# IBM Networking Campus Overview Fact Sheet

08 October 1996

## Accelerating your move to network computing while protecting your investment

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***Announcement Summary***

**Network computing is the convergence of two powerful forces–your needs and advanced networking technology.** The objective of network computing is to connect people to information and other people through networking. Network computing will:

- Help companies connect to their customers, suppliers and business partners
- Allow individuals at work, home, or school to share in all forms of information
- Help businesses, governments and educational institutions reach new markets, offer new services and lower their costs

Network computing is an evolutionary change with revolutionary implications. It will reshape every institution and business–and ultimately transform the way we work, shop, communicate, learn and interact.

**IBM realizes that you want end-to-end solutions–not just piece parts.** We realize you want networks that support the applications you choose and provide excellent network response wherever you choose to whomever you choose. You want network and systems management to keep them running smoothly and efficiently. You want systems integration to tie it all together. IBM can deliver what you want.

**With our products and services, IBM is aiming to be an enabler for network computing.** IBM Networking product solutions, based on IBM's Switched Virtual Networking (SVN) framework, are key elements of IBM's plan for network computing.

**In this announcement, IBM Networking solves your problems by providing world-class Internet, intranet and company-wide infrastructure solutions that enable the latest network-computing applications at the lowest total solution cost.**

## Announcement Highlights

- *Multiprotocol Switched Services (MSS) fulfills the promise of SVN*
  - SVN with MSS switches data from end to end, minimizing the need for routers in the data path and providing higher throughput and lower latency than router networks or switched networks without MSS.

  - New MSS Servers provide ATM Forum-compliant LAN Emulation (LANE), Classical IP over ATM, bridging and routing along with enhanced broadcast management in either stand-alone or hub module versions with optional backup for high availability.

- *Increased ATM connectivity choices speed ATM deployment*

  - New 155-Mbps ATM adapters for the IBM 3172, new adapter drivers for LANE and Classical IP support, LANE support for the 8281 Nways™ ATM-to-LAN Bridge and ATM uplinks in switches integrate ATM into campus networks.

- *Application enablers facilitate money-saving, real-time video*

  - ATM enablers for real-time, interactive delivery of broadcast-quality video over local or wide area ATM networks ease collaboration, speed project completion and save money.

- *Dramatically expanded Nways switch solutions ease the transition to switched networks*

  - New and enhanced Nways switches meet all configurations and media needs, with support for Ethernet and Token-Ring and new FDDI, CDDI, Fast Ethernet and ATM support in workgroup and backbone switches.

- *Remote access solves critical customer problems*

  - Extensions to IBM's remote access servers help network managers to meet one of their most pressing objectives–delivering network computing to remote offices, homes and hotels.

- *Ethernet and Token-Ring enhancements preserve investments*

  - Ethernet and Token-Ring adapters preserve customer investments and increase the value of existing networks.

- *Integrated management lowers the cost of network ownership*

  - A wide range of new, integrated management support adds exciting new capabilities for network configuration and operation while reducing the overall cost of network ownership.

## Customer Environments

In this announcement, IBM Networking focuses on solutions in two key areas:

- Switched networks including Fast Ethernet, FDDI and ATM

- Integrated management

These areas are of critical interest to network managers and network users alike, as they move toward networks, built on existing infrastructures, that support higher capacities and more demanding applications at the same or lower costs.

*MSS solves performance, capacity and administration problems (Figure 1)*

A leading insurance company has been experiencing increasing network problems in two areas. First, their router network is becoming increasingly sluggish and hard to administer as the

network size grows. They have been offered router upgrades for increased performance, but are dissatisfied with accompanying hardware and software upgrade costs. They need to change their network continually, as they expand their business or simply relocate departments and users. Network administration has been costly and error-prone, and they foresee no improvements with their current network.

IBM proposed upgrades to their existing networks using Nways Switches implementing SVN, which is an innovative framework supporting cost-effective migration from existing networks to high-speed, high-capacity switched networks with distributed routing for maximum performance and scalability. The IBM solution used a combination of LAN and ATM switches, combined with MSS Servers, to increase performance and capacity (by as much as 2 times), lower response times and reduce network administration costs. The insurance company was able to change their networks a step at a time, preserving their investment in Ethernet and Token-Ring LANs. They were able to consolidate their existing routers and used surplus routers to implement Internet and intranet access.

**Figure 1. MSS networks are simpler and have higher performance**

View Figure 1 (Part A).

View Figure 1 (Part B).

Because MSS separates physical topology from user connections, making large virtual networks feasible, they were able to replace complicated router administration with graphical virtual LAN reconfiguration. With virtual LANs, they simplified administration and reduced errors, enabling them to use fewer, less skilled administrators and increase network availability. Users with similar interests could be placed on the same virtual LAN without changing their physical location or connectivity. Users who needed access to SNA and IP applications were placed on emulated LAN A. The remaining users were divided into two groups, separating users who needed access outside the company from users who needed only local access for increased security. Figure 1 shows how these virtual LANs, with simple, logical configurations, can be formed from disparate physical network segments using the new MSS Servers.

**Figure 2. Video enablers make real-time, broadcast-quality video more feasible than before**

View Figure 2.

*Video enablers make real-time collaboration practical (Figure 2)*

Projects that require two or more workers depend on collaboration among the workers. Companies are increasingly implementing projects with ad hoc groups of geographically dispersed workers to minimize the duplication of skills and reduce project cycle times. Costly, time-consuming travel may be needed when face-to-face collaboration is required. Videoconferencing has long been an interesting solution, but has not been technically feasible or cost-effective until recently.

**Figure 3. Switches support many new configurations and media, offering new flexibility and increased network performance**

View Figure 3.

IBM was able to show a car manufacturer how they could use video enablers and ATM from IBM to build a network for design conferences, remote dealer sales meetings and technician training at dealer locations. The video enablers in this announcement, coupled with previously announced solutions, combined to reduce project cycle times, improved employee productivity and morale and saved the company more than $5 million per year in travel expenses. Figure 2 shows the network that IBM proposed.

*LAN Switches prepare networks for network computing applications (Figure 3)*

Many companies are using LAN switches to reduce or eliminate congestion in heavily used subnetworks or to enable new network-computing applications, including corporate intranets. While

many vendors offer switches, few have a broad enough line to meet the diverse needs of large corporations. Because their switches don't fit all configurations well, network managers must add extra components or make network design compromises.

Figure 3 shows the wide range of LAN, server and backbone connections IBM offers, using stand-alone switches or adding switches to existing, multipurpose hubs. This means IBM can provide switches, without compromise, for all configurations and media.

*Integrated network management allows existing staff to increase network effectiveness and lower operating costs (Figure 4)*

Operating costs are by far the largest component of LAN costs over a multi-year period. IBM was able to show a brokerage firm how they could make their network more effective while reducing training and operating costs, with integrated Nways Managers for LANs, ATM, RMON and their enterprise network.

The brokerage firm was able to save on operating costs. Increased network efficiency and availability helped them to avoid expensive down time, making for more competitive trades and increased customer satisfaction. Figure 4 shows a small sample of the information available to make real-time, informed decisions about network operation. Nways Managers were used at several locations within their network to save thousands of dollars per month compared with prior operating expenses.

**Figure 4. Integrated management lowers costs by giving operators the information they need to operate networks at peak efficiency**

View Figure 4.

## Additional Technical Details

For more complete descriptions of announced product solutions, please refer to the product-area fact sheets following this fact sheet.

*Multiprotocol Switched Services fulfills promise of SVN (Figure 5)*

MSS is a major component of SVN. Combined with ATM switching, MSS provides a network infrastructure that is more efficient than routed networks or switched networks without MSS.

With MSS, customers can build efficient, flexible, virtual LANs for multiple protocols over an ATM backbone, with ATM for backbone servers, desktop ATM for demanding applications, or a combination. MSS, which is more flexible than limited approaches like IP switching, is the solution for integrating current switched, bridged or routed LANs with new ATM networks.

MSS makes ATM implementations much more practical. MSS combines the functions of LANE, Classical IP, routing and bridging in a single component and delivers advanced functions required to fully integrate ATM into existing network infrastructures.

MSS can eliminate the need for separate routers and bridges and improves the functions of LAN Emulation and Classical IP by supporting multiple emulated LAN segments, allowing communication between emulated LANs and IP subnets, providing backup LANE servers to increase network availability and managing broadcasts in large virtual LANs to minimize network overhead.

