IBM Nways ATM Solutions Fact Sheet

Award-winning, industry-leading, low-cost, end-to-end ATM solutions

11 March 1997

Announcement Summary

IBM reinforces its Switched Virtual Networking (SVN) strategy by delivering ATM solutions that are scalable and that provide clear migration paths to position you for the new and exciting networking technologies of the future. The cornerstones of IBM's ATM solutions are the IBM 8260 Nways Multiprotocol Switching Hub and the award-winning IBM 8210 Multiprotocol Switched Services (MSS) Server. These products with their switching capabilities and multiprotocol support give you a versatile and expandable ATM backbone.

IBM continues to deliver industry-leading ATM solutions that improve your Ethernet, Token-Ring, FDDI and router environments by consolidating remote data, voice and video traffic into an ATM switched environment. IBM's solutions give you an end-to-end competitive advantage by cutting costs, increasing performance, consolidating networks and easing network and asset administration.

The IBM Nways family of switching hubs, routers and Ethernet and Token-Ring LAN switches now have modules or Universal Feature Cards (UFCs) with ATM uplink capabilities that allow you to consolidate your Token-Ring and Ethernet LANs to 155-Mbps ATM solutions. It's through these Nways products that IBM delivers ATM solutions which provide industry-leading Internet and intranet access to S/390 and SP2 servers that control over 70% of the world's business data.

The IBM ATM Family:

Wide-area switches
- IBM 2220 Nways BroadBand Switch
- IBM 2225 Nways MultiService Switch
- IBM 2230 Nways ATM Switch

Switching Hub
- IBM 8260 Nways Multiprotocol Switching Hub

Workgroup switch
- IBM 8285 Nways Workgroup Switch

Server
- IBM 8210 Nways Multiprotocol Switched Services (MSS) Server

Routers
- IBM 2210 Nways Multiprotocol Router
- IBM 2216 Nways Multiaccess Connector

LAN switches
- IBM 8271 Ethernet Switch
- IBM 8272 Token-Ring Switch
- IBM 8273 Ethernet RouteSwitch
- IBM 8274 Nways LAN RouteSwitch
- IBM 8276 Nways Ethernet RoutePort

Workstation adapters
- IBM TURBOWAYS 25-Mbps ATM Adapters
- IBM TURBOWAYS 155-Mbps ATM Adapters

Video encoder/decoder
- IBM 8300 Video Access Node
- 8260/8285 Video Distribution Module

Nways Campus Manager Suite
- ATM management applications for AIX, HP OpenView and Windows

IBM's Multiprotocol Switched Services (MSS) with its standards and ATM Forum-compliant services, increases responsiveness, simplifies networks, lowers costs by increasing network capacity and scalability and eliminates single points of failure. MSS supports ATM protocols (Classical IP and LAN Emulation [LANE]) and routing protocols (IP, IPX, AppleTalk, X.25 and Frame Relay) over IBM and ATM Forum-compliant emulation and virtual LANs (VLANs), as well as advanced functions such as IBM exclusive Super VLAN and Next Hop Resolution Protocol (NHRP).

ATM solutions scenarios

IBM announces and previews these industry-leading, low-cost, comprehensive, end-to-end ATM solutions:

- Global VLANs over WAN ATM solutions with the 8260/8285 and 8210 MSS Server with 22xx WAN switches
- Bridging and routing over ATM with the 8210 MSS Server
- End-to-end ATM management with the Nways Campus Manager Suite
- Ethernet-to-ATM solution
- ATM 25-Mbps solutions–printer consolidation
- 8260 with 9729 Optical Wavelength Division Multiplexer
- IBM LAN Emulation on MSS Server
- Token-Ring solution: 8272 with ATM 155-Mbps UFC
- 8271 with ATM 155-Mbps UFC
- 2210 with an ATM 25-Mbps solution
- Video ATM solutions
- Voice and clear-channel solutions
- 2216 Nways Multiaccess Connector
- Private network-to-network interface (PNNI) and IBM Switch-to-Switch Interface (SSI) interworking
- 8260 OC12 and 827x ATM/LAN
- 8260 Switching Modules with ATM uplink
- FDDI-to-ATM migration

Additional technical details

Global VLANs over WAN ATM solutions with 8260/8285 and 8210 MSS Server with 22xx WAN switches (Figure 1)

With 2220, 2225 and 2230 products, the WAN enhances the end-to-end story with remote access, the 8285 and the ATM wide-area uplink connectivity (T1, E1, J1, OC3, STM-1, DS3, T3 and E3). All this allows the virtual LAN capabilities to be deployed not only on the campus but also in the wide area.

The 8260 or 8285 with "Permanent Virtual Path (PVP) tunneling" and the MSS module allow the connection of campus networks into a virtual ATM wide area or a wide-area, clear-channel network.

PVP, exclusive on the 8260 and 8285 products, allows switched virtual circuits (SVCs) to flow across the WAN infrastructure, independent of the WAN switch vendor. The incorporation of an MSS on the campus and ATM WAN module in the 8260 or 8285 gives an ATM connection to the WAN.

The MSS VLAN capability from remote sites and the campus environment across the WAN is transparent. The WAN environment acts like an independent, transparent transport medium, allowing the flow of dynamic SVCs. This allows full VLAN switching between sites for maximum performance.

Bridging and routing over ATM with the 8210 MSS Server (Figure 2)

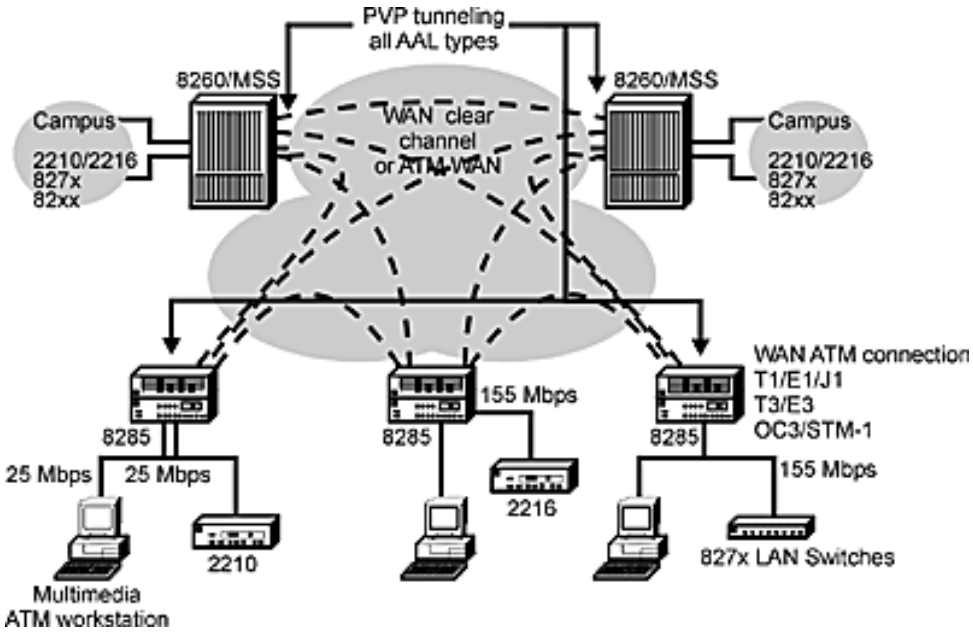


Figure 1: VLANs over WAN ATM solutions.

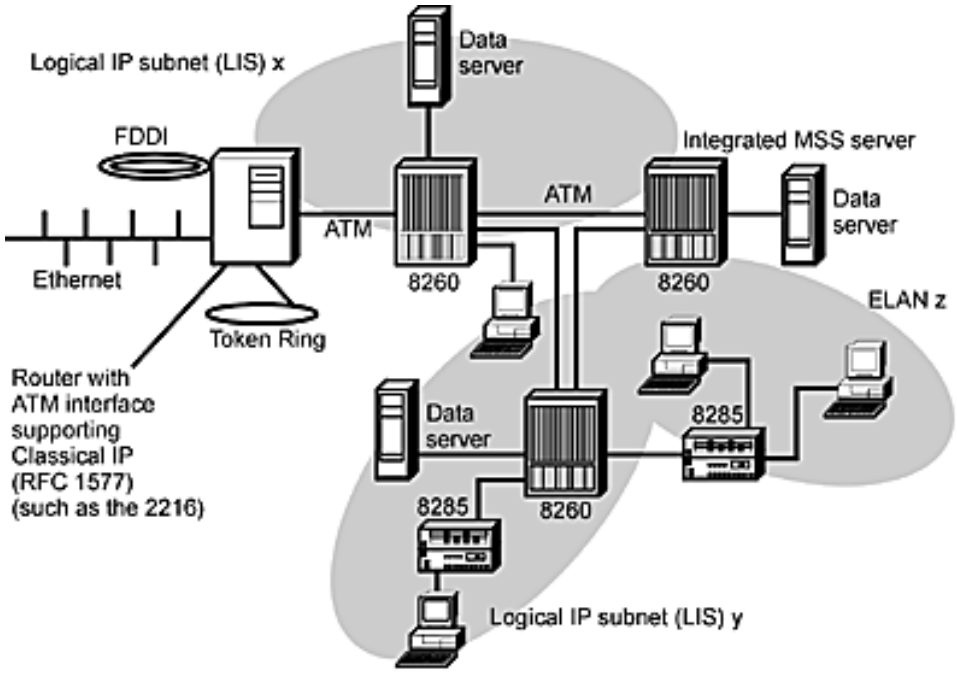


Figure 2: Classical IP and VLAN communication with ATM/MSS.

