

BXM-T3/E3 Broadband Switch Module

THE BXM-T3/E3 IS A HIGH-DENSITY ATM T3/E3 INTERFACE CARD THAT USES CUSTOM APPLICATION-SPECIFIC INTEGRATED CIRCUIT (ASIC) TECHNOLOGY, FOR THE BPX 8600 SERIES, TO DELIVER THE INDUSTRY'S MOST ADVANCED AND RELIABLE ATM NETWORKING FEATURES. IT SUPPORTS PVCs, SVCs, S-PVCs AND MPLS LVCs (LABEL VC) AND PROVIDES CARD REDUNDANCY PROTECTION. ITS HIGH-SPEED CONNECTIVITY TAKES ATM TO NEW LEVELS OF EFFICIENCY AND SCALABILITY.

THE ENHANCED MODELS OF THE BXM-T3/E3 ALSO DELIVER THE MOST ADVANCED ATM SWITCHING AND TRAFFIC MANAGEMENT CAPABILITIES IN THE INDUSTRY. THESE MODELS EXTEND SCALABILITY BY DOUBLING THE CONNECTION DENSITY AND CELL BUFFERS ON SELECTED MODELS AS WELL AS PROVIDE FUTURE SUPPORT FOR VC MERGING FOR LARGE MPLS-BASED IP+ATM NETWORKS.

Key Features

- High-scalability connection densities with up to 144 T3/E3 ATM ports on a single Cisco BPX[®] 8600 series wide-area switch
- Complete network control through dynamic resource sharing and support for all ATM service classes
- Industry's first fully compliant ATM Forum available bit rate (ABR) virtual source/virtual destination (VS/VD) capability in custom ASICs
- New level of ATM price/performance to optimize the network life cycle
- Support for VC merging with future software upgrade allows "label" sharing for different MPLS VCs with the same destination and class of service (enhanced -E and -EX models only)

With the increasing deployment of Asynchronous Transfer Mode (ATM) networks, there is a growing need for an ATM network platform that can deliver an unprecedented level of scalability, performance, and functionality at lower costs. Such an ATM switching platform must support high-speed interfaces with high port densities as well as advanced ATM traffic management capability.

Advanced ATM traffic management capabilities are implemented in a family of custom ASICs that enable high-density, high-speed ATM interface modules with advanced features and functionality for the BPX 8600 and IGX[™] 8400 series wide-area switches.

This ASIC technology cost-effectively delivers the most advanced ATM switching and traffic management capability in the industry. It represents the first commercially available implementation of VS/VD.

The BXM-T3/E3 broadband switch module is a 8-, or 12-port, Digital Signal level 3 (DS-3) (45 or 34 Mbps) ATM interface card for the BPX switch platform. The interface can be configured for trunk, public, or private User-Network Interface (UNI) applications on a per-port basis to provide a high-density, low-cost broadband ATM networking solution.

Technical Specifications

Physical Layer

- 8-, or 12-port T3/E3 ports
- Complies with ATM Forum UNI Specification Version 3.1, 4.0
- 1:1 BXM redundancy supported using 'Y' redundancy
- Interface Physical Characteristics:

Characteristic	T3 (DS3)	E3 (34 Mbps)
Line Rate	44.736 Mbps 20 ppm	34.368 Mbps 20ppm
Line Code	B3ZS	HDB3
Cell transfer rate	96,000 cells/sec	80,000 cells/sec
Framing	ANSI T1.107, T1.107a	ITU-T G.804, G.832
Signal Level	TA-TSY-00077 (PLCP)	ITU-T G.703
Connector	Locking SMB	Locking SMB
Cell Mapping	Direct	Direct

Synchronization

- Can be configured for internal timing from the BPX internal Stratum 3 clock conforming to ATT Pub. 62411
- System clock synchronization to service module port option

