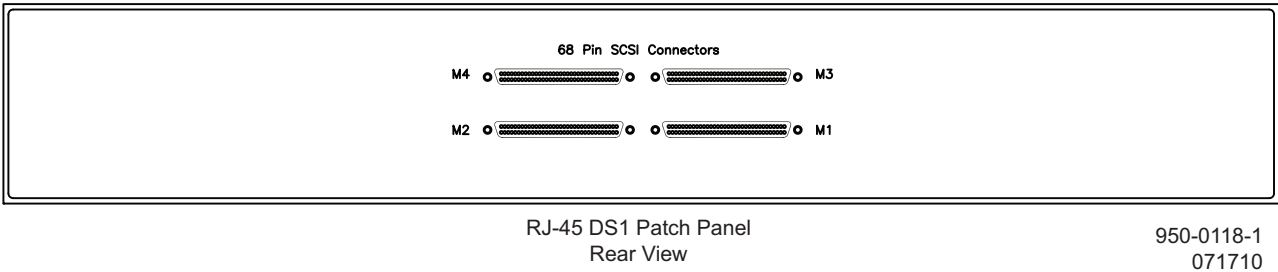


Figure 113-2. DS1 RJ-45 patch panel (rear view)



Connectors

Refer to Table 113-A for DS1 RJ-45 Patch Panel connector details.

Table 113-A. P32E1DS1 DS1 card front panel connector details

CONNECTOR	TYPE	FUNCTION
I/O (1- 32)	RJ-45	DS1, Tx and Rx (tip and ring), interconnect DS1s number 1 through 32
M1	64 position SCSI connector	DS1, Tx and Rx (tip and ring), interconnect DS1s number 1 through 16, Main
M2	64 position SCSI connector	DS1, Tx and Rx (tip and ring), interconnect DS1s number 17 through 32, Main
M3	64 position SCSI connector	DS1, Tx and Rx (tip and ring), interconnect DS1s number 1 through 16, Spare
M4	64 position SCSI connector	DS1, Tx and Rx (tip and ring), interconnect DS1s number 17 through 32, Spare

UDS-114
Type N adapter bracket

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM23272AA	Type N Adapter Bracket	N/A	N/A	N/A	Active

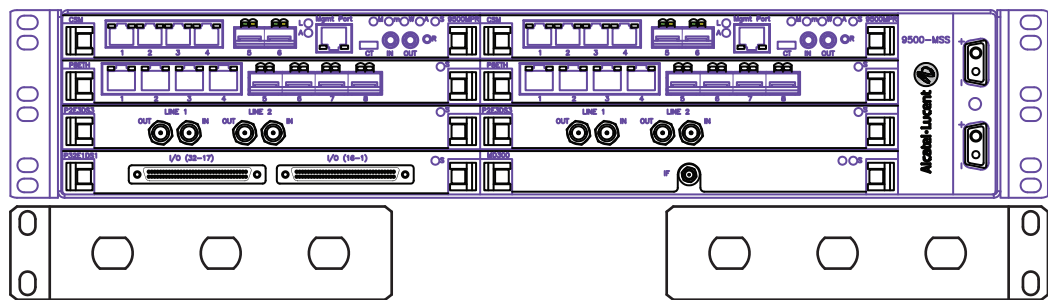
Features and application notes

- Provides mechanical mounting location for three MOD300 IF jumper cables to transition MOD300 card SMA connector to Type N female connector.

Description

The Type N Adapter Bracket mounts on either the left and/or right side of the rack. May be mounted above and/or below the MSS-8 shelf. See Figure 114-1 for a front view of the Type N Adapter Bracket. See Figure 114-2 for Type N Adapter Bracket dimensions.

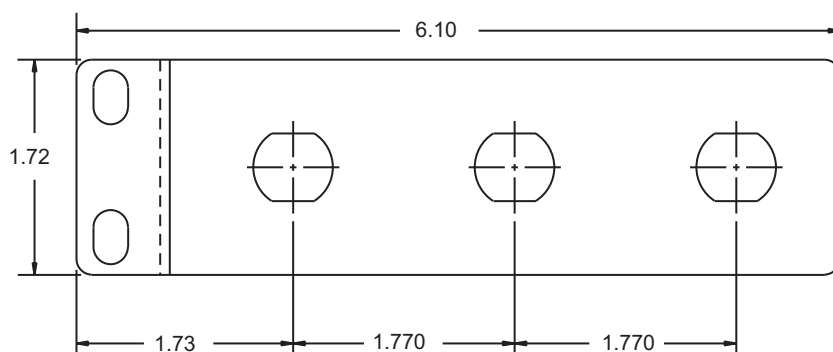
Figure 114-1. Type N adapter bracket (front view)



Type N Adapter Brackets
May be Mounted above MSS-8 Shelf

950-0116-1
071610

Figure 114-2. Type N adapter bracket dimensions



950-0115-1
071610

UDS-115
DS1 d-connector patch panel

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

Features and application notes

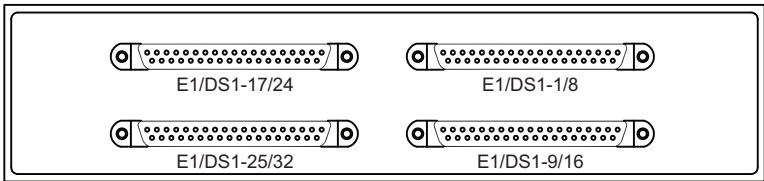
- Converts P32E1DS1 card SCSI connectors to four 37 position DSUB connectors.
- Supports both protected and non-protected P32E1DS1 applications.
- Requires two 68 pin SCSI cables in non-protected DS1 configuration.
Requires four 68 pin SCSI cables in protected DS1 configuration.

Description

The DS1 D-Connector Patch Panel mounts above and/or below the MSS-8 shelf.
Requires 1 rack increments.

Customer interconnect are the four 37 position DSUB connectors. Each 37 position DSUB connector supports eight DS1 signals. Four 68 pin SCSI connectors interconnects the main and spare P32E1DS1 card connectors. See Figure 115-1 for a front view of the DS1 D-Connector Patch Panel. See Figure 115-2 for a rear view of the DS1 D-Connector Patch Panel.

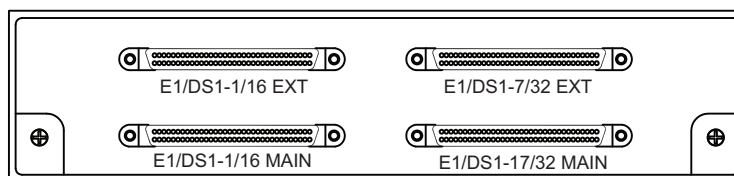
Figure 115-1. DS1 RJ-45 patch panel (front view)



37 Pin DSUB
DS1 Patch Panel
Front View

950-0119-1
071710

Figure 115-2. DS1 RJ-45 patch panel (rear view)



37 Pin DSUB
DS1 Patch Panel
Rear View

950-0120-1
071710

Connectors

Refer to Table [115-A](#) for DS1 D-Connector Patch Panel connector details.

Table 115-A. P32E1DS1 DS1 card front panel connector details

CONNECTOR	TYPE	FUNCTION
E1/DS1 - 1/8	37 position DSUB connector	DS1, Tx and Rx (tip and ring), Customer Interconnect DS1s number 1 through 8
E1/DS1 - 9/16	37 position DSUB connector	DS1, Tx and Rx (tip and ring), Customer Interconnect DS1s number 9 through 16
E1/DS1 - 17/24	37 position DSUB connector	DS1, Tx and Rx (tip and ring), Customer Interconnect DS1s number 17 through 24
E1/DS1 - 25/32	37 position DSUB connector	DS1, Tx and Rx (tip and ring), Customer Interconnect DS1s number 25 through 32
E1/DS1 - 1/16 Main	64 position SCSI connector	DS1, Tx and Rx (tip and ring), P32E1DS1 Interconnect DS1s number 1 through 16, Main
E1/DS1 - 17/32 Main	64 position SCSI connector	DS1, Tx and Rx (tip and ring), P32E1DS1 Interconnect DS1s number 17 through 32, Main
E1/DS1 - 1/16 Spare	64 position SCSI connector	DS1, Tx and Rx (tip and ring), P32E1DS1 Interconnect DS1s number 1 through 16, Spare
E1/DS1 - 17/32 Spare	64 position SCSI connector	DS1, Tx and Rx (tip and ring), P32E1DS1 Interconnect DS1s number 17 through 32, Spare

UDS-116

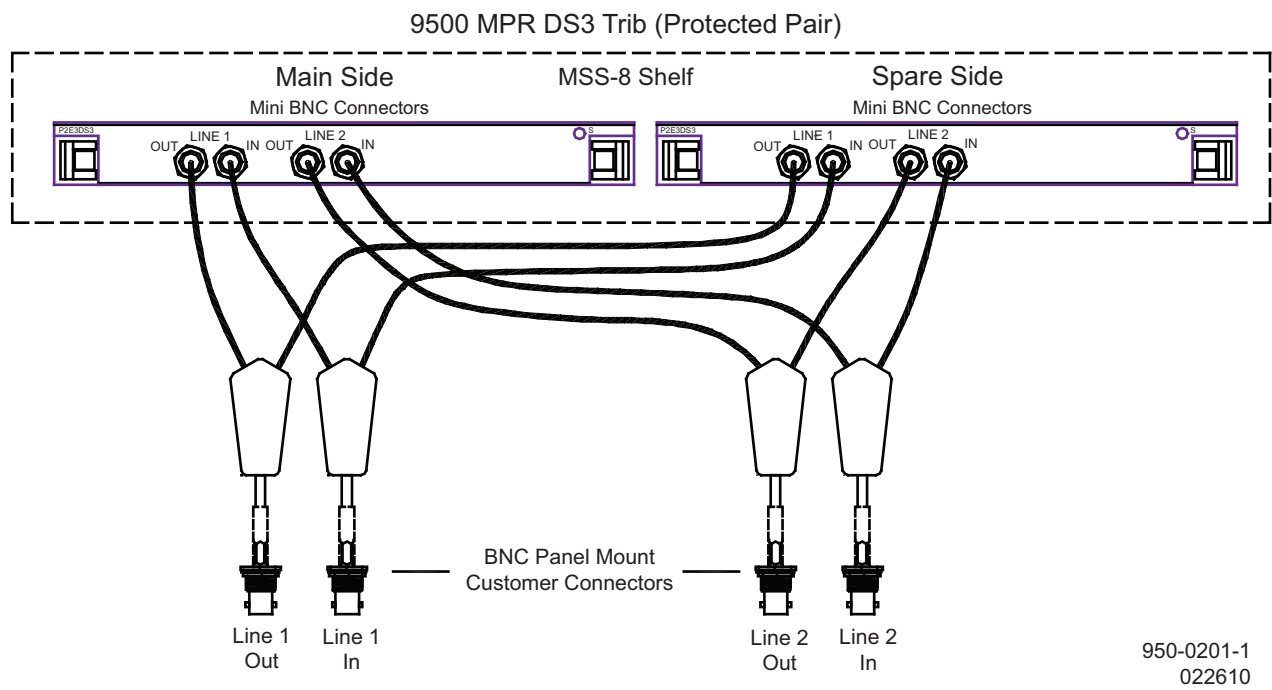
3 dB hybrid splitter

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3EM24462AA	DS3 Patch Panel	N/A	N/A	N/A	Active
3EM22900AA	DS3 Hybrid Splitter	N/A	N/A	N/A	Active

Description

External 3 dB hybrid splitter used to interconnect protected DS3 signals.

Figure 116-1. Hybrid splitter interconnect



Connectors

Refer to Table 116-A for DS3 Hybrid Splitter connector details.

ADD DS3 PATCH PANEL DETAILS..

Table 116-A. Hybrid splitter connector detail

CONNECTOR	TYPE	FUNCTION
Customer Interconnect	75 ohm BNC, Female	Protected DS3 customer interconnect, input and output.
P2E3DS3 Card Interconnect	75 ohm male, mini-BNC	Protected DS3 P2E3DS3 Card interconnect, input and output.

UDS-117**MSS-4 microwave service switch shelf**

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18219AB	MSS-4 Microwave Service Switch Shelf	N/A	N/A	N/A	Active

Features and application notes

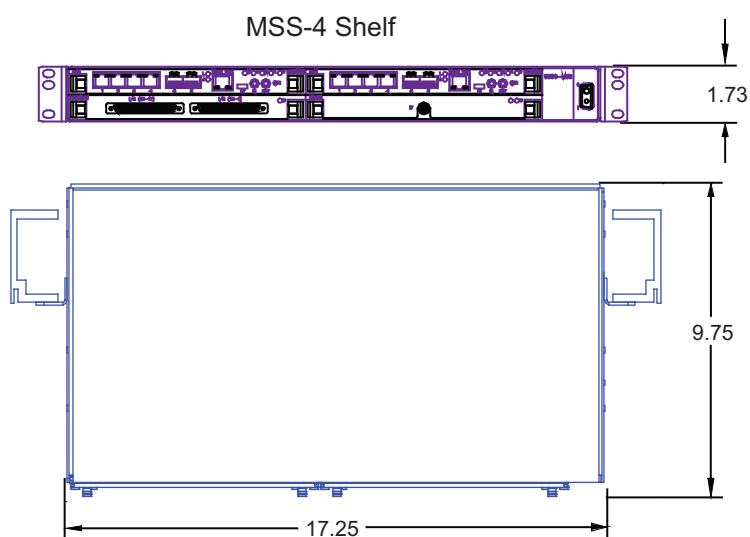
- The Microwave Service Switch (MSS-4) shelf provides cross-connection, port aggregation, switching, and equipment management.
- 10Gb Packet Based Node
- 300 Mbps full-duplex Ethernet transport capacity
- Flexible aggregate capacity sharing DS1, DS3, and Ethernet traffic
- Split mount configuration utilizing the MOD300 radio cards support up to two unprotected RF channels, one 1+1 HSB, Space Diversity (SD) or Frequency Diversity (FD) protected RF channels in one MSS-4 shelf connected to up to two ODU300s.
- Split mount configuration utilizing the MPTACC card supports up to four unprotected RF channels, up to two 1+1 HSB, Space Diversity (SD) or Frequency Diversity (FD) protected RF channels in one MSS-4 shelf connected to up to four MPT-HC/XP Transceivers.
- Split mount configuration utilizing the Core-E SFP ports support up to two unprotected RF channels in one MSS-4 shelf connected to up to two MPT-HC/XP and/or MPT-GC Transceivers.

- Split mount configuration utilizing the Core-E electrical Ethernet ports support up to four unprotected RF channels in one MSS-4 shelf connected to up to four MPT-HC/XP and/or MPT-GC Transceivers.
- All indoor mount utilizing the P8ETH cards support up to eight unprotected RF channels, four 1+1 HSB, Space Diversity (SD) or Frequency Diversity (FD) protected RF channels in one MSS-4 shelf using P8ETH cards connected to up to four Microwave Packet Transport-Long Haul (MPT-HL) Transceivers.
- Stand-alone shelf configuration
- All cards 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 five card slots. Two are dedicated for Control and Switching Modules (Core-E). Two universal slots are available for transport cards: P32E1DS1 (DS1), P2E3DS3 (DS3), SDHACC (OC-3), MOD300 (RADIO), MPTACC (MPT Access) and/or P8ETH (Ethernet). One slot supports optional AUX (Auxiliary) card. One slot is dedicated for fan card.

Description

The MSS-4 self consists of a module cage and backplane which provides five slots. Two dedicated slots for Core-E cards. Two slots are available for transport cards (P32E1DS1 (DS1), P2E3DS3 (DS3), SDHACC (OC-3), MPTACC (MPT Access), MOD300 (Radio), and/or P8ETH (Ethernet). One slot is dedicated for a required fan card. See figure [117-1](#) for an example of the MSS-4 shelf.

The MSS-4 shelf is 19 inches wide (17.25 inches wide without mounting flanges), 1.73 inches high (1 EIA rack increments), and 9.75 inches deep. Adapter plates are available to mount the MSS-4 shelf in 23 inch aluminum racks. See figure [117-2](#) for outline and shelf dimensions of the MSS-4 shelf.

Figure 117-1. Microwave service switch (MSS-4) shelf**Figure 117-2. MSS-4 shelf dimensions**950-0045-1
092110

Equipment complement

MSS-4 shelf slots 1 and 2 are dedicated to the Core-E card. Slots 3 and 4 are available for transport cards; P32E1DS1, P2E3DS3, MPTACC, MOD300, SDGACC, and/or P8ETH. Slot 4 supports optional AUX card. Slot 5 is dedicated for required fan card. See figure 117-3 for MSS-4 shelf slot definitions. Refer to Table 117-A for details of card equipage options.

Figure 117-3. MSS-4 shelf slot definitions

1	CSM-E (Main)	2	CSM-E (Spare)	5 Fan
3	Any Transport	4	Any Transport or Auxiliary Card	

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Table 117-A. MSS-4 shelf card complement

CIRCUIT PACK/ UNIT DATA SHEET	PART NO.	CLEI	QTY	SLOT
CSM-E Enhanced Control and Switching Module UDS-103	3DB18326AC	CRCCA EVEAA	1	1
CSM-E Enhanced Control and Switching Module UDS-103	3DB18326AC	CRCCA EVEAA	Up to 1	2
MOD300 Radio Interface UDS-104	3DB18136AE	CRG2ABVDAA	Up to 2	3, 4
MOD300EN Radio Interface UDS-104	3DB18538AC	CRG2ABWDAA	Up to 2	3, 4
MPTACC MPT Access UDS-118	3DB18634AB	N/A	Up to 2	3, 4
P2E3DS3 DS3 PDH Card UDS-106	3DB18194AC	CRG2AA9DAA	Up to 2	3, 4
P8ETH Ethernet Access Switch Card UDS-107	3DB18206AC	CRCCACGJAA	Up to 2	3, 4
P3E1DS1 DS1 PDH Card UDS-105	3DB18126AE	CRG2ABUDAA	Up to 2	3, 4
SDHACC OC-3 SDH Card UDS-125	3DB18735AA	N/A	Up to 6	3, 4
AUX Auxiliary Card UDS-120	3DB18236AB	N/A	Up to 1	4
Fan 1U Card UDS-110	3DB18218AD	N/A-4	1	5

MSS-4 shelf slot 1 is dedicated to the main Core-E card and is required in every application. See figure 117-4 to see an example of the MSS-4 shelf configured in the unprotected Core-E configuration. Slot 2 is dedicated for an optional spare Core-E card for protected Core-E configurations. See figure 117-5 to see an example of the MSS-4 shelf configured in the protected Core-E configuration.

Figure 117-4. MSS-4 shelf, unprotected Core-E configuration

1	CSM-E (Main)	2	Filler Panel	5	Fan
3	Any Transport	4	Any Transport or Auxiliary Card		

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Figure 117-5. MSS-4 shelf, protected Core-E configuration

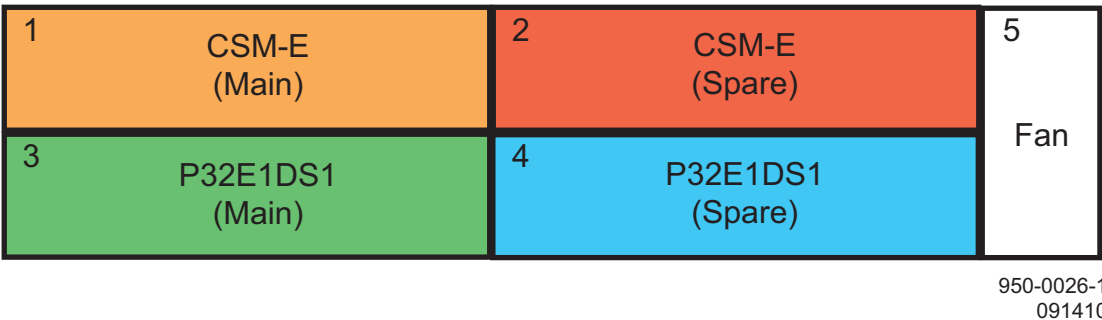
1	CSM-E (Main)	2	CSM-E (Spare)	5	Fan
3	Any Transport	4	Any Transport or Auxiliary Card		

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MSS-4 shelves supports up to two P32E1DS1 card in unprotected DS1 aggregation configurations. Supports one pair of P32E1DS1 cards in 1+1 EPS protected DS1 aggregation configuration. In 1+1 EPS protected configuration, the main P32E1DS1 card is equipped in slot 3 and the spare (protection) P32E1DS1 card is equipped in slot 4 respectively.

See figure 117-6 to see an example of a stand-alone MSS-4 shelf configured with one pair of P32E1DS1s in slots 3 and 4 in the protected 1+1 EPS configuration.

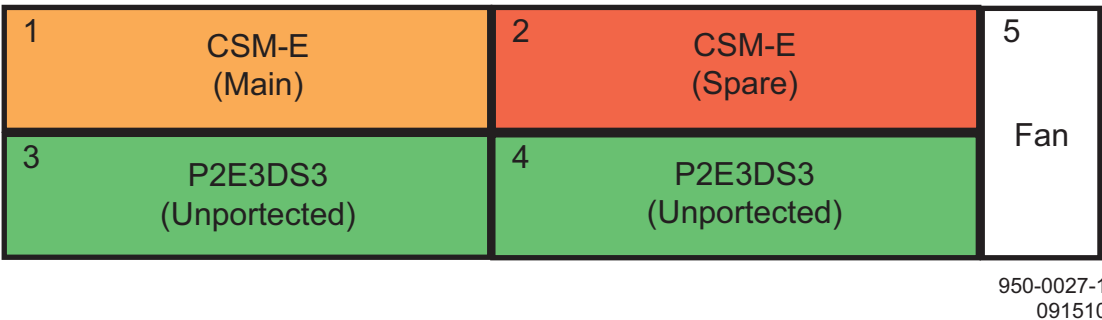
Figure 117-6. MSS-4 stand-alone shelf, equipped with P32E1DS1 (DS1 card)



MSS-4 shelves supports up to two P2E3DS3 cards in unprotected configurations. Supports one pair of P2E3DS3 cards in 1+1 EPS protected configurations. In 1+1 EPS protected configuration, the main P2E3DS3 card is equipped in slot 3, and the spare (protection) P2E3DS3 card is equipped in slot 4 respectively.

