Network intelligence—Turning your ATM network into a high-performance, scalable, reliable data network

IBM 8210 Nways Multiprotocol Switched Services (MSS) Server

Highlights

Minimum 50% performance increase over Model 2 handles peakload conditions with a newer processor, faster ATM adapter/ microcode

Implements Multiprotocol Over ATM (MPOA), distributed switch-routing server function for IP and IPX transport–IBM Ethernet and Token-Ring MPOA clients complete the picture

Incorporates Next Hop Resolution Protocol (NHRP) and NHRP server clients

Includes redundant IP gateway improvements and routing and bridging improvements

Improves network security and performance with BUS filtering/ policing

Includes Fastpath for source routed and 802.3 frames

Provides configuration command auto completion help

Uses dynamic LES/BUS recovery negotiation

Offers LECS database synchronization/auto configuration and replication with auto discovery

Protects VCC traffic during momentary LEC/LECS connection loss

Provides enhanced Quality of Service (QoS)

Offers Super LAN Emulation (LANE) for ATM emulated LANs (Super VLAN) including source-route bridging support and support of multiple Super VLANS by one MSS server

Uses a built-in Ethernet port

Supports MAC-based and policy-based VLANs

Utilizes FDDI-to-ATM connection

Provides support for APPN and Banyan VINES

MSS can expand and enhance your ATM network

The IBM 8210 Nways® Multiprotocol Switched Services (MSS) Server provides another way to use ATM to help you expand your campus network. By attaching the 8210 to your campus ATM switch, you can create a high-performance, multiprotocol backbone-maximizing the effectiveness of your existing networks while preparing your business for the demanding applications of the future.

This release of the MSS server has a minimum 50% increase in throughput over the Model 2 platform with a built-in performance margin for future functionality additions. The 8210 MSS server is easier to configure and use. The new HTML help function provides additional assistance to help explain the MSS configuration options. The 8210 MSS technology is available as a standalone box or as an 8265 Switch module. Along with the 8265 Nways ATM Switch for the backbone, the 8371 Multilayer Ethernet edge switch with MPOA, and the 8270 Token-Ring edge switch with MPOA/MSS Client, the 8210 MSS delivers the most complete MPOA solution for IP and IPX transport in the industry.



IBM 8210 Nways Multiprotocol Switched Services Server Model 003

Implement a virtual switch-route networking solution

The 8210 provides a smooth migration path to ATM by enabling legacy networking software and hardware to take advantage of high-speed ATM backbones. This approach allows you to preserve your current networking infrastructure while taking advantage of the many benefits of ATM. By using the ATM switched backbone, MSS creates a solution that is more scalable and manageable than that available with traditional internetworking.

ATM/MSS provides the opportunity to restructure the way networks are constructed and to rethink the functions that they are capable of providing. ATM provides an infrastructure in which any device attached to the ATM fabric can be one hop away (even when the devices are geographically separated). The 8210 lets you move routing function to the edge of the network. IBM, MPOA and extensions to the NHRP enable edge switch-route devices, connected to workstations and servers, to make intelligent routing decisions. Once the path is established, subsequent transmissions on that path will switch with a latency of microseconds rather than the microseconds of a router.

ATM can also provide many of the functions, such as load balancing and re-routing in the event of link outages, that is currently performed by Layer 3 devices. And ATM provides new function such as Quality of Service (QoS)/Class of Service (COS) guarantees on bandwidth and delay for CBR, VBR and UBR forms of traffic. ATM allows characteristics of the specific connection through the network to be tailored to meet the requirements of the application. The 8210 is designed to exploit all these capabilities of ATM and extend them to devices connected by traditional LANs and WANs.

Complete ATM standards support

Existing LANs are connected through LAN switches with ATM uplinks, and a router is attached to the ATM backbone. MSS can support this environment for LANs using ATM Forum LANE, IBM LANE and/or Classical IP over ATM (RFC 1577). This means that the MSS Server can function as an internetwork router between any combination of emulated LANs (ELANs) and Classical IP subnets. This function includes ARP server support and support for both permanent and switched virtual circuits.

