9500 MPR
Product Information

PN 3EM23952AA 01
R02.00, Issue 01, September 2009

THIS PRODUCT COMPLIES WITH D.H.H.S. RADIATION PERFORMANCE STANDARDS 21 CFR, 1040.10, FOR A CLASS 1 LASER PRODUCT.

DANGER

Invisible laser radiation is present when the optic connector is open. AVOID DIRECT EXPOSURE TO BEAM.

WARNING

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 users will be required to correct the interference at their own expense.

NOTICE

This manual applies to 9500 MPR R02.00 software. Release notes describing revisions to this software may impact operations described in this manual.

This transfer of commodities, technology, or software, if from the United States, is an export in accordance with the U.S. Export Administration Regulations. Diversion contrary to U.S. law is prohibited. The export or re-export (further transfer) of such commodities, technology, software or products made from such technology is prohibited without proper authorization(s) from the U.S. Department of Commerce or other appropriate U.S. government agency(s).

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DOCUMENTATION

Product documentation is available on Alcatel-Lucent's OnLine Customer Support web site at https://support.alcatel-lucent.com/portal/olcsHome.do.

To offer comments on this documentation, visit Alcatel-Lucent's OnLine Customer Support web site at https://support.alcatel-lucent.com/portal/olcsHome.do and select *Contact us*, *Customer support*, and then *OnLine Assistance* or write to the following address.

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9500 MPR Product Information
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FCC Part 15 Subpart B

1. 9500 MPR UNLICENSED RADIO

1.1 The JF6-9558H (unlicensed) radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC requirements) allow immediate turn-up. After the license is received, the unlicensed radio can be easily converted to the lower 6 GHz licensed band.

1.2 The JF6-9558H unlicensed radio operates in the 5725-5850 Information, Scientific, and Medical (ISM) band in accordance with FCC Part 15.247. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum.

FCC Class B Compliance Statement

1.3 The JF6-9558H unlicensed radio has been tested and found to comply with the limits for a Class B 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 his own expense.

FCC Class B Requirements

1.4 This device complies with part 15 of the FCC Rules and IC RSS-210. Operation is subject to the following three conditions: (1) this device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation. (3) This device must be professionally installed.

CAUTION Possibility of service interruption. Changes or modifications not expressly approved by Alcatel-Lucent could void the authority to operate the JF6-9558H (unlicensed) radio.

CAUTION Possibility of service interruption. Installation, Turn-Up, Maintenance, and Operation Instruction supplied with the JF6-9558H (unlicensed) radio require strict adherence for continued part 15 of the FCC Rules and IC RSS-210 compliance.

9500 MPR General System Description

1. INTRODUCTION

1.1 This General System Description applies to 9500 MPR software release R02.00 (hereafter called R02.00) and any subsequent or maintenance release to this release. It describes system applications, floor space, and power requirements. Signal input and output characteristics are also defined. This manual can be used by system and operations staff who plan to operate, install, commission, or maintain a 9500 MPR, and by any others who must be familiar with the equipment.

1.2 Alcatel-Lucent 9500 Microwave Packet radio (MPR) is a solution for smooth transformation of backhaul networks from TDM to IP.

1.3 The Alcatel-Lucent 9500 MPR efficiently transports multimedia traffic since it handles packets natively, while still supporting legacy TDM DS1 traffic. It also provides the quality of service needed to satisfy end-users. This solution improves packet aggregation, increases bandwidth and optimizes Ethernet connectivity. With the Alcatel-Lucent 9500 MPR the network can easily and efficiently absorb rapid growth in multimedia traffic, because it handles packets natively by adapting the transmission of the packets to the air conditions and the quality required by the different types of services.

1.4 9500 MPR9500 MPR covers the frequency range from 5 GHz to 6 GHz, consisting of Microwave Service Switch (MSS-8) shelf providing the baseband processing and tributaries interfaces as well as supervision, and Microwave Packet Transport-Long Haul (MPT-HL) shelf providing the radio function.

1.5 9500 MPR replaces the traditional terminal or single-link based approach to networking with a nodal solution.

1.6 9500 MPRThe 9500 MPR supports up to eight RF links for operation on the same or different frequency bands. A Transceiver module in the MPT-HL shelf for each link is connected to P8ETH Ethernet Access Switch module inside the MSS-8 shelf.

1.7 Other plug-in modules provide line interface access and management. 9500 MPR supports a mix of non-protected and protected or diversity operation for single link, repeater or star radio configurations.

1.8 System control and synchronization is provided by the Enhanced Control and Switching Module (CSM-E) module.

Documentation

1.9 For additional information, refer to the following related documentation:

- Unit Data Sheets (UDSs) in this manual
- 9500 MPR Installation Practices manual (PN 3EM23953AA)
- 9500 MPR Operation and Administration manual (PN 3EM23954AA)
- 9500 MPR Turn-Up manual (PN 3EM23955AA)
- 9500 MPR Maintenance and Trouble Clearing manual (PN 3EM23956AA)
- 9500 MPR Engineering Support Documentation manual (PN 3EM23957AA)

Standards

1.10 The following is a partial list of the standards that have influenced certain behavioral aspects of the 9500 MPR:

- 21 CFR PART 1040.10 and 1040.11
- Banned substances list
- CENELEC EN 61000-3-2
- CENELEC EN 61000-3-3
- CENELEC EN 61000-4-8
- CISPR/I/105/CDV-CISPR/I/29/CD-CISPR/I/106/CDV
- CISPR 16-1-1
- CISPR 16-1-2
- CISPR 16-1-4
- CISPR 16-2-1
- CISPR 16-2-3
- CISPR 16-2-4
- CISPR 16-4-2
- CSA-C22.2 No 60950
- EC RoHS Directive 2002/95/EU, compliance with
- EC WEEE Directive 2002/96/EU, compliance with
- EN 301 751
- EN 302 217
- EN 50 385
- EN 50 383
- ETSI and RTTE directive: health and safety
- ETSI and RTTE directive: electromagnetic compatibility

- ETSI and RTTE directive: ETSI standard
- ETSI and RTTE directive: EN 302 217
- ETSI standards: Transmitter requirements
- ETSI standards: Receiving requirements
- ETSI standards: Note
- ETSI EN 302 217-1 to 4
- ETSI EN 301 489
- ETSI EN 300 019
- ETS 300 753
- ETSI EN 300 132-2
- ETSI EN 300 132-3
- EU Directive EuP Directive 92/42/EEC, Compliance with proposal
- FCC OET 65
- FCC Title 247, Part 15
- GR-487-CORE
- GR-1089-CORE
- Human exposure
- IC RSS-210
- IEC 61000-4
- ICES 003
- ICNIRP
- IEC EN 60950-1
- IEC EN 50385
- IEC EN 60825-1/-2:2000
- IEC UL 60950-1
- IEC 60529

- IEEE Std 802.3
- IEEE Std 802.1D
- IEEE Std 802.1Q
- IETF RFC 2474
- IETF RFC 2475
- IETF RFC 3550
- IETF RFC 0793
- IETF RFC 0791
- IETF RFC 1157
- IETF RFC 768
- IETF RFC 2616
- ITU-T G.664
- ITU-T G.703
- ITU-T G.704
- ITU-T G.706
- ITU-T G.775
- ITU-T G.823
- ITU-T G.8261
- ITU-T G.826
- ITU-T G.921
- ITU-T Recommendation K20
- ITU-T Recommendation K21
- ITU-T Recommendation K45
- ITU-T Recommendation K44
- MEF 8
- Safety (Canada)

- TR NWT 000499
- TR TSY 000191

FCC Part 15 Subpart B

1.11 The JF6-9558H (unlicensed) radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC requirements) allow immediate turn-up. After the license is received, the unlicensed radio can be easily converted to the lower 6 GHz licensed band.

1.12 The JF6-9558H unlicensed radio operates in the 5725-5850 Information, Scientific, and Medical (ISM) band in accordance with FCC Part 15.247. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum.

FCC Class B Compliance Statement

1.13 The JF6-9558H unlicensed radio has been tested and found to comply with the limits for a Class B 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 his own expense.

FCC Class B Requirements

1.14 This device complies with part 15 of the FCC Rules and IC RSS-210. Operation is subject to the following three conditions: (1) this device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation. (3) This device must be professionally installed.

CAUTION Possibility of service interruption. Changes or modifications not expressly approved by Alcatel-Lucent could void the authority to operate the JF6-9558H (unlicensed) radio.

CAUTION Possibility of service interruption. Installation, Turn-Up, Maintenance, and Operation Instruction supplied with the JF6-9558H (unlicensed) radio require strict adherence for continued part 15 of the FCC Rules and IC RSS-210 compliance.

2. FEATURES

2.1 This section describes 9500 MPR features of the 9500 MPR R02.00.

2.2 The following paragraphs describe the features of the system for R02.00. To administer these new features by the Craft Terminal and WebEML refer to the 9500 MPR Operation and Administration manual (PN 3EM23954AA).

System Features

- All Indoor Mount mechanical arrangement
  - Up to 8 radio directions per node
- Frequencies: 5.8 Unlicensed, 6L, and 6U GHz
- Static Modulation
- Bandwidths: 5, 10, and 30 MHz
- Modulations: 32 QAM, 128 QAM, and 256 QAM
- Ethernet Access Switch transponder card
  - Four 10/100/1000BaseT Ethernet ports
  - Four GigE SFP optical Ethernet ports
- DS1, DS3, and 10/100/1000 Ethernet interfaces
- CESoETH
- EF8
- 300 Mbps full-duplex Ethernet transport capacity
- Flexible aggregate capacity sharing DS1/DS3 and Ethernet
- 10Gb Packet Based Node
- Microwave uplink
- ODU V2
- Ethernet uplink with VLAN
- Point-to-point VLAN
- IEEE 802.1p and Diffserv QoS
- Queue Management & Flow control ability
- DS1/DS3 Protection
- 1+1 EPS on All Cards
- SW License control
- SNMP v2

- TSM8000 Support
- 1340 INC Support
- 1350 OMS Support

System Architecture

- All Indoor Mount mechanical arrangement
  - Up to 8 radio directions per node
- Frequencies: 5.8 Unlicensed, 6L, and 6U GHz
- Static Modulation
- Bandwidths: 2.5, 3.75, 5, 10, and 30 MHz
- Modulations: 32 QAM, 128 QAM, and 256 QAM
- Ethernet Access Switch transponder module
  - Four 10/100/1000BaseT Ethernet ports
  - Four GigE SFP optical Ethernet ports

System Configurations

- Stand-Alone MSS-8 Shelf
- Unprotected 1+0 radio nodes
  - 1+0 Terminal
  - 1+0 Drop and Insert Repeater
  - 1+0 4-Way Junction
  - 1+0 Nodal 8-Way Junction
- Protected 1+1 HSB, Space Diversity (SD), and Frequency Diversity (FD) Radio Nodes
  - 1+1 HSB, SD/FD Terminal
  - 1+1 HSB, SD/FD Drop and Insert Repeater
  - 1+1 HSB, SD/FD 4-Way Junction
- 1+0 and 1+1 EPS P8ETH Ethernet Access Switch transponder module

System Architecture

All Indoor Mount mechanical arrangement

2.3 The system allows up to eight radio channels per node.

2.4 The radio channels can be either, all the same frequency, different frequencies, or a combination of both.

2.5 LICENSED RADIO: The 6L and 6U GHz frequencies are supported in the all indoor mount arrangement.

UNLICENSED RADIO

2.6 The JF6-9558H unlicensed radio provides fast deployment of service with microwave radio. No license and small antennas (no FCC requirements) allow immediate Turn-Up. After the license is received, the unlicensed radio can be easily converted to the lower 6 GHz licensed band.

