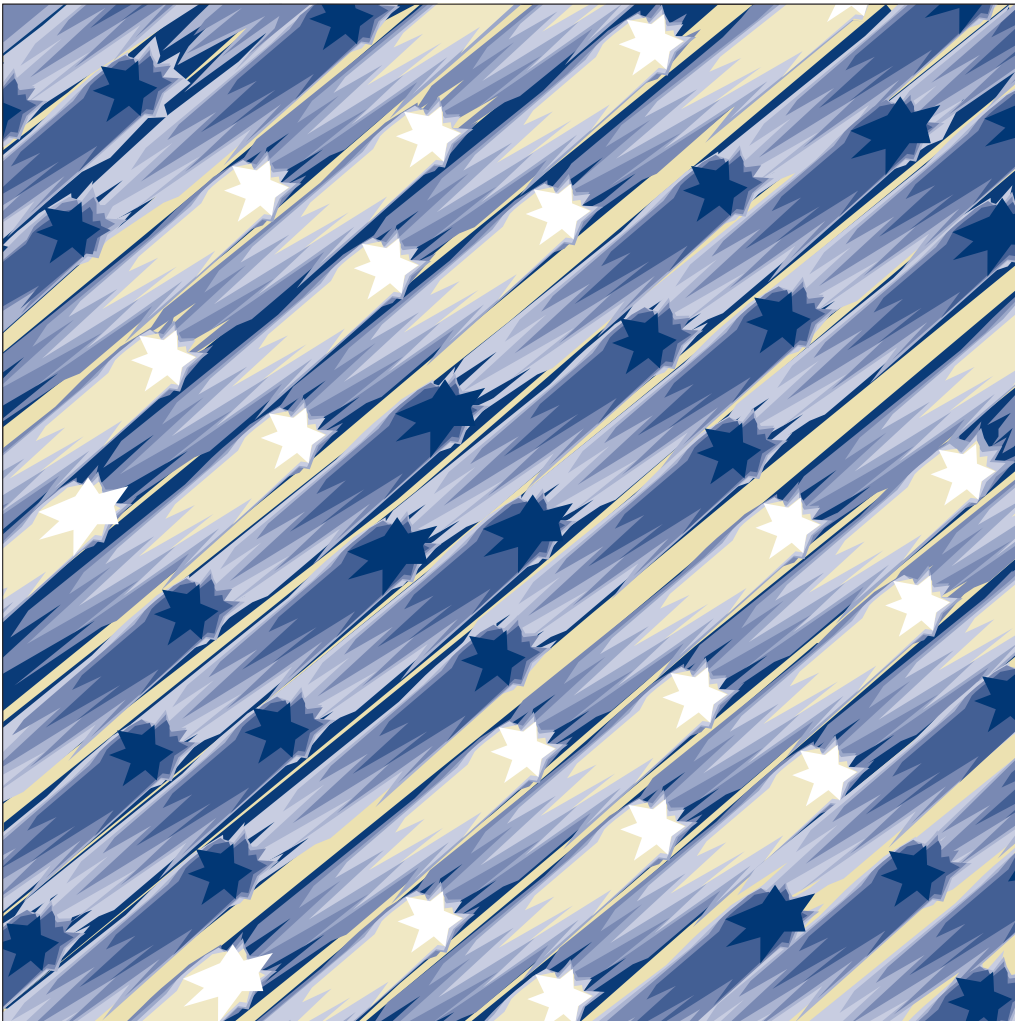8265 Nways ATM Switch

Product Description

IBM

8265 Nways ATM Switch

Product Description

IBM

Note|

Before using this information and the product it supports, be sure to read the general information under Appendix D, "Notices" on page 115.

Fifth Edition (September 1998)

The information contained in this manual is subject to change from time to time. Any such changes will be reported in subsequent revisions.

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About this Book

This book describes the IBM 8265 Nways® ATM Switch, its components, functions, and accessories. It also describes the characteristics, specifications, and power required of modules and daughter cards that can be installed.

Who Should Use this Book

This book is intended for the following people at your site:

- Customers
- Network Designer
- Network Administrator
- IBM Field (Sales Support) and Marketing personnel.

How to Use This Book

This book is divided into the following chapters and appendixes:

Chapter 1	describes how the 8265 switch operates and the network management environment.
Chapter 2	describes the basic and optional components, functions, and accessories for the 8265 switch.
Chapter 3	describes the modules that can be installed in the 8265, and the procedures for receiving and loading code updates.
Chapter 4	lists the 8260 features that can used with the 8265.
Appendix A	gives the technical specifications of the 8265 switch.
Appendix B	gives the specifications and feature codes of the modules and daughter cards that can be installed.
Appendix C	lists the power requirements for modules and daughter cards that can be installed.
Appendix D	contains various notices related to this product.

Prerequisite Knowledge

This book assumes that you are familiar with ATM networks and network management.

Where to Find More Information

Refer to the "Bibliography" on page 125 for a list of IBM manuals that contain related information and publications for the 8265 switch.

World Wide Web; You can access the latest news and information about IBM network products, customer service and support, and microcode upgrades via the Internet, at the URL:

```
http://www.networking.ibm.com
```

Chapter 1. Introduction

8265 Switch Overview

The IBM 8265 Nways ATM Switch provides a high switching capability (155 Mbps Sonet/STS-3c or SDH/STM-1 and 622 Mbps Sonet/STS-12c or SDH/STM-4) and high port density (up to fifty-six 155 Mbps and fourteen 622 Mbps non-blocking ports) in ATM backbone networks.

The IBM 8265 is designed to be used as an ATM switch in your campus backbone or as a WAN access switch with:

- Media speed switching capacity

- Integrated bridging and routing

- LAN emulation over ATM with integrated LAN Emulation Client, LAN Emulation Server, and Broadcast Unknown Server

- High call set-up rate

- Switched LAN ports for LAN attached servers

- PBX attachment via multiple T1/E1 interfaces

- WAN feeder ports: T1/E1 (1.544/2.048 Mbps), E3/DS3 (34.368/44.736 Mbps), Sonet/STS-3c or SDH/STM-1 (155 Mbps)

- Sonet/STS-3c or SDH/STM-1 (155 Mbps) ports to attach floor switches and servers

- Sonet/STS-12c and SDH/STM-4 (622 Mbps) ports for inter-building connections

- Support of ATM Forum interfaces and qualities of service

- Inverse Multiplexing – ATM on E1/T1 WAN connections

- Conformance to ATM Forum standards for all UNI versions (3.0, 3.1, 4.0) and PNN-I version 1.

- High availability and hot-plugging of components.

Figure 1. Front View of the IBM 8265

The 8265 Control Point provides a complete set of functions to control an ATM campus network and to interconnect local ATM networks over ATM WANs. The Control Point offers a high capacity for call setup and exclusive PNNI extensions to optimize link utilization.

The 8265 chassis is designed for high network availability. Dual Switch - Control Point slots ensure reliability. Load-sharing power supplies evenly distribute power consumption so that there is no single point of power failure. All ATM modules are hot swappable so that you do not have to power off the 8265 in order to insert new modules or replace failed ones.

Switched Virtual Networking in the ATM Backbone

Using the Multiprotocol Switched Services (MSS) Server module in the 8265 provides switched solutions in ATM backbones by combining the high speed switching capacity of ATM with:

- PNNI-1 QoS routing

- Layer 2 and Layer 3 cut-through switching

- Advanced broadcast control

- Dynamic protocol filtering

The MSS Server module serves as the base for a complete backbone switching solution by allowing all of IBM's LAN edge switches (827x) to function as feeders from any LAN type into the ATM backbone with their ATM uplink capacity. This means that you can continue to use your IBM Ethernet, Token-ring, and high-end multiprotocol LAN switches to connect the ATM backbone.

Migration and Scalability for 8260 ATM Networks

The 8265 offers a convenient migration path and scalability for your 8260 ATM networks. To protect your 8260 investment, 8260 and 8265 power supplies and Controller modules are interchangeable. Also, you can insert up to four 8260 ATM modules in the 8265 chassis and use combinations of one-, two- and three-slot modules, such as:

- MSS Server module

- 8271 Ethernet LAN Switch module

- 8272 Token-Ring LAN Switch module

- 8281 LAN Bridge module

- MPEG-2 Video Distribution module

- WAN 2 modules

- 25 Mbps module

- 100 Mbps module

- 155 Mbps module (2- or 3-port)

- Circuit-emulation module (PBX attachment)

- Modules and daughter cards developed under the ATMKit Development Program, such as the FiberCom circuit emulation I/O cards.

Note: Control Point and Switch (CPSW) module Feature Code 6501 is required. 8260 media modules cannot be used with the enhanced Control Point and Switch module (CPSW2) Feature Code 6502.

The 8265 is designed to be easily configured with 8260 ATM switches and 8285 ATM Workgroup switches in an ATM network. All three switches use the same standard protocols and share the same advanced features, command interface, and network management tools.

Building ATM Backbones

The 8265 is a key component in building ATM backbones for campus and MAN networks. The 8265 provides 768 Mbps (non-blocking) cell-switching capacity and offers a wide variety of ATM interfaces, including:

- Variable non-blocking backbone uplinks at 155 Mbps and 622 Mbps
- Wide-area connection speeds of 1.544 Mbps, 2.048 Mbps, 34.368 Mbps, 44.736 Mbps, 155 Mbps, and 622 Mbps
- Multiprotocol Switched Services (MSS) Server module
- MPEG-2 Video Distribution module (requires standard CPSW module)
- TAXI 100 Mbps (requires standard CPSW module)
- 25 Mbps for business desktops (requires standard CPSW module).

The 8265 conforms to ATM Forum standards, such as:

- PNNI-1
- Interim Inter-Switch Protocol (IISP)
- Classical IP over ATM (CIP, RFC 1577) for 8265 management
- LAN Emulation 1.0 for 8265 management
- UNI V3.0, V3.1, and V4.0
- ILMI V3.0, V3.1, and V4.0
- Inverse Multiplexing for ATM V1.0.

The 8265 supports the following Management Information Bases (MIBs):

- MIB 2
- IETF AToMMIB
- ATM Forum PNNI MIB.

Control Point Functions

The 8265 Control Point provides a complete set of functions for controlling an ATM campus network and interconnecting local ATM networks over ATM WANs.

Control Point software is available in a base version that includes IISP and a PNNI version. The 8265 offers a PNNI-1 implementation that gives greater flexibility in the way that ATM switches optimize links. Although the network automatically selects the least loaded route, you may select the links over which you want preferred traffic to be sent.

The 8265 Control Point supports the following:

- Switched virtual paths (SVPs) for point-to-point and permanent virtual paths (PVPs) for point-to-multipoint connections.

- Switched virtual connections (SVCs) and permanent virtual connections (PVCs) for point-to-point and point-to-multipoint connections according to the PNNI-1 specifications for soft PVCs.

- ATM signaling (SVC and PVC point-to-point and point-to-multipoint) according to ATM Forum UNI V3.0, V3.1 and V4.0.

- Virtual paths (VPs) assigned according to QoS allowing traffic with different QoSs to be split over different VPs that share the same ATM physical interface.

- Different types of VPs (UNI, IISP, PNNI) on the same physical interface or VP tunnel.

- VP tunneling to support interconnection of ATM campus switches over an ATM WAN that provides PVPs.

- VP multiplexer.

- Interworking between UNI V3.0, V3.1, and V4.0 end systems.

- UNI without ILMI registration for connecting devices without ILMI support to an ATM network through the 8265 switch.

- Automatic configuration by means of ILMI.

- Network access controlled by ILMI address registration.

- IISP according to ATM Forum specifications.

- PNNI Phase 1 (private NNI) according to ATM Forum specifications.

    - Link backup and load balancing between independent peer groups

    - Automatic call rerouting at peer group boundaries through crankback mechanism

    - Support for up to 10 levels of network hierarchy.

- E.164/ATM address mapping, allowing ATM devices to be reached through a network using E.164 addressing (such as a public telephone network).

- Inverse multiplexing software to manage logical port groupings of E1, T1, or J1 ports.

- Web-based network management including a network topology with device hierarchy.

- Link selection based on load-balancing algorithm (if all parallel links share the same or the lowest administrative weight).

- Link-sharing control to limit the amount of bandwidth reserved on a link for reserved bandwidth connections.

- Classical IP over ATM for 8265 management.

- Ethernet and Token-Ring LAN Emulation Client for 8265 management.

8265 Chassis Offers High Availability

The 8265 chassis is designed for high availability with a 17-slot 25 Gbps ATM backplane. Dual Control Point/Switch module slots allow the installation of a second Control Point/Switch module for redundancy purposes. Load-sharing power supplies are hot swappable and easily accessible from the front of the 8265.

Power supply and cooling system management can be controlled by either:

* The enhanced Control Point and Switch (CPSW2) module(s)

* The controller module(s), if installed.

  Controller modules are required when the standard CPSW module is used. Controller modules may be installed in conjunction with the CPSW2 module, should you prefer power supply and power management functions to be handled by a Controller module instead of the CPSW2 module.

  You can install a second controller module as a backup in case of failure of the active controller module.

The following management functions are performed:

* Monitoring of installed power supplies

* Intelligent power management, allowing you to prioritize the modules that will power off in case of an 8265 power failure that leaves insufficient power available.

* Monitoring of environmental variables, such as fan operations and temperature

* Inventory management.

All 8265 modules are hot swappable and field replaceable.

8265 Media Modules and Daughter Cards

Several new media modules have been designed for use with the 8265, including:

- 155 Mbps 4-port integrated multimode module (Feature Code 6540) to provide Sonet/STS-3c or SDH/STM-1 speeds

- 155 Mbps 4-port flexible module (Feature Code 6543) in which you can install different types of daughter cards according to your ATM networking needs:

  - Multimode fiber (MF)

  - Singlemode fiber (SF) for short or long distances

  - Shielded or unshielded twisted pair (TP)

- 622 Mbps 1-port module available in multimode fiber (Feature Code 6511) and singlemode fiber (Feature Code 6512) versions.

  The 622 Mbps module answers the need for supporting high traffic in connections between switches in large ATM backbone networks where ATM switches concentrate a growing number of 155 Mbps links.

- ATM WAN 2.5 module (Feature Code 6561) that supports daughter cards having the following speeds: 2.048 Mbps (E1) 1.544 Mbps (T1/J1), 34.368 Mbps (E3), 44.736 Mbps (DS3), and 155 Mbps (Sonet/STS-3c or SDH/STM-1)

  An IMA daughter card allows you to define groups of 2.048 Mbps (E1) or 1.544 Mbps (T1/J1) ports as a single logical unit in order to save on the cost of transmitting data at 8 Mbps over public lines. Each IMA daughter card can provide four E1, T1, or J1 ports.

- The new 8260/8265 MSS Server module that replaces the previous dual–slot 8210 MSS Server module. This single-slot module has the following advantages:

  - New 166 MHz 603EV PowerPC processor, providing extra cycles to handle peak load conditions and eliminating the need for an external PCMCIA hard drive.

  - An embedded Ethernet port for fast downloading of new code and configurations.

  - An optional 20 MB PCMCIA flash card that can be preloaded with microcode and configuration data and used to update the MSS.

- ATM Carrier modules:

  - Generic carrier modules supporting the UTOPIA 1 interface:

    - Symmetric, Feature Code 6559

    - Asymmetric, Feature Code 6560

  - A generic carrier module supporting the UTOPIA 2 interface, Feature Code 6558.

ATM Backplane

All data transmitted between modules in the ATM subsystem passes through the ATM backplane. Data is switched between media modules in the ATM subsystem by a Control Point and Switch (CPSW) module. CPSW modules are installed in slot positions 9 and 10 or 11 and 12 in the 8265 switch (see Figure 2).

Each media module has a dedicated set of connections to the CPSW module. This set of dedicated connections constitutes a star-wiring topology in which the media modules are at the tips of the star and the CPSW module at the center. The wiring topology used in the ATM backplane is shown in Figure 2.
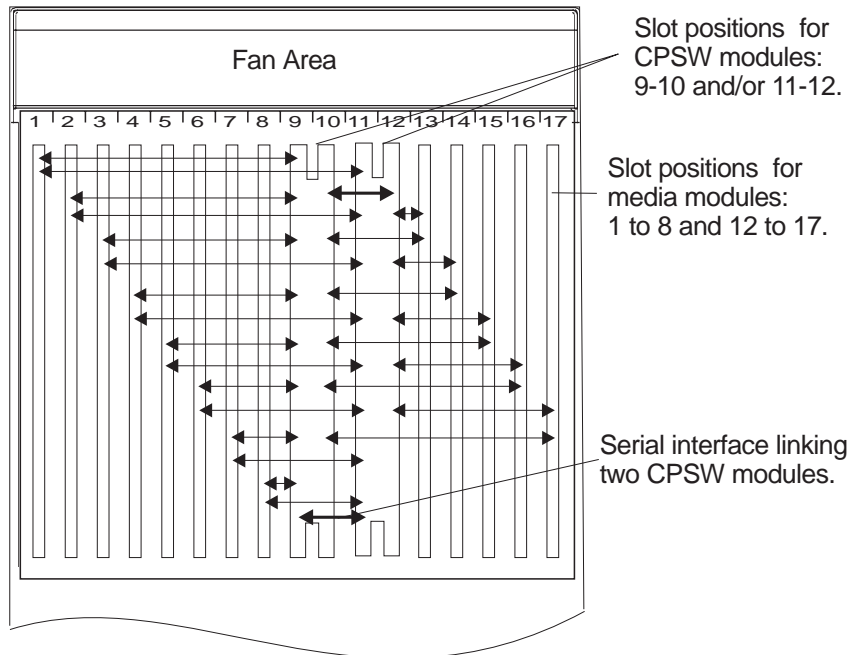
Figure 2. Star-Wiring Topology in ATM Backplane

The main characteristics of the ATM backplane are as follows:

- Modular structure
- Full floating media modules
- Support of two CPSW switch modules for reliability and redundancy.

You can install a media module in slots 1 to 8 and 12 to 17 (slots 9-11 are reserved for CPSW modules, and slot 12 can only be used when there is no CPSW module in slot 11.)

8260 ATM modules can only be installed in slots 1, 3, 5, and 7, and must be used in conjunction with CPSW module Feature Code 6501).

After installing the module, you must configure it for operation by entering a series of commands from the CPSW module console.

Understanding 8265 Management

The management of the 8265 is achieved in four areas:

- Chassis Management
- Network Management
- Traffic Management
- Data Management.

Chassis Management

The 8265's controller module provides management of the power and cooling subsystems. The 8265 has one controller module as standard, and a second module can be installed as a backup in case of failure.

Controller module functionality is integrated into the enhanced CPSW2 module, so the Controller module is not required.

The 8265 also features an integrated web server, reachable via the Internet, that provides a graphical view of the chassis and components, with easy navigation. Basic configuration functions (isolate and connect modules, enable and disable interfaces) are possible along with basic display functions. Debugging facilities include the ability to set up and display traces, display the error log, and display the connection table. A TELNET link to the Control Point is also provided.

Network Management

You can manage the ATM subsystem in any of the following ways:

- From an ASCII terminal with a character-based command line interface that is directly connected to the RS-232 console port or RJ-45 Ethernet port on the control point and switch module.

- By remotely logging in to the control point console using TELNET. Management traffic flows via the network.

- From a network management station running a network management application that supports Simple Network Management Protocol (SNMP) protocols and the 8265 SNMP-compliant Management Information Base (MIB) extensions.

- Telnet and PING operations can be performed either inband using RFC1577 or LAN emulation client, or out-of-band using the Ethernet port or Serial Line Interface Protocol (SLIP) on the RS-232 port.

Network Management Programs: The management of 8265 ATM networks can be significantly improved with the Nways Manager for AIX product. This product consists of the following components:

- Campus Manager — LAN

- Campus Manager — ATM

- Remote Monitor

- Traffic Monitor.

The Campus Manager — LAN component provides an easy-to-use, cost-effective management solution for medium to large FDDI and Token-ring networks, including virtual LANs (VLANs), APPN networks, and DSLw networks. It also provides graphical device management applications for various SNMP-enabled IBM networking devices.

Java-based management support in the Campus Manager — LAN component enables you to manage your devices from your intranet, the Internet, and from your local AIX workstation. You can use your Java-enabled Web browser to access the Campus Manager — LAN functions from anywhere in your enterprise.

Performance management for devices managed by Java technology provides the ability to select and monitor specific MIB objects or collections of MIB objects. Creating collections of MIB objects allows you to create complex expressions that provide a better representation of performance information. You can specify which objects (or collections of objects) to monitor, set thresholds for these objects, specify the action to occur when a threshold is exceeded, display the data graphically (pie charts, line graphs, bar charts) and store the data for report generation. Java-based performance management requires a Java Database Connectivity (JDBC)-compliant database to store the performance information (IBM DB2 Universal Database, Version 5 is provided).

To provide support for larger networks, Campus Manager — LAN's performance functions use Java-enabled Distributed Intelligent Agents (DIAs). These agents enable you to offload the polling of information from the manager workstation (freeing up the processor on the manager) and to place the polling close to the devices being polled (freeing up bandwidth across WAN links). These agents can be configured to notify the management workstation when exceptions (threshold exceeded) occur. The agents can be placed in any Java-enabled workstations (Java virtual machine) in the network.

Contact your IBM representative for information on the latest versions of these, and other, network management programs for the 8265.

The Campus Manager — ATM component provides easy-to-use, efficient management of ATM networks, including virtual networks formed from emulated LANs (ELANs).

The **Remote Monitor** component is a remote monitoring (RMON) application that collects, monitors, analyzes, and displays statistics from all RMON groups, some RMON2 groups (protocol directory, protocol distribution, address mapping, and probe configuration), and IBM's Enterprise Communications Analysis Module (ECAM) groups. Nways Workgroup Remote Monitor also supports the configuration of RMON, RMON2, and ECAM agents, providing a single application for configuration.

