports frame relay, SDLC and X.25.
AnyNet Compatibility	The MpC is compatible with IBM's AnyNet family of software solutions that perform many of the same protocol conversions.
Configuration	The MpC configuration package runs on OS/2 workstations. From one workstation, all the MpCs throughout the network can be configured. Configurations can be distributed to remote systems.
Management Software	Can be managed by SNA-centric manager (NetView/390) or any SNMP-compliant manager product (NetView for OS/2 and NetView for AIX). Also works with LNM Version 2.
Easy Installation	Is an integrated solution with preloaded hard drive.
Warranty	One year warranty.

2217 Products and Options

Description
2217 Multiprotocol Concentrator with 1 WAN and 1 LAN attachment
Token-Ring 16/4 adapter
Ethernet adapter
X.21 WAN adapter
V.35 WAN adapter
RS-422/449 WAN adapter
X.21 WAN 2nd interface
V.35 WAN 2nd interface
RS-422/449 WAN 2nd interface
RS-232 WAN 2nd interface

Target Market

The 2217 is targeted at customers currently running a traditional SNA wide area network backbone. Although many of these customers will have a multiprotocol network, they are committed to SNA/APPN as the predominant protocols for the future. Customers that need a wider range of protocols supported, LAN-to-LAN routing or who are migrating to a non-SNA backbone should consider the IBM 6611 or IBM 2210 as their primary solution.

Q's and A's

Q) What is the key distinguishing feature that makes the IBM 2217 MpC stand out in its category?

A) The MpC pioneers a radically different, and more efficient, technique for supporting multiprotocol routing. Unlike bridges and routers that transfer data in its native protocol, the MpC transforms non-SNA protocols to SNA/APPN at the edge of the WAN and routes them across the WAN. At the other side, the MpC converts the messages back into their native protocols. The only protocol routed across the WAN is SNA/APPN. This single protocol routing scheme ensures that all protocols enjoy any value-added features such as load balancing, traffic usage accounting, and non-disruptive protection against link failures. Moreover, HPR will soon provide state-of-the-art anticipatory congestion control and unparalleled (Layer 2) routing performance.

Q) What is the business case for the IBM 2217 MpC?

A) The return on investment of this product is very high and is derived from multiple facets. Designed to have the reliability associated with SNA/APPN network controllers, the MpC eliminates lost business due to network failures. The MpC more effectively uses the expensive WAN bandwidth by eliminating the significant overhead associated with routing multiple protocols, along with all of the different routing table updates, and by avoiding retransmission of discarded messages. And, the MpC avoids network operation expense by capitalizing on the users current investment in equipment, tools and knowledge.

Q) What makes this product a significant improvement in the IBM networking product line?

A) The MpC creates a whole new category of multiprotocol LAN interconnect solutions. Now there is a distinction between conventional routing and the single SNA-centric backbone protocol routing approach introduced by the MpC. Network routing will evolve along both of these approaches. In addition, the MpC will work with all of IBM's current and future networking offerings including 3745, 3746, 3172, 3174, 82XX Intelligent Hub, 8260 ATM hub, 2220 Broadband ATM Switches as well as the 2210 and 6611 bridge/routers.

Sales Tools

The following brochure is available for the IBM 2217:

Nways 2217 Multiprotocol Concentrator G325-3515-00

Competition

There are no products that compete with the IBM 2217's unique approach to LAN internetworking. IBM's AnyNet software provides similar function and the MpC will interoperate with these products. The defining difference is that MpC is a hardware solution. Other approaches to LAN interconnection (e.g., routers, bridges, RFC 1490) transport multiple protocols across the backbone and do not derive the advantages of a single protocol backbone.

Key Selling Points

When selling the IBM 2217, the following points should be emphasized:

- Multiprotocol transport over single WAN backbone
- Reduces cost of ownership through consolidation and efficient bandwidth utilization
- Utilizes existing customer skill / knowledge base
- Position as SNA integration industry leader
- Manageable from NetView/390 or SNMP
- Downstream SNA resources manageable from SNMP
- Facilitates transition to switching
- Compatibility with total IBM networking product line
- IBM service and support

DataComm MAGAZINE TESTER'S CHOICE FEBRUARY 1997

"When it came to prioritizing, the 2218 Nways FRAD scored a bull's-eye!"