2.7 Refer to 9500 MPR Engineering Support Documentation manual (PN 3EM23957AA) and see drawing 3EM227840000BJZZA, Equipping Options Drawing for unlicensed radio configurations and equipping options.

2.8 The JF6-9558H unlicensed radio operates in the 5725-5850 Information, Scientific, and Medical (ISM) band in accordance with FCC Part 15.247. This unlicensed radio, although operating in the same band as a spread spectrum radio, operates using narrower bandwidths than spread spectrum. Advantages, disadvantages, and antenna recommendations for the unlicensed radio follow:

2.9 Advantages:

- Fast installation and Turn-Up
- 18, 26, 37, 53, 114, 160, or 183 Mb/s data payload capacity consisting of a combination of DS1, DS3, and/or Ethernet traffic
- Field convertible to lower 6 GHz licensed band
- Field expandable to higher capacities.
- Common network management with licensed radios.
- Common spares and training with licensed radios

2.10 Disadvantages:

- Interference from other 5725-5850 ISM band transmissions are possible
- Operating restrictions
- 5.725 to 5.850 GHz band
- Performance could deteriorate due to interference as the frequency band becomes congested.

2.11 Antenna Recommendations:

- Frequency – 5.8 GHz
- Size and Type – 2, 4, 6, 8, or 10 foot parabolic; 1 or 2 foot flat panel.
  - Parabolic antennas, See Table 2-A.
  - Flat antennas, See Table 2-A.
- Gain and Bemired (3 dB)

Table 2-A. 5.8 GHz Unlicensed Antenna Recommendation

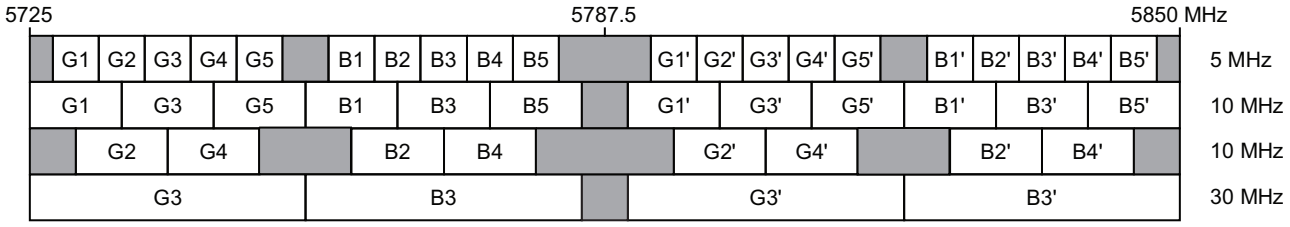
PARABOLIC	FLAT
2 ft parabolic – 29 dB/6°	1 ft flat panel – 23 dB/9°
4 ft parabolic – 35 dB/3°	2 ft flat panel – 28 dB/3.5°
6 ft parabolic – 38 dB/2°	
8 ft parabolic – 41 dB/1.5°	
10 ft parabolic – 42.5 dB/1.2°	

2.12 The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 12 meters from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

DANGER **Possibility of personal injury. Danger of public exposure to long term RF radiated energy. When using a 1 ft flat panel antenna with a 1 watt (+30 dBm) output power, the antenna must be located in an area that does not allow the general population access to within 12 meters (5.8 Ghz) of the antenna.**

2.13 Frequency Plan: Refer to Figure 2-1 for the frequency plan for the 5.725 and 5.850 GHz unlicensed band.

Figure 2-1. Frequency Plan: 5.725 to 5.850 GHz Unlicensed Band (FCC Part 15)



Transmit Channel	Frequency MHz	Receive Channel	Frequency MHz
G1	5730	G1'	5795
G2	5735	G2'	5800
G3	5740	G3'	5805
G4	5745	G4'	5810
G5	5750	G5'	5815
B1	5760	B1'	5825
B2	5765	B2'	5830
B3	5770	B3'	5835
B4	5775	B4'	5840
B5	5780	B5'	5845

Notes:

1. The drawing above shows the 5 MHz bandwidth channels used by the JF6-9558H radio. Gray channels are designated "G". Blue channels are designated "B". Transmit and receive channels have a 65 MHz frequency separation.
2. RF filters are centered on channels G3, B3, G3', and B3'.
3. The flexability of the JF6-9558H allows any radio to grow to 183 Mb/s without a hardware upgrade.

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2.14 Static Modulation is supported in the all indoor mount arrangement.

2.15 Bandwidths: 5, 10, and 30 MHz are supported in the all indoor mount arrangement

2.16 Modulations: 32 QAM, 128 QAM, and 256 QAM

2.17 Ethernet Access Switch transponder module

2.18 Four 10/100/1000BaseT Ethernet ports

2.19 Four GigE SFP optical Ethernet ports

System Architecture

Architecture

2.20 System architecture provides a multi-service aggregation layer which aggregates and carries over a common packet layer TDM, 2G, 3G, and IP/Ethernet traffic. Using Circuit emulation and pseudo-wire protocols allows mapping over Ethernet these various traffic types into a single transmission pipe.

2.21 The Service Awareness feature allows data flows to be prioritized by their Quality of Service QoS requirements.

2.22 The single packet matrix allows a high switching capacity, greater than 10 Gb/s, in a common aggregation layer.

2.23 Service Driven Packet Adaptive Modulation allows utilizing the available bandwidth in its entirety by changing modulation schemes according to the changing propagation conditions to the different transport capacity service quality.

Microwave Service Switch (MSS-8) Shelf

2.24 A fully equipped Microwave Service Switch (MSS-8) shelf provides up to 267 Mb/s full-duplex Ethernet transport capacity per radio carrier channel.

2.25 MSS-8 shelf provides up to 10 Gb/s packet switching which creates flexible aggregate capacity sharing across DS1, DS3 and Ethernet traffic.