Because IBM embeds RMON agents in its networking devices, if you also have the Remote Monitor running, the Campus Manager — LAN component has the ability to access the Remote Monitor information (RMON coupling) for the IBM networking devices from the embedded RMON. RMON coupling allows the graphical management applications for these devices to seamlessly access and display the RMON and ECAM data provided for these devices by the Remote Monitor.

The **Traffic Manager** component collects and correlates data from multiple RMON and ECAM probes to provide a complete picture of enterprise network traffic for performance management, trend analysis, and troubleshooting. Traffic Monitor can display end-to-end communications patterns and detail client-server applications using the network.

Ordering Information

The Nways Manager for AIX CD-ROM (Part Number 4300293) contains all four components (Campus Manager — LAN, Campus Manager — ATM, Remote Monitor, and Traffic Monitor). This CD can also be ordered using the publication number SK2T-0420.

60–day try-and-buy license use certificates for all components are provided on the CD. For production environments you will need to order production license use certificates for each component you want to use. The following list identifies the part numbers for these certificates:

- Campus Manager — LAN, Part Number 4300291 (includes one DIA and DB2)
- Campus Manager — ATM, Part Number 4300288
- Remote Monitor, Part Number 4300287
- Traffic Monitor, Part Number 4300286.

If you are upgrading from a previous version of Nways Manager for AIX or the Nways Campus Manager products, the upgrade will automatically include the CD and the production license use certificates.

To order, contact your IBM representative, an IBM Business Partner, or the IBM North America Sales Centers at 800–IBM-CALL, Reference: RE001.

SNMP Support: In a campus environment managed by SNMP, the 8265's control point and switch module acts as a SNMP agent allowing you to configure all ATM modules installed in the switch using SNMP. The SNMP agent implements the ATM MIB defined in the UNI (V3.0, 3.1, and 4.0) and ILMI (V4.0) specifications of the ATM Forum. The following MIBs are available for network management:

- MIB-II Evolution (RFC 1573), defined to model network interfaces
- ATM Supplemental MIB (draft-ietf-atommib-atm2), an extension of the AToMMIB, mainly covering SVC management
- AToMMIB and LAN Emulation MIBs
- ATM Forum PNNI MIB extension, which allows the creation, deletion, and management of soft-PVCs in relation to the AToMMIB tables
- WAN MIBs:
    - E1/T1 (RFC 1406)
    - E3/DS3 (RFC 1407)
    - SONET (RFC 1595)
- ATM Forum PNNI MIB, for PNNI management
- ATM IBM MIB for monitoring (VC connection counters).

Traffic Management

The 8265 provides all key functions for managing ATM traffic, distributed on each 8265 module instead of centralized on the switching fabric. This allows for increased network availability and growth.

The 8265 offers the use of distributed buffer pools for improved link utilization and traffic shaping. Other traffic management functions include:

- Support for all ATM Qualities of Service (CBR, VBR, ABR, and UBR)

- Priority queues per Quality of Service:

  - Constant Bit Rate (CBR)

  - Variable Bit Rate (VBR)

  - Available Bit Rate (ABR), with Minimum Cell Rate value and relative rate control flow.

    Two types of ATM cells flow on an ABR connection: data cells and Resource Management (RM) cells. A source receives a regular sequence of RM cells that enables it to adjust the rate of cell transmission. Forward Resource Management (FRM) cells are transmitted from the source and returned from the destination as Backward Resource Management (BRM) cells. Each FRM cell contains Congestion Indicator (CI), No Increase (NI), and Explicit Rate (ER) fields. The source typically sets CI=0, NI=0, and ER equal to the desired transmission rate. The 8265 switch directly sets the CI or NI bit of a passing BRM cell. If the bit is set in an FRM cell, that bit will remain set in the corresponding BRM cell.

    When severely congested, the 8265 sets the ER field to 0, forcing the source to decrease the transmission rate to the Minimum Cell Rate (MCR).

    These actions allow the 8265 to signal a source that congestion is occurring and to reduce its cell rate. The destination system can also signal congestion. Usually, the destination system converts each incoming FRM cell to a BRM cell without changing the NI, CI, or ER fields. If the destination is experiencing congestion, it may set the CI or NI bit, or reduce the ER value when converting an FRM cell to a BRM cell.

  - Unspecified Bit Rate (UBR).

- Early and Partial Packet Discard:

  This function allows the 8265 to drop, when required (for example due to traffic congestion), cells belonging to the same end user packet.

- Policing per Virtual Circuit:

  The 8265 ensures that the contract is respected at the Virtual Circuit (VC) level, and drops cells over contract is required. To reduce the burstiness of traffic, a reshaping function is provided.

- Traffic shaping per Virtual Path (VP) and Virtual Channel (VC):

  Traffic shaping regulates traffic to a lower rate than the line speed, and is active for outgoing traffic. The control at the VP and VC level means that the 8265 can have different shaping values for different VPs and VCs that are active on the same port. Each of these VPs and VCs may have a different end user address.

- Buffering:

  The 8265 modules are equipped with input and output buffer queues, combining the benefits of the two queueing methods:

  - The output buffering helps to improve the link utilization when temporary traffics bursts occur, and delays the implementation of flow control on the traffic. In addition, it allows the shaping of traffic, down at the VP level, with a fine granularity.

– The input buffering with the reshaping function reduces the burstiness of the traffic in the network, and minimizes the likelihood of contention within the 8265 or the network. By exercising backpressure inside the 8265, traffic can be held at the input buffer in various modules without significantly increasing the size of the output buffer.

- Port mirroring (snooping):

  This function duplicates and redirects traffic flow to a designated port. This allows traffic analysis by connecting a Traffic Analyzer to the port. Multiple mirrored ports can be active at the same time. When a port is used to redirect traffic from other port(s), the other ports on the same module are disabled.

WAN Connection Statistics: Counters are provided to:

- Control traffic or policy violations on a per-connection basis

- Monitor throughput at the switch or module level

- Detect congestion

- Track CPU and buffer initialization.

The types of counter available are:

- Per connection:

  – number of valid cells received

  – number of valid cells received discarded due to policing or UBR

  – number of valid cells transmitted

  – number of valid cells transmitted and discarded due to congestion.

  The counters can be enabled either manually for a specific connection, or automatically for all connections (in this mode, there is a limitation of 4000 connections per module).

- Per port:

  – number of unknown Virtual Path Identifiers and Virtual Channel Identifiers

  – number of Available Bit Rate (ABR) RM cells with invalid CRCs.

- Per module:

  – number of cells transmitted to the Control Point.

Summary files are used to collect and record statistical information over long periods of time (typically on a daily, weekly, or monthly basis).

Data Management

The following operations can be performed either inband using RFC1577 or LAN emulation client, or out-of-band using the Ethernet port or Serial Line Interface Protocol (SLIP) on the RS-232 port:

- Microcode can be downloaded using TFTP for update
- FPGA can be downloaded using TFTP for update
- Configuration data can be uploaded and downloaded using TFTP
- Error log, traces, and dumps can be uploaded for debugging purposes.

Security

Security is provided in two ways:

- Configuration protection
- Network Access Protection

Configuration Protection

The configuration of the 8265 and installed media modules in managed through terminal dialog with the CPSW module. Passwords are required in order to modify the configuration parameters.

Network Access Protection

Access to the 8265 ATM network is provided for all types of ATM applications. When an ATM station connects to the 8265 switch, it must register its address through ILMI. The network administrator can specify which ATM address are allowed access.

ATM Kit Development Program

The IBM ATM Kit Development Program provides companies and developers with a simple and inexpensive way to add their ATM technology to the 8265. This program allows you to build ATM functions and modules for the 8265, and develop new ATM applications.

Carrier modules are available that act as generic motherboards, containing standard ATM functions, and accept customer developed daughter boards. The Carrier modules use the UTOPIA 2 standard interface for communication with 1 or 2 daughter cards that contain the developer's function or application. The daughter cards access all necessary ATM functions via the UTOPIA interface.

By using the UTOPIA interface on the ATM Carrier motherboard, the PHY-specific functions are separated from the standard ATM functions that are common to all ATM applications:

- Standard ATM functions are located on the Carrier module motherboard

- All PHY-specific functions are concentrated on custom-designed daughter cards that are mounted on the Carrier module.

Functions built on the daughter board benefit from the advanced features of the 8265 and the Carrier module.

There are three types of 8265 Carrier module available:

- Generic versions with asymmetric or symmetric connectors which support the UTOPIA 2 8–bit interface, with up to 160 Mbps of throughput.

- A generic version that supports the UTOPIA 2 16–bit interface, allowing up to 622 Mbps throughput (non-blocking).

For more information refer to the *IBM 8260 Nways ATM Kit Development Program, We Carry your Creativity to ATM*, GA33-0371.

Information about the ATM Kit Development Program and 8265 Carrier modules can be obtained from the Internet, at the following URL: `http://www.networking.ibm.com`.

New Software Functions

Release 4 of the Control Point code brings significant additional functions to reinforce the IBM 8265 ability to build even larger ATM networks with the right level of management tools:

- PNNI Full Hierarchy, allowing subnetworking for large ATM networks, without additional overhead for address administration (Requires PNNI version of Control Point code).

- LAN Emulation over ATM. The 8265 supports LAN emulation, as defined in ATM specifications, using two different servers:

  - LAN Emulation Server

  - Broadcast Unknown Server

  The 8265 also includes a basic LAN Emulation Client and supports external LAN Emulation Configuration Servers.

- Native ATM/E.164 addressing to facilitate connecting private networks to switched publib networks.

- Enhanced WAN connectivity. Using the ATM Forum Inverse Multiplexing — ATM Specification, a single high-speed stream of ATM cells can be distributed across several E1, T1, or J1 links and then recombined at the other end.

- Web server enhancements including a dynamic topology display and a quick means of starting an ATM network.

- Improved serviceability with the new ATM Ping function adn trace filtering, which significantly ease problem determination in the network.

PNNI Full Hierarchy

Networks are contually expanding and sometimes become so large that they need to be split into logical subnetworks. PNNI Full Hierarchy, based on ATM Forum standards, provides a means of creating ATM subnetworks (called *Peer Groups*) without additional overheads for address administration, whilst maintaining the full dynamics of PNNI across the Peer Groups. This split in Peer Groups often maps to geographical or administrative entities.

With PNNI Full Hierarchy, a switch within a Peer Group is no longer burdened with other Peer Group detail parameters, making local route calculation faster and control traffic between Peer Groups lower.

Within a Peer Group, an 8265 is elected Peer Group leader and is charge of exchanging control information with other Peer Group leaders.

The 8265 can be either a PNNI border node to connect PNNI Peer Groups or a PNNI Peer Group leader in a network comprising of several PNNI Peer Group networks. Moreover, the 8265 includes extensions allowing ATM switches with PNNI non-hierarchical functions (such as the IBM 8260, 8274, or 8275) to participate in a PNNI hierarchical networks.

Note: To run the PNNI code, a minimum of 32 MB of memory is required on the Control Point and Switch (CPSW) module. When the standard CPSW module (Feature Code 6501) is used, the memory upgrade must be installed (see page 30). The enhanced CPSW2 module (Feature Code 6502) is supplied with 64 MB.

For further information, refer to the *8265 Users Guide*.

LAN Emulation Over ATM

The 8265 supports LAN emulation, as defined in ATM Forum specifications, using two different servers:

- LAN Emulation Server (LES)
- Broadcast Unknown Server (BUS)

The LAN emulation servers are integrated in the Control Point and Switch module, and are configured and operated in tandem.

The 8265 also includes a basic LAN Emulation Client (LEC) and supports external LAN Emulation Configuration Servers (LECSs).

IBM's implementation of LAN emulation in the 8265 complies with Version 1.0 of the ATM Forum specifications for LAN emulation, and supports:

- Token-Ring (802.5) and Ethernet (802.3 and V2/DIX) LAN types for the LES/BUS.
- Up to two separate emulated LANs simultaneously, of the same or different LAN types.
- Token-Ring (802.5) and Ethernet (802.3 and V2/DIX) LAN types for the LEC.
- UNI 3.0 and 3.1 LECs, concurrently.
- Up to 128 LECs (combined total).
- LES addresses that are either configured directly in each LEC or supplied through a dialog with an external LECS.
- LECS locations that may be:
  - Set to the well-known anycast LECS ATM address
  - Supplied by the LECS ATM address field in the ILMI MIB
  - Set to the well-known PVC (Virtual Path Identifier=0, Virtual Channel Identifier=17).
- All maximum frame sizes defined in ATM Forum specifications:
  - Control frames: 1516 bytes
  - Data frames: 1516, 4544, 9324, 18190 bytes.
- Best-effort connections with Quality of Service set to 0. Bearer classes supported are:
  - BCOB-X and BCOC-C for incoming call
  - BCOC-X for outgoing calls.
- IBM's current implementation of LAN emulation does not support:
  - Communication over Permanent Virtual Connections (PVCs)
  - Internal LECS
  - Broadcast Manager, which is not standardized.

Centralized LES/BUS: The LAN Emulation Servers are centralized, such that each emulated LAN is monitored by only one LES/BUS. Distributed, or multiple, LAN emulation servers are not yet standardized.

The LAN emulation function translates LAN (MAC) addresses, and performs broadcast and multicast LAN services.

While the 8265 does support two separate emulated LANs, the two LANs cannot communicate directly with each other; a router or bridge is required. This configuration is not currently recommended.

If desired, you can disable the LAN emulation functions of the 8265, and use "external" LAN emulation servers attached, for example, to an 8260 hub.

Integrated LAN Emulation Components: The following LAN emulation components are integrated in the 8265:

- LAN Emulation Server (LES)

  The LES provides control and address resolution functions.

- Broadcast and Unknown Server (BUS)

  The BUS provides broadcast and multicast functions. No separate configuration commands are required to start the BUS, as it is started automatically when starting the LES.

- LAN Emulation Client (LEC)

  Integrated LECs for inband management allow TFTP, TELNET, and SNMP functions to be run over Token-Ring (802.5) and Ethernet (802.3 and V.2/DIX) emulated LANs. These clients may run concurrently and may work with the integrated LES/BUS or with an external ATM Forum-compliant LES/BUS.

  Each LEC supports up to 30 connections to other LECs.

  Management functions take place on the IP layer over the Ethernet LAN layer. The maximum length of PING and TELNET messages depends on the maximum SDU size supported on the corresponding emulated LAN. Table 1 lists the correspondence (in bytes).

Table 1. Maximum PING and TELNET Lengths			
SDU	**PING - 802.5 LEC**	**PING - 802.3 LEC**	**PING - DIX LEC**
1516	1462	1492	1500
4544	4490	4520	4528
9234	9180	9210	9218
18190	18136	18166	18176

Inverse Multiplexing Over ATM

The Inverse Multiplexing over ATM (IMA) ATM Forum specification was approved in July 1997. This specification defines a method of splitting up a single, high-speed stream of ATM cells, distributing the traffic across several E1/T1/J1 links on a cell-by-cell basis, and then recombining the cells at the remote end.

From the ATM device viewpoint, whether it is a UNI or PNNI device, everything appears as if there is a single UNI or PNNI port, but with a greater bandwidth. The IMA specification defines how to perform synchronization betweek links, how to remove or add a link dynamically, and how to handle errors and monitor the links.

A 4–port IMA daughter card that implements these specifications is available for the 8265 WAN 2.5 module (Feature Code 6561) and the 8260 WAN 2 modules (Feature Codes 6502 and 6512). Up to two IMA cards can be installed on each WAN module.

The IMA cards support both T1/J1 with 100 ohm twisted pair cabling and E1 with either 120 ohm twisted pair or 75 ohm coaxial cabling and integrated Channel Service Unit.

The IMA card complies with the following standards:

  * ATM Forum: AF-PYH-0016.000, AF-PHY-0064.000, AF-PHY-0086.000d
  * ITU-TS: G.704, G.706, G.804, G.823, G.826, G.832, I.431, I.432, I.610.

Two IMA groups (of E1, T1, or J1 ports) can be configured within an IMA card (up to 4 ports). Ports not configured as part of an IMA group can be used as normal E1/T1/J1 ports. IMA groups can be configured as UNI, IISP, or PNNI ports, and all usual 8265 operations (such as management of quality of services or logical link definitions) are possible.

From the 8265 perspective, the group of E1/T1/J1 ports (IMA group) acts as a single, coherent ATM virtual connection that can be managed as one link. The aggregate bandwidth of this group of links determines the rate of the ATM connection. For example, a group of four E1 ports would offer a bandwidth of 8 Mbps.

The IMA card offers flexible timing options (master, internal onboard crystal, slave, and loop-receive clock on other transmit ports) and performs alarm handling, performance monitoring, diagnostics, and loop-backs.

ATM E.164 Addressing

Most service providers offering ATM provide Permanent Virtual Connection (PVC) services. Many, however, are planning to move to switched services based on Switched Virtual Connections (SVCs). In this case, the requested addressing system is based on the native E.164 standard (public type).

As most private companies using ATM currently use the Network Service Access Point (NSAP) addressing system, it was not possible to communicate either with, or across, the public network.

A new function in the Release 4 code of the 8265 allows, via SVCs, private networks using NSAP addressing to interconnect with, or across, public networks using the E.164 addressing standard, without the need to change the existing addresses of ATM devices.

Integrated Web Server Improvements

The integrated web server in the 8265 provides access, via a web browser, to essential functions of tyhe 8265.

With Release 4 of the 8265 CPSW code, the following improvments have been implemented:

- A dynamic topology display application, which is a JAVA applet transferred from the 8265. This application provides a precise image of the topology seen by the PNNI node, and also the hierarchical view of the networks when the node is a peer group leader. This application allows an ATM network to be started quickly without any needing any definition at higher level protocols (IP, SNMP), something that cannot be done from a network management station.

- Congiuration displays, trace files, and error logs can be saved in HTML format for future use, using the commands of the web browser.

- To ease the readability of trace data, a trace formatter is transferred to the web browser as a JAVA applet.

Increased Serviceabilty

Release 4 of the Control Point code includes significant ehanced for maintenance and troubleshooting:

- The new ATM Ping function, which provides a connectivity test between ATM switches. It allows the checking of ATM signalling and the PNNI protocol status on teh ping route, at ATM level. This function helps to quickly identify physical or logical problems in ATM networks.

- To simplify the use of ATM addresses,

Chapter 2. Features and Components

Base Product

The base product of the 8265 switch consists of a chassis and the following components:

- Three fan units (already installed)
- Three fan mounting guards (already installed)
- Fourteen blank single-slot filler plates (already installed)
- Three blank power supply bay filler plates (already installed)
- One rubber feet kit, for use when mounting the 8265 on a table or shelf.

The following components are delivered with the 8265 switch and are used to connect a console, locally or remotely, to the CPSW module serial port:

- RS-232 DTE/DCE cable (Part Number 59G0278)
- Null modem interposer (Part Number 58F2861)
- Gender changer interposer (Part Number 58G4422).

Note: The load sharing power supply with its power cord, the controller module, the CPSW module, and media modules are ordered separately.

Additional Required Components

In addition to the base components supplied with the switch, the following components are also required to operate the 8265:

- 8265 Control Point and Switch Module (Feature Code 6501 or 6502)
- 8265 Controller Module (Feature Code 8000), required only when CPSW module Feature Code 6501 is installed.
- PCMCIA card for Control Point and Switch Module, either:
  - Base microcode with UNI and IISP functions (Feature Code 6545), or
  - Enhanced microcode with UNI, IISP, and PNNI functions (Feature Code 6546).

    Note: Control Point and Switch module Feature Code 6501 requires the 16 MB memory upgrade be installed to run the enhanced microcode (see "Additional Memory" on page 30).

- Documentation (on CD).
- ATM media modules (8265 and/or 8260)

    Note: 8260 modules require CPSW module Feature Code 6501.

- Power supplies: either
  - 415 W AC (Feature Code 8027), or
  - 295 W -48 Vdc (Feature Code 8026 or 8028)
- Power supply cables

For additional optional components, refer to page 30.

Control Point and Switch Module

The IBM 8265 Control Point and Switch (CPSW) module contains a control program to perform the functions associated with the establishment and management of ATM circuits. These functions are integrated into the switching element of each CPSW module. As a result, the 8265 ATM subsystem uses a distributed control system which offers the following advantages:

- Each ATM module benefits from the fault-tolerant design of the IBM 8265 chassis.

- Continued ATM network operation is ensured in case of a failure at a single point in the network.

There are two versions of the CPSW module available:

- Feature Code 6501, the standard CPSW. This module requires a Controller module be installed in the 8265 to handle power and cooling system management. Supplied with 16 MB as standard, expandable to 32 MB.

- Feature Code 6502, the enhanced CPSW, also referred to as the CPSW2 module. This module has integrated power and cooling system functionality, 64 MB of memory, and does not require a Controller module to be installed in the 8265.

The enhanced CPSW2 module incorporates the following chassis monitoring and power supply management functions:

- In the event of a power supply failure, the CPSW2 module will, if the remaining power budget is insufficient to support all installed modules, automatically power media modules until the power budget is sufficient. Modules can be assigned power class settings so that the order in which they are powered down can be pre-designated. Once the power supply deficit is corrected, the CPSW2 module will restore power to the modules, starting with modules that have the highest power class setting.

- The CPSW2 module monitors three overheat management areas:

  – Slots 1 through 8

  – Slots 6 through 13

  – Slots 10 through 17.

  If an overheat condition is detected, then modules within that area are selectively powered down, according to their power class settings, until the temperature falls below the overheat threshold.

The integrated chassis monitoring and power supply management functions of the enhanced CPSW2 module can be disabled, should you wish these activities to be handled by a Controller module instead.

You can add a second Control Point and Switch module to the switch for backup purposes, provided that is of the same type. You cannot mix CPSW and CPSW2 modules.

Controller Module

The 8265 Controller Module (Feature Code 8000) monitors switch conditions and reports failures to the Control Point and Switch module. The Controller module is a required component when the standard CPSW module is installed (optional with the enhanced CPSW2 module).