IBM 2218 Nways FRAD

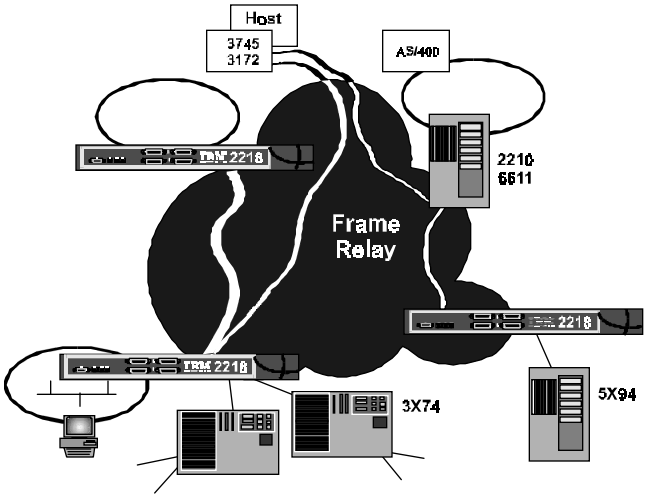
(Frame Relay Access Device)

Background

Frame relay is a cost-efficient, high performance means of connecting multiple LANs and SNA services through the use of various techniques. Similar to the X.25 packet-switching services, frame relay uses transmission links only when they are needed. This "as needed" concept creates a "virtual circuit" or "virtual network". Since the connection is not always "nailed up", other users connected to the same network can transmit traffic across the same wires. In addition, due to the limited amount of delay for network processing, frame relay transports data very quickly. Frame relay simply looks at an address in the frame and passes the frame along to the next node in the network.

Frame relay was developed because of a number of significant trends in the industry such as:

- **The greater need for speed caused by the trend away from text-based services to the more graphics-oriented services and the time-sensitive, burst-type applications.** This means much larger, more complex files and, unless speedier transmission is in place, much longer transmission times.
- **The improvement in transmission facilities**. Protocols featuring extensive error-correction features such as X.25 are no longer necessary.
- **The need to connect LANs to WANs and internetworking capabilities.** Today's user expects the same performance across the WAN as he gets from his local networks. A newer system that supports higher speed connections across a wider area was needed.
- **The increasing capabilities of devices attached to the network**. Increased functionality demands greater bandwidth allocation for these devices.



Frame relay offers a number of significant advantages. The following are a sample of these:

- **Cost Savings-** The use of a single connection to support a variety of sources, speeds and times allows the user to consolidate services and, therefore, save money.
- **Improved Uptime-** Since Frame relay is a virtual network, it assures the user that failed connections can be automatically reestablished.
- **Flexibility-** Permanent Virtual Circuits (PVCs) can be adjusted (added, deleted, modified, etc.) with ease through the network administration group of the carrier.

Market Trends

According to the Vertical Systems Group, sales revenue for FRAD devices was approximately $155 million in 1996 which is almost double the 1995 performance. In 1999, Vertical projects revenues of almost $450 million. These projections indicate a very strong and rapidly growing market.

IBM 2218 Nways FRAD

Product Description

The IBM 2218 Nways Frame Relay Access Device (FRAD) interconnects devices and hosts across a frame relay or LAN Network. It channels SNA, BSC, asynchronous, and multiprotocol LAN traffic onto a single frame relay PVC. The 2218 eliminates the need for separate WAN links for traditional and LAN traffic. With the IBM 2218, customers with serial multipoint, leased line protocols and LAN-based protocols can take advantage of the cost savings and network consolidation inherent in frame relay networks.

The IBM 2218 is fully compliant with RFC 1490 (the IETF specification) and can interoperate with many IBM products including the 3745/6 (Boundary Network Node and Boundary Access Node) and the 3172 Interconnect Controller. The 2218 integrates and supports traditional equipment and serial protocols such as:

- SDLC
- X.25 QLLC
- Binary Synchronous (BSC)
- Asynchronous
- SNA Downstream Physical Units (DSPUs)

The 2218 also concentrates (local LLC2 termination) up to 120 LAN and serial link-attached controllers onto a single, high-speed frame relay circuit. At the enterprise, the 2218 attaches to the host through SDLC, Token-Ring, BSC or Frame Relay circuit. Remote source route and transparent bridging are supported across a frame relay network to compatible bridge partners such as RXR/2, 6611, or 2210. The 2218 can also convert SDLC, X.25, QLLC, BCS, and asynchronous into 802.2 LLC. This option allows traditional equipment to be transported on a LAN-based network through bridges and routers.