In addition to LANE and Classical IP support, MSS also implements extensions to LANE that improve network flexibility, performance, security and reliability. MSS includes a Broadcast Manager that uses MSS configuration information to eliminate as many broadcasts as possible:

- For IP, by converting broadcast ARPs into ARPs sent directly to the end station
- For IPX, by sending RIP and SAP advertisements only to IPX routers and servers

- For NetBIOS, by converting broadcasts to unicasts and by filtering repeated broadcast frames
- For source-route broadcasts, by converting multi-ring broadcast frames (sent onto multiple rings) into single-ring frames (sent to the destination ring only) whenever possible

Workstations on emulated LANs use LAN Emulation Configuration Services (LECSs) to locate the LAN Emulation Servers (LESs) and the Broadcast Unknown Servers (BUSs). The LECS provides the address of the LES and BUS. When a workstation wants to communicate with another workstation, it contacts the LES to obtain an ATM circuit that it can use. Broadcasts on emulated LANs are converted by the BUS to the point-to-point or point-to-multipoint transmissions needed to emulate the broadcast. Network managers have been concerned about the lack of backup and potential inefficiencies of essential LECS, LES and BUS functions. In addition, they have been concerned about providing security for emulated LANs similar to the security they depend on for conventional LANs.

IBM MSS alleviates concerns with:

- Redundant LES/BUS and backup LECS for increased availability
- BUS Monitor to pinpoint excessive broadcasts
- LANE security that validates ATM addresses and allows network managers to control which stations attach to which VLANs

The MSS extensions are being submitted to the ATM Forum. MSS has also been accepted by the new Network Interoperability Alliance (NIA). The NIA is a group of industry leaders, including IBM, dedicated to helping customers simplify, standardize and enhance the design and development of LANs.

MSS functions are being delivered in a new, stand-alone product, the IBM 8210 Nways MSS Server for use with any ATM switch and as a two-slot module for the IBM 8260 Nways Multiprotocol Switching Hub. The MSS products include their own PowerPC™ 603E™ processor, a PC Card hard disk for code, configuration storage and logging and a PC Card modem for remote installation, management and service. The MSS components:

- Support 155-Mbps single-mode or multimode fiber connections to an ATM switch (in the 8210) or connect to the 8260 Switch/Control Point Module via the 8260 backplane (as an 8260 module)
- Provide ATM LANE for Ethernet and Token-Ring LANs
- Support IBM LANE for Ethernet and Token-Ring LANs for interoperability between older devices using IBM LAN Emulation and devices using ATM Forum-compliant LAN Emulation
- Provide virtual LANs defined as logical groups of end stations
- Provide enhanced broadcast management for LANE, reducing IP, IPX, NetBIOS and source-route bridge broadcasts to reduce network traffic, improve performance and allow larger networks
- Support redundant LANE servers to increase availability
- Support transparent bridging between Ethernet emulated LANs and source-route bridging between Token-Ring emulated LANs

- Support source-route translational bridging between Ethernet emulated LANs and Token-Ring emulated LANs
- Provide IP routing on ATM for Classical IP and routes between an emulated LAN and Classical IP
- Provide IPX routing on ATM between emulated LANs
- Include intelligent, easy-to-use graphical configuration and management tools that can be accessed from the Internet or, with a voice/fax/data modem, accessed from a touch-pad telephone with voice response

**Figure 5. MSS functions are available as a hub module or as a stand-alone product solution**

View Figure 5.

*Increased ATM connectivity choices speed ATM deployment*

IBM extends its already wide ATM adapter line with new drivers for a range of 25-Mbps, 100-Mbps and 155-Mbps ATM adapters. The new drivers support:

- WIN 95 on TURBOWAYS™ 25 ISA and PCI adapters with Ethernet or Token-Ring ATM LANE or Classical IP
- Support for OS/2® on TURBOWAYS 100 Multimode Fiber and TURBOWAYS 155 Multimode Fiber and UTP5/STP adapters with Classical IP
- Support for NetWare 3.x or 4.x on TURBOWAYS 155 Multimode Fiber and UTP 5/STP adapters with Ethernet or Token-Ring LANE

IBM also announces a 155-Mbps ATM adapter for the IBM 3172 for high-speed, high-capacity access to S/390 enterprise servers from ATM networks using Ethernet or Token-Ring LANE.

IBM offers a number of options for interconnecting Ethernet and Token-Ring LANs with ATM networks. One of these, the 8281 Nways ATM-to-LAN Bridge, operates as a stand-alone component or as an 8260 hub module, and connects two or four LAN ports to an ATM network. In this announcement IBM added field-upgradable, ATM LANE, allowing LANs connected to ATM networks via the 8281 to fully participate in MSS-based virtual LANs.

IBM also announces ATM uplinks to servers or backbones in a wide variety of new and enhanced Nways Switches and switch modules. Refer to the section on Nways Switches for additional information.

*ATM application enablers facilitate money-saving, real-time video*

Applications like distance learning, telemedicine and real-time dissemination of video can help reduce project cycle times, rapidly disseminate critical information and minimize costly, time-consuming travel. The falling cost per user for video applications, coupled with their widely recognized benefits led the International Teleconferencing Association to predict that the market for videoconferencing alone will almost double over the next year.

Inadequate network infrastructures and the lack of integrated video tools are two of the primary obstacles to effective video applications. IBM addresses both in this announcement with its broadly enhanced ATM support and video enablers. These announcements, together with a reseller agreement with First Virtual, announced earlier this year, make it easier and less expensive than ever before to implement video applications that distribute video or provide desktop or multi-person videoconferencing solutions.

Solutions developed using IBM and First Virtual products deliver desktop videoconferencing over a local ATM network or remote ISDN network. In these solutions IBM provides the ATM infrastructure, desktop workstations and management tools, and First Virtual provides multimedia operating software and adapters for desktops plus multimedia storage servers and gateway servers. These solutions meet the needs of many customers for collaboration between individuals in different locations.

Customers who want to do distance learning with multiple, large groups or who need high quality for medical consultation, for example, can benefit from video solutions enabled by newly announced products. These enablers include:

- The IBM 8260 Nways Video Distribution Module for the 8260 Hub and 8285 Nways ATM Workgroup Switch, which receives encoded MPEG-2 video from the ATM network and decodes it, converting it to NTSC/PAL video and stereo audio for distribution to eight television monitors
- The IBM 8300 Video Access Node (VaN), which uses MPEG-2 encoding to convert analog video signals into digital form for real-time, interactive transmission over an ATM network
- A development kit for the IBM 8300 with an Audiovisual Services application programming interface that can be used to develop conferencing applications

Support for the MPEG-2 standard, rather than the more commonly supported MPEG-1 standard, allows higher transmission rates, progressive or interlaced scans, and resolutions up to 1920 x 1080–all of which contribute to higher quality, more realistic video.

*Dramatically expanded LAN switch solutions ease the transition to switched networks (Figures 6-9)*

The same heavy bandwidth demands challenging Internet service providers are coming to campus networks, if they're not already here. Campus network growth, coupled with growing use of intranets, generates large increases in the amount of data networks must carry and increases the potential for network congestion.

Network managers rank the need for increased bandwidth second after the need to provide remote access in 1996. LAN switching is generally regarded to be the most cost-effective way to increase the effective bandwidth of existing networks. Network managers need LAN switches that fit their existing configuration and can expand to meet future needs. IBM dramatically expands its LAN switch product line in this announcement, with 13 new switches that support all campus environments, all media and growth to ATM.

**Figure 6. New IBM 8270 Nways Modular LAN Switch flexibly supports Token-Ring workgroups with optional ATM uplinks**

View Figure 6.

IBM has offered inexpensive, high-performance Ethernet and Token-Ring switches for LAN workgroups for two years. IBM now expands its existing 827x Nways LAN Switch products with a new, fully modular workgroup LAN switch for Token-Ring, two new Universal Feature Cards (UFCs), two new LAN Switch modules for the 8260 Nways Hub and source-route bridging for Token-Ring LAN switches.

The new 8270 Nways LAN Switch Model 800 has a maximum usable throughput of 480,000 packets per second. Slots for up to eight UFCs allow it to be configured as a Token-Ring switch with copper or fiber media and ATM uplinks for server or backbone network connections.

The new UFCs support 155-Mbps ATM uplinks for Ethernet or Token Ring. The ATM UFC can be used in all models of IBM 8270, 8271 and 8272 LAN Switches, and the LAN Switch modules for

the 8260. Source-route bridging provides multiport bridging capability, allowing network managers to support multiple virtual LANs on a Token-Ring switch with communication among all nodes on all virtual LANs. The new 8271 and 8272 LAN Switch Modules for the 8260 provide packet-to-ATM cell conversion, ATM LANE and a direct connection between the switch modules and 8260 ATM backplane.