The MSS Server expands the capability of the ATM network in terms of scalability, reliability, performance, adaptability, connectivity and total redundancy. With support of ATM Forum-compliant LANE standard and IETF Classical IP (RFC 1577) standard, the Logical IP Subnet (LIS) in an IP environment gives you the capability to communicate with different ELAN (emulated Token-Ring or Ethernet LANs) and VLAN environments. Thus LIS x and y and ELAN z can communicate through the MSS ATM infrastructure.

With the functions offered by the 8210 MSS Server, ATM networks are now superior to any other type of LAN infrastructure.

IBM, with the Super VLAN function in the MSS Server, is the first in the industry to provide cut-through VLAN switching, which allows you to go from one ELAN to another (virtual LAN-to-virtual LAN) without going through a routing medium–*you avoid further investment in complex, expensive routers*.

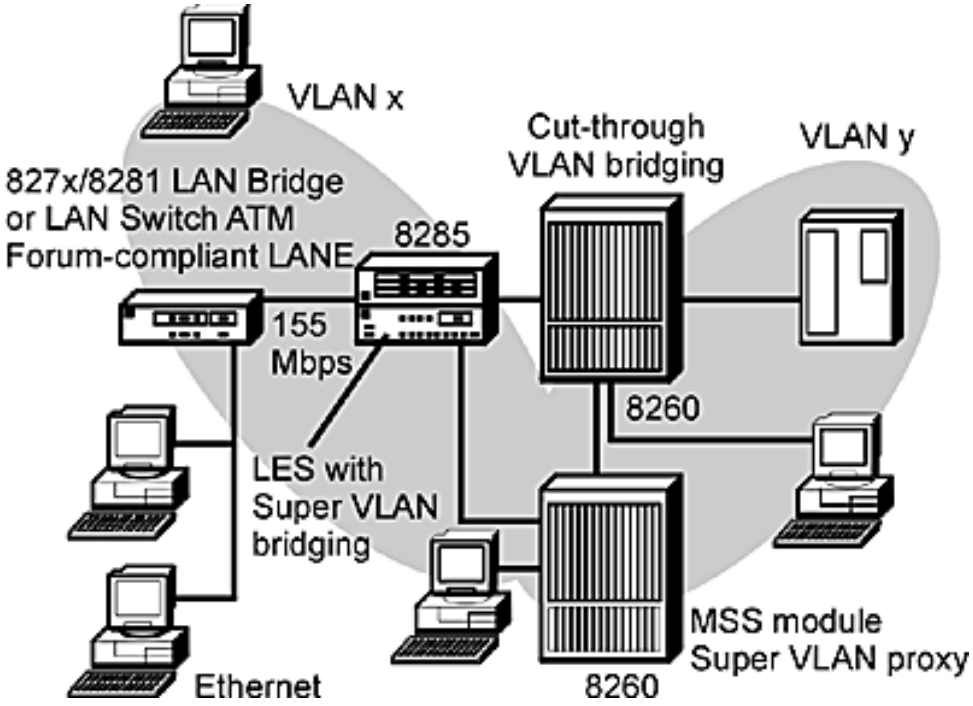


Figure 3: Super VLAN bridging.

MSS, in conjunction with PNNI-1 support in the 8260, provides customers deploying IBM's campus infrastructure with totally redundant, highly scalable, high-performance, VLAN-enriched, switched infrastructure with Quality of Service (QoS).

Super VLAN with MSS (Figure 3)

Release 1.1 of MSS delivers *Super VLAN*, which allows customers to build large VLANs on ATM networks. A Super VLAN is a collection of multiple VLANs. MSS enables short-cut switching between VLANs in a Super VLAN by the creation of direct virtual circuit connection (VCC) between VLANs.

The reliability and performance of the LANE services increase with the number of service entities. Performance in Super VLANs is maintained because a client in a Super VLAN can establish a direct link (VCC) to any other client on a Super VLAN.

Among the rich set of functions delivered by MSS Release 1.1 are:

- Super VLAN for Ethernet ATM ELANs

- NHRP server capability
- SNA, NetBIOS, AppleTalk, DecNet and others over RFC 1483 bridging format
- QoS within VLANs
- Distributed, redundant ARP server
- Improved, redundant IP gateway function
- Higher performance for the 8260 and 8210 MSS Module
- FDDI support in the 8210
- IP, IPX, AppleTalk routing capabilities

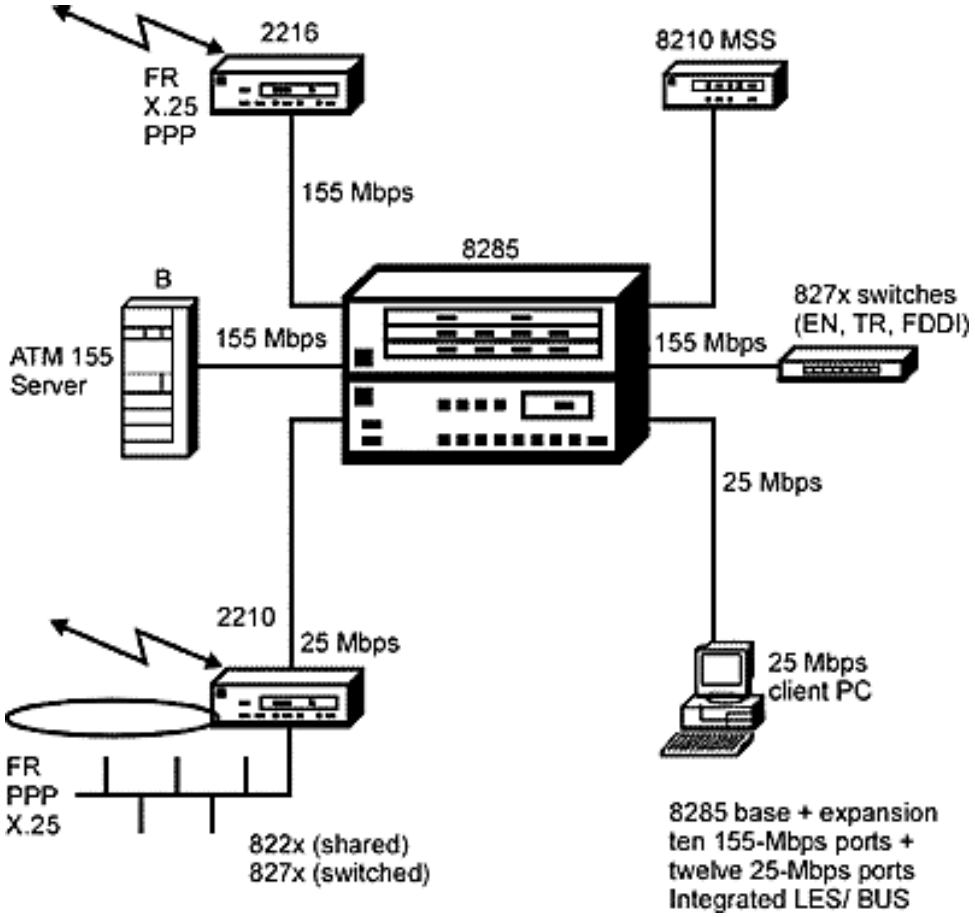


Figure 4: 8285 Workgroup 25-Mbps desktop solution.

8285 ATM 25-Mbps workgroup switching (Figure 4)

The 8285 is an ATM workgroup switching solution for 25-Mbps users. It has twelve 25-Mbps ports and a single 155-Mbps port in the base unit. The base can be expanded with an expansion unit that has three slots. 8260 ATM modules can be used in the expansion unit, thus increasing the number of connections up to forty-eight 25-Mbps ports, with a total of four 155-Mbps ports for main backbone uplinks or connections to local servers or to LAN switches with ATM uplinks. The 8285 can thus be positioned as an inexpensive, low-entry ATM switch.