See figure 117-7 to see an example of a stand-alone MSS-4 shelf configured with one pair of unprotected P2E3DS3s in slots 3 and 4 in the unprotected configuration.

Figure 117-7. MSS-4 stand-alone shelf, equipped with P2E3DS3 (DS3 card)



MSS-4 shelves supports up to two SDHACC cards in unprotected configurations. Supports one pair of SDHACC cards in 1+1 EPS protected configurations. In 1+1 EPS protected configuration, the main SDHACC card is equipped in slot 3, and the spare (protection) SDHACC card is equipped in slot 4 respectively.

MSS-4 shelves supports up to two MOD300 cards in unprotected RF radio configurations. Supports one pair of MOD300 cards in protected RF radio in 1+1 HSB, SD or FD configurations. In 1+1 HSB, SD or FD configurations, the main MOD300 card is equipped in slots 3 and the spare (protection) MOD300 card is equipped in slot 4 respectively.

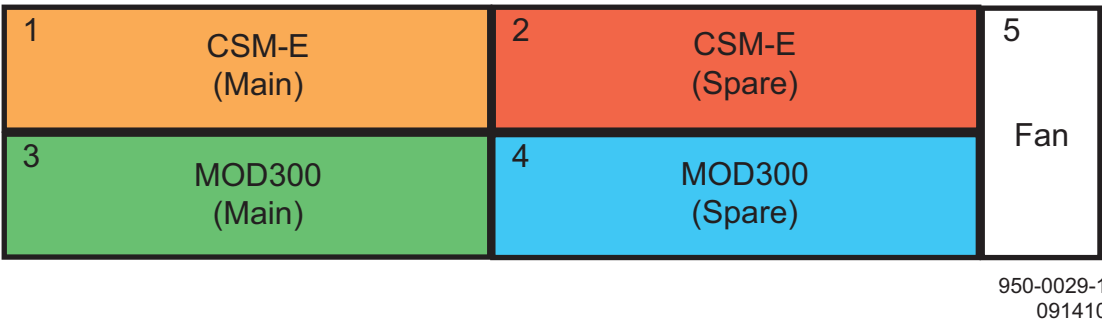
See figure 117-8 to see an example of the MSS-4 shelf configured as a split mount, 1+0 drop and insert repeater configuration.

See figure 117-9 to see an example of the MSS-4 shelf configured as a split mount, 1+1 terminal configuration.

Figure 117-8. MSS-4 shelf, split mount using MOD300, 1+0 drop and insert repeater configuration



Figure 117-9. MSS-4 shelf, split mount using MOD300, 1+1 terminal configuration



MSS-4 shelves supports up to two MPTACC cards in unprotected configuration, up to four RF radio channels. Supports one pair of MPTACC cards in protected 1+1 HSB/FD configuration, up to two protected RF radio channels. In 1+1 HSB, SD or FD configuration, the main MPTACC card is equipped in slot 3 and the spare (protection) MPTACC card is equipped in slot 4 respectively.

See figure 117-10 to see an example of the MSS-4 shelf configured as a split mount, unprotected, up to 2-way junction in slot 3, with a P32E1DS1 card in slot 4.

See figure 117-11 to see an example of the MSS-4 shelf configured as a split mount, 1+1 EPS, up to 2-way junction in slots 3 and 4.

See figure 117-12 to see an example of the MSS-4 shelf equipped with two MPTACC cards supports up to a four spoke hub. In this configuration; main MPTACC cards are equipped in slots 3 and 4 and support up to four 1+0 spokes.

Figure 117-10. MSS-4 shelf, split mount using MPTACC, 1+0 2-way junction configuration

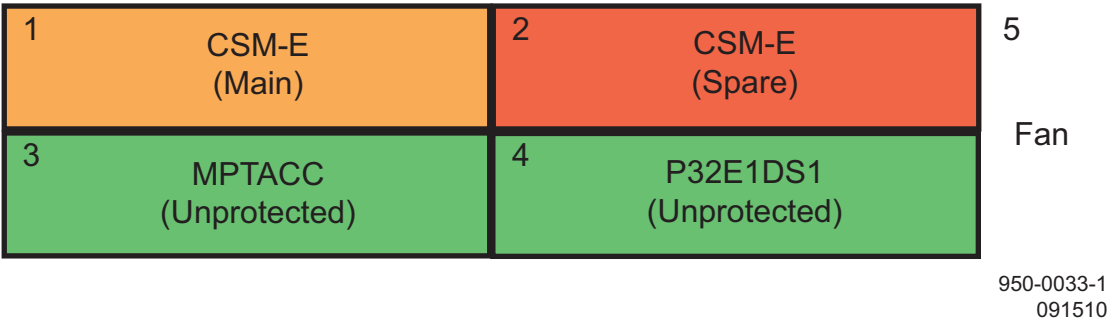
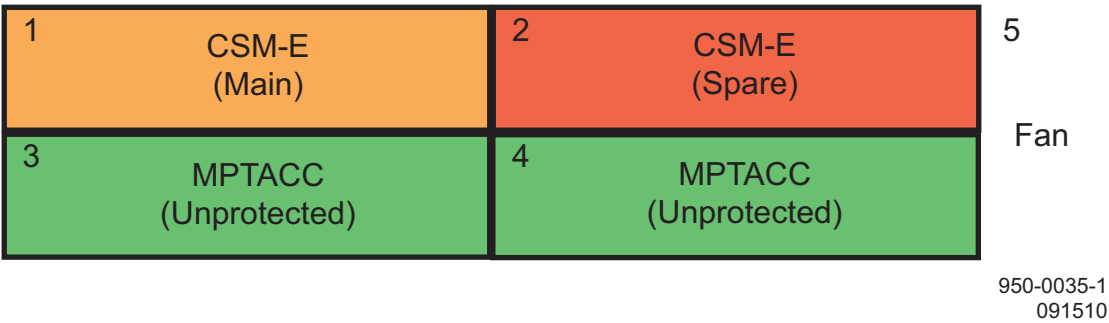


Figure 117-11. MSS-4 shelf, split mount using MPTACC, 1+1 2-way junction configuration



Figure 117-12. MSS-4 shelf, split mount using MPTACC, 1+0 4-way junction configuration



MSS-4 shelves supports up to two P8ETH cards in unprotected configuration. Supports one pair of P8ETH cards in protected in 1+1 EPS configuration. In 1+1 EPS configuration, the main P8ETH card is equipped in slot 3 and the spare (protection) P8ETH card is equipped in slot 4 respectively.

See figure 117-13 to see an example of the MSS-4 shelf configured as an all indoor mount, unprotected, up to 4-way junction in slot 3, with a P32E1DS1 card in slot 4.

See figure 117-11 to see an example of the MSS-4 shelf configured as an all indoor mount, 1+1 EPS, up to 4-way junction in slots 3 and 4.

See figure 117-15 to see an example of the MSS-4 shelf equipped with two P8ETH cards support up to an eight spoke hub. In this configuration; main P8ETH cards are equipped in slots 3 and 4 and support up to eight 1+0 spokes.

Figure 117-13. MSS-4 shelf, all indoor mount, 1+0 4-way junction configuration

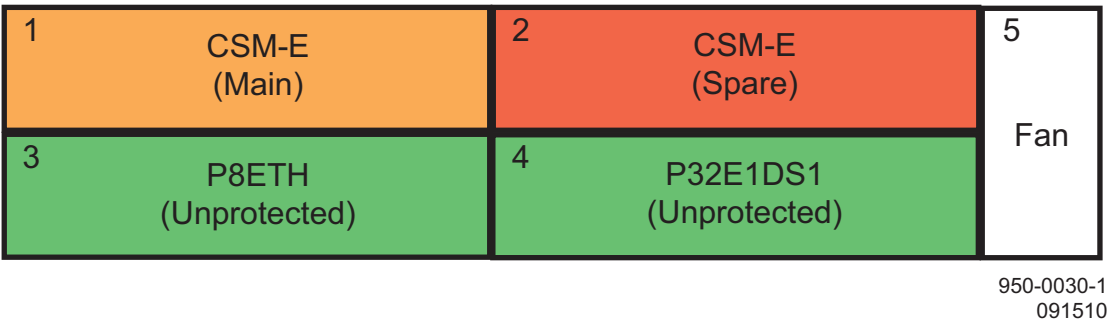


Figure 117-14. MSS-4 shelf, all indoor mount, 1+1 4-way junction configuration



Figure 117-15. MSS-4 shelf, 1+0, 12 spoke hub configuration

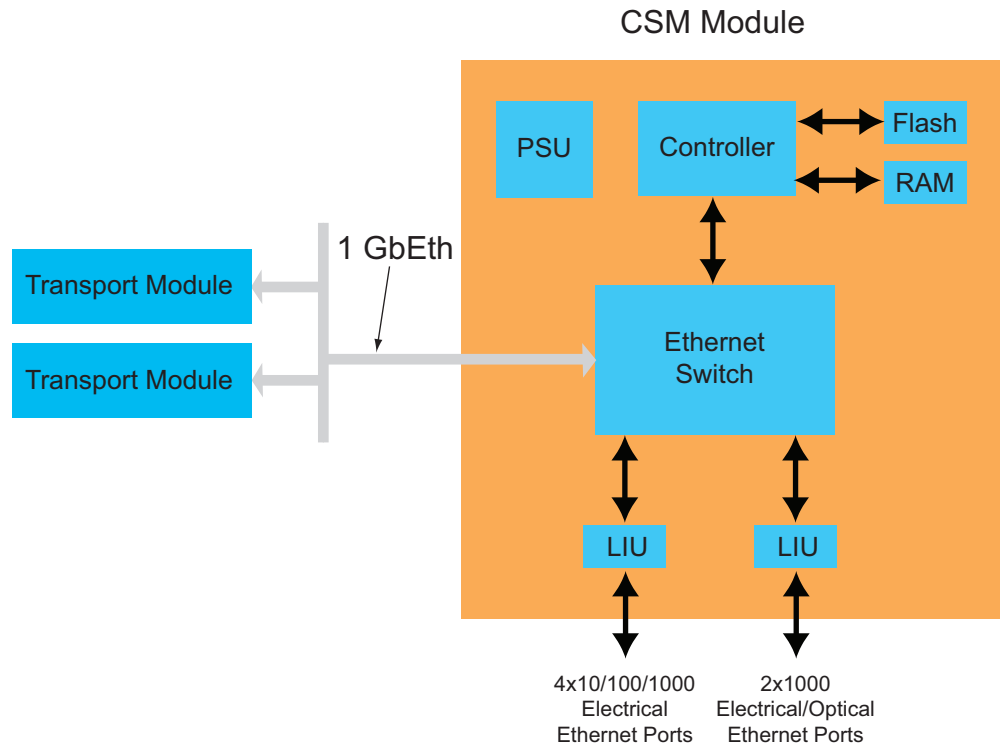


MSS-4 shelf slot 4 supports the AUX (Auxiliary) card for applications that require office station alarms and controls.

Functional overview

MSS-4 implements functionality of grooming, routing, switching and protection, exploiting a packet oriented technology in order to meet the overall architecture.

The MSS-4 Core-E platform, with multiplexing and symmetrical cross-connect functions, can manage different radio directions (up to four), with the possibility to add-drop data flows of local DS1/DS3/OC-3//Ethernet traffic. Core-E platform is based on packet technology (Ethernet Switch) with a generic serial GigE interface between Core-E and transport cards. See figure 117-16 for a functional block diagram of the MSS-4 shelf.

Figure 117-16. MSS-4 shelf block diagram950-0022-2
111710

The MSS-4 shelf houses the following cards:

- AUX Auxiliary card—houses one optional Auxiliary card in slot 4. Auxiliary card provides six station alarm inputs and seven station alarm control outputs.
- Core-E Control and Switching Module—houses one main and one optional spare control and switching module(s). Provides four 10/100/1000 Base-T Ethernet ports. Provides two GigE optical Ethernet port.
- MOD300 Radio card—houses up to two MOD300 cards. In the Tx direction, converts Ethernet packet data from the Core-E card(s) into a modulated IF output signal that is applied to the ODU300. In the Rx direction, demodulates the IF input signal from the ODU300, encapsulates the digital data into Ethernet packets, and sends the packets to the Core-E card(s).
- P2E3DS3 DS3 PDH card—houses up to two P2E3DS3 cards for DS3 TDM traffic encapsulation/extraction into standard Ethernet packets
- P8ETH Ethernet Access Switch—houses up to two P8ETH cards for MSS-4-to-MPT-HL interface for all indoor configurations. The P8ETH card functions as a layer 2 switch, cross-connecting VLAN tagged Ethernet data to/from the addressed MPT-HL.
The P8ETH card provides traffic management for Core-Es for up to four directions using protected radios and up to eight directions using unprotected radios.
P8ETH cards also provide four 10/100/1000 Base-T Ethernet ports and up to four GigE optical Ethernet ports.
- SDHACC OC-3 SDH card—houses up to two SDHACC cards for OC-3 TDM traffic encapsulation/extraction into standard Ethernet packets
- P2E3DS3 DS3 PDH card—houses up to two P2E3DS3 cards for DS3 TDM traffic encapsulation/extraction into standard Ethernet packets
- The MSS-4 shelf houses one fan card resident in slot 5 on the right-hand side of the shelf and provides forced-air cooling for the shelf.

UDS-118

MPTACC MPT access card

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18634AB	MPTACC MPT Access	N/A	N/A	N/A	Active

Features and application notes

- Provide traffic interface between Core switch and up to two MPT-HC/XP
- Simplified interconnection with MPT-HC using PFoE function (Ethernet traffic and power supply on the same cable)
- Supports both unprotected and 1+1 EPS/HSB protected configurations
- MPT-HC/XP EPS/HSB management function
- Clock distribution function
- L2 packet based Proprietary clock algorithm
- Ethernet link quality monitor function
- Radio Link Quality notification through MPR Protection Protocol frames
- Communication with Core controller for provisioning and status report.
- Provide the power supply interface to the MPT-HC
- Lightning and surge protection for both electrical GbEth and power interfaces that are connected to MPT-HC
- Ethernet and power interface supervision

Description

The MPTACC is an interface for one or two MPT-HC/XP. This interface is comprised of two components, Ethernet and DC power. The Ethernet interface to the MPT-HC/XP is a standard GbEth interface (electrical or optical). It sends/receives standard Ethernet packets to/from both Core-E modules. It contains the logic for the EPS Core-E protection. One or two MPT-HC/XP can be connected.

The MPTACC is supported in MSS-8 slots 3 through 8 and MSS-4 slots 3 and 4.

In unprotected radio configurations the main MPTACC card is supported in any of the supported MSS-4/8 slots, two radio channels per MPTACC card for a maximum of twelve MPTACC/MPT-HC/XP radio channels per MSS-8 shelf and four radio channels per MSS-4 shelf.

In protected radio configurations, two arrangements are available. The first arrangement utilizes one interface on a MPTACC card configured as main and the second interface as spare for a single protected radio channel. This arrangement is supported in MSS-8 slots 3 through 8 and MSS-4 slots 3 and 4. The second arrangement utilizes a main MPTACC card and a spare MPTACC card. The main MPTACCs are equipped in slots 3, 5, and/or 7 and the protect (spare) MPTACCs are equipped in the slots directly across from the main (slots 4, 6, and/or 8).

The MPTACC card can be equipped with GigE SFP as required to meet system requirements.

The MPTACC card provides four GigE ports, two electrical (ports 1 and 2) and two optical SFP (ports 3 and 4). Only two GigE ports are supported simultaneously, either two electrical, two optical, or one electrical and one optical.

Either electrical port #1 or optical port #3 can be enabled and is associated with power supply port #1.

Either electrical port #2 or optical port #4 can be enabled and is associated with power supply port #2.

Indicators, connectors, and control

See figure [118-1](#) for MPTACC card front panel indicator and connectors.

The MPT Access (MPTACC) card has the following indicators, connectors, and controls.

Refer to Table 118-A for MPTACC card indicators details.

Refer to Table 118-B for MPTACC card connector details.

The MPTACC card has no controls located on the card.

Figure 118-1. MPTACC card (MSS/MPTACC)

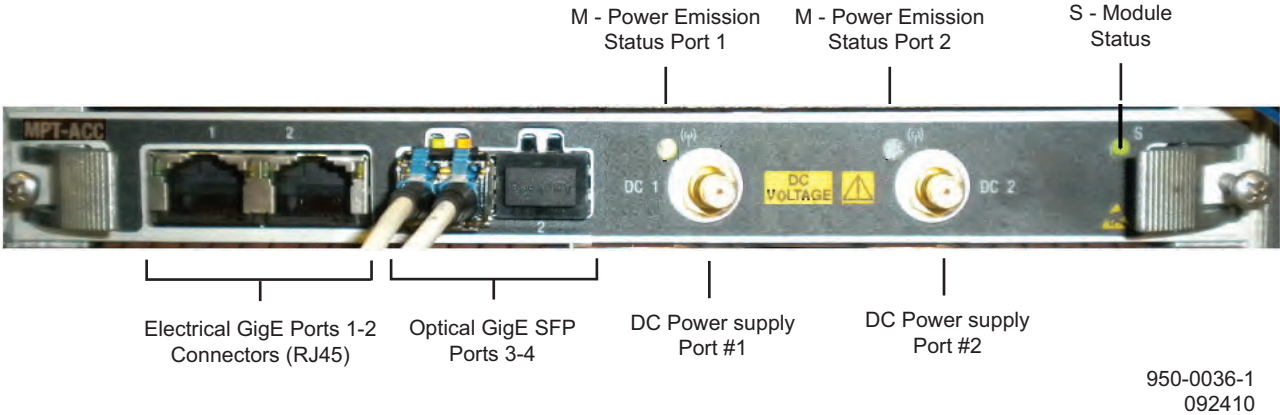


Table 118-A. MPTACC front panel indicator details

INDICATOR	STATUS	DEFINITION
Power Emission Status (M)	Off	No Output Power (e.g.: Hot-Standby Transmitter, Software is Booting, or FPGA Downloading is In-Progress)
	Green	Normal Output Power
	Yellow	Forced Squelch Enabled on Craft Terminal or unit is in Protect, Properly Provisioned as EPS
	Red	Abnormal Output Power
Status (S)	Off	Card not equipped, not provisioned, or not powered
	Green Blinking	Download, Software Booting, or Flash Card 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
LINK	Off	Indicates GigE link is down
	Green	Indicates GigE link is up
ACTIVITY	Off	Indicates no activity on GigE link
	Amber Blinking	Indicates activity on GigE link

Table 118-B. MPTACC front panel connector details

CONNECTOR	TYPE	FUNCTION
GigE Ports 1, 2	RJ45	Electrical GigE Ethernet Radio Port
GigE Ports 3, 4	SFP	Optical GigE Ethernet Radio Port
DC 1, 2	SMA	DC Power Supply Port 1 and 2

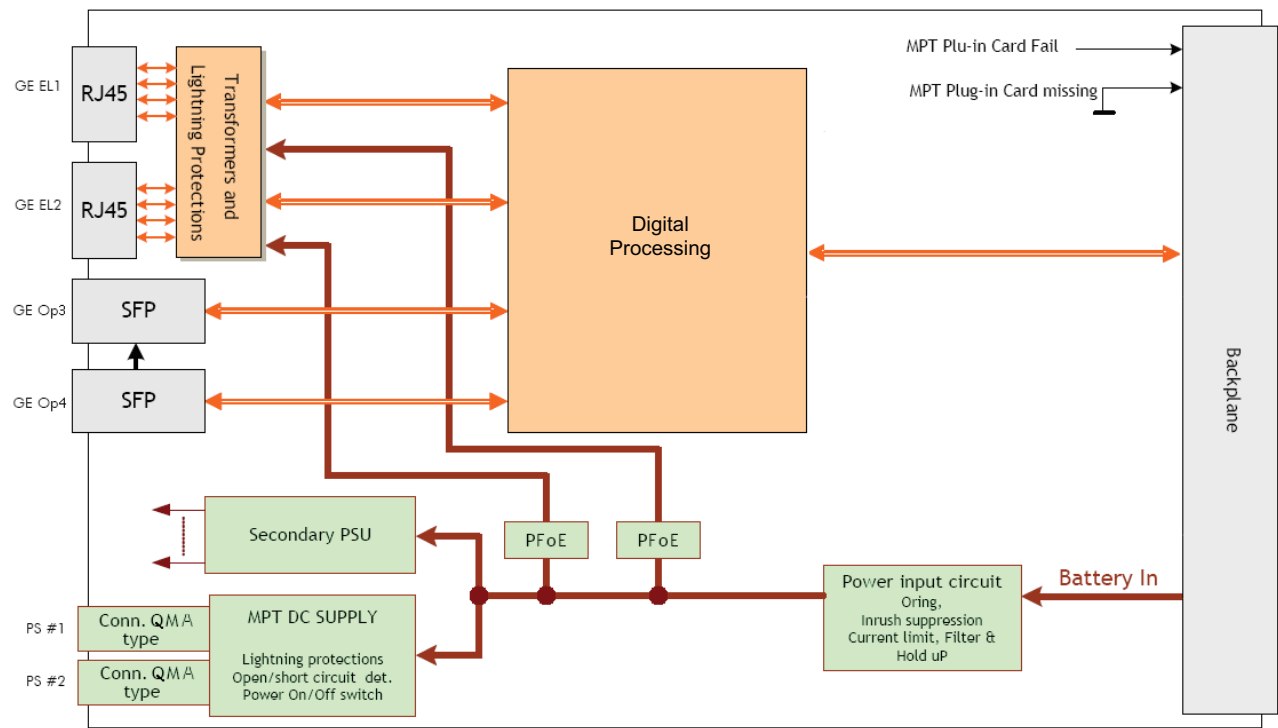
Functional overview

In the TX direction, the MPTACC card receives Ethernet packets from the Core-E (Control and Switching Module - Core) card(s) and outputs the Ethernet packets towards the MPT-HC/XP.