Open Shortest Path First (OSPF) is supported for both types of subnets, and Routing Information Protocol (RIP) is supported for Emulated Local Area Networks (ELANs) under Classical IP. The MSS Server can also route between ELANs, and between ELANs and interfaces supporting RFC 1483 encapsulation under Internetwork Packet Exchange (IPX). The MSS Server supports a combination of RFC 1483 encapsulation and ATMARP that allows it to learn destination IPX host numbers dynamically, instead of requiring them to be configured.

Interconnection between VLANs

With MSS, an emulated LAN port provides either source route bridging or source route transparent bridging. A server with a mix of emulated Ethernet and Token-Ring LANs can provide a combination of bridging modes, as appropriate. Six bridging behaviors are possible when the base modes are combined.

The 8210 supports LAN switches using standards-based NHRP. This allows ATM-connected LAN switches to switch inter-subnet traffic, LAN switch-to-LAN switch, without the performance degradation or added latency of an intermediate router. MSS V2.2 also includes previously released unique extensions to the NHRP standard that allow for routing decisions to be pushed all the way to the edge of the network.

Network edge clients make the necessary routing decisions so that data can be switched end-to-end without having to pass through a traditional router. When the NHRP clients develop a short-cut path, all intermediate router hops are then bypassed. This is referred to as Zero-Hop Routing, if routed from MSS Client to MSS Client. With Zero-Hop Routing the MSS can boost network performance by enabling high-speed switching, rather than a routed path.

MPOA server support

MSS offers MPOA server support that is fully compliant with the ATM Forum MPOA specifications and that includes support for ATM Forum LANE 2 specifications.

MPOA is a virtual router model that allows you to simplify the configuration of your ATM networks. The MPOA server is the only router image in the network, and IBM MPOA clients require no configuration. Any time LANE is configured in the client the MPOA client is active, automatically taking advantage of MPOA shortcuts.

The MSS V2.2 supports MPOA MIBs and MPOA server and client for IP and IPX. The MPOA server for IPX allows the server to supply ATM address resolution information for IPX protocol addresses to clients with MPOA IPX shortcut capability. The MPOA IPX Client can create shortcuts for the IPX frames for Token-Ring SNAP, IEEE 802.2, Ethernet SNAP, DIX and IEEE 802.3.

APPN support

The 8210 MSS provides APPN® support. This function is similar to the APPN function in the IBM 2210 Nways Multiprotocol Router and IBM 2216 Nways Multiaccess Connector. It includes support for High-Performance Routing over LAN Emulation and natively over ATM. Key APPN functions include:

- Dependent LU requester (DLUR)
- Boundary access node (BAN)
- Boundary network node (BNN)
- High-Performance Routing (HPR)

Some advantages of MSS

Coexists with current applications
LANE allows networks to appear as Ethernet or Token-Ring LANs, providing a migration path to ATM that protects your investments in current LAN hardware and software. IP routing over ATM (Classical IP over ATM) enables IP networks to be extended across the ATM network using existing IP routers at the edge of the ATM network.

Simplifies administration for configuration, moves and changes
Many configuration tools are included:

- Workstation-based graphical user interface configuration tool
- Web interface
- Command line interface
- Integrated voice/fax modem that provides the ability to have faxes sent for reports or alerts, to interact with a voice response unit to perform basic configuration, to retrieve monitoring information or to dial a pager in the event of a fault.

MSS also supports SNMP management. Nways Campus Manager ATM for AIX® supports a full graphical end-user interface for the MSS. VLANs within the MSS enable workstations to move without requiring reconfiguration of the network.

Provides ATM switching for business applications
Functioning as an autolearning routing device as well as a server, MSS enables workstations within the LAN to take advantage of ATM switching over the ATM backbone.

