



Installing MXP_MR_10DME_C and MXP_MR_10DME_L Cards in the Cisco ONS 15454 SONET/SDH

Product Names: 15454-10DME-C=, 15454-10DME-L=

This document provides a card description, specifications, and installation procedure for the MXP_MR_10DME_C and MXP_MR_10DME_L cards. These cards are compatible with the ONS 15454 SONET (ANSI) and the ONS 15454 SDH (ETSI) shelf assemblies. As appropriate use this document in conjunction with the *Cisco ONS 15454 DWDM Procedure Guide*, the *Cisco ONS 15454 DWDM Reference Manual*, and the *Cisco ONS 15454 DWDM Troubleshooting Guide*.



Note

“MXP_MR_10DME_C” is the card name that appears in Cisco Transport Controller (CTC); the same card is named “10DME-C” on the physical faceplate. “MXP_MR_10DME-L” is the name that appears in CTC; the same card is named “10DME-L” on the physical faceplate.

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MXP_MR_10DME_C and MXP_MR_10DME_L Card Description

The MXP_MR_10DME_C and MXP_MR_10DME_L muxponder cards aggregate a mix of storage access networking (SAN) service client inputs (GE, FICON, and Fibre Channel) into one 10.0 Gbps STM-64/OC-192 DWDM signal on the trunk side. The MXP_MR_10DME_C and



Corporate Headquarters:

Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

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MXP_MR_10DME_L cards pass all SONET/SDH overhead bytes transparently. Each card provides one long-reach STM-64/OC-192 port and is compliant with Telcordia GR-253-CORE and ITU-T G.957. You can install MXP_MR_10DME_C and MXP_MR_10DME_L cards in Slots 1 to 6 and 12 to 17. Each ONS 15454 shelf assembly can accommodate up to 12 cards.


Note

On the card faceplates, the MXP_MR_10DME_C and MXP_MR_10DME_L cards are displayed as 10DME_C and 10DME_L, respectively.


Note

The MXP_MR_10DME_C and MXP_MR_10DME_L cards are not compatible with the MXP_2.5G_10G card, which does not support full optical transparency.

Feature Summary

For detailed information about card features refer to the *Cisco ONS 15454 DWDM Reference Manual*.

The MXP_MR_10DME_C and MXP_MR_10DME_L cards have the following high-level features:

- **Onboard E-FEC processor:** The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- **Pluggable client interface optic modules:** The MXP_MR_10DME_C and MXP_MR_10DME_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- **Y-cable protection:** Supports Y-cable protection between the same card type only, on ports with the same port number and signal rate. See the *Cisco ONS 15454 DWDM Reference Manual* for more detailed information.
- **High level provisioning support:** The cards are initially provisioned using Cisco MetroPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- **Automatic laser shutdown:** A safety mechanism used in the event of a fiber cut.
- **Link monitoring and management:** The cards use standard OC-48 OH bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its OH bytes transparently.
- **Control of layered SONET/SDH transport overhead:** The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- **Automatic timing source synchronization:** The MXP_MR_10DME_C and MXP_MR_10DME_L cards normally synchronize from the TCC2/TCC2P card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P is not available, the cards automatically synchronize to one of the input client interface clocks.

- Configurable squelching policy: The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The cards are tunable across the full C band (MXP_MR_10DME_C) or full L band (MXP_MR_10DME_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.

Signal Types

The cards support aggregation of the following signal types:

- 1-Gigabit Fibre Channel
- 2-Gigabit Fibre Channel
- 4-Gigabit Fibre Channel
- 1-Gigabit Ethernet
- 1-Gigabit ISC-Compatible (ISC-1)
- 2-Gigabit ISC-Peer (ISC-3)



Note

Because the client payload cannot oversubscribe the trunk, a maximum of 10-Gbps of mixed client signals can be accepted.

Digital Wrapper

The digital wrapper function (ITU-T G.709-compliant) formats the DWDM wavelength so that it can be used to set up generic communication channels (GCCs) for data communications, enable forward error correction (FEC), or facilitate performance monitoring (PM). The MXP_MR_10DME_C and MXP_MR_10DME_L cards work with the OTN devices defined in ITU-T G.709. The cards support ODU1-to-OTU2 multiplexing, which is an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope.