Positioning

The 2218 provides customers with an alternative to a router-based solution for configurations they are hierarchical with little branch-to-branch traffic. The WAN utilization features, the ability to concentrate multiple traffic types over a single trunk or LAN, and the NetView management support make the 2218 a cost-effective product for deployment in remote branch offices.

Features and Benefits

The IBM Nways 2218 is a feature-rich FRAD that affords the customer flexible options for growth. The following table outlines some of the most important features and their associated benefits.

Feature	Benefit
RFC 1490 Support	Provides the most efficient method of transporting SNA and client-server applications over a frame relay WAN. Compliance with RFC 1490 ensures interoperability.
Virtual Route Switching (VRSw)	Provides a scaleable client-server architecture for large branch networks eliminating router overhead from branch locations and the WAN.
Logical Link Switching (LLSw)	Provides a scaleable data link (level 2) switching architecture for SNA, which eliminates level 3 processing overhead at both the branch and data center.
Priority Dependent Queing and Transmission (PDQ/PDT)	Provides guaranteed bandwidth and network resources on a single PVC.
Explicit and Parallel Virtual Routes (eVR/pVR)	Provides routing around network and equipment failures without loss of session.

Feature	Benefit
Alternate Virtual Route (aVR)	Provides automated disaster recovery scenarios eliminating the need for manual reconfiguration of branch locations.
Adaptive Congestion Control (aCC)	Dynamically adjusts to network congestion notification to maximize application throughput and minimize response time fluctuations.
Logical Link Switching (LLSW)	Provides local LLC2/SDLC termination/poll spoofing without the overhead of DLSw.
NetView Performance Monitor (NPM)	Provides response time data for assuring network performance.
BSC-to-SNA Conversion	Provides connectivity for BSC controllers to SNA hosts. Provides connectivity for BSC controllers to SNA hosts.
Coupled Polling	Provides consistent application state changes across an SNA internetwork.
Virtual Route Switching (VRSw)	Eliminates per branch routing topology updates. Provides faster switching between routes. Optimized for large branch networks.
Automatic Installation	Auto-detects frame relay and LAN interfaces and access configuration file (BOOTP).
NetView Service Points	Includes two domain independent NetView Service Points for management from both the primary and disaster recovery data centers.
Integral VTAM Commands	Incorporates important VTAM SDLC line handler commands such as LL2, LPDA-2.
Multi Protocol Support	Handles SDLC, Ethernet, Token-Ring, BSC 3270, X.25 QLLC and polled asynchronous protocols.
Integral Protocol Analyzer	Provides remote protocol tracing capability without additional equipment or local technical support personnel.
DSU/CSU Management	Provides network management of external modems or DSU/CSUs (LPDA-2, Racal, SLIP).
Plug and Play Installation	Provides self-configuring installation and configuration retrieval which eliminates all configuration by remote installation personnel.
Management	Provides full network management with NetView/390 and SNMP, as well as with optional programs such as FRAD/Manager and FRAD/Monitor for controlling the 2218 network from a PC.
Cost Savings	• Operating-Unified SNMP and NetView eliminates retraining of operating personnel. • Equipment-Integral protocol tracing eliminates remote diagnostic equipment and visits. • WAN-RFC 1490 provides the most efficient use of the frame relay WAN network.
SNA Support	Offers SNA session resiliency-bandwidth priority allocation, extensive frame-relay controls and alternate/disaster routing.
TCP/IP Routing	Supports client/server applications via optimized TCP/IP routing and protocol bridging.

2218 Products and Options

The 2218 is priced to be competitive with virtually any alternative solution. See appendix for pricing.

Description
Model 02X, 2 ports, no LAN
Model 02T, 2 ports, Token-Ring
Model 02E, 2 ports, Ethernet
Model 12X, 2 ports, no LAN
Model 12E, 2 ports, Ethernet
Model 12T, 2 ports, Token-Ring
Model 14X, 4 ports, no LAN
Model 14E, 4 ports, Ethernet
Model 14T, 4 ports, Token-Ring
Model 18X, 8 ports, no LAN
Model 18E, 8 ports, Ethernet
Model 18T, 8 ports, Token-Ring
Model 32E, 2 ports, Ethernet
Model 32T, 2 ports, Token-Ring
Model 34E, 4 ports, Ethernet
Model 34T, 4 ports, Token-Ring
Model 38E, 8 ports, Ethernet
Model 38T, 8 ports, Token-Ring