ATM Layer

- Configurable for trunk and public or private UNI application

- UNI conformant to ATM Forum UNI Specification V.3.1, ITU-T I.361 and I.432 specifications
- Support for ATM Forum ILMI 4.0
- Complies with standard Usage Parameter Control (UPC) per ATM Forum UNI Specification V.3.1, TM 4.0 and ITU-T I.371
- Supports virtual circuit connections (VCCs) and virtual path connections (VPCs) per ATM Forum UNI Specification V.3.1 and ITU-T I.371
- Connections:
 - 16,384 to 32,768 connections per card per UNI Specification 3.1
- Virtual path identifier (VPI)/virtual channel identifier (VCI) range for VCCs and VPCs: per UNI Specification V.3.1
- Support for VC merging with future software upgrade (enhanced -E and -EX models only)

Traffic Management

- Per-VC queuing and scheduling
- Per-VC traffic shaping
- Per-VC weighted fair queuing (WFQ)
- Up to 16 classes of service with the following configurable parameters:
 - Separate cell discard threshold for CLP0 and CLP1 cells
 - Separate early packet discard (EPD) threshold for CLP0 and CLP1 cells with future software upgrade (enhanced -E and -EX models only)
 - Maximum Queue Depth (MQD) with partial packet discard (PPD)
 - Service Priority Level (SPL)
 - Explicit Forward Congestion Indication (EFCI) threshold

Constant Bit Rate Service

- UPC per ATM Forum UNI Specification V.3.1, TM V.4.0 and ITU-T I.371
- UPC: Ingress rate monitoring and discarding for:
 - Peak Cell Rate (PCR)
 - Cell Delay Variation Tolerance (CDVT)

Variable Bit Rate Service

- UPC per ATM Forum UNI Specification V.3.1, TM V.4.0 and ITU-T I.371
- UPC: Ingress rate monitoring and cell tagging for:
 - PCR

- CDVT
- Sustainable Cell Rate (SCR)
- Maximum Burst Size (MBS)
- CLP tagging, enabled, or disabled on a per-virtual circuit (VC) basis at the ingress side
- Support for both VBR-rt and VBR-nrt
- EPD

ABR Service and Congestion Control

- VS/VD per ATM Forum Traffic Management Specification V.4.0
- Explicit Rate (ER) stamping
- EFCI tagging monitoring
- ForeSight[®]
- Support for non-AAL5 traffic (enhanced -E and -EX models only)

ABR VS/VD

- VS and VD resource management (RM) cell generation and termination
- Virtual connection queue (VCQ) assigned to each VC ingress
- VCQ configurable parameters:
 - Separate cell discard threshold for CLP0 and CLP1 cells
 - EPD threshold
 - Maximum queue depth with PPD
 - Reserved buffer space for RM cells
- Support for UBR and VBR access
- Interworking with ForeSight[®] (enhanced -E and -EX models only)

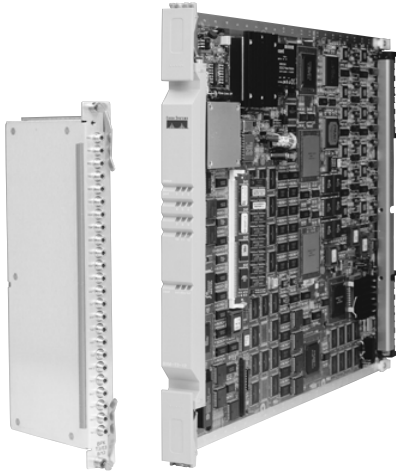
Unspecified Bit Rate Service

- UPC per ATM Forum UNI Specification V.3.1, TM V.4.0 and ITU-T I.371
- Minimum cell rate configurable and guaranteed
- EPD

Virtual Trunks

- Support for up to 31 virtual trunks per card, each with 16 class-of-service queues
- UNI and NNI option for the interface with public ATM network
- Per virtual trunk traffic shaping
- Reconfigurable maximum trunk rate