IBM also announces six new 8273 and 8274 Nways midrange switches. Three of these new switches support fixed, 10-Mbps Ethernet configurations with FDDI, CDDI, Fast Ethernet or ATM uplinks. Three of these new switches are modular switches supporting either five or nine Ethernet, Token-Ring, FDDI, CDDI, Fast Ethernet, or ATM modules. All of these switches include, in addition to self-learning, any-to-any switching and high-speed server and backbone access:

- Policy-based virtual LANs supported by an advanced, graphical virtual LAN manager
- Standard 802.10 trunking
- Internal IP and IPX routing
- Comprehensive LAN-to-ATM networking, with PVC and SVC support, ATM LANE, Classical IP over ATM and Multiprotocol Encapsulation over ATM
- RMON support

**Figure 7. New 8273 supports all Ethernet cabling, offers FDDI and ATM uplinks and includes an integrated IP and IPX router**

View Figure 7.

The new 10-Mbps Ethernet switches provide front-panel connections for either 12, RJ-45 ports for 10BASE-T or 8 slots for a mixture of 10BASE-2, 10BASE-5, 10BASE-T and 10BASE-FL ports, accommodating all Ethernet media. Each of the 10-Mbps Ethernet LAN switches also has two back-panel connections for uplink modules supporting any combination of 100BASE-TX, 100BASE-FX, FDDI, CDDI or 155-Mbps (OC-3) ATM single-mode fiber.

**Figure 8. New 8274 flexibly supports workgroups and switched backbones, with Ethernet, Fast Ethernet, FDDI, CDDI and ATM modules**

View Figure 8.

The new, mid-range, modular switches support either five or nine hot-swappable switching modules. They are based on an 11.2-Gbps frame bus optimized for frame-to-frame switching and frame-to-cell adaptation, a 13.2-Gbps cell matrix optimized for cell-to-cell switching and cell-to-frame adaptation and a management bus for configuration and operation.

Each switching module has two RISC processors and five ASICs, supported by an advanced memory architecture for media-speed switching no matter how many ports are supported. The 9-slot switch has a capacity of up to 96 Ethernet ports, 64 100BASE-TX ports, 64 CDDI ports, 48 Token-Ring ports or 16 FDDI or 155-Mbps ATM ports. The 8274 fits between the 8270, 8271 and 8272 workgroup switches and the 8260 with backbone or workgroup switch modules.

The 8273 and 8274 will be enhanced throughout 1997. IBM previews will further broaden the already broad configuration support offered by these products with additional 8273 sub-modules, including Fast Ethernet, DS3 ATM and E3 ATM, along with Fast Ethernet, DS3 and E3 ATM and Token-Ring switching modules for the 8274.

IBM also announced 10 new backbone LAN switch modules for the 8260 Nways Hub. The 8260 backbone switch modules use a new 2-Gbps, 3.4 million packet-per-second 8260 packet backplane, in conjunction with 650,000 packet-per-second switch controllers on each module for high-speed, scalable, fault-tolerant backbone switching of up to 196 Ethernet segments, 32 FDDI

DAS-connected rings or 64 Fast Ethernet segments. These modules, for 10BASE-T, 10BASE-FL/FB, FDDI, 100BASE-TX and 100BASE-FX support the high-function requirements of backbone switching with features like:

- Support for up to 32,000 MAC addresses
- Hardware-based frame and protocol filtering
- Traffic prioritization
- ASIC-based virtual networking, with up to 256 virtual switches per hub
- Complete fault tolerance, with no single point of failure
- Integrated RMON
- Graphical management

A dedicated switching engine on each switch module provides scalability and full media-speed switching on all ports. User-specified protocol prioritization guarantees priority access for critical operations, like IP broadcasts for multimedia applications. Store-and-forward switching with dynamic buffering provides full error checking and switches large data bursts without packet loss. IBM also previewes a LAN-to-ATM switch module which will convert frames to cells and communicate using ATM LANE to an ATM network through a 155-Mbps, front-panel connector.

IBM also announces three new models of the 8260 with the new packet backplane, and upgrades that allow the new backplane to be added to existing hubs. IBM previewes a new, more compact 8260 with seven slots for switch modules. The new 8260 offers all the function of larger 8260 models in a smaller package, making it ideal for floor wiring closets where space is often at a premium.

In addition to new 8260 Switch Modules, IBM also announces a 155-Mbps Concentration Module with three ports. This module offers a 50% increase in the number of 155-Mbps ATM ports compared with earlier modules. Also, IBM releases a new version of the ATM Switch/Control Point microcode that:

- Quadruples the number of ATM connections to 4,000 per ATM module
- Supports larger buffer pools to better support LANE
- Adds support for available bit rate (ABR) flow control for maximum network resource utilization, combined with early packet discard or partial packet discard
- Supports a variable range of VPC and VCC values to optimize for a range of destinations and connections per site.

**Figure 9. New switching modules for the IBM 8260 Nways Hub**
View Figure 9.

*Remote access solves critical customer problems (Figure 10)*

Many corporations have already evaluated or implemented small-scale remote access, often using IBM Dial-In Access to LANs (DIALs) servers. Network managers now consider deploying remote access on a large scale to be their most pressing mission, according to the 1996 survey of network managers conducted by Communications Week. The remote access server market is expected to double over the next year, according to International Data Corporation.

As network managers learn more about remote access and how to offer and manage it, their requirements are centering on:

- High performance and end-to-end optimization, including tariff management
- Servers with a range of capacities that match small, regional and central office needs
- Support for multiple protocols
- Wide range of client support
- Extensive security and manageability

IBM, working with Shiva Corporation, has developed an extensive, award-winning family of remote access servers for Ethernet and Token-Ring LANs that meets these requirements and supports from 2 to more than 70 connections at a time. These servers support:

- Dial in, dial out, fax out and LAN-to-LAN connections
- A wide range of clients including DOS, Windows, Windows95, Windows NT, OS/2, Apple, UNIX and others
- Key protocols including IP, IPX, NetBIOS, SNA and AppleTalk
- Analog, ISDN, X.25 and switched 56-Kbps connections
- Specially designed for remote LAN access functions, like filtering, header compression and STAC data compression
- Extensive security and management

IBM added Token-Ring support to its 8235 DIALs Model I40 remote access server for corporate offices in this announcement. The 8235 DIALs Model I40, with its unique, high-performance multiprocessing architecture, supports low-latency, remote access for more than 70 analog or ISDN calls simultaneously. The 8235 DIALs Model I40 can automatically discriminate between analog and digital calls, making it easier to configure and allowing users to use a single telephone number regardless of the service used. Ethernet connections were previously announced for the 8235 DIALs Model I40.

**Figure 10. IBM 8235 Model I40 DIALs remote access server for enterprise remote access**
View Figure 10.

*Ethernet and Token-Ring enhancements preserve investments*

While IBM continues to recommend switching and ATM for new networks and network expansions, IBM realizes that many of its customers continue to need enhancements for their existing Ethernet and Token-Ring networks. IBM offers three new, industry-leading Ethernet and Token-Ring adapters in this announcement.

A new EtherJet PC Card combines the functions of the existing Ethernet PC Card with full-duplex capability and industry-leading EtherJet technology and performance. The new Turbo 16/4 Token-Ring ISA adapter transmits data up to 90% faster than its predecessor ISA adapter. The new PCI Token-Ring Adapter is the highest-performing Token-Ring adapter yet, with even higher performance than the previously industry-leading Auto LANStreamer™ adapter. In addition to flexibility and high performance, these adapters share IBM's innovative LANAID driver, which combines ease of use and support for all key systems with extremely low resource utilization.

*Integrated management lowers the cost of network ownership (Figure 11)*

Nways Managers help customers save money and increase the effectiveness of their networks at the same time by providing easy-to-use integrated software applications that cost less than a

set of separate device managers and allow a user to configure, control and maintain LANs, virtual LANs, ATM networks and WANs. When coupled with the TME™ 10 product line, the Nways Managers offer powerful, end-to-end management solutions for managing their entire network and its interconnected networking devices.

**Figure 11. Nways Managers lower the cost of networking by providing the information operators need to keep networks running smoothly**

View Figure 11.

Network management is as important to effective network operation as good network design. By reducing operation costs, network management can save more money over the life of a network than it originally cost to implement the network. IBM offers Nways Managers for AIX, Windows, and HP OpenView that improve operator productivity and network effectiveness and save money. Key features common to these Nways Managers across the supported environments include:

- Automatic network discovery
- Object-oriented databases
- Up-to-date, color-coded graphical views of network topology that change dynamically as network conditions change
- Similarly dynamic color-coded views of network devices
- The ability to browse, update and compile MIBs
- Trap management, including the ability to specify trap severities
- Polling configuration and notification
- Inventory management
- Real-time and historical statistics collection, presentation and reporting
- Telnet and FTP
- Access control based on user identification

With these managers, operators work with dynamically updated, graphical depictions of networking devices and how they are interconnected in managed networks to:

- View or change network, device, module or port configuration
- Display statistics at a device, module or port
- Select specific components by pointing with a mouse
- View color-coded device status
- Define and monitor performance thresholds
- Define and monitor real-time and historical statistics
- Update device software

This announcement delivers integrated software applications that lower network operating costs. New versions of the existing Nways Managers for Windows, Nways Campus Manager LAN, ATM and RMON and new management applications for newly announced switches are announced.