Microwave Service Switch (MSS-8) Shelf

2.26 1+0 and 1+1 EPS on All DS1, DS3, and 10/100/1000 Ethernet interfaces

2.27 CESoETH

2.28 MEF8

2.29 Microwave uplink

2.30 Ethernet uplink with VLAN

2.31 Point-to-point VLAN

2.32 IEEE 802.1p and Diffserv QoS

2.33 Queue Management & Flow control ability

2.34 Channel Spacing:

2.35 SW License control

2.36 SNMP v2

2.37 TSM8000 Support

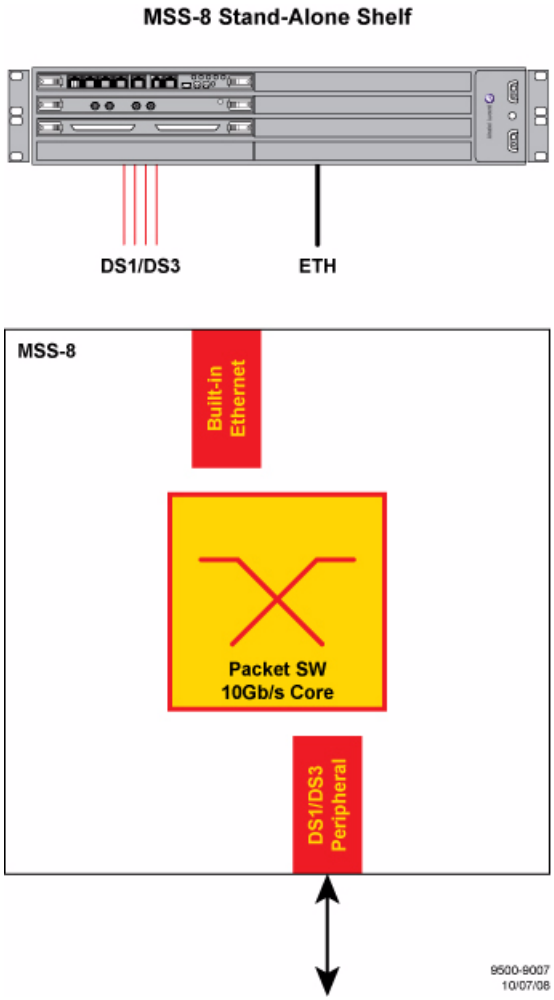
2.38 1340 INC Support

2.39 1350 OMS Support

System Configurations

2.40 Stand-Alone Microwave Service Switch (MSS-8) shelf: See Figure 2-2.

Figure 2-2. Stand-Alone Microwave Service Switch (MSS-8) shelf

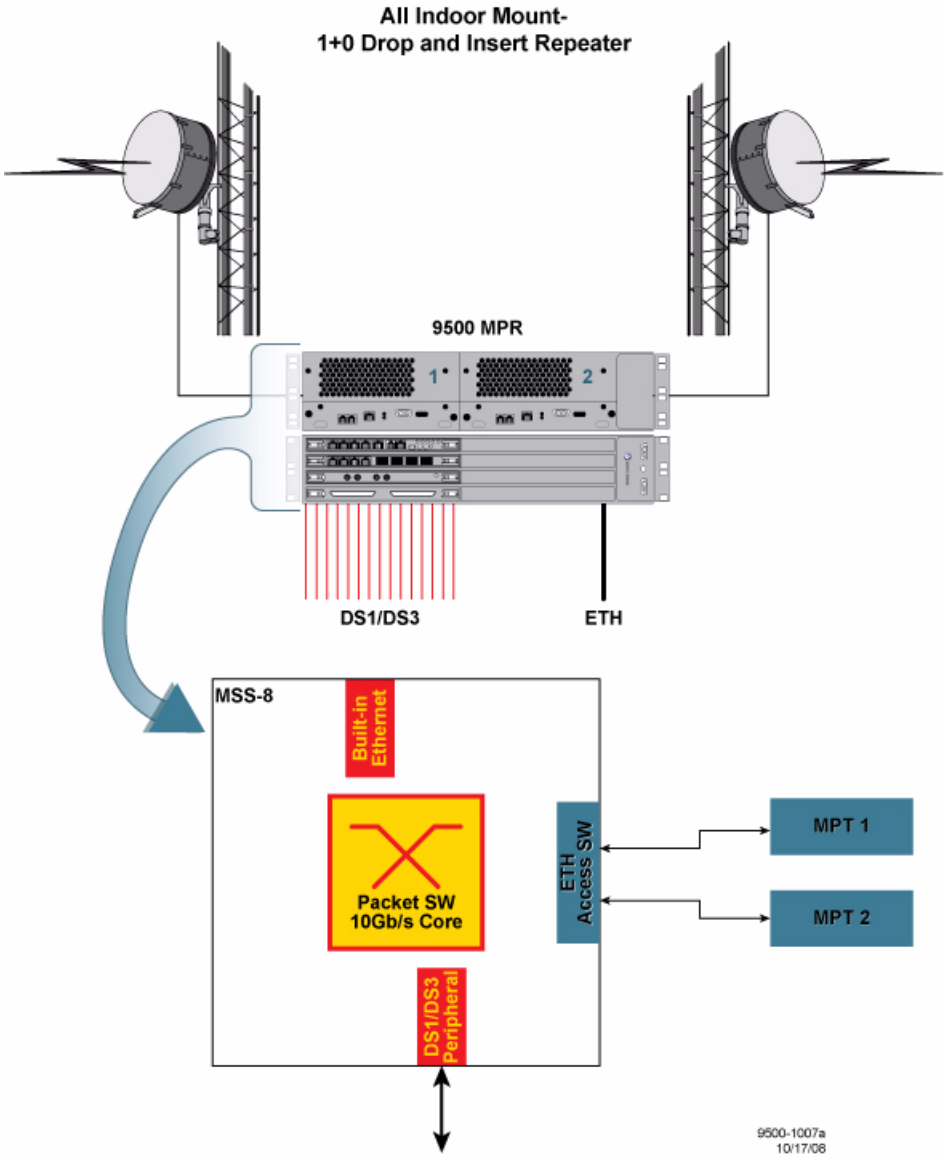


2.41 All Indoor Mount - 1+0 Terminal: See Figure 2-3.

Figure 2-3. All Indoor Mount - 1+0 Terminal

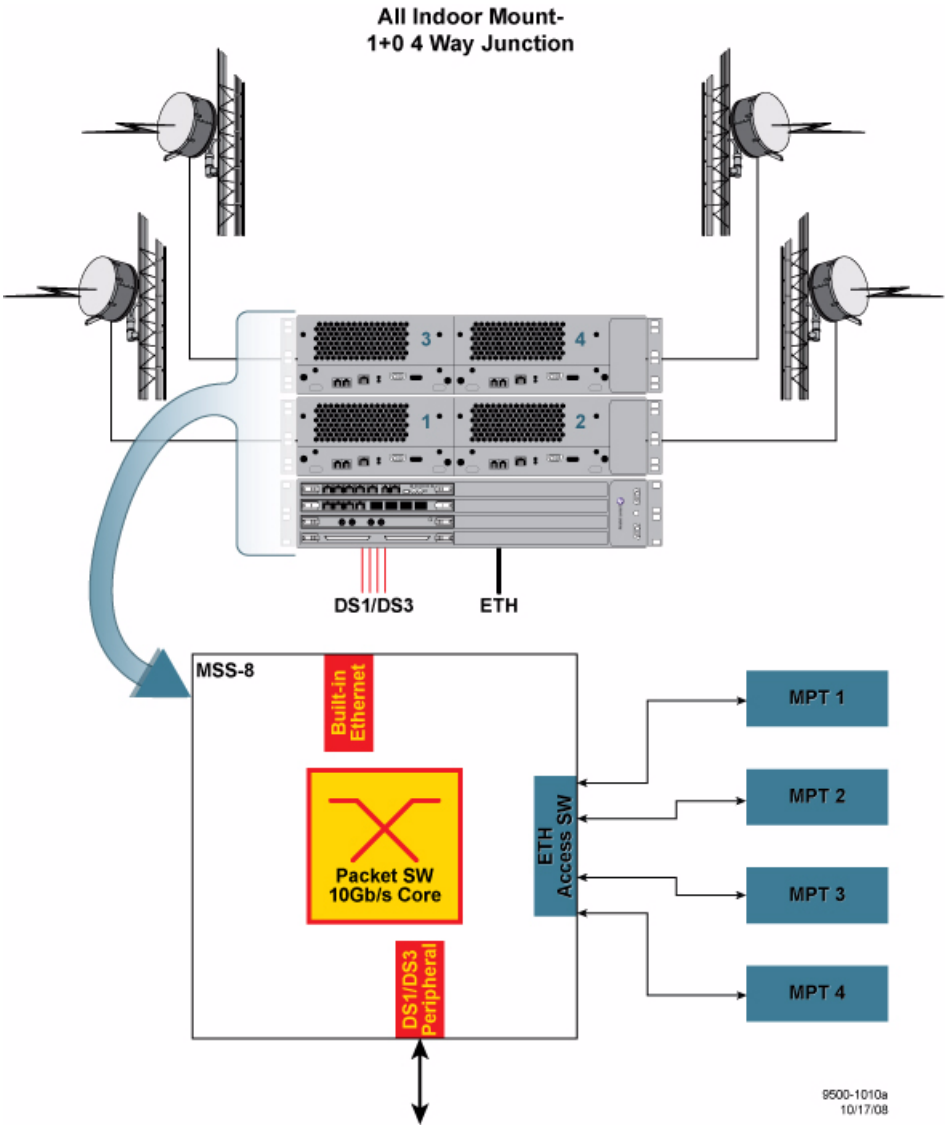
2.42 All Indoor Mount - 1+0 Drop and Insert Repeater: See Figure 2-4.

Figure 2-4. All Indoor Mount - 1+0 Drop and Insert Repeater



2.43 All Indoor Mount - 1+0 4-Way Junction: See Figure 2-5.

Figure 2-5. All Indoor Mount - 1+0 4-Way Junction



2.44 All Indoor Mount - 1+0 8-Way Nodal Junction: See Figure 2-6.

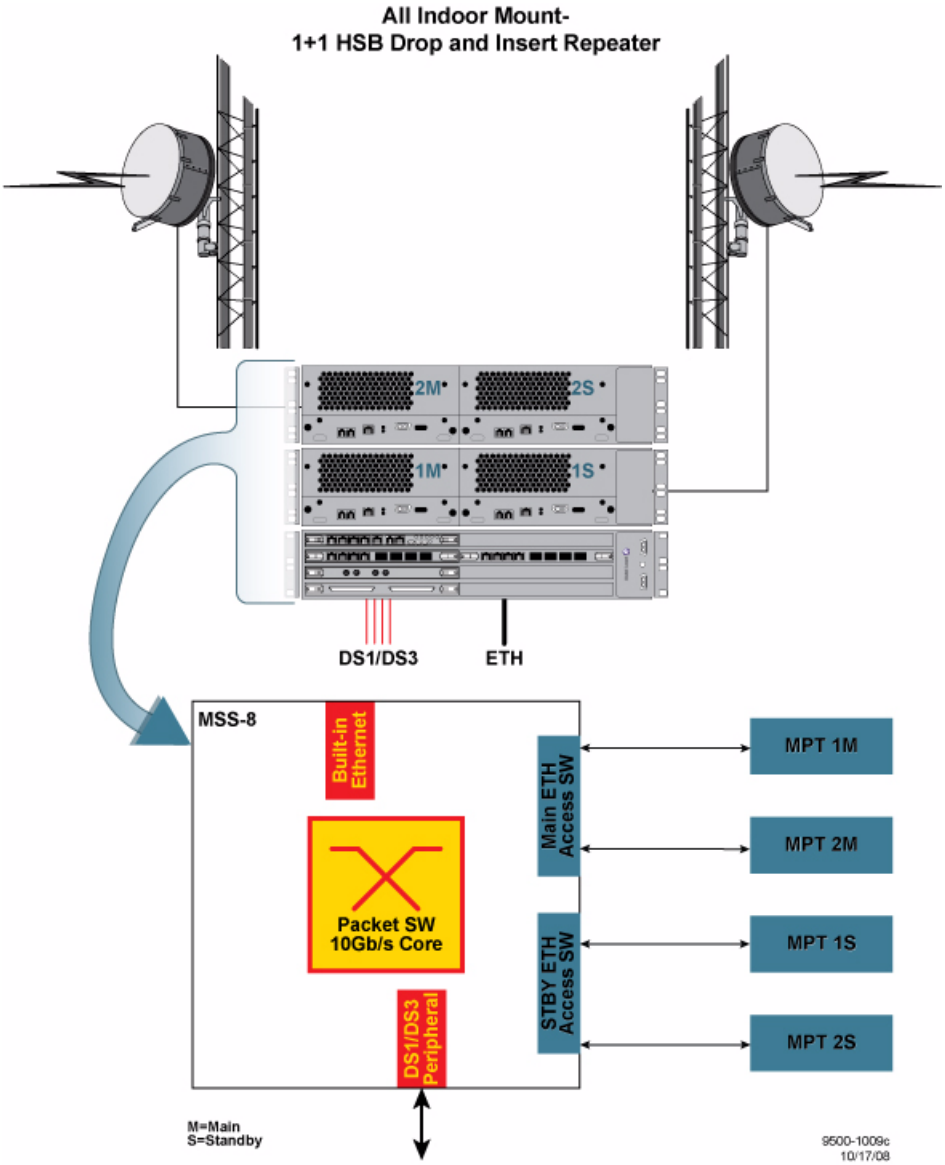
Figure 2-6. All Indoor Mount - 1+0 8-Way Nodal Junction

2.45 All Indoor Mount - 1+1 Terminal: See Figure 2-7.

Figure 2-7. All Indoor Mount - 1+0 Terminal

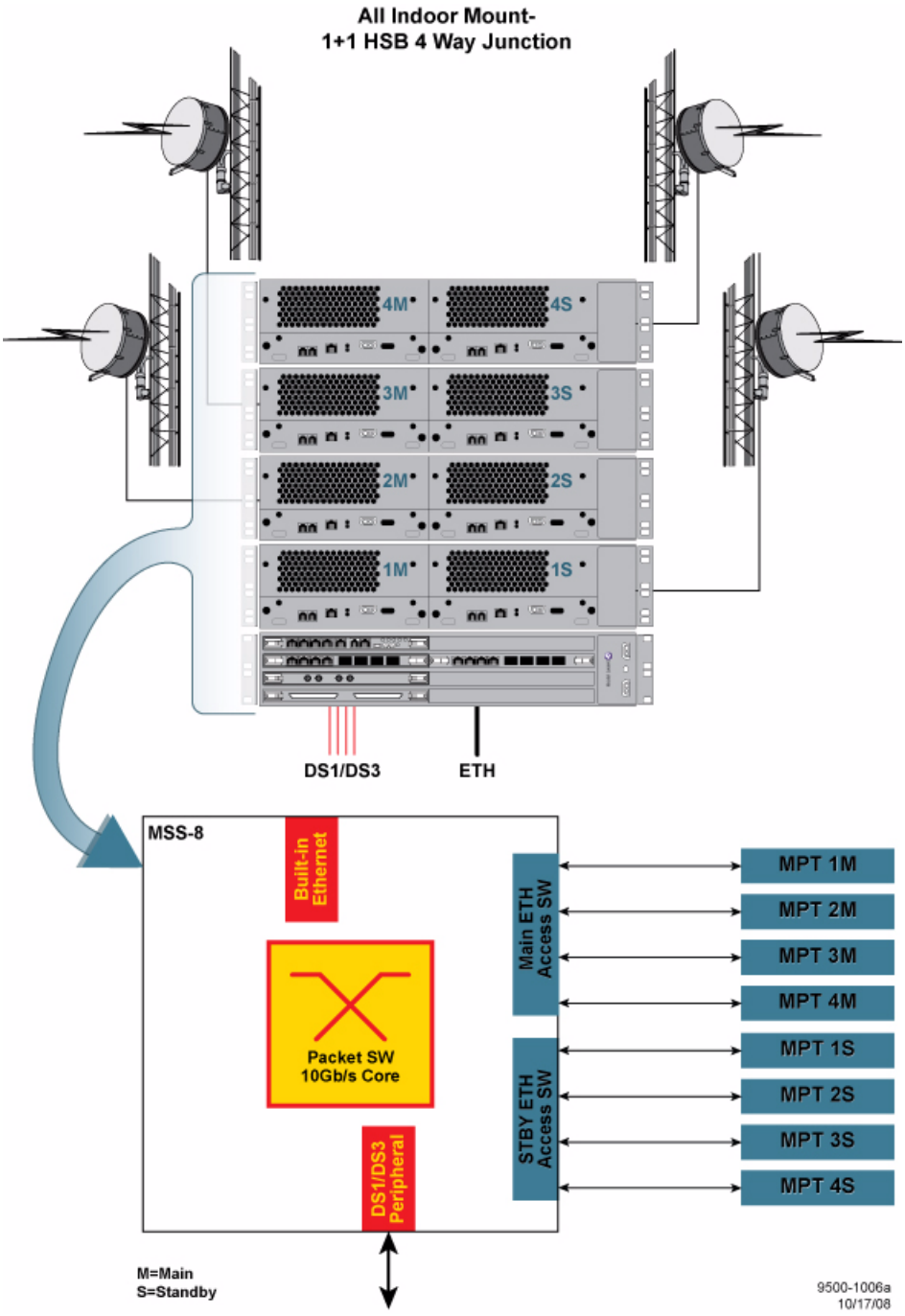
2.46 All Indoor Mount - 1+1 HSB Drop and Insert Repeater: See Figure 2-8.