This configuration is useful for customers who want to use a low-end ATM solution for small, remote deployments with non-redundant ATM switching fabric.

The IBM 8285 Workgroup ATM Switch in remote locations can be connected to the ATM WAN by using the 8260 ATM WAN modules in the 8285 expansion unit.

The 8260 ATM WAN modules supported by the 8285 are:

- DS0/E1/J1
- DS3/E3
- OC3/STM-1 WAN

When attached to the 8285 IBM routers, such as the IBM 2210 Nways Multiprotocol Router and the IBM 2216 Nways Multiaccess Connector with ATM 25-Mbps and 155-Mbps uplinks, respectively, connect remote campus routed infrastructures to the WAN through the 8285, providing a transparent connection. Of course the 8273 or 8274 LAN Switch products have hardware routing capabilities to create one of the best-of-breed VLANs in the campus. So the VLANs-over-WAN ATM solutions with the 8260 or 8285 and MSS Server provide extendable hardware capabilities.

Because the 2210/2216 provides connectivity to ATM (25 Mbps/155 Mbps) as well as capabilities to X.25, Frame Relay, PPP and ISDN, these protocols have an easy migration into the ATM infrastructure.

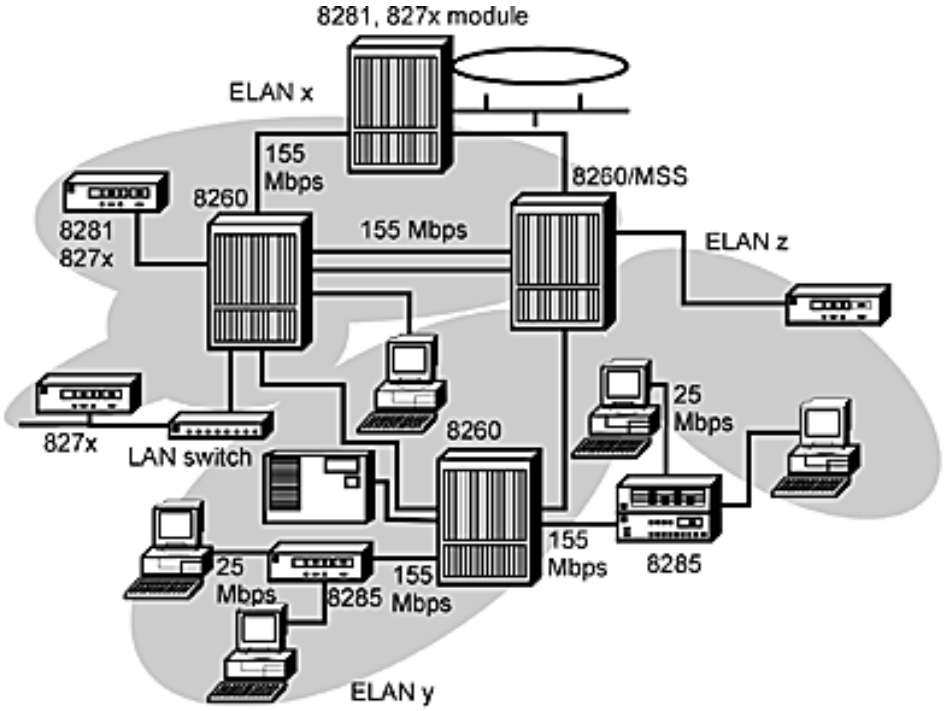


Figure 5: Bridging and routing over ATM with the 8210 MSS Server.

Bridging and routing over ATM with the 8210 MSS Server (Figure 5)

MSS extends bridging and routing functions with LANE. QoS can now be negotiated by defining QoS for a LAN Emulation Client (LEC), VLAN or an ATM interface. And MSS delivers one of the main functions of the expected Multiprotocol over ATM (MPOA) standard–NHRP. This function allows NHRP clients to set up a data-direct VCC and forward IP frames without traversing intermediate routers. This enables zero- and one-hop routing capabilities from servers and LAN switches.

MSS enables VLAN communications with LANE bridging (from Ethernet-to-Ethernet, Token-Ring-to-Token-Ring or Token-Ring-to-Ethernet). Other functions available are routing support for IP, IPX and AppleTalk, bridging support for RFC 1483 bridge format frames and support for routing IP and IPX from FDDI to ATM.

Because MSS supports NHRP server and client functions, it is possible for the 8271 or 8272 Model 108 or 216 and the 8270 Model 800 with ATM uplinks to be able to perform one-hop routing with MSS Release 1.1. This capability increases performance and lowers latency delays as the LAN

switch (ATM enabled) uses the MSS's NHRP client code as a one-hop router.

Nways Campus Manager Suite

The IBM Nways Campus Manager management application is available in versions that allow you to manage your networking devices in AIX or HP OpenView environments. It lowers costs, increases network availability and provides a better view of what is happening to the network. Nways Campus Manager has the following capabilities:

- LAN management
  - LAN configuration
  - Drag-and-drop operations
  - Dynamic display of ELAN topology
  - Automatic discovery of LECs and LAN Emulation Servers (LESs)
  - ELAN security
  - Fault management
  - Performance-monitoring
  - ELAN status
- Improved ATM management
  - Automatic discovery of OEM ATM devices
  - Display of ATM workstations
  - Search facility with ATM address-formatting

Ethernet-to-ATM solution (Figure 6)

IBM has a comprehensive switched Ethernet-to-ATM solution with these stand-alone switches connected to the 8260 ATM backbone:

- IBM 8271 Nways Ethernet LAN Switch
- IBM 8273 Nways Ethernet RouteSwitch
- IBM 8274 Nways LAN RouteSwitch

With the help of ATM uplinks on the Ethernet switches, connectivity into the ATM backbone is provided. The Fast Ethernet modules in the 8260 with Packet-Channel-to-ATM connectivity on the 8260 allow Fast Ethernet servers or Ethernet switches with Fast Ethernet uplinks transparent connectivity to ATM and MSS.

8273 specifics for this announcement are:

- 1-port ATM DS3 and E3 submodule (8273) connects campus networks to wide-area ATM networks at higher speeds.
- 2-slot, FDX 10BASE-T AUI for Model 10U doubles the capacity of connected segments with FDX support.
- 4-port HDX, 1-port FDX, UTP, MMF, and SMF Fast Ethernet submodules provide low-cost support for 100-Mbps Ethernet for servers, power users and network backbones.

8274 specifics for this announcement are:

- 1- and 2-port ATM DS3 and E3 submodule (8274) connects campus networks to wide-area ATM networks at higher speeds.
- 1- and 2-port UTP-5 155-Mbps ATM module connects campus networks to servers, ATM campus networks or ATM WANs.

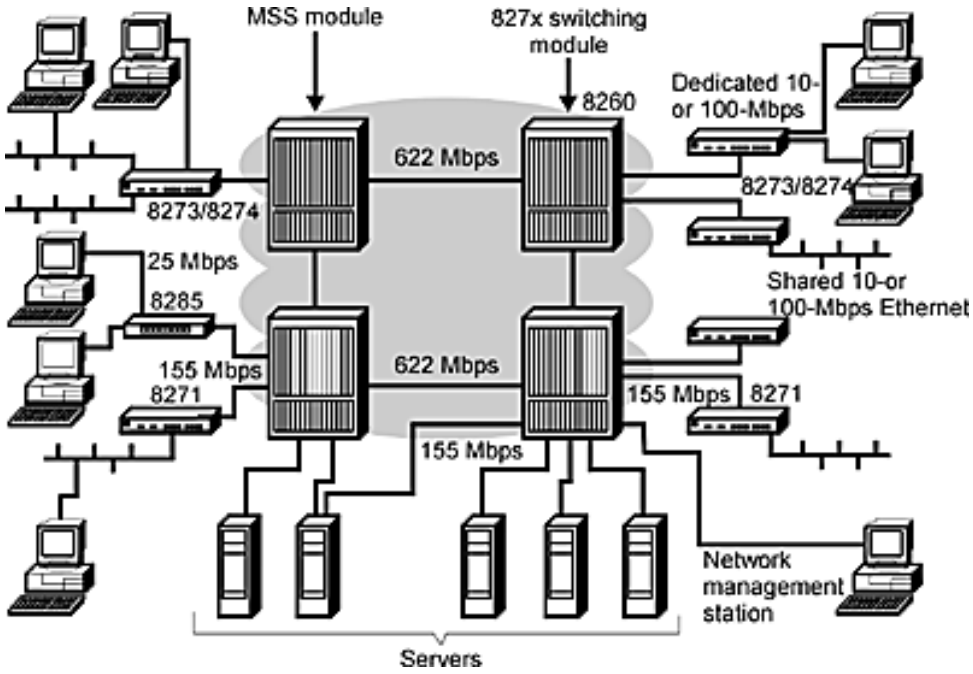


Figure 6: Ethernet-to-ATM solution.