The Nways RouteSwitch Network Manager and Nways RouteTracker Manager provide support for the 8273 and 8274. The new switch modules for the 8260 will be supported by a PTF to the current Nways Campus Manager LAN for AIX, concurrent with switch module availability. The PTF will provide a simple view of the switch modules, plus VBridge management, protocol filter definition, a list of DMMs and other functions. The PTF will be available from an IBM Conference Disk at no charge until the function is integrated into the Nways Campus Manager LAN.

IBM also announces a new Nways Manager for Enterprise Networks combining the functions of the Nways BroadBand Switch Manager, the Router and Bridge Manager and the SNA Alert Manager into a single product called the *Nways Enterprise Manager* (link).

Key management highlights of this announcement are:

- Improved management of medium-to-large LANs, ATM networks, and Virtual LANs in the Nways Campus Managers for AIX
  - 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 2 standard
  - Comprehensive device management for IBM Networking Hardware devices
- Improvements for managing small networks and workgroup environments in the Nways Manager for Windows
  - Enhanced ATM management capabilities
  - Virtual LAN management, using a drag and drop interface
  - Enhanced operator productivity through coupling the Nways Manager for Windows and the Nways LAN Remote Monitor for Windows
  - An improved TCP/IP stack optimized for the Windows environment
  - Inclusion of NetView for Windows Version 2.1
  - RMON interface enhancements for end users
  - Comprehensive device management for IBM networking hardware devices
- New managers for the 8273 and 8274 Nways Switches
  - Comprehensive graphical device management
  - Industry-leading, policy-based virtual LAN management
- New Nways Enterprise Manager that, in conjunction with the other Nways Managers, allows end-to-end management of an entire network

- Combines the functions of the Nways BroadBand Switch Manager, the Router and Bridge Manager, and the SNA Alert Manager
- Refer to the separate fact sheet in the announcement booklet describing IBM Enterprise Networking Announcements for additional details

IBM will provide enhancements to the Nways Campus Managers for HP OpenView that are similar to those announced for the Nways Campus Managers for AIX. These enhancements will be announced at a later date.

In addition, IBM previews network management application software for the newly announced switch modules for the 8260. This software will be integrated into the Nways Campus Manager LAN for AIX and HP OpenView, with target availabilities of 1H97 and 2H97, respectively.

One of the most significant enhancements to these managers is support for virtual LANs. In traditional networks, using hubs and routers, networks are divided using hubs into segments comprising broadcast domains. Broadcast domains are connected using routers. Ethernet or Token-Ring frames are repeated within hubs and routed between hubs. The network structure is determined by the physical placement of components and their connection to hubs and routers. Switching can be used to increase throughput and decrease latency within broadcast domains.

With virtual LANs, the network structure is divorced from the physical placement of components, by using switches to divide the network into logical broadcast domains independent of component physical location. Broadcast domains can be defined using some or all of the components connected to a switch or multiple switches. The broadcast domain becomes a virtual LAN. Frames are switched within a virtual LAN and routed between virtual LANs. Virtual LANs can be created from Ethernet, Token-Ring or ATM Emulated LAN segments and allow network managers to arrange users into logical groups, dramatically simplifying the task of adding, moving and changing users.

The Nways RouteTracker Manager provides powerful virtual LAN capability for IBM's new 8273 and 8274 switches. When a user or server is moved from one location to another, the Nways RouteTracker Manager automatically reconfigures the switches involved. Components can belong to more than one virtual LAN, keeping broadcast domains small and minimizing delays introduced by routing and the bandwidth needed by broadcast traffic.

The Nways Campus Manager ATM for AIX provides comprehensive support for LANE. This support includes automatic discovery of LANE servers, clients and proxy clients. Discovered topologies can be used to build displays which are dynamically updated to show color-coded device status and the devices assigned to virtual LANs. Operators can add, remove or change components of a virtual LAN with a drag-and-drop interface. Templates are provided to automate virtual LAN configuration by grouping a set of individual actions and executing them with a single command. Fault management, performance monitoring and security control are provided.

## Benefits

*Multiprotocol Switched Services (MSS) fulfills promise of SVN*

The key benefits of MSS are:

- Networking among LANE and Classical IP clients for an easy migration path from existing networks to ATM.
- Support for both IBM LANE and ATM Forum-compliant LANE for maximum interoperability.

- Emulated, virtual LANs that remove physical constraints and facilitate adding, moving or changing equipment and users.
- Standards-based IP and IPX routing over ATM between virtual LANs that preserves customer investments in IP and IPX networks.
- Standards-based transparent and source-route bridging between virtual LANs that allows virtual LANs to be partitioned for increased performance and manageability.
- Reduced broadcast traffic for higher performance and scalability by converting broadcasts into unicasts whenever possible.
- Reduced network complexity by combining LANE server and ARP server functions within a single component that can be optionally integrated into an ATM switching hub.
- Increased availability with redundant LES and ARP server capability.
- Reduced operation costs and skill requirements with intelligent, graphical configuration and management tools that can be accessed from the Internet.

*Increased ATM connectivity choices speed ATM deployment*

- ATM Forum-compliant LANE and Classical IP over ATM broaden interoperability with other ATM products and ease migration to ATM or ATM use in critical subnetworks for server access, intranets or backbone traffic.
- ATM uplinks in Nways switches provide a direct, high-speed, high-capacity link between switched LANs and servers or backbones, increasing performance and lowering latency and response times.
- 155-Mbps ATM support with LANE in the 3172 provides faster response times and higher throughput for database, Web server or other application access to S/390 enterprise servers.

*ATM application enablers facilitate money-saving, real-time video*

- Eases implementation of money-saving videoconferencing by providing many of the components needed, with application interfaces to facilitate custom application development.
- Supports MPEG-2 standard for higher quality and realism than achievable with the more commonly supported MPEG-1 standard.

*Dramatically expanded Nways switch solutions ease the transition to switched networks*

- The range of switches and supported media offers greater flexibility and reduces costs with solutions that match an extremely large number of customer configurations.
- Any-to-any translation and internal IP and IPX routing in many of the switches allow network managers to build large virtual LANs that are easier to administer and manage than LANs based on physical topology alone.
- ATM uplinks in Nways switches provide a direct, high-speed, high-capacity link between switched LANs and servers or backbones, increasing performance and lowering latency and response times.

- Fault-tolerant 8274 Nways switches and the 8260 with switching modules provide a broad range of protocol and media support, very high capacities and industry-leading fault tolerance.

*Remote access solves critical customer problems*

- New Token-Ring support for the 8235 Model I40 DIALs enterprise remote access server supports more than 70 users with scalable dial-in, dial-out (including Internet and intranet access) and LAN-to-LAN access from a central location where it can be more easily managed and administered.

*Ethernet and Token-Ring enhancements preserve investments*

- New Ethernet and Token-Ring adapters combine industry-leading performance and ease of use at aggressively competitive prices.

*Integrated management lowers the cost of network ownership*

- Enhanced Nways managers combine advanced, graphical support of all announced IBM Networking products with integrated management applications for analysis, reporting and record-keeping for lowest cost of network ownership.
- Enterprise Communications Analysis Module (ECAM) tells network managers who is talking to whom in the network and what protocols they are using.

