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

PRODUCT UPDATE

IBM 8210 Multiprotocol Switched Services (MSS) Server

- ***An IBM-developed technology that implements multiprotocol, distributed routing in switched networks***
- ***A new, single-slot-wide ATM MSS Server Module***
- ***Built-in Ethernet port***
- ***Next Hop Resolution Protocol (NHRP) and NHRP server and clients***
- ***Support for APPN and Banyan VINES***
- ***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***
- ***Multiprotocol over ATM (MPOA) server function for both Ethernet and Token-Ring MPOA clients***
- ***MAC-based and policy-based VLANs***
- ***Virtual ATM interfaces***
- ***FDDI-to-ATM connection***
- ***Enhanced Quality of Service (QoS)***
- ***Redundant IP gateway improvements and routing and bridging enhancements***

The IBM 8210 Nways Multiprotocol Switched Services (MSS) Server functions as the server portion of MSS, offering a multiprotocol networking solution for the ATM environment. It provides a seamless approach to migrating networks from legacy shared LANs to high-speed ATM backbones and to ATM on the desktop. The 8210 Nways MSS Server offers a wide array of capabilities in a single product, including the following functions and features:

- 155-Mbps multimode fiber (MMF) or single-mode fiber (SMF) ATM connections to an ATM switch
- Emulated LANs (ELANs) that conform to ATM Forum LANE
- Standards-based routing for IP and IPX over ATM
- Standards-based transparent and source-route bridging to connect multiple ELANs
- Enhanced broadcast management in emulated LANs
- A link between IBM LANE, ATM Forum-compliant LANE and Classical IP over ATM

The MSS Server is available either as a stand-alone product (8210) or as modules for the 8260 Nways Multiprotocol Switching Hub and the 8265 Nways ATM Switch (ATM MSS Server Module). The modules are functionally equivalent to the stand-alone product except that they do not support the ATM/FDDI port features of the 8210.

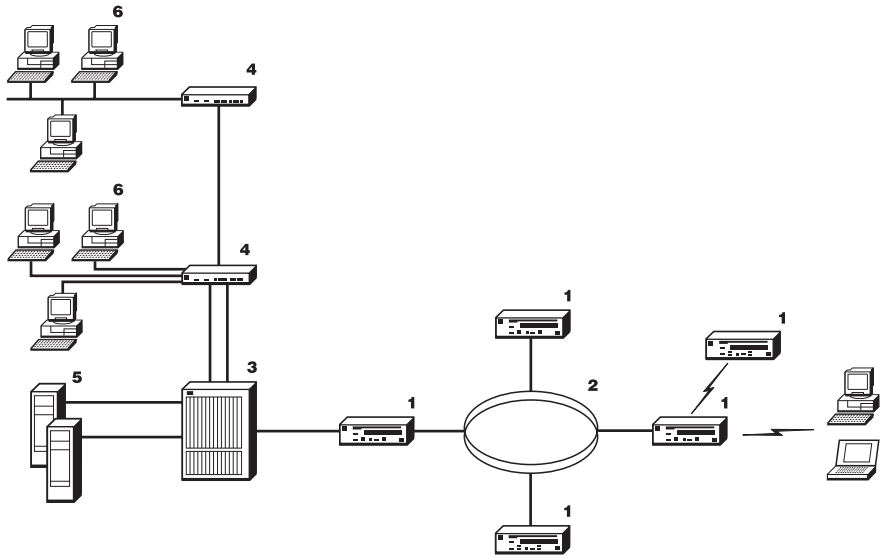
Positioning and Benefits

The IBM MSS Server is intended for customers who are ready to update their current campus infrastructures or to prepare for new applications that have QoS requirements such as voice or video. They need lower latency and better QoS for an exceptionally fast and reliable LAN-to-WAN network. They also need scalability for easy expansion of the network without disruption of current service. They want to move workstations within the network without having to reassign addresses or track the moves, and they need redundancy to protect against network failures.

Problem: A university needs multimedia support for the classrooms.