- Frame-to-cell switching module (being previewed) simplifies high-performance networking by giving interconnected LANs and ATM networks the appearance of a single network.
- ATM cell backplane in all modules simplifies networks and lowers cost by supporting larger networks with fewer components.
- 1- and 2-port FDX UTP, SMF and MMF Fast Ethernet modules support Fast Ethernet at up to 200-Mbps effective capacity for servers, power users and network backbones.
- 2-slot universal Ethernet FDX 10BASE-T AUI adapter module doubles the capacity of connected segments with FDX support.
- 6-port UTP/STP/fiber Token-Ring switch module supports dedicated Token-Ring connections and increases the capacity of connected Token-Ring segments.
- Faster (MPM-1G) processor simplifies networks and lowers costs by supporting larger networks with fewer components.

The IBM 8260 Nways Multiprotocol Switching Hub provides an integrated solution with the availability of 8271 Ethernet switching modules allowing the combination into one platform of LAN and ATM switching.

8260 specifics for this announcement are:

- Homologation of the 1-port E3 I/O card for additional countries. This card connects campus networks to wide-area ATM networks.
- E1/J1/T1 ATM WAN module with up to 8 ports for lower cost connections between sites over WANs.
- 1-port 155-Mbps MMF I/O card for 25-Mbps ATM module lowers the cost of 25-Mbps access to a campus backbone by combining 25-Mbps and 155-Mbps support on a single module.
- Packet-to-ATM cell conversion for Packet Channel backplane switch modules provides a high-performance path between Ethernet/FDDI and ATM networks, and extends the VLAN capability at the network level.
- Integration of shared Ethernet backplane segments with Packet Channel backplane switching and VLANs.

- 1-port, 2-slot 622-Mbps SMF and MMF ATM provides a very-high-capacity solution for extremely demanding applications and network backbones.
- Forum-compliant PNNI-1 protocol for standards-based switch-to-switch protocol.
- FiberCom ATM Circuit Emulation Card (ACE) simplifies high-performance networking by consolidating separate voice and data networks.

IBM's ATM solution provides these value-add features:

- ATM Forum-compliant
- Servers on ATM backbone
- Backbone redundancy and alternate paths
- Dynamic routes
- VLANs and broadcast reduction through MSS
- ATM network management

ATM 25-Mbps solutions – printer consolidation (Figure 7)

The new 155-Mbps I/O card for the 25-Mbps module of the 8260/8285 increases significantly the capacity of the 8285 when used with the expansion unit. With the 8285 expansion unit you can have a total of forty-eight 25-Mbps ports with four 155-Mbps ports, or twelve 25-Mbps ports with ten 155-Mbps ports.

This solution delivers 25 Mbps to the desktop as well as allowing you to consolidate printers to a 25-Mbps ATM environment.

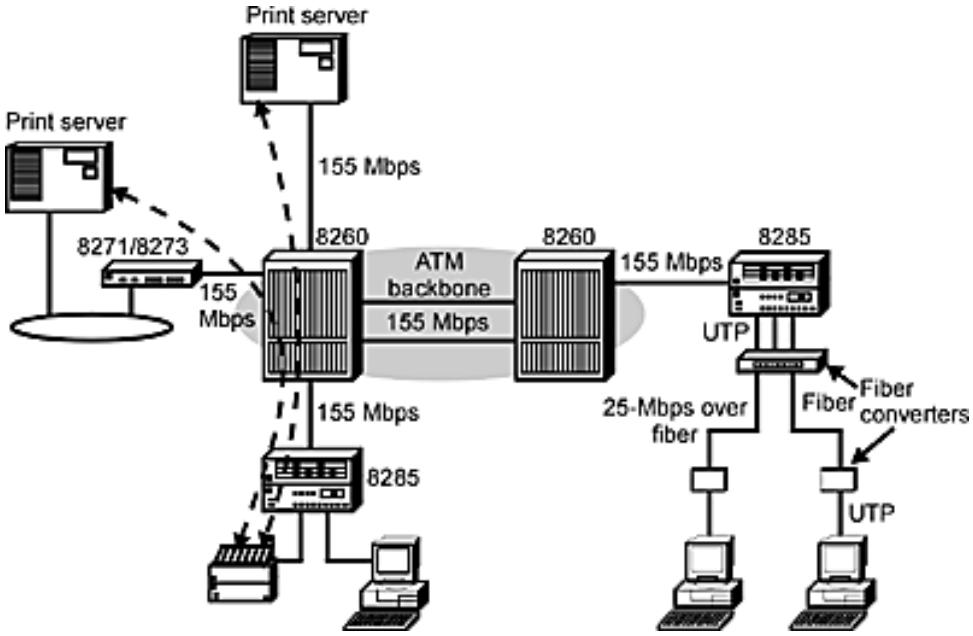


Figure 7: ATM 25-Mbps solutions – printer consolidation.

Interface adapters to certain Lexmark or HP printers can be obtained from Datalect Limited. For more information, you can access the Datalect Home Page at `http://www.datalect.ltd.uk/`.

Customers willing to deploy 25-Mbps ATM over optical fiber can get 25-Mbps fiber converters from BIT Communications.

The 8285 gives you a consolidated solution with the 2210 ATM 25-Mbps router attachment capabilities, which get to Frame Relay, X.25 and PPP and gives you a comprehensive end-to-end, 25-Mbps solution, not just from a switching standpoint but also from a routing standpoint.

8260 with 9729 Optical Wavelength Division Multiplexer (Figure 8)

The IBM 9729 Optical Wavelength Division Multiplexer uses revolutionary new technology that divides a single optical-fiber line into as many as 20 separate channels, dramatically reducing leased-line costs while delivering fast, reliable optical fiber connections between sites.

Features for the 9729 include:

- A new External Time Reference (ETR)/ESCON I/O adapter, a replacement for the current ESCON card, that extends connectivity to the Sysplex Timer Model 2. The signals emitted from the Sysplex Timer to remote data centers can now be extended using optical fiber to connect multiple sites to the same ETR network.
- The ability to transparently transmit OC3 data through the 9729 using the ESCON or ETR/ESCON I/O adapter.

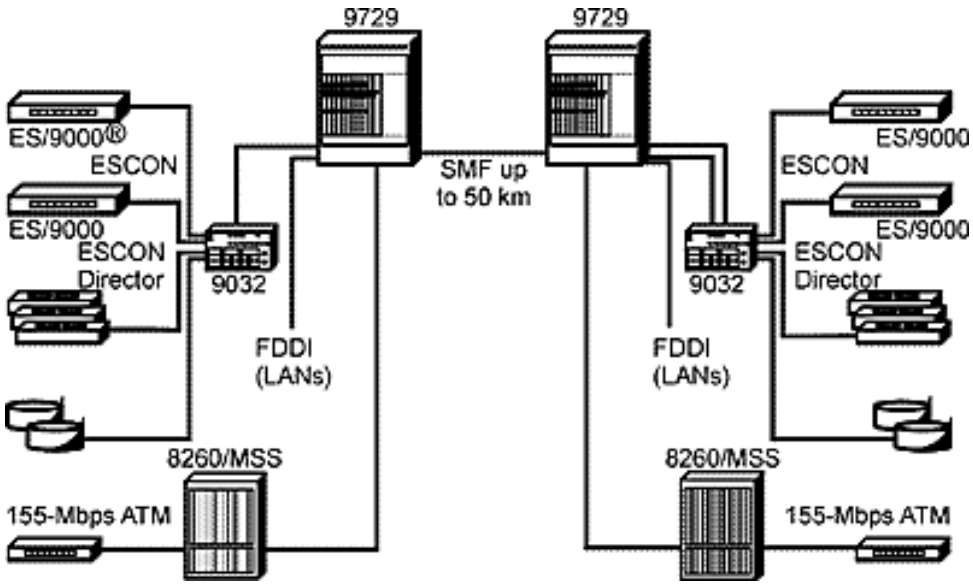


Figure 8: 8260 with the 9729 Optical Wavelength Division Multiplexer.

- A new dual-fiber adapter, an alternative replacement for the fiber I/O adapter. The dual-fiber adapter allows attachment of a backup fiber between a pair of 9729s. If a 9729 detects that light is no longer passing through the main fiber, it will switch operation to the backup fiber, thus adding essential available options for mission-critical networks.
- A network management application that runs on AIX and is used to graphically represent the 9729 and all I/O, laser and diagnostic features. Status information is presented from up-to-date MIB parameters pertaining to each adapter.