In the event of a power supply failure, the Controller module will, if the remaining power budget is insufficient to support all installed modules, automatically power media modules until the power budget is sufficient. Modules can be assigned power class settings so that the order in which they are powered down can be pre-designated. Once the power supply deficit is corrected, the Controller module will restore power to the modules, starting with modules that have the highest power class setting.

The Controller module monitors three overheat management areas:

- Slots 1 through 8
- Slots 6 through 13
- Slots 10 through 17.

If an overheat condition is detected, then modules within that area are selectively powered down, according to their power class settings, until the temperature falls below the overheat threshold.

You can install an additional controller module to the switch for increased fault tolerance.

Note: The additional Controller module can only act as a backup for another Controller module. It cannot be used as a backup to an enhanced CPSW2 module using integrated power control.

Controller module functionality is integrated in the CPSW2 module.

For further details, refer to page 41.

PCMCIA Cards

The PCMCIA cards contain 4MB of Flash EEPROM and contain the operational microcode. The card fits into a type 3 PCMCIA slot on the CPSW module.

The following PCMCIA cards are available:

- Base microcode with UNI and IISP functions (Feature Code 6545).
- Enhanced microcode with UNI, IISP, and PNNI functions (Feature Code 6546).

Documentation

All documentation related to the 8265 is provided on a CD. This CD is automatically shipped with the PCMCIA card containing the Control Point and Switch microcode (Feature Code 6545 or 6546). For a list of publications on this CD, refer to the "Bibliography" on page 125.

Media Modules and Daughter Cards

The media modules and daughter cards available for use with the 8265 switches are described in the following chapter.

For detailed specifications of each component, refer to one of the following appendixes:

- Appendix B for technical specifications
- Appendix C for power requirements.

See "8260 ATM Media Modules" on page 59 for information on 8260 ATM modules that can be installed in the 8265 (when standard CPSW module, Feature Code 6501, is installed).

Power Supplies

Up to four power supplies can be installed in the 8265. The following types of power supply may be installed:

- 415 W AC, Feature Code 8027

- 295 W DC -48 V, Feature Code 8026, or 8028 (NEBS Certified).

- Existing power supplies from an IBM 8260 (295 W and 415 W AC, or 295 W -48V DC).

  Note: Although you can install both 8265 415 W and 8260 295 W AC power supplies in the same switch, this should be avoided when running in power fault-tolerant mode. This is because the lower output power supply (295 Watt) cannot backup a higher output power supply (415 Watt). See the *IBM 8260 Nways Multiprotocol Switching Hub Product Description*, GA33-0415 for power capacities when a mixture of 415 W and 295 W AC power supplies are used.

The power supplies provide two main output voltages:

- + 12 volts, used by the 8265 components at power on time

- + 5.2 volts, used by the 8265 components during operation.

As a rule, it is recommended that you run the switch with at least one power supply more than the minimum number needed to operate it. The minimum number of power supplies is determined by the amount of power required (at +5.2 volts) to operate all of the installed components.

The availability of extra power can help prevent the switch from shutting down when modules demand more power than the switch can provide. An additional power supply minimizes the chance that power supply redundancy will be lost without warning.

For example, if the total power requirement of all installed modules is 350 watts (at + 5.2 volts), the switch can operate with only two power supplies. A third power supply, however, is needed to achieve power fault tolerance. If you use three power supplies and one power supply fails, the remaining two supplies can still support the load.

Power Capacity for Modules: The following tables show the power capacity (at + 5.2 volts) available in non-fault tolerant and fault-tolerant modes. When calculating the number of power supplies required, you must also allow for the system overhead (power used by the fan units and backplane) which is 1 Watt.

415 W AC Power Supplies:

Table 2. Power Capacity at +5.2 Volts (AC Power supplies)		
Number of Power Supplies	**Non-Fault Tolerant Mode**	**Fault Tolerant Mode**
One	301	See note
Two	542	301
Three	813	542
Four	1084	813
Note: Note: Power Fault Tolerance can only be established if the unallocated power budget (of at least one power supply) can be held in reserve.		

295 W DC Power Supplies:

Table 3. Power Capacity at +5.2 Volts (DC Power supplies)		
Number of Power Supplies	**Non-Fault Tolerant Mode**	**Fault Tolerant Mode**
One	204	See note
Two	367	204
Three	551	367
Four	734	551
Note: Note: Power Fault Tolerance can only be established if the unallocated power budget (of at least one power supply) can be held in reserve.		

AC Power Cords: Different countries use different power cord plugs and receptacles. Table 4 identifies, by country, which power cor d can be shipped with the 8265. All power cords are 2.8 m (9 ft) in length unless specified otherwise. Use this table to ensure that you receive the correct power cord with your 8265. This list does not include all countries. If your country is not listed, consult your IBM representative.

Table 4. AC Power Cords For Each Country		
Country	**Part Number**	**Feature Code**
Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Colombia, Costa Rica, Dominican Republic, El Salvador, Equador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Surinam, Taiwan, Thailand, Trinidad, U.S.A., Venezuela.	6952300 6952301 1.8 m (6 ft)	8039 8040
Argentina.	13F9940 6952291	8038 8046
Australia, China, New Zealand, Paraguay, Uruguay.	13F9940	8038
Afghanistan, Albania, Algeria, Angola, Austria, Belarus, Belgium, Bosnia, Bulgaria, Croatia, Czechia, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Lebanon, Luxembourg, Macau, Macedonia, Mauritius, Mozambique, Netherlands, Norway, Poland, Portugal, Rhodesia, Romania, Russia, Serbia, Slovakia, Slovenia, South Korea, Spain, Sudan, Sweden, Syria, Turkey, Ukraine, Swaziland, Zaire, Zimbabwe.	13F9979	8036
Bahrain, Brunei, Cyprus, Ghana, Hong Kong, Iraq, Ireland, Jordan, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Oman, Qatar, Sierra Leone, Singapore, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, Yemen, Zambia.	14F0033	8037
Denmark.	13F9997	8044
Chile, Ethiopia, Italy, Libya.	14F0069	8042
Israel.	14F0087	8045
Liechtenstein, Switzerland.	14F0051	8043
Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka.	14F0015	8041

Optional Components

The following optional components are also available:

- Additional memory (Feature Code 6516) for the standard CPSW module (required to use enhanced microcode)
- Universal code download kit (Feature Code 3150)
- Cable management tray (P/N 13J8751)
- Rack mount kit (P/N 25H1834)
- Documentation CD (Feature Code 6509).

Additional Memory

An additional memory module of 16 MB (Feature Code 6516) can be installed in the standard Control Point and Switch module (Feature Code 6501), boosting memory to 32 MB, and allowing the enhanced microcode to be run.

Universal Code Download Kit

The Universal Code Download Kit enables the installation of the ProComm™ terminal emulator on a PC. Once installed, the network administrator can upgrade the CPSW boot code and operational microcode using the out-of-band XMODEM protocol on the 8265 console port.

Cable Management Tray

The cable management tray available for the 8265 switch provides a simple way to route all cabling connected to the front panels and the back of the switch. The tray weighs 4.4 kg (7.7 lbs), and has the following dimensions:

Width   471 mm (18.54 in.)

Depth   444 mm (17.48 in.)

Height   44 mm (1.72 in.)

Rack Mount Kit

A rack mount kit is available that allows you to install the 8265 in a TELCO or metric rack.

Either rack may be used, providing it can support at least 170 kg (375 lbs) and allow enough space for the 8265 chassis:

TELCO rack 66.3 cm (26.1 in.)

Metric rack 67.5 cm

Documentation

All documentation related to the 8265 is provided on a CD. This CD is automatically shipped with the PCMCIA card containing the Control Point and Switch microcode (Feature Code 6545 or 6546).

Additional copies of the CD can be ordered using Feature Code 6509. For a list of publications on this CD, refer to the "Bibliography" on page 125.

ATM/Token-Ring
LAN Switch Module

MSS Server
Module

4-port 155Mbps
Module

Video Distribution
Module

Wan 2 Module

Power Supply
Bay Grille

Control Point and
Switch Module

4-port 155 Mbps
Module

1-port 622Mbps
Module

Controller Module
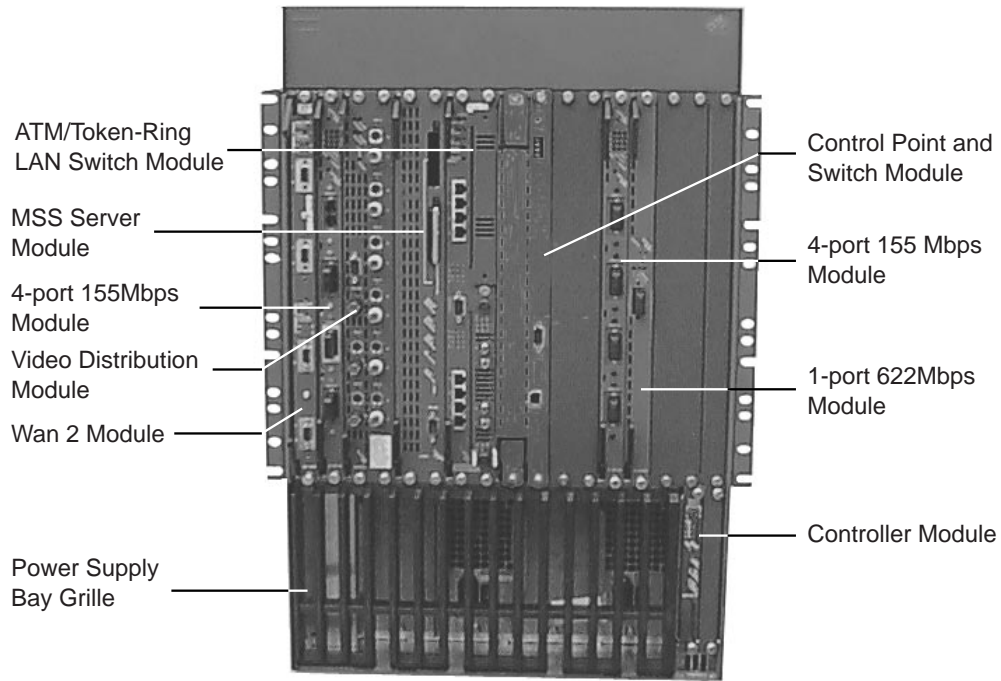
Figure 3. 8265 with Components Installed (Standard CPSW Module Shown)

Chapter 3. Modules

The chapter describes the modules and daughter cards that are available for the 8265 switches. A section is provided at the end of this chapter detailing how to obtain code updates.

Control Point and Switch Module

The Control Point and Switch (CPSW) modules (Feature Codes 6501 and 6502) used in the 8265 switch consists of three cards packaged into a double-slot module:

- A base card (ATM Switch fabric) that switches cells from one ATM concentration port to another port or to another output link on the same module.

  ATM cell switching is carried out by means of the Switch integrated circuit, made of two chips acting as a single non-blocking 16-by-16 times 16-bit parallel module, with an aggregate throughput of 12.8 Gbps full duplex, on a 25 Gbps ATM backplane.

- A control point card that houses a high speed Power PC processor where the control point resides. This card incorporates a PCMCIA card from which the control point is loaded.

- A daughter card that fits onto the base card and provides the logical and physical interface between the control point card and the switch fabric.

Figure 4 shows the faceplate of the standard CPSW module (left) and enhanced CPSW2 module (right).
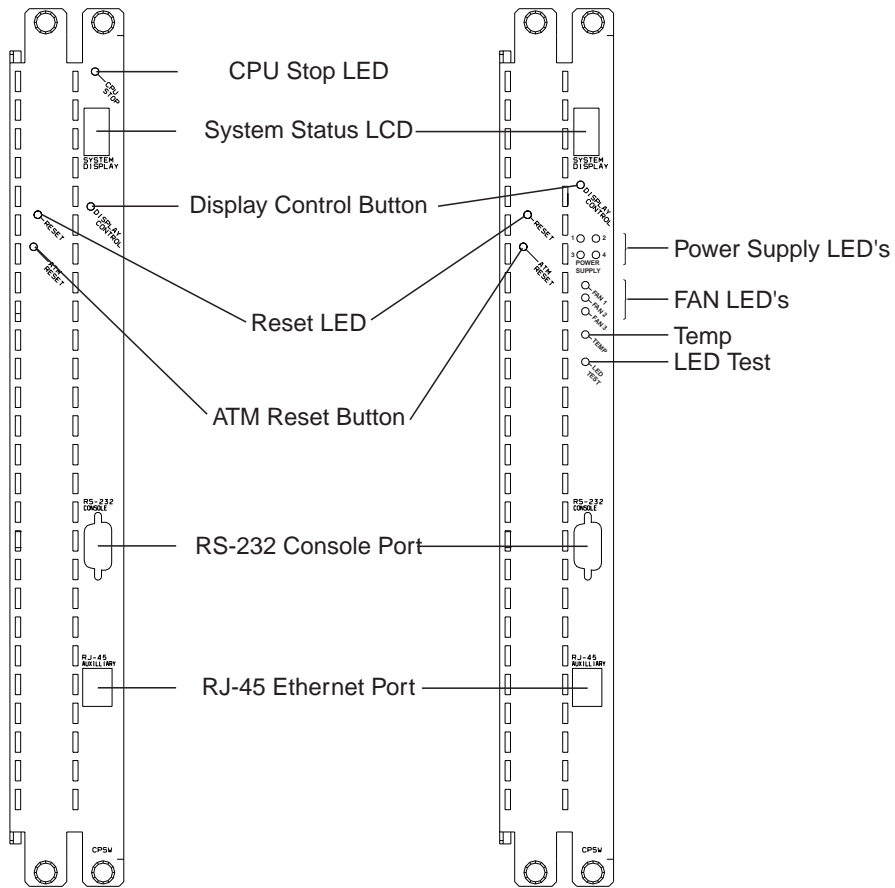
Figure 4. CPSW Module Faceplates

CPSW Module Functions

The imbedded Control Point provides a complete set of functions to control an ATM campus network and to interconnect local ATM networks over ATM wide area networks.

The CPSW module acts as an SNMP agent that implements the ATM MIB. The SNMP agent allows you to:

- Configure ATM modules
- Monitor ATM subnetworks.

Each IBM 8265 Control Point provides functions on three planes; the Control plane, User plane, and Management plane.

Control Plane

- Both Switched and Permanent Virtual Circuits (SVCs and PVCs)
- User-to-Network Interface (UNI)
  - Support of ATM signaling (SVC point-to-point and point-to-multipoint) according to ATM Forum V3.0, V3.1, and V4.0 specifications.
  - Support of permanent connections (PVC point-to-point and point-to-multipoint). The setting of PVCs is supported in accordance with PNNI Phase 1 Specification (soft-PVCs), ATM Forum.
  - Support of Permanent Virtual Paths (PVPs).
  - Support of internetworking between UNI V3.0, V3.1, and V4.0 end-systems.
  - Support of ILMI V4.0.
- UNI without ILMI Registration

  Some ATM devices from other vendors do not support the Interim Local Management Interface (ILMI) registration process, which prevents them from receiving incoming calls. With this extension, you can now connect these devices to the ATM network through the 8265.
- Network-to-Network Interface (NNI)
  - Support of Interim Inter-Switch Signalling Protocol (IISP) according to ATM Forum specifications.
  - Support of link backup and load balancing between independent peer groups.
  - Automatic call rerouting at peer group boundary through crankback.
- Private Network-to-Network Interface (PNNI-1)
  - Support of Private NNI (P-NNI Phase 1) according to ATM Forum specifications), with up to n layers of network hierarchy.
  - Support of Path Selection. Depending on network constraints, connections types and network operator wishes, either precomputed or on-demand paths, at either widest or shortest paths can be selected.

  This is an optional feature available with PCMCIA card microcode Feature Code 6546.
- Public UNI

  Support of connectivity to Public Networks via VP tunneling (without supporting its signalling).
- VP Tunneling
  - Support of interconnection of ATM campus switches over an ATM WAN providing permanent virtual paths (PVPs). The signalling channel is transparently passed to the WAN.

- – Support of VP multiplexor.

- – Support of multiple VPs of differing types (UNI, IISP, PNNI) on the same physical interface.

- Virtual Path Assignment per Quality of Service (QOS)

    Allows traffic of different QOS to be split over different virtual paths sharing the same physical ATM interface. This is a key function when connecting to WAN ATM carrier services or to a WAN ATM switch, such as the IBM Nways 2220 Broadband Switch.

- Link Redundancy

    - – Supported on physical and VP tunnel interfaces regardless of interface type (UNI, IISP, or PNNI).

    - – Link selection can be based on a load balancing algorithm, if all the parallel links share the same Administrative Weight', or on the lowest Administrative Weight'.

    - – Automatic Call Setup rerouting on the next best-fit link in case of failure on the selected link.

- Link Sharing Control

    Allows the network administrator to limit the proportion of the link bandwidth (or VP tunnel) that can be reserved by reserved bandwidth connections (CBR, rt VBR, nrt VBR, Minimum Cell Rate of ABR). This is supported on all interface types (UNI, IISP, PNNI).

- Switch Access

    - – Support of Classical IP over ATM (CIP, RFC 1577) for switch management and services.

    - – Support of LAN Emulation Client for Ethernet and Token-Ring for switch management and services.

- Inverse Multiplexing – ATM (IMA)

    - – Support of IMA groups (of up to four E1, T1, or J1 ports) on the 8265 WAN 2.5 module and 8260 WAN 2 module IMA daughter cards.

User Plane (Hardware)

- ATM layer switching

- Support of reserved bandwidth connections

- Support of unspecified bit rate (UBR) and available bit rate (ABR) connections

- Support of frame discard.

Management Plane

- Access Control

  Unauthorized users are prevented from accessing the network.

- Network Management

  – Chassis Monitoring

    This feature allows the network administrator to monitor the 8265 environment parameters (power supplies, inventory, temperature) via the Control Point and Switch module. Environment parameters can be accessed either via the console or via Telnet. SNMP traps are triggered when major events (such as power supply failure and overheating) occur.

  – Inverse Multiplexing Groups

    In addition to the separation of ATM cells from one logical port across several physical ports and the subsequent reassembly of the cells into a single data stream, the following are also managed:

    - Synchronization between links

    - Failed links are dynamically removed from the connection and the data is redistributed across the remaining links. Once the failed connection is corrected, the link is automatically re-establishing in the connection and the traffic redistributed. The link bandwidth availability in constantly advertised to other PNNI nodes.

  – Counters per virtual connection, port, and module

  – ILMI support (3.0, 3.1, and 4.0) for plug-and-play operations on both physical and VP links on all interface types (UNI, IISP, PNNI)

  – SNMP support (Get, Getnext, Set, and Traps)

  – MIB 2 support

  – IETF AToMIB

  – ATM Forum PNNI MIB.

- Box Services

  – Command line interface

    - Local RS-232 console

    - Remote access via Telnet either inband (IP over ATM, IP over LAN Emulation) or out-of-band (IP over SLIP)

    - Ethernet port to connect a Management Station using Ethernet access.

  – Code and hardware picocode upgrade via TFTP (inband or out-of-band)

    Dual codes images to resist download failures.

  – Download of Controller Module microcode

  – Troubleshooting Support

    - Counters

    - Port mirroring

    - Trace services

    - Dump services

    - Error logging in non-volatile storage

    - Transfer of trace, dump, and error logs using TFTP (inband or out-of-band).

- – Configuration Services

    - Management of configuration parameters in non-volatile storage

    - Upload and download of configuration (for same microcode version) via TFTP (inband or out-of-band).

- – Box Survey

  Module monitoring and failure handling.

- – Switch Redundancy

    - Automatic configuration synchronization

    - Monitoring and automatic takeover in case of active switch failure.

SNMP

The SNMP ATM agent is a function of the Control program in the CPSW module and implements the ATM MIB defined in the V3.0 UNI Specification of the ATM Forum.

The AToMIB is defined by the IETF and by the IBM extensions. It can be driven by SNMP managers, such as IBM NetView for AIX. The IBM ATM management application, Nways Campus Manager - ATM, can be used by a LAN administrator to fine-tune the system.

Both PVCs and SVCs are supported. The signaling is compatible with the ATM Forum V3.0, V3.1, and V4.0 UNI. Control messages are encapsulated in the SAAL Adaptation Layer.

The ATM Forum ILMI is fully supported. End-systems can register their local address to the IBM 8265 and receive notification of their network address. ILMI messages are SNMP-formatted and conveyed using the AAL5 Adaptation Layer.

Connection Types

The Control Point supports an extensive set of ATM connections, including:

- Switched and permanent virtual channels (VCs)
- Switched and permanent virtual paths (VPs)
- Point-to-point and point-to-multipoint
- Reserved Bandwidth (CBR, real-time VBR, non-real time VBR, minimum cell rate of ABR) and best-effort (UBR).

Table 5 shows the types of ATM connections supported in 8265 switches.

Table 5. ATM Connections Supported in 8265 Switches			
Virtual Connection Type	**ATM Connection Type**	**Connection Class**	**Connection Mode**
Virtual Path (VP) and Virtual Channel (VC)	Switched	Reserved Bandwidth (CBR, VBR, ABR) and Best-effort (UBR)	Point-to-point
		Reserved Bandwidth (CBR, VBR) and Best-effort (UBR)	Point-to-multipoint
Virtual Path (VP) and Virtual Channel (VC)	Permanent	Reserved Bandwidth (CBR, VBR) and Best-effort (UBR)	Point-to-point and point-to-multipoint

CPSW Backup: The primary CPSW module is installed in slots 9-10. For backup purposes, a second standby CPSW may be installed in slots 11-12, to take over if the primary CPSW module fails. The active CSPW module permanently checks that the standby CPSW is present and up-to-date.

Controller Module

The 8265 Controller Module (Feature Code 8000) monitors switch conditions such as power and temperature and reports failures to the Control Point and Switch module.