Figure 2-8. All Indoor Mount - 1+1 HSB Drop and Insert Repeater



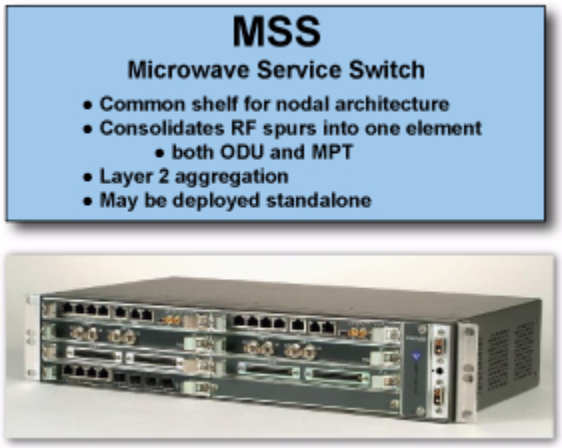
2.47 All Indoor Mount - 1+1 HSB 4-Way Junction: See Figure 2-9.

Figure 2-9. All Indoor Mount - 1+1 HSB 4-Way Junction



MSS (Microwave Service Switch)

Figure 2-2. Macerate Service switch (MSS-8)



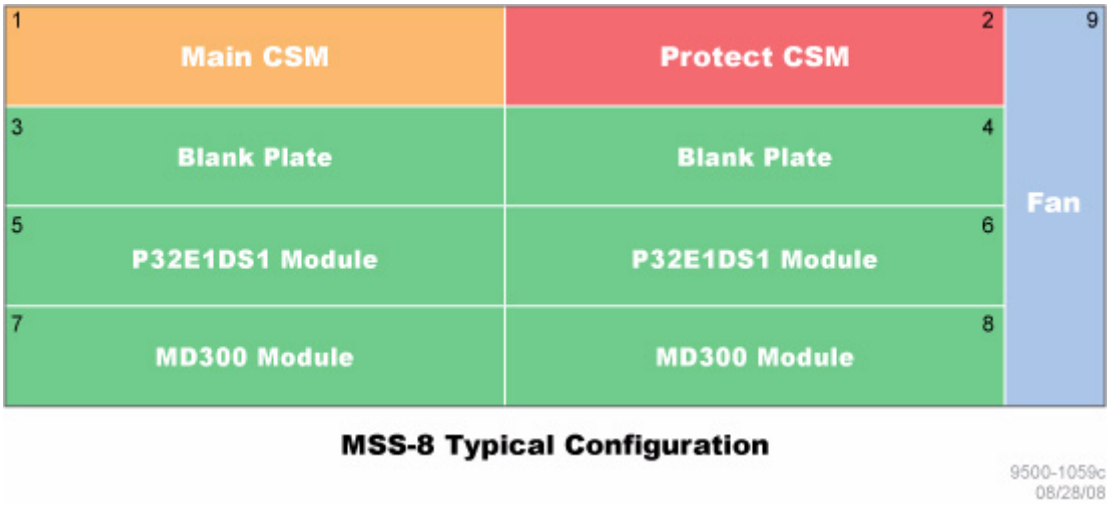
MSS-8 Configurations

2.48 A MSS-8 typical configuration consists of:

- MSS-8 Typical Configuration
- MSS-8 Not Protected
- MSS-8 Protected

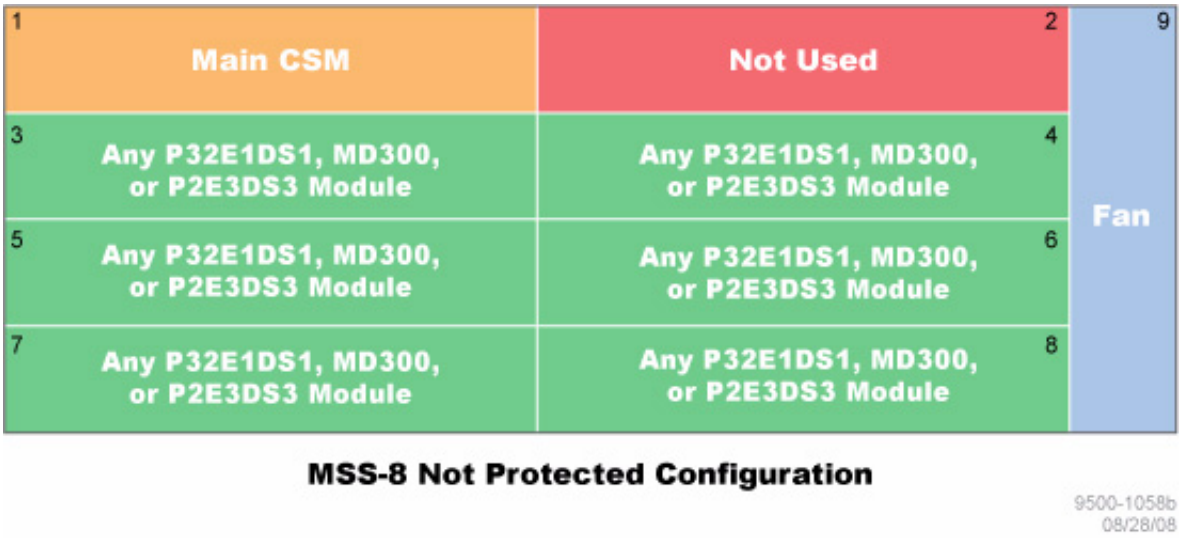
Figure 2-3. MSS-8 Typical Configuration - Front View

Figure 2-4. MSS-8 Typical Configuration



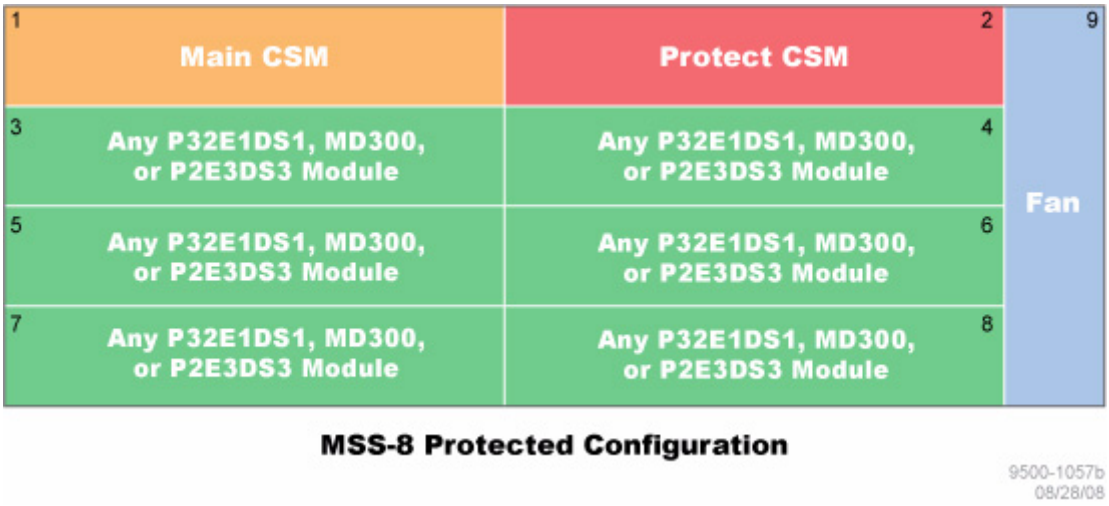
NOTE: Adjacent slot must be same P32E1DS1, MD300 or P2E3DS3 module for protection. Not all slots may require protection. Any P32E1DS1, MD300 or P2E3DS3 module can be installed in any not protected slot(s). The Main CSM (Control and Switching Module - Core) must always be in slot 1 and the Protect CSM must be in slot 2.

Figure 2-5. MSS-8 Not Protected Configuration



NOTE: Adjacent slot must be same P32E1DS1, MD300 or P2E3DS3 module for protection. Not all slots may require protection. Any P32E1DS1, MD300 or P2E3DS3 module can be installed in any not protected slot(s). The Main CSM (Control and Switching Module - Core) must always be in slot 1.

Figure 2-6. MSS-8 Protected Configuration



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2.49 Refer to table 2-G for descriptions of the modular configurations the system supports.

Table 2-G. Configurations

ITEM	DESCRIPTION
Microwave Switching Services (MSS-8) Shelf PN: 3DB18001AA Qty: 1 per node	The MSS-8 houses equipment that supports 10 Gb/s packet switching, synchronization, protection switching, provisioning, and alarm management utilizing either one CSM module in unprotected configuration or two CSM modules in protected configuration. Six transponder slots support any mixture of unprotected and/or 1+1 EPS protected transponder modules. Supported transponder types include: up to two P8ETH (Ethernet) modules, up to six P32E1DS1 (DS1) modules, up to six P2E3DS3 (DS3), and/or up to six MOD300 (radio) modules. One fan module is required for system cooling.
Microwave Packet Transport-Long Haul (MPT-HL) Shelf PN: 3EM22618AA Qty: Up to 4 per 9500 MPR node	The MPT-HL shelf supports Two MPT-HL transceiver radio modules.
Transport modules	32-port 32PDS1T1 for DS1(T1) interface Eight-port 8PETH for 10,100,1000 Ethernet Ports
I/O interface types	DS1, Ethernet
Battery feeds	Independent, redundant battery feeds Independent, isolated battery returns
Power supply redundancy	1:1 protected
Bay power distribution	PDU

In-Service Upgrade

2.50 Systems software and hardware can be upgraded to a new release, as specified in the upgrade procedure, while the system carries traffic.

Local Software Download

2.51 The active CSM can receive a software generic

Facility Alarms

2.52 Facility alarms indicate failures of a DS1 and/or Ethernet. Facility alarms and parameters can be established individually. Notification codes follow:

- Critical (CR)
- Major (MJ)
- Minor (MN)
- Cleared (CL)

Remote Inventory

2.53 Remote Inventory (RI) provides operators with the capability to remotely determine what equipment is installed in the system. RI data contains information programmed in the factory to indicate the configuration, capability, and compatibility of the installed circuit packs.

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3. UNIT DESCRIPTIONS

3.1 Refer to table 3-A for brief descriptions of shelf assemblies, plug-in modules, and miscellaneous components used in the 9500 MPR.

