

Everon™ 6000 v1.0

User Manual

CORNING



Corning Optical
Communications

www.corning.com

User Manual v1.0



Everon™ 6000 v1.0

User Manual



Preface Material

About this Manual

This manual describes how to install, use, configure and manage Corning's Everon™ 6000 1.0 platform. It includes a description of the system end-to-end first time and on-going configuration, management and maintenance.

Intended Users and Scope

This manual is intended for Corning system installers, technicians and users. It is assumed that the user is familiar with the system and its units, and understands the basic functionality of the system.

Contacting Technical Support HelpDesk

Corning technical support contact information:

email: cmatsg@corning.com

Tel: [800] 787 1266

Legal Notice

Copyright

Copyright © 2021 Corning., All Rights Reserved

Disclaimer

This document contains proprietary information of Corning and may not be reproduced in any form without the prior written consent of Corning.

No part of this document may be reproduced, translated, stored in a retrieval system or transmitted in any form and by any means, electronic, mechanical, photographic, photocopying, recording, or otherwise, without the prior written permission of Corning.

Information provided in this document is subject to change without notice and does not represent a commitment on the part of Corning.

All products and company names are trademarks or registered trademarks of their respective holders.

Software License Terms

The software and the system design is the property of Corning.

It is supplied to the user to be used solely for its stated purposes. It is strictly forbidden to make copies of the software or transfer it in any way, for any purpose, to any third party.

The license to use the software is granted to the user only for the specific system it is installed on by Corning, or its authorized distributors and representatives.



The purchaser shall not modify the software in any way.

It is strictly forbidden to use this product for any purpose other than originally designated for or stipulated by Corning.

Conventions

Important information is highlighted in a frame, as explained below:



*Warning: Actions requiring special attention to avoid serious bodily injury;
For example, working with high voltage components*



Caution: Actions requiring special attention, to avoid possible damage to equipment



Note: Hints and recommendations for working efficiently



Warranties

Hardware Warranty

Corning Optical Communications Wireless, Inc. ("Corning") warrants to the original purchaser ("Customer") that for the duration of the warranty period, one (1) year, commencing on the date of shipment of the Hardware, unless otherwise agreed in writing by Corning (the "Hardware Warranty Period"), the Hardware furnished by Corning shall be free in all material respects from defects in material and workmanship, and shall conform to the applicable portions of the Specifications, as defined below (the "Hardware Warranty"). If notified by Customer of any such defects in material or workmanship or nonconformity with applicable portions of the Specifications within the Hardware Warranty Period, Corning shall promptly, at its own election and expense, repair or replace any such Hardware proven to be defective under the terms of this Hardware Warranty. Such repair or replacement shall be Customer's sole remedy and Corning's sole obligation in the event this Hardware Warranty is invoked. If any components comprising a part of the Hardware are replaced or repaired during the Hardware Warranty Period, the Hardware Warranty Period for such repaired or replaced components shall extend to the longer of (i) the balance of the Hardware Warranty Period or (ii) three (3) months from the date of repair or replacement. For purposes of this Warranty, "Specifications" shall mean the specifications and performance standards of the Products as set forth in documents published by Corning and delivered to Customer which contain technical specifications or performance standards for the Products.

If Customer invokes this Hardware Warranty, it shall notify Corning promptly of the claimed defect. Customer will allow Corning to inspect the Hardware at Customer's location, or to return the Hardware to Corning's closest repair facility. For Hardware returned to Corning's repair facility, Customer shall be responsible for payment of all transportation and freight costs (including insurance) to Corning's repair facility, and Corning shall be responsible for all transportation and freight costs (including insurance) incurred in connection with the shipment of such Hardware to other repair facilities of Corning and/or its return to Customer. Notwithstanding the foregoing, in no event will Corning be liable for damage to Products resulting from improper handling during or after shipment, misuse, neglect, improper installation, operation or repair (other than by authorized Corning personnel), alteration, accident, or for any other cause not attributable to defects in materials or workmanship on the part of Corning. Corning shall not reimburse or make any allowance to Customer for any labor charges incurred by Customer for replacement or repair of any goods unless such charges are authorized in advance in writing by Corning.

Software Warranty

Corning warrants to the original purchaser ("Customer") that for the duration of the warranty period, one (1) year, commencing on the date of shipment of the Software, unless otherwise agreed in writing by Corning (the "Software Warranty Period"), the Software shall conform with, and perform the functions set forth in the Specifications, and shall be free from defects in material or workmanship (the "Software Warranty"). In the event the Software is proven to be defective under the terms of this Software Warranty, Corning shall correct such defects or failure and ensure that the Software conforms with, and performs the functions set forth in, the Specifications. Customer will allow Corning to inspect the Software at Customer's location or to return it to Corning's closest repair facility. Notwithstanding the foregoing, Corning shall have no obligation under the Software Warranty if the Software is modified or used with hardware or software not supplied or approved by Corning or if the Software is subject to abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling. Third-party software distributed with the Software may carry certain warranties which, to the maximum extent allowed by law, Corning hereby assigns, transfers and otherwise conveys to Customer, provided, however, that Corning itself provides no warranty of any kind, express, implied, statutory or otherwise, for any third-party software provided hereunder.

Corning does not warrant any hardware, software or services not provided by Corning. This warranty is the only warranty made by Corning and is in lieu of all other warranties, express or implied including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Corning shall not be liable for any other damage including, but not limited to, indirect, special or consequential damages arising out of or in connection with furnishing of goods, parts and service hereunder, or the performance, use of, or inability to use the goods, parts and service. Corning sales agents or representatives are not authorized to make commitments on warranty returns.

Returns

above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Corning prior to returning any unit. Advise Corning of the model, serial number, and discrepancy. The unit may then be forwarded to Corning, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Corning will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.



Limitations of Liabilities

Corning's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contract, shall in no case exceed the purchase price of the device which gives rise to the claim.

Except as expressly provided herein, Corning makes no warranty, expressed or implied, with respect to any goods, parts and services provided in connection with this agreement including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Corning shall not be liable for any other damage including, but not limited to, indirect, special or consequential damages arising out of or in connection with furnishing of goods, parts and service hereunder, or the performance, use of, or inability to use the goods, parts and service.

Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects. Examine the units for any damage that may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Corning as soon as possible in writing.

Note: Keep all packing material until you have completed the inspection.

Warnings and Admonishments

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

The equipment has been designed and constructed to prevent, as far as reasonably, practicable danger. Any work activity on or near equipment involving installation, operation or maintenance must be, as far as reasonably, free from danger.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

Equipment provided for the purpose of protecting individuals from electrical risk must be suitable for the purpose and properly maintained and used. This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding or restraining an object, animal or person from the equipment. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Where some of the abovementioned activities are required, the equipment must be handled with care to avoid being damaged. Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.



WARNINGS!

According to the device type:

- For DLRU-678, dHRU-dHPAM-7, dHRU-dHPAM-85:**
 WARNING: THIS IS A 90.219 CLASS B DEVICE. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC License to operate this device. You MUST register Part 90 Class B signal booster (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in a significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.
- For DLRU-1719232, dHRU-dHPAM-6, dHRU-dHPAM-17, dHRU-dHPAM-19, dHRU-dHPAM-23, dHRU-dHPAM-25:**
 WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC License to operate this device. Unauthorized use may result in a significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

For all devices:

Warning info: Preclude indications that the device supports home/personal use



RF Safety

To comply with FCC RF exposure compliance requirement, adhere to the following warnings:

Warning! Antennas used for this product must be fixed mounted on indoor permanent structures, providing a separation distance of at least 120 and above cm from all persons during normal operation.

Warning! Each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 380 cm or more from all persons and must not be co-located with any other antenna for meeting RF exposure requirements.

Warning! Antenna gain should not exceed 10 dBi.

Warning! The design of the antenna installation needs to be implemented in such a way so as to ensure RF radiation safety levels and non-environmental pollution during operation.

Compliance with RF Safety Requirements:

CAUTION! Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Power Requirements for DC Inputs

Warning! Only use a special DC supply cable with connector

Warning! Always keep DC IN connectors connected during the product operation

Warning! Disconnect all power from the equipment by means of an external circuit breaker before connecting or disconnecting the DC IN connectors.