The LAN is connected to a LAN-ATM switch that uses MSS to obtain the ATM address of the target device and then sets up a direct ATM connection. The ATM replaces a routed network, which reduces network latency and simplifies network configuration.

Some special MSS functions

Super VLAN
Super VLAN is a collection of ELANs that allows you to build large ATM networks. A client on any of the ELANs can establish a direct link, a data-direct virtual channel connection (VCC), to any other client on the Super VLAN. In essence, the Super VLAN is emulating a standard VLAN, except that the LAN Emulation Server (LES) function is distributed throughout the ATM network. Reliability and performance of the LANE services increase with the number of service entities. Resource utilization also becomes less centralized, allowing for a much larger Super VLAN than a standard ELAN. LANs with source routed bridges are supported within Super VLANs and multiple Super VLANs are supported by one MSS server.

Short-cut bridging
Short-cut bridging (SCB), which facilitates the establishment of direct VCCs, includes two additional functions: Bridging Broadcast Manager (BBCM) and Dynamic Protocol Filtering VLANs (D-PVLAN). These functions control broadcast traffic that would otherwise limit the effectiveness of a large ELAN. BBCM, like BroadCast Manager (BCM) in a single ELAN, resolves Layer 3 broadcasts into Layer 2 unicast frames, whereas D-PVLAN keeps track of what protocols and what subnets are on each of the LES domains. When BBCM is unable to resolve a broadcast, D-PVLAN forwards only to those segments that are interested in the broadcast. D-PVLAN partitions the Super VLAN into protocol-specific VLANs.

Virtual ATM interfaces/IP Multicast
Virtual ATM interfaces can improve performance in large, complicated networks and will aid multicast routing protocols such as OSPF. Currently, only 32 protocol addresses can be configured on any physical interface; however, the virtual ATM function eliminates this limitation. When more protocol interfaces are needed on a physical interface, the virtual ATM interface function allows you to define additional virtual interfaces on that same physical interface. And to the protocol support in the MSS server, a virtual ATM interface looks just like an additional adapter, allowing 32 addresses to be assigned to each virtual interface.

BUS performance
In emulation, Broadcast and Unknown Server (BUS) performance determines the ability of ATM to forward frames for which a data-direct VCC has not been established. MSS approaches wire speed in the standard BUS configuration.

FDDI-to-ATM connection
MSS provides bridging support for FDDI that allows you to route IP, IPX and AppleTalk traffic between FDDI and ATM networks. Four types of FDDI adapters support single and dual FDDI rings and allow you to use both copper and optical fiber cables.

Quality of Service (QoS)
One of the advantages of ATM is the ability to negotiate QoS. MSS provides the ability to define a QoS level for a LAN Emulation Client (LEC), an emulated LAN or an ATM interface. You can take advantage of this function now and know that IBM will provide compliance as the standard work continues.

Enhanced routing and bridging
With is variety of routing and bridging support, the 8210 protects your investments in existing networking equipment while providing a migration path to ATM. The bridging and routing support allows emulated LANs to be partitioned for better manageability and allows Ethernet-to-Token-Ring communication for mixed customer environments. The 8210 provides a LAN emulation environment for transport of SNA over ATM that bridges SNA between the emulated LANs.

MSS provides routing support for AppleTalk and bridging support for RFC 1483 bridge format frames.

Redundant ARP server
MSS allows you to decide which MSS server to configure as the primary ARP server and which one to configure as the secondary ARP server. If both MSS servers are active, the primary server will always be the one to service incoming calls. If the primary MSS fails, self-healing occurs and the second ARP server automatically takes over.

Redundant default IP gateway
The redundant default IP gateway function provides a backup gateway that allows end stations with manually configured default gateway IP addresses to continue passing traffic to other subnets after their primary gateway goes down.

A faster processor with extra cycles to handle peak load conditions

The 8210 Model 003 comes equipped with a faster, more powerful 233-MHz PowerPC 740 base processor and is designed to increase capacity, performance and ATM network availability, yet is priced the same as Model 002. As with Model 002, Model 003 comes with built-in MPOA server support and an optional MSS Flash Card to make microcode loading and configuration faster and easier.