Table 3-A. 9500 MPR Unit Descriptions

UNIT	DESCRIPTION
Microwave Switching Services (MSS-8) Shelf PN: 3DB18001AA Qty: 1 per 9500 MPR node	The MSS-8 houses equipment that supports 10 Gb/s packet switching, synchronization, protection switching, provisioning, and alarm management. Up to 192 DS1 TDM circuits, up to 12 DS3 TDM circuits, up to 12 10/100/1000BaseT Ethernet circuits, or 9 GigE SFP optical Ethernet circuits for customer data flows. It is composed of a power panel, and a card cage. Two Control and Switching Module (CSM) slots support either one CSM module in unprotected configuration or two CSM modules in protected configuration. Six transponder slots support any mixture of unprotected and/or 1+1 EPS protected transponder modules. Supported transponder types include: up to two P8ETH (Ethernet) modules, up to six P32E1DS1 (DS1) modules, up to six P2E3DS3 (DS3), and/or up to six MOD300 (radio) modules. One fan module is required for system cooling.
Microwave Packet Transport-Long Haul (MPT-HL) Shelf PN: 3EM22618AA Qty: Up to 4 per 9500 MPR node	The MPT-HL shelf supports Two MPT-HL transceiver radio modules.
Power Distribution Unit (PDU) PN: 3EM13317AA Qty: 1 per rack	The PDU provides power distribution and protection fuses for equipment protection.
DS1 RJ-45 Patch Panel PN: 1AF15245AB Qty: Up to 6 per 9500 MPR node	DS1 RJ-45 Patch Panel supports up to 32 protected or unprotected DS1 (Tx and Rx) interfaces. DS1 RJ-45 Patch Panel provides 32 customer interconnects using RJ-45 connectors. Two SCSI to SCSI cables are required per unprotected P32E1DS1 module and four SCSI to SCI cables are required for protected pair of P32E1DS1 modules to transition the two module front panel SCSI connectors to the DS1 RJ-45 Patch Panel.

Table 3-A. 9500 MPR Unit Descriptions (cont.)

UNIT	DESCRIPTION
DS1 D-Connector Patch Panel PN: 3DB16102AA Qty: Up to 6per 9500 MPR node	DS1 D-Connector Patch Panel supports up to 32 protected or unprotected DS1 (Tx and Rx) interfaces. DS1 D-Connector Patch Panel provides 32 customer interconnects using 37-position D-Sub connectors for terminating traditional ABAM cable. Two SCSI to SCSI cables are required per P32E1DS1 module and four SCSI to SCI cables are required for protected pair of P32E1DS1 modules to transition the two module front panel SCSI connectors to the DS1 D-Connector Patch Panel.

UDS-100
9500 MPR Unit Data Sheet Cross-Reference

Unit Data Sheet Cross-Reference by UDS Number

UDS NUMBER	DESCRIPTION	CLEI	STATUS	PART NUMBER
UDS-100	9500 MPR Unit Data Sheet Cross-Reference	NA	NA	NA
UDS-101	MSS-8 Microwave Service Switch Shelf	1	Active	3DB18001AA
UDS-102	MPT-HL Microwave Packet transport-Long Haul Shelf	1	Active	3EM22618AA
UDS-104	PDU Power Distribution Unit	1	Active	3EM13317AA
UDS-106	DS1 RJ-45 Patch Panel	1	Active	1AF15245AB
UDS-107	DS1 D-Connector Patch Panel	1	Active	3DB16102AA
UDS-109	CSM-E Enhanced Control and Switching Module	4	Active	3DB18326AB
UDS-110	Fan Card	1	Active	3DB18134BA
UDS-113	P32E1DS1 DS1 PDH Module	1	Active	3DB18126AD
UDS-114	P2E3DS3 DS3 PDH Module	1	Active	3DB18194AB
UDS-115	P8ETH Ethernet Access Switch Module	1	Active	3DB18206AC
UDS-116	MPT Transceiver L6, 5725-6425 MHz	1	Active	3EM22617AA
	MPT Transceiver U6, 6425-6930 MHz	4	Active	3EM22617AB
UDS-117	GigE SFP 1000Base-SX, 850 nm	DRR3AA3CAA	Active	3EM20277AA
	GigE SFP 1000Base-LX, 1310 nm	DRR3AA4CAA	Active	3EM20277AB
	GigE SFP 1000Base-EX, 1310 nm	DRR3AA5CAA	Active	3EM20277AC
	GigE SFP 1000Base-ZX, 1550 nm	DRR3AA6CAA	Active	3EM20277AD

Unit Data Sheet Cross-Reference by Part Number

PART NUMBER	DESCRIPTION	CLEI	STATUS	UDS NUMBER
1AF15245AB	DS1 RJ-45 Patch Panel	1	Active	UDS-106
3DB16102AA	DS1 D-Connector Patch Panel	1	Active	UDS-107
3DB18001AA	MSS-8 Microwave Service Switch Shelf	1	Active	UDS-101
3DB18126AD	P32E1DS1 DS1 PDH Module	1	Active	UDS-113
3DB18134BA	Fan Card	1	Active	UDS-110
3DB18206AC	P8ETH Ethernet Access Switch Module	1	Active	UDS-115
3DB18326AB	CSM-E Enhanced Control and Switching Module	4	Active	UDS-109
3EM13317AA	PDU Power Distribution Unit	1	Active	UDS-104
3EM20277AA	GigE SFP 1000Base-SX, 850 nm	DRR3AA3CAA	Active	UDS-117
3EM20277AB	GigE SFP 1000Base-LX, 1310 nm	DRR3AA4CAA	Active	UDS-117
3EM20277AC	GigE SFP 1000Base-EX, 1310 nm	DRR3AA5CAA	Active	UDS-117
3EM20277AD	GigE SFP 1000Base-ZX, 1550 nm	DRR3AA6CAA	Active	UDS-117
3EM22617AA	MPT Transceiver L6, 5725-6425 MHz	1	Active	UDS-116
3EM22617AB	MPT Transceiver U6, 6425-6930 MHz	4	Active	UDS-116
3EM22618AA	MPT-HL Microwave Packet transport-Long Haul Shelf	1	Active	UDS-102

UDS-101
MSS-8 Microwave Service Switch Shelf

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18001AA	MSS-8 Microwave Service Switch Shelf	1	2	3	Active

FEATURES AND APPLICATION NOTES

- The Microwave Service Switch (MSS-8) shelf provides cross-connection, port aggregation, switching, and equipment management.
- 300 Mbps full-duplex Ethernet transport capacity
- Flexible aggregate capacity sharing DS1, DS3, and Ethernet traffic
- All indoor mount supports up to eight unprotected RF channels, four 1+1 HSB, Space Diversity (SD) or Frequency Diversity (FD) protected RF channels in one MSS-8 shelf using P8ETH modules connected to up to four Microwave Packet Transport-Long Haul (MPT-HL) shelves.
- Stand-alone shelf configuration
- All modules are accessed from the front side of the shelf
- Mounts in a 19-inch aluminum rack or 19-inch seismic rack. Adapter flanges available to mount in a 23-inch aluminum rack
- Provides two mounting depth options: flush mount or 5 inch projection
- Provides nine module slots. Two are dedicated for Control and Switching Modules (CSM). Six universal slots are available for transport modules: P32E1DS1 (DS1), P2E3DS3 (DS3), and/or P8ETH (Ethernet). One slot is dedicated for fan module.

DESCRIPTION

MSS-8 shelf provides nine slots. Two dedicated slots for CSM modules. Six slots are available for transport module (P32E1DS1 (DS1), and two of the six slots are available for P8ETH (Ethernet). And one slot is dedicated for a required fan module. See figure 101-1 for an example of the MSS-8 shelf.

The MSS-8 shelf is 19 inches wide (17.48 inches wide without mounting flanges), 3.46 inches high (2 EIA increments), and 9.54 inches deep. Adapter plates are available to mount the MSS-8 shelf in 23 inch aluminum racks.

Figure 101-1. Microwave Service Switch (MSS-8) Shelf

EQUIPMENT COMPLEMENT

MSS-8 shelf slots 1 and 2 are dedicated to the CSM module. Slots 3 through 8 are available for transport modules P32E1DS1, P2E3DS3. Slots 3 and 4 are available for P8ETH. Slot 9 is dedicated for required fan module. See figure 101-2 for MSS-8 shelf slot definitions. Refer to Table 101-A for details of module equipage options.

Figure 101-2. MSS-8 Shelf Slot Definitions

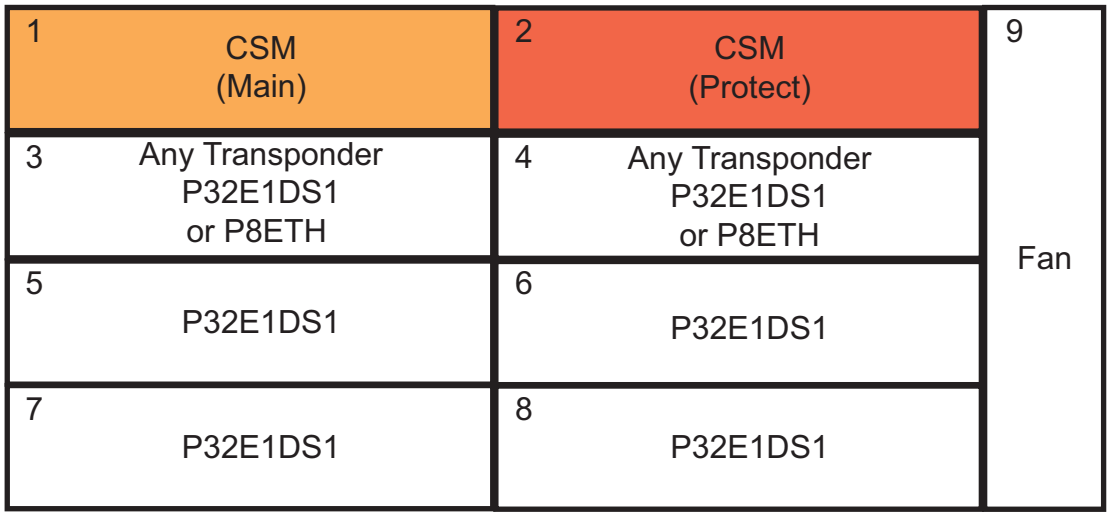

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Table 101-A. MSS-8 Module Complement

CIRCUIT PACK/ UNIT DATA SHEET	PART NO.	CLEI	QTY	SLOT
CSM-E Enhanced Control and Switching Module UDS-109	3DB18326AB	4	1	1
CSM-E Enhanced Control and Switching Module UDS-109	3DB18326AB	4	Up to 1	2
P32E1DS1 DS1 PDH Module UDS-113	3DB18126AD	1	Up to 6	3, 4, 5, 6, 7, 8
P8ETH Ethernet Access Switch Module UDS-115	3DB18206AC	1	Up to 2	3, 4
Fan Card UDS-110	3DB18134BA	1	1	9

MSS-8 shelf slot 1 is dedicated to the main CSM module and is required in every application. See figure 101-3 to see an example of the MSS-8 shelf configured in the unprotected CSM configuration. Slot 2 is dedicated for an optional spare CSM module for protected CSM configurations. See figure 101-4 to see an example of the MSS-8 shelf configured in the protected CSM configuration.