In the RX direction, the MPTACC card receives Ethernet packets from the MPT-HC/XP and sends the packets to the Core-E card(s).

See figure [118-2](#) for a block diagram of the MPTACC.

Figure 118-2. MPTACC card block diagram



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UDS-119**MPT-HC/XP microwave packet transport-high capacity**

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
MPT-HC with embedded diplexer					
MPT-HC L6 GHz, 252.04 MHz separation with embedded diplexer					
3DB20441BA	MPT-HC, 5929 - 6050 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20443BA	MPT-HC, 6182 - 6302.04 MHZ, TX HIGH	N/A	N/A	N/A	Active
3DB20442BA	MPT-HC, 6047.96 - 6168 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20444BA	MPT-HC, 6300 - 6420.04 MHZ, TX HIGH	N/A	N/A	N/A	Active
MPT-HC 11 GHz, 490/500 MHz separation with embedded diplexer					
3DB20371BA	MPT-HC, 10695 - 10955 MHZ, TX LOW	CRMYAB7JRA	462997	N/A	Inactive
3DB20371BB	MPT-HC, 10695 - 10955 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20547BA	MPT-HC, 11205 - 11485 MHZ, TX HIGH	CRMYAB8JRA	462998	214812	Inactive
3DB20547BB	MPT-HC, 11205 - 11485 MHZ, TX HIGH	N/A	N/A	N/A	Active
3DB20546BA	MPT-HC, 10935 - 11205 MHZ, TX LOW	CRMYAB9JRA	462999	214813	Inactive
3DB20546BB	MPT-HC, 10935 - 11205 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20548BA	MPT-HC, 11445 - 11705 MHZ, TX HIGH	CRMYACAJRA	463000	214814	Inactive
3DB20548BB	MPT-HC, 11445 - 11705 MHZ, TX HIGH	N/A	N/A	N/A	Active
MPT-HC 15 GHz, 475 MHz separation with embedded diplexer					
3DB20373BA	MPT-HC, 14500 - 14724 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20423BA	MPT-HC, 14920 - 15144 MHZ, TX HIGH	N/A	N/A	N/A	Active
MPT-HC 18 GHz, 1560 MHz separation with embedded diplexer					
3DB20432BA	MPT-HC, 17700 - 18140 MHZ	CRMYAB1JRA	462990	214805	Active

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB20433BA	MPT-HC, 19260 - 19700 MHz	CRMYAB2JRA	462993	214807	Active
MPT-HC 23 GHz, 1200/1232 MHz separation with embedded diplexer					
3DB20473BA	MPT-HC, 21198 - 21819 MHz, TX LOW	CRMYAB3JRA	462991	214806	Active
3DB20475BA	MPT-HC, 22400 - 23019 MHz, TX HIGH	CRMYAB4JRA	462994	214808	Active
3DB20474BA	MPT-HC, 21781 - 22400 MHz, TX LOW	CRMYAB5JRA	462995	214809	Active
3DB20476BA	MPT-HC, 22981 - 23600 MHz, TX HIGH	CRMYAB6JRA	462996	214810	Active
MPT-HC 38 GHz, 700 MHz separation with embedded diplexer					
3DB20379BA	MPT-HC, 38600 - 38950 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20563BA	MPT-HC, 39300 - 39650 MHz, TX HIGH	N/A	N/A	N/A	Active
3DB20562BA	MPT-HC, 38950 - 39300 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20564BA	MPT-HC, 39650 - 40000 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-HC with external diplexers¹					
9558HC 5.8 GHz Unlicensed, 64 MHz separation with external diplexer					
3DB20913BA	9558HC, 5725.5-5785.5 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20914BA	9558HC, 5789.5-5849.5 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-HC L6 GHz, 252.04 MHz separation with external diplexer					
3DB20800BA	MPT-HC, 5929.96 - 6168 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20802BA	MPT-HC, 6182 - 6420.04 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-HC U6 GHz, 160/340 MHz separation with external diplexer					
3DB20804BA	MPT-HC, 6420 - 6775 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20806BA	MPT-HC, 6710 - 7115 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-HC 7/8 GHz, 175/300 MHz separation with external diplexer					
3DB20454BC	MPT-HC, 7107 - 8377 MHz, TX LOW	N/A	N/A	N/A	Active

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB20456BC	MPT-HC, 7261 - 8496.114 MHZ, TX HIGH	N/A	N/A	N/A	Active
MPT-XP with external diplexers²					
MPT-XP L6 GHz, 252.04 MHz separation with external diplexer					
3DB20760BA	MPT-XP, 5929.96 - 6168 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20761BA	MPT-XP, 6182 - 6420.04 MHZ, TX HIGH	N/A	N/A	N/A-	Active
MPT-XP U6 GHz, 160/340 MHz separation with external diplexer					
3DB20763BA	MPT-XP, 6420 - 6775 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20764BA	MPT-XP, 6710 - 7115 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-XP 7 GHz, 175 MHz separation with external diplexer					
3DB20771BA	MPT-XP, 7107 - 7714.5 MHZ, TX LOW	N/A	N/A	N/A	Active
3DB20772BA	MPT-XP, 7261 - 7911 MHz, TX HIGH	N/A	N/A	N/A	Active
MPT-XP 8 GHz, 300 MHz separation with external diplexer					
3DB20773BA	MPT-XP, 7725 - 8377 MHz, TX LOW	N/A	N/A	N/A	Active
3DB20774BA	MPT-XP, 8025 - 8496.114 MHZ, TX HIGH	N/A	N/A	N/A	Active
MPT-HC/XP external protection module					
3DB20117BA	RPS Module	N/A	N/A	N/A	Active
3DB20116BA	XPIC+RPS Module	N/A	N/A	N/A	Inactive
3DB20116BB	XPIC+RPS Module	N/A	N/A	N/A	Active

[1] MPT-HC with external diplexer requires selecting the appropriate external diplexer.

[2] MPT-XP with external diplexer requires selecting the appropriate external diplexer.

Features and application notes

- Optimal for urban links
- MPT-HC/XPs are band specific
- Input interface is a standard Gigabit Ethernet interface (electrical or optical)
- Supports static and adaptive modulation
- Support for the following channel plans: 5.8, L6, U6, 7, 8, 11, 15, 18, 23, and 38 GHz
- Channel frequency software selectable within tuning range of the MPT-HC/XP
- 1+0 Not protected, 1+1 HSB, 1+1 SD, and 1+1 FD radio configurations support without optional XPIC+RPS or RPS module (using Virtual 1+1 RPS configuration)
- 1+0 Not protected, 1+1 HSB, 1+1 SD, 1+1 FD radio configurations support with optional 1+1 RPS module (using Virtual 1+1 RPS or Cabled RPS configuration)
- 1+1 HSB, 1+1 SD, 1+1 FD, 2x(1+0) XPIC, 4x(1+0), XPIC, 2x(1+1) HSB XPIC radio configuration support with optional XPIC+RPS or RPS module (using Virtual 1+1 RPS or Cabled RPS configuration)
- Support for the following static radio profiles:
 - Supported static channel bandwidths: 10, 30, 40, and 50 MHz
 - Supported static modulations: 64 QAM, 128 QAM, and 256 QAM
- Support for the following adaptive radio profiles:
 - Supported adaptive channel bandwidths: 30, 40, and 50 MHz
 - Supported adaptive modulations: 4/16/32/64/128/256 QAM
- Automatic Transmit Power Control (ATPC) support
- Integrated antenna mount
- Non-Integrated antenna mount optional
- Polarization is field configurable, Vertical (standard) or horizontal (optional)

- One of two cables (Power and Ethernet) are required to connect to the MPT-HC/XP. Several methods are available to interconnect the MSS-4/MSS-8 to the MPT-HC/XP:
 - One electrical Ethernet cable connects the MPT Access unit to the MPT-HC (using the PFoE solution).
 - One optical Ethernet cable (data) and one coaxial cable (power) connect the MPT Access unit to the MPT-HC/XP.
 - One electrical cable (data) connects the Core-E card to the Power Injector Card/Box, and one electrical Ethernet cable connects to the MPT-HC (using the PFoE solution).
 - One electrical or optical Ethernet cable (data) connects the Core-E card to the MPT-HC/XP. Power is provided outside the MSS shelf.
 - One optical Ethernet cable (data) connects the P8ETH card to the MPT-HC/XP. Power is provided outside the MSS shelf.
- MPT-HC/XPs include built-in lightning surge suppressor

Description

The MPT-HC/XP is a microprocessor controlled transceiver that interfaces the MSS-4/8/1c shelf with the antenna. Transmitter circuits in the MPT-HC/XP consists of cable interface, modulator, local oscillator, up converter/mixer, power amplifier, and diplexer. Receive circuits consist of diplexer, low-noise amplifier, local oscillator, down converter/mixer, automatic gain control, demodulator, and cable interface. The microprocessor manages MPT-HC/XP frequency, transmit power alarming, and performance monitoring. Power is provided by -48Vdc from the MSS or external power source to the MPT-HC DC-DC converter through PFoE electrical Ethernet cable or a dedicated power supply cable. The MPT-HC/XP is frequency dependent.

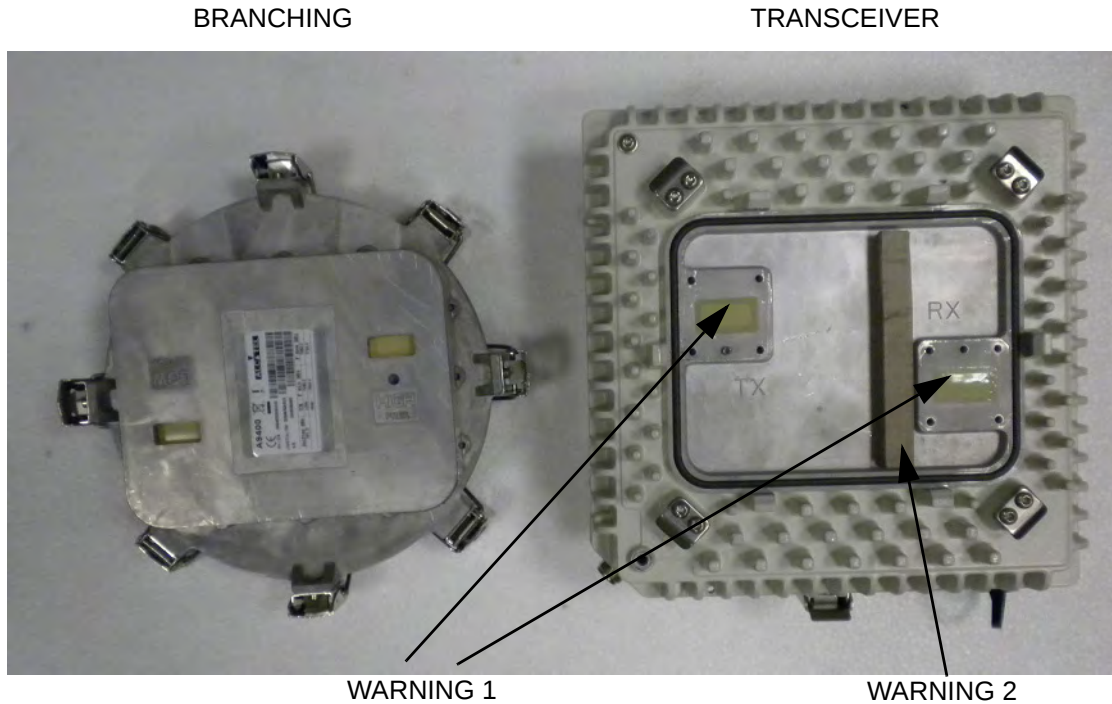
Additional information for MPT-HC/XP with external diplexer

The MPT-HC/XP with external diplexer is made up of two boxes, one for diplexer system (BRANCHING) and the other for all other active functions (TRANSCEIVER) connected together to form the MPT-HC/XP. See Figure [119-1](#).

An O-RING present in the TRANSCEIVER box guarantees the MPT-HC/XP assembly waterproofness.

NOTE: This is a conductive O-RING and must be left dry. Do not wet it with silicon grease (silicon grease must be used only on O-ring between MPT-HC/XP and antenna).

Figure 119-1. Composition of MPT-HC/XP with external diplexer



WARNING *Possibility of equipment damage. WARNING 1: A waterproofness tape is glued on the waveguide of the MPT-HC/XP. It must never be removed.*

WARNING *Possibility of equipment damage. WARNING 2: This gasket must never be removed.*

The TRANSCEIVER box performs all the functions, but does not include the diplexer system.

The BRANCHING box provides the interface between the pole mounting/antenna and the TRANSCEIVER.

This solution foresees the possibility to change in the field a TRANSCEIVER without disconnecting the BRANCHING box from the pole mounting/antenna. The TRANSCEIVER and BRANCHING boxes fixing and unfixing are obtained through the four levers.

Branching box

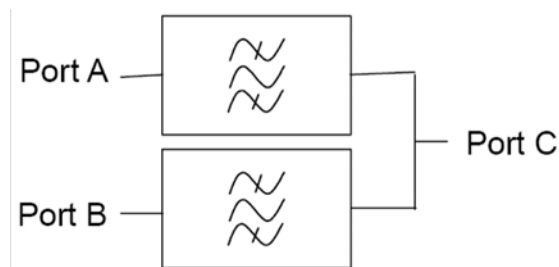
The diplexer included in the available BRANCHING assemblies refers to ITU–R F.385, 386 and RF special CUSTOMERS channelling with Tx/Rx separation specified in Table 119-A.

Table 119-A. Branching box details¹

ITEM DESCRIPTION	SHIFTER MHz	FILTER 1 MHz (LOW BAND)		FILTER 2 MHz (LOW BAND)		Part Number
		LOW LIMIT f1	HIGH LIMIT f2	LOW LIMIT f3	HIGH LIMIT f4	
5.8 GHz unlicensed CH1-1P P.SH.64MHz	64	5725.5	5755.5	5789.5	5819.5	3DB20752BA
5.8 GHz unlicensed CH2-2P P.SH.64MHz	64	5755.5	5785.5	5819.5	5849.5	3DB20752BB
L6 GHz CH1-1P P.SH.252.04 MHz	252.04	5929.96	6050	6182	6302.0	3DB20753BA
L6 GHz CH2-2P P.SH.252.04 MHz	252.04	6032.96	6168	6285	6420.04	3DB20753BB
U6 GHz CH1-1P P.SH.160 MHz	160	6540	6610	6710	6780	3DB20756BA
U6 GHz CH2-2P P.SH.160 MHz	160	6590	6660	6750	6820	3DB20756BB
U6 GHz CH3-3P P.SH.160 MHz	160	6640	6710	6800	6870	3DB20756BC
U6 GHz CH1-1P P.SH.340 MHz	340	6420	6600	6760	6940	3DB20755BA
U6 GHz CH2-2P P.SH.340 MHz	340	6565	6720	6905	7060	3DB20755BB
U6 GHz CH3-3P P.SH.340 MHz	340	6595	6775	6935	7115	3DB20755BC
7GHz CH1-1P P.SH.175 MHz	175	7125	7215	7300	7390	3CC40072AC
7GHz CH2-2P P.SH.175 MHz	175	7155	7250	7330	7425	3CC40072AD
8GHz CH1-1P P.SH.300/310 MHz	300	7725	7845	8025	8155	3CC40073AC
8GHz CH2-2P P.SH.300/310 MHz	300	7845	7975	8145	8275	3CC40073AD

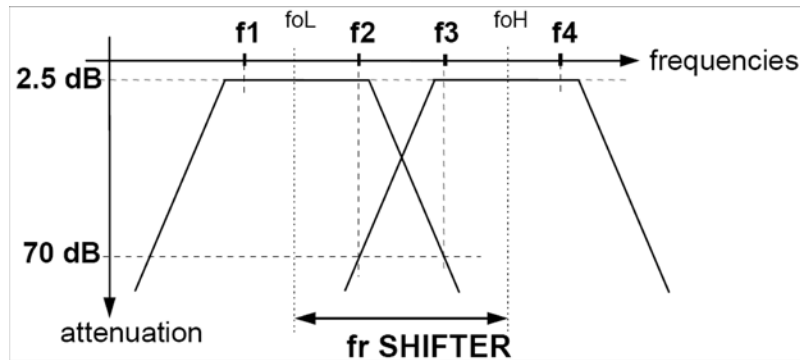
[1] Application specific branching box is required with MPT-HC/XP W/External Diplexer.

Each branching box diplexer is a 3-port passive device with two band–pass filters as described in Figure 119-2.

Figure 119-2. Branching box block diagram

The arrangement between filters on the same branching device is described in Figure 119-3.

Figure 119-3. Branching box band-pass detail



NOTE: f1, f2, f3 and f4 frequencies of the branching filters refer to the extreme channel frequencies and not to the cut-off frequencies of the filters.

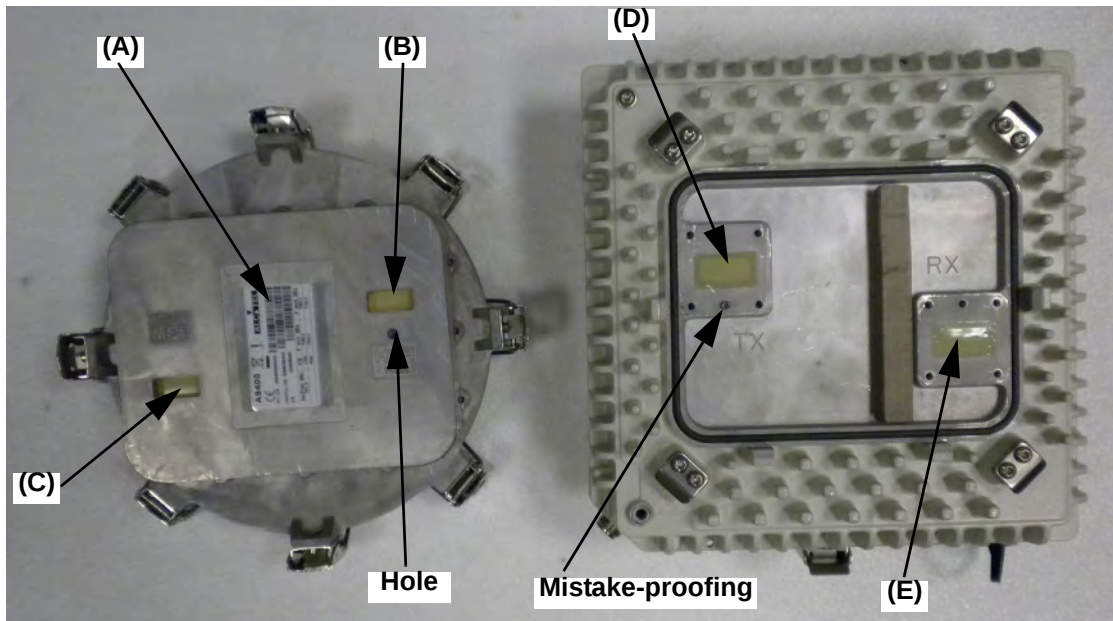
TRANSCEIVER and BRANCHING boxes coupling

Figure 119-4 shows the TRANSCEIVER and BRANCHING boxes coupling surfaces:

- (A) **BRANCHING box information label**
- (B) **(HIGH FREQ)** and (C) **(LOW FREQ)** RF interfaces on BRANCHING box
- (D) **(TX)** and (E) **(RX)** RF interfaces on TRANSCEIVER box

The TRANSCEIVER and BRANCHING boxes can be coupled in two alternative ways (180°-rotated with respect to each other):

- BRANCHING box (B) **(HIGH FREQ)** coupled to TRANSCEIVER box's (D) **(TX)**
in this case the TX part of the transceiver uses the HIGH frequency range of the Shifter set by the Craft Terminal; obviously the RX part of the transceiver uses the corresponding LOW frequency range;
- BRANCHING box (C) **(LOW FREQ)** coupled to TRANSCEIVER box's (D) **(TX)**
in this case the TX part of the transceiver uses the LOW frequency range of the Shifter set by the Craft Terminal; obviously the RX part of the transceiver uses the corresponding HIGH frequency range.

Figure 119-4. MPT-HC/XP TRANSCEIVER and BRANCHING boxes coupling surfaces

NOTE: There is only one possible way to couple the BRANCHING box and the TRANSCEIVER box: the TRANSCEIVER box is keyed with a mistake-proofing pin, whose position depends on the type of transceiver (low or high band, as shown in Figure 119-4) to ensure that the association with the BRANCHING box is always correct.

Indicators, connectors, and control

See Figure 119-5 for MPT-HC/XP.

The external interfaces for embedded and external diplexer versions are listed in Table 119-B, including a description of the corresponding connectors.

The RF Interface waveguide types are listed in Table 119-C.

MPT-HC with embedded diplexer views and access points are shown in Figure 119-6.

MPT-HC/XP with external diplexer views and access points are shown in Figure 119-7.