The 9729, combined with the 8260 ATM backbone, allows you to implement low-cost, efficient VLAN-to-VLAN communications between campus networks and saves money by:

- Increasing network availability
- Reducing administrative costs and skills
- Consolidating multimedia within the campus
- Gaining greater bandwidth than that provided by a carrier

A 9729 allows you to consolidate traffic of several types with an aggregate throughput over 1 Gbps. For example 8260s can be connected in parallel, to ESCON traffic, enabling your entire campus

network to communicate: VLANs on one campus network communicating with VLANs on another campus network. So in environments where multiple fibers have been used to connect different companies in different technology parks, a 9729 can now be used to consolidate over a single fiber.

In its January, 1997 issue, *Data Communications* awards the 9729 its "Hot Product rating", stating that "...the Muxmaster cuts costs by dramatically reducing the number of links needed between sites...".

Token-Ring solution: 8272 with ATM 155-Mbps UFC (Figure 9)

The 8272 Models 108 and 216 are low-end workgroup ATM solutions for Token-Ring LANs. The 8270 Model 800 provides 32 switched Token-Ring ports or 28 Token-Ring ports and 1 155-Mbps ATM uplink. The ATM 155-Mbps Multimode Fiber UFC, with its fully ATM Forum-compliant SONET interface, can switch data to an industry-standard ATM backbone switch like the 8260 over multimode optical fiber cables. The ATM UFC supports ATM Forum-compliant LAN emulation that lets you run all of your applications without any changes in your software. The ATM 155-Mbps UFC can be connected also to the 8285 through its 155-Mbps module.

The 8272 module in the 8260 provides Token-Ring switching to ATM connectivity, utilizing the ATM backplane connection or the front-end ATM UFC. The redundant power supply of the 8260 provides additional advantages by enhancing the total redundant solution. The shared Token-Ring modules in the 8260 connect to the 8272 modules, providing shared-to-switched Token-Ring connectivity through the 8272 switch.

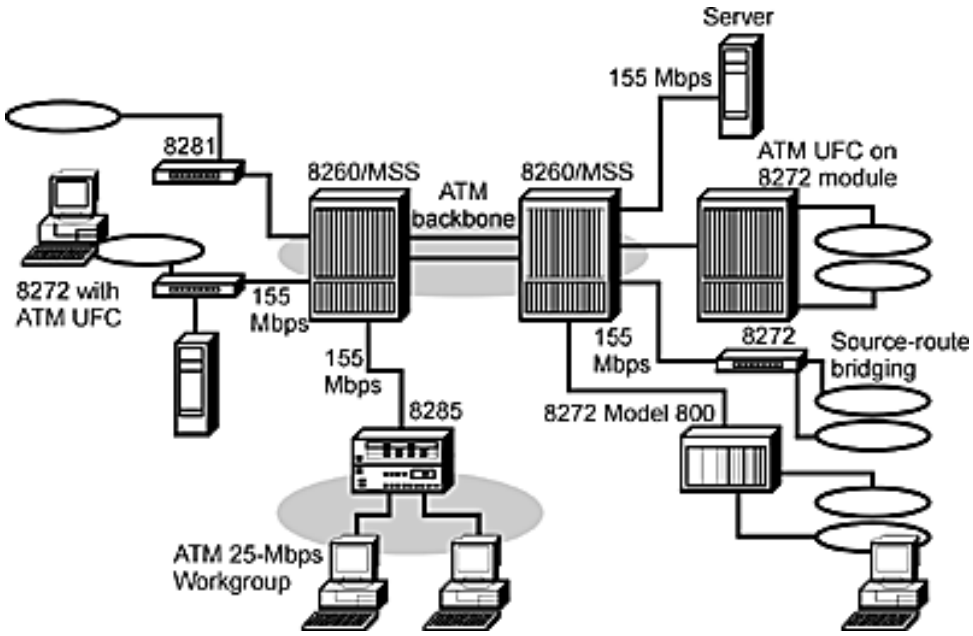


Figure 9: Token-Ring solution: 8272 and 8285 with an ATM 155-Mbps uplink.

8271 with an ATM 155-Mbps UFC (Figure 10)

Existing 8271 Model 108 or 216 customers, by using the ATM UFC, can consolidate their Ethernet to an ATM backbone strategy. This is part of IBM's overall SVN strategy for existing customers, yet provides a way to migrate to a more enhanced VLAN Ethernet solution with the IBM 8273 and 8274.

The 8271 Models 108 and 216 are low-end workgroup ATM solutions for Ethernet LANs. The ATM 155-Mbps Multimode Fiber UFC, with its fully ATM Forum-compliant SONET interface, can switch

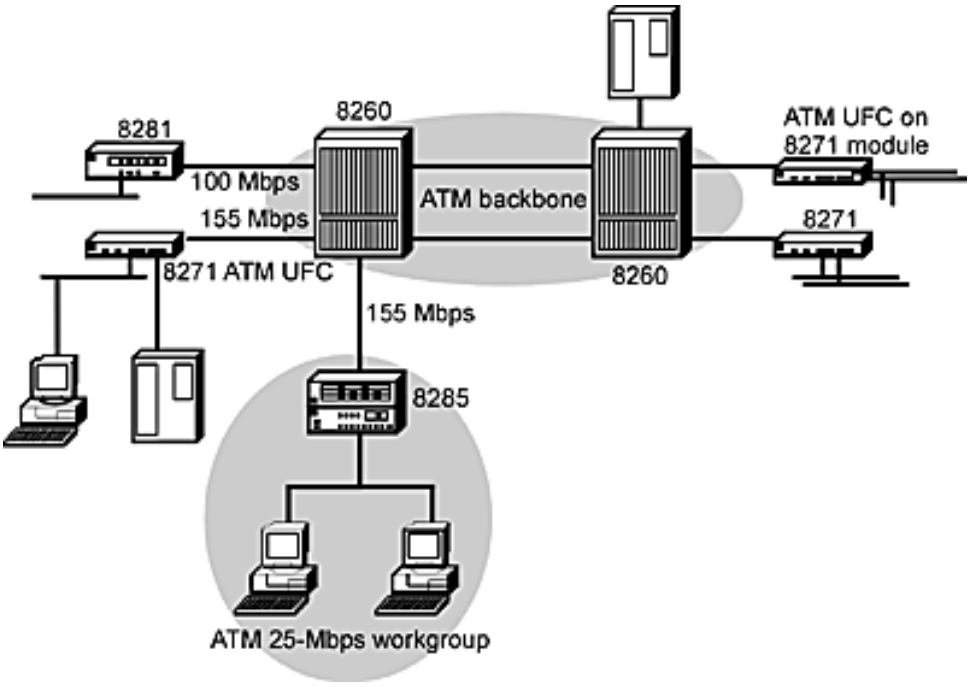


Figure 10: 8271 with an ATM 155-Mbps UFC.

data to an industry-standard ATM backbone switch, such as the 8260, over multimode optical fiber cables. The ATM UFC supports ATM Forum-compliant LAN emulation that lets you run all of your applications without any changes in your software. The ATM 155-Mbps UFC can be connected also to the 8285 through its 155-Mbps ATM port.

Because MSS supports NHRP server and client function, it is possible for the 8271 or 8272 Model 108 or 216 and the 8270 Model 800 with ATM uplinks to perform one-hop routing with MSS Release 1.1. This capability increases performance and lowers latency delays as the LAN switch (ATM enabled) uses the MSS's NHRP client code as a one-hop router.

2210 with an ATM 25-Mbps solution (Figure 11)

IBM's overall 25-Mbps solution is enhanced by the 2210 Router. The 2210 is now available with a 25-Mbps ATM uplink that gives you ISDN, Frame Relay, X.25, PPP and SDLC along with ATM connectivity.

2210s can be used to connect remote sites where you have, for example, an 8285 supporting graphics and multimedia workstations that are connected to a 2210 to get to your WAN.

The 2210 has Ethernet or Token-Ring connections that can connect to 8271, 8272, 8273 or 8274 LAN switches to incorporate LAN switching with a router which has access to the ATM network.

All this allows you to go from a remote site in the 2210 or use switching to feed into a 2210, which goes to an 8260 and gives a complete 25-Mbps solution with a router.

In its July 1996 issue, *Data Communications* awarded the 2210 with its "Tester's Choice Award". As stated by the publisher of *Data Communications*, Joe Braue:

> "This is the most prestigious award that we give...and it's earned only after we've tested a product–head-to-head and in our own laboratories–with the best the rest of the industry has to offer. You should be proud, the IBM 2210 router clearly is the price/performance leader in the industry."