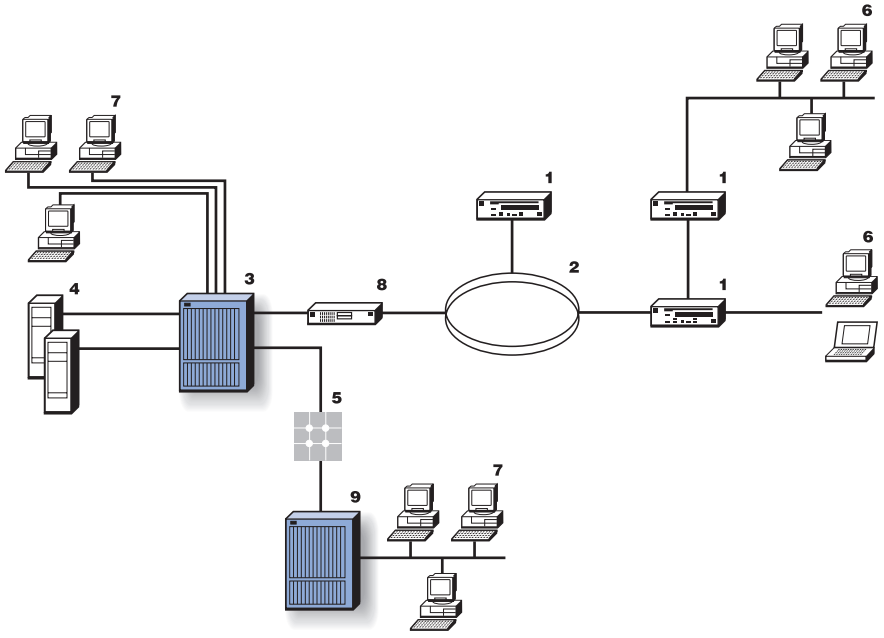
Environment: An existing router-based network is not fast and reliable enough to deliver multimedia support to send medical simulations to the students. Network expansion is also a problem.

1. *Routers*
2. *FDDI backbone*
3. *IBM 8265*
4. *LAN switches*
5. *Servers*
6. *Ethernet LANs*

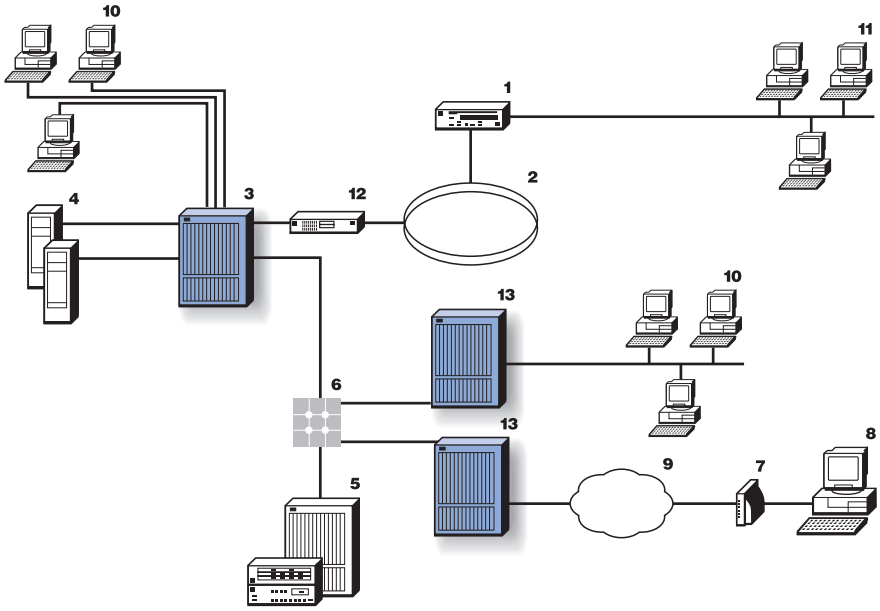


Solution, Stage 1: Deliver multimedia simulations using an ATM and MSS network in parallel with the existing FDDI backbone. With MSS the university can continue to run existing Ethernet applications without interruption, even though the network is being upgraded.

1. *Router*
2. *FDDI backbone*
3. *IBM 8265*
4. *Server*
5. *ATM backbone*
6. *Ethernet LANs*
7. *Switched Ethernet LANs*
8. *MSS*
9. *8265 with MSS*



Solution, Stage 2: Use ATM over WAN modules in the 8265 to deliver multimedia to the remote campus. Team with a cable operator to allow students to review materials at home with instant response times. Switch the classroom LANs to the 8265 with MSS for connection to the ATM backbone. Replace the FDDI and router network with ATM and MSS over time.