➤ RF Parameters

| Frequency Range Name | Uplink | Downlink |
|----------------------------|---------------------|---------------|
| 600-band 71 | 663-698 MHz | 617-652 MHz |
| 700L (Lower Band)- band 12 | 698-716 MHz | 728-746 MHz |
| 700U (Upper Band)-band 13 | 776-787 MHz | 746-757 MHz |
| FirstNet (700)-band 14 | 788-798 MHz | 758-768 MHz |
| 800/850 -band 26 | 817-849 MHz | 862-894 MHz |
| 1900 (PCS)-band 25 | 1850-1915 MHz | 1930-1995 MHz |
| EAWS-band 66 | 1710-1780 MHz | 2110-2200 MHz |
| WCS -band 30 | 2305-2315 MHz | 2350-2360 MHz |
| 2500 -band 41 | 2496-2690 MHz (TDD) | |



Compliance with RF Safety Requirements:

Warning! Only use a special DC supply cable with connector

Warning! Always keep DC IN connectors connected during the product operation

Company Certification

Corning products have met the approvals of the following certifying organizations:

Certification

Certification No.: 88061; Certification Issue Date: 26/06/2019

Initial Certification Date: 29/04/2007; Certification Expiry Date: 24/06/2022





has issued an IQNet recognized certificate that the organization:

Golan Building, Hagolan street & Hanegev street, Airport City, Israel

Haa implemented and maintains a Quality Management System

For the following script:

Design and Development of electronic and fiber optical telecommunication and special purpose equipment.

which fulfils the requirement of the following standard:

ISO 9001:2015

| | |
|---------------------------|------------|
| Issued on: | 25/06/2019 |
| Date of initial approval: | 29/04/2007 |
| Date of expiration: | 24/06/2023 |

This certificate is directly linked to the Jiffy Partner's original certificate and shall not be used as a stand-alone document.

Registration number: IL - 88061



Author Biographies

[illegible]

¹²The list of EAP® products is available at the time of issue of this certification. Updated information is available under www.usgbc.org/certification.com.

www.sii.org.il



Licensee Contact Information

Industrial Boosters may only be used by FCC licensees or those given express (individualized) consent of license. Corning Optical Communications Wireless certifies all of the VARs listed as licensed installers for Corning. For the list of licensed VARs, please contact the Technical Support Team at: onesupport@corning.com or + (1) 833 4CORNING (833-426-7646)

About This Manual

This user manual provides all the information necessary to perform the Corning® Everon™ 6000 solutions management connections and to configure and manage all of the system elements. It also provides a detailed description of all of the management and configuration options and features for software v1.4.



Revision History

| Revision | Date | Created by | Reviewed by | Changes |
|----------|----------|---|-------------|-------------|
| 0.1 | Mar 2021 | Yoni Henya Aloomit Godfarb Gila Shmueli | Moti Shalev | First issue |
| | | | | |



Table of Contents

| | | |
|-----------|---|-----------|
| 1. | Introduction | 15 |
| 1.1 | Key Features and Capabilities | 15 |
| 1.2 | Terminology, Acronyms, and Abbreviations | 16 |
| 1.3 | Applicable Documents | 19 |
| 1.4 | Everon™ 6000 1.0 Architecture Overview | 20 |
| 1.4.1 | External Interfaces and Use Cases - Example | 20 |
| 1.4.2 | Internal sub-units | 23 |
| 2. | System Installation | 26 |
| 2.1 | Head End Units – Architecture Examples..... | 27 |
| 2.2 | Integrated Headend Unit (IHU) Installation | 29 |
| 2.2.1 | Verify Box Contents | 30 |
| 2.2.2 | IHU Interfaces and Slots..... | 33 |
| 2.2.3 | Mount the Chassis in a Rack..... | 34 |
| 2.2.4 | Install the Modules in the Chassis | 35 |
| 2.2.5 | Connect the Cables | 36 |
| 2.2.6 | Power ON..... | 40 |
| 2.2.7 | Verify NORMAL Operation..... | 41 |
| 2.3 | Head End Unit (HEU) Installation | 42 |
| 2.3.1 | Verify Box Contents | 43 |
| 2.3.2 | Mount the Chassis | 46 |
| 2.3.3 | Install the Modules in the Chassis | 47 |
| 2.3.4 | Connect the Cables | 48 |
| 2.3.5 | Power ON..... | 50 |
| 2.3.6 | Verify NORMAL Operation..... | 51 |
| 2.4 | Additional stack and DRU connections..... | 52 |
| 2.5 | DRU Installation..... | 53 |
| 2.5.1 | Verify box contents | 53 |
| 2.5.2 | DRU Interfaces | 54 |
| 2.5.3 | DRU Dimensions [mm] | 55 |
| 2.5.5 | Mount the DRU in the 19" Rack | 56 |
| 2.5.6 | Connect the Cables | 56 |
| 2.5.7 | Verify Normal Operation | 58 |
| 2.6 | LRU Installation..... | 60 |
| 2.6.1 | Verify box Contents | 60 |



| | | |
|--------|---|-----|
| 2.6.2 | LRU Dimensions [mm] | 62 |
| 2.6.3 | LRU Interfaces | 63 |
| 2.6.4 | Combiner Interfaces | 64 |
| 2.6.5 | Fully connected system diagram | 65 |
| 2.6.6 | Connect under-lid cables | 66 |
| 2.6.7 | Mount the LRU | 68 |
| 2.6.8 | Connect the rest of the Cables | 70 |
| 2.6.9 | Combiner cables | 72 |
| 2.6.10 | Verify normal operation | 74 |
| 2.7 | MRU (Digital Medium-power Remote Unit) Installation | 75 |
| 2.7.1 | Verify Box Contents | 75 |
| 2.7.2 | MRU Interfaces | 79 |
| 2.7.3 | Mount chassis in 19-in Rack | 80 |
| 2.7.4 | Wall Mount | 81 |
| 2.7.5 | Ground MRU Chassis | 83 |
| 2.7.6 | Connect Fiber SFP+ | 84 |
| 2.7.7 | Connect Antenna | 85 |
| 2.7.8 | External RF Source (3.5 GHz) | 85 |
| 2.7.9 | Connect Power & POWER UP | 86 |
| 2.7.10 | Verify Normal Operation | 88 |
| 2.8 | HRU Installation | 90 |
| 2.8.1 | Verify Box Contents | 91 |
| 2.8.2 | dHRU Interfaces, Connections, Dimensions | 93 |
| 2.8.3 | Installation steps Overview | 99 |
| 3. | GUI – General Description | 107 |
| 3.1 | Screen Layout | 107 |
| 3.2 | Main Menu Options | 108 |
| 3.3 | Default Network Settings | 109 |
| 3.4 | Supported Access Options | 109 |
| 4. | Session Access and first time settings | 111 |
| 4.1 | Open a Local Session | 111 |
| 4.2 | Remote Management | 117 |
| 5. | Commissioning | 124 |
| 5.1 | Create new user operators | 124 |
| 5.2 | Set system parameters through Main Menu Config Option | 126 |



| | | |
|-------|---|-----|
| 5.2.1 | Set Site config – auto set..... | 126 |
| 5.2.2 | Power Sharing | 130 |
| 5.2.3 | Run time options | 131 |
| 5.2.4 | TDD Config | 132 |
| 5.2.5 | Adjustment | 133 |
| 6. | Using the System Graphical User Interface (GUI) | 134 |
| 6.1 | Main GUI Options | 134 |
| 6.1.1 | Devices Screen – Element Management | 134 |
| 6.1.2 | Events Screen | 152 |
| 6.1.3 | Admin Screen | 153 |
| 6.1.4 | Multi-Stack Screen..... | 166 |
| 6.1.5 | Channels Screen | 167 |
| 7. | SNMP Management..... | 174 |
| 7.1 | SNMP Setup..... | 175 |
| 7.1.1 | Set Protocol Version Parameters (SNMPv2 / SNMPv3) | 175 |
| 7.1.2 | Set Traps Monitoring Destination Addresses | 178 |
| 7.1.3 | SNMP manager Setup: Load the MIB Files | 179 |
| 7.2 | Test the Configuration using a MIB Browser Tool (Recommended) | 179 |
| 6.3 | Trap Variable Bindings | 179 |
| 7.3 | List of traps..... | 181 |
| 8. | APPENDIX A: Specifications..... | 184 |
| 9. | APPENDIX B: Ordering information | 198 |



1. Introduction

Corning Everon™ 6000 is an advanced in-building cellular service solution for small, medium and large size venues, supporting a broad range of cellular generations: 3G, 4G and 5G.

Corning Everon™ 6000 is based on digital distribution architecture, advanced digital processing, and channelized implementation, enabling efficient utilization of digital links.

The solution is designed to support multi-band, multi-technology and multi-operator networks over a single fibre-based infrastructure.

Corning Everon 6000 high bandwidth distribution architecture provides preparedness for future radio technologies, broader spectrum, and new frequency bands.

Due to its modular design and configuration flexibility, Corning Everon 6000 is highly scalable in terms of supported capacity (number of sectors, frequency bands, channels) and remote units (coverage), and can be easily configured to support a large variety of deployment scenarios including single and multi-building ("Campus") network topologies.

Corning Everon 6000 offers multiple types of digital remote units, supporting a variety of frequency band combinations, SISO/MIMO configurations, with different power levels ranging from 20 dBm per band to 43 dBm per band.

Advanced network configuration and management capabilities enable on-site as well as remote end-to-end configuration, system diagnostics, maintenance and support operators NOC connectivity.