## Positioning

*MSS fulfills promise of SVN*

The MSS components are for customers with one or more of the following needs:

- Support for a mixture of existing Ethernet or Token-Ring LANs and ATM
- Replacement of an existing LAN backbone with a high-performance, scalable ATM backbone with attached servers
- Support for large ATM emulated LANs (ELANs) or ATM ELANs with excessive broadcasts
- Highly available ATM ELANs
- Bridging or routing among multiple ELANs (including between Ethernet and Token Ring)
- Communication between Classical IP stations and ATM ELAN stations
- Support for a large Classical IP environment

*Increased ATM connectivity choices speed ATM deployment*

- ATM Forum-compliant LANE for TURBOWAYS adapters, the 8281 Nways ATM LAN Bridge and IBM LAN switches broadens interoperability for these products
- ATM uplinks for workgroup and backbone LAN switches, offered as stand-alone components or 8260 Nways Hub modules, support high-speed backbone or server attachments in a very wide range of configurations

*ATM application enablers facilitate money-saving, real-time video*

- The IBM-First Virtual solutions are for customers who want personal videoconferencing for collaboration between individuals
- The Video Access Node and Video Server are for customers who want to implement high-quality, full-motion, group or individual videoconferencing or distance learning
- The Video Distribution Module for the 8260 is for customers who want simultaneous display of high-quality, full-motion video on multiple monitors connected over an ATM network

*Dramatically expanded Nways switch solutions ease the transition to switched networks*

- The 8271 and 8272 Nways LAN Switches are intended for customers with small to medium workgroups who need:
  - Ethernet or Token-Ring switching (either half-duplex or full duplex)
  - Ethernet, Token-Ring, Fast Ethernet or ATM uplinks
  - Costs-per-port that are among the lowest in the industry
- The 8270 Nways LAN Switch is for customers with small to medium workgroups who need Token-Ring switching (either half-duplex or full-duplex), plus more flexibility or redundancy than the 8272 can offer
- The 8273 Nways RouteSwitches are for customers with medium-size workgroups, or those who need primarily Fast Ethernet, FDDI uplinks or large virtual LANs not based on ATM
- The 8274 Nways LAN RouteSwitch is for customers with medium to large workgroups who want a flexible switched solution with medium levels of fault tolerance
- The 8260 with switching modules is for customers who need the extremely broad range of protocol and media support, very high capacities and industry-leading fault tolerance offered only by the 8260 with its range of Ethernet, Token-Ring, FDDI, Fast Ethernet and ATM concentration and switching

*Remote access solves critical customer problems*

- The enhancements to the 8235 DIALs Model I40 are for customers who need centralized, large-scale remote access for up to 70 simultaneous users connected to a Token-Ring infrastructure

*Ethernet and Token-Ring enhancements preserve investments*

- The EtherJet PC Card delivers industry-leading EtherJet technology in a PC Card. This adapter combines high performance, low drain on the host CPU, low driver memory requirements and easy-to-use installation and operation with the portability of a PC Card for portable computers needing Ethernet LAN access
- The new Token-Ring adapters continue IBM's emphasis on high performance, low cost, and ease of use. The TURBO 16/4 ISA adapter, designed for demanding network computing applications, can almost double throughput compared with previous Token-Ring ISA adapters. The new PCI adapter performance continues to lead the industry and is especially well-suited to Pentium servers or desktops

*Integrated management lowers the cost of network ownership*

- The Nways Manager for Windows is for networks with up to 200 nodes, with Ethernet, Token Ring, ATM or a combination. The Nways Manager for Windows, with NetView for Windows and TCP/IP support included, is an uncomplicated, cost-effective, all-in-one answer to lower operating costs
- The Nways Campus Managers for AIX and HP Openview support even the largest networks, and are packaged as separate components to give network managers the option of excluding functions that they don't currently need. Nways Manager Suites are also available for those who need multiple components and are attracted by cost savings compared with components purchased separately
- The Nways Enterprise Manager provides integrated wide-area management for routers, bridges, and wide-area switches, and augments the Nways Campus Managers. The Nways Campus and Enterprise Managers together offer graphical management for the total spectrum of network hardware, from workstation adapters to central backbone switches
- The Nways RMON Managers deliver comprehensive RMON 2 support, providing remote management of higher layer protocols and applications
- New management applications for the 8273 and 8274 switches and new switch modules for the 8260 will be integrated into the Nways Manager family at a later date

## Announcement Summary

Network computing defines a connected world where people have easy access to the information they need to work and live. Network computing will reshape every institution and business–and ultimately transform the way we work, shop, communicate, learn and interact. IBM has focused its development and services on network computing because of the importance of network computing, the Internet and intranets to our customers. IBM Networking product solutions are a key element of that focus.

While ATM enables the full implementation of network computing, ATM must complement existing local and wide-area technologies to be successful. Realizing this, IBM has delivered ATM solutions with switches, routers, workstations and mainframes linked to existing networks in a way that both increases their value and enables exciting new applications. The SVN framework, for ATM and non-ATM switched networks, allows customers to build smart, switched networks that support all applications. IBM continues to deliver product solutions, quarter by quarter, that enhance that framework.

IBM Networking's primary objective is to pave the way for customers who implement network computing by delivering smart networks that leverage investments and support all applications at aggressive, affordable prices. IBM Networking delivers solutions that solve our customers' problems:

- Virtual networks supporting multiple protocols and millions of packets per second
- LAN switches that support every media type, LAN protocol and customer configuration with outstanding price and performance

- New and enhanced integrated management software for more efficient networks that cost less to operate
- Remote access for flexible network access that matches the way people like to work
- Improvements to adapters, hubs, switches, routers and control units that increase performance and make them more flexible and easier to use, at aggressively affordable prices
- Frame Relay, ISDN and ATM protocol support for more capacity and lower line costs

IBM Networking is uniquely positioned to meet the totality of our customers' networking needs, as a member of a tightly linked IBM team focused on network computing, the Internet, and intranets. This team can offer our customers the broadest range of products and services in the industry.

As demonstrated by this announcement, IBM Networking is ensuring best-of-breed technology throughout the product line by:

- Driving new applications with innovative approaches like SVN and MSS that leverage existing investments
- Leading in patents, interoperability and proactive standards participation
- Establishing key technology exchange alliances to give customers more solutions sooner

IBM Networking is dedicated to solving our customers' problems with world-class Internet and intranet infrastructure solutions, as a key element of IBM's network-computing initiatives.