The controller module is a required component when the standard CPSW module (Feature Code 6501) is used. The enhanced CPSW (CPSW2) module (Feature Code 6502) has Controller module functionality integrated, and as such, a Controller module is not required. A Controller module may be used in conjunction with the CPSW2 module, should you prefer that the Controller module manages the power and cooling system instead of the CPSW2 module (a jumper must be set on the CPSW2 module).

The controller module bay can accommodate two controller modules. One controller module is required for normal switch operation, and only one controller module can be active at any given time. A second controller module can be installed to achieve controller module fault tolerance (that is, if one controller module fails, the other controller module automatically takes over). Controller-based fault tolerance is highly recommended.

Note: A second controller module can only act as a backup for another controller module. It cannot act as a backup for a CPSW2 module using integrated power control.

Figure 5 shows the faceplate of the Controller Module.
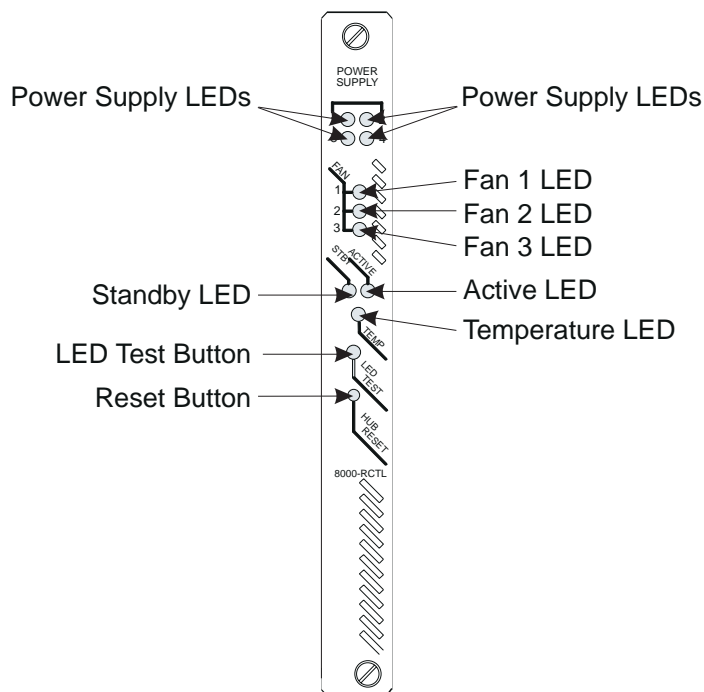
Figure 5. Controller Module Faceplate

For more information, refer to the *IBM 8265 Nways ATM Switch Installation Guide*, SA33-0441.

Media Modules

Media modules belong to the Nways family and can be used in the 8265 switch to:

- Send and receive data from an ATM subsystem in another 8265 switch
- Attach high capacity workstations and servers that function in ATM mode.

The media modules interface to the 8265 switch by means of the Control Point and Switch (CPSW) module. These modules process ATM cells of data by:

- Checking their validity
- Accessing the switching tables to locate the destination module
- Preparing the internal ATM format required by the CPSW module
- Sending the cells to the CPSW module.

The media modules support the following interfaces:

- User-to-Network (UNI)
- Public User-to-Network (Public UNI)
- Private Network-to-Network (PNNI)
- Interim Inter-Switch Protocol (IISP)
- VOID.

The UNI, IISP, and PNNI interfaces supported are defined in the following documents:

- ATM User-Network Interface (UNI) Specifications V3.0, V3.1, and V4.0, ATM Forum
- ATM Interim Inter-Switch Signalling (IISP), ATM Forum
- ATM Public Network-to-network Interface (PNNI) Phase 1, ATM Forum.

The media modules may be installed or removed from the switch (hot-pluggable) without disturbing data traffic on other ATM modules.

Available Media Modules

Table 6 lists the media modules that can be installed in the 8265. For a list of 8260 ATM media modules that can be installed, refer to Chapter 4, "Supported 8260 ATM Features" on page 57.

Table 6. Available Media Modules				
Module	**Feature Code**	**Slot Width**	**Data Speed[1]**	**Slots**
MSS Server 2.5	5401	1	768 Mbps (non-blocking)	1-8[2], 12[3]-17
WAN 2.5	6561	1		
1-port 622 Mbps (MMF)	6511	1		
1-port 622 Mbps (SMF)	6512	1		
4-port 155 Mbps	6540	1		
4-port 155 Mbps (MMF)	6543	1		
Carrier	6558	1		
Carrier	6559	1		
Carrier	6560	1		
Notes:				
1. The speed of data transfer between the module and the backplane.				
2. Slot 8 cannot be used for a 2-slot module when a CPSW module is installed in slot 9.				
3. Slot 12 cannot be used if a CPSW module is installed in slot 11.				

Daughter Cards: Table 7 lists the daughter cards available for 8265 media modules.

Table 7 (Page 1 of 2). Media Module Daughter Cards

Type	Feature Code	Connector Type(s)	No. of Ports
For 155Mbps Module (Feature Code 6543):			
Multimode Fiber	6580	SC	1
Singlemode Fiber	6581	SC	1
UTP/STP	6582	RJ-45	1
For WAN 2.5 Module (Feature Code 6561):			
E1/J1/T1:			
U.S.A, Canada	6570		
CE Mark countries	6571		
United Kingdom	6572		
Switzerland	6573		
Italy	6574	DB9	4
Australia, New Zealand, Singapore	6575		
Inverse Multiplexing: • USA, Canada • CE, UK, Italy	• 6670 • 6671		
E3:			
France, Spain	6590		
Switzerland	6591		
United Kingdom	6592		
New Zealand	6593		
Australia	6594	BNC	1
Italy	6595		
Germany	6596		
Belgium	6597		
Netherlands	6598		
Israel	6599		
DS3:			
Worldwide	8502	BNC	1
Japan	8512		
OC3: Singlemode Fiber	8503	SC	1
OC3: Multimode Fiber	8504	SC	1
STM-1: Singlemode Fiber			
Worldwide	8505	SC	1
Japan	8513		
STM-1: Multimode Fiber			

Table 7 (Page 2 of 2). Media Module Daughter Cards			
Type	**Feature Code**	**Connector Type(s)**	**No. of Ports**
Worldwide	8506	SC	1
Japan	8514		

WAN 2.5 Module

The WAN 2.5 module (Feature Code 6561) enables direct communication between ATM networks, residing in different locations, over the Wide Area Network (WAN).

The module is a single-slot module that can host any two daughter cards of the following types:

- 4–port E1 or T1/J1, with DB9 connectors for E1 over coaxial cable at 2 Mbps, RJ–48 connectors for E1/T1/J1 over twisted pair cable at 2 Mbps (E1) or 1.5 Mbps (T1/J1).

  IMA (Inverse Multiplex – ATM) versions of the E1 and T1/J1 daughter cards are available that allows you to define groups of E1, T1, or J1 ports as a single logical port in order to save on the cost of transmitting data at 8 Mbps or 16 Mbps over public lines. Each card can provide four E1, T1, or J1 ports.

- 1–port E3, with BNC connector, for coaxial cable at 34 Mbps.
- 1–port DS3, with BNC connector, for coaxial cable at 45 Mbps.
- 1–port STM–1, with SC connector, for multimode fiber cable at 155 Mbps.
- 1–port STM–1, with SC connector, for singlemode fiber cable at 155 Mbps.
- 1–port OC3, with SC connector, for multimode fiber cable at 155 Mbps.
- 1–port OC3, with SC connector, for singlemode fiber cable at 155 Mbps.

Support for WAN 2 I/O Cards: The following WAN 2 I/O cards are supported:

- E1, T1/J1, E3, and DS3 cards
- OC3/STM1 cards, providing they have the following part numbers:
  - OC3 singlemode fiber, Part Number 02L3269
  - OC3 multimode fiber, Part Number 02L3275
  - STM1 singlemode fiber, Part Number 02L3272
  - STM1 multimode fiber, Part Number 02L3278

The module supports the UNI, IISP, and PNNI interfaces. The STM–1 interface implements full SDH support, while the OC3 interface implements SONET support.

The UTOPIA interface connects the daughter cards to the motherboard in the following way:

- ATM data cells are transferred via UTOPIA
- Daughter cards access the ATM functions via UTOPIA.

Up to fourteen modules can be used in the 8265.

Module Status LED
(multifunction)

Ports 1-4 Status LEDs
(multifunction)

Ports 1 & 2

Ports 3 & 4

Module Status LED
(multifunction)

Ports 5-8 Status LEDs
(multifunction)

Ports 5 & 6

Ports 7 & 8
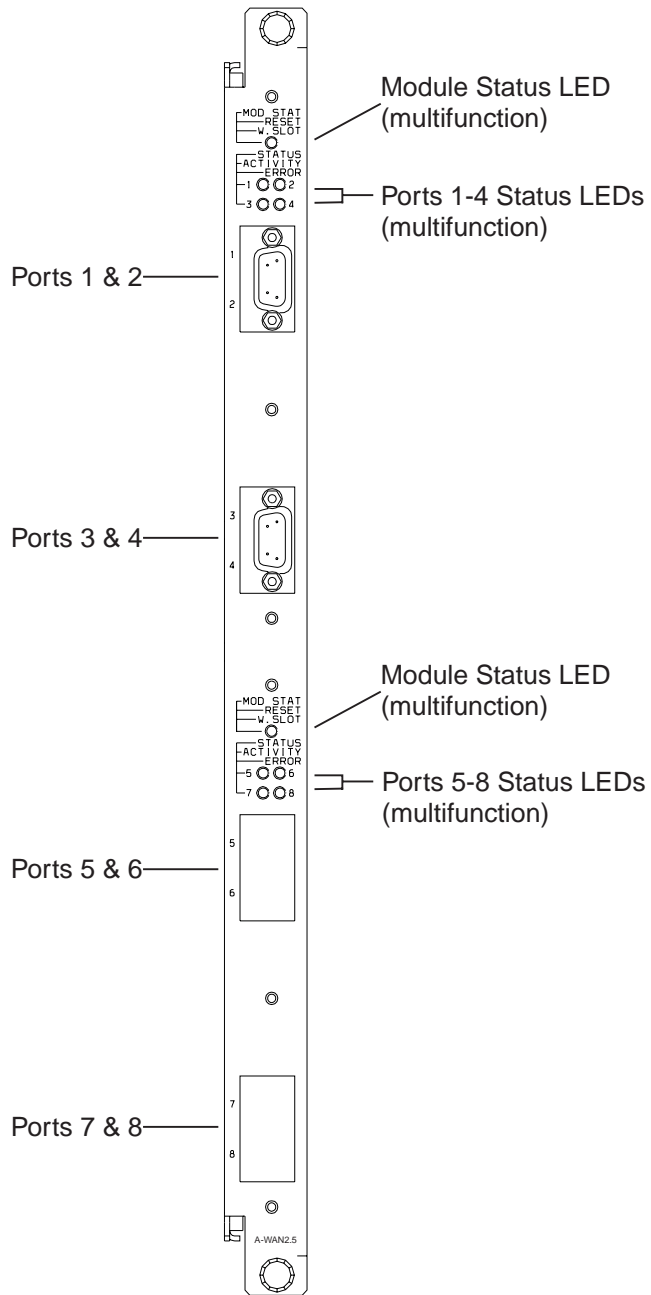
Figure 6. WAN 2.5 Module Faceplate

1–Port 622 Mbps Modules

There are two types of single port OC12 (formally known as STS12c or STM-4c) modules available for the 8265:

- Feature Code 6511, for multimode fiber
- Feature Code 6512, for singlemode fiber.

The modules have the following characteristics:

- One port operating at up to 622 Mbps (non-blocking) to:
    - connect to high capacity workstations and servers that function in ATM mode and support the SONET lite (LAN) standard servers and other switches or hubs.
    - exchange data with other ATM subsystems.
- Physical interface: optical fiber.
- Connections up to:
    - 500 m (1640 ft) using multimode fiber cable
    - 15 km (9.32 miles) using singlemode fiber cable.

    The maximum length of connection depends on the type of cabling used, as shown in Table 8.

Table 8. Maximum Distances for Valid 622 Mbps Connections			
Module Type	**MMF 50/125 micron**	**MMF 62.5/125 micron**	**SMF 9/125 micron**
Multimode	500 m[1]	800 m	—
Singlemode	3.1 km[2]	2.9 km	15 km
Notes:			
1. The A1-MF622 module may be connected to an existing 50/125 micron fiber base, however this is not recommended when setting up a new fiber base.			
2. The A1-SF622 singlemode fiber module may be connected to multimode fiber cabling.			

- Up to fourteen 622 Mbps modules can be used in the 8265 switch.

For further information, refer to page 90.

STATUS
MODULE
RESET

———— Module Status LED
———— Module Reset LED
———— Reset Button
———— Ports LEDs

ERROR
ACTIVITY
STAT

———— Port

A1-SF622

Figure 7. 622 Mbps Module Faceplate

4–Port 155 Mbps Modules

There two types of 4-port 155 Mbps OC3 module available for the 8265:

- Feature Code 6540 (MMF), a single-slot, multimode fiber module.

- Feature Code 6543 (Flex), a single-slot module containing a motherboard with up to four daughter cards for port-to-port and port-to-device connections. By using different daughter cards you can mix and match different media types. The module supports the following daughter cards:

  - Multimode fiber

  - Singlemode fiber

  - Shielded or unshielded twisted pair (STP/UTP5).

The modules have the following characteristics:

- Physical interface:

  - optical multimode fiber for Feature Code 6540

  - optical fiber (multimode or singlemode) or copper cable for Feature Code 6543, depending on the daughter cards installed.

- Connections up to:

  - 2 km (1.24 miles) using multimode fiber cable

  - 20 km (12.4 miles) using singlemode fiber cable

  - 100 m (328 ft) using 100 ohm UTP5 cable

  - 150 m (493 ft) using 150 ohm STP cable.

- Up to 14 modules can be used in the 8265 switch at the same time.

For further information, refer to page 87.
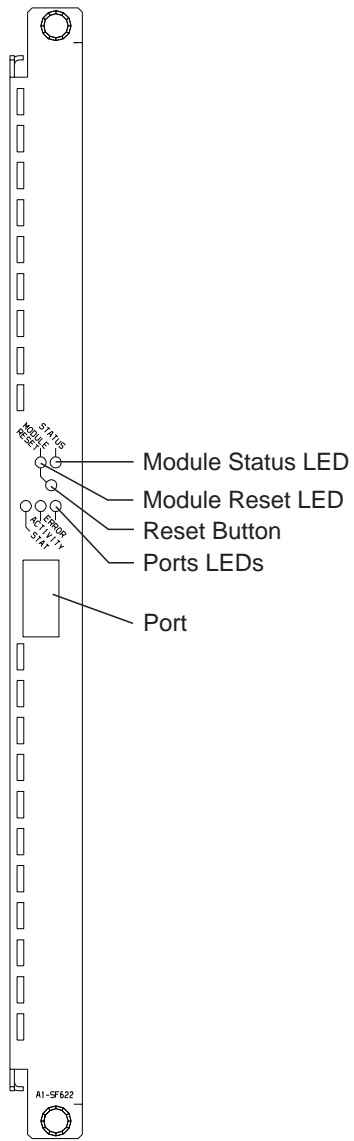
Figure 8 on page 51 shows the faceplate of the multimode fiber module.

Module Status LED

Ports LEDs

Reset LED

Module Reset Button

Ports
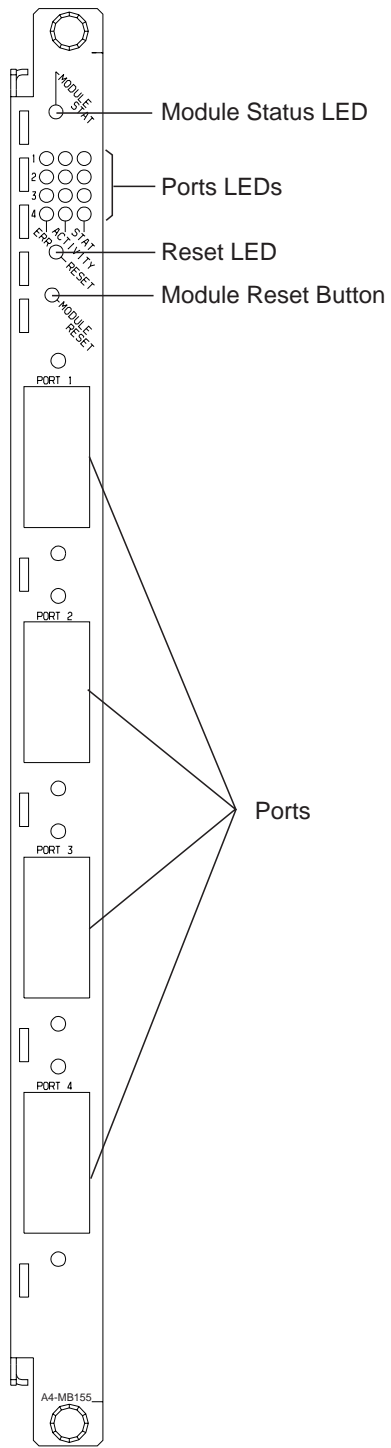
Figure 8. 4–Port 155 Mbps Module Faceplate

Multiprotocol Switched Services Server 2.5 Module

The Multiprotocol Switched Services (MSS) Server 2.5 module (Feature Code 5401) provides a multiprotocol networking solution for the ATM environment and allows a smooth migration from shared LANs to high speed ATM backbones.

The MSS Server acts as a LAN emulation server and a server for Classical IP over ATM. It enables you to create emulated LANs (ELANs) and virtual IP subnetworks. Its bridging and routing functions can connect these virtual LANs as if they were physical LANs, IP subnetworks, or IPX subnetworks.

The MSS Server can provide ATM campuses with the following services (depending on the software code installed):

- ATM Forum-compliant and IBM LAN emulation services, including support for both Ethernet and Token-Ring emulated LANs. LAN emulation allows ATM networks to appear as LANs. Using LAN emulation, devices that are connected to existing LANs and devices that are connected to the ATM network can belong to the same emulated LAN and use existing LAN applications.

  Devices included in emulated LANs are organized according to their logical groupings rather than their physical locations. Therefore, when a device in an ELAN or a virtual IP subnet is moved or added to the network, you do not have to provide it with new addresses.

- Enhanced LAN emulation broadcast manager support for IP, Novell IPX, NetBIOS, and source route bridge broadcasts. Reducing broadcasts reduces the traffic on the network and allows better performance and scalability.

- Enhanced LAN emulation fault tolerance, supporting multiple redundant LAN emulation servers with automatic recovery in case of failure.

- Support for Banyan VINES.

- Support for backup LAN emulation service components.

- The following types of bridging support:

    - Source route bridging (SRB)

    - Transparent bridging (TB)

    - Source route transparent bridging (SRT)

    - Source route to transparent bridging (SR-TB) for protocols that use IEEE 802.2 logical link control (such as SNA and NetBIOS).

    - Source route and transparent bridging without translation

    - Adaptive source route transparent bridging (ASRT). This is SRT bridging combined with SR-TB. In this type of bridging, source-routed traffic can be converted to transparent bridge format. The conversion is not part of the SRT standard.

    - Dual Spanning Tree support

- Standards-based IP routing support on ATM, including support for Classical IP and routing between an ELAN and Classical IP.

- Standards-based Novell IPX routing support on ATM between emulated LANs. IPX routing is supported over emulated LAN interfaces and RFC 1483 connections to other routers. The IP and IPX protocols treat emulated interfaces implemented by LAN emulation clients just like real Ethernet and Token-Ring interfaces.

- Super LANE for Ethernet ATM emulated LANs (SuperELAN)

- Quality of Service (QoS) for ATM emulated LANs

- Next Hop Routing Protocol (NHRP) support for reduction of routing hops

  Extensions to NHRP allowing workstations and servers to make routing decisions (Zero-Hop Routing)

- AppleTalk routing support

- Support for RFC 1483 bridging format

- Improved Broadcast Manager (BCM) for larger IPX networks

- Redundant ARP server support

- Improved redundant gateway function.

- Support for APPN, including dependent logical unit requestor (DLUR), boundary access node (BAN), and high-performance routing (HPR) for both LAN emulation and native ATM support.

- Ability to receive and transmit encapsulated bridge frames natively over ATM switched virtual circuits (SVCs).

The module has the following hardware specifications:

- Two PCMCIA adapter slots (for type 3 cards).

  An optional 20 MB PCMCIA card (Feature Code 8711) is available. This lets you to preload MSS configurations and microcode, and the MSS can be updated by the insertion of the card.

- A PCMCIA modem for remote access. Depending on to country homologation rules, it is either a PCMCIA data/fax modem or a PCMCIA voice/data/fax modem.

- An internal integrated drive electronics (IDE) hard disk drive.

- A 166 MHz 603EV Power PC processor

- A service port conforming to the EIA–232 standard.

- A 10BASE-T Ethernet port for out-of-band loading of microcode and configuration data.

There are several options for operating and managing the MSS Server module:

- By using a local console (ASCII terminal) on the service port

- Via remote login via a Telnet session

- Via a remote connection through an HTML Web browser

- From an SNMP management station.

In addition to the remote attachment, via a modem connected to the service port, the integrated PCMCIA modem can also be used.

Up to fourteen modules can be used in the 8265 at the same time.

