DATA SHEET

CISCO MGX 8850 AXSM ENHANCED ATM SWITCHING MODULE

The Cisco MGX 8850 AXSM Enhanced (AXSM-E) ATM Switching Module is a high-density, double height service module for use in the Cisco MGX 8850 Multiservice Switch in combination with the high-capacity PXM-45 processor switching module. The AXSM delivers connectivity from T1/E1 to OC-12c/STM-4. Up to 12 AXSM modules can be accommodated in the MGX 8850 to provide the aggregation required by service providers. The AXSM Enhanced ATM Switching Module, in conjunction with the PXM-45, AXSM (Broadband ATM Switch Service Module), and Route Processor Module (RPM), offers the industry's most advanced and reliable ATM networking features, such as Private Network-Network Interface (PNNI), switched virtual circuit/path (SVC/SVP), soft permanent virtual circuit/path (SPVC/SPVP), and Multiprotocol Label Switching (MPLS).

KEY FEATURES

- High scalability in interfaces speeds with T1/E1, T3/E3, OC-3c/STM-1, OC-12c/STM-4; each port on the AXSM-E can be configured for either trunk or access applications
- 622 Mbps maximum full-duplex bandwidth available per AXSM-E card without blocking.
  Notice: Extra physical ports are provided on some AXSM-E card types in order to support maximum flexibility in bandwidth allocation and traffic separation. Unless blocking is acceptable, the total amount of bandwidth allocated to all ports on an AXSM-E card should not exceed 622 Mbps.
- Support for all ATM service classes, with up to 16 classes of service (CoSs); supports carrier-class implementation of standards-based PNNI, SVC/SVP, SPVC/SPVP, and MPLS services
- Large cell buffers (half million cells), which help to maximize "goodput" performance during congestion, reducing the number of retransmits; the buffers are allocated dynamically, depending on connection resource needs, thereby optimizing use of system resources
- High reliability with hot-standby 1:1 AXSM-E card redundancy, 1:1 and 1+1 line redundancy using APS

Figure 1. Cisco MGX 8850 AXSM Enhanced ATM Switch Service Module

TECHNICAL SPECIFICATIONS

Physical-Layer Interface

T1/E1

- Ports and trunks supported on same AXSM module
- User-Network Interface (UNI) Specifications 3.0, 3.1
- PNNI Specification 1.0
- T1/E1 supports direct cell mapping per ITU-T G.804
- Onboard BERT testing features support:
  - Per channel BERT
  - ITU-T 0.151
  - ITU-T 0.152
  - ITU-T 0.153
  - ITU-T 0.161
  - Loopback on E1 lines (both endpoints of the loop must be configured on the same hardware, i.e. AXSM)
- Support for Long Haul and Short haul T1/E1
- T1 compliant with T1.101, T1.403
- E1 compliant with G.703
- Conforms to RFC2495

Table 1. AXSM-32-T1E1-E Module with IMA

Type of Back Card	T1	E1
Port Speed	1.544 Mbps	2.048 Mbps
Cell Transfer Delay	3623 cells/sec	4528 cells/sec (G.704), 4830 cells/sec (clear channel)
Number of Ports/AXSM	32	32
Number of Ports/Back card	16	16
Line Coding	B8ZS	HDB3
Line Framing	ANSI T1.408 extended Super Frame format line framing	ITU-T G.704 16 frame multiframe line framing and clear channel
Port Media	100 ohm twisted pair	120 ohm twisted pair
Port Connector	RJ-48	RJ-48, SMB
Cell Mapping	Direct	Direct
Redundancy	1:1, Y-cable	1:1, Y-cable

T3/E3

- Ports and trunks supported on same AXSM module
- User-Network Interface (UNI) Specifications 3.0, 3.1
- PNNI Specification 1.0
- Conforms to G.703, Accunet45 specifications
- Conforms to RFC 2556
- E3 supports direct cell mapping per ATM standards G.832

Table 2. AXSM-16-T3E3-E Module

Type of Back Card	T3	E3
Port Speed	44.736 Mbps	34.368 Mbps
Cell Transfer Rate	104,268 cells/sec (ADM mode), 96,000 cells/sec (PLCP mode)	80,000 cells/sec
Number of Ports/AXSM	16	16
Number of Ports/Back card	8	8
Line Coding	B3ZS	HDB3
Line Framing	ANSI T1.107, T1.107a	ITU-T G.804, G.832
Port Media	75 ohm coaxial	75 ohm coaxial
Port Connector	SMB	SMB
Cell Mapping	PLCP (for cbit framing) Direct	Direct
Redundancy	1:1, Y-cable	1:1, Y-cable

OC-3c/STM-1

- Ports and trunks supported on same AXSM module
- UNI Specifications 3.0, 3.1
- PNNI Specification 1.0
- Compliant with SONET standards
  - Bellcore GR-253-CORE
  - Conforms to ITU-T G.703
  - ANSI T1.105
- Compliant with SDH standards
- ITU-T G.707, G.708, G.709
- ITU-T G.957, G.958