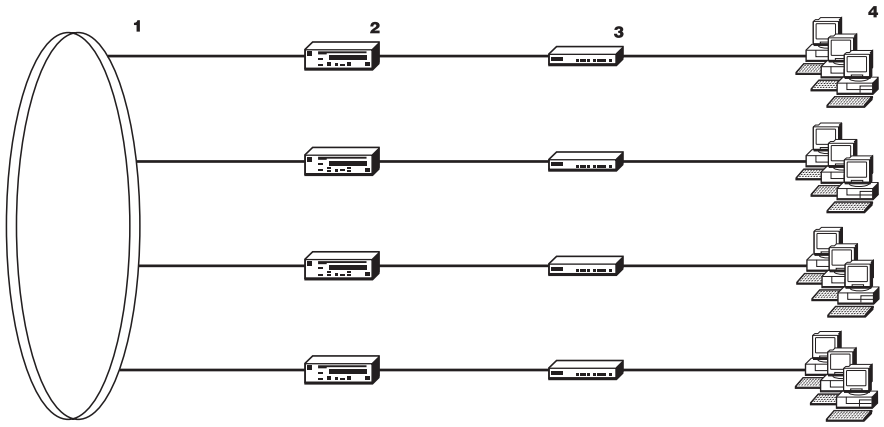
1. *Router*
2. *FDDI backbone*
3. *IBM 8265*
4. *Servers (155-Mbps ATM)*
5. *IBM 8265 or 8285*
6. *ATM backbone*
7. *Cable modem*
8. *Cable system*
9. *WAN*
10. *Switched Ethernet LAN*
11. *Routed Ethernet LAN*
12. *MSS*
13. *IBM 8265 with MSS*

Benefits

- Support of real-time multimedia applications, especially medical simulation
- Cost-savings by using fewer instructors
- Scalability—ATM scalability enables existing equipment and MSS to coexist in the network for gradual expansion
- Improved reliability—redundant MSS functions located in different devices within the network protect against failure
- Improved performance—NHRP reduces latency
- Improved manageability—virtual LANs (VLANs) enable the devices in the network to track moves without intervention from administrators

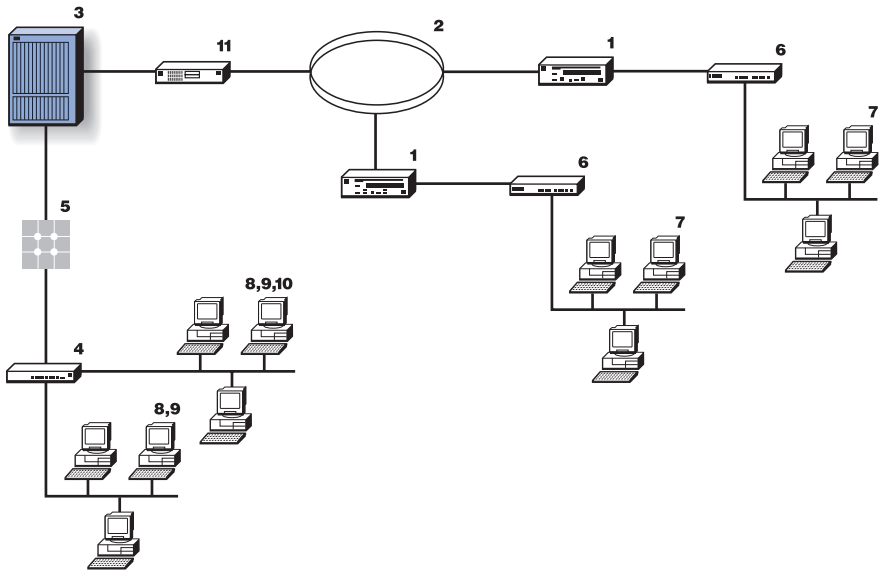
Problem: A government department experiences congestion in a very large Ethernet network of more than 5000 users. The network is supported by routers connected to FDDI backbones.

Environment: The existing network suffers from congestion. As a result, performance is suffering. Servers are difficult to access and new collaborative and multimedia applications cannot be supported.