Client and Trunk Ports

The MXP_MR_10DME_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The MXP_MR_10DME_L features a tunable 1580-nm L-band laser on the trunk port. The laser is tunable across 80 wavelengths on the ITU grid, also with 50-GHz spacing. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The cards use dual LC connectors on the trunk side and use small-form factor pluggable (SFP) modules on the client side for optical cable termination.

Data Rates

Table 1 shows the input data rate for each client interface and the encapsulation method. The current version of the GFP-T G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, ISC, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed SERDES is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the high-speed SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 1 *MXP_MR_10DME_C and MXP_MR_10DME_L Client Interface Data Rates and Encapsulation*

Client Interface	Input Data Rate	GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes
2G FICON/2G ISC-Compatible (ISC-1)/ 2G ISC-Peer (ISC-3)	2.125 Gbps	Yes
1G FICON/1G ISC-Compatible (ISC-1)/ 1G ISC-Peer (ISC-3)	1.06 Gbps	Yes
Gigabit Ethernet	1.25 Gbps	Yes

There are two FPGAs on each MXP_MR_10DME_C and MXP_MR_10DME_L, and a group of four ports is mapped to each FPGA. Group 1 consists of Ports 1 through 4, and Group 2 consists of Ports 5 through 8. [Table 2](#) shows some of the mix and match possibilities on the various client data rates for Ports 1 through 4 and Ports 5 through 8. An X indicates that the data rate is supported in that port.

Table 2 *Supported Client Data Rates for Ports 1 through 4*

Port (Group 1)	Port (Group 2)	Gigabit Ethernet	1G FC	2G FC	4G FC
1	5	X	X	X	X
2	6	X	X	—	—
3	7	X	X	X	—
4	8	X	X	—	—

Performance Monitoring

GFP-T PM is available through RMON and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

Distance Extension

A buffer-to-buffer credit management scheme provides FC flow control. With this feature enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a “ready” indication. The MXP_MR_10DME_C and MXP_MR_10DME_L cards support FC credit-based flow control with a buffer-to-buffer credit extension of up to 1600 km (994.1 miles) for 1G FC, up to 800 km (497.1 miles) for 2G FC, or up to 400 km (248.5 miles) for 4G FC. The feature can be enabled or disabled.

Feature Summary

For detailed information about card features refer to the *Cisco ONS 15454 DWDM Reference Manual*.