**Table 1. Part Numbers, Prices, Availability**

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| **Multiprotocol Switched Services** | | | | |
| 8210 Nways Multiprotocol Switched Server | 8210 | 001 | $9,590 | Available |
| 1-Port 155-Mbps Multimode Fiber ATM Adapter | 8210 | 3001 | $2,600 | Available |
| 1-Port 155-Mbps Single-Mode Fiber ATM Adapter | 8210 | 3002 | $5,500 | Available |
| PC Card Hardfile | 85H4658 | 8708 | $800 | Available |
| MSS Service Kit | 8210 | 2505 | $15 | Available |
| MSS Microcode Release 1 | 8210 | 8706 | $6,000 | Available |
| 8260 Multiprotocol Switched Services Module | 42H1350 | 5300 | $12,860 | Available |
| IBM LAN Emulation Support | – | – | NC | 12/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| **LAN Switches** | | | | |
| 8270 Nways LAN Switch Model 800 | 85H6584 | 800 | $1,250 | 3/97 |
| 8270 Token-Ring Processor Card | 72H4650 | 4650 | $3,750 | 3/97 |
| 8270 Redundant Power Supply | 72H4648 | 4648 | $795 | 3/97 |
| 155-Mbps ATM Ethernet UFC (Multimode Fiber) for 8271 and 8271 LAN Switch Module for the 8260 | 41H6988 | 6988 | $3,995 | 12/96 |
| 155-Mbps ATM Token-Ring UFC (Multimode Fiber) for 8270, 8272 and 8272 LAN Switch Module for the 8260 | 85H5076 | 5076 | $3,995 | 12/96 |
| 4-Port Enhanced Token-Ring UTP/STP UFC for 8270, 8272 and 8272 LAN Switch Module for the 8260 | 85H5092 | 5092 | $1,600 | 12/96 |
| 2-Port Enhanced Token-Ring Fiber UFC for 8270, 8272 and 8272 LAN Switch Module for the 8260 | 85H5087 | 5087 | $1,600 | 12/96 |
| 8271 Ethernet Switch R3 Microcode Upgrade | 85H6615 | – | NC | 12/96 |
| 8272 Token-Ring Switch R3 Microcode Upgrade | 85H6617 | – | NC | 12/96 |
| 8270 Token-Ring Switch R3 Microcode Upgrade | 85H6618 | – | NC | 3/97 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8272 Token-Ring Module R3 Microcode Upgrade | 85H6619 | – | NC | 12/96 |
| 8273 Nways Ethernet RouteSwitch Model 100 | 8273 | 100 | $5,000 | Available |
| 8273 Nways Ethernet RouteSwitch Model 10E | 8273 | 10E | $6,925 | Available |
| 8273 Nways Ethernet RouteSwitch Model 10U | 8273 | 10U | $3,750 | Available |
| 8273 Model 10U AUI/10BASE-T Adapter Board | 8273 | 7119 | $450 | Available |
| 8273 Model 10U 10BASE-FL Adapter Board (Multimode Fiber) | 8273 | 7118 | $450 | Available |
| 8273 Model 10U 10BASE-FL Adapter Board (Single-Mode Fiber) | 8273 | 7117 | $1,450 | Available |
| 8273 Model 10U 10BASE2 Adapter Board | 8273 | 7115 | $250 | Available |
| 8273 Model 10U 10BASE-T Adapter Board | 8273 | 7116 | $250 | Available |
| 8273 100BASE-TX Sub-Module (4-Port) | 8273 | 7123 | $1,750 | Available |
| 8273 FDDI Sub-Module (1-Port DAS, Multimode Fiber) | 8273 | 7131 | $3,000 | Available |
| 8273 FDDI Sub-Module (1-Port DAS, Single-Mode Fiber) | 8273 | 7130 | $6,000 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8273 CDDI Sub-Module (4-Port CDDI) | 8273 | 7129 | $3,000 | Available |
| 8273 155-Mbps OC3 SONET SDH ATM Sub-Module (1-Port Multimode Fiber, 500-KB SRAM) | 8273 | 7128 | $3,000 | Available |
| 8273 155-Mbps OC3 SONET SDH ATM Sub-Module (1-Port Multimode Fiber, 2-MB SRAM) | 8273 | 7127 | $4,450 | Available |
| 8273 155-Mbps OC3 SONET SDH ATM Sub-Module (1-Port Single-Mode Fiber, 500-KB SRAM) | 8273 | 7126 | $6,000 | Available |
| 8273 155-Mbps OC3 SONET SDH ATM Sub-Module (1-Port Single-Mode Fiber, 2-MB SRAM) | 8273 | 7125 | $7,450 | Available |
| 8273 RouteSwitch Software Program V2 R0.x | 5697-B69 | 4040 | $2,450 | Available |
| 8273 RouteSwitch Software Program V2 R1.x | 5697-B69 | 4061 | $3,400 | 12/96 |
| 8274 Nways LAN RouteSwitch Model 500 | 8274 | 500 | $3,850 | Available |
| 8274 Nways LAN RouteSwitch Model 548 | 8274 | 548 | $3,750 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 Nways LAN RouteSwitch Model 513 | 8274 | 513 | $5,250 | Available |
| 8274 Nways LAN RouteSwitch Model 900 | 8274 | 900 | $6,545 | Available |
| 8274 Nways LAN RouteSwitch Model 913 | 8274 | 913 | $7,950 | Available |
| 8274 10BASE-T Module (12-Port/RJ-45, 1024-byte CAM) | 8274 | 7108 | $5,450 | Available |
| 8274 10BASE-T Module (12-Port/RJ-45, 2048-byte CAM) | 8274 | 6863 | $5,800 | Available |
| 8274 10BASE-T Module (12-Port/TELCO, 1024-byte CAM) | 8274 | 7107 | $5,450 | Available |
| 8274 10BASE-T Module (12-Port/TELCO, 2048-byte CAM) | 8274 | 6864 | $5,800 | Available |
| 8274 10BASE-FL Module (8-Port/Multimode Fiber, 1024-byte CAM) | 8274 | 7106 | $6,950 | Available |
| 8274 10BASE-FL Module (8-Port/Multimode Fiber, 2048-byte CAM) | 8274 | 6866 | $7,300 | Available |
| 8274 Ethernet Universal Switching Module (USM) (1024-byte CAM) | 8274 | 7105 | $3,950 | Available |
| 8274 Ethernet Universal Switching Module (USM) (2048-byte CAM) | 8274 | 6865 | $4,300 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 Ethernet USM Adapter for AUI/10BASE-T | 8274 | 7104 | $450 | Available |
| 8274 Ethernet USM Adapter for 10BASE-FL (Multimode Fiber) | 8274 | 7103 | $450 | Available |
| 8274 Ethernet USM Adapter for 10BASE-FL (Single-Mode Fiber) | 8274 | 7102 | $1,450 | Available |
| 8274 Ethernet USM Adapter for 10BASE-T | 8274 | 7101 | $250 | Available |
| 8274 Ethernet USM Adapter for FDX BNC Port (10BASE2) | 8274 | 7100 | $250 | Available |
| 8274 Ethernet USM Adapter for FDX AUI Port (10BASE2) | 8274 | 7099 | $450 | Available |
| 8274 100BASE-TX Module (4-Port/RJ-45, 1024-byte CAM) | 8274 | 7098 | $5,200 | Available |
| 8274 100BASE-TX Module (4-Port/RJ-45, 2048-byte CAM) | 8274 | 6867 | $5,550 | Available |
| 8274 100BASE-TX Module (8-Port/RJ-45, 1024-byte CAM) | 8274 | 7025 | $6,950 | Available |
| 8274 100BASE-TX Module (8-Port/RJ-45, 2048-byte CAM) | 8274 | 6868 | $7,300 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Multimode Fiber, 500-KB SRAM, 1024-byte CAM) | 8274 | 7087 | $7,950 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 ATM OC-3c SONET SDH Module (1-Port Multimode Fiber, 500-KB SRAM, 2048-byte CAM) | 8274 | 6877 | $8,300 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Multimode Fiber, 2-MB SRAM, 1024-byte CAM) | 8274 | 7086 | $9,400 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Multimode Fiber, 2-MB SRAM, 2048-byte CAM) | 8274 | 6878 | $9,750 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Multimode Fiber, 500-KB SRAM, 1024-byte CAM) | 8274 | 7027 | $10,950 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Multimode Fiber, 500-KB SRAM, 2048-byte CAM) | 8274 | 6879 | $11,300 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Multimode Fiber, 2-MB SRAM, 1024-byte CAM) | 8274 | 7084 | $13,850 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Multimode Fiber, 2-MB SRAM, 2048-byte CAM) | 8274 | 6880 | $14,200 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 ATM OC-3c SONET SDH Module (1-Port Single-Mode Fiber, 500-KB SRAM, 1024-byte CAM) | 8274 | 7083 | $10,950 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Single-Mode Fiber, 500-KB SRAM, 2048-byte CAM) | 8274 | 6881 | $11,300 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Single-Mode Fiber, 2-MB SRAM, 1024-byte CAM) | 8274 | 7082 | $12,400 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port Single-Mode Fiber, 2-MB SRAM, 2048-byte CAM) | 8274 | 6882 | $12,750 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Single-Mode Fiber, 500-KB SRAM, 1024-byte CAM) | 8274 | 7081 | $16,950 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Single-Mode Fiber, 500-KB SRAM, 2048-byte CAM) | 8274 | 6883 | $17,300 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 ATM OC-3c SONET SDH Module (2-Port Single-Mode Fiber, 2-MB SRAM, 1024-byte CAM) | 8274 | 7080 | $19,850 | Available |