1.1 Key Features and Capabilities

- **Comprehensive service Support** - 600 MHz, 700 MHz, FirstNet, 800/850 MHz, 1900 (PCS), EAWS, 2.3 GHz (WCS), 2.5 GHz (TDD). Support of SISO and MIMO services, FDD and TDD formats. Supports 3G, 4G, 5G technologies
- **Multi-X system** - Supports multi-operator, multi-band, multi-technology services over a single infrastructure. Supports single and multi-building ("campus") network architectures.
- **Highly modular/ Highly scalable** - Can be easily expanded to support additional capacity: sectors, frequency bands, channels and coverage areas via extending the number of remotes.
- **Advanced Digital Signal Processing** - Provides higher dynamic range, enables per channel granularity, delivers enhanced overall power efficiency and improves overall system performance.
- **Digital CPRI based Transport** - Provides robust signal distribution. Ready for future direct interfaces interoperability with digital based capacity sources.
- **Digital Service and capacity routing** - Enables advanced capacity and coverage management through flexible routing configuration management
- **Carrier-grade network management** - Network configuration and management capabilities enable on-site as well as remote end-to-end configuration, system diagnostics, maintenance, support management and control by operators NOC



1.2 Terminology, Acronyms, and Abbreviations

Table 1 Abbreviations

| Abbreviation | Description | Picture |
|-----------------|---|--|
| Chassis | HEU — Headend unit IHU — Integrated headend unit |  |
| Chassis modules | RIM — Radio interface module OIM — Optical interface module HCM — Headend control module ACM — Auxiliary control module FAM (Fan Module) FMM — Fiber main module* FRM — Fiber remote module* *FMM and FRM are part of the FCM (fiber connectivity module) solution |  |
| DRU | Digital Router Unit |  |



| Abbreviation | Description | Picture |
|--------------|---|---|
| Remote units | LRU Remote Antenna Unit: Medium Band / Low Band |  |
| | MRU — Mid-power remote unit |  |
| | HRU —High-power Remote Unit |  |
| NOC | Network Operation Center | |
| SMV | Small Medium Venues | |
| CPRI | Common Public Radio Interface | |



| Abbreviation | Description | Picture |
|--------------|--|---------|
| DSP | Digital Signal Processing | |
| EARFCN | E-UTRA Absolute Radio Frequency Channel Number | |
| EPC | Evolved Packet Core | |
| EUTRA | Evolved Universal Terrestrial Radio Access | |
| EUTRAN | Evolved Universal Terrestrial Radio Access Network | |
| FPGA | Field Programmable Gate Array | |
| GE / GigE | Gigabit Ethernet | |
| GPS | Global Positioning System | |
| LTE | Long Term Evolution | |
| MNO | Mobile Network Operator | |
| PLMN | Public Land Mobile Network | |
| RF | Radio Frequency | |
| SNMP | Simple Network Management Protocol | |
| TCP | Transmission Control Protocol | |
| UDP | User Datagram Protocol | |
| UE | User Equipment | |
| UL | Uplink | |



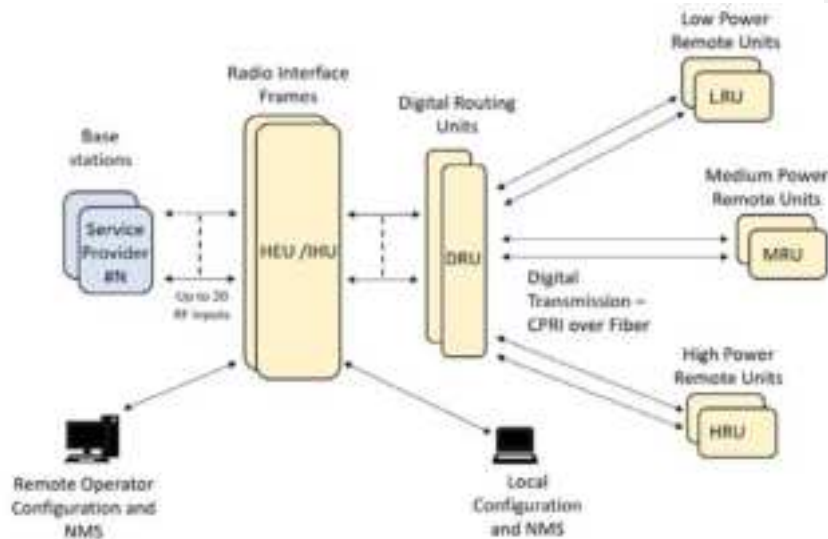
| Abbreviation | Description | Picture |
|--------------|--|---------|
| UTRAN | Universal Terrestrial Radio Access Network | |
| UDP | User Datagram Protocol | |

1.3 Applicable Documents

Table 2: References

| Document Name | Document # |
|----------------|------------|
| Everon 6000 UM | MN0020801 |

1.4 Everon™ 6000 1.0 Architecture Overview



Corning Everon™ 6000 allows combining between Optical Network Evolution (ONE) platform, and the fully digital Corning Building Wireless System (BWS) platform, which incorporates the digital distribution units – Digital Router Unit (DRU) and remotes.

The system devices are managed via a web session to the headend control module (HCM) that is installed as either a headend unit (HEU) or integrated headend unit (IHU). The HCM serves as the element management system (EMS) of the Everon 6000, and provides local and remote management capabilities for all connected system devices using both web GUI (HTTP) and SNMP interfaces.

Note: The HCM is installed in one headend element (HEU or IHU); an auxiliary control module (ACM) is installed in every additional HEU/IHU and OIU chassis. Every ACM is connected either directly or indirectly to the HCM.

1.4.1 External Interfaces and Use Cases - Example

The Everon™ 6000 system connects externally, through the Head End Unit Chassis (IHU, HEU) towards the service provider base station via RF cable.

Internally, the HEU/IHU units are connected to the DRU units via Common Public Radio Interface (CPRI) lines.

The system internal configuration and management allows user access flexibility, and is done through the DRU units, according to the needs.

1.4.1.1 SISO Use Case

The following figure shows an example of the system's internal and external connectivity for a single input single output use case:

The picture below presents a SISO configuration with 16 SISO MRUs connected to a single DRU.





1.4.1.2 MIMO Use Case

The following figure shows an example of the system's internal and external connectivity for a multiple input multiple output use case: 4 MIMO streams, each one consists of a pair of HEU-IHU with a single HCM. Each IHU-HEU pair includes up to 2 DCMs; up to 4 DCMs are connected to a DRU, which can support 2x2 MIMO

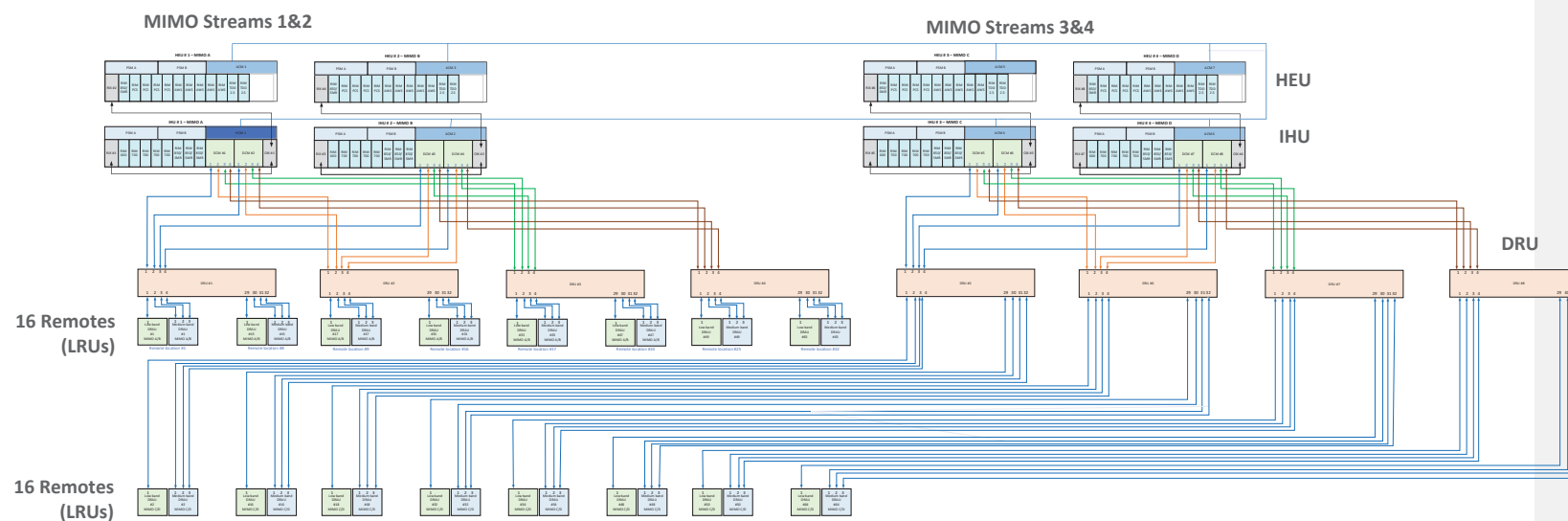


Figure 1 Single stack 4x4 MIMO; all bands; in this example: 32 remote locations

NOTE: A single DRU can support both the low power and high power (LRU and HRU) units. However, if an application requires adding MRUs, a separate DRU will be required to support it.