Figure 101-3. MSS-8 Shelf, Unprotected CSM Configuration

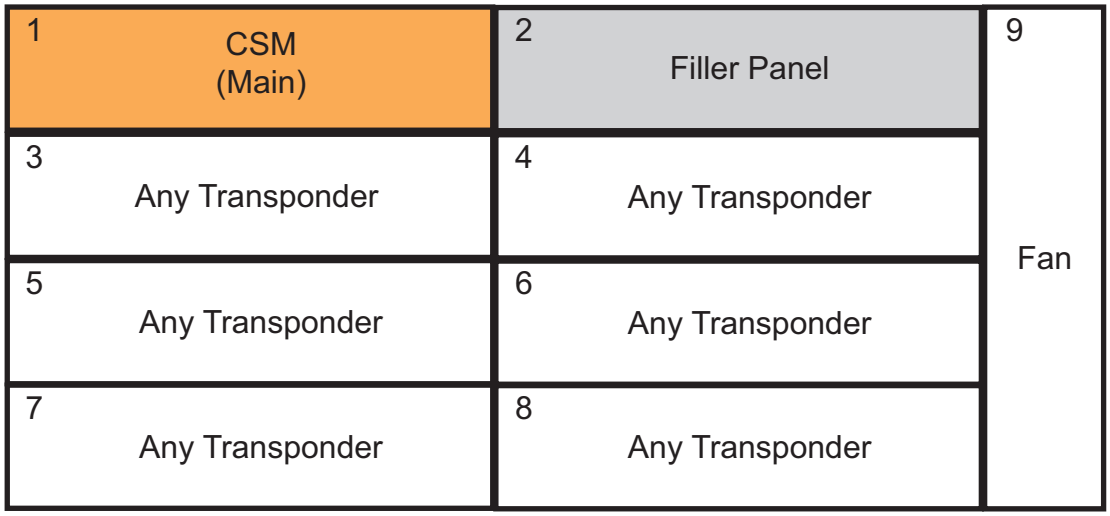

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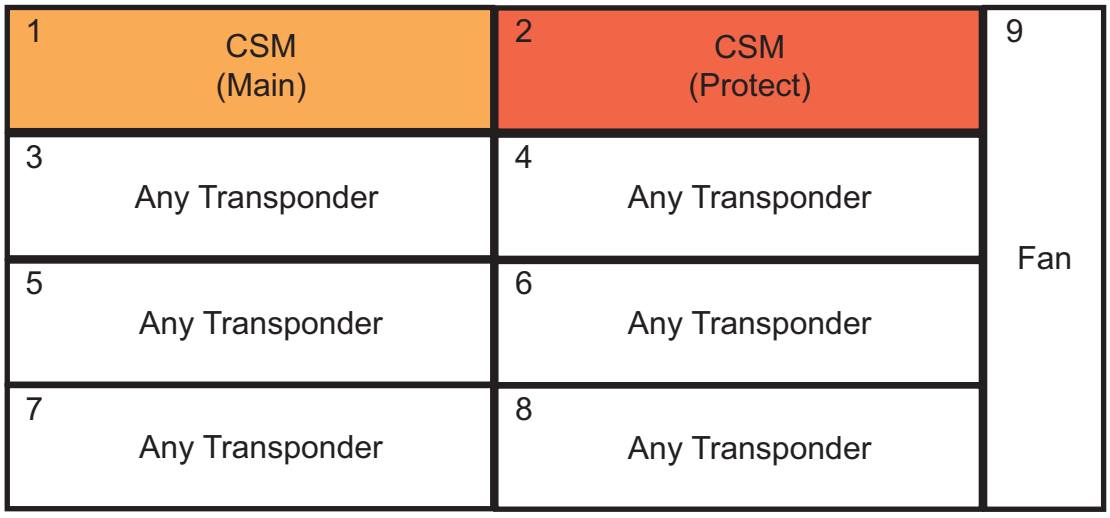
Figure 101-4. MSS-8 Shelf, Protected CSM Configuration



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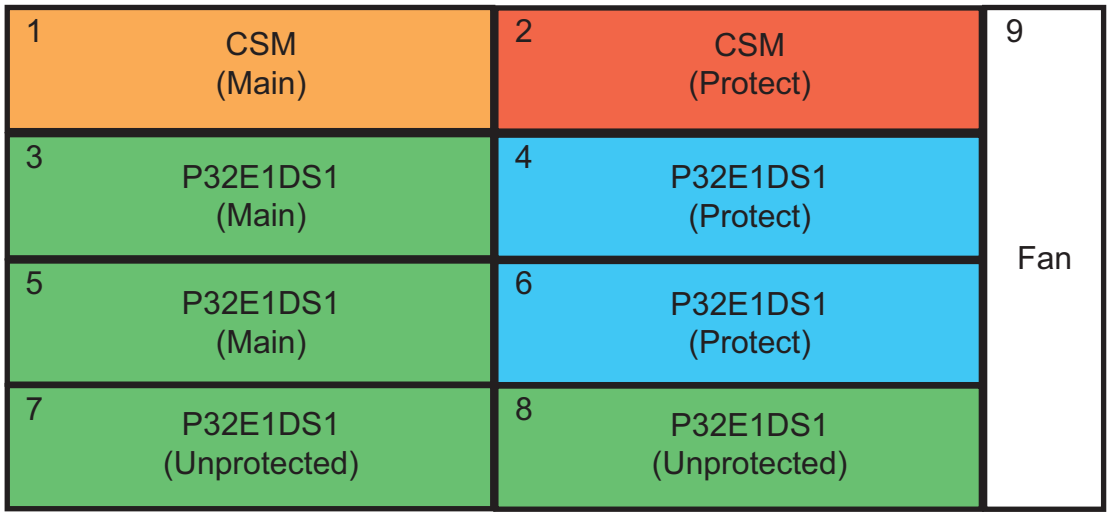
MSS-8 shelves supports up to six P32E1DS1 module in unprotected DS1 aggregation configurations. Supports up to three pairs of P32E1DS1 modules in 1+1 EPS protected DS1 aggregation configurations. In 1+1 EPS protected configuration, the main P32E1DS1 modules are equipped in slots 3, 5, and/or 7, and the spare (protection) P32E1DS1 modules are equipped in slots 4, 6, and/or 8 respectively.

See figure 101-5 to see an example of a stand-alone MSS-8 shelf configured with two pairs of P32E1DS1s in slots 3 through 6 in the protected 1+1 EPS configuration and slots 7 and 8 configured in the unprotected configuration.

Figure 101-5. MSS-8 Stand-Alone Shelf, Equipped with P32E1DS1



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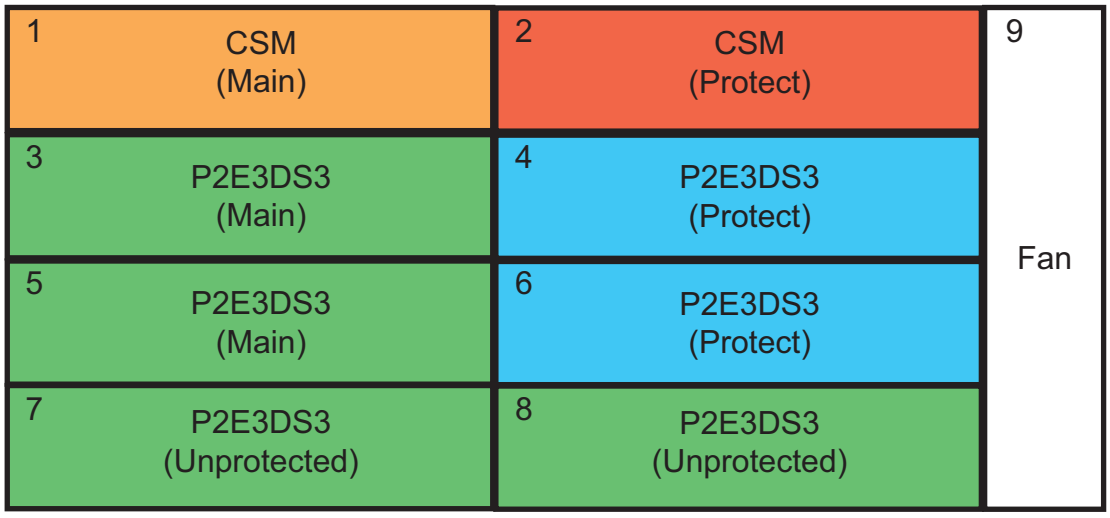
MSS-8 shelves supports up to six P2E3DS3 modules in unprotected configurations. Supports up to three pairs of P2E3DS3 modules in 1+1 EPS protected configurations. In 1+1 EPS protected configuration, the main P2E3DS3 modules are equipped in slots 3, 5, and/or 7, and the spare (protection) P2E3DS3 modules are equipped in slots 4, 6, and/or 8 respectively.

See figure 101-6 to see an example of a stand-alone MSS-8 shelf configured with two pairs of P2E3DS3s in slots 3 through 6 in the protected 1+1 EPS configuration and slots 7 and 8 configured in the unprotected configuration.

Figure 101-6. MSS-8 Stand-Alone Shelf, Equipped with P32E1DS1



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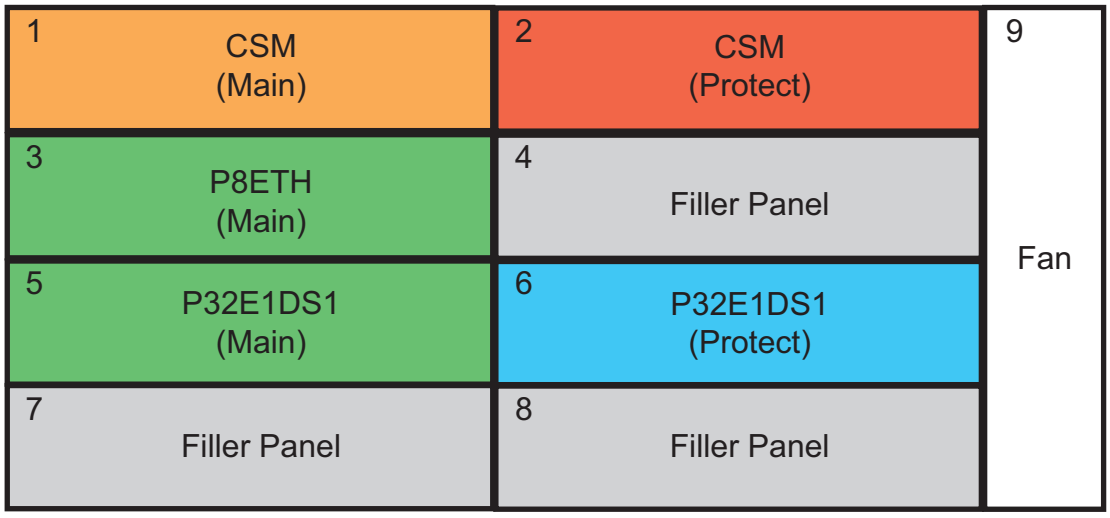
MSS-8 shelves equipped with P8ETH modules, the main P8ETH is required in slot 3 for unprotected configurations. For protected P8ETH applications, the main P8ETH module is required in slot 3 and the spare (protection) P8ETH is required in slot 4.

See figure 101-7 to see an example of the MSS-8 shelf configured as an all indoor mount, 1+0 4-way junction in slot 3, with a pair of P32E1DS1s in slots 5 and 6 in the protected 1+1 EPS configuration.