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Cell Buffering

- Large ingress and egress cell buffer architecture
- 204,800 to 1,024,000 cells stored per card
 - Accommodate large traffic bursts
 - Avoid network congestion and cell discard
 - Suited to TCP/IP traffic

Intelligent QoS (Quality of Service) Management Suite

Connection Admission Control (CAC)

Automatic Routing Management

- Automatic end-to-end connection management mechanism
- Deterministically allocates bandwidth and routes VCs autonomously over optimum network paths
- Automatic rerouting preserves service integrity during network failures

Advanced CoS (Class of Service) Management

- Up to 16 class-of-service queues, with independent service algorithms dedicated to each interface in the network

Optimized Bandwidth Management

- Dedicated queue- and rate-controlled servers for each VCC/VPC
- Dynamic thresholding, providing fairness and more than 95 percent utilization

ATM-Frame Relay (FR) Service Interworking

- Provides transparent end-to-end connectivity, operating two services on a single switch platform

Switched Virtual Circuits

- Signaling protocol per ATM Forum UNI Specification V.3.0 and V.3.1
- E.164/NSAP addressing per ATM Forum UNI Specification V.3.1
- Support for Private Network-Network Interface (PNNI) per ATM Forum PNNI Specification V.1.0

Fault Management and Reporting

- Compliant with Bellcore GR-253-CORE

Alarms

- Loss of Signal (LOS)
- Loss of Pointer (LOP)
- Loss of Frame (LOF)
- Loss of Cell Delineation (LOC)
- Alarm Indication Signal (AIS)
- Remote Defect Indication (RDI)
- Alarm integration up/down count

Performance Monitoring

- Performance monitoring provided for line, section, and path
- Bit Interleaved Parity (BIP) error detection
- Far-End Block Error (FEBE) count
- Unavailable Seconds (UAS)
- Errored Seconds (ES)
- Severely Errored Seconds (SES)
- Header Checksum (HCS) monitoring

Statistics

- ATM statistics collected on a per-VC basis
- Four levels of ATM-layer statistics collection provided

OAM

- Segment and end-to-end Operations, Administration and Maintenance (OAM) loopbacks supported per Bellcore TA-NWT-001248
- External OAM segment flows, consisting of segment loopback cells per ATM Forum UNI Specification V.3.1 and ITU-T I.371
- Generation and detection of AIS and RDI OAM cells
- OAM cell generation and loopback facility supported for diagnostics and self-test purposes

Network Management

- Management using Cisco Wan Manager™ software
- Simple Network Management Protocol (SNMP)-based for configuration and statistics collection
- Graphical user interface

Alarm Indicators

- Via LEDs on face plate

Status Site	Alarm LED Green	Alarm LED Yellow	Alarm LED Red
Card	Active	Standby	Fail
Port	Active and OK	Active—remote alarm	Active—local alarm

Physical Specifications

- Dimensions: (H x W x D) 19 in x 1.1 in x 27 in (48.26 cm x 2.79 cm x 68.58 cm)
- Weight: 6 lb (2.7 kg)

Electrical Specifications

- Input power required: -48V DC
- Power consumption: 100W

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

Summary Specifications

Product Number	Enhanced Model	Number of Ports per Card	Ingress Cell Buffer (cells)	Egress Cell Buffer (cells)	Number of Connections per Card	VC Merge Capable
BXM-T3-8, BXM-E3-8		8	102,400	102,400	16,384/32,768	

Product Number	Enhanced Model	Number of Ports per Card	Ingress Cell Buffer (cells)	Egress Cell Buffer (cells)	Number of Connections per Card	VC Merge Capable
BXM-T3-12, BXM-E3-12		12	133,120	235,520	16,384/32,768	
BXM-T3-8E, BXM-E3-8E	Yes	8	256,000	256,000	16,384/32,768	Yes
BXM-T3-12E, BXM-E3-12E	Yes	12	256,000	256,000	16,384/32,768	Yes
BXM-T3-12EX, BXM-E3-12EX	Yes	12	512,000	512,000	32,768	Yes

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