1.4.2 Internal sub-units

The following sections describe the system sub-units.

1.4.2.1 Head end: Radio Interface Frames (IHU/HEU) (Point of Interface)



Radio Interface frames are modular chassis used for interface between the base stations and the Everon™ 6000. A system may be comprised of two types of Chassis: IHU (Integrated Head-end Unit) and HEU (Head End Unit). The IHU can interface up to 8 RF duplexed ports (or 16 UL/DL simplex ports) and can be expanded by an HEU radio interface frame which provides interface capabilities for additional 12 RF duplexed ports (or 24 UL/DL simplex ports). The following modules are used with the radio interface frames:

- **RIM** (Radio Interface Module) - provides an interface and signal conditioning to signals coupled between the signal source RF antenna ports and the Everon™ 6000 (uplink and downlink)
- **DCM** (Digital Conversion Module) – **For IHU only!** Provides RF to CPRI (Downlink) and CPRI to RF (Uplink) conversion, where the well-known CPRI (Common Public Radio Interface) standard is used for representing the RF signals. Each DCM may convert signals capturing up to 190 MHz aggregated bandwidth.
- **RIX** (Radio Interface Expander) - combines downlink signals of the HEU and IHU RIMS and provides the combined signals to the OIX, splits uplink signals arriving from the OIX to the HEU and IHU RIMs.
- **OIX** (Optical Interface Expander) - combines downlink signals arriving from the HEU RIX and the IHU RIX and splits the uplink signal for the HEU RIX and the IHU RIX uplink ports.
- **PSM** (Power Supply Module) (DC or AC) - provides power to the radio interface frame
- **dHCM** (Head-End Control Module) is a "master" frame controller
- **ACM** (Auxiliary Control Module) is a "slave" frame controller controlled by the dHCM

1.4.2.2 Digital Remote Unit (DRU)



The DRU - Digital Routing Unit is the Everon™ 6000 central Hub and Distribution element. The DRU interfaces between the DCM modules and the IHU Radio Interface Frames, allowing to receive the operators service signals in CPRI format, and to route these signals to the remote units. The DRU supports all Corning digital remote antenna units' flavours, for all services, power levels and antenna configurations (SISO or MIMO). Each DRU includes 4 F/O CPRI ports connected to the DCMs and 32 F/O



CPRI ports for connection to the remote units. When additional remote antenna units are needed, the system scales up easily by adding additional system modules. DRU supports both AC and DC.

1.4.2.3 Remote Units

- **LRU** Digital Remote Antenna Unit: Medium Band / Low Band

The LRU is a remote antenna unit with 20 dBm per MIMO stream per band output RF power and native support of 2x2 MIMO antenna scheme. Two types of LRU are available:

Low band LRU - supports 600 MHz, 700 MHz Low, 700 MHz High, FirtsNet, 800/850 MHz bands via one SFP connection.

Medium Band LRU - supports EAWS, PCS, WCS and 2.5GHz TDD services via 3 SFP connections.

The LRU cooling is natural convection with no fans. Due to its IP66 enclosure design the LRU can also be installed outdoors.

Remotes: Up to 32 MIMO low-power units per DRU (when LRU low-band with a single CPRI port is connected to the DRU)



- **MRU** – Digital Medium-power Remote Unit



The MRU is a medium power modular remote antenna unit with a single antenna port. The output power for the lower bands: 600/700 MHz Low/700 MHz High/FirstNet, 800/850 MHz is 33 dBm and the output power for the medium bands EAWS, PCS, WCS and 2.5GHz TDD is 37dBm.

Two SFP connections are used to support all the bands. The MRU modular structure and integrated high-performance cavity-based multiplexing functionalities, enable setups of up to 6 RF modules, for a variety of licensed frequency bands within a single cabinet.

The MRU also provides CBRS/C-Band ready RF interface for future field upgrades.

Remotes: Up to 16 SISO mid-power units per DRU



- **HRU** – Digital High-power Remote Unit



The HRU is a high power modular remote antenna unit which provides 43 dBm output RF power per service module, and native support of 2x2 MIMO antenna scheme. The HRU modular structure enables set ups of up to 8 service modules in 600/700 MHz Low/700 MHz High/FirstNet, 800/850 MHz, EAWS, PCS, WCS and 2.5GHz TDD.

The HRU cooling is based on natural convection, with no fans. Due to its IP65 enclosure design the HRU can also be installed outdoors

Remotes: Up to 8 MIMO high- power units per DRU

- **Synchronization:** 10 MHz clock domain



2. System Installation

This chapter provides installation instructions for the system units. Refer to the specific elements required in your deployment:

- Head End (HEU, HIU), see 2.1
- DRU, see 2.5
- Remote units Installation:
 - LRU, see 2.6
 - MRU, see 2.7
 - HRU, see 2.8

Note: for dimensions and specifications refer to chapter 8.



2.1 Head End Units – Architecture Examples

➤ Example 1: SISO

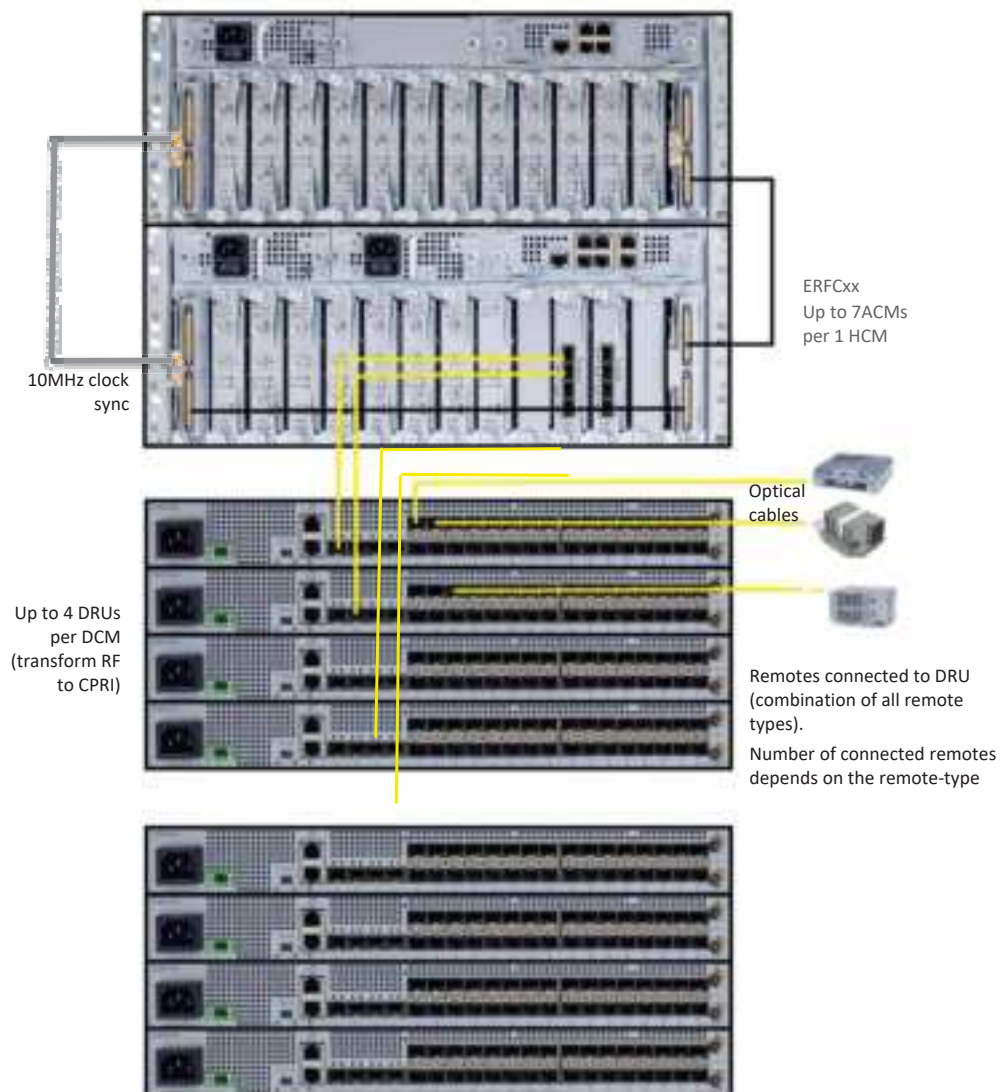


Figure 2: Example: Installation Diagram

Note: Release 1.4 does not support combined connection between MRU and the other remote types. Thus, connect MRUs to a separate DRU.