PCMCIA Flash Drive Slot (Left)

PCMCIA Modem Slot (Right)

PCMCIA LEDs

Ethernet Port

Traffic

Link

Module Status

Port Activity

Port Status

OK

Reset

RS232 Port
Wrong Slot
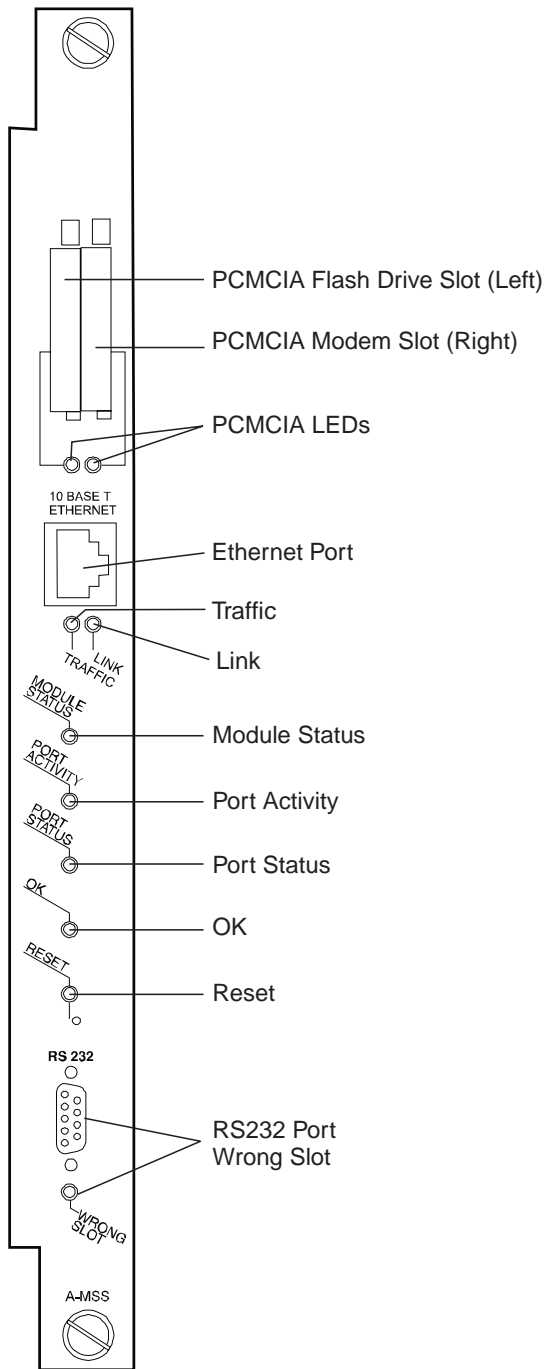
Figure 9. MSS Server Module Faceplate

ATM Carrier Modules

The ATM Carrier modules are part of the IBM ATM Kit Development Program that provides companies and developers with a simple and inexpensive way to add their ATM technology to the 8265. This program allows you to build ATM functions and modules for the 8265, and develop new ATM applications.

The Carrier module inserts into the 8265 switch and acts as a generic motherboard that accepts a feature daughter board. The Carrier module uses the well-known standard interface UTOPIA 2 for communication with 1 or 2 daughter cards that contain the developer's function or application. Functions built on the daughter board benefit from the advanced features of the 8265 and the Carrier module. Two types of UTOPIA 2 interface are supported

By using the UTOPIA interface on the ATM Carrier motherboard, the PHY-specific functions are separated from the standard ATM functions that are common to all ATM applications:

- multi-phy 8–bit interface, with up to 160 Mbps of throughput

- multi-phy 16–bit interface, with up to 800 Mbps of throughput

- Standard ATM functions are located on the Carrier module motherboard

- All PHY-specific functions are concentrated on custom-designed daughter cards that are mounted on the Carrier module.

The daughter cards access all necessary ATM functions via the UTOPIA interface.

There are three types of 8265 Carrier module available:

- A generic version with symmetric connectors (both connectors are on the side of the Carrier module) that supports the UTOPIA 2 8–bit interface, Feature Code 6559.

- A generic version with asymmetric connectors (one connector is on the side of the carrier module, the other one is on the edge) that supports the UTOPIA 2 8–bit interface, Feature Code 6560.

- A generic version that supports the UTOPIA 2 16–bit interface, allowing up to 622 Mbps throughput (non-blocking), Feature Code 6558.

IBM's current partners in the IBM ATMKit Development program include:

- *Bus-Tech Inc.*, who have developed a S/390 ESCON (Enterprise System Connection) attachment daughter card for the symmetric carrier module. This card can be used with Feature Code 6559.

- *Odetics Telecom*, who have developed a Frame Relay/ATM daughter card for the symmetric carrier module. This card can be used with Feature Code 6559.

- *Fibercom*, a division of Litton Systems Inc., who have developed an ATM Circuit Emulation (ACE) daughter card for the asymmetric carrier module. This daughter card connects and transports circuit emulation (PBX) traffic over an ATM campus backbone. This card can be used with Feature Code 6560.

Up to fourteen modules can be used in the 8265.

For more information refer to the *IBM 8260 Nways ATM Kit Development Program, We Carry your Creativity to ATM*, GA33-0371.

Information about the ATM Kit Development Program and 8265 Carrier modules can be obtained from the Internet, at the following URL: `http://www.networking.ibm.com`.

Receiving Code Updates

New versions of code for 8265 modules that are already in operation are available via the Internet, at the following URL:

http://www.networking.ibm.com/8265/8265fix.html

This is the "8265 Microcode Upgrades" home page. From here, you can select the right 8265 module.

Automatic Notification of Updates

To automatically receive notification when microcode updates are available, register your e-mail address at the following URL:

http://www.networking.ibm.com/8265/8265reg.html

Upgrading ATM Microcode

Microcode and FPGA picocode upgrades for CPSW and media modules can be downloaded inband, from a server attached to the network.

For more information on upgrading ATM microcode, refer to the *IBM 8265 Nways ATM Switch User's Guide*, SA33-0456.

Chapter 4. Supported 8260 ATM Features

This chapter describes the 8260 features that can be used in the 8265:

- Power supplies

- Controller modules

- ATM media modules.

8260 Power Supplies

The power supplies used in the 8260 can be also used in the 8265:

- 295 Watt AC

- 415 Watt AC

- 295 W —48 Volt DC

Although both 295 W and 415 W AC power supplies can be installed in the 8265 at the same time, this should be avoided when running in power fault-tolerant mode.

8260 Controller Modules

The 8260 Controller module can be used in the 8265 provided it has a microcode level of 1.14 or higher.

Note: The Controller module is not required when the enhanced CPSW2 module (Feature Code 6502) is used, as Controller module functionality is integrated in the CPSW2 module. If a Controller module is to be used with the CPSW2 module, the integrated power control functions of the CPSW2 module must be disabled (by setting the FORCE RCTL jumper to the ON position). The Controller module will then take over the power and cooling system management capabilities.

If you are planning to use an existing 8260 Controller module that has a microcode level below 1.14, you must upgrade the microcode **before** installing it in the 8265. Refer to the *IBM 8260 Nways Control Point and Switch Module Installation and User's Guide*, SA33–0326 for information on how to upgrade the microcode.

8260 ATM Media Modules

The section describes the 8260 ATM media modules and daughter cards that can be ordered and installed in the 8265.

Note: 8260 modules will only operate in conjunction with the standard CPSW module (Feature Code 6501).

For a list of 8260 modules that can be migrated from an existing 8260 environment to the 8265, and their required FPGA levels, see "Migrating 8260 ATM Modules" on page 75.

Table 9 lists the 8260 ATM media modules that can be installed in the 8265.

Table 9. Supported 8260 ATM Media Modules		
Module	**Feature Code**	**Slot Width**
WAN 2 (Worldwide except Japan)	5602	1
WAN 2 (Japan)	5612	1
4-port 100Mbps	5104	1
12-port 25Mbps	5012	1
ATM/Ethernet (8271)	5212	2
ATM/Ethernet (8271)	5312	3
ATM/Token-Ring (8272)	5208	2
ATM/Token-Ring (8272)	5308	3
Video Distribution	5008	2
ATM Carrier	5015	1

Data Speed

The speed of data transfer between the module and the backplane is 256 Mbps. For individual port speeds, refer to the module description later in this chapter.

Available Slots

The 8260 media modules can only be installed in slots 1, 3, 5, and 7. Slot 7 cannot be used for a 3-slot module when a CPSW module is installed in slot 9.

Daughter Cards

Table 10 on page 60 lists the daughter cards available for 8260 media modules.

Table 10. Media Module Daughter Cards			
Type	**Feature Code**	**Connector Type(s)**	**No. of Ports**
For WAN 2 Modules (Feature Codes 5602 and 5612):			
E1/J1/T1:			
U.S.A, Canada	6570	DB9	4
CE Mark countries	6571		
United Kingdom	6572		
Switzerland	6573		
Italy	6574		
Australia, New Zealand, Singapore	6575		
Inverse Multiplexing: • USA, Canada • CE, UK, Italy	• 6670 • 6671		
E3:			
France, Spain	6590	BNC	1
Switzerland	6591		
United Kingdom	6592		
New Zealand	6593		
Australia	6594		
Italy	6595		
Germany	6596		
Belgium	6597		
Netherlands	6598		
Israel	6599		
DS3:			
Worldwide except Japan	8502	BNC	1
Japan	8512		
OC3: Singlemode Fiber	8503	SC	1
OC3: Multimode Fiber	8504	SC	1
STM-1: Singlemode Fiber			
Worldwide except Japan	8505	SC	1
Japan	8513		
STM-1: Multimode Fiber			
Worldwide except Japan	8506	SC	1
Japan	8514		
For 25 Mbps Module:			
Multimode Fiber	8510	SC	1

Universal Feature Cards

Table 11 lists the universal feature cards available for 8260 media modules.

Table 11. Media Module Universal Feature Cards			
Type	**Feature Code**	**Connector Type(s)**	**No. of Ports**
For 8271 ATM/Ethernet Modules:			
ATM/Ethernet MMF	6988	SC	1
100BASE-Tx	6995	RJ-45	1
100BASE-Fx	7000	ST	1
10BASE-FL	8603	ST	3
10BASE-T	9195	RJ-45	4
For 8272 ATM/Token-Ring Modules:			
ATM/Token-Ring MMF (enhanced)	2762	SC	1
Fiber (enhanced)	5087	ST	2
UTP/STP (enhanced)	5092	RJ-45	4

WAN 2 Module

The WAN 2 module enables direct communication between ATM networks, residing in different locations, over the Wide Area Network (WAN). There are two versions of the WAN 2 module:

- Feature Code 5612, for use in Japan
- Feature Code 5602, for use worldwide except Japan.

The module is a single-slot module that can host any two daughter cards of the following types:

- 4–port E1 or T1/J1, with DB9 connectors for E1 over coaxial cabling at 2 Mbps or E1/T1/J1 over twisted pair cabling at 2 Mbps (E1) or 1.5 Mbps (T1/J1).

  IMA (Inverse Multiplex – ATM) versions of the E1 and T1/J1 daughter cards are available that allows you to define groups of E1, T1, or J1 ports as a single logical port in order to save on the cost of transmitting data at 8 Mbps or 16 Mbps over public lines. Each card can provide four E1, T1, or J1 ports.

- 1–port E3, with BNC connector, over a coaxial cable at 34 Mbps.
- 1–port DS3, with BNC connector, over a coaxial cable at 45 Mbps.
- 1–port STM–1, with SC connector, over a multimode fiber cable at 155 Mbps.
- 1–port STM–1, with SC connector, over a singlemode fiber cable at 155 Mbps.
- 1–port OC3, with SC connector, over a multimode fiber cable at 155 Mbps.
- 1–port OC3, with SC connector, over a singlemode fiber cable at 155 Mbps.

The module supports the UNI, IISP, and PNNI interfaces. The STM–1 interface implements full SDH support, while the OC3 interface implements SONET support.

The UTOPIA interface connects the daughter cards to the motherboard in the following way:

- ATM data cells are transferred via UTOPIA
- Daughter cards access the ATM functions via UTOPIA.

Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed.
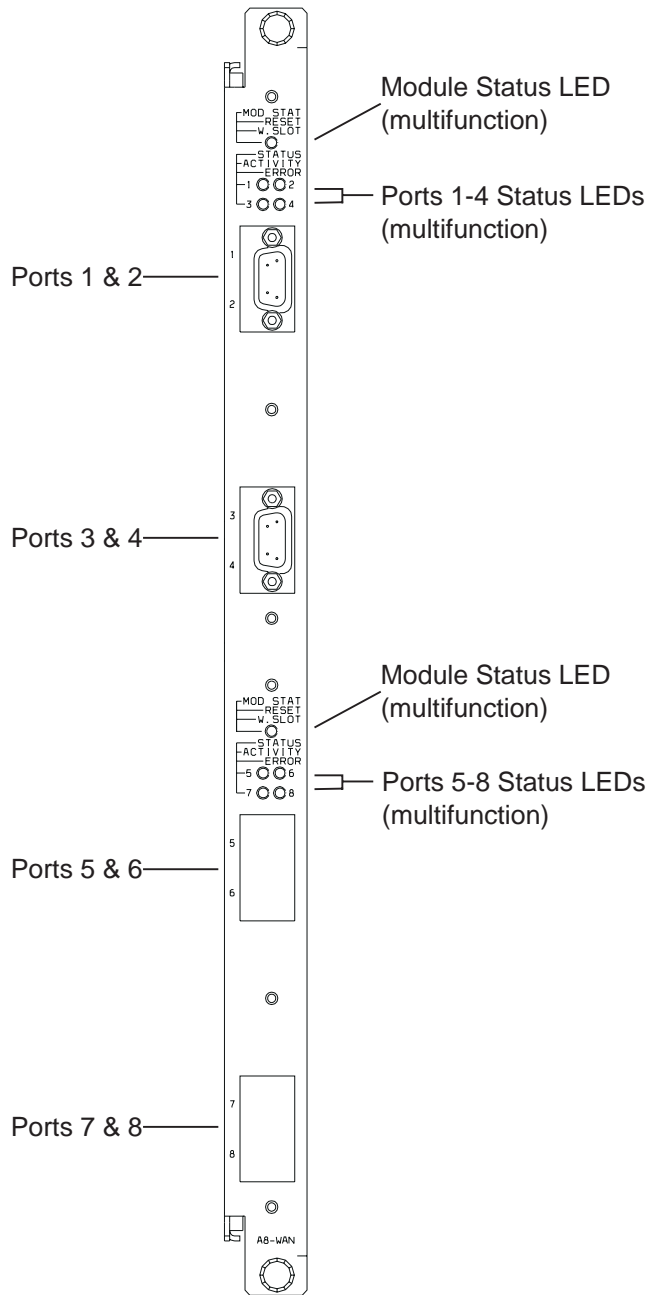
Figure 10. WAN 2 Module Faceplate

4–Port 100 Mbps Module

The 4-port 100 Mbps module (Feature Code 5104) is a single-slot module that uses SC port connectors.

The module has the following characteristics:

- Four ports operating at up to 100 Mbps to connect to stations, servers, hubs, or switches. Each port may connect to:
    - A concentrator with up to twelve workstation connections
    - An ATM bridge with either up to four Token-Ring (N station) connections or up to four Ethernet connections
    - An ATM or multimedia workstation that requires a high bit rate
    - A UNI, PNNI, or IISP device using a supported interface.
- Physical interface: optical fiber cable with an SC connector, as specified in ISO DIS 9314-3.
- Workstation and server connections of up to two kilometers (1.24 miles) from the switch.
- Port-to-port connections of up to 2.2 kilometers (1.36 miles), depending on the quality of the cabling used.
- Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed.

Figure 11. 4–Port 100 Mbps Module Faceplate

12–Port 25 Mbps Module

The 12–port 25 Mbps module (Feature Code 5012) is a single-slot module that uses RJ–45 connectors, enabling the building of large ATM workgroups or a smooth evolution from Legacy LAN to ATM networks.

The module has the following characteristics:

- Twelve ports operating at up to 25 Mbps to connect to stations, servers, hubs, or switches. Each port may connect to:
    - A concentrator with up to twelve workstation connections
    - An ATM bridge with either up to four Token-Ring (N station) connections or up to four Ethernet connections
    - An ATM or multimedia workstation that requires a high bit rate
    - A UNI, PNNI, or IISP device using a supported interface.
- Physical interface: twisted pair cables with RJ–45 connectors
- Workstation and server connections of up to:
    - 100 meters (329 ft.) on 100 ohm UTP Category 3 cable
    - 255 meters (837 ft.) on 150 ohm STP cable.
- A 1–port 155 Mbps daughter card can be added as a feature. This card allows the attachment of the module to a server or ATM backbone via a multimode fiber cable. This port supports all types of interface: UNI, PNNI, and IISP, and allows port-to-port connections of up to 2.2 kilometers (1.36 miles), depending on the quality of the cabling used.
- Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed.

For further information, refer to page 98.

Figure 12 on page 67 shows the faceplate of the module.

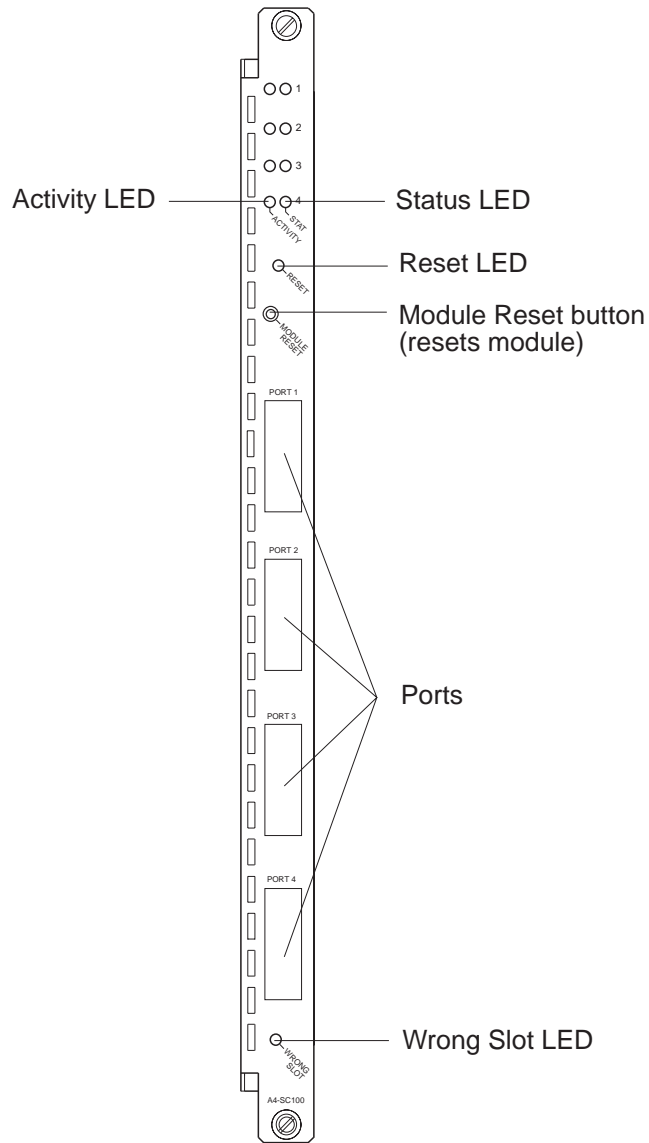Port Status LEDs

1 Port 155Mbps (optional)

Module Reset LED
Module Reset Button

12 Ports 25Mbps

Wrong Slot LED
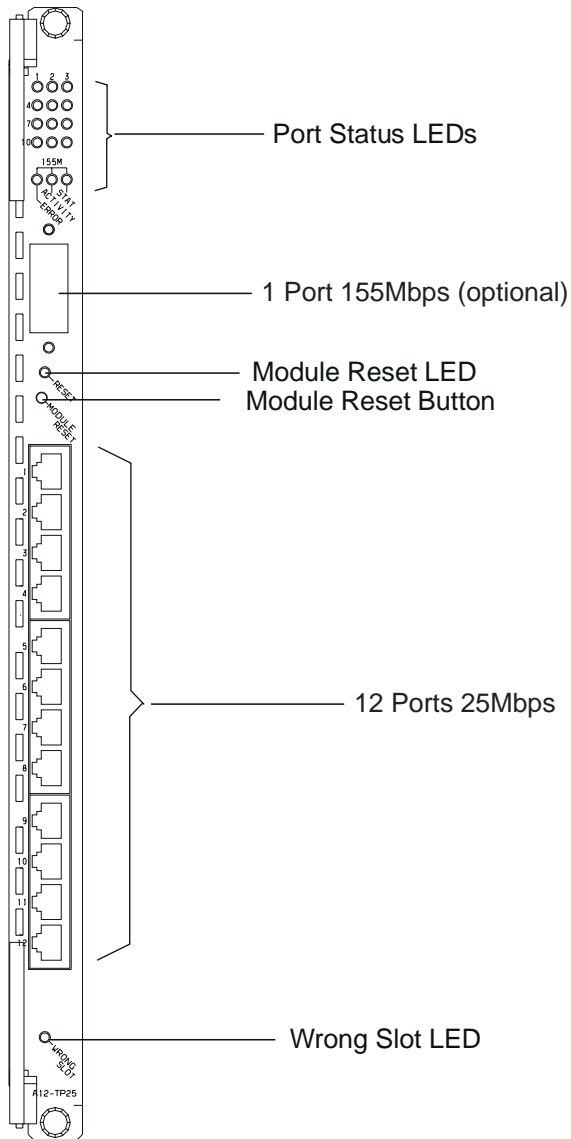
Figure 12. 12–Port 25 Mbps Module Faceplate

ATM/Ethernet LAN Switch Modules (8271)

The 8271 ATM/Ethernet LAN Switch (8271) modules, by using Ethernet MAC addresses to forward Ethernet frames between ports, can accommodate any type of LAN segment to provide a high-performance switching solution.

The modules provide direct ATM backplane connectivity allowing segments of Ethernet LAN users to be interconnected to other Ethernet LAN segments via LAN switching or high-speed ATM switching.

The modules are offered in two– and three-slot versions (Feature Codes 5212 and 5312), with the following characteristics:

- 12 frontal 10BASE-T Ethernet ports with RJ–45 UTP/STP connectors (UTP cabling Category 3, 4, or 5 is supported)

- Universal Feature Cards (UFCs) can be installed, allowing the attachment of LAN segments. Up to four UFCs are supported on the three-slot version (two on the two-slot version). The following UFCs are available, and may be installed in any combination:

    - 4–port 10BASE-T UFC for UTP or STP cabling

    - 3–port 10BASE-FL UFC for fiber cabling

    - 1–port 100BASE-Tx UFC for UTP or STP cabling

    - 1–port 100BASE-Fx UFC for fiber cabling

    - 1–port ATM/Ethernet UFC for fiber cabling

    UFCs working with fiber optic cables allow the connection of LAN segments up to two kilometers (1.25 miles) from the 8265 using multimode fiber cabling.

