Cisco MGX Service Resource Module: Enhanced

The Cisco® MGX® Service Resource Module-Enhanced Model B (SRME/B) is designed for use with the Cisco MGX 8230, MGX 8250, MGX 8830/B, MGX 8850/B, and MGX 8880 platforms. The Cisco MGX SRME/B provides three major functions for service modules: bulk distribution of T1 and E1 traffic, bit error rate testing (BERT) of T1 and E1 lines and ports, and 1:N redundancy.

The Cisco MGX SRME/B is an enhanced version of the existing Cisco MGX SRM, operating at line speeds of OC-3 or T3. The Cisco MGX SRME/B provides the existing functions of the Cisco MGX SRM 3T3/C, such as bulk distribution, 1:N redundancy, and BERT. It supports either one SONET or SDH interface using SMFIR-155 (optical) and SMB-155 (electrical) back cards or three T3 interfaces using legacy SMB back cards.

The Cisco MGX SRME/B has a similar architecture to the current SRM-3T3/C with the following additional features:

- Bulk distribution of T1 traffic to all 12 service-module slots using 1 SONET or SDH OC-3/STM-1 interface
- Bulk distribution of T1 traffic to all 12 service-module slots using up to 3 T3 interfaces
- 1:1 SRM hot-standby redundancy
- Card-to-card linear (1+1) automatic-protection-switching (APS) support for optical interfaces
- Elimination of back-card requirement for Cisco MGX SRME/B operation when bulk distribution is not required

Key Features

Bit Error Rate Testing

The Cisco MGX SRME/B provides the BERT service to narrowband service modules, such as the Cisco MGX Frame Service Module, the Cisco MGX Circuit Emulation Service Module, the Cisco MGX ATM UNI Service Module, and the Cisco MGX VISM-8T1/E1 Voice Interworking Service Module. After a service-module line or port is put into loopback mode, the Cisco MGX SRME/B can generate a test pattern over the looped line or port, read the received looped data, and report on the error rate. This operation can be performed on a complete T1 or E1 line, on a fractional T1 or E1 line, on a DS-0 bundle (N x DS-0), or on a single DS-0 channel. The Cisco MGX SRME/B can support BERT on only one line or channel at a time. BERT can generate a variety of test patterns, including all ones, all zeros, alternate one zero, double alternate one zero, $2^{23} - 1$, $2^{20} - 1$, $2^{15} - 1$, $2^{11} - 1$, $2^9 - 1$, 1 in 8, 1 in 24, digital data service 1 (DDS1), DDS2, DDS3, DDS4, and DDS5.

Bulk Mode Distribution

In the bulk mode distribution, the Cisco MGX SRME/B uses its back card to receive a signal from its OC-3/STS3 or STM-1 interface. The SONET or SDH signal is broken down into its T1 components and then distributed through the distribution bus to the appropriate service module. In this mode, service modules do not require any back cards and only the Cisco MGX SRME/B needs to have its back card. Hence, it greatly reduces cable clutter behind the shelf.

The following external physical interfaces are supported for the T1 or E1 bulk distribution:

- OC-3/STS3: For T1 distribution using VT1.5 (North America)
- STM-1: For T1 distribution using VC11 (Japan)
- STM-1: For E1 distribution using VC12 (international)
- T3: For T1 distribution using M13 format

1:N Service Module Redundancy

The Cisco MGX SRME/B provides multiple 1:N redundancy groups (one standby card and N active cards) for T1 or E1 service modules in both bulk mode and nonbulk mode. Each active Cisco MGX SRME/B provides redundancy for a maximum of 11 service modules per shelf. Each redundancy group requires an additional front card to operate as the standby, with the same capabilities as the active cards in the group. Any service-module slot can be used for standby.

Bulk-Mode Redundancy

In the bulk mode, when a service module fails, the Cisco MGX PXM Processor Switch Module initiates a switchover to the previously configured standby module. The Cisco MGX SRME/B then redirects the recovered T1/E1 traffic to the designated standby module. The switching takes place inside the Cisco MGX SRME/B and requires no special back cards or cabling for the service modules. In order for Bulk-Mode Redundancy to operate properly, the Cisco MGX SRME/B needs to have its back card installed. The data path to the standby module is through the distribution bus, and the redundancy bus is not used at all in bulk mode.

Nonbulk-Mode Redundancy

In nonbulk mode, individual T1/E1 lines are directly connected to the back cards of service modules. During normal operation, the T1/E1 data flow is from the service-module back card to its front card, and conversely. A back card is not required for the Cisco MGX SRME/B in this mode of operation.