NOTES:

1. The example above shows SISO configuration. For MIMO 2x2, there is a need to add an additional pair of IHU-HEU, where the DCMs for the 2nd pair will be connected to the same DRU. To support 4x4 configuration, there is a need to add 2 additional pairs of IHU-HEU, and DRUs and remote units.
 2. for 4x4 stack: one HCM (for MIMO1 IHU), will be connected to up-to 7 ACMs in the IHU-HEU chassis explained above
-

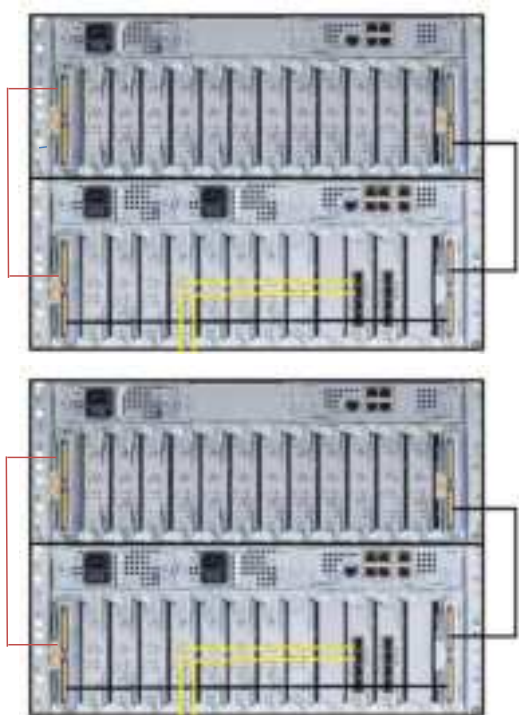
➤ Example2

Figure 3 a single rack with 4 head-end units: 2 sets of IHU-HEU. One HCM, the others are ACMs



2.2 Integrated Headend Unit (IHU) Installation

The IHU chassis is supplied empty and only includes the factory assembled Fan Module (FAM) + additional modules according to the ordered PN. All other modules are ordered separately and must be installed.

➤ Example of system connection

See 2.1 for example rack installations (SISO, MIMO).

➤ IHU Expansion Connections TO IHU, HEU and DRU Units

A single IHU supports expansion connections as follows:

- To one additional IHU unit
- To 7 HEU and 8 DRU

For details see section **Error! Reference source not found.**

➤ To install the IHU, follow these steps:

1. Verify box contents, see 2.2.1
2. Mount the chassis, see 2.2.3
3. Insert the modules into the chassis, see 2.2.4
4. Connect the cables, see 2.2.5
5. If needed: connect additional head end units, see 2.4
6. Power On, see 2.2.6
7. Verify normal operation, see 2.2.7



2.2.1 Verify Box Contents





1. Open the package and verify all elements are available according to the following table.

Notes:



** for details refer to APPENDIX B: Ordering information*

**see an example of package unpacking underneath the table*

Table 3: HEU Package Items List

| Item | Quantity | Image |
|---|-----------------------------|---|
| HARDWARE – provided in the box | | |
| Headend Unit Chassis (with blank panels on RIM and one PSM slots) – includes factory installed Fan Module (FAM) in chassis rear | 1 |  |
| FAM Fan Module (FAM) – single unit hosting 4 fans (factory installed in chassis rear) | 1 |  |
| RJ45/RJ45 communication cable L=2m-2.15m (P/N 705900003) – HCM management cable | 1 |  |
| RIM kit: Radio Interface Module (service specific) | 1-12 (according to order) |  |
| RIX Module Kit Radio Expander Module – expands the RF sources to the OIU | 1 or 2 (according to order) |  |
| Pilot Transport Cable (P/N: PCKC47*) – Single QMA to QMA cable; L = 47 in; used for passing | 1 |  |

| Item | Quantity | Image |
|--|----------------------------------|---|
| reference clock signal connections between RIX modules. *Additional lengths can be ordered: | | |
| <ul style="list-style-type: none"> PCKC20: L=20 in PCKC63: L=63 in PCKC79: L=79 in | | |
| ERFC (Expander Cable) - RF interface cable to HEU; 9 pin SMP to SMP connector Available in five different lengths: <ul style="list-style-type: none"> ERFC16: L= 16 in ERFC24: L= 24 in ERFC34: L= 34 in ERFC40: L= 40 in ERFC59: L= 59 in | 1 |  |
| DCM kit Optical cables Up to 900 meters LC/UPC SM DX SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module); Support for option 8 line-rate 10.1 Gbps, single mode | |  |
| ETM Kit: ETM Expander Termination Module (for unused Expander slot) unit | 1 |  |
| PSM Kit (AC or DC modules): <ul style="list-style-type: none"> PSM-AC: 100-240 VAC Power Supply Module including standard IEC 60320-1 C13 cable PSM-DC: 48 V DC Power Supply Module; 9 A Max.; Includes six pin terminal block connectors | 1 or 2 kits (according to order) |  |

| Item | Quantity | Image |
|---|----------|---|
| | |  |
| Controller Module Kit (HCM or ACM - according to order) <ul style="list-style-type: none">• dHCM Kit (Headend Control Module) – installed in Main HEU unit; enables remote/local management of all hosted units• ACM Kit (Auxiliary Control Module) – installed in Auxiliary HEU units; provides management connections for the Auxiliary HEU. | |  |

➤ **Example: Unpacking**

For ordered unit type IHU-2-11-1-A-dH:

Verify your package includes one RIX; one OIX; one ERFC cable; one PSM-AC module and one dHCM module.



2.2.2 IHU Interfaces and Slots

The following figure shows the internal positions of IHU

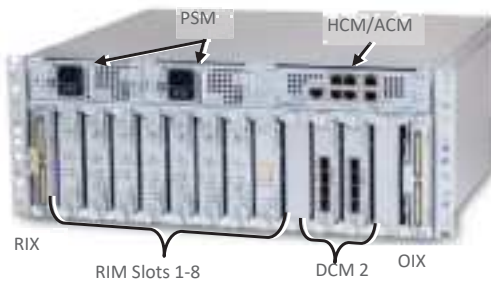


Figure 4: IHU Interfaces and Slots

➤ IHU Slots

NOTE: If DCM cards are available, ensure they are installed in the IHU only (not in the HEU)!

Each IHU includes 14 slots supporting the following modules (see Figure 4: IHU Interfaces and Slots)

Remove blank panel and slide in the relevant module (chassis slots are 100% mistake proof):

- 1 **HCM** (for Standalone/Master HEU units) / (One) **ACM** (for Auxiliary HEU unit)
- 1 to 2 **PSM** – for single power supply installations, install the PSM in either (PSM) slot
- 1 to 8 **RIM** – no need to terminate unoccupied RIM slot (Slots 2-7)
- 1 to 2 **DCM** (Slots 8-9)
- 1 **RIX** (Slot 1)
- 1 **OIX** slot (Slot 14)

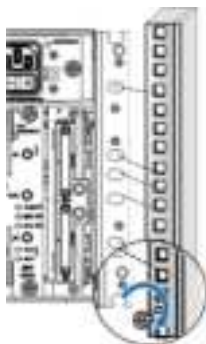


2.2.3 Mount the Chassis in a Rack

Notes:

- *One HEU supports connections to up to four IHUs*
- *IHU chassis requires 4U rack height availability*
- *Rack nuts and screws not provided*

1. Determine the location of the HEU in the rack while considering additional HEU and IHU units and the lengths of the available ERFC cable.
2. Refer to **Error! Reference source not found.** for an example planning the rack positions.
3. Secure the units' rack ears to the rack frame as follows:
 - Insert two screws half-way into the rack frame.
 - Position the chassis on to the screws using the handles and the top and bottom half slots of the rack ears.
 - Secure the unit in the rack via all applicable bracket holes using the appropriate rack nuts and screws.



Installing Chassis in Rack

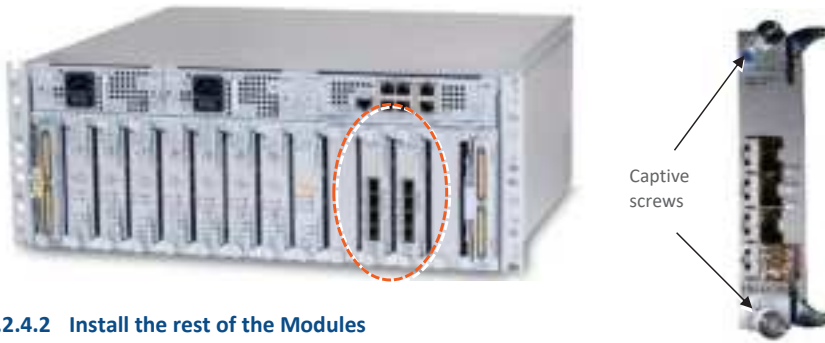


2.2.4 Install the Modules in the Chassis

Note: For modules with ejectors (i.e. RIM, RIX OIM, OIX, DCM and HCM/ACM) – verify that the ejectors are completely open when inserting in dedicated slot and then push in until the module clicks in to the backplane. See Figure 5: Module Captive Screws and Ejectors below, that shows an example of module type captive screws and ejectors.