- Full compliance with IEEE 802.3 standard

- Variable switching mode:

    - Cut-through mode, where the frames are forwarded as soon as the address has been received

    - Store-and-forward mode, where frames are checked before being forwarded

    - Adaptive mode, which offers the benefits of both cut-through and store-and-forward modes.

- Virtual switch capability — which allows a single physical LAN to be divided into two or eight virtual switches.

- Full duplex support — provides 2 independent paths, each at 10 Mbps, per port.

- Etherpipe support — allows multiple ports (up to four) to be connected together between two 8271 modules.

- MAC addresses — up to 1790 Ethernet MAC addresses per port and 10 000 per module are supported.

- Transparent bridging and filtering.

- Statistics — the 8271 modules keeps statistics on a per-port, per-station, or entire module basis.

- Management — either via the service port or from an SNMP management station.

Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed. Slot 7 cannot be used for a 3-slot module when a CPSW module is installed in slot 9.

For more information, refer to page 105, and the "Bibliography" on page 125, for related publications.

Figure 13 on page 69 shows the faceplates of the 2- and 3-slot 8271 modules.
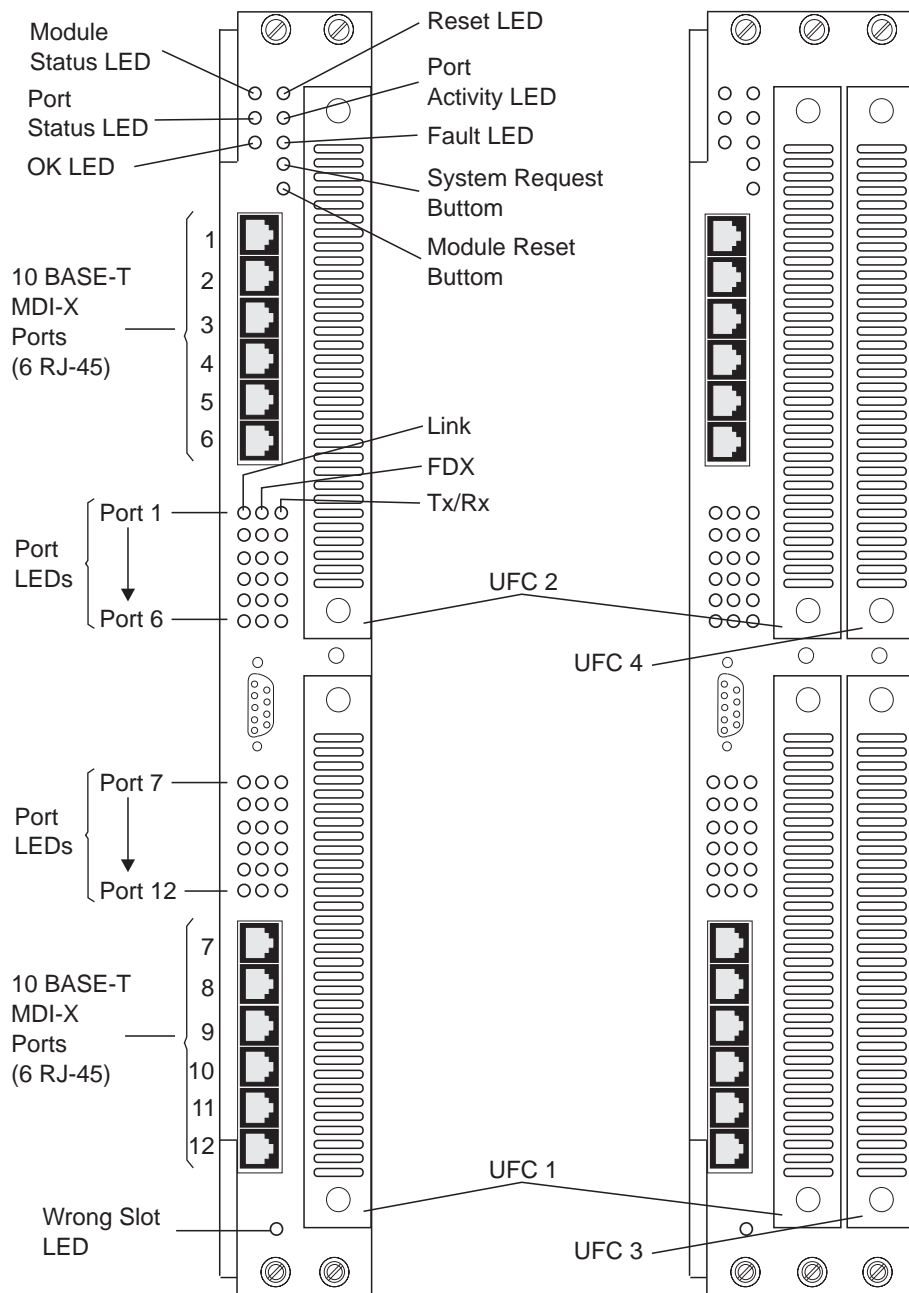
Figure 13. 8271 Ethernet LAN Switching Module Faceplates

ATM/Token-Ring LAN Switch Modules (8272)

The ATM/Token-Ring LAN Switch (8272) modules, by using Token-Ring MAC addresses and source route descriptors to forward Token-Ring frames between ports, provides a high-performance switching solution.

The module provides direct ATM backplane connectivity allowing segments of Token-Ring LAN users to be interconnected to other Token-Ring LAN segments via LAN switching or high-speed ATM switching.

The modules are offered in two- and three–slot versions (Feature Codes 5208 and 5308), with the following characteristics:

- 8 frontal Token-Ring (4 Mbps or 16 Mbps) ports with RJ–45 UTP/STP connectors (UTP cabling Category 3, 4, or 5 is supported).

- UFCs working with fiber optic cables allow the connection of LAN segments up to two kilometers (1.25 miles) from the 8265 using multimode fiber cabling. The ports can be used as ring-in/ring-out connections. Up to four UFCs are supported on the three-slot version (two on the two-slot version).

  The following UFCs are available, and may be installed in any combination:

  – 4–port UFC for UTP or STP cabling

  – 2–port UFC for fiber cabling

  – 1–port ATM multimode fiber/Token-Ring II UFC for fiber cabling.

- Full compliance with IEEE 802.5 standard

- Variable switching mode:

  – Cut-through mode, where the frames are forwarded as soon as the address has been received

  – Store-and-forward mode, where frames are checked before being forwarded

  – Adaptive mode, which offers the benefits of both cut-through and store-and-forward modes.

- Virtual switch capability — which allows a single physical LAN to be divided into two or eight virtual switches.

- Full duplex support — provides 2 independent paths, each with a bandwidth of 16 Mbps per port.

- Tokenpipe support — allows multiple ports (up to four) to be connected together between two 8272 modules.

- MAC addresses — up to a maximum of 1790 Token-Ring MAC addresses per port and 10 000 per module are supported.

- Transparent bridging and filtering.

- Source route switching — based on source route descriptors rather than MAC addresses.

- Source route bridging — allows frame transport between Token-Ring segments with different ring numbers.

- Auto-sense/auto-configure capabilities — to automatically configure the port to the network characteristics.

- Statistics — the 8272 modules keeps statistics on a per-port, per-station, or entire module basis.

- Token Probe — a port can be defined to monitor other ports.

- Management — either via the service port or from an SNMP management station.

Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed. Slot 7 cannot be used for a 3-slot module when a CPSW module is installed in slot 9.

For more information, refer to page 108, and the "Bibliography" on page 125.

Figure 14 shows the faceplates of the 2- and 3-slot 8272 modules.
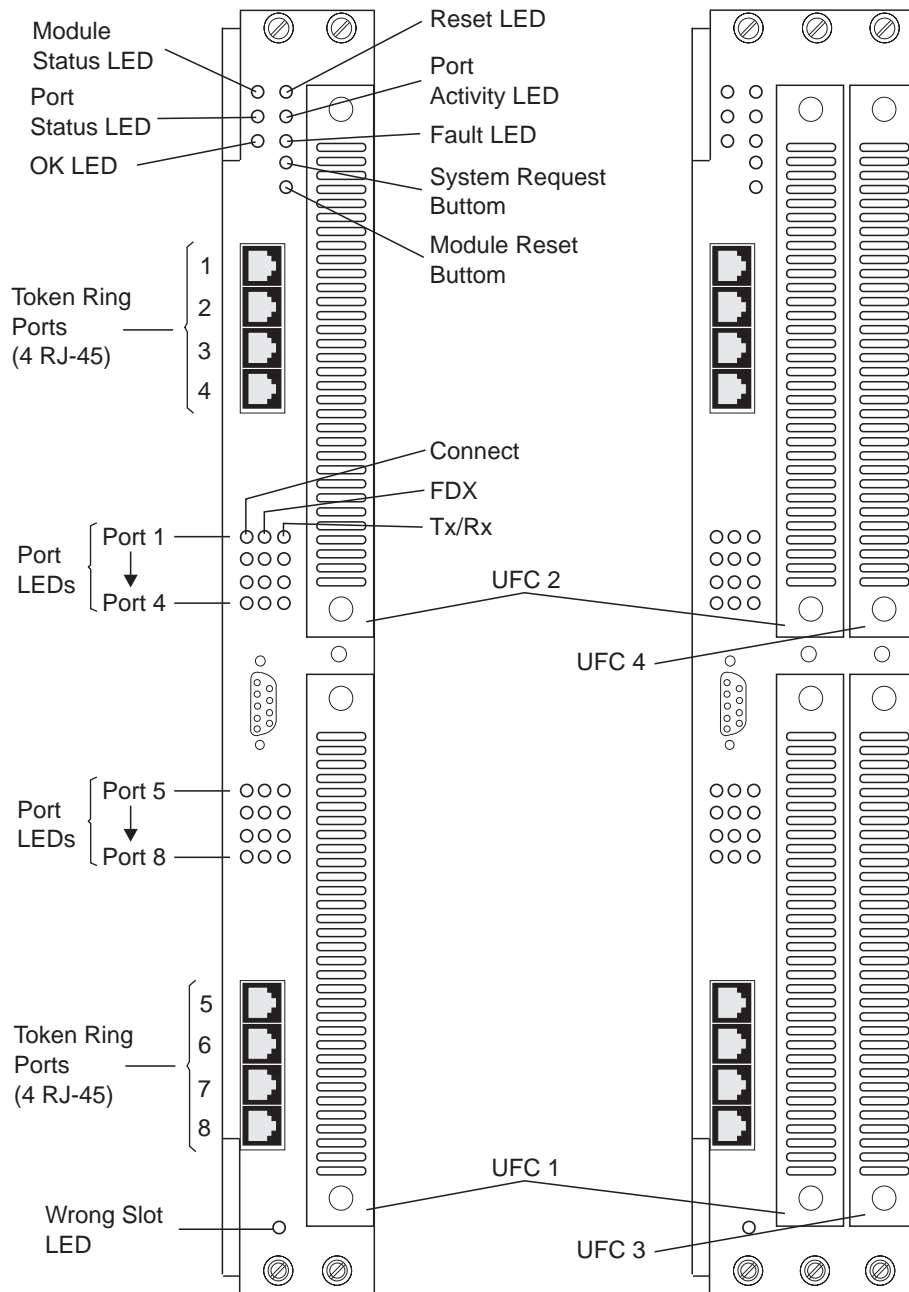
Figure 14. 8272 Token-Ring LAN Switching Module Faceplates

Video Distribution Module

The Video Distribution Module (Feature Code 5008) is a two-slot module providing 8 independent ports to decode MPEG-2 video streams. A video source, such as the IBM Media Streamer or the Video Access Node (IBM 8300), can connect to one or more of the module's ports and transmit MPEG–2 video streams through the ATM network and into the module.

The module receives the cells, reassembles the MPEG–2 video and audio packets, decompresses and decodes the digitized video information, and converts it into separate analog audio and video signals. External ports provide baseband NTSC compliant (US standard) and PAL (worldwide standard) video, and CD-quality audio.

The module also has the capability to receive Closed Caption information in the MPEG-2 transport stream and reinsert that information into the Vertical Banking Interval of the outgoing analog video signal.

The video output signals can be synchronized to an external video clocking signal via the genlock input (an RG59/U cable with BNC connector is required). The module microcode controls the clocking source used for the video (either the genlock signal or internal clocking). The module supports H-sync and V-sync clocking via the genlock input.

Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed.
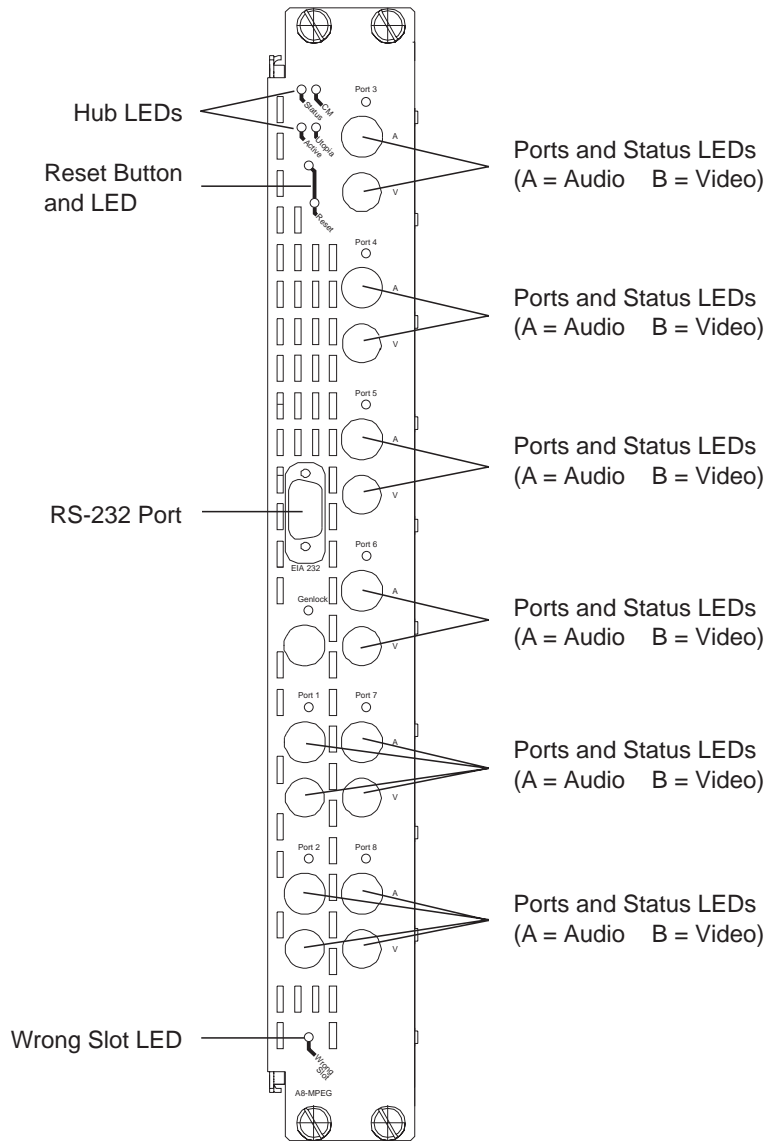
Figure 15. Video Distribution Module Faceplate

ATM Carrier Module

The ATM Carrier module (Feature Code 5015) is part of the IBM ATM Kit Development Program that provides companies and developers with a simple and inexpensive way to add their ATM technology to the 8265. This program allows you to build ATM functions and modules for the 8265, and develop new ATM applications.

The Carrier module inserts into the 8265 switch and acts as a generic motherboard that accepts a feature daughter board. The Carrier module uses the well-known standard interface UTOPIA2 for communication with 1 or 2 daughter cards that contain the developer's function or application. Functions built on the daughter board benefit from the advanced features of the 8265 and the Carrier module.

The UTOPIA 2 interface (8 bits), running at 50 nanseconds, has a maximum throughput of 160 Mbps, and allows the multiplexing of several ATM links.

By using the UTOPIA interface on the ATM Carrier motherboard, the PHY-specific functions are separated from the standard ATM functions that are common to all ATM applications:

- Standard ATM functions are located on the Carrier module motherboard

- All PHY-specific functions are concentrated on custom-designed daughter cards that are mounted on the Carrier Module.

The daughter cards access all necessary ATM functions via the UTOPIA interface.

Up to four modules can be used in the 8265 (slots 1, 3, 5, and 7), provided that the standard CPSW module (Feature Code 6501) is installed.

For more information, refer to the *IBM 8260/8265 Nways ATM Kit Development Program, We Carry your Creativity to ATM*, GA33-0371.

Migrating 8260 ATM Modules

This section lists the 8260 ATM modules, daughter cards, and universal feature cards that you can transfer from an 8260 to an 8265, provided that the standard CPSW module (Feature Code 6501) is installed.

Some 8260 ATM modules must have a minimum FPGA level to operate in the 8265. These FPGA levels are shown in Table 12 on page 76.

The modules must have this FPGA level, or higher, before being installed in the 8265.

If your 8260 ATM module does not have the specified FPGA level (or higher), upgrade the module before removing it from the 8260, using MES 5099. For information on how to upgrade FPGA code, refer to *IBM 8260 Nways Multiprotocol Switching Hub, ATM Control Point and Switch Module Installation and User's Guide*, SA33-0326.

Other supported 8260 ATM modules (8271/8272 LAN Switch modules, for example), are fully compatible with the 8265, and have no minimum FPGA level requirement.

ATM Modules

Table 12. Supported 8260 Media Modules					
Module	**Connector Type(s)**	**No. of Ports**	**Slot Width**	**Faceplate Marking**	**FPGA Level**
4-port 100 Mbps	SC	4	1	A4-SC100	B50
4-port 100 Mbps	MIC	4	1	A4-FB100	B50
12-port 25 Mbps	RJ-45	12	1	A12-TP25	C30
2-port 155 Mbps	—	2	1	A2-MB155	B50
3-port 155 Mbps	—	3	1	A3-MB155	C31
ATM WAN	—	2	1	A2-WAN	B50
ATM WAN 2	—	8	1	A8-WAN	C32
ATM Carrier	—	—	1	A-CMU1	B50
ATM Carrier	—	—	2	A-CMU2	B50
Video Distribution	BNC, mini-DIN	8	2	A8-MPEG	n/a
8210 MSS Server (FC 5300)	RS-232, DB9	—	2	A-MSS	B50
8271 ATM/Ethernet	RJ-45	12	2	A-E12LS2	n/a
8271 ATM/Ethernet	RJ-45	12	3	A-E12LS4	n/a
8272 ATM/Token-Ring	RJ-45	8	2	A-TR8LS2	n/a
8272 ATM/Token-Ring	RJ-45	8	3	A-TR8LS4	n/a
8281 ATM LAN Bridge	RJ-45, DB-15	4	2	A04MB-BRG	B50

Daughter Cards

Type	Connector Type(s)	No. of Ports	Faceplate Marking
For 155 Mbps Modules:			
Mulitmode fiber	SC	1	MF
Singlemode fiber	SC	1	SF
UTP/STP	RJ-45	1	TP
For WAN Modules:			
E1/T1/J1	BNC, RJ-48	4	E1/T1
E3	BNC	1	E3
DS3	BNC	1	DS3
OC3 Singlemode	SC	1	O-SF
OC3 Multimode	SC	1	O-MF
STM-1 Singlemode	SC	1	S-SF
STM-1 Multimode	SC	1	S-MF
For 25 Mbps Module:			
Multimode fiber	SC	1	MF

Universal Feature Cards

Type	Connector Type(s)	No. of Ports	Faceplate Marking
For 8271 ATM/Ethernet Modules:			
ATM/Ethernet MMF	SC	1	—
100BASE-Tx	RJ-45	1	—
100BASE-Fx	ST	1	—
10BASE-FL	ST	3	—
10BASE-T	RJ-45	4	—
For 8272 ATM/Token-Ring Modules:			
ATM/Token-Ring MMF	SC	1	—
Fiber (enhanced)	ST	2	—
UTP/STP (enhanced)	RJ-45	4	—

Appendix A. Technical Specifications

Environment Specifications

Operating Environment

Air Temperature: 5 to 40°C (41 to 104°F)

Note: In the short term, the air temperature may fall to –5°C (–23°F) or rise to 55°C (131°F). *Short term* is considered to mean not more than 96 consecutive hours, and not exceeding 15 days in one year.

Relative humidity: 5 to 85%

Note: In the short term, the relative humidity can rise to 95% (not exceeding 0.024 Kg of water per Kg of dry air). *Short term* is considered to mean not more than 96 consecutive hours, and not exceeding 15 days in one year.

Wet bulb: 27°C (80.6°F)

Storage and Shipping Environment

Shipping temperature: -40 to 70°C (-40 to 158°F)

Storage temperature: 1 to 60°C (33.8 to 140°F)

Wet bulb: 29°C (84.2°F)

Shipping relative humidity: 5 to 95%

Storage relative humidity: 5 to 80%

Acoustics

A weighted sound power level not exceeding 6.0 Bels.

Power and Electrical Wiring Information

Power Supply Installation

AC Power Supplies: A dedicated 15 ampere circuit (or an equivalent method of providing this current) is recommended to supply power to the switch when operated at voltage between 90 and 130 volts ac. This will ensure adequate power for a fully loaded switch configuration. This circuit must be grounded to a safety protected ground (earth), NOT to a neutral ground that carries current back to the transformer. Do not use an electrical conduit pipe as your only means of grounding the switch. There must be four ac power outlets available within 2 m (6 ft) of the 8265 in the event that there are four power supplies installed in the switch.