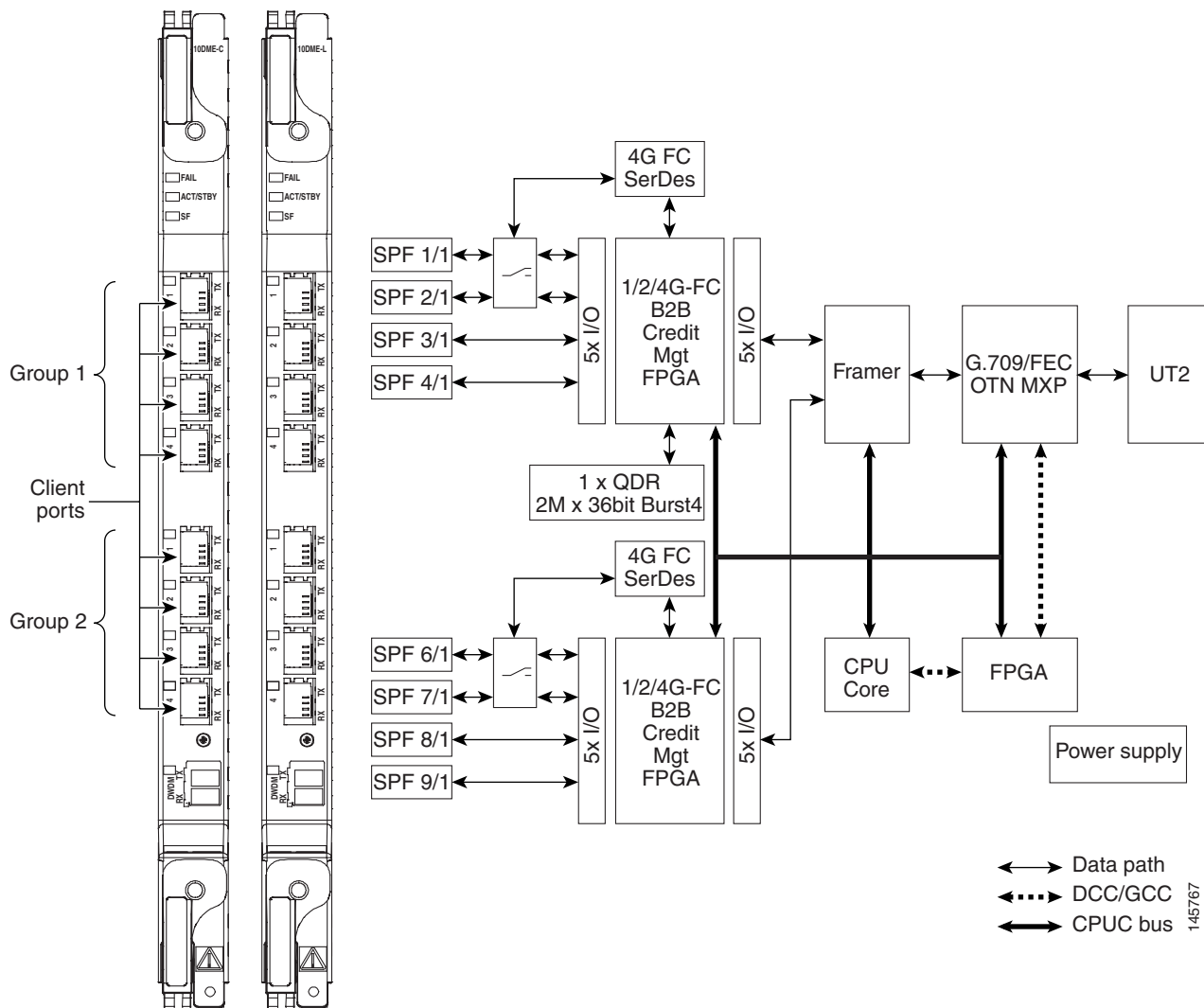
The MXP_MR_10DME_C and MXP_MR_10DME_L cards have the following high-level features:

- **Onboard E-FEC processor:** The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- **Pluggable client interface optic modules:** The MXP_MR_10DME_C and MXP_MR_10DME_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- **Y-cable protection:** Supports Y-cable protection between the same card type only, on ports with the same port number and signal rate. See the *Cisco ONS 15454 DWDM Reference Manual* for more detailed information.
- **High level provisioning support:** The cards are initially provisioned using Cisco MetroPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- **ALS:** A safety mechanism used in the event of a fiber cut. For details regarding ALS provisioning for the MXP_MR_10DME_C and MXP_MR_10DME_L cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.
- **Link monitoring and management:** The cards use standard OC-48 OH bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its OH bytes transparently.
- **Control of layered SONET/SDH transport overhead:** The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- **Automatic timing source synchronization:** The MXP_MR_10DME_C and MXP_MR_10DME_L cards normally synchronize from the TCC2/TCC2P card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P is not available, the cards automatically synchronize to one of the input client interface clocks.
- **Configurable squelching policy:** The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- **The cards are tunable across the full C band (MXP_MR_10DME_C) or full L band (MXP_MR_10DME_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.**

Faceplates

Figure 1 shows the MXP_MR_10DME_C and MXP_MR_10DME_L faceplates and block diagram.

Figure 1 MXP_MR_10DME_C and MXP_MR_10DME_L Faceplates and Block Diagram



Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. Both the MXP_MR_10DME_C and MXP_MR_10DME_L cards implement the UT2 module. The MXP_MR_10DME_C card uses a C-band version of the UT2 and the MXP_MR_10DME_L card uses an L-band version.

Table 3 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_C card. The laser is tunable over 82 wavelengths in the C band at 50-GHz spacing on the ITU grid.

Table 3 **MXP_MR_10DME_C Trunk Wavelengths**

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389

Table 3 *MXP_MR_10DME_C Trunk Wavelengths (Continued)*

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 4 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_L card. The laser is fully tunable over 80 wavelengths in the L band at 50-GHz spacing on the ITU grid.