Figure 101-7. MSS-8 Shelf, All Indoor Mount, 1+0 4-Way Junction Configuration



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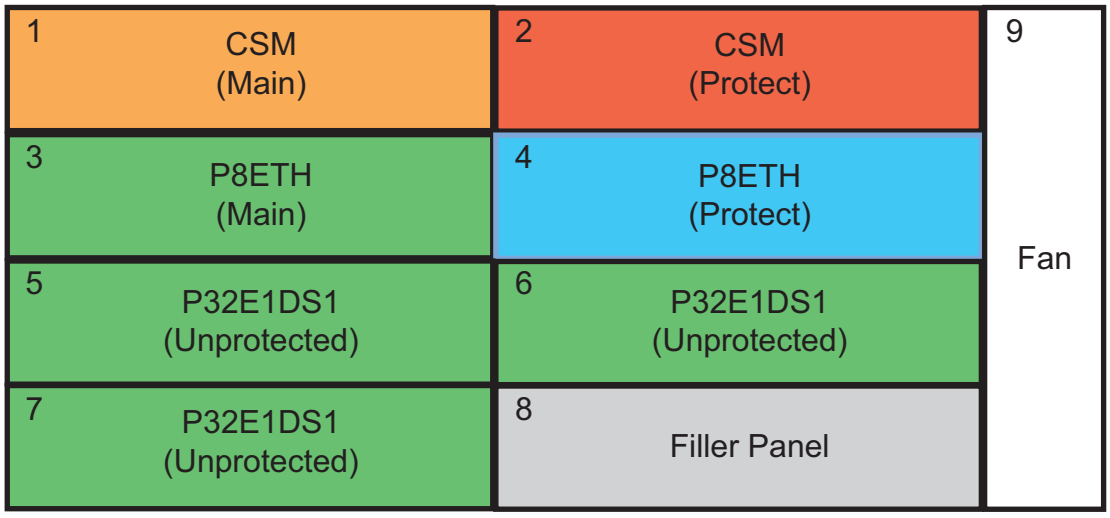
See figure 101-8 to see an example of the MSS-8 shelf configured as an all indoor mount, 1+1 4-way junction in slots 3 and 4, with three P32E1DS1s in slot 5 through 7 in the unprotected configuration.

Figure 101-8. MSS-8 Shelf, All Indoor Mount, 1+1 4-Way Junction Configuration



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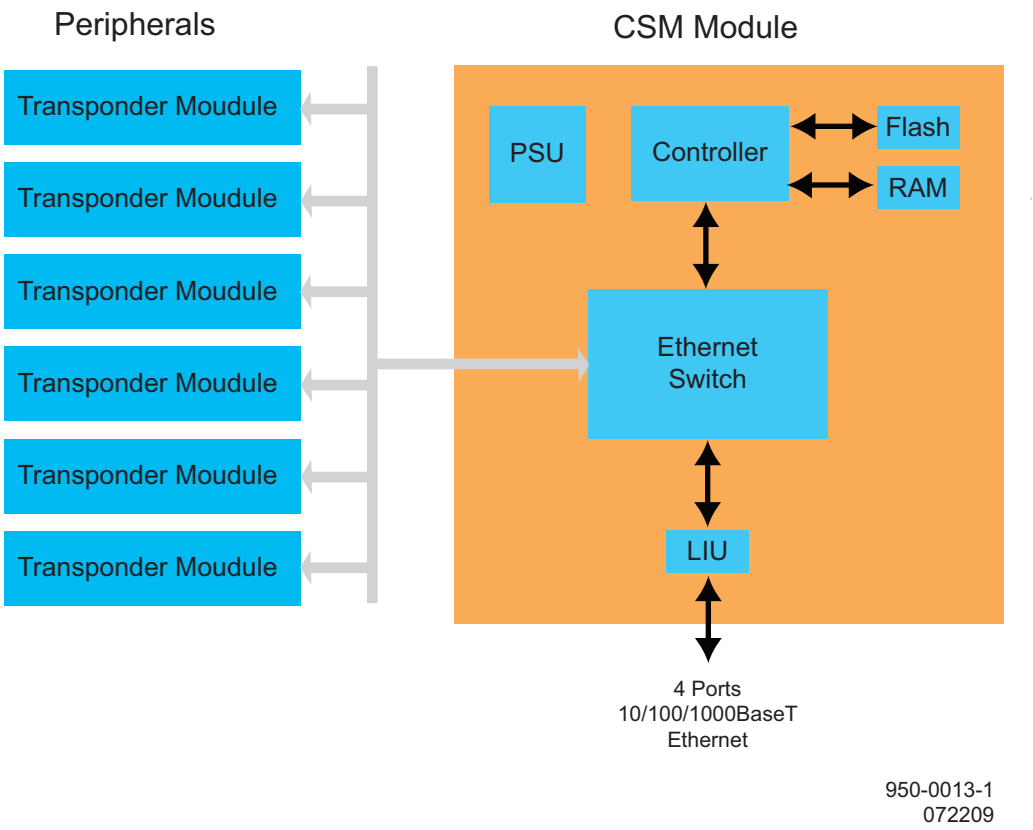
FUNCTIONAL OVERVIEW

MSS-8 implements functionality of grooming, routing, switching and protection, exploiting a packet oriented technology in order to meet the overall architecture.

The MSS-8 CSM platform, with multiplexing and symmetrical cross-connect functions, can manage different radio directions (up to eight), with the possibility to add-drop data flows of local DS1/Ethernet traffic. CSM platform is based on packet technology (Ethernet Switch) with a generic serial GigE interface between CSM and transponder modules. See figure 101-9 for a functional block diagram of the MSS-8 shelf.

Figure 101-9. MSS-8 Shelf Block Diagram



The MSS-8 shelf houses the following modules:

- CSM Control and Switching Module—houses one main and one optional protect control and switching module(s). Provides four 10/100/1000 Base-T Ethernet ports.

- P32E1DS1 DS1 PDH module—houses up to six P32E1DS1 modules for DS1 TDM traffic encapsulation/extraction into standard Ethernet packets

- P8ETH Ethernet Access Switch—houses up to two P8ETH modules for MSS-8-to-MPT-HL interface for all indoor configurations. The P8ETH module functions as a layer 2 switch, cross-connecting VLAN tagged Ethernet data to/from the addressed MPT-HL.
  The P8ETH module provides traffic management for CSM(s) for up to four directions using protected radios and up to eight directions using unprotected radios.
  A secondary purpose of the P8ETH module is to provide four 10/100/1000 Base-T Ethernet ports.

- The MSS-8 shelf houses one fan module resident in slot 9 on the right-hand side of the shelf and provides forced-air cooling for the shelf.

UDS-102
MPT-HL Microwave Packet Transport-Long Haul Shelf

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM22618AA	MPT-HL Microwave Packet transport-Long Haul Shelf	1	2	3	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

EQUIPMENT COMPLEMENT

UDS-104
PDU Power Distribution Unit

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM13317AA	PDU Power Distribution Unit	1	2	3	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

EQUIPMENT COMPLEMENT

FUNCTIONAL OVERVIEW

UDS-106
DS1 RJ-45 Patch Panel

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
1AF15245AB	DS1 RJ-45 Patch Panel	1	2	3	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

CONNECTORS

FUNCTIONAL OVERVIEW

UDS-107
DS1 D-Connector Patch Panel

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB16102AA	DS1 D-Connector Patch Panel	1	2	3	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

CONNECTORS

FUNCTIONAL OVERVIEW

UDS-109
CSM-E Enhanced Control and Switching Module

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18326AB	CSM-E Enhanced Control and Switching Module	4	5	6	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

INDICATORS, CONNECTORS, AND CONTROL

FUNCTIONAL OVERVIEW

UDS-110
Fan Card

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18134BA	Fan Card	1	2	3	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

CONNECTORS

FUNCTIONAL OVERVIEW

UDS-113
P32E1DS1 DS1 PDH Module

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18126AD	P32E1DS1 DS1 PDH Module	1	2	3	Active

FEATURES AND APPLICATION NOTES

- Terminates up to 32 DS1 signals
- Framed DS1 Bi-Directional alarm management
- Bi-Directional performance monitoring on framed DS1 signals
- Encapsulation of DS1 data flows into standard Ethernet packets Inter Working Function (IWF)
- Extraction of DS1 data flows from standard Ethernet packets IWF
- Supports both unprotected and 1+1 EPS protected configurations

DESCRIPTION

The P32E1DS1 module provides 32 DS1 interfaces. The MSS-8 shelf supports up to six P32E1DS1 modules or 192 unprotected DS1 interfaces or 96 protected DS1 interfaces.

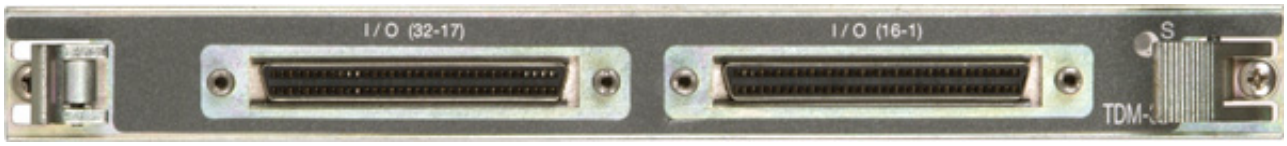
The P32E1DS1 are supported in MSS-8 slots 3 through 8 for unprotected radio configurations. In protected radio configurations, a pair of P32E1DS1s are required. The main P32E1DS1s are equipped in slots 3, 5, or 7 and the protect (spare) P32E1DS1s are equipped in the slots directly across from the main (slot 4, 6, or 8). The protect (spare) P32E1DS1 module protects the radio if the main P32E1DS1 fails.

INDICATORS, CONNECTORS, AND CONTROL

The P32E1DS1 DS1 PDH module has the following indicator and connectors. See figure 113-1 for P32E1DS1 DS1 PDH module front panel indicator and connectors.

ITEM	FUNCTION
STATUS (S)	• Off - Card not equipped, not provisioned, or not powered • Green Blinking - Download, Software Booting, or Flash Module Realignment in Progress • Green - In Service, Normal Operation, and Properly Provisioned • Yellow - In Protect, Properly Provisioned as EPS • Red - Card Fail • Red Blinking - Card Mismatch
I/O (16-1)	64 position SCSI connector: • DS1, Tx and Rx (tip and ring), interconnect • DS1s number 1 through 16
I/O (32-17)	64 position SCSI connector: • DS1, Tx and Rx (tip and ring), interconnect • DS1s number 17 through 32

Figure 113-1. P32E1DS1 DS1 Module (MSS/DS1) Front Panel View



FUNCTIONAL OVERVIEW

In the transmit direction, the P32E1DS1 receives DS1 signals from the customer interfaces. Encapsulates the DS1 data flows into standard Ethernet packets, (IWF). The Ethernet packets are sent to the cross-connections matrix for connection to their provisioned destinations.

In the receive direction, the P32E1DS1 receives Ethernet packets from the cross-connections matrix from their provisioned sources. Extracts the DS1 data flows from standard Ethernet packets (IWF). The DS1 signals are sent to the customer interfaces.

UDS-114
P2E3DS3 DS3 PDH Module

FEATURES AND APPLICATION NOTES

- Terminates up to two DS3 signals.
- Framed DS3 Bi-Directional alarm management
- Bi-Directional performance monitoring on framed DS3 signals
- Encapsulation of DS3 data flows into standard Ethernet packets Inter Working Function (IWF)
- Extraction of DS3 data flows from standard Ethernet packets IWF
- Supports both unprotected and 1+1 EPS protected configurations

DESCRIPTION

The P2E3DS3 module provides 2 DS3 interfaces. The MSS-8 shelf supports up to six P2E3DS3 modules or 12 unprotected DS3 interfaces or 6 protected DS3 interfaces.

The P2E3DS3 are supported in MSS-8 slots 3 through 8 for unprotected radio configurations. In protected radio configurations, a pair of P2E3DS3s are required. The main P2E3DS3s are equipped in slots 3, 5, or 7 and the protect (spare) P2E3DS3s are equipped in the slots directly across from the main (slots 4, 6, or 8). The protect (spare) P2E3DS3 module protects the radio if the main P3E3DS3 fails.

INDICATORS, CONNECTORS, AND CONTROL

The P2E3DS3 DS3 PDH module has the following indicator and connectors. See figure 114-1 for P2E3DS3 DS3 PDH module front panel indicator and connectors.