DC Power Supplies: To comply with the UL requirements, an 8265 equipped with a –48 Vdc power supply must be installed in a rack or enclosed cabinet. Do not installed an 8265 with a –48 Vdc power supply on a table or shelf. The power cord must be routed through a raceway up to the –48 Vdc distribution panel.

Connect the –48 Vdc power supply to Safety Extra Low Voltage only.

Power Information

The power source (wall outlet or receptacle) at the place you have chosen for the 8265 must provide the electrical specifications shown in Table 13 to ensure that the 8265 will not be dam aged and will work satisfactorily.

Table 13. 8265 Power Information	
Phase	Single phase + earth
Frequency	50 or 60 Hz ± 2%
110 Volt Range	90 Vac (minimum), 132 Vac (maximum)
220 Volt Range	180 Vac (minimum), 256 Vac (maximum)
-48 Volt DC	-40 Vdc (minimum), -57 Vdc (maximum)
Maximum Inrush Current per 415 W Power Supply	20 A
Calorific Value per Power Supply	966 BTU/hour
Maximum Configurable Power Consupmtion	1.7 kVA
Site Power Requirement Recommendations	2.2 kVA (90-256 V, 47/63 Hz)
Leakage Current with Four 415 W Power Supplies	2.1 mA

Ventilation Requirements

Three fan units draw air in through the front and center of the chassis and exhaust air out the back. To ensure that the fans provide adequate ventilation, you must allow a minimum of 15 cm (6 in.) between the rear of the switch and the nearest wall (or other vertical surface).

Lightning Protection

Power Lines: You should add lightning protection on your redundant power source when:

- The utility company installs lightning protectors on the primary source.

- The area is subject to electrical storms or equivalent power surges.

Signal Lines: You are responsible for selecting and setting up lightning protection, if needed.

Magnetic Compatibility

In some instances, the site chosen for setup of the 8265 may have surrounding magnetic fields.

These fields can result from nearby radio-frequency sources, such as transmitting antennas (AM radio, FM radio, television, and two-way radios), radar, and industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers).

Other sources of interference are transformers (including those within other units), distribution displays, rotating machinery, fluorescent light fixtures, and electric floor heating.

Check with your building engineer or get help in identifying possible sources of magnetic interference at the site you choose to set up the 8265.

Before positioning control units or cabling, a setup planning review may be appropriate to evaluate the environment and to determine whether any special setup or product considerations are required to ensure normal system operation and maintenance. Consult your IBM representative or LAN installation provider.

Electrostatic Discharge

Electrostatic charges can build up on buildings and people as a result of:

- Movement of personnel, carts, or furniture in contact with floor covering

- Personnel in contact with furniture coverings, such as plastic seat covers.

Discharge of these static charges to the metal parts of the 8265, or on the furniture to which it is situated, may cause interference with the operation of the electronic equipment. The 8265 is a Class 2 product (RH not always > 20%, no specified minimum floor surface conductivity, and no specified furniture resistance).

Major factors that contribute to this problem include:

- High-resistance floor surface material

- Carpeting without antistatic properties

- Plastic seat coverings

- Very low humidity (usually less than 20%)

- Metal-framed furniture.

If any of the previous factors are present at your site, review the building with your IBM representative or LAN installation provider.

Physical Characteristics

The 8265 is designed to be either rack mounted or placed on a table, stand, or shelf.

Item	Weight	Width	Depth	Height
Chassis	29.9 Kg[1] (65.9 lb)	44.4 cm (17.52 in.)	38.5 cm (15.14 in.)	67.4 cm (26.52 in.)
Cable Tray	4.4 Kg (9.7 lb)	47.1 cm (18.54 in.)	44.4 cm (17.48 in.)	4.37 cm (1.72 in.)
Bottom Cover	0.4 Kg (0.88 lb)	39.1 cm (15.38 in.)	1.9 cm (0.75 in.)	19.9 cm (7.84 in.)
	[1] Unloaded, with blank filler plates, three fan units, one controller module and one power supply installed.			

Table 14. 8265 Weight and Dimensions

Appendix B. Module Specifications

This appendix describes the modules that you can use with the IBM 8265 Nways ATM Switch; and is divided into two main sections:

- 8265 modules and daughter cards
- 8260 modules and daughter cards that are supported.

8265 Modules

Control Point and Switch Module (Feature Code 6501)

Faceplate marking:	CPSW
Power consumption:	80 W at +5 Vdc
Operating temperature:	0 to 40° C (32 to 104° F)
Humidity:	Less than 95%, non-condensing
Connectors:	• One RS-232 DB-9 connector for console port connections • One Ethernet port for configuration, management, file transfer, and debugging.
Processors:	MPC680 (33MHz)
Memory:	• 512 KB Boot Flash EEPROM • 4 MB PCMCIA Flash EEPROM 16MB EDO Dynamic RAM, expandable to 32 MB • 128 KB Nonvolatile RAM.
Special circuits:	Imbedded real-time clock
Front panel indicators:	System Status LCD, Reset LED, CPU Stop LED.
Front panel buttons:	ATM Reset, Display Control

Control Point and Switch Module (Feature Code 6502)

Faceplate marking:	CPSW
Power consumption:	80 W at +5 Vdc
Operating temperature:	0 to 40° C (32 to 104° F)
Humidity:	Less than 95%, non-condensing
Connectors:	• One RS-232 DB-9 connector for console port connections • One Ethernet port for configuration, management, file transfer, and debugging.
Processors:	MPC680 (50MHz)
Memory:	• 512 KB static RAM • 512 KB Boot Flash EEPROM • 4 MB PCMCIA Flash EEPROM 64 MB EDO Dynamic RAM • 512 KB Nonvolatile RAM.
Special circuits:	Imbedded real-time clock
Front panel indicators:	System Status LCD, Reset LED, CPU Stop LED.
Front panel buttons:	ATM Reset, Display Control, Power supply status, Fan status, Temperature status.

Controller Module (Feature Code 8000)

Faceplate marking:	8000-RCTL
Power consumption:	5 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Front panel indicators:	Power supply status, Fan status, Temperature status, Current active controller
Front panel buttons:	Switch reset, LED test

MSS Server 2.5 Module (Feature Code 5401)

Faceplate marking:	A-MSS
Connectors:	One RS-232 DB-9 for service port connection
	One 10BASE-T Ethernet port
	Two Type 3 PCMCIA slots
Switch interface:	16-bit, 20ns (768 Mbps)
Processor:	PowerPC 603EV (166 MHz)
Power consumption:	33.1 W at +5 Vdc
Memory:	• 8 KB non-volatile RAM
	• 512 KB level 2 cache memory
	• 12 MB Flash EPROM
	• 64 MB dynamic RAM (two 32 MB SIMMs)
	• 10 MB of ATM packet memory
Special circuits:	ATM dedicated chip sets
Modem support:	PCMCIA data/fax 28.2 Kbps modem
	PCMCIA voice/data/fax 28.2 Kbps modem
	100% Hayes compatible modem via RS-232 port

4–Port 155 Mbps Module — Multimode Fiber (Feature Code 6540)

Faceplate marking:	A4-MF155
Connectors:	SC multimode fiber
Number of ports:	4
Switch interface:	16-bit, 20ns (768 Mbps)
Memory:	5 Mb SRAM (synchronous)
Power consumption:	29 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.
Front panel indicators:	Module Status LED, Port LEDs (Status, Activity, and Error), Reset LED.
Front panel buttons:	Module Reset

4–Port 155 Mbps Module — Flexible (Feature Code 6543)

Faceplate marking:	A4-MB155
Connectors:	SC for fiber I/O cards
	RJ-45 for twisted pair I/O cards
Number of ports:	Up to 4, depending on the number of I/O cards installed
Switch interface:	16-bit, 20ns (768 Mbps)
Memory:	5 Mb SRAM (synchronous)
Power consumption:	20 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.
Front panel indicators:	Module Status LED, Port LEDs (Status, Activity, and Error), Reset LED.
Front panel buttons:	Module Reset

Daughter Cards for 4-Port 155 Mbps Flex Modules (Feature Code 6543)

Common Technical Specifications

Connectors:	40-pin connector
Power consumption:	2.5 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
BTUs/hour:	8.5
Mechanical:	6.5 cm x 6 cm (2.5 in. x 2.36 in.).
Regulatory compliance:	EMI emissions: FCC Class A certification, VDE B certification, CCI, CISPR22/A, EN 55022 Safety: CSA-22.2, IEC 950 (EN 60950), UL 1950, AS 3260, NZS 6661

Multimode Fiber I/O Card (Feature Code 6580)

Faceplate marking:	MF
Connector:	SC
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

Singlemode Fiber I/O Card (Feature Code 6581)

Faceplate marking:	SF
Connector:	SC
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.
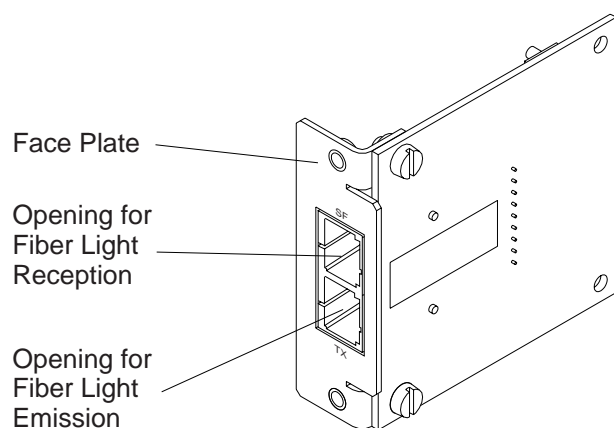
Figure 16. 155 Mbps Module Fiber Daughter Card

UTP/STP I/O Card (Feature Code 6582)

Faceplate marking:	TP
Connector:	RJ-45
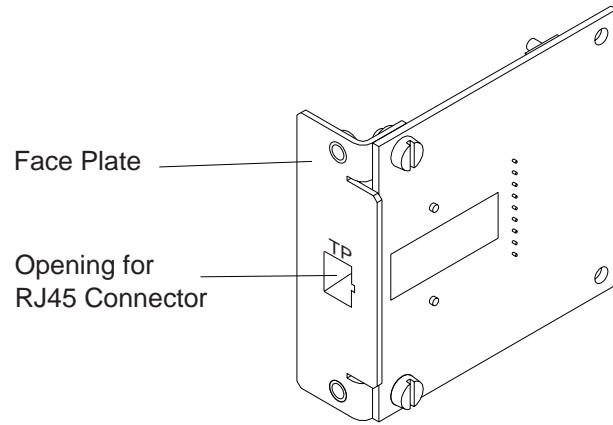
Figure 17. 155 Mbps Module UTP/STP Daughter Card

1–Port 622 Mbps Module — Multimode Fiber (Feature Code 6511)

Faceplate marking:	A1-MF622
Connectors:	SC multimode fiber: • 62.5/125 micron (preferred) • 50/125 micron
Number of ports:	1
Switch interface:	16-bit, 20ns (768 Mbps)
Memory:	5 Mb SRAM (synchronous)
Power consumption:	28 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

1–Port 622 Mbps Module — Singlemode Fiber (Feature Code 6512)

Faceplate marking:	A1-SF622
Connectors:	SC multimode fiber, 9/125 micron
Number of ports:	1
Switch interface:	16-bit, 20ns (768 Mbps)
Memory:	5 Mb SRAM (synchronous)
Power consumption:	28 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

WAN 2.5 Module (Feature Code 6561)

Faceplate marking:	A-WAN 2.5
Connectors:	See daughter cards below
Number of ports:	8 maximum
Switch interface:	16-bit, 20ns (768 Mbps)
Daughter card interface:	UTOPIA 2 (16 bits)
Power consumption:	34.2 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing

Daughter Cards for WAN 2.5 Module

DS3 I/O Card (Feature Codes 8502 and 8512)

Faceplate marking:	DS3
Connectors:	BNC
Data rate:	44.736 Mbps
Cable type:	Coax RG59 (75 ohm)
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	135 m (443 ft)

E3 I/O Card (Feature Codes 6590-6599)

Faceplate marking:	E3
Connectors:	BNC
Data rate:	34.368 Mbps
Cable type:	Coax RG59 (75 ohm)
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	100 m (330 ft)

Figure 18. WAN 2.5 Module DS3/E3 Daughter Card

STM-1 MMF I/O Card (Feature Codes 8506 and 8514)

Faceplate marking:	S-MF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Multimode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

STM-1 SMF I/O Card (Feature Codes 8505 and 8513)

Faceplate marking:	S-SF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Singlemode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

OC3 MMF I/O Card (Feature Code 8504)

Faceplate marking:	O-MF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Multimode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

OC3 SMF I/O Card (Feature Code 8503)

Faceplate marking:	O-SF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Singlemode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

Figure 19. WAN 2.5 Module OC3/STM–1 Daughter Card

E1/T1/J1 I/O Card (Feature Codes 6570-6575)

Faceplate marking:	E1/T1
Connectors:	• DB 9 (coax) • DB 9 (twisted pair)
Data rate:	2 Mbps for E1, 1.5 Mbps for T1
Cable type:	RG59 coax (75 ohm) or STP (120 ohm) for E1, STP (100 ohm) for T1
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	122 m (400 ft) for coax, 130 m (426 ft) for STP

Coaxial/Twisted-Pair Connectors

Figure 20. WAN 2.5 Module E1/T1/J1 Daughter Card

E1/T1/J1 IMA I/O Cards (Feature Codes 6670 and 6671)

Faceplate marking:	E1/T1 IMA
Connectors:	• DB 9 (coax) • DB 9 (twisted pair)
Data rate:	2 Mbps for E1, 1.5 Mbps for T1 (Rrate per physical port. Rate should be multiplied according to the number of ports in a group).
Cable type:	RG59 coax (75 ohm) or STP (120 ohm) for E1, STP (100 ohm) for T1
Power consumption:	4.5 W at +5 Vdc
Maximum link distance:	122 m (400 ft) for coax, 130 m (426 ft) for STP

ATM Carrier Module (Feature Code 6558)

Faceplate marking:	A-CMU 2
Internal clocking:	50/100 MHz
Number of ports:	1
Switch interface:	16-bit, 20 ns
Port connector:	120-pin AMP
Power requirements:	18 W at +5 Vdc
Daughter cards:	1
Daughter card interface:	UTOPIA-2 (16 bits)
Maximum allowable power per daughter card:	28.6 W at +5 Vdc 9.8 W at +12 Vdc 2.5 W at -5 Vdc 3 W at -12 Vdc

ATM Carrier Module (Feature Code 6559)

Faceplate marking:	A-CMU2.5S
Internal clocking:	20 MHz
Number of ports:	2
Switch interface:	16-bit, 20 ns
Port connector:	120-pin AMP symmetric
Power requirements:	30 W at +5 Vdc
Daughter cards:	2
Daughter card interface:	UTOPIA-2 (8 bits)
Maximum allowable power per daughter card:	28.6 W at +5 Vdc 9.8 W at +12 Vdc 2.5 W at -5 Vdc 3 W at -12 Vdc

ATM Carrier Module (Feature Code 6560)

Faceplate marking:	A-CMU2.5A
Internal clocking:	20 MHz
Number of ports:	2
Switch interface:	16-bit, 20 ns (800 Mbps)
Port connector:	120-pin AMP asymmetric
Power requirements:	30 W at +5 Vdc
Daughter cards:	2
Daughter card interface:	UTOPIA-2 (8 bits)
Maximum allowable power per daughter card:	28.6 W at +5 Vdc 9.8 W at +12 Vdc 2.5 W at -5 Vdc 3 W at -12 Vdc

8260 Modules

4-Port Fiber 100 Mbps Module (Feature Code 5104)

Faceplate marking:	A4-SC100
Connectors:	SC fiber
Number of ports:	4
Switch interface:	16-bit, 20ns (256 Mbps)
Power consumption:	35 W at +5 Vdc, 2.5 W at +12 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

12-Port 25 Mbps Concentration Module (Feature Code 5012)

Faceplate marking:	A12-TP25
Connectors:	RJ-45
Number of ports:	12
Switch interface:	16-bit, 20ns (256 Mbps)
Power consumption:	25 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing

MMF Daughter Card for Concentration Module

Faceplate marking:	MF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Multimode fiber
Power consumption:	10 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

Multiprotocol Switched Services Server Module (Feature Code 5400)

Faceplate marking:	A-MSS
Connectors:	One RS-232 DB-9 for service port connection
	One 10BASE-T Ethernet port
	Two Type 3 PCMCIA slots
Switch interface:	16-bit, 20ns (256 Mbps)
Processor:	PowerPC 603EV (166 MHz)
Power consumption:	33.1 W at +5 Vdc
Memory:	• 8 KB non-volatile RAM
	• 512 KB level 2 cache memory
	• 12 MB Flash EPROM
	• 64 MB dynamic RAM (two 32 MB SIMMs)
	• 10 MB of ATM packet memory
Special circuits:	ATM dedicated chip sets
Modem support:	PCMCIA data/fax 28.2 Kbps modem
	PCMCIA voice/data/fax 28.2 Kbps modem
	100% Hayes compatible modem via RS-232 port

WAN 2 Module (Feature Codes 5602 and 5612)

Faceplate marking:	A8-WAN
Connectors:	See daughter cards below
Number of ports:	8 maximum
Switch interface:	16-bit, 20ns (256 Mbps)
Power consumption:	18.4 W at +5 Vdc
Operating temperature:	0 to 50° C (32 to 122° F)
Humidity:	Less than 95%, non-condensing

Daughter Cards for WAN 2 Modules

DS3 I/O Card (Feature Codes 8502 and 8512)

Faceplate marking:	DS3
Connectors:	BNC
Data rate:	44.736 Mbps
Cable type:	Coax RG59 (75 ohm)
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	135 m (443 ft)

E3 I/O Card (Feature Codes 6590-6599)

Faceplate marking:	E3
Connectors:	BNC
Data rate:	34.368 Mbps
Cable type:	Coax RG59 (75 ohm)
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	100 m (330 ft)

Figure 21. WAN 2 Module DS3/E3 Daughter Card

STM-1 MMF I/O Card (Feature Codes 8506 and 8514)

Faceplate marking:	S-MF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Multimode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

STM-1 SMF I/O Card (Feature Codes 8505 and 8513)

Faceplate marking:	S-SF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Singlemode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

OC3 MMF I/O Card (Feature Code 8504)

Faceplate marking:	O-MF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Multimode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	2.2 km (1.36 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

OC3 SMF I/O Card (Feature Code 8503)

Faceplate marking:	O-SF
Connectors:	SC
Data rate:	155.520 Mbps
Cable type:	Singlemode fiber
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	20 km (12.42 miles)
Optical specifications:	Refer to the *IBM 8265 Nways ATM Switch Planning and Site Preparation Guide*, SA33-0460.

Figure 22. WAN 2 Module OC3/STM–1 Daughter Card

E1/T1/J1 I/O Card (Feature Codes 6570-6575)

Faceplate marking:	E1/T1
Connectors:	DB9
Data rate:	2 Mbps for E1, 1.5 Mbps for T1
Cable type:	RG59 coax (75 ohm) or STP (120 ohm) for E1, STP (100 ohm) for T1
Power consumption:	7.9 W at +5 Vdc
Maximum link distance:	122 m (400 ft) for coax, 130 m (426 ft) for STP
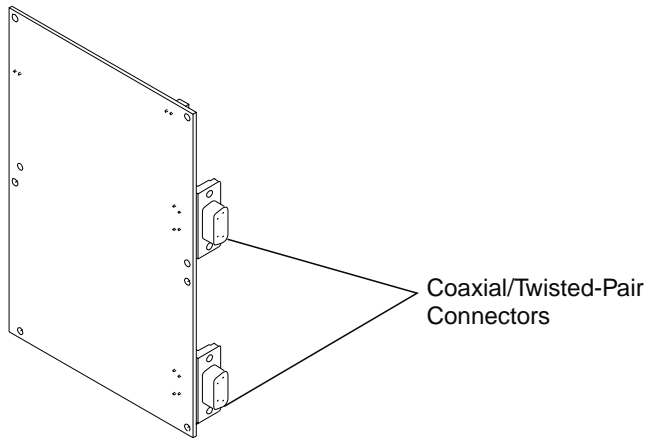
Figure 23. WAN 2 Module E1/T1/J1 Daughter Card

E1/T1/J1 IMA I/O Cards (Feature Codes 6670 and 6671)

Faceplate marking:	E1/T1 IMA
Connectors:	• DB 9 (coax) • DB 9 (twisted pair)
Data rate:	2 Mbps for E1, 1.5 Mbps for T1 (Rrate per physical port. Rate should be multiplied according to the number of ports in a group).
Cable type:	RG59 coax (75 ohm) or STP (120 ohm) for E1, STP (100 ohm) for T1
Power consumption:	4.5 W at +5 Vdc
Maximum link distance:	122 m (400 ft) for coax, 130 m (426 ft) for STP

Video Distribution Module (Feature Code 5008)

Faceplate marking:	A8-MPEG
Number of ports:	8 video, 8 audio
Connectors:	BNC for video, 5-pin mini-DIN for audio
Cable type:	• RG59/U (75 ohm) for video • unbalanced audio cable for audio
Power consumption:	62.5 W at +5 Vdc

8271 ATM/Ethernet LAN Switch Module (Feature Code 5212)

Faceplate marking:	A-E12LS2
Number of slots:	2
Number of UFCs:	2
Number of ports:	12
Switch interface:	16-bit, 20 ns (256 Mbps)
Power consumption:	58.5 W at +5 Vdc
Data rate:	10 Mbps
Port connector:	RJ-45

8271 ATM/Ethernet LAN Switch Module (Feature Code 5312)

Faceplate marking:	A-E12LS4
Number of slots:	3
Number of UFCs:	4
Number of ports:	12
Switch interface:	16-bit, 20 ns (256 Mbps)
Power consumption:	58.5 W at +5 Vdc
Data rate:	10 Mbps
Port connector:	RJ-45

Universal Feature Cards for 8271 LAN Switch Modules

4–Port Ethernet 10BASE-T UFC (Feature Code 9195)