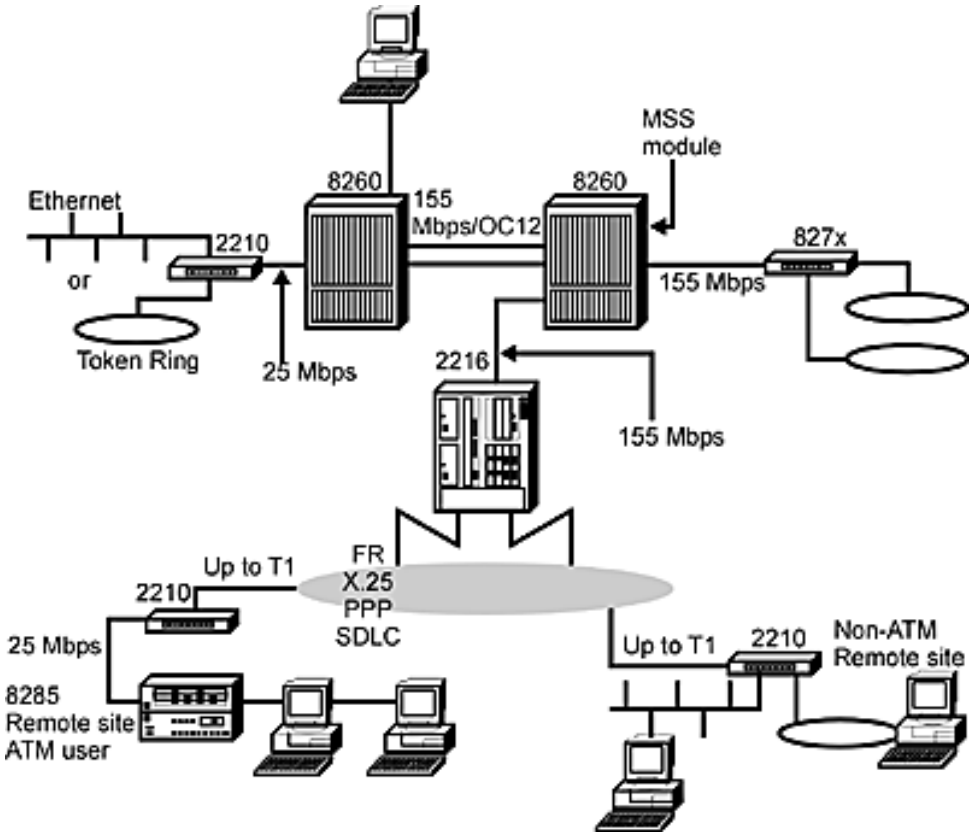


Figure 11: 2210 with an ATM 25-Mbps UFC.

This example can be expanded by incorporating the 2216 Multiaccess Connector, because it uses the same code with much value-added function but has a 155-Mbps connection to provide a larger scaled, routed environment. The 2216 supports these protocols:

- ATM protocol (Classical IP and LANE)
- Routed protocols
  - APPN, HPR, DLUR, DLSw
  - IP, IPX, OSPF, AppleTalk, DEC, Banyan, OSI, ISDN
- Serial Interfaces
  - PPP, Frame Relay, SDLC
  - V2.5bis
  - APPN, PPP, ISDN
  - APPN, Frame Relay, ISDN

Video ATM solutions

IBM's family of networked video solutions enable video applications, including video collaboration, video-on-demand and live video broadcast. Customers are using video for distance learning, telemedicine, remote court arraignment, executive broadcasts and training.

IBM's networked video solutions are based on ATM. ATM is the only networking technology today that has the true QoS properties to ensure that your data and video applications are delivered over the same network without delay.

IBM's networked video solution family includes:

- *Broadcast quality* video with the 8300 Video Access Node (VaN), the Video Distribution Module (VDM) and the IBM MediaStreamer
- *Business quality* video with the IBM and First Virtual Corporation (FVC) video solution

Broadcast quality video (Figure 12)

IBM's broadcast quality video solutions utilize the power of MPEG-2 video compression and ATM to deliver video quality that is crisper than the signal you receive at your home TV.

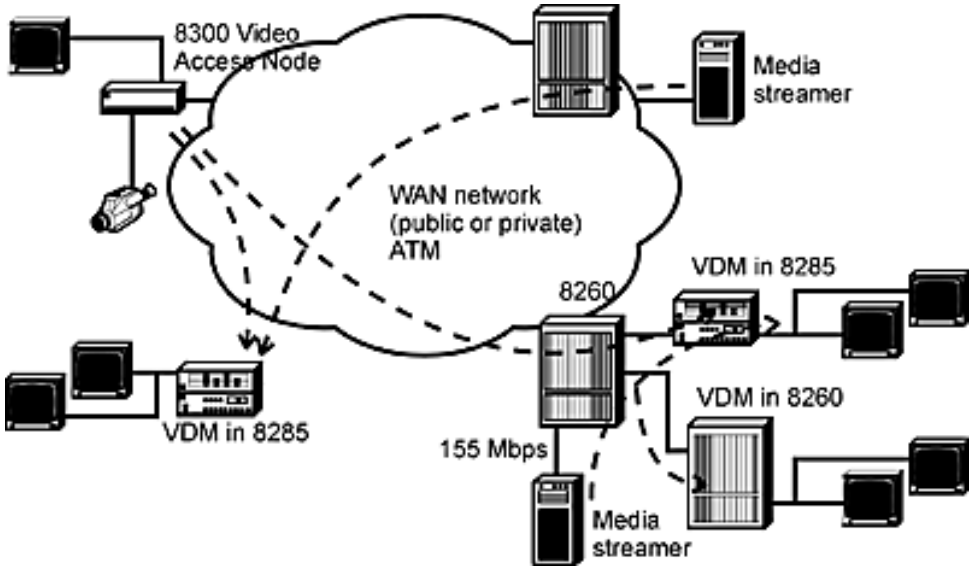


Figure 12: Broadcast quality video solutions.

The VaN provides industry-standard H.310 video encoding and decoding for videoconferencing, video broadcast and video-on-demand. The VDM, a module for the 8260 and the 8285, provides cost-effective MPEG-2 video broadcast streams to eight individual analog devices. The MediaStreamer Video Server provides MPEG-2 video storage over an ATM network. Through IBM's business partner relationship with AMX Corporation, this solution also includes an MCU and Synergy software scheduling package to provide a turn-key broadcast-quality video solution.

Business quality video (Figure 13)

The IBM and FVC video solution provides business quality video based upon H.320 video technology. The solution can take any existing H.320 desktop or room-system videoconferencing product from vendors such as PictureTel and Zydacron and adapt it to ATM. This saves cost and complexity of direct ISDN attachment. Video stations get access to ISDN through a central ATM-attached gateway, the *V-gate*.

The V-Cache video server provides high-performance video distribution for up to 50 concurrent video streams to ATM clients. The V-Caster takes any NSTC or PAL video feed and translates it to MPEG-1 for transmission to any client on the ATM network.

The IBM and FVC video solution is enabled by the 8260 and the 8285, providing a turn-key, business quality video solution.

IBM's Video ATM Solution provides best QoS for video traffic over existing ATM networks and the WAN.

With the availability of video solutions over ATM MPEG-2 broadcast-quality traffic, commercial customers can utilize their existing installed ATM infrastructure and provide remote videoconferencing, collaborative computing and distance learning capabilities. Broadcast quality video capabilities al-

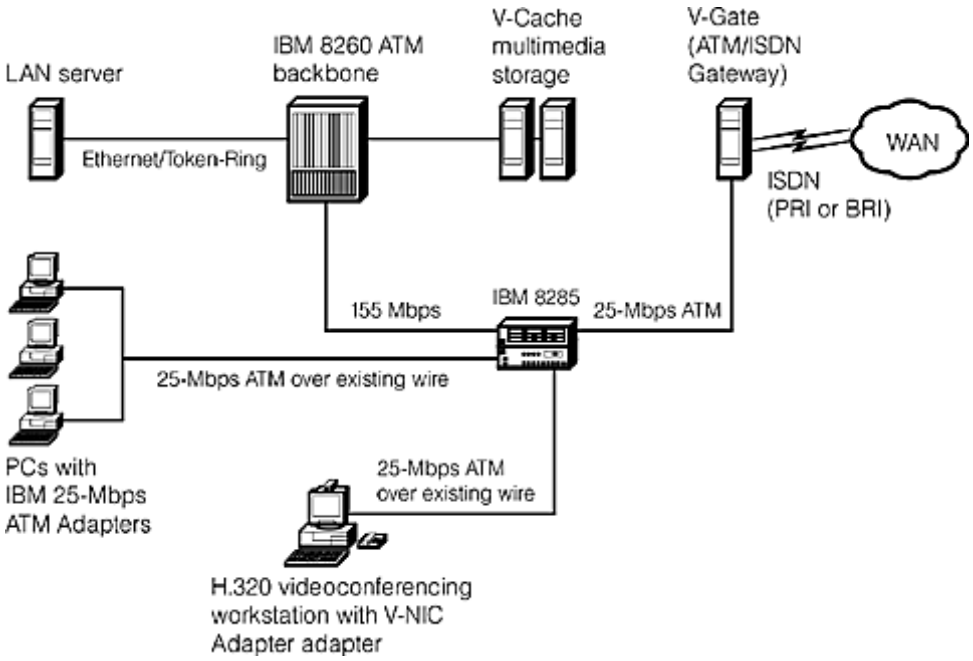


Figure 13: Business quality video solutions.

low hotels, conference centers and sports stadiums an avenue to portray high-quality images on an ATM infrastructure along with data traffic.