Reliability and redundancy

The MSS Release 1.1 added controls that allowed you to configure an MSS Server to act as the primary ARP server and one to act as the secondary ARP server. Version 2.0 refines this redundant ARP server capability. The MSS Server features distributed ARP server for load balancing and redundancy in a Classical IP (RFC 1577) network. And the Interactive Network Dispatcher function of MSS Server 2.1 enables multiple S/390® servers to act as a single Internet or intranet server. Version 2.2 adds dynamic LES/BUS peer redundancy for maximum uptime.

The redundant IP gateway capability of MSS allows end stations with manually configured default gateway IP addresses to continue passing traffic to other subnets after their primary gateway goes down. Version 2.2 permits a dynamic, non-interruptive, negotiation between primary and backup MSS based on the number of clients saved at the time of failed unit restore. Without a backup gateway an end station with a manually configured default gateway address is unable to send packets to other subnets until either the gateway comes up or the user changes the default gateway address.

Multiple, independent Super VLANs

Previous releases of MSS allowed SCB and D-PVLAN across a collection of ELANs. Multiple Super VLANs could be supported, but only one Spanning Tree could be run and MAC addresses could not be duplicated across the Super VLANs. MSS V2.2 removes these restrictions and allow multiple, independent Super VLANs with separate Spanning Tree and forwarding database instances running for each Super VLAN. MSS Version 2.2 also supports source route bridging (SRB) within super VLANs as well as MAC-address and policy-based VLANs.

Classical IP requires that a VCC be established before any IP traffic will flow. IP traffic is often short in duration, and setting up a VCC for these short-duration flows puts a high load on the ATM network. MPOA provides a path for these traffic flows. VCCs are set up only when a flow reaches a certain threshold.

MSS Clients

The MPOA clients for 8270 Nways LAN Token-Ring Switch and Networking 8371 Multilayer Ethernet Switch are intended for use in ATM networks.

For the Token-Ring edge switch, the MSS Client ATM uplink is available in both 155-Mbps MMF and SMF versions.

Both employ hardware assistance for near-ATM media speed Layer 2 forwarding and both incorporate the 603e PowerPC processor for Layer 3 switching. The MSS Client features Layer 3 switching for IP, IPX, AppleTalk and Banyan VINES. It also features VLAN support, NHRP, Proxy LEC, Classical IP, and support for ATM Forum MPOA.

Also for Token Ring, the MSS Domain Client uses the 603e PowerPC processor turning the 8270 Nways LAN Switch into a Layer 3 switch-router with VLAN support for IP, IPX, AppleTalk, and Banyan VINES without ATM connectivity.

For the Ethernet, the MPOA client is built into the switch, and an ATM 155-Mbps MMF uplink feature card completes the picture.

Features	*Benefits*
ATM Forum-compliant LAN emulation	Migration path to ATM for both Token-Ring and Ethernet LANs
Super VLANs	Maximum flexibility for workstation moves, additions and changes
Zero-Hop Routing	Higher performance, minimum latency
MPOA	Pushes routing decisions to the edge of the network with single server control
MPOA Client MIB	Implements the MIB for the MPOA client
MPOA IPX Client	Creates shortcuts for IPX frames
MPOA server for IPX	Allows the server to supply ATM address resolution information for IPX protocol addresses
MPOA server MIB	Implements the MIB for the MPOA server
Distributed ARP server	Redundancy, load balancing between servers
Bridging Broadcast Manager	Fewer broadcast messages in emulated LANs for better performance and scalability