Number of ports:	4
Connector:	RJ-45
Data rate:	10 Mbps
Cable type:	STP, UTP Category 3 or better
Power consumption:	5.5 W at +5 Vdc
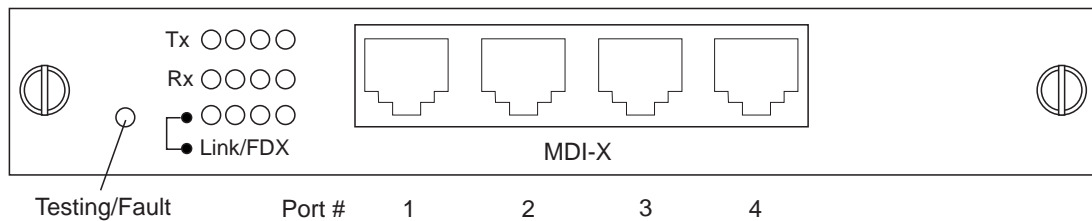
Figure 24. 4–Port Ethernet 10BASE-T UFC

3–Port Ethernet 10BASE-FL UFC (Feature Code 8603)

Number of ports:	3
Connector:	ST
Data rate:	10 Mbps
Cable type:	Multimode fiber
Power consumption:	6.7 W at +5 Vdc
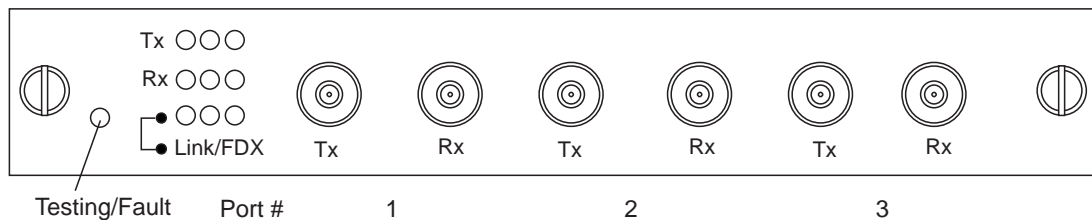
Figure 25. 3–Port Ethernet 10BASE-FL UFC

1–Port Ethernet 100BASE-Tx UFC (Feature Code 6995)

Number of ports:	1
Connector:	RJ-45
Data rate:	100 Mbps
Cable type:	STP, UTP Category 5
Power consumption:	5.7 W at +5 Vdc
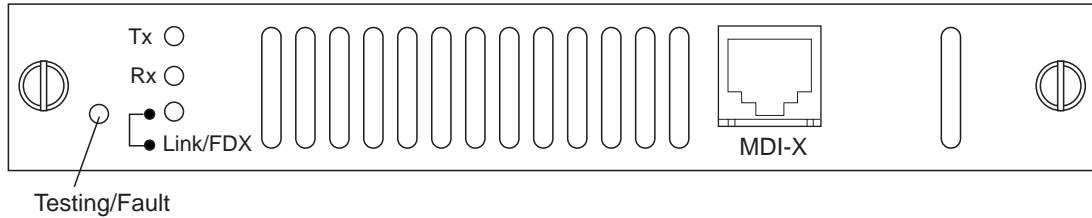
Figure 26. 1–Port Ethernet 100BASE-Tx UFC

1–Port Ethernet 100BASE-Fx UFC (Feature Code 7000)

Number of ports:	1
Connector:	ST
Data rate:	100 Mbps
Cable type:	Multimode fiber
Power consumption:	6 W at +5 Vdc
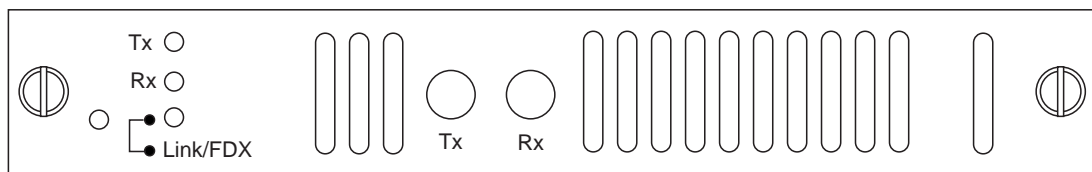
Figure 27. 1–Port Ethernet 100BASE-Fx UFC

1–Port ATM/Ethernet UFC (Feature Code 6988)

Number of ports:	1
Connector:	SC
Data rate:	155 Mbps
Cable type:	Multimode fiber
Power consumption:	25 W at +5 Vdc

8272 ATM/Token-Ring LAN Switch Module (Feature Code 5208)

Faceplate marking:	A-TR8LS2
Number of slots:	2
Number of UFCs:	2
Number of ports:	8
Switch interface:	16-bit, 20 ns (256 Mbps)
Power consumption:	67.5 W at +5 Vdc
Data rate:	4 Mbps or 16 Mbps
Port connector:	RJ-45

8272 ATM/Token-Ring LAN Switch Module (Feature Code 5308)

Faceplate marking:	A-TR8LS4
Number of slots:	3
Number of UFCs:	4
Number of ports:	8
Switch interface:	16-bit, 20 ns (256 Mbps)
Power consumption:	67.5 W at +5 Vdc
Data rate:	4 Mbps or 16 Mbps
Port connector:	RJ-45

Universal Feature Cards for 8272 LAN Switch Modules

4–Port Token—Ring UTP/STP UFC (Feature Code 5092)

Number of ports:	4
Connector:	RJ-45
Data rate:	4 Mbps or 16 Mbps
Cable type:	STP, UTP Category 3 or better
Power consumption:	12 W at +5 Vdc
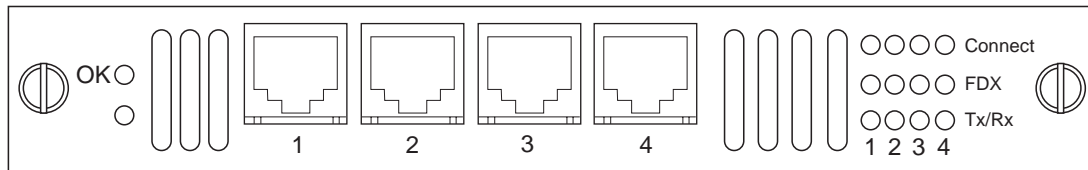
Figure 28. 4–Port Token—Ring UTP/STP UFC

2–Port Token-Ring Fiber UFC (Feature Code 5087)

Number of ports:	2
Connector:	ST
Data rate:	4 Mbps or 16 Mbps
Cable type:	Multimode fiber
Power consumption:	11 W at +5 Vdc
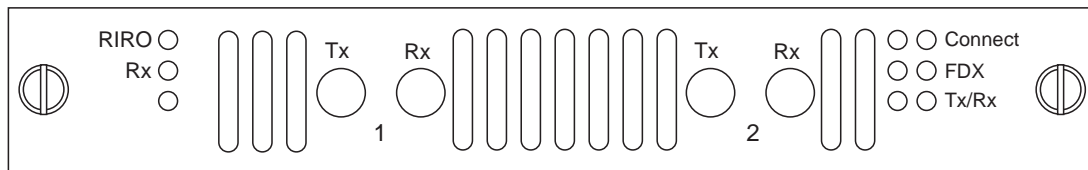
Figure 29. 2–Port Token-Ring Fiber UFC

1–Port ATM/Token-Ring UFC (Feature Code 2762)

Number of ports:	1
Connector:	SC
Data rate:	155 Mbps
Cable type:	Multimode fiber
Power consumption:	25 W at +5 Vdc

ATM Carrier Module 1.5 (Feature Code 5015)

Faceplate marking:	A-CMU15
Internal clocking:	20 MHz
Number of ports:	2
Switch interface:	8-bit, 30 ns (160 Mbps)
Port connector:	120-pin AMP
Power requirements:	20 W at +5 Vdc
Daughter cards:	2
Daughter card interface:	UTOPIA-2 (8 bits)
Maximum allowable power per daughter card:	28.6 W at +5 Vdc 9.8 W at +12 Vdc 2.5 W at -5 Vdc 3.0 W at -12 Vdc

Appendix C. Power Consumption

This appendix details the power consumption of the individual modues and daughter cards that can be installed in the 8265.

8265 Modules

Table 15. 8265 Module Power Consumption			
Module	**Feature Code**	**Slot Width**	**Power Required (Watts at +5 Volts)**
Control Point & Switch (Standard)	6501	2	80
Control Point & Switch 2 (Enhanced)	6502	2	60
Controller	8000	1	5
4-port 155 Mbps (MMF)	6540	1	29
4-port 155 Mbps (Flex)	6543	1	20
1-port 622 Mbps (MMF)	6511	1	28
1-port 622 Mbps (SMF)	6512	1	28
WAN 2.5	6561	1	34.2
MSS Server 2.5	5401	1	42
Carrier	6558	1	18
Carrier	6559	1	30
Carrier	6560	1	30

8265 Daughter Cards

Table 16. 8265 Daughter Card Power Consumption		
Type	**Feature Code**	**Power Required (Watts at +5 Volts)**
For 4-Port 155 Mbps Flex Module:		
Multimode Fiber	6580	2.5
Singlemode Fiber	6581	2.5
UTP/STP	6582	2.5
For WAN 2.5 Module:		
E1/T1/J1	See Note	7.9
E1/T1/J1 IMA (US, Canada)	6670	4.5
E1/T1/J1 IMA (CE, UK, Italy)	6671	4.5
E3	See Note	7.9
DS3	8502	7.9
DS3 (Japan)	8512	7.9
STM-1 MMF	8506	7.9
STM-1 MMF (Japan)	8514	7.9
STM-1 SMF	8505	7.9
STM-1 SMF (Japan)	8513	7.9
OC3 MMF	8504	7.9
OC3 SMF	8503	7.9
Note: Feature Code varies according to country (see "Daughter Cards" on page 44).		

8260 Modules

Table 17. 8260 Module Power Consumption

Module	Feature Code	Slot Width	Power Required (Watts at +5 Volts)
4-port 100 Mbps	5104	1	35
12-port 25 Mbps	5012	1	25
WAN 2	5612	1	18.4
MSS Server	5400	1	33.1
ATM/Ethernet (8271)	5212	2	58.5
ATM/Ethernet (8271)	5312	3	58.5
ATM/Token-Ring (8272)	5208	2	30
ATM/Token-Ring (8272)	5308	3	30
ATM Carrier	5015	1	20
Video Distribution	5008	2	62.5

8260 Daughter Cards

Table 18. 8260 Daughter Card Power Consumption

Type	Feature Code	Power Required (Watts at +5 Volts)
For 12-Port 25 Mbps Module:		
155 Mbps	8510	10
For WAN 2 Modules:		
E1/T1/J1	See Note	7.9
E1/T1/J1 IMA (USA, Canada)	6670	4.5
E1/T1/J1 IMA (CE, UK, Italy)	6671	4.5
E3	See Note	7.9
DS3	8502	7.9
DS3 (Japan)	8512	7.9
STM-1 MMF	8506	7.9
STM-1 MMF (Japan)	8514	7.9
STM-1 SMF	8505	7.9
STM-1 SMF (Japan)	8513	7.9
OC3 MMF	8504	7.9
OC3 SMF	8503	7.9
Note: Feature Code varies according to country (see "Daughter Cards" on page 59).		

8260 Universal Feature Cards

Table 19. 8260 Universal Feature Card Power Consumption		
Type	**Feature Code**	**Power Required (Watts at +5 Volts)**
For 8271 ATM/Ethernet LAN Switch Modules:		
4-port Ethernet 10BASE-T	9195	5.5
3-port Ethernet 10BASE-FL	8603	6.7
1-port Ethernet 100BASE-Tx	6995	5.7
1-port Ethernet 100BASE-Fx	7000	6.0
1-port ATM/Ethernet	6988	25
For 8272 ATM/Token-Ring LAN Switch Modules:		
4-port Token-Ring UTP/STP	5092	12
2-port Token-Ring Fiber	5087	11
1-port ATM/Token-Ring MMF	2762	25

Appendix D. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates.

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Product Page/Warranties

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Safety Information

General Safety

The IBM 8265 Nways ATM Switch complies with the following industry safety standards or their updated versions:

Safety of Information Technology Equipment:

Number	Date	Description
IEC 950	1991	International Standard
C22.2 No. 950	1989	(Canadian Standard)
UL 1950	1991	(U.S.A. Standard)
EN 60 950	1992	(European CENELEC Standard)
AS/NZS 3260	1993	(New Zealand Standard)

Safety of Laser Products:

Number	Date	Description
IEC 825-1	1993	Equipment Classification, Requirements, and User's Guide
IEC 825-2	1993	Safety of Optical Fiber Communications Systems
EN 60825-1	1993	(European CENELEC IEC 825-1 Standard)
EN 60825-2	1993	(European CENELEC IEC 825-2 Standard)

Safety Notice for United Kingdom

The network adapter interfaces housed within the IBM 8265 Nways ATM Switches are approved separately, each one having its own independent approval number. These interface adapters, supplied by IBM, do not use or contain excessive voltages. An excessive voltage is one that exceeds 42.4 V peak ac or 60 Vdc. They interface with the IBM 8265 Nways ATM Switch using Safety Extra Low Voltages (SELV) only. In order to maintain the separate (independent) approval of the IBM adapters, it is essential that other optional cards, not supplied by IBM, do not use mains voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by IBM.

Industry Standards Reflected in This Product

The IBM 8265 Nways ATM Switch is designed according to the specifications of the following industry standards as understood and interpreted by IBM as of October 1992.

International Organization for Standardization (ISO)

- ISO 8802/1
- ISO 8802/3
- ISO 8802/5

IEEE (Institute of Electrical and Electronic Engineers)

- 802.1 Local area network (LAN) management and Internet working
- 802.3 Carrier sense multiple access and collision detection
- 802.5 Token passing ring

ANSI (American National Standard Institute)

The IBM Fiber Distribution Data Interface (FDDI) network is an implementation of the American National Standards Institute (ANSI) X3T9.5 family of standards.

The IBM base standards for the implementation of the FDDI are:

- ANSI X3.166-1990, FDDI physical layer medium-dependent (PMD), ISO 93/4-3
- ANSI X3.148-1988, FDDI token-ring physical layer protocol (PHY), ISO 93/4-1
- ANSI X3.139-1987, FDDI token-ring media access control (MAC)
- ANSI X3.T9, 5/84-49 RFC 1285 FDDI station management (SMI).

ITU-T (International Telecommunications Union - Telecommunication)

The IBM standards for the implementation of ATM are:

- Q.2110 Service Specific Connection-Oriented Protocol (SSCOP)
- Q.2130 Service Specific Coordination Function (SSCF)

ATM Standards

The IBM 8265 Nways ATM Switch complies with the following ATM standards:

- ATM User-Network Interface (UNI) Specifications V3.0, V3.1, and V4.0 ATM Forum
- ATM Interim Inter-Switch Signalling (IISP), ATM Forum
- ATM Public Network-to-Network Interface (PNNI) Phase 1, ATM Forum
- LAN Emulation over ATM Specifications V1.0, ATM Forum
- Q.2110 Service Specific Connection-Oriented Protocol (SSCOP), ITU, March 17, 1994
- Q.2130 Service Specific Coordination Function (SSCF) for support of signaling at the user-network interface, March 17, 1994
- RFC1577 — Classical IP and ARP (Address Resolution Protocol over ATM.

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Year 2000 Statement

This product is Year 2000 ready. When used in accordance with its associated documentation, is capable of correctly processing, providing, and/or receiving date data within and between the 20th and 21st centuries, provided all other products (for example, software, hardware, and firmware) used with the product properly exchange acurate date data with it.

Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Japanese Voluntary Control Council for Interference (VCCI) Statement

This equipment is Class 1 Equipment (information equipment to be used in commercial and industrial districts) which is in conformance with the standard set by Voluntary Control for Interference by Data Processing Equipment and Electronic Office Machines (VCCI) with an aim to prevent radio interference in commercial and industrial districts. This equipment could cause interference to radio and television receivers when used in and around residential districts. Please handle the equipment properly according to the instruction manual.

Power Line Harmonics (JEIDA) Statement

The guidelines of the power line harmonics required by JEIDA are satisfied.

Korean Communications Statement

Please note that this device has been approved for business use with regard to electromagnetic wave interference. If you find this is not suitable for your use, you may exchange it for one designated for non-business purposes.

New Zealand Statement

Attention: This is a Class A product. In a domestic environment, this product may cause radio interference in which case you may be required to take adequate measures.

Taiwanese Class A Warning Statement

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user will be required to take adequate measures.

警告使用者:
這是甲類的資訊產品,在
居住的環境中使用時,可
能會造成射頻干擾,在這
種情況下,使用者會被要
求採取某些適當的對策 •

Radio Frequency Interference (RFI) Compliance

- Class A digital device pursuant to part 15 of the Federal Communications Commissions (FCC) rules

- VDE Class B

- VCCI Class 1

- EN 55022 requirement

- CISPR22 Class A

- NEBS Certification.

NEBS Certification

The IBM 8265 Nways ATM Switch has successfully completed testing and evaluation by Bell Communications Research, Inc, (Bellcore) and has met all requirements for NEBS certification. The Bellcore analysis determines a device's environmental compatibility and acceptability for applications in telco central office environments. The telecommunications industry considers NEBS certification a major prerequisite for the selection of vendor products to be used in central offices. NEBS certification is also viewed by procurers of private network equipment as an indicator of a product's industrial strength and robustness.

Bellcore's NEBS evaluation addresses two key areas of environmental compatibility:

1. Electromagnetic compatibility criteria in the areas of:

   - electrostatic discharge

   - electromagnetic interference

   - lightning and AC power faults

   - electrical safety, bonding, and grounding.

2. Physical compatibility criteria in the areas of:

   - thermal and fire resistance

   - earthquake and office vibration

   - transportation and handling

   - acoustic noise.

Criteria are defined at three levels: desirable features and functions, conditional requirements, and mandatory requirements being the most stringent. The 8265 has satisfied the highest level of criteria for all attempted tests. These tests represent the exhaustive list of NEBS tests for level 3 certification with the exception of "airborne contaminants". IBM will consider attempting the airborne contaminants test in the future if required for specific application.

NEBS certification now gives both telco and private network customers the assurance that the 8265 can meet the requirements of the most demanding segment of networking industry.

In addition to the 8265 chassis itself, the following components have, at the time of publication, received NEBS certification:

- CPSW2 module (Feature Code 6502)
- Controller module (Feature Code 8000)
- 415 W AC power supply (Feature Code 8027)
- 295 W DC power supply (Feature Code 8028)
- WAN 2.5 module (Feature Code 6561)
- MSS Server 2.5 module (Feature Code 5401)
- 155 Mbps multimode fiber daughter card (Feature Code 6580)
- 155 Mbps singlemode fiber daughter card (Feature Code 6581)
- E1/T1/J1 daughter card (Feature Code 6570)
- E1/T1/J1 IMA daughter cards (Feature Codes 6670 and 6671)
- DS3 daughter card (Feature Code 8502)

- OC3 singlemode fiber daughter card (Feature Code 8503)
- STM1 singlemode fiber daughter card (Feature Code 8505).

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Bibliography

8265 Documentation

For additional information on the IBM 8265 Nways ATM Switch, please refer to the following documents. The documents are included on the *IBM 8265 Nways ATM Switch Documentation Library* CD, SA33–0454.

IBM 8265 Nways ATM Switch Product Description, GA33-0449.

IBM 8265 Nways ATM Switch User's Guide, SA33-0456.

IBM 8265 Nways ATM Switch Command Reference Guide, SA33-0458.

IBM 8265 Nways ATM Switch Installation Guide, SA33-0441.

IBM 8265 Nways ATM Switch Planning and Site Preparation Guide, GA33-0460.

IBM 8265 Nways ATM Switch Media Module Reference Guide, SA33-0459.

IBM 8265 Nways ATM Switch Problem Determination and Service Guide, SY33-2128.

These documents are also available via the Internet:

http://www.networking.ibm.com/did/8265bks.html

Related Documentation

The following related publications are included on the *IBM 8265 Nways ATM Switch Documentation Library* CD, SA33–0454.

Multiprotocol Switched Services (MSS) Server Introduction and Planning Guide, GC30-3820.

A-MSS 2.5 Server Module / A-MSS Server Module Quick Reference Card, GX27-4018.

Nways Multiprotocol Switched Services Server Interface Configuration and Software User's Guide, SC30-3818.

Nways Multiprotocol Switched Services Configuring Protocols and Features, SC30-3819.

Multiprotocol Switched Services (MSS) Server Service and Maintenance Manual, GY27-0354.

Nways Multiprotocol Switched Services (MSS) Server Module Installation and Initial Configuration Guide, GA27-4141.

Nways MAS/MRS/MSS/MSSC Library, Configuration Program User's Guide for Nways Multiprotocol Access, Routing and Switched Services, GC30-3830.

Nways Event Logging System Messages Guide, SC30-3682.

8271 LAN Switch Module Planning and Installation Guide, GA27-4162.

8272 LAN Switch Module Planning and Installation Guide, GA27-4163.

4-Port 10BASE-T & 3-Port 10BASE-FL UFCs Planning and Installation Guide, GA27-4120.

100BASE-TX and 100BASE-FX Universal Feature Cards Planning and Installation Guide, GA27-4096.

ATM 155 Mbps Multimode Fiber Universal Feature Card Planning and Installation Guide, GA27-4156.

2-Port Fiber and 4-Port UTP/STP Token-Ring Enhanced Universal Feature Card Planning and Installation Guide, GA27-4168.

IBM Video Distribution Module User's Guide, GA27-4173.

The 8260 Nways ATM Kit Development Program, We Carry Your Creativity to ATM, GA33-0371.

ATM Forum

For more information on ATM Forum specifications, refer to the following:

- *UNI Specification – Versions 3.0, 3.1, and 4.0*
- *P-NNI Specification Version 1.0*
- *ILMI Specification Version 4.0*
- *UNI Traffic Management Version 4.0*

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Product Description

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