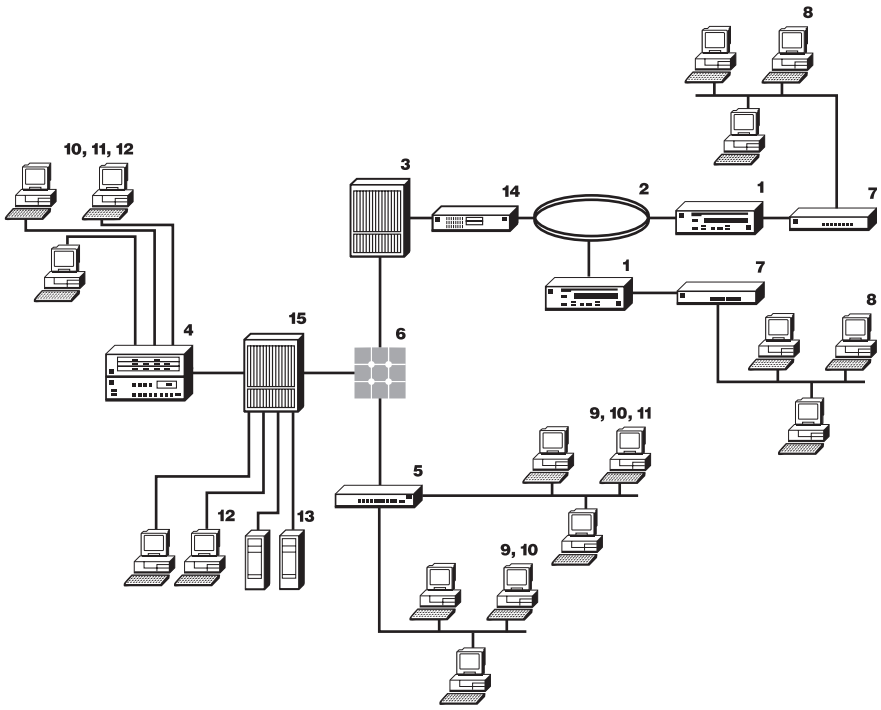
1. *FDDI backbone*
2. *Router*
3. *Hub*
4. *Ethernet LANs*

Solution, Stage 1: Migrate from the FDDI backbone to an ATM and switch-based backbone. To accomplish this, tie FDDI to the MSS (UFC card) and the MSS to the 8265 for FDDI and ATM backbone coexistence. Flatten the network to one logical subnet using the MSS with multiple emulated LANs.



1. *Router*
2. *FDDI backbone*
3. *IBM 8265*
4. *LAN-ATM switch*
5. *ATM backbone*
6. *Hub*
7. *Routed Ethernet LAN*
8. *10-Mbps switched Ethernet LANs*
9. *ELAN 1*
10. *ELAN 2*
11. *MSS*

Solution, Stage 2: In addition to the coexisting FDDI and ATM backbones, connect some workgroups that need particularly high bandwidth directly to the 8265, using either Fast Ethernet or ATM. These workgroups include servers, which have unusually large demands for throughput. Reducing routing in the network improves performance and access to the servers so that multimedia applications can be supported.



1. *Router*
2. *FDDI backbone*
3. *IBM 8265*
4. *IBM 8285 ATM Switch*
5. *LAN-ATM switch*
6. *ATM backbone*
7. *Hub*
8. *Routed Ethernet LAN*
9. *10-Mbps switched Ethernet LANs*
10. *ELAN 1*
11. *ELAN 2*
12. *25-Mbps ATM to the desktop*
13. *Servers (155-Mbps ATM)*
14. *MSS*
15. *8265 with MSS*

Benefits

- Relief of server congestion
- Support of multimedia and collaborative applications
- Improved network performance
- Migration strategy to preserve existing network investment
- Simplified network management by reduction of routing (replaced by flat ELANs)
- High, dedicated bandwidth where needed
- Network expandability

Product Overview

Multiprotocol Switched Services (MSS) includes those hardware and software products that provide IBM's solution to switched virtual networking in a campus or MAN ATM environment. With its distributed client/server approach and ATM core, MSS allows traditional networking equipment to exploit ATM's characteristics and provides a solution that is more scalable and more manageable than traditional internetworking options like routers. Because MSS separates physical topology from user connections, making large virtual networks feasible, it enables you to replace complicated router administration with graphical virtual LAN reconfiguration. You can build efficient, flexible VLANs for multiple protocols over an ATM backbone, using ATM for backbone servers, desktop ATM for demanding applications or a combination of these. MSS is the solution for integrating switched, bridged or routed LANs with new or existing ATM networks.