Figure 114-1. P2E3DS3 DS3 Module (MSS/DS3) Front Panel View

FUNCTIONAL OVERVIEW

In the transmit direction, the P2E3DS3 receives DS3 signals from the customer interfaces. Encapsulates the DS3 data flows into standard Ethernet packets, (IWF). The Ethernet packets are sent to the cross-connections matrix for connection to their provisioned destinations.

In the receive direction, the P2E3DS3 receives Ethernet packets from the cross-connections matrix from their provisioned sources. Extracts the DS3 data flows from standard Ethernet packets (IWF). The DS3 signals are sent to the customer interfaces.

UDS-115
P8ETH Ethernet Access Switch Module

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18206AC	P8ETH Ethernet Access Switch Module	1	2	3	Active

FEATURES AND APPLICATION NOTES

- Terminates up to four GigE optical Ethernet SFP interfaces
- Terminates up to four 10/100/1000 electrical Ethernet interfaces
- Framed DS3 Bi-Directional alarm management
- Bi-Directional performance monitoring on framed DS3 signals
- Encapsulation of DS3 data flows into standard Ethernet packets Inter Working Function (IWF)
- Extraction of DS3 data flows from standard Ethernet packets IWF
- Supports both unprotected and 1+1 EPS protected configurations

DESCRIPTION

The P8ETH module provides four 10/100/1000 electrical Ethernet interfaces and four GigE optical Ethernet SFP interfaces. The MSS-8 shelf supports one protected pair of P8ETH modules or one unprotected P8ETH module.

The P8ETH is supported in MSS-8 slot 3 for unprotected radio configurations. In protected radio configurations, a pair of P8ETHs are required. The main P8ETH is equipped in slot 3 and the protect (spare) P8ETH is equipped in slot 4 directly across from the main. The protect (spare) P8ETH module protects the radio if the main P8ETH fails.

INDICATORS, CONNECTORS, AND CONTROL

The P2E3DS3 DS3 PDH module has the following indicator and connectors. See figure 115-1 for P2E3DS3 DS3 PDH module front panel indicator and connectors.

ITEM	FUNCTION
STATUS (S)	• Off - Card not equipped, not provisioned, or not powered • Green Blinking - Download, Software Booting, or Flash Module Realignment in Progress • Green - In Service, Normal Operation, and Properly Provisioned • Yellow - In Protect, Properly Provisioned as EPS • Red - Card Fail • Red Blinking - Card Mismatch
LINE 1	• IN - DS3 Rx interconnect • OUT - DS3 Tx interconnect
LINE 2	• IN - DS3 Rx interconnect • OUT - DS3 Tx interconnect

Figure 115-1. P8ETH Module (MSS/P8ETH)

FUNCTIONAL OVERVIEW

In the transmit direction, the P2E3DS3 receives DS3 signals from the customer interfaces. Encapsulates the DS3 data flows into standard Ethernet packets, (IWF). The Ethernet packets are sent to the cross-connections matrix for connection to their provisioned destinations.

In the receive direction, the P2E3DS3 receives Ethernet packets from the cross-connections matrix from their provisioned sources. Extracts the DS3 data flows from standard Ethernet packets (IWF). The DS3 signals are sent to the customer interfaces.

UDS-116
MPT Transceiver

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM22617AA	MPT Transceiver L6, 5725-6425 MHz	1	2	3	Active
3EM22617AB	MPT Transceiver U6, 6425-6930 MHz	4	5	6	Active

FEATURES AND APPLICATION NOTES

DESCRIPTION

INDICATORS, CONNECTORS, AND CONTROL

FUNCTIONAL OVERVIEW

UDS-117
GigE SFP

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM20277AA	GigE SFP 1000Base-SX, 850 nm	DRR3AA3CAA	147527	U73234	Active
3EM20277AB	GigE SFP 1000Base-LX, 1310 nm	DRR3AA4CAA	147539	U73235	Active
3EM20277AC	GigE SFP 1000Base-EX, 1310 nm	DRR3AA5CAA	147542	U73236	Active
3EM20277AD	GigE SFP 1000Base-ZX, 1550 nm	DRR3AA6CAA	147544	U73237	Active

FEATURES AND APPLICATION NOTES

- Is an in-service pluggable optical module
- Provides a 1.25 Gb/s Gigabit Ethernet (GigE) interface for Control and Switching Module (CSM) or Ethernet Access Switch Card (P8ETH).
- Available in four optical reaches
  - 1000Base-SX, 850 nm (up to 550 meter applications)
  - 1000Base-LX, 1310 nm (up to 10 kilometer applications)
  - 1000Base-EX, 1310 nm (up to 40 kilometer applications)
  - 1000Base-ZX, 1550 nm (up to 80 kilometer applications)
- Provides a duplex LC connector
- Is compliant with Small Form Factor Plug-in (SFP) Multi-Service Agreement (MSA)

DESCRIPTION

The GigE Small Form Factor Plug-in (SFP) is installed in one slot of a CSM or EAS. Provides a 1.25 Gb/s; 1000Base-SX 850 nm, 1000Base-LX 1310 nm, 1000Base-EX 1310 nm, or 1000Base-ZX 1550 nm GigE interface and a duplex LC connector. See figure 117-1 for an illustration of the GigE SFPs.

INDICATORS, CONNECTORS, AND CONTROL

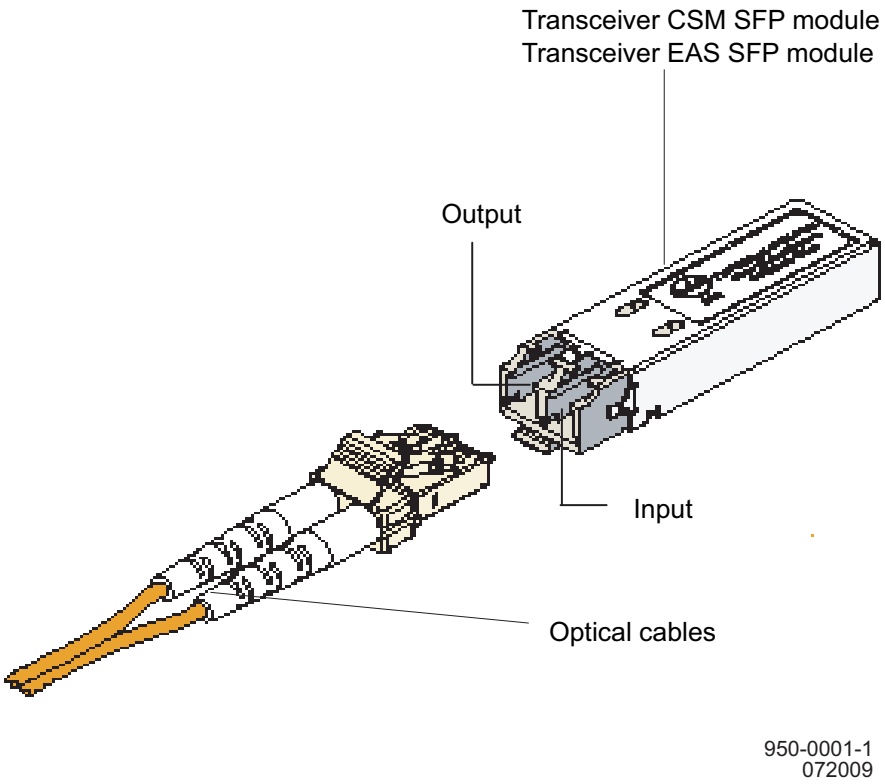
The SFPs have the following indicators and connector.

ITEM	FUNCTION
LINK	Off indicates GigE link is down. Green LED indicates GigE link is Up.
ACTIVITY	Off indicates no activity on GigE link. Blinking amber LED indicates activity on GigE link.
DUPLEX LC OPTICAL CONNECTOR	Tx and Rx GigE ports

FUNCTIONAL OVERVIEW

The GigE SFP interfaces with the CSM or EAS through a 2.5 Gb/s data signal line. All timing, control, and power are provided by the CSM or EAS in which it is housed (refer to UDS-109 or UDS-115, respectively, for information). See figure 117-2 for a block diagram of the GigE SFPs.

Figure 117-1. Optical SFP Module

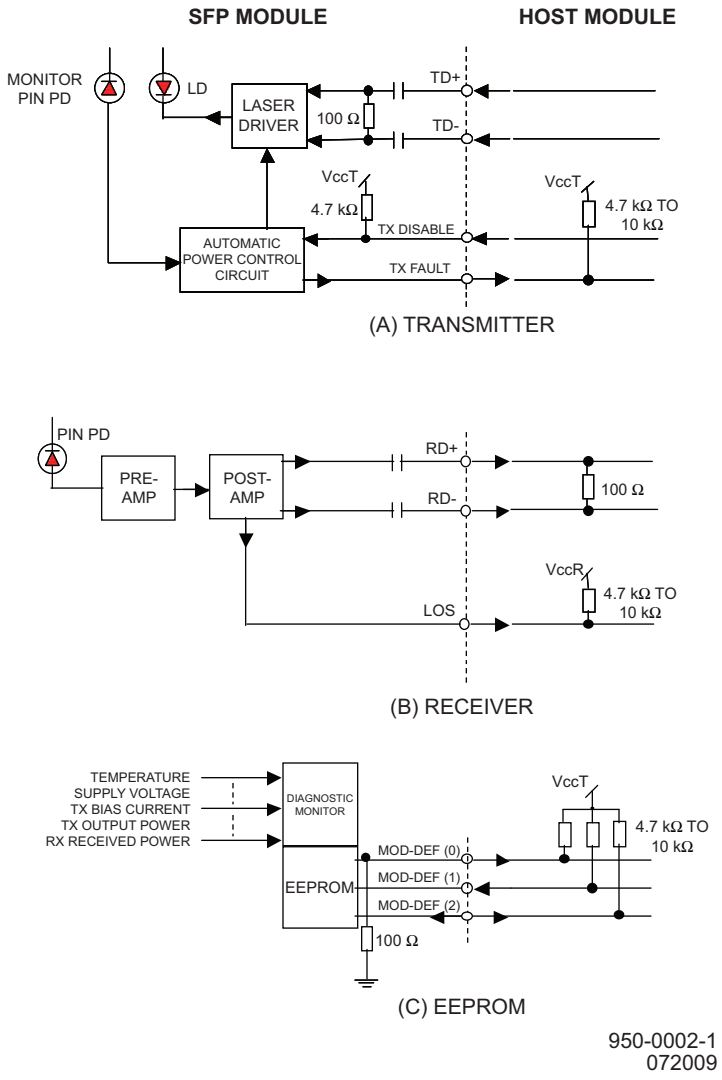


On the transmitter side, the GigE SFPs has an automatic optical output power control circuit, a laser driver and a laser diode module. The transmitter is based on a non-cooled DFB laser. The laser safety class for the complete integrated module is class 1 according to IEC 60825. It can manage commands for TX disable and provides a TX fault alarm.

TX fault indicates a laser fault. The transmitter is not disabled when the TX fault signal is active. TX disable is an input that is used to shut down the transmitter optical output.

On the receiver side, the GigE SFPs have a PIN photo detector for light-to-electrical current conversion and a limiting amplifier. The photo-detected current is amplified by an electrical circuit that delivers two complementary data signals.

Figure 117-2. Optical SFP Module Block Diagram



The module provides LOS alarm (loss of input power signal alarm). This output signal indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use).

The transceiver has an EEPROM to provide Remote Inventory RI information. DDM supports analog parameter measurements such as temperature, laser bias, and laser power.