Target Markets

- **Retail Application-** Example: A fifty branch retail organization uses an AS/400 network to support an integrated point-of-sale and inventory system. The company is adding a new TCP/IP client-server branch application to support customer queries for additional product.
- **Insurance Application-** Example: An Insurance company's current application network consists of SDLC leased lines connecting ninety-five regional locations to the data center. The company wants to migrate to SNA/SDLC network frame relay using a Token-Ring LAN connection to the FEP. The 2218 is used to provide connectivity for both the data center and remote branch locations.
- **Branch Banking Application**- Example: An 800 branch bank network based on leased lines connecting each branch location to centralized data and application resources. A separate leased line is required for each application or protocol. The 2218 supports the consolidation of the multiple serial protocols over a common frame relay connection.

Reseller Support

Resellers interested in pre-sale assistance and information for IBM networking hardware products, please feel free to send inquiries to our NETeam Support Center for Business Partners via e-mail. The address is: **neteam@vnet.ibm.com**.

Routers versus FRADs

Your customers may have some concern as to whether they should purchase a router or a FRAD. The following table provides you with some guidelines to assist your customer and yourself as to which solution is appropriate.

2218 FRAD is best when the prospect:	Router is best when the prospect:
Network Topology	
Wants to create a branch network.	Wants to create a campus network.
Has a large number of sites.	Has only a few sites.
Requires a star or hub spoke topology.	Requires a full mesh topology.
Predominantly communicates corporate-to-branch office.	Predominantly communicates branch-to-branch.
Requires an efficient WAN solution.	Can afford unlimited bandwidth.
Application Requirements	
Is running mission critical applications.	Uses the network for casual applications such as E-Mail.
Has interactive transaction based applications.	Has batch file transfer based applications.
Requires predectable and consistent response times.	Can tolerate unpredictable response times.
Has mainframe and client-server applications.	Has only LAN serial applications.
Bases their applications on SNA, TCP/IP or Novell IPS's protocols.	Applications are based on AppleTAlk, DecNet or Banyan Vines.
Network Management	
Currently is using NetView.	Is not using a centralized network management application.
Requires network performance monitoring.	Does not require proactive network management.
Requires plug and play installation.	Has successfully deployed a large router network.
SNA Applications	
Is using SNA to deliver mission critical applications.	Is rapidly phasing out their SNA applications.
Requires IBM interoperability.	Does not intend to leverage their current IBM equipment.
Requires a high performance SNA environment.	Does not use SNA for key applications.
Cost of Ownership	
Requires the lowest cost of ownership.	Focuses only on the cost of equipment.

Q's and A's

Q) What is important about our new FRAD products?

A) New models provide a low-priced entry point.
Modular design allows convenient and economical future expansion.
Optional adapters facilitate incremental growth.
Customer installable features accelerate installation.
Expandable dram protects platform for future growth.

Q) What problem do these products solve?

A) New features include 4MB memory expansion, integrated DSU/CSU adapter, ISDN basic rate interface (BRI) adapter, and field upgradable capability. Offers the customer much more flexibility for network design.

Q) What is the customer value of the 2218?

A) The key advantage is the low cost ownership. Other advantages are customer upgradable features, added function for advanced performance, and remote diagnostics for operations savings.

Q) When will the 2218 be available?

A) The product will be available on 4/25/97.

Q) Where can I see a demo of the 2218?

A) A demo program is available from the NALOAN process through ECFORMS.

Q) What information will be available on MKTTOOLS ? When?

A) All product information will be available on MKTTOOLS on 3/11/97.

Q) Could you describe what functions the 2218 FRAD provides?

A) The IBM 2218 Frame Relay Access Device (FRAD) provides device/host interconnection across a frame relay or LAN network. It channels SNA, BSC, polled Async, and multiprotocol LAN traffic onto a single frame relay permanent virtual circuit, thereby eliminating the need to have separate WAN links for traditional and LAN client/server traffic. The ability to concentrate traffic is based on RFC 1490, the IETF specification that defines the encapsulation of multiple protocols in frame relay frames. The 2218 provides an adaptation layer for optimizing serial devices and transparently transports multiple protocols on a frame relay trunk. In addition, the 2218's traffic management scheme for prioritization of protocols and bandwidth allocation ensures the delivery of critical SNA or LAN traffic from branch offices onto frame relay backbones.

Q) Could you describe how the 2218 is managed?