| 8274 ATM OC-3c SONET SDH Module (2-Port Single-Mode Fiber, 2-MB SRAM, 2048-byte CAM) | 8274 | 6884 | $20,200 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port UTP, 500-KB SRAM, 1024-byte CAM) | 8274 | 7079 | $7,950 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port UTP, 500-KB SRAM, 2048-byte CAM) | 8274 | 6885 | $8,300 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port UTP, 2-MB SRAM, 1024-byte CAM) | 8274 | 7078 | $9,400 | Available |
| 8274 ATM OC-3c SONET SDH Module (1-Port UTP, 2-MB SRAM, 2048-byte CAM) | 8274 | 6886 | $9,750 | Available |
| 8274 FDDI DAS Module (1-Port MIC Multimode Fiber, 1024-byte CAM) | 8274 | 7055 | $7,950 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 FDDI DAS Module (1-Port MIC Multimode Fiber, 2048-byte CAM) | 8274 | 6893 | $8,300 | Available |
| 8274 FDDI DAS Module (2-Port MIC Multimode Fiber, 1024-byte CAM) | 8274 | 7056 | $10,950 | Available |
| 8274 FDDI DAS Module (2-Port MIC Multimode Fiber, 2048-byte CAM) | 8274 | 6894 | $11,300 | Available |
| 8274 FDDI DAS Module (1-Port SC Single-Mode Fiber, 1024-byte CAM) | 8274 | 7060 | $10,950 | Available |
| 8274 FDDI DAS Module (1-Port SC Single-Mode Fiber, 2048-byte CAM) | 8274 | 6896 | $11,300 | Available |
| 8274 FDDI DAS Module (2-Port SC Single-Mode Fiber, 1024-byte CAM) | 8274 | 7061 | $16,950 | Available |
| 8274 FDDI DAS Module (2-Port SC Single-Mode Fiber, 2048-byte CAM) | 8274 | 6897 | $17,300 | Available |
| 8274 CDDI DAS Module (4-Port RJ-45, 1024-byte CAM) | 8274 | 7057 | $7,950 | Available |
| 8274 CDDI DAS Module (4-Port RJ-45, 2048-byte CAM) | 8274 | 7075 | $8,300 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 CDDI DAS Module (8-Port RJ-45, 1024-byte CAM) | 8274 | 7058 | $10,950 | Available |
| 8274 CDDI DAS Module (8-Port RJ-45, 2048-byte CAM) | 8274 | 7026 | $11,300 | Available |
| 8274 FDDI/CDDI DAS Module (1-Port MIC Multimode Fiber, 4-Port STP, 1024-byte CAM) | 8274 | 7028 | $10,950 | Available |
| 8274 FDDI/CDDI DAS Module (1-Port MIC Multimode Fiber, 4-Port STP, 2048-byte CAM) | 8274 | 6895 | $11,300 | Available |
| 8274 Management Processor Module (8-MB DRAM) | 8274 | 7113 | $2,600 | Available |
| 8274 Management Processor Module (16-MB DRAM) | 8274 | 7112 | $3,500 | Available |
| 8274 Management Processor Module Upgrade to 16 MB | 8274 | 7110 | $1,475 | Available |
| 8274 Management Processor Module 2-MB Flash Memory Upgrade | 8274 | 7109 | $100 | Available |
| 8274 Management Processor Module 1024-byte CAM Upgrade | 8274 | 7062 | $350 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8274 Redundant or Spare Power Supply for Model 500 | 8274 | 7142 | $1,750 | Available |
| 8274 Redundant or Spare Power Supply for Model 513 | 8274 | 7141 | $2,500 | Available |
| 8274 Redundant or Spare Power Supply for Model 548 | 8274 | 7140 | $2,000 | Available |
| 8274 Redundant or Spare Power Supply for Model 900 | 8274 | 7139 | $2,500 | Available |
| 8274 Redundant or Spare Power Supply for Model 913 | 8274 | 7138 | $3,000 | Available |
| 8274 Wall-Mount Bracket for Models 500, 513 and 548 | 8274 | 7137 | $95 | Available |
| 8274 Wall-Mount Bracket for Models 900 and 913 | 8274 | 7136 | $95 | Available |
| 8274 Blank Panel for Models 5xx and 9xx | 8274 | 7135 | $65 | Available |
| 8274 Cable Organizer for Model 5xx | 8274 | 7134 | $95 | Available |
| 8274 Cable Organizer for Model 9xx | 8274 | 7133 | $195 | Available |
| 8274 RouteSwitch Software Program V2 R0.x | 5697-B70 | 4042 | $2,950 | Available |
| 8274 RouteSwitch Software Program V2 R1.x | 5697-B70 | 4060 | $3,900 | 12/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 10-Slot 8260 with Packet Bus | 29H4384 | P10 | $6,550 | 12/96 |
| 17-Slot 8260 with Packet Bus | 29H4380 | P17 | $8,440 | 12/96 |
| 17-Slot 8260 with Packet Bus and ATM Backplane | 29H4382 | G17 | $9,490 | 12/96 |
| MES for 010 to P10 conversion | 29H4425 | 010 | $3,570 | 1/97 |
| MES for 017 to P17 conversion | 29H4422 | 017 | $4,200 | 1/97 |
| MES for 017 to G17 conversion | 29H4424 | 017 | $5,250 | 1/97 |
| MES for A17 to G17 conversion | 51H5247 | A17 | $1,500 | 1/97 |
| 8260 1-Slot, 12-Port 10BASE-T LAN Switch Module | 29H4350 | 7312 | $7,345 | 1/97 |
| 8260 2-Slot, 24-Port 10BASE-T LAN Switch Module | 29H4352 | 7324 | $11,335 | 1/97 |
| 8260 1-Slot, 10-Port 10BASE-FB/FL LAN Switch Module | 29H4354 | 7310 | $10,495 | 1/97 |
| 8260 2-Slot, 20-Port 10BASE-FB/FL LAN Switch Module | 29H4356 | 7320 | $18,895 | 1/97 |
| 8260 2-Slot, 12-Port 10BASE-T FDDI DAS LAN Switch Module | 29H4358 | 7314 | $10,495 | 1/97 |
| 8260 2-Slot, 10-Port 10BASE-FB/FL, FDDI DAS LAN Switch Module | 29H4360 | 7412 | $14,170 | 1/97 |
| 8260 1-Slot, Dual FDDI DAS LAN Switch Module | 29H4362 | 7304 | $11,125 | 1/97 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8260 1-Slot, 4-Port 100BASE-TX LAN Switch Module | 29H4366 | 7504 | $3,500 | 3/97 |
| 8260 1-Slot, 4-Port 100BASE-FX LAN Switch Module | 29H4364 | 7404 | $7,135 | 3/97 |
| 8260 8-MB LAN Switch Memory Upgrade | 29H4372 | 8968 | $835 | 1/97 |
| 8260 16-MB LAN Switch Memory Upgrade | 29H4374 | 8976 | $1,675 | 1/97 |
| 8260 2-Slot 8271 LAN Switch Module (ATM) | 51H4931 | 5212 | $14,500 | 3/97 |
| 8260 3-Slot 8271 LAN Switch Module (ATM) | 51H4932 | 5312 | $15,500 | 3/97 |
| 8260 2-Slot 8272 LAN Switch Module (ATM) | 51H4933 | 5208 | $13,500 | 3/97 |
| 8260 3-Slot 8272 LAN Switch Module (ATM) | 51H4934 | 5308 | $14,500 | 3/97 |
| 8260 ATM Backplane Upgrade for 8271 LAN Switch Module | 51H4935 | 5009 | $6,550 | 6/97 |
| 8260 ATM Backplane Upgrade for 8272 LAN Switch Module | 51H5020 | 5010 | $4,850 | 6/97 |
| **ATM Enhancements** | | | | |
| TURBOWAYS 25 ISA Adapter (Single) | 42H0525 | 0287 | $295 | Available |
| TURBOWAYS 25 ISA Adapter (5-pack) | 42H0526 | 0288 | $1,430 | Available |
| TURBOWAYS 25 PCI Adapter (Single) | 25H3562 | 2844 | $295 | Available |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| TURBOWAYS 25 PCI Adapter (5-pack) | 25H3563 | 2845 | $1,430 | Available |
| TURBOWAYS 25 PCI Adapter (30-pack) | 42H0554 | 1797 | $8,580 | Available |
| TURBOWAYS 100 PS/2 Multimode Fiber Adapter (Single) | 04H7521 | 4757 | $1,995 | 10/96 |
| TURBOWAYS 100 PS/2 Multimode Fiber Adapter (5-pack) | 04H7522 | 4758 | $8,975 | 10/96 |
| TURBOWAYS 155 PS/2 Multimode Fiber Adapter | 38H6388 | 4754 | $1,995 | 12/96 |
| TURBOWAYS 155 PS/2 UTP5/STP Adapter | 55H9366 | 1775 | $1,995 | 12/96 |
| 8281 Nways ATM LAN Bridge with ATM Forum-Compliant LAN Emulation | 13H6675 | 001 | $5,399 | 10/96 |
| 8281 ATM Forum-Compliant LAN Emulation Code available via FTP, bulletin boards, and the World Wide Web | – | – | NC | 10/96 |
| 8260 1-Slot, 3-Port, 155-Mbps ATM Module | 51H4474 | 5003 | $4,995 | 10/96 |
| ATM Firmware Upgrade for the 8260 and 8285 | 51H5232 | 5099 | $250 | 10/96 |
| 8260 ATM Switch/Control Point Upgrade | – | – | NC | 10/96 |