The MPT-HC/XP has no indicators and controls on the unit.

Figure 119-5. MPT-HC/XP

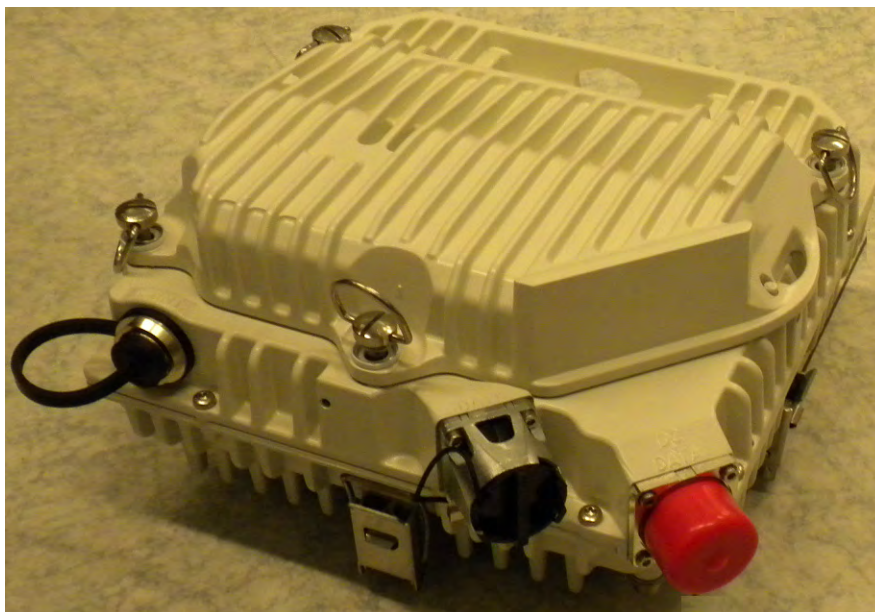


Table 119-B. MPT-HC with internal diplexer connector details

REF	CONNECTOR	TYPE	FUNCTION
1 ¹	Antenna Port	Waveguide Interface	RF signal to antenna
2	Data & Power In	RJ45 + R2CT	Electrical Data & DC Power connection to MSS-4/MSS-8
3	SFP	LC + Q-XCO	Optical GigE Data Interface connection to MSS-4/MSS-8
4	RPS	LC + Q-XCO	Optical GigE RPS Interface connection to second MPT-HC
5	XPIC	Round Proprietary	Connection to second MPT-HC in XPIC configuration.
6	RSSI	LEMO	RSSI Monitor Port
	Ground Stud		MPT-HC Grounding

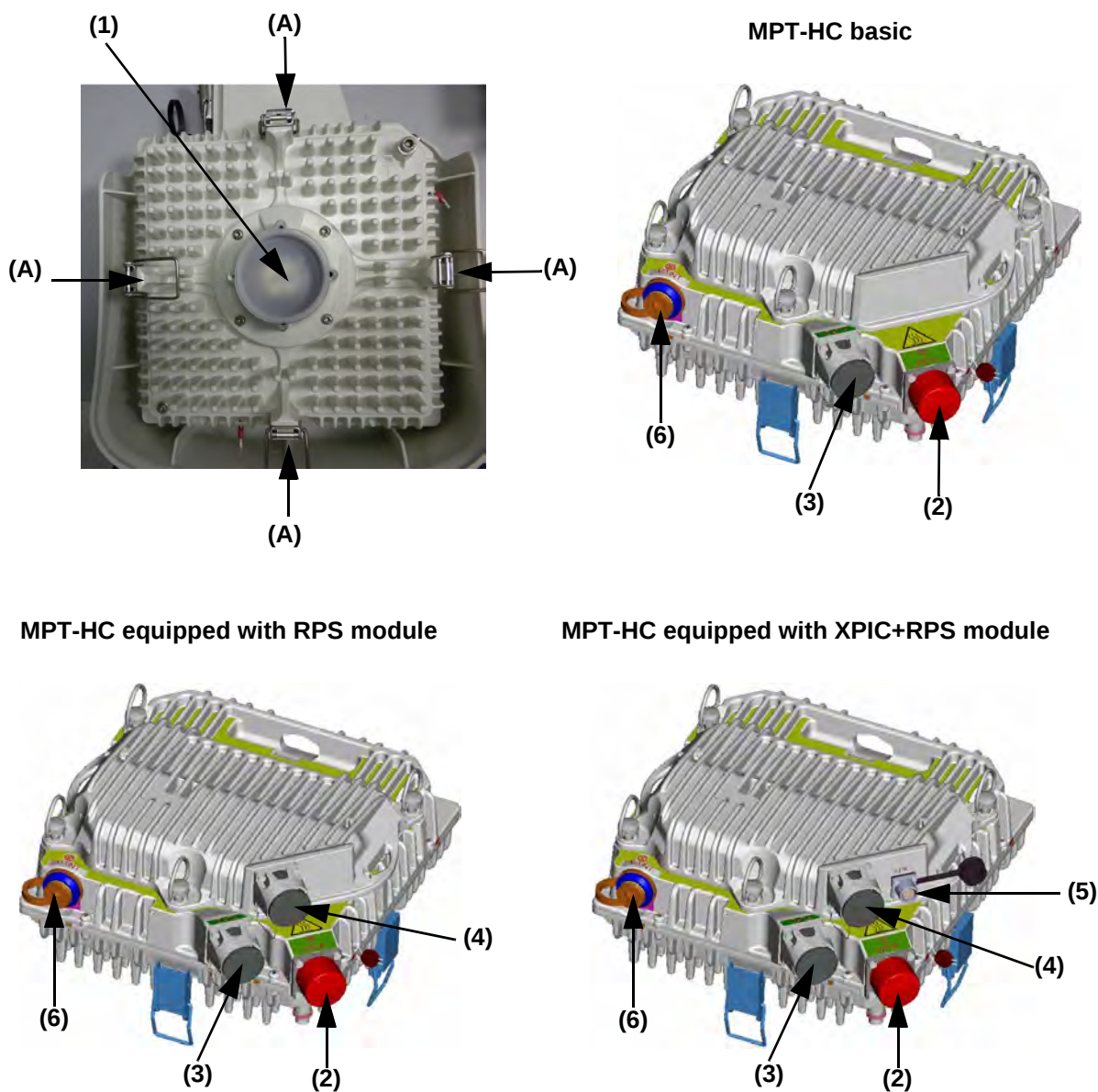
[1] RF interface for connection to antenna or coupler. The plastic cover is removed during installation.

WARNING: A waterproof tape is glued on the waveguide of the MPT-HC, it **MUST** never be removed.

Table 119-C. MPT-HC/XP: RF interface

FREQUENCY GHz	6	7	8	11	15	18-23	38
Waveguide Type	WR137	WR112	WR112	WR75	WR62	WR42	WR28

Figure 119-6. Views of MPT-HC with embedded diplexer (6, 11-38 GHz)

**REFERENCE
NUMBER**

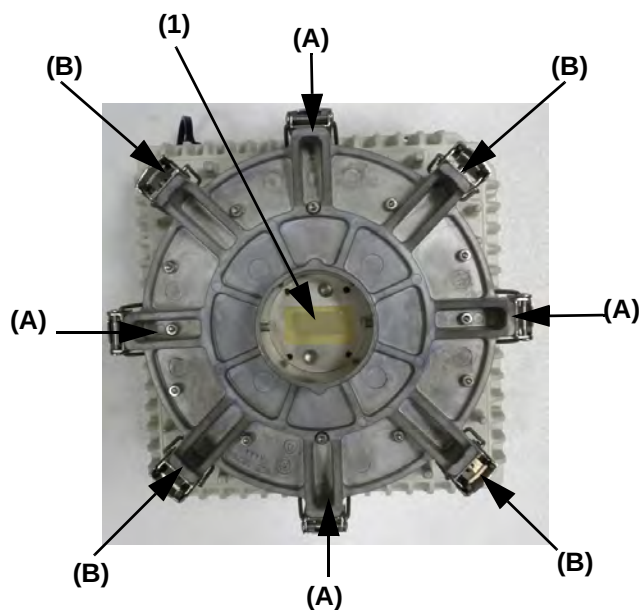
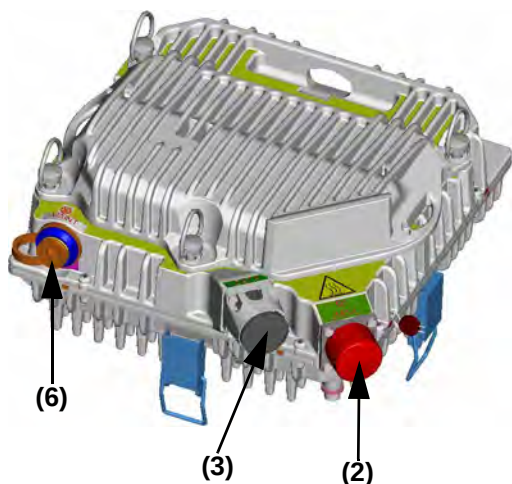
- (A) Locking hooks **(4)** to fix/unfix MPT-HC assembly to antenna or coupler
 (1) RF interface for connection to antenna or coupler

INTERFACE

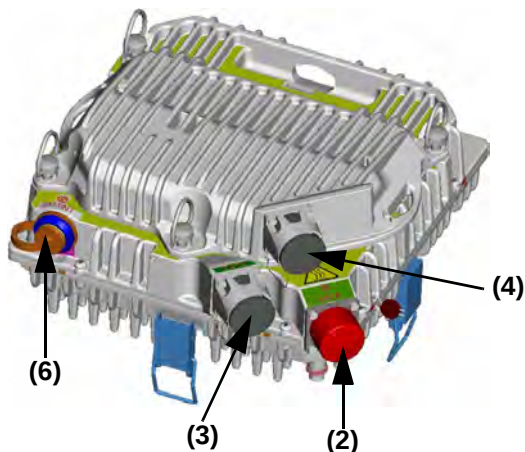
WARNING: Possibility of equipment damage. A waterproofness tape is glued on the waveguide of the MPT-HC. It must never be removed.

Figure 119-7. Views of MPT-HC/XP/9558HC with external diplexer (5.8 to 8 GHz)

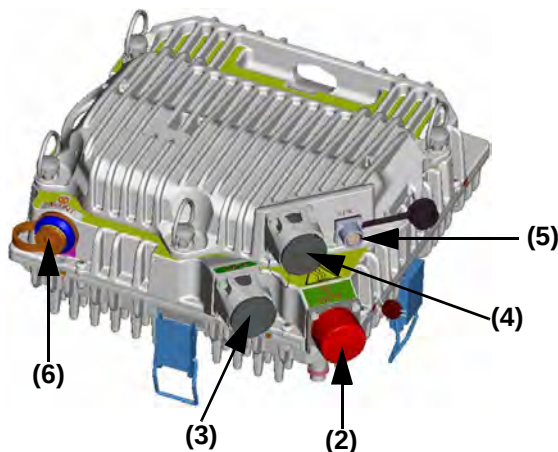
MPT-HC/XP basic



MPT-HC/XP equipped with RPS module



MPT-HC/XP equipped with XPIC+RPS mod-



REFERENCE NUMBER

- (A) 4 locking hooks to fix/unfix branching assembly (diplexer) to transceiver
- (B) 4 locking hooks to fix/unfix branching assembly (diplexer) to antenna or coupler
- (1) RF interface for connection to antenna or coupler

INTERFACE

WARNING: Possibility of equipment damage. A waterproofness tape is glued on the waveguide of the MPT-HC/XP. It must never be removed.

RSSI monitoring point

The RSSI is available on the maintenance LEMO connector and is used to manually align the antenna in the field.

The Higher the RSSI voltage is the better the antenna is aligned.

Table 119-H. RSSI table

UNITS	MEASUREMENT (with MPT-HC/XP)									
BNC (Vdc)	5	4.71	4.12	3.5	2.9	2.3	1.71	1.11	0.59	0.14
RSSI (dBm)	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100

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AUX auxiliary card

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18236AB	AUX Auxiliary Card	N/A	N/A	N/A	Active

Features and application notes

- Housekeeping alarm points (six station alarm inputs and seven station control outputs)
 - User provisionable alarm labels
 - User provisionable polarity (Active Low/Active High)
- Hardware support for EOW. EOW is not supported in 9500 MPR-A R4.1.0.
- Hardware support for two 64 Kb/s, RS422/V.11 DCE co-directional service channels. Service channels are not supported in 9500 MPR-A R4.1.0.
- One AUX card supported per MSS shelf. In the MSS-4 shelf, AUX card is supported in slot 4 only. In the MSS-8 shelf, AUX card is supported in MSS-8 shelf slot 8 only.

Description

The AUX card provides thirteen housekeeping alarm points, six station alarm inputs and seven station control outputs. Housekeeping alarm points support user provisionable alarm labels on a per alarm basis. User provisionable alarm active polarity on a per alarm basis.

Indicators, connectors, and control

The AUX card has the following indicators, connectors, and controls.

See Figure [120-1](#) for AUX card front panel indicator and connector locations.

Refer to Table 120-A for AUX card indicators details.

Refer to Table 120-B for AUX card connector details.

Figure 120-1. AUX card (MSS/AUX)

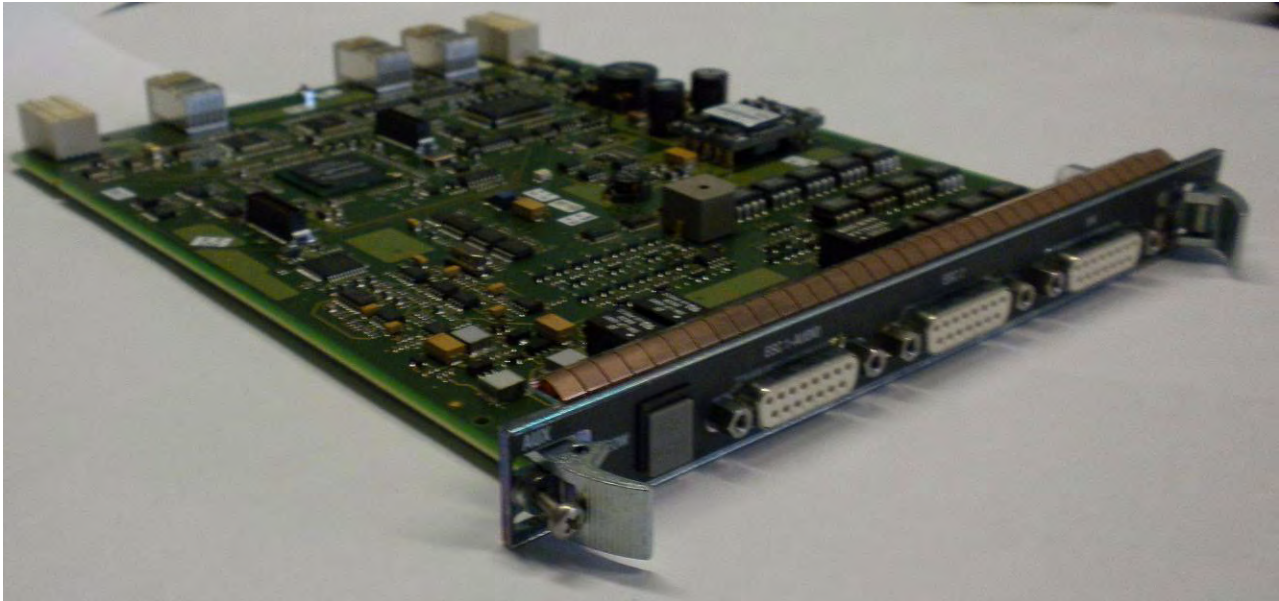


Table 120-A. AUX front panel indicator details

INDICATOR	STATUS	DEFINITION
Status (S)	Off	Card not equipped, not provisioned, or not powered
	Green Blinking	Download, Software Booting, or Flash Card Realignment in Process
	Green	In-Service, Normal Operation, and Properly Provisioned
	Yellow	In Protect, Properly Provisioned as EPS
	Red	Card Fail
	Red Blinking	Card Mismatch
EOW Line Status (E)	Off	EOW Line Status LED is not supported in R4.1.0
	Yellow	The EOW line is engaged.
	Yellow Blinking	An acknowledgement of call (in Selective Call or Conference Call) in progress
	Green	The EOW Line is free.

Table 120-B. AUX front panel connector details

CONNECTOR	TYPE	FUNCTION
Service Channel 1 ¹	15-Position D-Sub Female	64 Kb/s, RS422/V.11 DCE Co-Directional Service Channel 1
Service Channel 2 ¹	15-Position D-Sub Female	64 Kb/s, RS422/V.11 DCE Co-Directional Service Channel 2
Housekeeping	15-Position D-Sub Female	Housekeeping Alarm Points: 6 Station Alarm Inputs and 7 Station Control Outputs
EOW ²	TBD	EOW

[1] Service channel 1 and 2 are not supported in 9500 MPR-A version R4.1.0.

[2] EOW is not supported in 9500 MPR-A version R4.1.0.

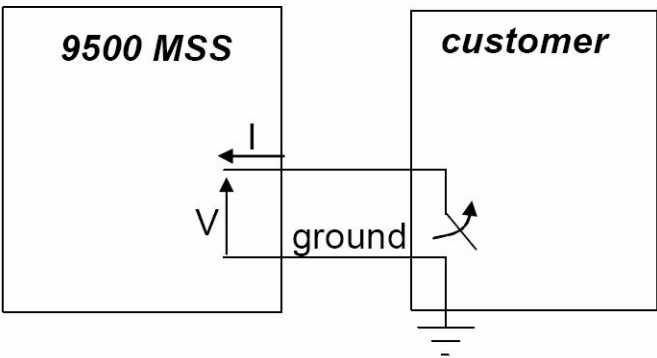
Functional overview

Housekeeping station alarm inputs

The polarity of each input housekeeping alarm input is configurable using the ECT/NMS. When the active state of an alarm input is configured high (open contact) the voltage on the input is high. When the active state of an alarm input is configured low (closed contact) the voltage on the input is low. The default value is low (closed contact).

The polling rate of the input alarms is 1 second, no latch of input state is performed.

Figure 120-2. Housekeeping alarm polarity



Housekeeping station alarm input electrical characteristics

Open Contact: $2V < |V| < 60 V$; $|I| < 0.2mA$

Closed Contract: $0V < |V| < 2 V$; $|I| < 50mA$

Though the housekeeping equipment requirement on max input voltage is 60 V, the PCB layout of peripheral must be able to manage 72 V.

By default the presence of active alarm corresponds to closed relay contact with a common wire available to the customer. By CT/NMS it is possible to change the polarity independently for each alarm (both normally closed and normally open contacts are available on the I/O connector).

When the power supply is down (and also when the power supply is on but the SW hasn't yet initialized the HW), all the relays of the outputs of the alarms/housekeeping are in the "open contact" state (HW default condition).

Output alarm electrical characteristics

Open Contact: $2V < |V| < 60 V$; $|I| < 0.2mA$

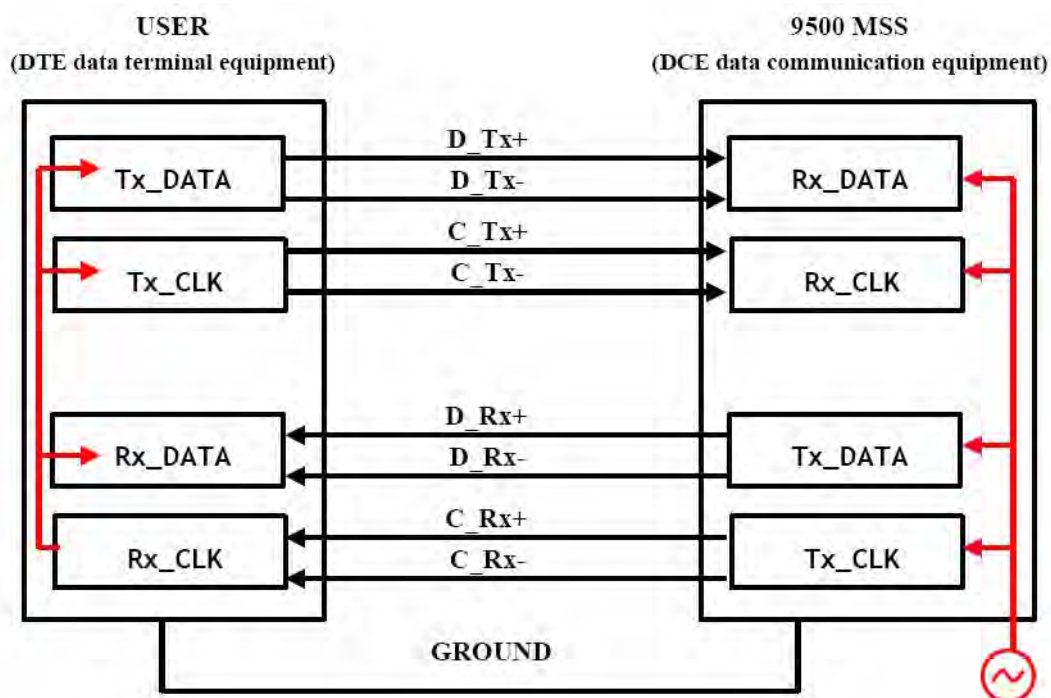
Closed Contract: $0V < |V| < 2 V$; $|I| < 50mA$

Though the housekeeping equipment requirement on max input voltage is 60 V, the PCB layout of peripheral must be able to manage 72 V.

Synchronous 64 Kb/s RS422/V.11 DCE co-directional

The service channel interface is DCE co-directional definition where it is possible to assume that the timing signals are equal in both the directions: the subordinate equipment (DTE) has to synchronize the output data with the unique timing signal received.