Table 4 *MXP_MR_10DME_L Trunk Wavelengths*

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76

Table 4 *MXP_MR_10DME_L Trunk Wavelengths (Continued)*

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

Card-Level Indicators

[Table 5](#) describes the three card-level LEDs on the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

Table 5 *MXP_MR_10DME_C and MXP_MR_10DME_L Card-Level Indicators*

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or more ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

Port-Level Indicators

Table 6 describes the port-level LEDs on the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

Table 6 MXP_MR_10DME_C and MXP_MR_10DME_L Port-Level Indicators

Port-Level LED	Description
Port LED (eight LEDs, four for each group, one for each SFP)	When green, the port LED indicates that the client port is either in service and receiving a recognized signal (that is, no signal fail), or Out of Service and Maintenance (OOS,MT or locked, maintenance) and the signal fail and alarms are being ignored.
Green/Red/Amber/Off	When red, the port LED indicates that the client port is in service but is receiving a signal fail (LOS). When amber, the port LED indicates that the port is provisioned and in a standby state. When off, the port LED indicates that the SFP is either not provisioned, out of service, not properly inserted, or the SFP hardware has failed.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

MXP_MR_10DME_C Card Specifications

The MXP_MR_10DME_C card has the following specifications:

- Payload configuration
 - FC1G—Fibre Channel 1.06 Gbps
 - FC2G—Fibre Channel 2.125 Gbps
 - FC4G—Fibre Channel 4.25 Gbps
 - FICON1G—Fiber CON 1.06 Gbps (IBM signal)
 - FICON2G—Fiber CON 2.125 Gbps (IBM signal)
 - FICON4G—Fiber CON 4.25 Gbps (IBM signal)
 - ONE_GE—One Gigabit Ethernet 1.125 Gbps
 - Mixed configurations up to maximum line rate of 10.0 Gbps. See the *Cisco ONS 15454 DWDM Reference Manual* for more information on mixed-mode operation.
- Client ports: 8x SFP
- Line (trunk side)
 - Bit rate: 2.488 Gbps for OC-48/STM-16, 9.952 Gbps for OC-192/STM-64
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode or 850-nm multimode
 - Loopback modes: Terminal and facility


Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_10DME_C card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_10DME_C cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_C cards.

- Connectors: LC
- Compliance: Telcordia GR-253-CORE, Telcordia GR-2918-CORE, Issue 2, ITU-T G.957, and ITU-T 100-GHz grid standard G.692
- Transmitter (trunk side)
 - Minimum output power: +3 dBm
 - Maximum output power: +6 dBm
 - Minimum SMSR: 30 dB
 - Minimum optical extinction ratio: 10 dB
 - 41 wavelength tunability at 100-GHz spacing
 - Receiver maximum return reflectance (Rx return loss): –27 dB
 - Chromatic dispersion allowance: 5400 ps/nm, giving an optical power penalty < 2.0 dB
 - Minimum side mode suppression ratio: 30 dB
 - Wavelength stability (drift): +/- 25 picometers (pm)


Note

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Receiver (trunk side)

Table 7 *MXP_MR_10DME_C Receiver Trunk Side Specifications*

FEC Applications	OSNR ¹	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance	Power Penalty	OSNR Penalty
None	23 dB	<10 exp – 12	—	–8 to –20 dBm	+/- 1200 ps/nm	2 dBm	—
	19 dB	<10 exp – 12	—	–9 to –22 dBm	+/- 1000 ps/nm	2 dBm	—
FEC	10 dB	<10 exp – 5	<10 exp – 15	–8 to –18 dBm	+/- 800 ps/nm	—	1.5 dB
Enhanced FEC	19 dB	<10 exp – 4	<10 exp – 15	–8 to –26 dBm	+/- 800 ps/nm	2 dBm	2 dB
	8 dB	<10 exp – 4	<10 exp – 15	–8 to –18 dBm	+/- 800 ps/nm	2 dBm	1.5 dB

1. OSNR defined with 0.5 nm RBW

- Line (client side)
 - Bit rate: 1.06 Gbps to 2.125 Gbps per client
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode or 850-nm multimode
 - Maximum chromatic dispersion allowance: 1600 ps/nm