Table 3. AXSM-8-155-E Module

Type of Back Card	STM-1 Electrical	MMF	SMF-IR	SMF-LR
Port Speed	155 Mbps	155 Mbps	155 Mbps	155 Mbps
Cell Transfer Rate	353,208 cells/sec	353,208 cells/sec	353,208 cells/sec	353,208 cells/sec
Number of Ports/AXSM	8	8	8	8
Number of Ports/Back card	4	4	4	4
Port Media	75-ohm coaxial	MMF	SMF	SMF
Port Connector	SMB	MT-RJ	SC	SC
Optics		Laser 1310nm	Laser 1310nm	Laser 1310nm
Tx Power Level (dBm)		–15 min –8 max	–15 min -8 max	5 min 0 max
Rx Power Level (dBm)		–23 min –8 max	-28 min -8 max	–34 min –10 max
Typical Reach/km		2	15	40
Redundancy	1:1, Y-cable, 1+1 1:1 APS	1:1, 1+1 1:1 APS	1:1, Y-cable,1+1 1:1 APS	1:1, Y-cable, 1+1 1:1 APS

OC-12c/STM-4

- Ports and trunks supported on same AXSM module
- UNI Specifications 3.0, 3.1
- PNNI Specification 1.0
- Compliant with SONET standards
  - Bellcore GR-253-CORE, TR-TSY-000020
  - ANSI T1.105
  - ITU-T G.703
- Compliant with SDH standards
  - ITU-T G.707, G.708, G.709
  - ITU-T G.957, G.958

Table 4. AXSM-2-622-E Module

Type of Back Card	SMF-IR	SMF-LR
Port Speed	622 Mbps	622 Mbps
Cell Transfer Rate	1,412,832 cells/sec	1,412,832 cells/sec
Number of Ports/AXSM	4	4
Number of Ports/Back card	1	1
Port Media	SMF	SMF
Port Connector	SC	SC
Optics Laser	1310 nm	Laser 1310 nm
Tx Power Level (dBm)	–15 min –8 max	–3 min +2 max
Rx Power Level (dBm)	–28 min –8 max	–28 min –8 max
Typical Reach/km	15	40
Redundancy	1:1, Y-cable, 1+1 and 1:1 APS	1:1, Y-cable, 1+1 1:1 APS

Network Synchronization

- Can be configured for internal timing from the internal PXM-45 Stratum 3 clock
- System clock synchronization to any service module port from line interface
- Looped line clock support

ATM Layer

- Configurable for trunk, NNI or UNI application
- Conformant to ATM Forum UNI 3.0, 3.1 specification, ITU-T I.361 and I.432 specifications
- Supports up to 16 CoSs and includes all ATM Forum traffic type services: ABR, UBR, VBR-nrt, VBR-rt, CBR; ABR supported for EFCI, RM marking, and ER stamping; support for IP quality of service
- ABR with Virtual Source/Virtual Destination (VS/VD)
- Early packet discard (EPD) and partial packet discard (PPD)
- Per Vc queuing for traffic scheduling
- Per Vc Traffic shaping on egress
- Per Vc policing
- 32 Virtual interfaces on egress
- Support for Virtual Path Termination
- Support for ILMI 4.0
- Complies with standard usage parameter control (UPC) per ATM Forum UNI 3.x, TM 4.0, and ITU-T I.371
- Support for virtual circuit connections (VCCs) and virtual path connections (VPCs)
- Virtual path identifier (VPI) and virtual circuit identifier (VCI) range for VCCs and VPCs per UNI 3.1
- Support for virtual circuit (VC) merge for egress and multipoint connections
- Usage policing supported on all interfaces
- Supports up to 60,000 total connections (VPCs and/or VCCs)

Virtual Trunks

- Supports maximum of 32 virtual interfaces per module; the interfaces can be ports, trunks, or virtual trunks; each virtual interface supports 16 CoS queues

Cell Buffering

- Supports half million cells of buffering to accommodate large traffic bursts, avoid network congestion, and cell discard; suitable for TCP/IP traffic

Support for Dynamic Routing Using PNNI 1.0

- Offers automatic end-to-end connection management mechanism
- Deterministically allocates bandwidth and reroutes connections autonomously over optimum network paths
- Preserves service integrity during network failure
- Offers E.164/NSAP addressing
- Offers support for SVC/SVP, SPVC/SPVP, MPLS link-state packets (LSPs)
- Offers QoS-based routing

Enhanced Call Admission Control

- A user-programmable enhanced connection-admission control (E-CAC) feature decides whether to admit or deny connections based upon the requested quality of service

Statistics

- Statistics supported using user-configurable bucket intervals
- Billing statistics supported on T1/E1, T3/E3, OC-3c/STM-1, and OC-12c/STM-4 interfaces
- Diagnostic statistics available per interface, CoS queues, and connections
- Multilevel Statistics Support
  - Level 2 connection statistics supports 60,000 connections with up to 35 stats/connection
  - Level 3 connection statistics supports 32,000 connections with up to 47 stats/connection

OAM

- OAM functionality per ITU-T I.610
- F4 to F5 fault propagation
- Inband diagnostics support using loopback cells
- Inband continuity check and automatic fault reporting for PVCs
- Loopback facility supported for diagnostics and self-test purposes

Network Management

- Management using Cisco WAN Manager software suite
- Based on Simple Network Management Protocol (SNMP) version 1.0 and 2.0

Reliability

- Greater than 75,000 hours MTBF

Physical Specifications

- Dimensions: (H x D) 15.83 x 15.65 in.

Electrical Specifications

- Input power required: 48 VDC
- Power consumption: 95W

Electrical and Safety Standards Compliance

- EMI/ESD compliance
  - FCC Part 15
  - Bellcore GR1089-CORE
  - IEC 801-2
  - EN55022
- Safety compliance
  - EN 60950
  - UL 1950
- Bellcore NEBS: Level 3 compliant
- Optical safety: IEC 825-1 (Class 1)

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