The NEs at either end of a service channel must be synchronized to the same Network Element Clock (NEC) in each MSS node.

Figure 120-3. 64 Kb/s service channel DCE co-directional

UDS-121

Power injector

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3CC50128AA	Power Injector Card	N/A	N/A	N/A	Active
3CC50129AA	Power Injector Box	N/A	N/A	N/A	Active
3DB77008AC	Power Injector Bracket	N/A	N/A	N/A	Active

Features and application notes

- Allows a single electrical Ethernet cable run between the MSS-4/8 shelf and the MPT-HC Transceiver mounting location.
- Redundant DC power inputs from -48V battery
- Low pass filtering
- Insertion of the DC voltage on two Ethernet streams to power two MPT-HCs
- Surge protection on both Ethernet output ports (K44 & K45)
- The maximum cable length is 100 meters.

Description

The Power Injector is an indoor device designed to deliver the DC power supply to MPT-HC by using the same cable carrying the Ethernet traffic.

MPT- HC is powered through an electrical Ethernet cable from the Power Injector.

The Power Injector box/Card combines the Ethernet traffic and DC power and sends the output on one connector the Power Supply + Ethernet Traffic. This solution is called PFoE (Power Feed over Ethernet), and is proprietary.

Power Injector box is stand-alone box, powered through two connectors on the front providing power supply redundancy. The box can be mounted in a rack by means of a separate bracket. The bracket can support two boxes side by side with a height of 1.3 rack increments.

Power Injector Card installs in any unused MSS-4/8 shelf slot, powered through MSS-4/MSS-8 shelf backplane connector.

The Power Injector can supply up to 2 MPT-HC.

The two Power Supply Sources provide power supply redundancy.

The input voltage range is -38.4 to -57.6 Vdc.

Indicators, connectors, and control

Power injector box

The Power Injector Box has no controls.

The Power Injector Box has two indicators which indicate the presence of DC voltage on their respective Ethernet output.

See Figure 121-1 for Power Injector Box front panel connector locations.

See Figure 121-2 for Power Injector Box and bracket mounted in a rack.

Refer to Table 121-A for Power Injector box connector details.

Figure 121-1. Power injector box

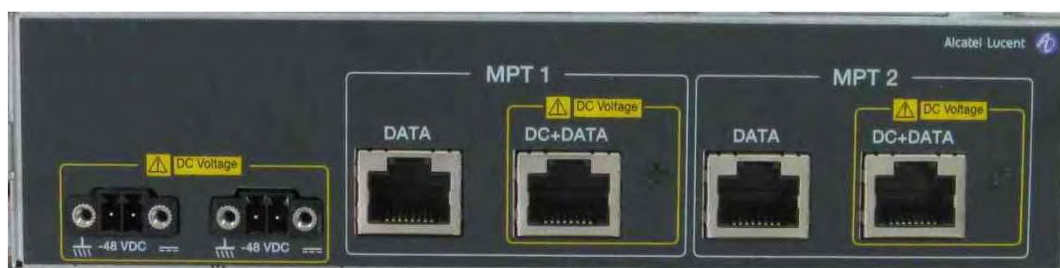


Figure 121-2. Power injector box and bracket

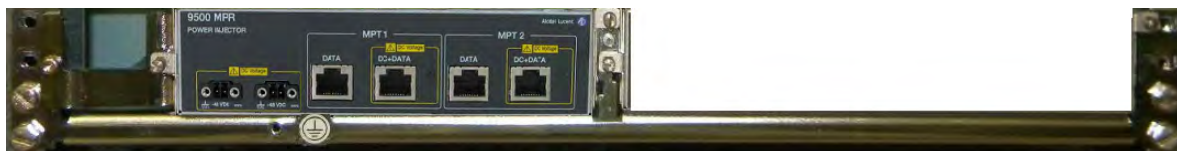


Table 121-A. Power injector box connector details

CONNECTOR	TYPE	FUNCTION
DC Voltage (+ & -)		Station Battery and Return
Data (MPT1 & MPT2)	RJ-45	Ethernet interconnect
Power+Data (MPT1 & MPT2)	RJ-45	Ethernet and DC power Interconnect with MPT-HC
Station Ground		Chassis ground (located on the Injector Box Bracket)

Power injector card

The Power Injector Card has no controls.

The Power Injector Card has two indicators which indicate the presence of DC voltage on their respective Ethernet output.

See Figure 121-1 for Power Injector Card front panel connector and indicator locations.

Refer to Table 121-B for Power Injector box connector details.

Figure 121-3. Power injector card



Table 121-B. Power injector card indicator connector details

CONNECTOR	TYPE	FUNCTION
Data (MPT1 & MPT2)	RJ-45	Ethernet interconnect
Power+Data (MPT1 & MPT2)	RJ-45	Ethernet and DC power Interconnect with MPT-HC

UDS-122**+24/-48 volt converter**

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18862AA	+24/-48 Volt Converter (2 Converters W/Chassis)	N/A	N/A	N/A	Active
3DB18863AA	+24/-48 Volt Converter (1 Converter W/Chassis)	N/A	N/A	N/A	Active
3DB18764AA	+24/-48 Volt Converter (Spare)	N/A	N/A	N/A	Active

Features and application notes

- Converts +24 Vdc office battery voltage to -48 Vdc for +24 Vdc office applications.
- Supports redundant power configuration
- Supports MSS-8 shelf applications, up to a maximum of 348 watts including any connected ODUs (ODU300 and MPT-HC/XP).
- +24/-48 Volt Converter card requires the FAN 2U Card W/Alarms (PN 3EM23911AA).
- Keyed power cables to connect the converter card(s) to the MSS-8 shelf are included with 3DB18862AA and 3DB18863AA kits.

Description

The +24/-48 Volt Converter operates from nominal +24 Vdc office battery input and provides -48 Vdc output to the MSS-8 shelf.

Single converter card can be inserted into the converter chassis to support unprotected power configurations. Two converter cards can be inserted into the converter chassis to support redundant power configurations.

+24/-48 Volt Converter installs in MSS-8 shelf slots 4, 6, or 8.

The input voltage range is +19 to +36 Vdc.

Indicators, connectors, and control

See Figure 122-1 for +24/-48 Volt Converter card front panel indicator and connectors.

The +24/-48 Volt Converter card has the following indicators, connectors, and controls.

Refer to Table 122-A for +24/-48 Volt Converter card indicators details.

Refer to Table 122-B for +24/-48 Volt Converter card connector details.

The +24/-48 Volt Converter card has no controls.

Figure 122-1. +24/-48 volt converter card

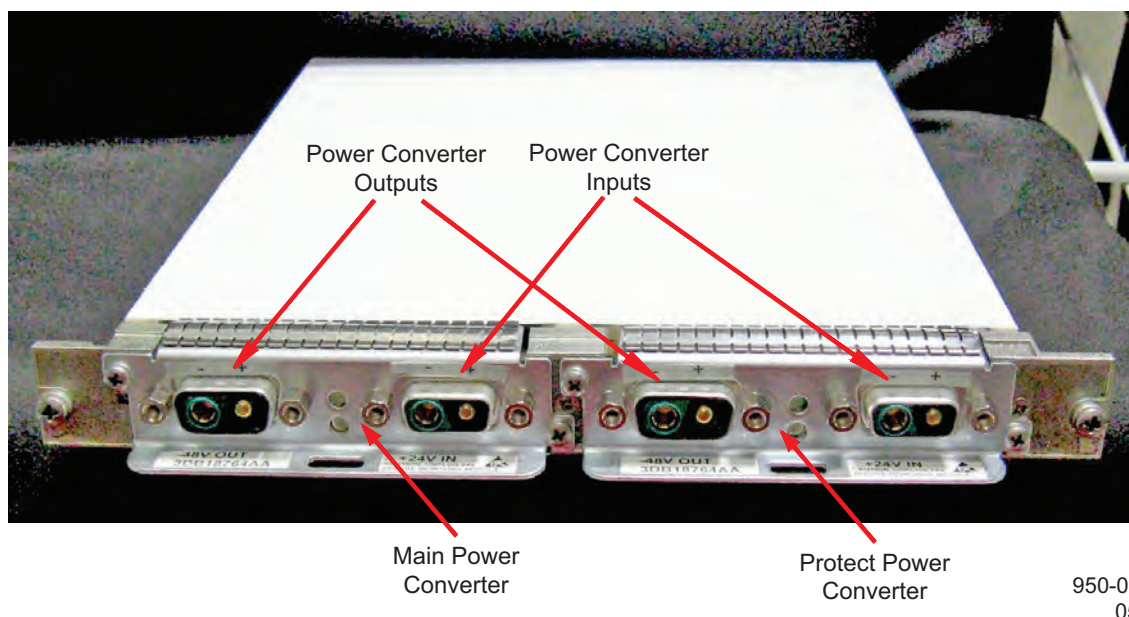


Table 122-A. +24/-48 volt converter card indicator details

INDICATOR	STATUS	DEFINITION
Status (top)	Off	Card not equipped, not powered, or hardware failure has been detected.
	Green	Normal operation (input and output)
PSU Failure Indication (bottom)	Off	Card not equipped, not powered, or no failure is detected.
	Red	PSU Failure indication detected.

Table 122-B. +24/-48 volt converter card connector details

CONNECTOR	TYPE	FUNCTION
+24 Vdc Input		Station Battery and Return
-48 Vdc Output		Ethernet interconnect

UDS-123

MPT power unit

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3CC50173AA	MPT Power Unit	N/A	N/A	N/A	Active

Features and application notes

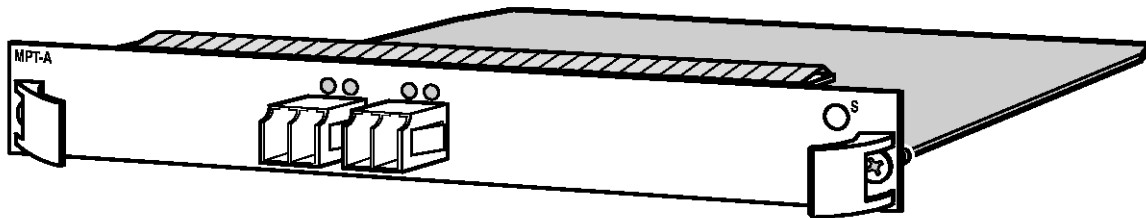
- Distributes power remotely to up to four external MPT-HC ODUs with or without XPIC
- Dual battery input provided with surge protection
- Power feed to support -48V DC on the ODU side
- In rush and short circuit protection on the ODU side
- Reverse polarity protection on the -48V Power input side
- Lightning protection on the ODU side
- Hot Swap function
- Output low-pass filter
- Power ORing feeds the board from two independent battery power lines
- Up to two units can be mounted in a 19-inch aluminum rack or 19-inch seismic rack.
- To power the ODU one mean, coaxial cable is connected to:
 - MPT Power Unit (N Connector)
 - N to Ethernet pair Pigtail (RJ45 of pair Pigtail is connected to RJ45 of MPT-HCV2)
- For data transmission, optical fiber is connected to the IDU and the MPT using optical connectors.

Description

The MPT Power Unit is designed to remotely power four external MPT ODUs through N-connector cables.

The size of the board is 198 x 150 mm. See Figure 123-1 for a front panel view of the MPT Power Unit. See Figure 123-2 for a top view of the box, and Figure 123-3 for a top view of the board.

Figure 123-1. MPT power unit front panel view



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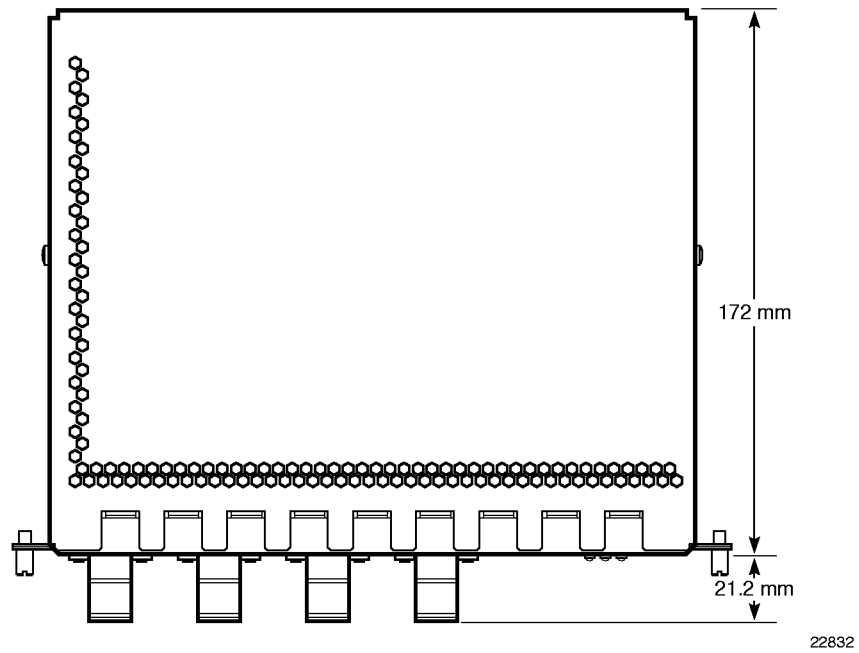
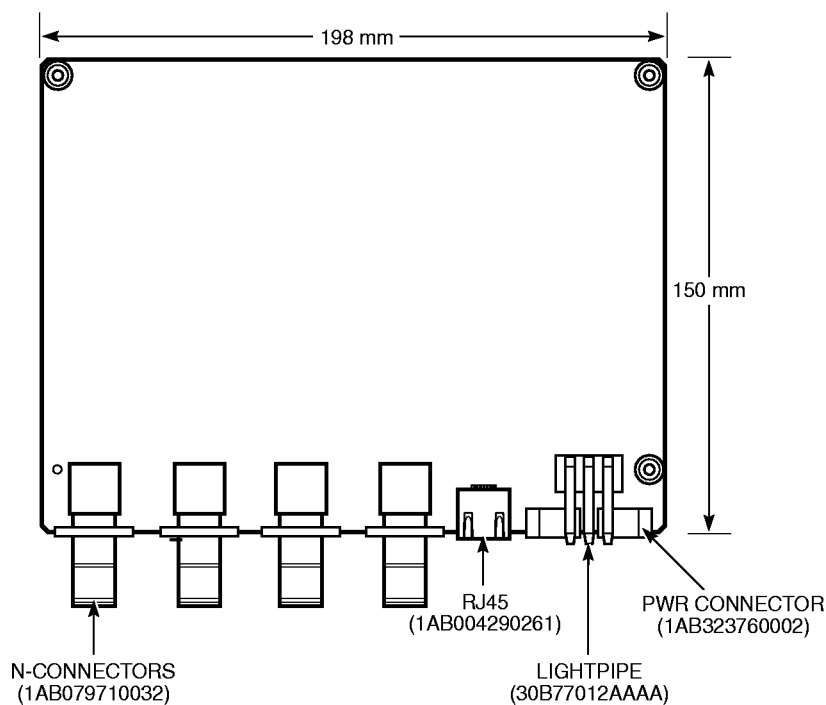
Figure 123-2. MPT power unit upper view of box

Figure 123-3. MPT power unit upper view of board



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Lightning protection

Surge protection is added on the Battery Input for compliance with ETSI EN 300 132-2 and Telcordia GR-1089-CORE. Lightning protection is added on each of the ODU Outputs for compliance with ITU-T K44 and K45.

Hot swap function

The Hot Swap function is mainly used for the following two tasks:

- Limit the In Rush current sunk by the remote ODU MPT during power-up.
- Break the current sourced by the power bar board in case of short circuit on the power link towards the remote ODU MPT.

It also accomplishes other minor tasks such as Overvoltage and Undervoltage shut down.

Operational environment requirements

The MPT Power Unit shall work in environment conditions as specified for Class 2 (protected equipment in outside environments) of GR-3108-CORE and Class 3.2 (partly temperature-controlled locations) of ETS 300 019-1-3.

The list of environmental requirements is reported in Table [123-A](#).

Table 123-A. Operational environment requirements

Operational Temperature Range	-40°C to +65°C
Humidity range	0% to 95% RH
Altitude Range	Sea Level to 4000 m
Ingress Protection Rating	IP20

The operational temperature range requirement includes power-up tests at temperature extremes.

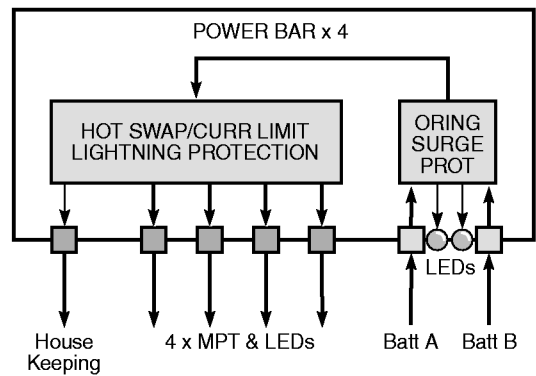
In addition to the above requirements the MPT Power Unit is also capable of withstanding occasional exposure to salt fog. No sign of corrosion shall be reported after 110 hours of exposure under standard salt fog conditions as defined in section 6.1 R6-1 of GR-3108-CORE.

Moreover, to limit fire propagation, the MPT Power Unit also meets the fire resistance criteria as specified in section 6.4 R6-18 of GR-3108-CORE and in NEBS.

Electrical overview

See Figure [123-4](#) for the block diagram of the card and its connectivity with supply and ODU equipment.

Figure 123-4. MPT power unit block diagram



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DC in interfaces

The MPT Power Unit card sinks the -48V power from the DC In interfaces to feed the remote ODU MPT units. There are two power inputs on the front side. Table 123-B describes the electrical characteristics of the DC In Interface.

Table 123-B. MPT power unit electrical characteristics of DC in interfaces

DC voltage from the battery	Voltage range	-38.4V down to -57.6V
	Typical Current	6.5 A
	Max Current	8 A
Surge protection	Standard	ETSI EN300 132-2

DC out interfaces

The DC Out interfaces are N connectors interfaces for connection to remote powered ODU MPT units. These interfaces carry the -48V DC power. Table 123-C describes the electrical characteristics of the DC Out Interface.

Table 123-C. MPT power unit electrical characteristics of DC out interfaces

DC (Remote Powering)	Voltage range	-38.4V down to -57.6V
	Current	2 A
Lightning protection	K45	

NOTE: the output voltage range indicated in Table 123-C is equal to the input voltage range. These values have to be adjusted depending on power consumption and on the number of MPTs connected, to take into account the voltage drop on the power path.

As a general consideration, considering a maximum total current of 8A, with 2A on each MPT:

- Maximum Voltage drop: 0.67 V

The minimum drop can be calculated considering only one MPT connected and thus 2A as total current consumption:

- Minimum Voltage drop: 0.44 V

Housekeeping interfaces

Housekeeping interfaces are RJ45 copper Ethernet connectors. Alarm data and common signal will be mapped. The logic for housekeeping signals is GROUND (normal operation) or TRI-STATE (fail condition).

Indicators, connectors, and control

The MPT Power Unit has the following indicators, connectors, and controls:

- 2 x Power In Connector
- 6 x Green LED
- 4 x N Connector
- 1 x RJ45 connector

Table [123-D](#) describes the electrical connections of the DC in interfaces. Table [123-E](#) describes the electrical connections of the DC out interfaces. Table [123-F](#) describes the electrical characteristics of the Housekeeping Interfaces.

Table 123-D. MPT power unit electrical connections of DC in interfaces

SIGNAL	DESCRIPTION
Power	-48V
Ground	GND

Table 123-E. MPT power unit electrical connections of DC out interfaces

PIN	N-connector	
	Signal	Description
Centre-tap	-48V	-48 V power
Shield	GND	Ground

Table 123-F. MPT power unit electrical connections of housekeeping interfaces

PIN	RJ45	
	Signal	Description
1	BATT_0_FAIL	Power FAIL from Battery 0
2	BATT_1_FAIL	Power FAIL from Battery 1
3	PRES_OUT_0	ODU Power 0 FAIL
4	PRES_OUT_1	ODU Power 1 FAIL
5	PRES_OUT_2	ODU Power 2 FAIL
6	PRES_OUT_3	ODU Power 3 FAIL
7	HK_COM	Common signal for HK
8	HK_COM	Common signal for HK

Note: The Housekeeping outputs are present on pins 7 and 8 of the RJ-45 Connector. These pins are isolated from the board Ground.

Alarm and LED behavior

The following tables summarize the alarm and LED behavior.

Table [123-G](#) describes the main causes of alarms and LEDs by VDC MPT input battery. NOTE: this table assumes that there is no short circuit or over current fault on any output MPT.

Table [123-H](#) describes VDC input battery operation ranges.

Table [123-I](#) describes the main causes of alarms and LEDs by VDC MPT output. NOTE: this table assumes that there is no short circuit or over current fault on input batteries.

Table 123-J describes DC output MPT (ODU) operation ranges.