- Loopback modes: Terminal and facility
- Connectors: LC
- Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: 1290 to 1330 nm
 - Nominal wavelength: 1310 nm
 - Transmitter: DFB laser
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER 1×10^{-12}
 - Minimum receiver level: –14 dBm at BER 1×10^{-12}
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = 1×10^{-12}
 - Receiver input wavelength range: 1290 to 1605 nm
- Environmental
 - Operating temperature: –5 to +40 degrees Celsius (+23 to +104 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing
 - Power consumption (maximum): 60 W, 1.25 A at –48 V, 204 BTU/hr
- Environmental
 - Operating temperature: –5 to +40 degrees Celsius (+23 to +104 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing
 - Power consumption (maximum): 60 W, 1.25 A at –48 V, 204 BTU/hr
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.716 in. (18.2 mm)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 2.25 lb (1.02 kg)

MXP_MR_10DME_L Card Specifications

The MXP_MR_10DME_L card has the following specifications:

- Payload configuration
 - FC1G—Fibre Channel 1.06 Gbps
 - FC2G—Fibre Channel 2.125 Gbps
 - FC4G—Fibre Channel 4.25 Gbps
 - FICON1G—Fiber CON 1.06 Gbps (IBM signal)

- FICON2G—Fiber CON 2.125 Gbps (IBM signal)
- FICON4G—Fiber CON 4.25 Gbps (IBM signal)
- ONE_GE—One Gigabit Ethernet 1.125 Gbps
- Mixed configurations up to maximum line rate of 10.0 Gbps. See the *Cisco ONS 15454 DWDM Reference Manual* for more information on mixed-mode operation.
- Client ports: 8x SFP
- Line (trunk side)
 - Bit rate: 2.488 Gbps for OC-48/STM-16, 9.952 Gbps for OC-192/STM-64
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode or 850-nm multimode
 - Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_10DME_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_10DME_L cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_L cards.

- Connectors: LC
- Compliance: Telcordia GR-253-CORE, Telcordia GR-2918-CORE, Issue 2, ITU-T G.957, and ITU-T 100-GHz grid standard G.692
- Transmitter (trunk side)
 - Minimum output power: +3 dBm
 - Maximum output power: +6 dBm
 - Minimum SMSR: 30 dB
 - Minimum optical extinction ratio: 10.5 dB
 - 40 wavelength tunability at 100-GHz spacing, 80 wavelength tunability at 50-GHz spacing
 - Receiver maximum return reflectance (Rx return loss): –27 dB
 - Chromatic dispersion allowance: 5400 ps/nm, giving an optical power penalty < 2.0 dB
 - Minimum side mode suppression ratio: 30 dB
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Receiver (trunk side)

Table 8 *MXP_MR_10DME_L Receiver Trunk Side Specifications*

FEC Applications	OSNR ¹	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance	Power Penalty	OSNR Penalty
None	23 dB	<10 exp – 12	—	–8 to –19 dBm	+/- 1200 ps/nm	2 dBm	—
	19 dB	<10 exp – 12	—	–9 to –19 dBm	+/- 1000 ps/nm	2 dBm	—
FEC	10 dB	<10 exp – 5	<10 exp – 15	–8 to –18 dBm	+/- 800 ps/nm	—	1.5 dB
Enhanced FEC	19 dB	<10 exp – 4	<10 exp – 15	–8 to –26 dBm	+/- 800 ps/nm	—	2 dB
	8 dB	<10 exp – 4	<10 exp – 15	–8 to –18 dBm	+/- 800 ps/nm	—	1.5 dB

1. Optical Signal-to-Noise ratio (OSNR) defined with 0.5 nm Resolution Bandwidth (RBW)

- Line (client side)
 - Bit rate: 1.06 Gbps to 2.125 Gbps per client
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode or 850-nm multimode
 - Maximum chromatic dispersion allowance: 1600 ps/nm
 - Loopback modes: Terminal and facility
 - Connectors: LC
 - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: 1290 to 1330 nm
 - Nominal wavelength: 1310 nm
 - Transmitter: DFB laser
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: –14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm
- Environmental
 - Operating temperature: –5 to +40 degrees Celsius (+23 to +104 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing
 - Power consumption (maximum): 60 W, 1.25 A at –48 V, 204 BTU/hr
- Environmental
 - Operating temperature: –5 to +40 degrees Celsius (+23 to +104 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing

- Power consumption (maximum): 60 W, 1.25 A at –48 V, 204 BTU/hr
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.716 in. (18.2 mm)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 2.25 lb (1.02 kg)

Install the MXP_MR_10DME_C and MXP_MR_10DME_L Cards



Warning

During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself. Statement 94



Warning

Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055



Warning

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 272



Note

If protective clips are installed on the rear connectors of the cards, remove the clips before installing the cards.