8210 Multiprotocol Switched Services (MSS) Server at a glance	
Physical specifications	Width: 440 mm (17.3 in.) without rack-mounting flanges, 480 mm (19 in.) with rack-mounting flanges Depth: 406.4 mm (16 in.) Height: 43.65 mm (1.7 in.) Weight: 6.7 kg (14.8 lb)
Operating environment	Temperature: 10° to 40°C (50° to 104°F) Relative humidity: 8% to 80% Maximum wet-bulb temperature: 27°C (80°F) Caloric value: 46.5 kcal/hr (184 BTU/hr) Electrical power: 0.107 kVA Capacity of exhaust: 0.566 m^3/min (20 ft^3/min) Noise level: 44 dB Leakage and storage current: 1.5 mA maximum/less than 40 A
Hardware	8210 Model 003 (P/N:31L3340) Base logic card • 233 MHz PowerPC 740 processor • 512-KB Layer 2 cache • 1-MB Flash • Two PCMIA slots • On-board 10BASE-T/RJ-45 for high-speed out-of-band configuration management • 1 EIA-232 D port (9-pin D-shell) for direct attachment or modem attachment. • Maximum speed of 38.4 Kbps • 8-MB ATM buffer • On-board 1-GB IDE driver for error logs and Op loads 64-MB EDO DRAM memory SC connectors for ATM Two internally accessible adapter slots (ATM and FDDI adapters) One ac power supply input PCMCIA Voice/Data/Fax Modem (optional) PCMCIA 20-MB Flash (optional)

8210 Multiprotocol Switched Services (MSS) Server at a glance (continued)

Certifications	*Safety Certifications* • EN 60950 • UL 1950 • CSA 950 *Electromagnetic Compliance Certification* • FCC Class A (USA) • VCCI Class A (Japan) • ICES-003 Class A (Canada) • European Community Mark of Conformity (CE Mark), EN55022 Class A (CISPR-22B)
Warranty	One year
Year 2000 ready	The IBM 8210 Multiprotocol Switched Services (MSS) Server is Year 2000 ready when used in accordance with its associated documentation and is capable of correctly processing, providing and receiving data within and between the 20th and 21st centuries, provided all hardware, software, and/or firmware used with the properly exchange accurate data with it.
Installation	May be placed on a flat surface or mounted in a rack in the wiring closet.
Publication	*IBM Multiprotocol Switched Services (MSS) Server Introduction and Planning Guide*, GC30-3820

8210 MSS Server Features

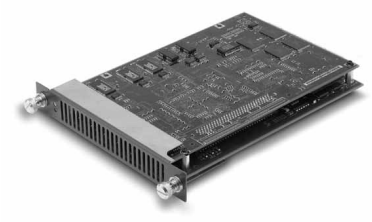
Features	**FC/Part number**
8265 ATM MSS 3.0 Server Module	5403/42L2494
8260 ATM MSS (A-MSS) Server Module	5400/86H2923
1-port 155-Mbps MMF ATM adapter	3003/31L3330
1-port 155-Mbps SMF ATM adapter	3004/31L3335
FDDI adapter with dual-ring SC connector	4002/55H9097
2-MB Flash Card	8711/08L2762
Data/Voice Fax Modem (US and Canada; other countries are available)	5357/02L3157
MSS Client, MMF, for the 8270-800	5205/85H4596
MSS Client, SMF, for the 8270-800	5206/85H4599
Domain Client for the 8270-800	5207/85H9303
MSS Microcode Upgrade Version 1.1 to Version 2.2	8709/02L1989
Service Kit	2505/55H8696



8265 MSS Module



8270 MSS Client



8270 MSS Domain Client

Request for Comments supported

MSS routing support is based on a large set of standards. These standards, draft standards and proposed standards are issued by the Internet Activities Board and distributed by the Network Information Center. They are referred to as Request for Comments (RFCs) numbers.