Voice and clear-channel solutions (Figure 14)

FiberCom has joined the IBM ATMKit Development program with the intent of providing a voice solution over ATM. Together with other IBM ATM features, this will bring a total voice, video and data consolidation over the ATM campus.

With the FiberCom ATM Circuit Emulation (ACE) card (T1 module) for the 8260 or 8285 expansion unit, the ATM backbone can be used as a media stream for consolidation and traffic transport of voice or Frame Relay.

The ACE card has an adaptive clock capability at AAL-1 that is used to consolidate and to connect your PBX or router or 374x products to another ACE card through SDLC Frame Relay over the ATM campus.

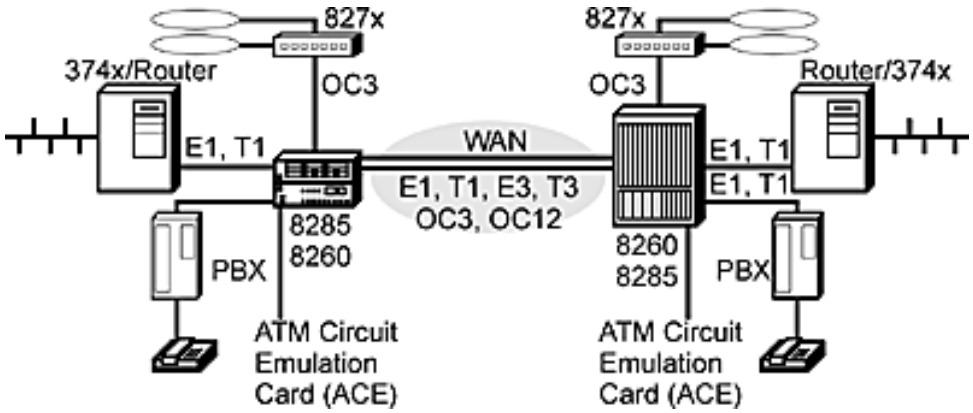


Figure 14: Voice and clear-channel solutions.

The ACE card will offer these advantages:

- Leased-line savings/rapid payback
- PBX-over-ATM connectivity
- Flexibility
  - n x 64 structured support (channeled sources)
  - Unstructured support (clear-channel sources)

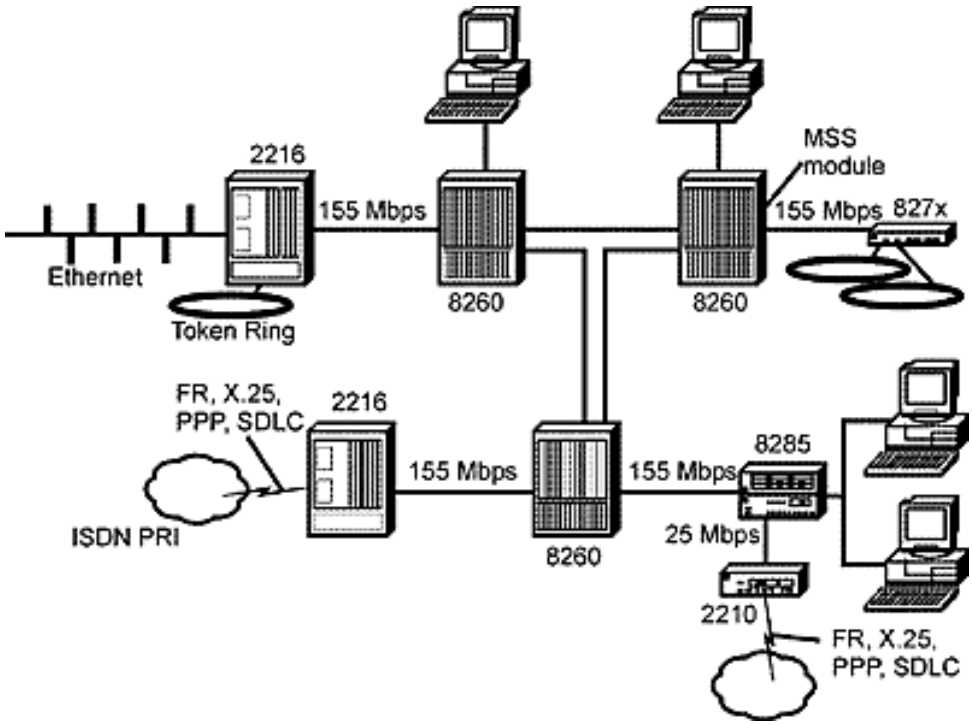


Figure 15: 2216 Nways Multiaccess Connector.

2216 Nways Multiaccess Connector (Figure 15)

The 2216 is IBM's expandable router backbone for the campus on an ATM network. It provides a way to interconnect ATM backbones with the non-ATM WAN, whether it's based on Frame Relay, X.25 or SDLC protocols. With 2216s with a 155-Mbps uplink, or with a 2210 with a 25-Mbps uplink into an ATM backbone, remote branch offices with traditional routed protocols are able to be linked to main ATM backbones. IBM provides therefore the most economical and efficient path into an ATM environment.

The ISDN solution comes into play with the availability of the 2216.

PNNI protocols (Figure 16)

IBM provides private network-to-network interface (PNNI) support on the ATM switches. With PNNI, you can create an extremely scalable network based on ATM Forum standards. With IBM's PNNI-1 ATM Forum standard implementation, network managers have more flexibility in the way the ATM switches optimize link utilization. Network managers can select a path selection mode: widest path or shortest path, based on administrative weight costs. Switches can be grouped into peer groups forming a hierarchy to simplify network administration and optimize network resources. PNNI peer groups can also link clusters of 8260s/8285s running the pre-standard version of PNNI (Switch-to-Switch Interface [SSI]) through IISP links.

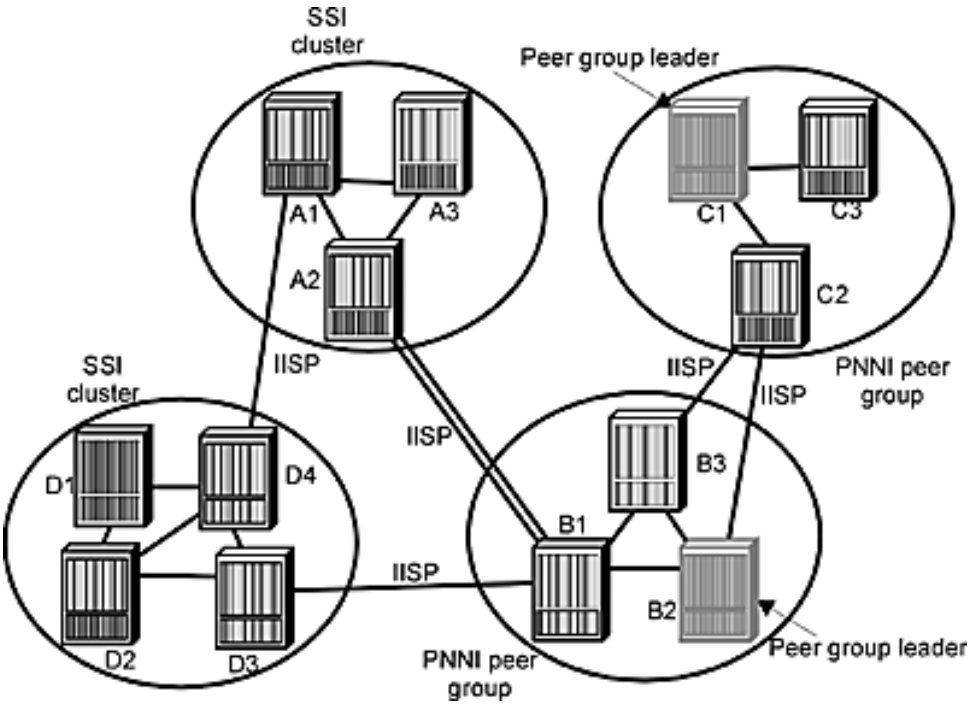


Figure 16: Example of PNNI and IBM SSI interworking.