Table 123-G. Main cases of alarms and LEDs by VDC MPT input battery

VDC Input Battery		Housekeeping alarms			LEDs		
Battery 1	Battery 2	Power Battery 1	Power Battery 2	ODU Power [1:4]	Battery A LED	Battery B LED	ODU LED [1:4]
$-38.4V < VDC < 0V$	$-38.4V < VDC < 0V$	Tri state	Tri state	Tri state	Off	Off	Off
$-38.4V < VDC < 0V$	$-57.6V < VDC < -38.4V$	Tri state	Ground	Ground	Off	Green	Green
$-57.6V < VDC < -38.4V$	$-38.4V < VDC < 0V$	Ground	Tri state	Ground	Green	Off	Green
$-57.6V < VDC < -38.4V$	$-57.6V < VDC < -38.4V$	Ground	Ground	Ground	Green	Green	Green
$-57.6V < VDC < -38.4V$	$VDC < -57.6V$	Ground	Tri state	Tri state	Green	Off	Off
$VDC < -57.6V$	$-57.6V < VDC < -38.4V$	Tri state	Ground	Tri state	Off	Green	Off
$VDC < -57.6V$	$VDC < -57.6V$	Tri state	Tri state	Tri state	Off	Off	Off

Table 123-H. VDC input battery operation ranges

Working range	$-57.6V < VDC < -38.4V$
Undervoltage	$-38.4V < VDC < 0V$
Overvoltage	$VDC < -57.6V$

Table 123-I. Main cases of alarms and LEDs by VDC MPT output (N connectors)

DC output MPT (ODU)				Housekeeping alarms				LEDs			
MPT out 1	MPT out 2	MPT out 3	MPT out 4	ODU Power 1	ODU Power 2	ODU Power 3	ODU Power 4	ODU LED 1	ODU LED 2	ODU LED 3	ODU LED 4
0A < DC < 2A	0A < DC < 2A	0A < DC < 2A	0A < DC < 2A	Ground	Ground	Ground	Ground	Green	Green	Green	Green
0A < DC < 2A	0A < DC < 2A	0A < DC < 2A	DC > 2A	Ground	Ground	Ground	Tri state	Green	Green	Green	Off
0A < DC < 2A	0A < DC < 2A	DC > 2A	0A < DC < 2A	Ground	Ground	Tri state	Ground	Green	Green	Off	Green
0A < DC < 2A	0A < DC < 2A	DC > 2A	DC > 2A	Ground	Ground	Tri state	Tri state	Green	Green	Off	Off
DC > 2A	DC > 2A	DC > 2A	0A < DC < 2A	Tri state	Tri state	Tri state	Ground	Off	Off	Off	Green
DC > 2A	DC > 2A	DC > 2A	DC > 2A	Tri state	Tri state	Tri state	Tri state	Off	Off	Off	Off

Table 123-J. DC output MPT (ODU) operation ranges

Working range	0A < DC < 2A
Short circuit or over current fault	DC > 2A

Cable length

Table [123-K](#) provides the maximum allowed cable length for a minimum input battery voltage of 40.5 V.

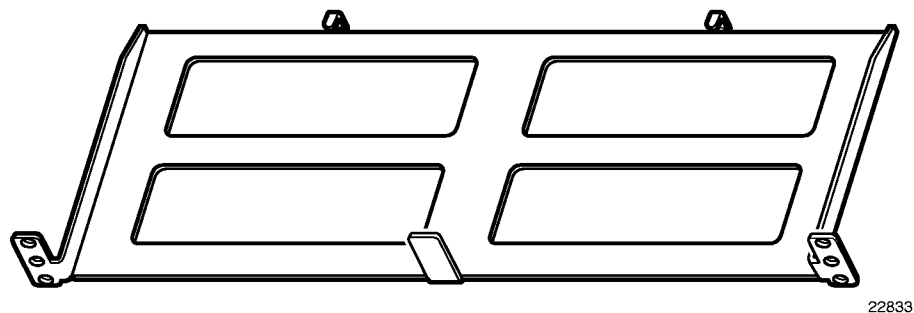
Table 123-K. Maximum allowed cable length for MPT Power Unit

Cable type		Coaxial cable 1AC001100022 Power only, data optical cable	
Configuration	Required power	Maximum length	Comment
MPT-HC V2	42 W	510 m	The MPT power unit can work at -38.4V. In that case, length should not exceed 470 m.
MPT-HC V2 with XPIC	47 W	440 m	The MPT power unit can work at -38.4V. In that case, length should not exceed 400 m.
MPT-XP	70 W	NA	Not supported
MPT-XP with XPIC	75 W	NA	Not supported

Mounting rack

A bracket is provided to mount the MPT Power Unit in a 19 inch rack. The bracket provides an attachment point for grounding, located in the central strut. The same bracket can be used to mount the MPT Power Unit. See [Figure 123-5](#).

Figure 123-5. MPT power unit mounting bracket



UDS-124**MPT Extended Power Unit**

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3CC50174	MPT Extended Power Unit	N/A	N/A	N/A	Active

FEATURES AND APPLICATION NOTES

- Feeds power to up to two external MPT-HC/XP ODUs with or without XPIC
- Dual battery input provided with surge protection
- Output voltage stabilized at -57V
- Total Output Power: 200W
- Galvanic Isolation between Battery Input and ODU Power Output
- Output Power available by means of both N-connectors and RJ-45 connectors
- Power Input capability for the following voltages:
 - +20.4VDC to +28VDC
 - -57.6VDC to -38.4VDC
- Input In-Rush and EMI filter
- Lightning protection on the ODU side
- Output Hot-Swap / Short Circuit Protection
- Input Reverse polarity protection
- Output low-pass filter
- Power ORing feeds the board from two independent battery power lines
- Up to two units can be mounted in a 19-inch aluminum rack or 19-inch seismic rack.
- There are three ways to power the ODU:
 1. Coaxial cable is connected to:
 - MPT Extended Power Unit (N connector)
 - N to Ethernet pair Pigtail (RJ45 of pair Pigtail is connected to MPT).
 - For data transmission, only optical fiber is connected on the IDU and the MPT using optical connectors.

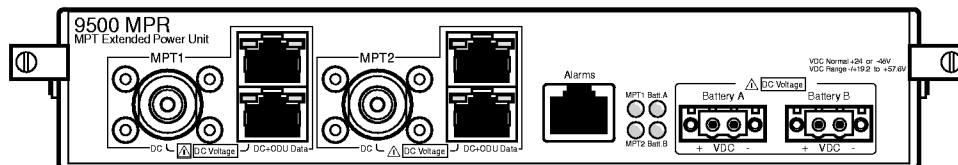
2. Ethernet cable is connected to:
 - MPT Extended Power Unit (RJ 45 connector DC ODU Data)
 - MPT (RJ45 connector)
3. Ethernet cable is connected to:
 - MPT Extended Power Unit (RJ 45 connector DC ODU Data)
 - MPT (RJ45 connector)
 - For data transmission, Ethernet cable is connected on:
 - IDU (RJ45 connector)
 - MPT Extended Power Unit (RJ 45 connector IDU Data)

DESCRIPTION

The MPT Extended Power Unit is designed to power up to two external MPT ODUs through N-connector cables and RJ-45 connectors. The power bar also uses the RJ-45 connectors to establish an Ethernet data link connection between IDU and ODU.

The size of the board is 208 x 150 mm. See Figure 124-1 for a front panel view of the MPT Extended Power Unit. See Figure 124-2 for a top view of the box, and Figure 124-3 for a top view of the board.

Figure 124-1. MPT Extended Power Unit Front Panel View



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Figure 124-2. MPT Extended Power Unit Upper View of Box

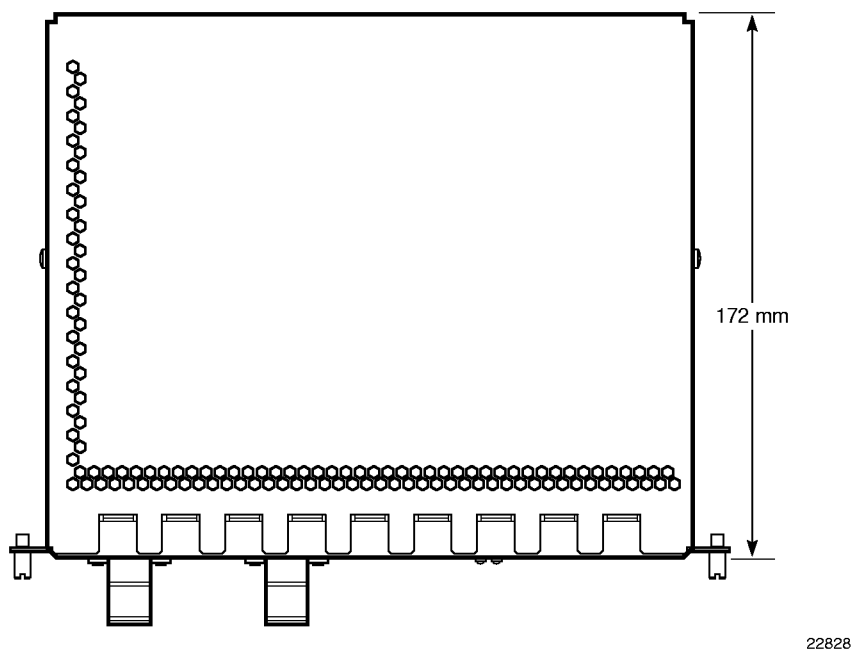
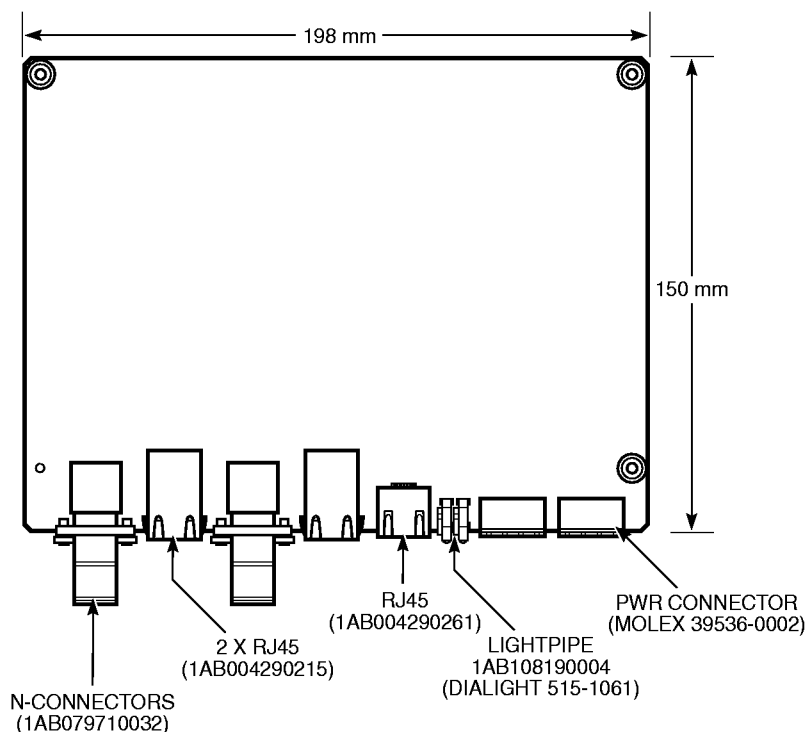


Figure 124-3. MPT Extended Power Unit Upper View of Board

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Lightning Protection

Surge protection is added on the Battery Input for compliance with ETSI EN 300 132-2 and Telcordia GR-1089-CORE. Lightning protection is added on each of the ODU Outputs for compliance with ITU-T K44 and K45.

EMI/EMC

Radiated Emission

The MPT Extended Power Unit meets the Radiated Emission criteria as described in section 3.2.1 of GR-1089 reference Class A, and in section 8.2.3 of EN 301 489-1 reference Class B.

Conducted Emission

DC In Interface Ports meet the Conducted Emission requirements as detailed in section 3.2.2 of GR-1089 and section 8.3.3 of EN 301 489-1.

Safety

The product has been designed to comply with the following safety standards:

- IEC-60950
- ETSI EN-60950
- UL-60950
- CSA-22.2

OPERATIONAL ENVIRONMENT CONDITIONS

The MPT Extended Power Unit shall work in environment conditions as specified for Class 2 (protected equipment in outside environments) of GR-3108-CORE and Class 3.2 (partly temperature-controlled locations) of ETS 300 019-1-3.

The list of environmental requirements is reported in Table [124-A](#).

Table 124-A. Operational environment requirements

Operational Temperature Range	-40°C to +65°C
Humidity range	0% to 95% RH
Altitude Range	Sea Level to 4000 m
Ingress Protection Rating	IP20

The operational temperature range requirement includes power-up tests at temperature extremes.

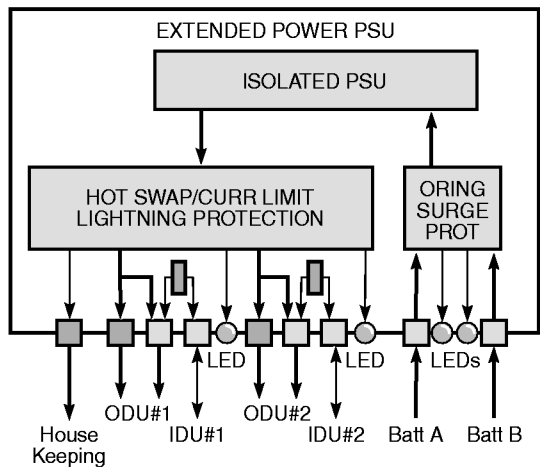
In addition to the above requirements the MPT Extended Power Unit is also capable of withstanding occasional exposure to salt fog. No sign of corrosion shall be reported after 110 hours of exposure under standard salt fog conditions as defined in section 6.1 R6-1 of GR-3108-CORE.

Moreover, to limit fire propagation, the MPT Extended Power Unit also meets the fire resistance criteria as specified in section 6.4 R6-18 of GR-3108-CORE and in NEBS.

ELECTRICAL OVERVIEW

See Figure 124-4 for the block diagram of the card and its connectivity with supply, ODU and IDU equipment.

Figure 124-4. MPT Extended Power Unit Block Diagram



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DC In interfaces

The dual battery input is provided by two DC In connectors. Table 124-B describes the electrical characteristics of the DC In Interface.

Table 124-B. MPT Extended Power Unit Electrical Characteristics of DC In Interfaces

DC voltage from the battery	Voltage range	19.2V to 57.6V
	Max Current	15 A
Surge protection	Standard	- ETSI EN300 132-2 - GR-1089-CORE

DC Out interfaces

The DC Out interfaces provide the power supply to two external MPTs (ODUs). For each ODU the power is available on N and RJ-45 connectors. Only one output (N or RJ-45) must be used to power an MPT. If an RJ-45 connector is used to power an MPT, the data coming from the other RJ-45 can be added. Table 124-C describes the electrical characteristics of the DC Out Interface.

Table 124-C. MPT Extended Power Unit Electrical Characteristics of DC Out Interfaces

ODU DC voltage	Voltage range	-57V
	Max Current	1.8 A
Lightning protection	• ITU-T K44 • ITU-T K45 • GR-1089-CORE	

RJ-45 connectors

There are two dual-stacked RJ-45 connectors.

Table 124-D describes the electrical characteristics of the dual-stacked RJ-45 connectors.

Table 124-D. MPT Extended Power Unit Electrical Characteristics of dual-stacked RJ-45 connectors

Ethernet signal	Standards	• 100 Base-T • 1000 Base-T
DC (remote powering)	Voltage range	-57V
	Current	500 mA per contact
Lightning protection	ITU-T K45	

Housekeeping interface

The housekeeping interface is a dedicated RJ-45 copper Ethernet connector. Alarm data and common signal will be mapped. The logic for housekeeping signals is GROUND (normal operation) or High Impedance (fail condition).

Table 124-E describes the electrical connections of the housekeeping interface.

Table 124-E. MPT Extended Power Unit Electrical Connections of housekeeping interface

RJ-45		
PIN	Signal	Description
1	BATT_A_FAIL	Power FAIL from Battery A
2	BATT_B_FAIL	Power FAIL from Battery B
3	PRES_OUT_1	ODU 1 Power FAIL
4	PRES_OUT_2	ODU 2 Power FAIL
5		
6		
7	HK_COM	Housekeeping Common
8	HK_COM	Housekeeping Common

Note: The Housekeeping outputs are present on pins 7 and 8 of the RJ-45 Connector. These pins are isolated from the board ground.

Main Power Supply Unit

The Main Power Supply Unit shall achieve the following tasks:

- Isolation between Battery Input and ODU Output
- Stabilization of the output voltage at -57V despite the variation of the input voltage

An Interleaved Forward Active Clamp topology is selected for this purpose. Table [124-F](#) describes the main features.

Table 124-F. MPT Extended Power Unit Interleaved Forward Clamp Topology Main Features

Topology	Interleaved Forward
Input Range	18-60V
Output Voltage	-57V
Output Power	200W
Isolation	1500V

INDICATORS, CONNECTORS, AND CONTROL

The MPT Extended Power Unit has the following indicators, connectors, and controls:

- 2 x Green LED for Battery Power presence
- 2 x Green LED for Output Power presence
- 2 x N-Connectors for Power Output
- 2 x RJ-45 Connectors for Power Output and Data In/Out from/to ODU
- 2 x RJ-45 Connectors for Data In/Out from/to IDU.
- Housekeeping output signalling through dedicated RJ-45 Connector

Table [124-G](#) describes the electrical connections of the DC In interfaces. Table [124-H](#) describes the electrical connections of the DC Out interfaces. Table [124-I](#) describes the electrical characteristics of the top section of the dual-stacked RJ-45 connector. Table [124-J](#) describes the electrical characteristics of the bottom section of the dual-stacked RJ-45 connector.

Table 124-G. MPT Extended Power Unit Electrical Connections of DC In Interfaces

SIGNAL	PIN NUMBER
Positive Supply	1
Negative Supply	2

Note: The battery ground needs to be isolated from the RJ-45 ground and N-connector ground. The RJ-45 ground and N ground must be "Chassis" grounds. This is because a surge can be delivered directly to the unit through the CAT5e outer shield. The outer shield should be coupled to the RJ-45 shield that is coupled to the metal box.

Table 124-H. MPT Extended Power Unit Electrical Connections of DC Out Interfaces

Type	Pin	Signal
N	Center Tap	-57V
	Shield	GND

Table 124-I. MPT Extended Power Unit Electrical Connections of top section of dual-stacked RJ-45 connector

PIN	Signal	Description
1	TR_DP0	IDU Data pair 0 +
2	TR_DN0	IDU Data pair 0 -
3	TR_DN1	IDU Data pair 1 -
4	TR_DP2	IDU Data pair 2 +
5	TR_DN2	IDU Data pair 2 -
6	TR_DP1	IDU Data pair 1 +
7	TR_DP3	IDU Data pair 3 +
8	TR_DN3	IDU Data pair 3 -

Table 124-J. MPT Extended Power Unit Electrical Connections of bottom section of dual-stacked RJ-45 connector

PIN	Signal	Description
1	BI_D0P	Bi-directional pair 0 + & GND
2	BI_D0N	Bi-directional pair 0 - & GND
3	BI_D1P	Bi-directional pair 1 + & GND
4	BI_D2P	Bi-directional pair 2 + & -57V
5	BI_D2N	Bi-directional pair 2 - & -57V
6	BI_D1N	Bi-directional pair 1 - & GND
7	BI_D3P	Bi-directional pair 3 + & -57V
8	BI_D3N	Bi-directional pair 3 - & -57V

Note: The shield of the dual stacked RJ-45 connector must be connected to ground; this will allow the cable shielding to be included in the return current path.

ALARM AND LED BEHAVIOR

The following tables summarize the alarm and LED behavior.

Table [124-K](#) describes the main causes of alarms and LEDs by VDC MPT input battery. Note: this table assumes that there is no short circuit or over current fault on any output MPT.

Table [124-L](#) describes VDC input battery operation ranges.

Table 124-M describes the main causes of alarms and LEDs by VDC MPT output. Note: this table assumes that there is no short circuit or over current fault on input batteries.

Table 124-N describes DC output MPT (ODU) operation ranges.

Table 124-K. Main cases of alarms and LEDs by VDC MPT input battery

VDC Input Battery		Housekeeping alarms			LEDs		
Battery 1	Battery 2	Power Battery 1	Power Battery 2	ODU Power [1:2]	Battery A LED	Battery B LED	ODU LED [1:2]
$0V < VDC < 19.2V$	$0V < VDC < 19.2V$	Tri state	Tri state	Tri state	Off	Off	Off
$0V < VDC < 19.2V$	$19.2V < VDC < 57.6V$	Tri state	Ground	Ground	Off	Green	Green
$19.2V < VDC < 57.6V$	$0V < VDC < 19.2V$	Ground	Tri state	Ground	Green	Off	Green
$19.2V < VDC < 57.6V$	$19.2V < VDC < -57.6V$	Ground	Ground	Ground	Green	Green	Green
$19.2V < VDC < 57.6V$	$VDC < -57.6V$	Ground	Tri state	Tri state	Green	Off	Off
$VDC > -57.6V$	$-57.6V < VDC < -38.4V$	Tri state	Ground	Tri state	Off	Green	Off
$VDC > -57.6V$	$VDC > -57.6V$	Tri state	Tri state	Tri state	Off	Off	Off

Table 124-L. VDC Input Battery Operation Ranges

Working range	$19.2V < VDC < 57.6V$
Undervoltage	$0V < VDC < 19.2V$
Overvoltage	$VDC > 57.6V$

Table 124-M. Main cases of alarms and LEDs by VDC MPT output (N/RJ-45 connectors)

DC output MPT (ODU)		Housekeeping alarms		LEDs	
MPT out 1	MPT out 2	ODU Power 1	ODU Power 2	ODU LED 1	ODU LED 2
$0A < DC < 1.75A$	$0A < DC < 1.75A$	Ground	Ground	Green	Green
$0A < DC < 1.75A$	$DC > 1.75A$	Ground	Tri state	Green	Off
$DC > 1.75A$	$0A < DC < 1.75A$	Tri state	Ground	Off	Green
$DC > 1.75A$	$DC > 1.75A$	Tri state	Tri state	Off	Off

Table 124-N. DC output MPT (ODU) Operation Ranges

Working range	0A < DC < 1.75A
Short circuit or over current fault	DC > 1.75A

Cable length

Table provides the maximum allowed cable length with step-up with output voltage of -53 V.