A) There are a variety of network management tools available to manage and trouble shoot 2218's in the network. These have been developed by SYNC Research and are available to our customers.

Q) Who are our major (external) competitors?
A) Cisco and Motorola.

Q) What are their strengths and weaknesses?
A) Their strengths are market presence and price. Their weaknesses are service and support posture and less than adequate management of the end devices for the typical SNA-oriented FRAD buyer.

Q) Are there other IBM products that offer similar features or functions?
A) The 2210 and 2216 offer similar functions, including SDLC to LLC2 conversion typically required for attaching downstream SDLC devices to frame relay.

Q) IBM has routing products and the 2218 FRAD. Can you highlight the differences in the products?
A) Routing products, such as the 2210, view each data packet and determine the next hop where the traffic is routed. A layer 3 networking device, it utilizes one or more metrics to determine the optimal traffic path. Routing products are complicated devices and they repeat the complication for each routed protocol. Routers generally perform network services such as, firewall security, user authentication, encryption and data compression.

FRADs, such as the 2218, are simpler layer 2 networking devices. FRADs rely on the frame relay network to deliver the traffic. FRADs are located within a branch and make simple in-branch or out-of-branch decisions about the traffic. If there is a frame relay network failure, FRADs attempt to establish an alternative link (e.g., ISDN) to the final destination.

The distinction between routers and FRADs is being blurred. When routers use RFC 1490 to transfer SNA traffic without IP encapsulation, they act as layer 2 networking devices (e.g., FRAD). Many FRADs can operate as layer 3 devices and route TCP/IP and IPX protocols. However the differences between layer 2 and layer 3 devices remain.

The 2218 has unique attributes-BSC and polled-Async protocol support and NetView/390 Management. These are not available in our routers.

Sales Tools

The following brochure is available for the 2218- **G325-3581-00**
Information is also available on the IBM Intranet at:
http://isscw3.raleigh.ibm.com/ns/2218/2218pres.html.

Competition

The 2218 was designed to provide significant advantages over our competition. The following table compares our software, hardware and pricing versus Motorola and Cisco.

Software

Feature	IBM R2.1	Motorola (Montreal)	Cisco (IOS 11.1X)
Product Number		Vanguard 300	2520LF
LAN Support	• Source Route Bridging • Transparent Bridging • Terminated SNA/LLC2 • IP Routing • IPX Routing	• Source Route Bridging • Transparent Bridging • IP Routing • IPX Routing • Appletalk Routing	• Source Route Bridging • Transparent Bridging • IP Routing • IPX Routing
Frame Relay Support	• Frame Relay (RFC1490) Annex D/LMI • Auto UNI • SLIP to RFC1490 • X.25	• Frame Relay (ANSIT1.617) Annex G • Frame Relay (RFC1490) Annex D/LMI (IP) • SLIP to RFC1490 TP • X.25	• Frame Relay (RFC1490) Annex D/LMI • Frame Relay (RFC1795) DLSw • Point-to-Point • X.25
IBM Support	• SRB • Transparent Bridging • Terminated SNA • Local Acknowledgment • SDLC-LAN Conversion • RFC1490 BNN & BAN • NetView/390 Service Point • BSC Transport • BSC 3270, 3275 • Polled Async (Wells Fargo) • SNA BNN • X.25 • SNI	• SRB • Transparent Bridging • LLC Termination • SDLC-LAN Conversion • BSC2780/3780 • Async PAD • X.25	• SRB/RSRB • Transparent Bridging • Local Acknowledgment • SDLC-LAN Conversion • SNA BAN • RFC1490 SNA FR • RFC1795 DLSw • NetView Service Point • Bisync • Polled Async (ADT, ADPLEX) • X.25
PVC Multiplexing	Yes	No	Yes
Congestion Management	• FECN/BECN Response • DE Mark • CIR Conformance	• No FECN/BECN Response • No DE Mark • No CIR Conformance	• No full support for FECN/BECN • DE Mark • No CIR Conformance
Prioritization	• PDQ/PDT • Protocol Specific Prioritization	• Not Supported. Use Multiple PVCs.	• Priority/Custom/Weighted-Fair Queuing
Compression Technique	• Not Supported	• Header Compression	• Pack-by Packet Compression (1.5-1.0)
Dial Backup Support	• V.25bis Dial Backup	• V.25bis Dial Backup	• V.25bis Dial Backup