2.2.4.1 Install the DCM Module

1. Slide the DCM to its slot in the HEU chassis (Refer to 2.6.2 for module slot positioning).
2. Secure the DCM to the Rack with the 2 captive screws



2.2.4.2 Install the rest of the Modules

(Refer to 2.6.2 for module slot positioning)

Referring to the following figure, secure the modules to the backplane by:

- Closing the ejectors (for relevant modules)
- Tightening the captive screws



Figure 5: Module Captive Screws and Ejectors

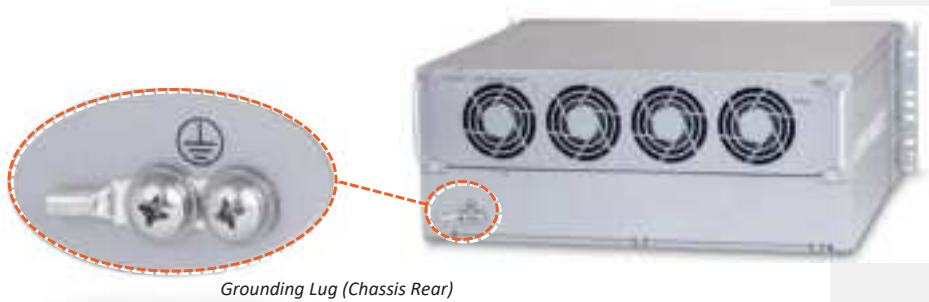


2.2.5 Connect the Cables

2.2.5.1 Ground

The grounding connection is performed via a two-hole, standard barrel grounding lug located on the HEU rear panel.

- For use with stranded copper wire conductors
- 10-14 AWG
- Holes - 1/4 inch

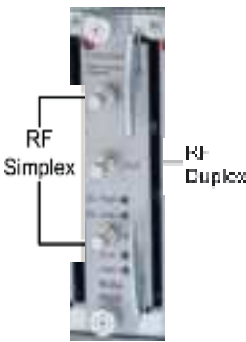


Grounding Lug (Chassis Rear)

2.2.5.2 Connect RIMS to RF Source(S)

For each RIM - connect the external RF source to the corresponding RIM (service specific) Simplex or Duplex QMA connectors:

- For each RIM - connect the RF coax cable to the RIM's Simplex or Duplex QMA connectors.
- Route the connected cables through the Cable Management Tray towards the right or left of the tray (depending on the module location in the chassis).
- Connect the RF coax cable from the RIM to the corresponding external RF source.



RIMs connections



2.2.5.3 RIX 10 MHz Pilot Clock Connections

Notes:

- This section is only relevant for configurations with additional IHU or HEU and OIU units.
- The REF IN and REF OUT pilot clock ports must be connected in a closed loop.
- Both RIX modules of each chassis must be connected.
- The jumper cables are routed through the sides of the cable management tray and door.

Referring to the following Figure, use the QMA/QMA jumper cable (PCKC47 provided with each RIX) to connect the REF OUT and REF IN ports of each of the RIX modules in the HEU chassis. See **Error! Reference source not found.**

Note: use SFP+ from the approved list provided by Corning.

1. Remove the rubber stopper from the source port.
2. Push the SFP+ connector into the port, until it clicks (note that there is only one correct direction for plugging-in).
3. Remove the white plug-protectors from the end of the SFP+ cable.
4. Plug the SFP+ cable into the D-MRU port until it clicks.
5. connect the other edge of the cable to the source unit



Figure 6 OIM SFP+ LC/UPC connection: Remove rubber stopper from port and from SFP+ Pluggable Transceiver and insert the SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module) into the port.



2.2.5.4 RIX to OIX Connections

Note: Each RIX module supports connections to up to two IHU.

1. Using the appropriate length ERFC cable (according to distance of available OIX port) connect the HEU RIX module 9-Pin connector to the corresponding connector on the IHU OIX module.

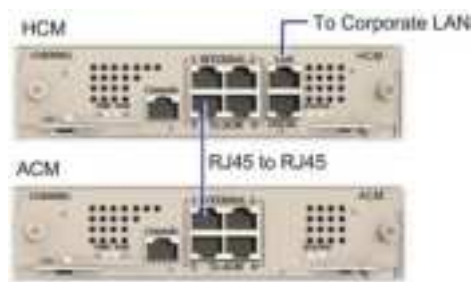


2. Refer to TBD for schematic diagram of coax connections in a maximum HEU-OIU configuration of 4x4 where all HEU units are connected to all IHU units.



2.2.5.5 Management Connections

- Notes:
- One RJ45/RJ45 management cable is provided with each headend unit (i.e. HEU/IHU).
 - Up to 7 ACMs are connected to a single HCM, where the connection between the units is using RJ45 cables.
-
- For HCM modules only - using the provided RJ45/RJ45 communication cable, connect the HCM LAN port to the corporate LAN:



- HCM LOCAL Port to ACM Port LOCAL Management Connection*
- HCM to ACM Management Connections - using RJ45/RJ45 communication cables perform the headend management connections according to the following:
 - Referring to the above Figure - for configurations with one HCM and up to four ACM modules (e.g. one HEU and four HIU units), directly connect as follows

| From (any) HCM | To (any) ACM... |
|--|--|
| INTERNAL (TO ACM) Port 1/2/3/4 | INTERNAL (TO HCM) Port 1/2/3/4 |

- Referring to the following Figure - for configurations with one HCM and more than four ACM modules (e.g. 4x4 HEU-OIU configurations) where there are only four available HCM INTERNAL ports



2.2.6 Power ON

- For PSM-AC modules – connect supplied power cable (100-240 VAC) connector to the PSM input connector and to the AC outlet and switch on.
- For PSM-DC modules – refer to Quick Start Guide provided with module for wiring pinout.

Verify that the Power Status LED on each PSM shows green. See Figure 13 for PS<-AC LED.



AC Power Supply Module LEDs



2.2.7 Verify NORMAL Operation

If RF source is operational, verify that the RIM, DCM and HCM/ACM LEDs indicate normal operation

| Module | LED | Description |
|---------|---------|--|
| RIM | Protect | N/A |
| | DL High | Off - DL RF input level in threshold range Steady Red - DL RF input level is 3dB above max expected power |
| | DL Low | Off - DL RF input level in threshold range Steady Red - DL RF input level is 3dB below max expected power |
| | RUN | Blinking Green - RIM module SW has initialized and is up and running Off - Power off |
| HCM/ACM | PWR | Steady green - Input power is within required range |
| | PWT | Steady Green - Power input detected by HCM/ACM |
| | RUN | Blinking Green - HCM module SW up and running |
| | SYS | Steady Green - Overall status of the managed system is ok |
| | FAA | Steady Green - Normal operation status for all time |



2.3 Head End Unit (HEU) Installation

The HEU chassis is supplied empty and only includes the factory assembled Fan Module (FAM) + additional modules according to the ordered PN. All other modules are ordered separately and must be installed.

NOTE: If DCM cards are available, ensure they are installed in the IHU only (not in the HEU)!

➤ Interfaces

The following figure shows the internal positions of HEU

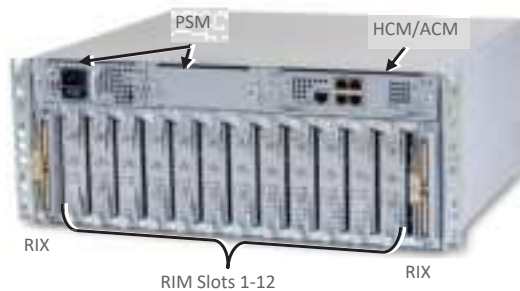


Figure 7: HEU Slots and Interfaces

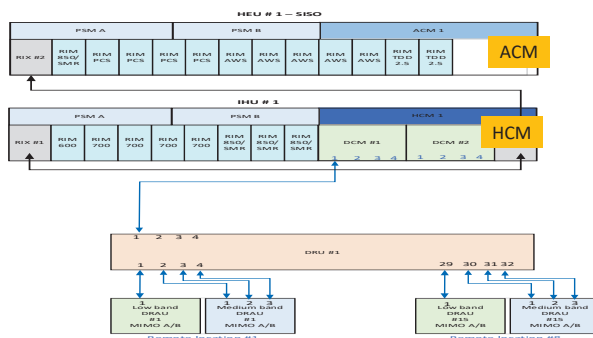
Each HEU includes 14 slots supporting the following modules:

- RIX slot (Slot 1)
- RIM slots (Slots 2-7)
- One OIX slot (Slot 14)

HEU supports the following expansion connection options: To a single 7 IHUs

➤ Example of system connection

The following figures describe an example rack installation for a maximum 4x4 HEU-IHU configuration in shared and dedicated equipment scenarios. For details refer to the use cases described in section 1.4.1



➤ **To install the HEU, follow these steps:**

1. Verify box contents, see 2.3.1
2. Mount the chassis, see 2.3.2
3. Insert the modules into the chassis, see 2.3.3
4. Connect the cables, see 2.3.4
5. Power On, see 2.3.5
6. Verify normal operation, see 2.3.6

2.3.1 Verify Box Contents




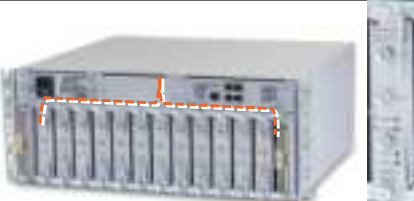
1. Open the package and verify all elements are available according to the following table.