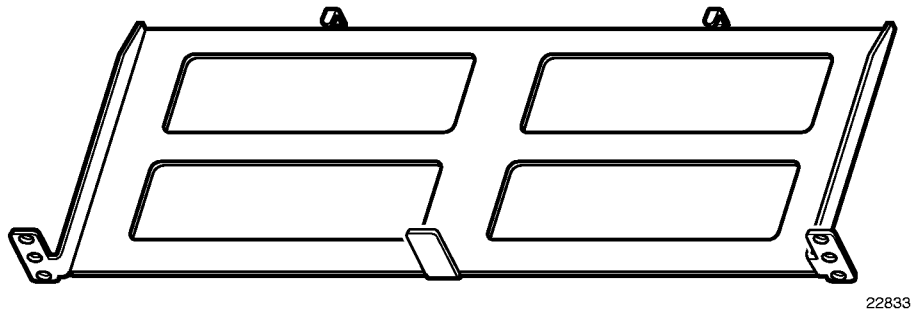
Table 124-O. Maximum allowed cable length for MPT Extended Power Unit

Cable type		Ethernet UTP 5E with outer screen and braided Power and Data on Ethernet cable	Ethernet UTP 5E with outer screen and braided Power only, Data optical cable	Coaxial cable 1AC001100022 Power only, Data optical cable
Configuration	Required power	Maximum length	Maximum length	Maximum length
MPT-HC	42 W	100 m	400 m	1100 m
MPT-HC with XPIC	47 W	100 m	350 m	1000 m
MPT-XP	70 W	100 m	170 m	480 m
MPT-XP with XPIC	75 W	100 m	130 m	360 m

MOUNTING RACK

A bracket is provided to mount the MPT Extended Power Unit in a 19 inch rack. The bracket provides an attachment point for grounding, located in the central strut. The same bracket can be used to mount the MPT Power Unit. See Figure [124-5](#).

Figure 124-5. MPT Extended Power Unit mounting bracket



UDS-125

SDHACC OC-3 SDH card

PART NUMBER/ MNEMONIC	NAME	CLEI	ECI/ BAR CODE	CPR	STATUS
3DB18735AA	SDHACC OC-3 SDH Card	N/A	N/A	N/A	Active

Features and application notes

- Terminates up to two OC-3 signals.
- Framed OC-3 Bi-Directional alarm management
- Encapsulation of OC-3 data flows into standard Ethernet packets Inter Working Function (IWF)
- Extraction of OC-3 data flows from standard Ethernet packets IWF
- Supports both unprotected and 1+1 EPS protected configurations
- MSS-8 shelf supports up to six unprotected SDHACC cards and up to three SDHACC protected pairs

Description

The SDHACC card provides 2 OC-3 interfaces. The MSS-8 shelf supports up to six SDHACC cards or 12 unprotected OC-3 interfaces or 6 protected OC-3 interfaces.

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

Indicators, connectors, and control

The SDHACC OC-3 SDH card has the following indicator and connectors.

See Figure 125-1 for SDHACC OC-3 SDH card front panel indicator and connectors.

Refer to Table 125-A for SDHACC OC-3 SDH card indicators details.

Refer to Table 125-B for SDHACC OC-3 SDH card connector details.

The SDHACC OC-3 SDH card has no controls located on the card.

Figure 125-1. SDHACC OC-3 card (MSS/SDH (OC-3)) front panel view

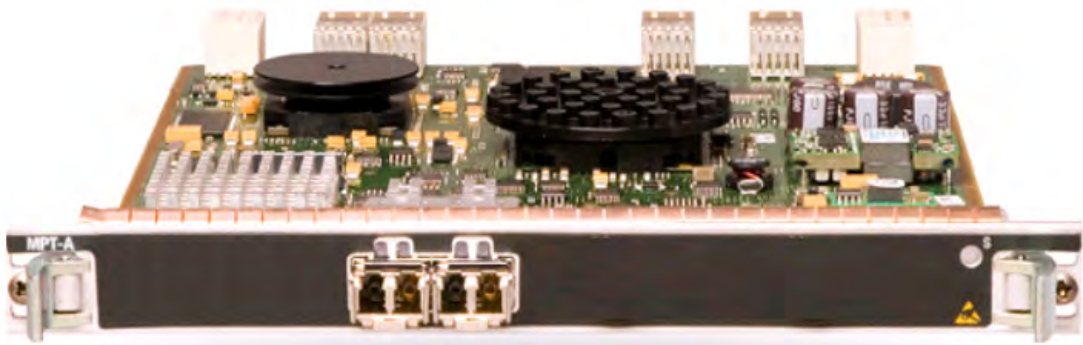


Table 125-A. SDHACC OC-3 card front panel indicator details

INDICATOR	STATUS	DEFINITION
Status (S)	Off	Card not equipped, not provisioned, or not powered
	Green Blinking	Download, Software Booting, or Flash Card 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

Table 125-B. SDHACC OC-3 card front panel connector details

CONNECTOR	TYPE	FUNCTION
SFP Port 1-2	SFP	STM-1/OC-3 electrical/optical port

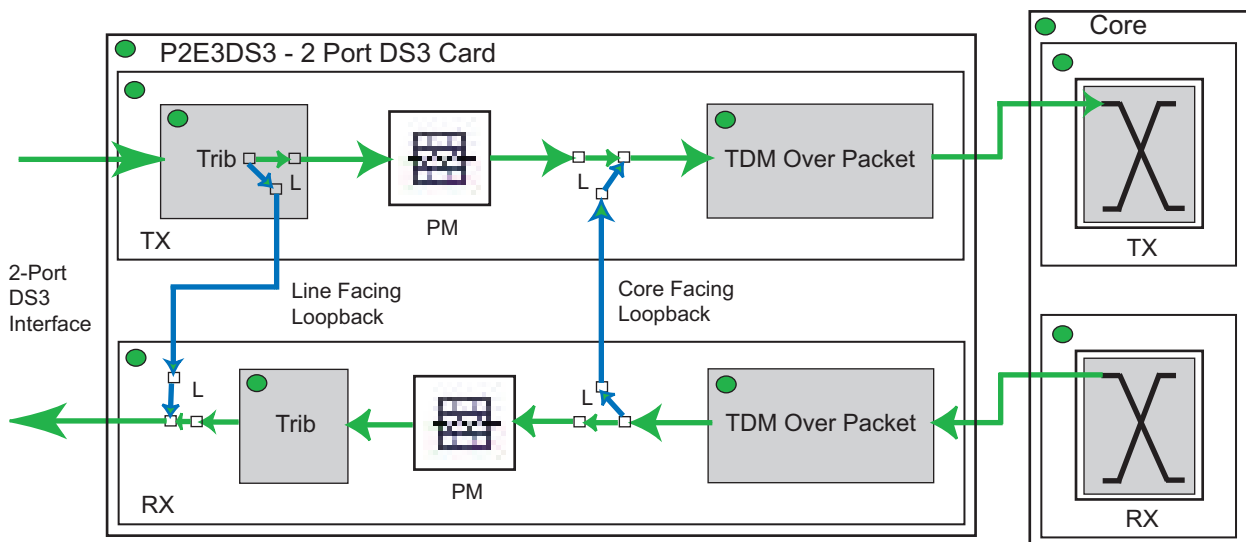
Functional overview

In the transmit direction, the SDHACC receives OC-3 signals from the customer interfaces. Encapsulates the OC-3 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 SDHACC receives Ethernet packets from the cross-connections matrix from their provisioned sources. Extracts the OC-3 data flows from standard Ethernet packets (IWF). The OC-3 signals are sent to the customer interfaces.

See figure 125-2 for a block diagram of the SDHACC.

Figure 125-2. P2E3OC-3 OC-3 block diagram Update



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Appendix A: Glossary

A

AIS - Alarm Indication Signal

AMI - Alternating Mark Inversion

ANSI - American National Standards Institute

APT - Active Problem Table

ASAP - Alarm Severity Assignment Profile

ASIC - Application Specific Integrated Circuit

ATPC - Automatic Transmit Power Control

AVC - Attribute Value Change

B

BBE - Background Block Error

BER - Bit Error Rate

BIP - Bit Interleaved Parity

C

CAS - Channel Associated Signaling

CD - Current Data

CES - Circuit Emulation Service

CESoETH - Circuit Emulation Service over Ethernet

CESoP - Circuit Emulation Services over Packet

CFA - Carrier Failure Alarm

CFM - Connectivity Fault Management

CLA - Common Loss Alarm

Core-E - Control and Switching Module

CoS - Class of Service

CRC - Cyclic Redundancy Check

CRU - Clock Reference Unit

CSM-E - Control and Switching Module (Core-E card)

CT - Craft Terminal

D

DL - Data Link

DS - Differentiated Services

E

EAS - Ethernet Access Switch Card

ECID - ECID (Emulation IDentification) is a network unique 8-bit code identifier used along with V-Lan to identify and switch individual DS1/DS3/OC-3 lines through the Core-E.

ECT - Equipment Craft Terminal

EFC - Ethernet Flow Control

EFD - Event Forwarding Discriminator

EOW - Engineering Order Wire

EPS - Equipment Protection Switching

ERP - Ethernet Ring Protection

ES - Errored Second

ESMC - Ethernet Synchronization Message Channel

ETH - EThernet

ETSI - European Telecommunications Standards Institute

EW - Early Warning

F

F - Framing

FAS - Frame Alignment Signal

FCS - Frame Check Sequence

FD - Frequency Diversity

FE - Fast Ethernet

FEC - Forward Error Correction

FPGA - Field Programmable Gate Array

G

GFP - Generic Frame Protocol

GNE - Gateway Network Element

H

HBER - High Bit Error Ratio

HD - History Data

HDB3 - High Density order 3 Bipolar encoding

HET - Hetero frequency

HS - Hitless Switch

HSB - Hot Stand-By

I

IDU - InDoor Unit

IM - Information Model

IP - Internet Protocol

ISPB - Intra Shelf Parallel Switching

IWF - Interworking Function

J

JA - Jitter Attenuator

JTAG - Joint Test Action Group

JUSM - Java User-based Security Model

K

L

LAN - Local Area Network

LAPD - Link Access Procedure on D-channel

LBER - Low Bit Error Ration

LIM - Link Identifier Mismatch

LIU - Line Interface Unit

LOF - Loss Of Frame

LOS - Loss Of Signal

M

MAC - Medium Access Control

MAU - Medium Attachment Unit

MEF - Metro Ethernet Forum

MEN - Metro Ethernet Network

MIB - Management Information Base

MOD300 (MD300) - Radio (Modem) Card

MPR - Microwave Packet Radio

MPT - Microwave Packet Transport

MRTIE - Maximum Relative Time Interval Error

MSOH - Multiple Section OverHead

MSS - Microwave Service Switch

MTIE - Maximum Time Interval Error

MXC - Microwave Cross Connect

N

NE - Network Element

NEC - Network Element Clock

NEtO - Network Element Overview

NMS - Network Management System

NNI - Network Node Interface

NRZ - Not Return to Zero

NSA - Not Service Affecting

NTP - Network Time Protocol

O

OC - ODU Controller

ODU - Outdoor Unit

OFS - Out of Frame Second

OH - OverHead

OMS - Operations Management System

OOF - Out Of Frame

OS - Operation System

OSPF - Open Short Path First

P

P2E3DS3 - Two port DS3 PDH Interface Card

P8ETH - Eight port Ethernet Access Switch Card

P32E1DS1 - Thirty-two port DS1 PDH Interface Card

PDH - Plesiochronous Digital Hierarchy

PDU - Protocol Data Unit

PLM - PayLoad Mismatch

PM - Performance Monitoring

PNU - Packet Node Unit

PPM - Part Per Million

PRBS - Pseudo Random Binary Sequence

PRS - Clock Primary Reference Source Clock

PSU - Power Supply Unit

PTU - Packet Transport Unit

Q

QoS - Quality of Service

R

R-APS - Ring Automatic Protection Switching

RAI - Remote Alarm Indication

RDI - Remote Defect Indication

REI - Remote Error Indication

RFC - Remote Frequency Control

RI - Remote Inventory

RPL - Ring Protection Link

RPS - Radio Protection Switching

RSOH - Regenerator Section Over-Head

RSL - Receive Signal Level

RTPC - Remote Transmit Power Control

RTU - Right To Use

S

SA - Service Affecting

SD - Space Diversity

SDH - Synchronous Digital Hierarchy

SDHACC - Two port OC-3 SDH Interface Card

SerDes - Serializer / Deserializer

SES - Severely Errored Second

SF - Signal Fail

SNMP - Simple Network Management Protocol

SP - Spare

SPI - Serial Peripheral Interface

SW - Software

SWP - Software Package

Symbol Rate - The number of symbol changes (signalling events) made to the transmission medium per second using a digitally modulated signal or a line code. Also known as *baud rate* or *modulation rate*.

T

TBI - Ten Bit Interface

TCA - Threshold Crossing Alarm

TCO - Total Cost of Ownership

TD - Threshold Data

TDEV - Time Deviation

TDF - Total Discarded Frames

TDM - Time Division Multiplexed

TDM2ETH - Time Division Multiplexed To Ethernet

TDM2TDM - Time Division Multiplexed To Time Division Multiplexed

TIM - Trace Identifier Mismatch

TMN - Telecommunication Management Network

TPS - Tx Protection Switching

TRCF - Total Received Correct Frames

TRCO - Total Received Correct Octets

TRSEF - Total Received Service Errored Frames

TS - Time Slot

TSM - Transmission Systems Manager

TTF - Total Transmitted Frames

TTO - Total Transmitted Octets

TTP - Trail Termination Point

U

UAS - UnAvailable Second

UAT - UnAvailable Time

UI - Unit Interval

V

VC-n - Virtual Container - n

VLAN - Virtual Local Area Network

W

WebEML - Web Element Manager Layer. A set of Java applications (Craft Terminal) containing NEtO and JUSM.

WK - Working

X

XPIC - Cross Polar Interference Cancellor

Y

Z

ZBTSI - Zero Byte Time Slot Interchange

Appendix B: 9500 MPR-A RF band channel plans

9500 MPR-A channel plan

- B.1** Refer to Table [B-A](#) for detailed 9500 MPR-A [Unlicensed band: 65 MHz separation, channel plan](#) information.
- B.2** Refer to Table [B-B](#) for detailed 9500 MPR-A [Unlicensed band: 64 MHz separation, channel plan](#) information.
- B.3** Refer to Table [B-C](#) for detailed 9500 MPR-A [Lower 6 GHz: 252.04 MHz separation, 10/30 MHz channel plan](#) information.
- B.4** Refer to Table [B-D](#) for detailed 9500 MPR-A [Lower 6 GHz: 252.04 MHz separation, 30 MHz split C channel plan](#) information.
- B.5** Refer to Table [B-E](#) for detailed 9500 MPR-A [Lower 6 GHz: 252.04 MHz separation, 30 MHz Split U channel plan](#) information.
- B.6** Refer to Table [B-F](#) for detailed 9500 MPR-A [Lower 6 GHz: 252.04 MHz separation, 5 MHz channel plan](#) information.
- B.7** Refer to Table [B-G](#) for detailed 9500 MPR-A [Upper 6 GHz: 160/170 MHz separation, channel plan](#) information.
- B.8** Refer to Table [B-H](#) for detailed 9500 MPR-A [Upper 6 GHz: 340 MHz separation, channel plan](#) information.
- B.9** Refer to Table [B-I](#) for detailed 9500 MPR-A [7 GHz: 175 MHz separation, Canada Industry \(Sub-Plan I\) channel plan](#) information.
- B.10** Refer to Table [B-J](#) for detailed 9500 MPR-A [7 GHz: 150 MHz separation, Canada Industry \(Sub-Plan II\) channel plan](#) information.
- B.11** Refer to Table [B-K](#) for detailed 9500 MPR-A [8 GHz: 300 MHz separation, Canada Industry channel plan](#) information.
- B.12** Refer to Table [B-L](#) for detailed 9500 MPR-A [11 GHz: 490/500 MHz separation, channel plan](#) information.
- B.13** Refer to Table [B-M](#) for detailed 9500 MPR-A [15 GHz: 475 MHz separation, Canada Industry channel plan](#) information.

PRELIMINARY

B.14 The following tables define 9500 MPR-A channel plan for 15 GHz industry Canada band with 490/500 MHz separation. Refer to Table B-N for a detailed [15 GHz: 490/475 MHz Separation Channel Plan](#).

B.15 The following tables define 9500 MPR-A channel plan for 15 GHz industry Canada band with 640 MHz separation. Refer to Table B-O for a detailed [15 GHz: 640 MHz Separation, Channel Plan](#).

B.16 Refer to Table B-P for detailed 9500 MPR-A [18 GHz: 1560 MHz separation, channel plan](#) information.

B.17 Refer to Table B-Q for detailed [23 GHz: 1200 MHz separation, channel plan](#).

B.18 The following tables define 9500 MPR-A channel plan for 26 GHz industry Canada band with 1008 MHz separation. Refer to Table B-R for a detailed [26 GHz: 1008 MHz Separation, Channel Plan](#).

B.19 The following table define 9500 MPR-A channel plan for 38 GHz band with 700 MHz separation. Refer to Table tba for a detailed tba.

Table B-A. Unlicensed band: 65 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		
	30 MHz	10 MHz	5 MHz		30 MHz	10 MHz	5 MHz
5730.0	G3	G1	G1	5795.0	G3'	G1'	G1'
5735.0		G2	G2	5800.0		G2'	G2'
5740.0		G3	G3	5805.0		G3'	G3'
5745.0		G4	G4	5810.0		G4'	G4'
5750.0		G5	G5	5815.0		G5'	G5'
5755.0				5820.0			
5760.0	B3	B1	B1	5825.0	B3'	B1'	B1'
5765.0		B2	B2	5830.0		B2'	B2'
5770.0		B3	B3	5835.0		B3'	B3'
5775.0		B4	B4	5840.0		B4'	B4'
5780.0		B5	B5	5845.0		B5'	B5'

Table B-B. Unlicensed band: 64 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		
	30 MHz	10 MHz	5 MHz		30 MHz	10 MHz	5 MHz
5730.5	G3	G1	G1	5794.5	G3'	G1'	G1'
5735.5		G2	G2	5799.5		G2'	G2'
5740.5		G3	G3	5804.5		G3'	G3'
5745.5		G4	G4	5809.5		G4'	G4'
5750.5		G5	G5	5814.5		G5'	G5'
5755.5				5819.5			
5760.5	B3	B1	B1	5824.5	B3'	B1'	B1'
5765.5		B2	B2	5829.5		B2'	B2'
5770.5		B3	B3	5834.5		B3'	B3'
5775.5		B4	B4	5839.5		B4'	B4'
5780.5		B5	B5	5844.5		B5'	B5'

Table B-C. Lower 6 GHz: 252.04 MHz separation, 10/30 MHz channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	30 MHz	10 MHz		30 MHz	10 MHz
5935.320	L6.B1.L	L6.D1.L	6187.360	L6.B1.H	L6.D1.H
5945.200		L6.D2.L	6197.240		L6.D2.H
5955.080		L6.D3.L	6207.120		L6.D3.H
5964.970	L6.B2.L	L6.D4.L	6217.010	L6.B2.H	L6.D4.H
5974.850		L6.D5.L	6226.890		L6.D5.H
5984.730		L6.D6.L	6236.770		L6.D6.H
5994.620	L6.B3.L	L6.D7.L	6246.660	L6.B3.H	L6.D7.H
6004.500		L6.D8.L	6256.540		L6.D8.H
6014.380		L6.D9.L	6266.420		L6.D9.H
6024.270	L6.B4.L	L6.D10.L	6276.310	L6.B4.H	L6.D10.H
6034.150		L6.D11.L	6286.190		L6.D11.H
6044.030		L6.D12.L	6296.070		L6.D12.H
6053.920	L6.B5.L	L6.D13.L	6305.960	L6.B5.H	L6.D13.H
6063.800		L6.D14.L	6315.840		L6.D14.H
6073.680		L6.D15.L	6325.720		L6.D15.H
6083.570	L6.B6.L	L6.D16.L	6335.610	L6.B6.H	L6.D16.H
6093.450		L6.D17.L	6345.490		L6.D17.H
6103.330		L6.D18.L	6355.370		L6.D18.H
6113.220 ¹	L6.B7.L	L6.D19.L	6365.260 ¹	L6.B7.H	L6.D19.H
6123.100 ¹		L6.D20.L	6375.140 ¹		L6.D20.H
6132.980 ¹		L6.D21.L	6385.020 ¹		L6.D21.H
6142.870 ¹	L6.B8.L	L6.D22.L	6394.910 ¹	L6.B8.H	L6.D22.H
6152.750 ¹		L6.D23.L	6404.790 ¹		L6.D23.H
6162.630 ¹		L6.D24.L	6414.670 ¹		L6.D24.H

[1] Alternate channels set aside for narrow band systems.