Hardware

Ethernet Models Comparison

Feature	IBM	Motorola*	Cisco
Product Number	2218 O2E	Vanguard 300	2520LF
Flash Memory	2MB	2MB	4MB
DRAM Memory	2MB	4MB	4MB
No. of Serial Ports	2	3	4
Optional 2-port daughter card	10BaseT RJ-45	N/A 10BaseT RJ-45	N/A 10BaseT RJ-45
LAN Type		10Base5 AUI	
Console Port	Yes	Yes	Yes
Auxiliary Port	Yes	No	Yes
Optional DSU/CSU Module	Yes	Yes	No
Optional ISDN Module	Yes	No	Yes

* The Motorola platform does not have an integral ISDN option.
The Motorola platform is not a modular platform and does not support more than two special access ports.
The Motorola integral DSU only supports 56Kbps. With most frame relay services, 64Kbps is priced at the same rate as 56Kbps, which allows the user up to 15 more bandwidth without having to purchase a fractional T1 DSU and service.

Key Selling Points

- Converges SNA, legacy, and client/server protocols into a frame relay for immediate, line cost savings.
- Frame Relay 1490 compliance ensures interoperability.
- SNA session resiliency--Bandwidth priority allocation, extensive frame relay controls, and alternate/disaster routing.
- Full network management.
- Support of prevalent SDLC, Ethernet, Token-ring, BSC 3270,X.25, QLLC and poller asynchronous protocols.
- Conversion of BSC 3270 to SNA 3270.
- Optimized TCP/IP routing and protocol bridging for client/server application support.

References

For information on additional IBM networking products, please consult the following IBM Sales Guides.

- Network Adapter Sales Guide
- LAN Hub Sales Guide
- LAN Switch Sales Guide
- Remote Access Sales Guide
- ATM Sales Guide

Glossary

APPN	Advanced Peer-to-Peer Networking.
DLUR/DLUS	Dependent Logical Unit Requester/Server.
BAN	Boundary Access Node.
Bandwidth Reservation	This is an innovative method of allocating scarce bandwidth resources on serial lines using PPP. It provides some guarantee that various types of traffic have fair access to outbound serial link bandwidth when more traffic must be sent than the link can currently send.
Bridge	A functional unit that connects two LAN segments that use the same logical link control (LLC) procedure but can use different medium access control (MAC) procedures.
Bridge Computer	The dedicated computer on which the Bridge Program is loaded.
DLSw	Data Link Switching. IBM's key technology to carry SNA traffic over TCP/IP router networks.
Frame Relay	Frame relay switching is a form of packet switching but it uses smaller packets and requires less error checking.
HPR	High Performance Routing offers an extension to APPN that provides proactive congestion control. HPR is also a superior SNA routing protocol for the backbone.
ISDN	Integrated Services Digital Network. International telecommunications standard for transmitting voice, video and data over a digital line. It uses 64 Kbps circuit-switched B channels to carry voice and data and uses a separate D channel to carry control signals via a packet-switched network.
LAN Segment	Any portion of a local area network that can operate independently, but is connected to the corporate network by one or more bridges, controllers or gateways.
OSPF	Open Shortest Path First. Routing protocol proposed as a successor to RIP.
PPP	Point-to-Point Protocol. Serial communications protocol for WANs defined by the Internet Engineering Task Force in 1991.

Priority Queuing Router technology that minimizes bandwidth requirements and costs. It dynamically allocates bandwidth to optimize its use and prioritizes network traffic, enabling protocols to share links more effectively.

RIP Routing Information Protocol. TCP/IP routing protocol that contains the addresses of all the interconnected networks as well as the number of router hops required to reach them.

SDLC Synchronous Data Link Control. A bit-oriented synchronous communications protocol developed by IBM where the message may contain any collection or sequence of bits without being mistaken for a control character. SDLC is used in SNA.

SLIP Serial Line IP. A protocol that allows a computer to use the Internet protocols with a standard telephone line and a high-speed modem. SLIP is being superseded by PPP.

SR Source Route Bridging is a method of forwarding frames through a bridged network in which the source station identifies the route that the frame will follow. Used in Token-Ring and FDDI networks.

SR-TB Source Route Transparent Bridging. This technology allows bridging between Ethernet and Token-Ring networks.

TB Transparent Bridging (TB) is also known as spanning tree bridge (STB). It refers to the fact that the bridge forwards non-local traffic to attached LANs in a way that is transparent or undetected by the user.

X.25 A CCITT standard for the protocols and message formats that define the interface between a terminal and a packet switching network.