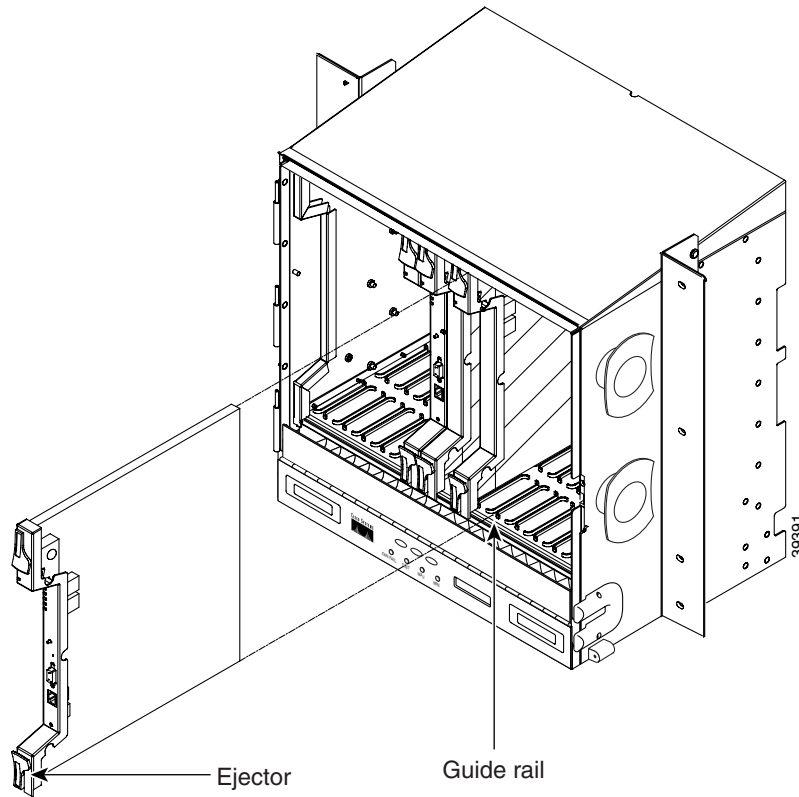


Note

If you install a card incorrectly, the FAIL LED flashes continuously.

Figure 2 shows general card installation.

Figure 2 *Installing a Card in the Cisco ONS 15454 SONET (ANSI) Shelf Assembly*



-
- Step 1** Display the card installation plan for the node using one of the following sources:
- The Cisco MetroPlanner Site Dialog window for the node you are provisioning.
 - CTC node view with slots preprovisioned based on the Cisco MetroPlanner Site Dialog window.
 - Written slot plan. The plan must be based on the Cisco MetroPlanner Site Dialog window for your installation.
- Step 2** Remove the card from its packaging, then remove the protective clips from the card's rear connectors.
- Step 3** Open the card latches/ejectors.
- Step 4** Use the latches/ejectors to firmly slide the card along the guide rails until the card plugs into the receptacle at the back of the slot.
- Step 5** Verify that the card is inserted correctly and close the latches/ejectors on the card.



Note It is possible to close the latches and ejectors when the card is not completely plugged into the chassis. Ensure that you cannot insert the card any further.

- Step 6** Verify the LED activity:
- The red FAIL LED turns on for 20 to 30 seconds.
 - The red FAIL LED blinks for 35 to 45 seconds.
 - All LEDs blink once and turn off for 5 to 10 seconds.

- The ACT or ACT/STBY LED turns on. The SF LED can persist until all card ports connect to their far-end counterparts and a signal is present.

Step 7 If the card does not boot up properly, or the LED activity does not occur as described in [Step 6](#), check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot. If the card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming that the card is faulty.
- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed properly. Remove the card and repeat Steps [3](#) to [6](#).

Stop. You have completed this procedure.

Related Documentation

- *Cisco ONS 15454 DWDM Reference Manual*
- *Cisco ONS 15454 DWDM Procedure Guide*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*
- *Cisco MetroPlanner DWDM Operations Guide*

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