ATM MSS Server Modules for the 8265 and the 8260

The ATM MSS Server Module is available in two versions, one with a native 8265 backplane connection and one with a native 8260 backplane connection.

The ATM MSS Server Modules for the 8265 and the 8260 are improved. A faster PowerPC 603ev processor gives the ATM MSS Server Modules extra cycles to handle peak load conditions. The new ATM MSS Server Modules eliminate the need for an external PCMCIA hard drive and require only one slot in the 8265 or the 8260.

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, called 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 becomes less centralized, allowing for a much larger Super VLAN than a standard ELAN. Source-routed bridged LANs 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, now 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 actually 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. This function eliminates this limitation. When more protocol interfaces are needed on a physical interface, additional virtual interfaces can be defined on the physical interface. To the protocol support in the MSS Server, a virtual ATM interface looks just like an additional adapter, and 32 addresses can be assigned to each virtual interface.

BUS performance
In LAN 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 can forward over 100 000 packets per second in the standard BUS configuration.

FDDI-to-ATM connection
MSS provides 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.

Mulitprotocol over ATM (MPOA)
MSS supports the MPOA standard for IP. MPOA is an industry standard that allows the physical separation of internetwork layer route calculation and forwarding, a technique known as virtual routing. In MPOA internetwork layer route calculation does not have to be performed by the same edge devices that do the forwarding.

Next Hop Resolution Protocol (NHRP)
MSS supports NHRP servers and clients. NHRP allows ATM-connected LAN switches to switch inter-subnet traffic, LAN switch-to-LAN switch, without performance degradation or the cost of using a multiprotocol router. NHRP clients can set up a data-direct VCC and forward IP data frames without traversing intermediate routers.

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

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

Redundant default IP gateway
This 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.

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.

SNMP management is supported. 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
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; the switch uses MSS to obtain the ATM address of the target device and then sets up a direct ATM connection. ATM replaces a routed network. This reduces network latency and simplifies network configuration.

8210 Multiprotocol Switched Services (MSS) Server Specifications

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)***

Machine type	
Hardware	8210 Model 002 Base logic card • PowerPC 603ev processor • 512-KB L2 cache • 1-MB Flash • Two PCMCIA 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 drive 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)

Features	**FC/Part number**
8265 ATM MSS 2.5 Server Module	5401/26L0105
8260 ATM MSS (A-MSS) Server Module	5400/86H2923
1-port 155-Mbps MMF ATM adapter (8210 only, not 8265 or 8260 MSS Server Module)	3001/55H9093
1-port 155-Mbps SMF ATM adapter (8210 only, not 8265 or 8260 MSS Server Module)	3002/55H9096
FDDI adapter with dual-ring SC connector (8210 only, not 8265 or 8260 MSS Server Module)	4002/55H9097
20-MB Flash Card	8711/08L2762
Data/Voice Fax Modem (U.S. and Canada; other countries are available)	5357/02L3157
MSS Client, MMF, for the 8270-800 and 8260 (3-slot 8272 module)	5205/85H4596
MSS Client, SMF, for the 8270-800	5206/85H4599
Domain Client for the 8270-800, 8260 (2- and 3-slot 8272 module, 8271 module, 8271-216 and 8272-216)	5207/85H9303

MSS Client

MSS Domain Client

A-MSS Blade

Microcode	**FC/PN**
MSS Microcode V 2	8707/08L2650
MSS Microcode Upgrade	8709

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)

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 current: 1.5 mA maximum Starting current: Less than 40 A

Requests 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 (RFC) numbers.

RFC 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	CMP 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 Number	**Description**
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

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

- LAN Emulation over ATM: Version 1.0 Specification, ATM Forum
- 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

Supplementary Information

The following sales tools are available for the 8210:

- Specification sheet:
  IBM 8210 Multiprotocol Switched Services (MSS) Server, G224-4506
- Information on the 8210 is available at:
  www.networking.ibm.com/netprod.html
  www.networking.ibm.com/820/820prod.html
- The white paper, *Advantages of Multiprotocol Switched Services*, is available at :
  www.networking.ibm.com/820/820white.html
- The IBM Redbook is *Understanding and Using the IBM MSS Server*, SG24-4915. The Redbooks are on the Web at *www.redbooks.ibm.com.*
- A CD-ROM that contains the product documentation is provided with the MSS.