When a service module fails, the Cisco MGX PXM initiates a switchover to the standby module. The relays on the service-module back card (all T1/E1s) are switched to drive the signals onto the common redundancy bus under Cisco MGX SRME/B control. The designated standby service-module back card (controlled by the Cisco MGX SRME/B) receives these signals on the redundancy bus. The data path then is from the failed service-module back card to the redundancy bus to the back card of the standby service module and finally to the standby service module itself. The distribution bus is not used in the nonbulk mode.

Cisco MGX SRME/B 1:1 Hot-Standby Redundancy

The Cisco MGX SRME/B is designed to be redundant, along with the Cisco MGX PXM. The Cisco MGX PXM and its corresponding Cisco MGX SRME/Bs are considered as one logical unit for redundancy purposes; redundancy switching occurs between these logical units. If the Cisco MGX PXM switches over to its standby, then the Cisco MGX SRME/B (in both bays) switches over to its standby. If the Cisco MGX SRME/B switches over to its standby, it causes the Cisco MGX PXM (and the Cisco MGX SRME/B in the other bay) also to switchover.

The Cisco MGX SRME/B offers hot-standby functionality. The standby Cisco MGX SRME/B configuration is synchronized with the active one. When a Cisco MGX SRME/B or MGX PXM switchover occurs, no reconfiguration is needed for the standby Cisco MGX SRME/B that will be activated to carry over traffic from the failed Cisco MGX SRME/B.

Linear APS

The APS standard provides a means for SONET line redundancy. APS involves switching between working (active) and protection (standby) SONET lines in the active and standby Cisco MGX SRME/Bs in case the receiving end or the far end detect a hardware failure. Only card-to-card linear (1+1) APS is supported. APS does not cause Cisco MGX SRME/B or MGX PXM switchover because it involves only back-card switchover.

Bellcore GR.253 and ITU-T G.783 Annex-A and Annex-B are supported.

Specifications

Card Size
- Front cards: 7.25 x 16.25 in. (18.41 x 41.28 cm)
- Back cards: 7.0 x 4.5 in. (17.78 x 11.43 cm)

Power
- –48 VDC
- 28W

Temperature Range
- 0° to 50°C (32° to 122°F)

Reliability
- Mean time between failure (MTBF): 99,608 hours

Availability
- 99.999 percent

Electrical Compliance
- EMI/ESD compliance
- FCC Part 15
- Bellcore GR1089-CORE
- IEC 801-2
- EN55022

Safety Compliance
- UL 1950, CSA C22.2No. 950, and EN60950
- AS/NZS 3260 and IEC 60950
- IEC 60825-1 and EN60825-1
- Bellcore Network Equipment Building Standards (NEBS) Level 3-compliant
- Optical safety: IEC 825-1 (Class 1)

Standards Compliance
- FCC 47 CFR Part 68
- Industry Canada CS-03
- ITU-T G.703
- ITU-T G.709

- ITU V.54
- ITU-T G.957
- ITU-G-783 including Annex-A and Annex-B
- CCITT/ITU O.150, O.151, O.152, O.153, and O.161
- GR-253-CORE
- ANSI T1.102
- ANSI T1.107-1988,
- ANSI T1.107a-1990 [9a]
- ANSI T1.105.02
- ANSI T1.403
- ANSI T1E1 2/92-003 R3
- TA-TSY-000055
- TA-TSY-000077
- TR-TSY-000476

Physical Characteristics

Physical Layer T3 Interface

Table 1 describes the physical characteristics of the Cisco MGX SRME/B T3 interface.

Table 1.   Physical Characteristics of Cisco MGX SRME/B T3 Interface

Characteristic	T3 (DS-3)
Line rate	44.736 Mbps ±20 ppm
Line code	Binary 3-zero substitution (B3ZS)
Cell transfer rate	96,000 cells per second in Physical Layer Convergence Protocol (PLCP) mode 104,268 cells per second in add/drop multiplexer (ADM) mode
Framing	C-bit parity
Signal level	ANSI T1.102, Telecordia GR-499 Core
Connector	Male SMB
Cell mapping	PLCP and direct

Physical Layer OC-3c/STM-1 Interface

- Compliant with SONET standards
  - Telecordia GR-253-CORE
  - ANSI T1.105
- Compliant with SDH standards
  - ITU-T G.707, G. 708, and G.709
  - ITU-T G. 957 and G.958
  - ITU-G.783 Annex-A

Table 2 describes the OC-3c/STM-1 interface.

Table 2.   OC-3c/STM-1 Interface Physical Characteristics

Type of Back Card	Source 1310 nm	Transmit Power (dBm)		Receive Range (dBm)		Physical	Range (km)
		Min	Max	Min	Max		
Single-mode fiber (SMF) intermediate reach (IR)	Laser (Class 1)	−15	−8	−28	−8	SC	15 km
STM-1 electrical	–	–	–	–	–	SMB	100 m for IG59 cables

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