PNNI deployment of ATM networks become Plug and Play through dynamic discovery of LES addresses and automatic propagation of these addresses throughout the network. Also, UNI level (3.0 versus 3.1) is detected automatically and conversion occurs to ensure interworking between different ATM Forum UNI-standard devices.

8260 OC12 (Figure 17)

With the availability of OC12 on the ATM switches, you can upgrade the 8260 ATM backbone to 622-Mbps ATM. You can get higher bandwidth solutions with the 827x LAN or ATM 25-Mbps workgroups or routers (2210 or 2216) feeding traffic into the ATM backbone. At the same time, with the help of an ATM WAN module, you have access to the wide-area ATM network.

8260 Switching Modules with ATM uplink (Figure 18)

Figure 18 shows how 10-Mbps shared IBM 8222 Ethernet Workgroup Hubs and IBM 8224 Ethernet Stackable Hubs are connected to 8273 or 8271 switches, to Fast Ethernet and to the 8260 ATM backbone. In addition, Fast Ethernet hubs such as the IBM 8223 Fast Ethernet Workgroup Hub and the IBM 8225 Fast Ethernet Stackable Hub can be connected directly to the 8260. With the availability (2Q97) of the Packet Channel/ATM Switching Module for the 8260, you have a high-performance solution for building backbones that combine Fast Ethernet and ATM switching.

The Switching Series Modules allow an 8260 to use the existing infrastructure of the packet, as well as the ATM base backplane, to consolidate and connect Ethernet, FDDI and ATM together.

This is achieved by using the 8260 Model G17, which integrates shared, ATM and Packet Bus backplanes.

FDDI-to-ATM migration

IBM provides for FDDI migration to ATM with:

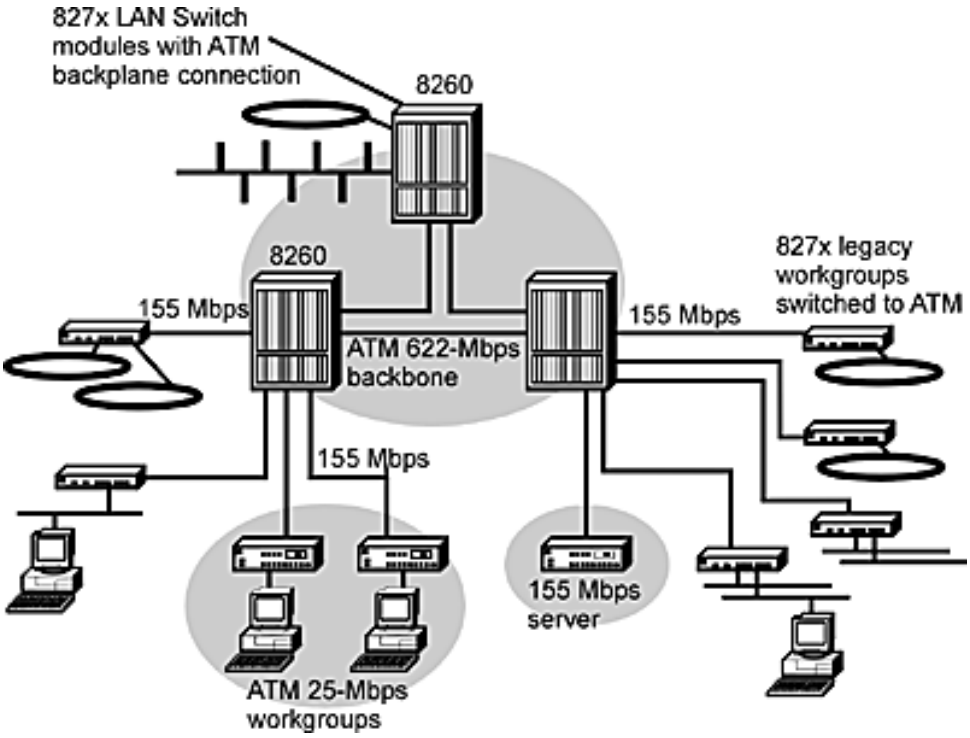


Figure 17: 8260 OC12 and 827x LAN/ATM modules (2Q97).

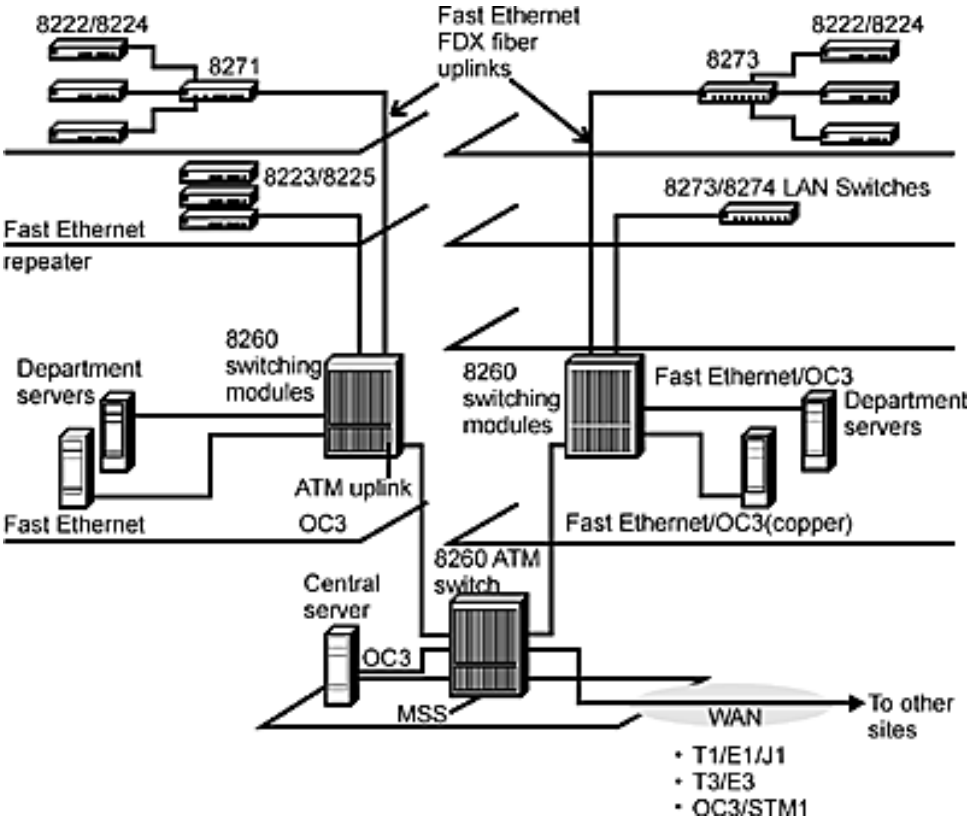


Figure 18: 8260 switching modules with ATM uplink.

- FDDI modules on the 8274
- FDDI adapter on the 8210
- FDDI switching modules on the 8260 with ATM Packet Channel backplane connection
- FDDI UFC on the 8271, 8272 and 8270 Model 800 switches and modules (3Q97)

This allows smooth, easy and low-cost connectivity from FDDI-connected servers or FDDI backbones to the ATM infrastructure.

Benefits

Depending on your implementation, IBM's 8260 ATM solutions can provide these benefits:

- Industry-leading, end-to-end networking services
- Reduced cost
- Increased availability
- Scalability
- Improved performance
- Increased capacity
- Consolidated voice, video and data networks

Positioning

The Nways line of products and IBM's ATM solutions are positioned for the following environments:

- Ethernet campus networks
- Token-Ring campus networks
- Router-based network environments
- WAN exchanging large amounts of data
- Video environments – high-intensity (MPEG-1) and graphics and multimedia development for broadcast quality video (MPEG-2)
- Voice consolidation environments
- Mobility in campus environments (easier moves and changes) with VLAN support

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This fact sheet is for an IBM Networking Product announced on 11 March 1997.

The part numbers, prices and availability dates shown here are valid in the U.S. They will vary from country to country. Some products may not be announced in your country. Refer to product announcements for your country or contact your local IBM representative or IBM Business Partner™.

Footnotes:
(1) BIT Communications is a division of the Fiber Company Ltd., Clifton Technology Centre, Clifton Moor Gate, York Y03 8XF, England, telephone: 01904 692700. For more information, you can also access the NHC Communications, Inc. Home Page at `http://www.nhc.com` or send e-mail to `bitcomm@cix.compulink.co.uk`.