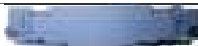

Notes:

** for details refer to APPENDIX B: Ordering information*

**see an example of package unpacking underneath the table*

Table 4: HEU Package Items List

| Item | Quantity | Image |
|---|------------------------------|---|
| HARDWARE – provided in the box | | |
| Headend Unit Chassis (with blank panels on RIM and one PSM slots) – includes factory installed Fan Module (FAM) in chassis rear | 1 |  |
| FAM Fan Module (FAM) – single unit hosting 4 fans (factory installed in chassis rear) | 1 |  |
| RJ45/RJ45 communication cable L=2m-2.15m (P/N 705900003) – HCM management cable | 1 |  |
| RIM kit: Radio Interface Module (service specific) <i>Note: the modules should be plugged-in instead of the blank panel</i> | 1-12 (according to order) |  |

| Item | Quantity | Image |
|--|-------------------------------------|---|
| | |  |
| RIX Module Kit Radio Expander Module – expands the RF sources to the OIU | 1 or 2 (according to order) |  |
| Pilot Transport Cable (P/N: PCKC47*) – Single QMA to QMA cable; L = 47 in; used for passing reference clock signal connections between RIX modules. *Additional lengths can be ordered: <ul style="list-style-type: none"> • PCKC20: L=20 in • PCKC63: L=63 in • PCKC79: L=79 in | 1 |  |
| ERFC (Expander Cable) - RF interface cable to HEU; 9 pin SMP to SMP connector Available in five different lengths: <ul style="list-style-type: none"> • ERFC16: L= 16 in • ERFC24: L= 24 in • ERFC34: L= 34 in • ERFC40: L= 40 in • ERFC59: L= 59 in | 1 |  |
| ETM Kit: ETM Expander Termination Module (for unused Expander slot) unit | 1 |  |
| PSM Kit (AC or DC modules): <ul style="list-style-type: none"> • PSM-AC: 100-240 VAC Power Supply Module including standard IEC 60320-1 C13 cable • PSM-DC: 48 V DC Power Supply Module; 9 A Max.; Includes six pin terminal block connector | 1 or 2 kits (according to order) |  |



| Item | Quantity | Image |
|---|----------|-------|
| | | |
| Controller Module Kit (HCM or ACM - according to order) <ul style="list-style-type: none">• dHCM Kit (Headend Control Module) – installed in Main HEU unit; enables remote/local management of all hosted units• ACM Kit (Auxiliary Control Module) – installed in Auxiliary HEU units; provides management connections for the Auxiliary HEU. | | |

➤ **Example: Unpacking**

For ordered unit type HEU-1-00-1-A-A:
Verify your package includes one RIX module; one ETM. one PSM-AC and one ACM.



2.3.2 Mount the Chassis

Notes:

- One IHU supports connections to up to seven Head-end units (HEUs or IHUs) in a single stack, where there is a single HCM per stack, and all the others have ACMs.
- HEU chassis requires 3U rack height availability
- Rack nuts and screws not provided

1. Determine the location of the HEU in the rack while considering additional HEU and IHU units and the lengths of the available ERFC cable (see **Error! Reference source not found.** for an example configuration)
2. Secure the units' rack ears to the rack frame as follows:
 - Insert two screws half-way into the rack frame.
 - Position the chassis on to the screws using the handles and the top and bottom half slots of the rack ears.
 - Secure the unit in the rack via all applicable bracket holes using the appropriate rack nuts and screws.



Installing Chassis in Rack



2.3.3 Install the Modules in the Chassis

Note: For modules with ejectors (i.e. RIM, RIX and HCM/ACM) – verify that the ejectors are completely open when inserting in dedicated slot and then push in until the module clicks in to the backplane. See Figure 8: Module Captive Screws and Ejectors below, showing an example of module type captive screws and ejectors.

Refer to the Figure 7: HEU Slots and Interfaces for module locations. Remove blank panel and slide in the relevant module (chassis slots are 100% mistake proof):

- (One) HCM (for Standalone/Master HEU units) / (One) ACM (for Auxiliary HEU unit)
- (One to two) PSM – for single power supply installations, install the PSM in either (PSM) slot
- (Two) RIX modules
- (One to 12) RIM – no need to terminate unoccupied RIM slot

Referring to the following figure, secure the modules to the backplane by:

- Closing the ejectors (for relevant modules)
- Tightening the captive screws



Figure 8: Module Captive Screws and Ejectors



2.3.4 Connect the Cables

2.3.4.1 Ground

The grounding connection is performed via a two-hole, standard barrel grounding lug located on the HEU rear panel.

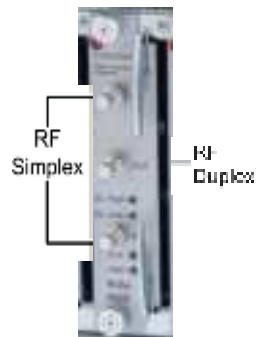
- For use with stranded copper wire conductors
- 10-14 AWG
- Holes - 1/4 inch



Grounding Lug (Chassis Rear)

2.3.4.2 Connect RIMS TO RF Source(S)

For each RIM - connect the external RF source to the corresponding RIM (service specific) Simplex or Duplex QMA connectors:



RIMS connections

Note: RIMs of newer version do not have the bottom simplex port



2.3.4.3 RIX TO OIX Connections

Note: Each RIX module supports connections to up to two IHU.

1. Using the appropriate length ERFC cable (according to distance of available OIX port) connect the HEU RIX module 9-Pin connector to the corresponding connector on the IHU OIX module.



2. Refer to TBD for schematic diagram of coax connections in a maximum HEU-OIU configuration of 4x4 where all HEU units are connected to all IHU units.

2.3.4.4 RIX Pilot Clock Connections

Referring to the following Figure (Shared Rack), use the QMA/QMA jumper cable (PCKC47 provided with each RIX) to connect the REF OUT and REF IN ports of each of the RIX modules in the HEU chassis

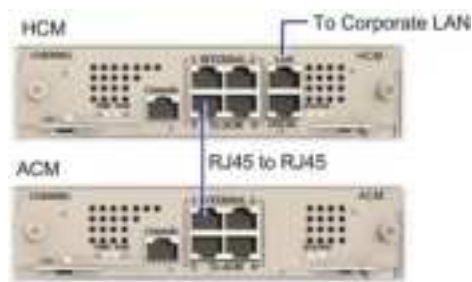
Note:

- The REF IN and REF OUT pilot clock ports must be connected in a closed loop as shown in **Error! Reference source not found.**
- Both RIX modules of each chassis must be connected



2.3.4.5 Management Connections

- Notes:
- One RJ45/RJ45 management cable is provided with each headend unit (i.e. HEU/IHU).
 - Up to 7 ACMs are connected to a single HCM, where the connection between the units is using RJ45 cables.
-
- For HCM modules only - using the provided RJ45/RJ45 communication cable, connect the HCM LAN port to the corporate LAN:



HCM LOCAL Port to ACM Port LOCAL Management Connection

- HCM to ACM Management Connections - using RJ45/RJ45 communication cables perform the headend management connections according to the following:
- Referring to the above Figure - for configurations with one HCM and up to four ACM modules (e.g. one HEU and four HIU units), directly connect as follows

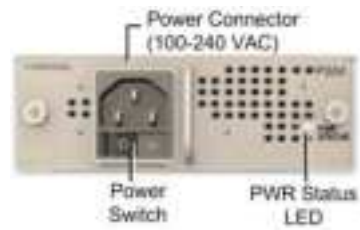
| From (any) HCM | To (any) ACM... |
|-----------------------------------|-----------------------------------|
| INTERNAL (TO ACM) Port 1/2/3/4 | INTERNAL (TO HCM) Port 1/2/3/4 |

- Referring to **Error! Reference source not found.**- for configurations with one HCM and more than four ACM modules (e.g. 4x4 HEU-OIU configurations) where there are only four available HCM INTERNAL ports

Schematic Example of 4x4 Management Connections

2.3.5 Power ON

- **For PSM-AC modules** – connect supplied power cable (100-240 VAC) connector to the PSM input connector and to the AC outlet and switch on.
- **For PSM-DC modules** – refer to Quick Start Guide provided with module for wiring pinout. Verify that the Power Status LED on each PSM shows green. See Figure 13 for PS<-AC LED.