RCF number	Description
RFC 768	User Datagram Protocol, August 1980
RFC 791	Internet Protocol, September 1981
RFC 792	Internet Control Message Protocol, September 1981
RFC 793	Transmission Control Protocol, September 1981
RFC 826	Ethernet Address Resolution Protocol, November 1982
RFC 894	Standard for the Transmission of IP Datagrams over Ethernet Networks, April 1984
RFC 919	Broadcasting Internet Datagrams, October 1984
RFC 922	Broadcasting Internet Datagrams in the Presence of Subnets, October 1984
RFC 925	Multi-LAN Address Resolution, October 1984
RFC 950	Internet Standard Subnetting Procedure, August 1985
RFC 951	Bootstrap Protocol (BootP)
RFC 1009	Requirements for Internet Gateways, June 1987
RFC 1027	Using ARP to Implement Transparent Subnet Gateways, October 1987
RFC 1042	Standard for the Transmission of IP Datagrams over IEEE 802 Networks, February 1988
RFC 1058	Routing Information Protocol, June 1988
RFC 1112	Host Extensions for IP Multicasting, August 1989
RFC 1122	Requirements for Internet Hosts-Communications
RFC 1155	Structure and Identification of Management Information for TCP/IP-Based Internets, May 1990
RFC 1156	Management Information Base: MIB-I
RFC 1157	Simple Network Management Protocol, May 1990
RFC 1191	Path MTU Discovery, November 1990
RFC 1213	Management Information Base for Network Management of TCP/IP-Based Internets: MIB-II, May 1990
RFC 1253	OSPF Version 2: Management Information Base, August 1991
RFC 1256	ICMP Router Discovery Messages
RFC 1293	Inverse ARP
RFC 1483	Multiprotocol Encapsulation over ATM Adaptation Layer 5
RFC 1493	Definitions of Managed Objects for Bridges
RFC 1519	Classless Inter-Domain Routing (CIDR)
RFC 1525	Definitions of Managed Objects for Source Route Bridges
RFC 1541	Dynamic Host Configuration Protocol-Router Support Only
RFC 1542	Clarifications and Extensions for Bootstrap Protocol
RFC 1573	Interface MIB
RFC 1577	Classical IP and ARP over ATM
RFC 1583	OSPF Version 2, March 1994
RFC 1584	Multicast Extensions to OSPF, March 1994
RFC 1626	Default IP MTU for Use over ATM AAL5
RFC 1654	BGP-4
RFC 1657	BGP-4 MIB
RFC 1695	Definitions of Managed Objects for ATM Management Version 8.0 Using SMIv2 (aka AToM MIB), August 1994
RFC 1716	Towards Requirements for IP Routers
RFC 1745	BGP4/IDRP for IP/OSPF Interaction
RFC 1755	ATM Signaling Support for IP over ATM
RFC 1812	Requirements for IP Version 4 Routers
RFC 2178	OSPR Currency
Bridging and IPX routing standards	ISO 10038-ANSI/IEEE Std. 802.1D: Media Access Control (MAC) Bridges; IPX Router Specification, Version 1.20 of Novell Corporation; Novell IPX and RIP/SAP MIBs

ATM standards

- Multiprotocol over ATM Version 1.0 MIB Specification, July 1998
- Multiprotocol over ATM Version 1.0 Specification, July 1997
- LAN Emulation over ATM: Version 2.0-LUNI Specification, July 1997
- User-Network Interface Specification-Version 3.0, ATM Forum
- User-Network Interface Specification-Version 3.1, ATM Forum
- Q.2110 (Service-Specific Connection-Oriented Protocol), ITU-T
- Q.2130 (Service-Specific Coordination Function), ITU-T
- Q.2931 (Signaling Messages), ITU-To I.363 (AAL Type 5 Common Part Protocol), ITU-T
- ATM Forum/94-0737R4, "LAN Emulation Client Management: Version 1.0 Specification, " May 1995
- ATM Forum/95-1129R3, "LAN Emulation Server Management Specification 1.0, " December 28, 1995

For more information

To find out more about the IBM 8210 Nways Multiprotocol Switched Services (MSS) Server and other high-performance IBM communications and networking products, contact your IBM representative or call IBM Direct at 1 800 IBM-CALL (1 800 426-2255). You can also access the IBM Networking Home Page at:
www.networking.ibm.com

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