Table B-D. Lower 6 GHz: 252.04 MHz separation, 30 MHz split C channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS	CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS
	30 MHz		30 MHz
5937.7875	11C	6189.8275	21C
5967.4375	12C	6219.4775	22C
5997.0875	13C	6249.1275	23C
6026.7375	14C	6278.7775	24C
6056.3875	15C	6308.4275	25C
6086.0375	16C	6338.0775	26C
6115.6875	17C	6367.7275	27C
6145.3375	18C	6397.3775	28C

Table B-E. Lower 6 GHz: 252.04 MHz separation, 30 MHz Split U channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS	CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS
	30 MHz		30 MHz
5952.6125	11U	6204.6526	21U
5982.2625	12U	6234.3025	22U
6011.9125	13U	6263.9525	23U
6041.5625	14U	6293.6025	24U
6071.2125	15U	6323.2525	25U
6100.8625	16U	6352.9025	26U
6130.5125	17U	6382.5525	27U
6160.1625	18U	6412.2025	28U

Table B-F. Lower 6 GHz: 252.04 MHz separation, 5 MHz channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS	CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS
	5 MHz		5 MHz
6110.75	L6.E1.L	6362.79	L6.E1.H
6115.69	L6.E2.L	6367.73	L6.E2.H
6120.63	L6.E3.L	6372.67	L6.E3.H
6125.57	L6.E4.L	6377.61	L6.E4.H
6130.51	L6.E5.L	6382.55	L6.E5.H
6135.45	L6.E6.L	6387.49	L6.E6.H
6140.40	L6.E7.L	6392.44	L6.E7.H
6145.34	L6.E8.L	6397.38	L6.E8.H
6150.28	L6.E9.L	6402.32	L6.E9.H
6155.22	L6.E10.L	6407.26	L6.E10.H
6160.16	L6.E11.L	6412.20	L6.E11.H
6165.10	L6.E12.L	6417.14	L6.E12.H

Table B-G. Upper 6 GHz: 160/170 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	10 MHz	5 MHz		10 MHz	5 MHz
6535 ¹	U6.D17.L				
6545 ²	U6.D1.L	U6.E1.L	6715 ²	U6.D1.H	U6.E1.H
6550		U6.E2.L	6730		U6.E2.H
6555 ²	U6.D2.L	U6.E3.L	6725 ²	U6.D2.H	U6.E3.H
6560		U6.E4.L	6740		U6.E4.H
6565	U6.D3.L	U6.E5.L	6735	U6.D3.H	U6.E5.H
6575 ¹	U6.D18.L				
6585	U6.D4.L	U6.6.L	6745	U6.D4.H	U6.6.H
6590		U6.E7.L	6750		U6.E7.H
6595	U6.D5.L	U6.E8.L	6755	U6.D5.H	U6.E8.H
6600		U6.E9.L	6760		U6.E9.H
6605	U6.D6.L	U6.E10.L	6765	U6.D6.H	U6.E10.H
6610		U6.E11.L	6770		U6.E11.H
6615	U6.D7.L	U6.E12.L	6775	U6.D7.H	U6.E12.H
6620		U6.E13.L	6780		U6.E13.H

Table B-G. Upper 6 GHz: 160/170 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	10 MHz	5 MHz		10 MHz	5 MHz
6625	U6.D8.L	U6.E14.L	6785	U6.D8.H	U6.E14.H
6630		U6.E15.L	6790		U6.E15.H
6635	U6.D9.L	U6.E16.L	6795	U6.D9.H	U6.E16.H
6640		U6.E17.L	6800		U6.E17.H
6645	U6.D10.L	U6.E18.L	6805	U6.D10.H	U6.E18.H
6650		U6.E19.L	6810		U6.E19.H
6655	U6.D11.L	U6.E20.L	6815	U6.D11.H	U6.E20.H
6660		U6.E21.L	6820		U6.E21.H
6665	U6.D12.L	U6.E22.L	6825	U6.D12.H	U6.E22.H
6670		U6.E23.L	6830		U6.E23.H
6675	U6.D13.L	U6.E24.L	6835	U6.D13.H	U6.E24.H
6680		U6.E25.L	6840		U6.E25.H
6685	U6.D14.L	U6.E26.L	6845	U6.D14.H	U6.E26.H
6690		U6.E27.L	6850		U6.E27.H
6695	U6.D15.L	U6.E28.L	6855	U6.D15.H	U6.E28.H
6700		U6.E29.L	6860		U6.E29.H
6705	U6.D16.L	U6.E30.L	6865	U6.D16.H	U6.E30.H
6710		U6.E31.L	6870		U6.E31.H

[1] Available only for emergency restoration, maintenance bypass, or other temporary fixed purposes. Such uses are authorized on a non-interference basis to other frequencies in this band.

[2] Alternate channels set aside for narrow band systems.

Table B-H. Upper 6 GHz: 340 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS	CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS
	10 MHz		10 MHz
6435	C1	6775	C'1
6445	C2	6785	C'2
6455	C3	6795	C'3
6465	C4	6805	C'4
6475	C5	6815	C'5
6485	C6	6825	C'6
6495	C7	6835	C'7
6505	C8	6845	C'8
6515	C9	6855	C'9
6525	C10	6865	C'10
6535	C11	6875	C'11
6545	C12	6885	C'12
6555	C13	6895	C'13
6565	C14	6905	C'14
6575	C15	6915	C'15
6585	C16	6925	C'16
6595 ¹	C17		
6605 ¹	C18		
6615 ¹	C19		
6625 ¹	C20		
6635 ¹	C21		
6645 ¹	C22		
6655 ¹	C23		
6665 ¹	C24		
6675 ¹	C25		

[1] Unpaired channels

Table B-I. 7 GHz: 175 MHz separation, Canada Industry (Sub-Plan I) channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	30 MHz	10 MHz		30 MHz	10 MHz
7130.00	A1	C1	7305.00	A1'	C1'
7140.00		C2	7315.00		C2'
7150.00		C3	7325.00		C3'
7160.00	A2	C4	7335.00	A2'	C4'
7170.00		C5	7345.00		C5'
7180.00		C6	7355.00		C6'
7190.00	A3	C7	7365.00	A3'	C7'
7200.00		C8	7375.00		C8'
7210.00		C9	7385.00		C9'
7220.00	A4	C10	7395.00	A4'	C10'
7230.00		C11	7405.00		C11'
7240.00		C12	7415.00		C12'

Table B-J. 7 GHz: 150 MHz separation, Canada Industry (Sub-Plan II) channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	30 MHz	10 MHz		30 MHz	10 MHz
7430.00	A5	C13	7580.00	A5'	C13'
7440.00		C14	7590.00		C14'
7450.00		C15	7600.00		C15'
7460.00	A6	C16	7610.00	A6'	C16'
7470.00		C17	7620.00		C17'
7480.00		C18	7630.00		C18'
7490.00	A7	C19	7640.00	A7'	C19'
7500.00		C20	7650.00		C20'
7510.00		C21	7660.00		C21'
7520.00	A8	C22	7670.00	A8'	C22'
7530.00		C23	7680.00		C23'
7540.00		C24	7690.00		C24'
7550.00		C25	7700.00		C25'
7560.00		C26	7710.00		C26'
7570.00		C27	7720.00		C27'

Table B-K. 8 GHz: 300 MHz separation, Canada Industry channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS	
	30 MHz	10 MHz		30 MHz	10 MHz
7730.00	A1	C1	8030.00	A1'	C1'
7740.00		C2	8040.00		C2'
7750.00		C3	8050.00		C3'
7760.00	A2	C4	8060.00	A2'	C4'
7770.00		C5	8070.00		C5'
7780.00		C6	8080.00		C6'
7790.00	A3	C7	8090.00	A3'	C7'
7800.00		C8	8100.00		C8'
7810.00		C9	8110.00		C9'
7820.00	A4	C10	8120.00	A4'	C10'
7830.00		C11	8130.00		C11'
7840.00		C12	8140.00		C12'
7850.00	A5	C13	8150.00	A5'	C13'
7860.00		C14	8160.00		C14'
7870.00		C15	8170.00		C15'
7880.00	A6	C16	8180.00	A6'	C16'
7890.00		C17	8190.00		C17'
7900.00		C18	8200.00		C18'
7910.00	A7	C19	8210.00	A7'	C19'
7920.00		C20	8220.00		C20'
7930.00		C21	8230.00		C21'
7940.00	A8	C22	8240.00	A8'	C22'
7950.00		C23	8250.00		C23'
7960.00		C24	8260.00		C24'
7970.00		C25	8270.00		C25'

Table B-L. 11 GHz: 490/500 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		
	40 MHz	30 MHz	10 MHz		40 MHz	30 MHz	10 MHz
10705.0		B1	1	11205.0		B1	1
10715.0			2	11215.0			2
10725.0			3	11225.0	A1		3
10735.0	A1		4	11235.0		B2	4
10745.0		B2	5	11245.0			5
10755.0			6	11255.0			6
10765.0			7	11265.0	A2		7
10775.0	A2		8	11275.0		B3	8
10785.0		B3	9	11285.0			9
10795.0			10	11295.0			10
10805.0			11	11305.0	A3		11
10815.0	A3		12	11315.0		B4	12
10825.0		B4	13	11325.0			13
10835.0			14	11335.0			14
10845.0			15	11345.0	A4		15
10855.0	A4		16	11355.0		B5	16
10865.0		B5	17	11365.0			17
10875.0			18	11375.0			18
10885.0			19	11385.0	A5		19
10895.0	A5		20	11395.0		B6	20
10905.0		B6	21	11405.0			21
10915.0			22	11415.0			22
10925.0			23	11425.0	A6		23
10935.0	A6		24	11435.0		B7	24
10945.0		B7	25	11445.0			25
10955.0			26	11455.0			26
10965.0			27	11465.0	A7		27
10975.0	A7		28	11475.0		B8	28
10985.0		B8	29	11485.0			29
10995.0			30	11495.0			30
11005.0			31	11505.0	A8		31
11015.0	A8		32	11515.0		B9	32
11025.0			33	11525.0			33

Table B-L. 11 GHz: 490/500 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS		
	40 MHz	30 MHz	10 MHz		40 MHz	30 MHz	10 MHz
11035.0		B9	34	11535.0			34
11045.0			35	11545.0	A9		35
11055.0	A9		36	11555.0		B10	36
11065.0		B10	37	11565.0			37
11075.0			38	11575.0			38
11085.0			39	11585.0	A10		39
11095.0	A10		40	11595.0		B11	40
11105.0		B11	41	11605.0			41
11115.0			42	11615.0			42
11125.0			43	11625.0	A11		43
11135.0	A11		44	11635.0		B12	44
11145.0		B12	45	11645.0			45
11155.0			46	11655.0			46
11165.0			47	11665.0	A12		47
11175.0	A12	B13	48	11675.0		B13	48
11185.0			49	11685.0			49
11195.0			50	11695.0			50

Table B-M. 15 GHz: 475 MHz separation, Canada Industry channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			
	40 MHz	30 MHz	20 MHz ¹	10 MHz		40 MHz	30 MHz	20 MHz ¹	10 MHz
14510			C1		14985			C'1	
14520	D1	D1			14995	D1'	D1'		
14530			C2		15005			C'2	
14550			C3		15025			C'3	
14560	D2	D2			15035	D2'	D2'		
14570			C4		15045			C'4	
14590			C5		15065			C'5	
14600	D3	D3			15075	D3'	D3'		
14610			C6		15085			C'6	
14630			C7		15105			C'7	
14640	D4	D4			15115	D4'	D4'		
14650			C8		15125			C'8	
14665				B21	15140				B'21
14670			C9		15145			C'9	
14675				B20	15150				B'20
14680	D5	D5			15155	D5'	D5'		
14685				B19	15160				B'19
14690			C10		15165			C'10	
14695				B18	15170				B'18
14705				B17	15180				B'17
14710			C11		15185			C'11	
14715				B16	15190				B'16
14720	D6	D6			15195	D'6	D'6		
14725				B15	15200				B'15
14730			C12		15205			C'12	
14735				B14	15210				B'14
14745				B13	15220				B'13
14750			C13		15225			C'13	
14755				B12	15230				B'12
14760	D7	D7			15235	D'7	D7		
14765				B11	15240				B'11
14770			C14		15245			C'14	
14775				B10	15250				B'10

Table B-M. 15 GHz: 475 MHz separation, Canada Industry channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS			
	40 MHz	30 MHz	20 MHz ¹	10 MHz		40 MHz	30 MHz	20 MHz ¹	10 MHz
14785				B9	15260				B'9
14790			C15		15275			C'15	
14795				B8	15270				B'8
14800	D8	D8			15275	D'8	D'8		
14805				B7	15280				B'7
14810			C16		15285			C'16	
14815				B6	15290				B'6
14825				B5	15300				B'5
14835				B4	15310				B'4
14845				B3	15320				B'3
14855				B2	15330				B'2
14865				B1	15340				B'1

[1] 20 MHz channels are currently not supported.

Table B-N. 15 GHz: 490/475 MHz Separation Channel Plan

[illegible]

Table B-O. 15 GHz: 640 MHz Separation, Channel Plan

[illegible]

Table B-P. 18 GHz: 1560 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
17705.0 ¹		D1 ¹	E1 ¹	u ¹	19265.0 ²		D1' ²		
17715.0 ¹				u ¹	19275.0 ²				
17720.0 ¹					19280.0 ²				
17725.0 ¹				u ¹	19285.0 ²				
17735.0 ¹				u ¹	19295.0 ²				
17745.0	C1	D2	E2	1	19305.0	C1'	D2'	E2'	1'
17755.0				2	19315.0				2'
17760.0					19320.0				
17765.0				3	19325.0				3'
17775.0				4	19335.0				4'
17785.0	C2	D3	E3	5	19345.0	C2'	D3'	E3'	5'
17795.0				6	19355.0				6'
17800.0					19360.0				
17805.0				7	19365.0				7'
17815.0				8	19375.0				8'
17825.0	C3	D4	E4	9	19385.0	C3'	D4'	E4'	9'
17835.0				10	19395.0				10'
17840.0					19400.0				
17845.0				11	19405.0				11'
17855.0				12	19415.0				12'
17865.0	C4	D5	E5	13	19425.0	C4'	D5'	E5'	13'
17875.0				14	19435.0				14'
17880.0					19440.0				
17885.0				15	19445.0				15'
17895.0				16	19455.0				16'
17905.0	C5	D6	E6	17	19465.0	C5'	D6'	E6'	17'
17915.0				18	19475.0				18'
17920.0					19480.0				
17925.0				19	19485.0				19'
17935.0				20	19495.0				20'
17945.0				21	19505.0				21'
17955.0				22	19515.0				22'

PRELIMINARY

Table B-P. 18 GHz: 1560 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
17960.0	C5	D7	E9		19520.0	C5'	D7'	E9'	
17965.0				23	19525.0				23'
17975.0				24	19535.0				24'
17985.0		C6	D8	E10	25		19545.0	D8'	E10'
17995.0	26				19555.0	26'			
18000.0					19560.0				
18005.0	27				19565.0	27'			
18015.0	E11		28	19575.0	C6'	E11'	28'		
18025.0			29	19585.0			29'		
18035.0			30	19595.0			30'		
18040.0									
18045.0	C7	D9	E12	31	19605.0	D9'	E12'	31'	
18055.0				32	19615.0			32'	
18065.0				33	19625.0			33'	
18075.0		D10	E13	34	19635.0	D10'	E13'	34'	
18080.0					19640.0				
18085.0				35	19645.0			35'	
18095.0				36	19655.0			36'	
18105.0		C8	D11	E14	37	19665.0	C8'	D11'	E14'
18115.0	38				19675.0	38'			
18120.0					19680.0				
18125.0	39				19685.0	39'			
18135.0					40	19695.0			

[1] Unpaired channels

[2] Channels are no longer available on a primary basis

Table B-Q. 23 GHz: 1200 MHz separation, channel plan

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
21205	z	y		w	22405	z'	y'		w'
21215				w	22415				w'
21220					22420				
21225			x	w	22425			x'	w'
21235				w	22435				w'
21245				w	22445				w'
21255	z	y		w	22455	z'	y'		w'
21265				w	22465				w'
21270					22470				
21275			x	w	22475			x'	w'
21285				w	22485				w'
21295				w	22495				w'
21305	z	y		w	22505	z'	y'		w'
21315				w	22515				w'
21320					22520				
21325			x	w	22525			x'	w'
21335				w	22535				w'
21345				w	22545				w'
21355	z	y		w	22555	z'	y'		w'
21365				w	22565				w'
21370					22570				
21375			x	w	22575			x'	w'
21385				w	22585				w'
21395				w	22595				w'
21405	z	y		w	22605	z'	y'		w'
21415				w	22615				w'
21420					22620				
21425			x	w	22625			x'	w'
21435				w	22635				w'
21445				w	22645				w'
21455		y		w	22655		y'		w'
21465				w	22665				w'
21470					22670				

Table B-Q. 23 GHz: 1200 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
21475	z			w	22675	z'			w'
21485			x	w	22685			x'	w'
21495				w	22695				w'
21505	z	y		w	22705	z'	y'		w'
21515				w	22715				w'
21520					22720				
21525				w	22725				w'
21535			x	w	22735			x'	w'
21545				w	22745				w'
21555				w	22755				w'
21565	z	y		w	22765	z'	y'		w'
21570					22770				
21575				w	22775				w'
21585			x	w	22785			x'	w'
21595				w	22795				w'
21605 ¹	z	y		w	22805 ¹	z'	y'		w'
21615 ¹				w	22815 ¹				w'
21620 ¹					22820 ¹				
21625 ¹				w	22825 ¹				w'
21635 ¹			x	w	22835 ¹			x'	w'
21645 ¹				w	22845 ¹				w'
21655 ¹	z	y		w	22855 ¹	z'	y'		w'
21665 ¹				w	22865 ¹				w'
21670 ¹					22870 ¹				
21675 ¹				w	22875 ¹				w'
21685 ¹			x	w	22885 ¹			x'	w'
21695 ¹				w	22895 ¹				w'
21705 ¹	z	y		w	22905 ¹	z'	y'		w'
21715 ¹				w	22915 ¹				w'
21720 ¹					22920 ¹				
21725 ¹				w	22925 ¹				w'

Table B-Q. 23 GHz: 1200 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
21735 ¹			x	w	22935 ¹			x'	w'
21745 ¹				w	22945 ¹				w'
21755 ¹	z	y		w	22955 ¹	z'	y'		w'
21765 ¹				w	22965 ¹				w'
21770 ¹					22970 ¹				
21775 ¹			x	w	22975 ¹			x'	w'
21785 ¹				w	22985 ¹				w'
21795 ¹				w	22995 ¹				w'
21805 ²				w	23005 ²				w'
21815 ²	z	y		w	23015 ²	z'	y'		w'
21820 ²					23020 ²				
21825 ²			x	w	23025 ²			x'	w'
21835 ²				w	23035 ²				w'
21845 ²				w	23045 ²				w'
21855 ²				w	23055 ²				w'
21865 ²	z	y		w	23065 ²	z'	y'		w'
21870 ²					23070 ²				
21875 ²			x	w	23075 ²			x'	w'
21885 ²				w	23085 ²				w'
21895 ²				w	23095 ²				w'
21905 ²				w	23105 ²				w'
21915 ²	z	y		w	23115 ²	z'	y'		w'
21920 ²					23120 ²				
21925 ²			x	w	23125 ²			x'	w'
21935 ²				w	23135 ²				w'
21945 ²				w	23145 ²				w'
21955 ²				w	23155 ²				w'
21965 ²		y		w	23165 ²		y'		w'
21970 ²					23170 ²				

Table B-Q. 23 GHz: 1200 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
21975 ²	z			w	23175 ²	z'			w'
21985 ²			x	w	23185 ²			x'	w'
21995 ²				w	23195 ²				w'
22005	z	y		w	23205	z'	y'		w'
22015				w	23215				w'
22020					23220				
22025				w	23225				w'
22035			x	w	23235			x'	w'
22045				w	23245				w'
22055				w	23255				w'
22065	z	y		w	23265	z'	y'		w'
22070					23270				
22075				w	23275				w'
22085			x	w	23285			x'	w'
22095				w	23295				w'
22105	z	y		w	23305	z'	y'		w'
22115				w	23315				w'
22120					23320				
22125				w	23325				w'
22135			x	w	23335			x'	w'
22145				w	23345				w'
22155	z	y		w	23355	z'	y'		w'
22165				w	23365				w'
22170					23370				
22175				w	23375				w'
22185			x	w	23385			x'	w'
22195				w	23395				w'
22205	z	y		w	23405	z'	y'		w'
22215				w	23415				w'
22220					23420				
22225				w	23425				w'
22235			x	w	23435			x'	w'
22245				w	23445				w'

Table B-Q. 23 GHz: 1200 MHz separation, channel plan (cont.)

CHANNEL FREQUENCY (MHz)	GO (RETURN) CHANNELS				CHANNEL FREQUENCY (MHz)	RETURN (GO) CHANNELS			
	50 MHz	40 MHz	30 MHz	10 MHz		50 MHz	40 MHz	30 MHz	10 MHz
22255	z	y		w	23455	z'	y'		w'
22265				w	23465				w'
22270					23470				
22275			x	w	23475			x	w'
22285				w	23485				w'
22295				w	23495				w'
22305 ¹	z	y		w	23505 ¹	z'	y'		w'
22315 ¹				w	23515 ¹				w'
22320 ¹					23520 ¹				
22325 ¹			x	w	23525 ¹			x	w'
22335 ¹				w	23535 ¹				w'
22345 ¹				w	23545 ¹				w'
22355 ¹	z	y		w	23555 ¹	z'	y'		w'
22365 ¹				w	23565 ¹				w'
22370 ¹					23570 ¹				
22375 ¹			x	w	23575 ¹			x	w'
22385 ¹				w	23585 ¹				w'
22395 ¹				w	23595 ¹				w'

[1] Alternate channels. These channels are set aside for narrow bandwidth systems and should be used only if all other channels are blocked.

[2] These frequencies may be assigned to low power systems. Low power systems are defined as, limited coverage systems in the 21.8ñ22.0 GHz and 23.0ñ23.2 GHz band segments. Notwithstanding any contrary provisions in this part, the frequency band segment 21.8ñ22.0 GHz paired with the frequency band segment 23.0ñ23.2 GHz may be authorized for low power.