| **Video Enablers** | | | | |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 8260 Video Distribution Module | 37H7725 | 5008 | $20,000 | 3/97 |
| Video Access Node | 8300 | 300 | $7,295 | 3/97 |
| MPEG-2 Encoder Adapter | 8300 | 2100 | $33,995 | 3/97 |
| MPEG-2 Decoder Adapter | 8300 | 2200 | $2,295 | 3/97 |
| 155-Mbps Multimode Fiber ATM Adapter | 8300 | 2310 | $1,195 | 3/97 |
| 155-Mbps UTP/STP ATM Adapter | 8300 | 2320 | $1,095 | 3/97 |
| 25-Mbps UTP/STP ATM Adapter | 8300 | 2350 | $295 | 3/97 |
| Token-Ring Adapter | 8300 | 2400 | $350 | 3/97 |
| 15-inch Multisync Monitor | 8300 | 3100 | $539 | 3/97 |
| Rack-Mount Kit | 8300 | 3200 | $180 | 3/97 |
| 4-GB Audio-Visual Hard File | 8300 | 3300 | $2,069 | 3/97 |
| **Remote Access** | | | | |
| 8235 DIALs Model I40 Access Switch Chassis | 85H6484 | 6484 | $18,390 | 11/96 |
| 8235 DIALs Model I40 Access Switch Ethernet Feature with CPU | 85H4026 | 4026 | $460 | 11/96 |
| 8235 DIALs Model I40 Access Switch Token Ring Feature with CPU | 85H5656 | 5656 | $995 | 11/96 |
| **Ethernet and Token-Ring Support** | | | | |
| 10BASE-T EtherJet 10-Mbps PC Card Adapter (Single) | 72H4533 | 8188 | $159 | 10/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| 10BASE-T EtherJet 10-Mbps PC Card Adapter (5-pack) | 72H4550 | 8189 | $770 | 10/96 |
| 10BASE-T/10BASE2 EtherJet 10-Mbps Adapter (Single) | 72H4534 | 8190 | $205 | 10/96 |
| 10BASE-T/10BASE2 EtherJet 10-Mbps PC Card Adapter (5-pack) | 72H4551 | 8191 | $995 | 10/96 |
| IBM PCI Token-Ring Adapter (Single, CD-Rom) | 75H9800 | – | $350 | Available |
| IBM PCI Token-Ring Adapter (Single, Diskette) | 41H8900 | – | $350 | Available |
| IBM PCI Token-Ring Adapter (Card Pack) | 85H3410 | – | $345 | Available |
| IBM PCI Token-Ring Adapter (Bulk Pack) | 85H3409 | – | $345 | Available |
| IBM Turbo 16/4 Token-Ring ISA Adapter (Single) | 72H3482 | – | $265 | Available |
| IBM Turbo 16/4 Token-Ring ISA Adapter (Card Pack) | 72H3514 | – | $247 | Available |
| IBM Turbo 16/4 Token-Ring ISA Adapter (Bulk Pack) | 72H3495 | – | $247 | Available |
| **Management** | | | | |
| Nways Campus Manager Suite for AIX V3 | 5697-B06 | 0340 | $18,000 | 12/96 |
| Nways Campus Manager LAN for AIX V3 | 5697-B07 | 0346 | $11,000 | 11/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Nways Campus Manager ATM for AIX V2 | 5697-B08 | 0348 | $6,000 | 11/96 |
| Nways Campus Manager ReMon for AIX V2 | 5697-B17 | 0350 | $5,000 | 12/96 |
| Nways Campus Manager ReMon Advanced for AIX V2 | 5697-B19 | 0352 | $8,000 | 12/96 |
| Upgrade to Nways Campus Manager Suite for AIX V3 from Nways Campus Manager Suite for AIX V2 | 5697-B06 | 0341 | NC | 12/96 |
| Upgrade to Nways Campus Manager Suite for AIX V3 from Nways Campus Manager LAN for AIX V2 | 5697-B06 | 0342 | $7,000 | 12/96 |
| Upgrade to Nways Campus Manager Suite for AIX V3 from Nways Campus Manager ATM for AIX V1 | 5697-B06 | 0343 | $12,000 | 12/96 |
| Upgrade to Nways Campus Manager Suite for AIX V3 from Nways Campus Manager ReMon for AIX V1 | 5697-B06 | 0344 | $13,000 | 12/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Upgrade to Nways Campus Manager Suite for AIX V3 from Nways Campus Manager ReMon Advanced for AIX V1 | 5697-B06 | 0345 | $10,000 | 12/96 |
| Upgrade to Nways Campus Manager LAN for AIX V3 from Nways Campus Manager LAN for AIX V2 | 5697-B07 | 0347 | $4,000 | 11/96 |
| Upgrade to Nways Campus Manager LAN for AIX V3 from Nways Campus Manager LAN for AIX V1 | 5697-B07 | 0349 | $6,000 | 11/96 |
| Upgrade to Nways Campus Manager ATM for AIX V2 from Nways Campus Manager ATM for AIX V1 | 5697-B08 | 0351 | $2,000 | 11/96 |
| Upgrade to Nways Campus Manager ReMon for AIX V2 from Nways Campus Manager ReMon for AIX V1 | 5697-B17 | 0353 | $2,000 | 12/96 |
| Upgrade to Nways Campus Manager ReMon Advanced for AIX V2 from Nways Campus Manager ReMon Advanced for AIX V1 | 5697-B19 | 0354 | $3,000 | 12/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Nways Manager for Windows V2.1 | 5697-B55 | 4038 | $1,500 | 12/96 |
| Upgrade to Nways Manager for Windows V2.1 from V2.0 | 5697-B55 | 4039 | $500 | 12/96 |
| Nways Manager for Windows RMON Feature V2.1 | 5697-B56 | 4059 | $750 | 12/96 |
| Nways Enterprise Manager V1.1 | 5697-B53 | 4037 | $5,000 | 12/96 |
| Upgrade to Nways Enterprise Manager V1.1 from Nways BroadBand Switch Manager V1.0 | 5697-B53 | 4043 | $1,500 | 12/96 |
| Upgrade to Nways Enterprise Manager V1.1 from Nways Router and Bridge Manager V1.0 | 5697-B53 | 4044 | $2,500 | 12/96 |
| Upgrade to Nways Enterprise Manager V1.1 from Nways SNA Alert Manager V1.0 | 5697-B53 | 4045 | $1,500 | 12/96 |
| Upgrade to Nways Campus Manager LAN for AIX V3 from Nways Campus Manager LAN for AIX V2 | 5697-B07 | 0347 | NC | 11/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Upgrade to Nways Campus Manager ATM for AIX V2 from Nways Campus Manager ATM for AIX V1 | 5697-B08 | 0349 | $250 | 11/96 |
| Upgrade to Nways Campus Manager ReMON for AIX V2 from Nways Campus Manager ReMon for AIX V1 | 5697-B17 | 0351 | $250 | 12/96 |
| Upgrade to Nways Campus Manager ReMON Advanced for AIX V2 from Nways Campus Manager ReMon Advanced for AIX V1 | 5697-B17 | 0352 | $250 | 12/96 |
| Nways Manager for Windows V2 | 84H2656 | 1463 | $2,250 | 10/96 |
| Nways Manager for Windows V2 Additional License with Certificate | 84H2657 | 0798 | $2,200 | 10/96 |
| Upgrade to Nways Manager for Windows V2 from Nways Manager for Windows V1 | 84H2658 | 0531 | $200 | 10/96 |
| Upgrade to Nways Manager for Windows V2 from NetView for Windows V2 | 84H2659 | 0532 | $1,500 | 10/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Upgrade to Nways Manager for Windows V2 from Nways Manager for Windows V1 Additional License with Certificate | 84H2660 | 0662 | $200 | 10/96 |
| Upgrade to Nways Manager for Windows V2 from NetView for Windows V2 Additional License with Certificate | 84H2661 | 0663 | $1,500 | 10/96 |
| Nways RouteSwitch Network Manager V2 R0.x for Sun Solaris | 5697-B67 | 4049 | $1,595 | Available |
| Nways RouteSwitch Network Manager V2 R0.x for HP-UX | 5697-B67 | 4053 | $1,595 | Available |
| Nways RouteSwitch Network Manager V2 R0.x for Windows 95 and Windows NT | 5697-B67 | 4057 | $495 | Available |
| Nways RouteSwitch Network Manager V2 R0.x for Windows 3.1 | 5697-B67 | 4055 | $495 | Available |
| Nways RouteSwitch Network Manager V2 R1.x for Sun Solaris | 5697-B67 | 4062 | $1,595 | 10/96 |

| Item | Part Number/Machine Type | Feature/Model | Price (USD) | Availability |
|---|---|---|---|---|
| Nways RouteSwitch Network Manager V2 R1.x for AIX | 5697-B67 | 4059 | $1,595 | 10/96 |
| Nways RouteSwitch Network Manager V2 R1.x for HP-UX | 5697-B67 | 4064 | $1,595 | 10/96 |
| Nways RouteSwitch Network Manager V2 R1.x for Windows 95 and Windows NT | 5697-B67 | 4065 | $495 | 10/96 |
| Nways RouteSwitch Network Manager V2 R1.x for Windows 3.1 | 5697-B67 | 4066 | $495 | 10/96 |
| Nways RouteTracker Manager V2 R1.x for Sun Solaris | 5697-B68 | 4044 | $1,595 | 10/96 |
| Nways RouteTracker Manager V2 R1.x for AIX | 5697-B68 | 4045 | $1,595 | 10/96 |
| Nways RouteTracker Manager V2 R1.x for HP-UX | 5697-B68 | 4046 | $1,595 | 10/96 |
| Nways RouteTracker Manager V2 R1.x for Windows 95 and Windows NT | 5697-B68 | 4047 | $495 | 10/96 |

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