2.3.6 Verify NORMAL Operation

If RF source is operational, verify that the RIM, DCM and HCM/ACM LEDs indicate normal operation

| Module | LED | Description |
|---------|---------|--|
| RIM | Protect | N/A |
| | DL High | Off - DL RF input level in threshold range Steady Red - DL RF input level is 3dB above max expected power |
| | DL Low | Off - DL RF input level in threshold range Steady Red - DL RF input level is 3dB below max expected power |
| | RUN | Blinking Green - RIM module SW has initialized and is up and running Off - Power off |
| HCM/ACM | PWR | Steady green - Input power is within required range |
| | PWT | Steady Green - Power input detected by HCM/ACM |
| | RUN | Blinking Green - HCM module SW up and running |
| | SYS | Steady Green - Overall status of the managed system is ok |
| | FAA | Steady Green - Normal operation status for all time |



2.4 Additional stack and DRU connections

➤ For connections to additional IHU or HEU and DRU units:

Using the appropriate length ERFC cable (according to distance of available OIX/RIX port) connect remaining IHU RIX and OIX module connectors as follows:

- Connections to additional IHU unit:
 - IHU #1 RIX 9-Pin connector to the corresponding IHU #2 OIX module
 - IHU #1 OIX 9-Pin connector to the corresponding IHU #2 RIX module
- Connections to additional HEU and OIU units:
 - IHU RIX 9-Pin connector to the corresponding connector on the OIX module of the additional OIU.
 - IHU OIX 9-Pin connector to the corresponding connector on the RIX module of the additional HEU.

Note: The RIX and OIX modules of the additional HEU unit must also be connected.

See use cases for details, section 1.4.1






2.5 DRU Installation

2.5.1 Verify box contents

The following table indicates the included and required items for installing the DRU unit.

| Item | Quantity | Image | Part Number |
|--|----------|---|-------------|
| HARDWARE – provided in the box | | | |
| DRU unit | 1 |  | 703A045402 |
| AC Power Cord | |  | 708A042301 |
| DC Power Adapter | |  | 255760003 |
| HARDWARE – not provided | | | |
| Screws | 4 |  | NA |
| Washers | 4 | | |
| SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module); Support for option 8 line-rate 10.1 Gbps, single mode | |  | NA |
| Optical cables Up to 900 meters LC/UPC SM DX | |  | NA |
| Power cable DC: 48v AC: 100-240v | |  Note: The image is an illustration only. | NA |
| Ethernet cable | |  | NA |

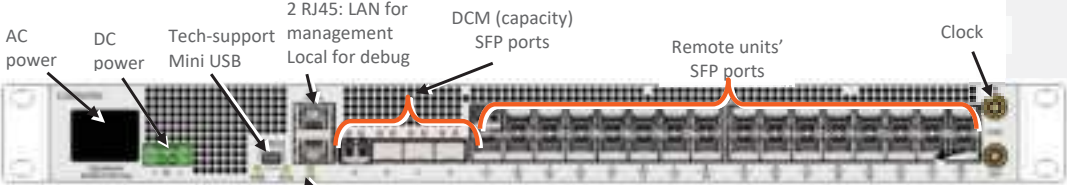


| Item | Quantity | Image | Part Number |
|--|----------|---|-------------|
| Grounding cable | |  | NA |
| Clock 10Mhz input clock 10Mhz output clock | |  | NA |
| USB to mini-USB cable Note: for technical support usage only. | |  | NA |
| Required Tools | | | |
| Screwdriver | | | NA |

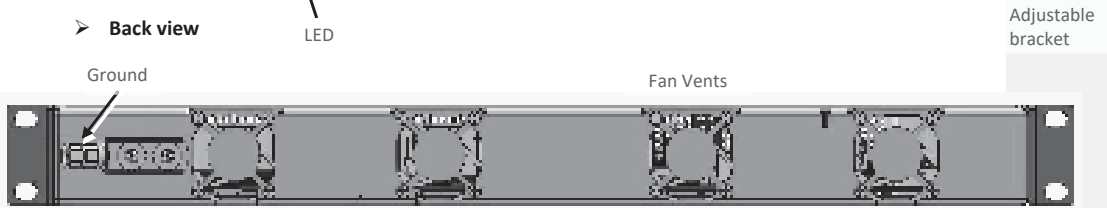
2.5.2 DRU Interfaces

The following images indicate the DRU interfaces

➤ Front view



➤ Back view

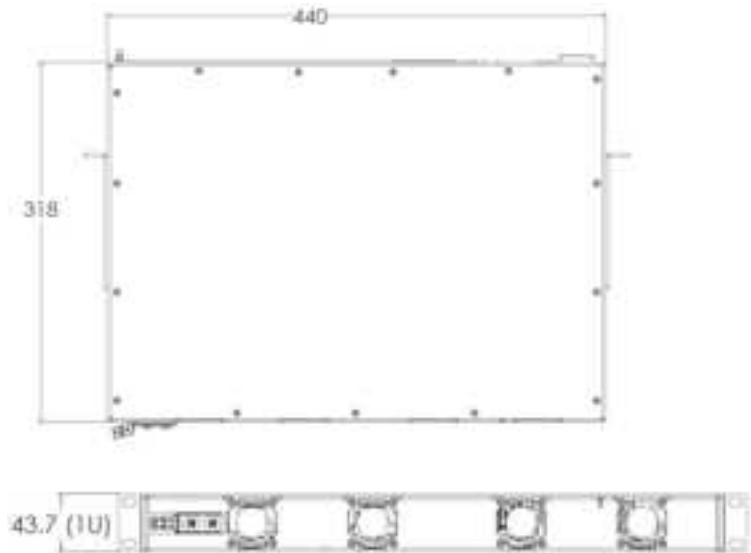


➤ Side view





2.5.3 DRU Dimensions [mm]



| Attribute | Description |
|-----------|----------------|
| Height | 1U (44.45 mm) |
| Width | 19" (482.6 mm) |
| Depth | 16.5" (419 mm) |
| Weight | 9 kg (max) |



2.5.5 Mount the DRU in the 19" Rack

1. Determine the location of the DRU in the rack while considering additional units (e.g. power supply).
2. Position the two brackets located on the DRU sides to fit in to the rack rail.
3. Slide the DRU module into the selected slot on the 19" chassis rear. Ensure the module is flush with the chassis rear.
Ensure at least 2" distance between the ventilation openings (in the rear and sides of the DRU) and any object (e.g. wall)
4. Secure the unit's rack ears to the rack frame, via applicable bracket holes, using the appropriate nuts and screws. using 2 screws in each side.



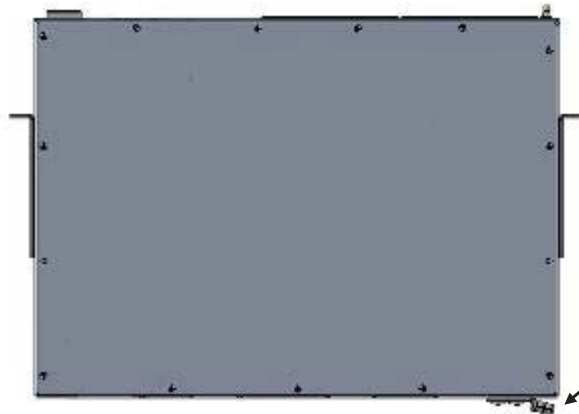
Screw to chassis



2.5.6 Connect the Cables

2.5.6.1 Ground

1. Connect one side of the grounding cable to the DRU rear grounding point and secure with 4 mm screw and washer.
2. Connect the other side of the grounding cable to grounding.



Grounding point



2.5.6.2 Power

Use your selected power source (DC or AC); Connect the power-unit's cable to the DRU front panel.

2.5.6.3 Source (DCM)

Connect an SFP+ Pluggable Transceiver to each source port to be used:

1. Remove the rubber stopper from the SFP connector.
2. Remove the rubber stopper from the source port (Figure 9).
3. Push the SFP connector into the DCM port, until it clicks (note that there is only one correct direction for plugging-in).
4. Remove the white plug-protectors from the end of the SFP cable.
5. Plug the LC/UPC SM DX cable into the DCM port until it clicks.
6. connect the other edge of the cable to the source unit

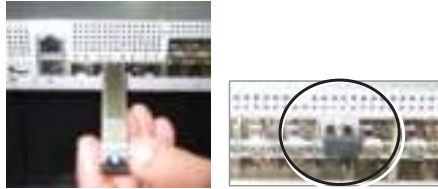


Figure 9 Remove rubber stopper from port and from SFP+ Pluggable Transceiver

2.5.6.4 Remotes

Remotes (i.e.: LRU, MRU, HRU): Connect an SFP+ Pluggable Transceiver to each remote port to be used:

1. Remove the rubber stopper from the SFP connector.
2. Remove the rubber stopper from the DRU-to Remote port (Figure 9).
3. Push the SFP connector into the remote port, until it clicks (note that there is only one correct direction for plugging-in).
4. Remove the white plug-protectors from the end of the SFP cable.
5. Plug the LC/UPC SM DX cable into the remote port until it clicks.
6. connect the other edge of the cable to the remote unit

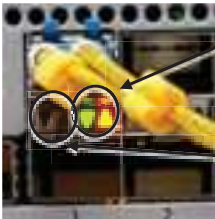



2.5.7 Verify Normal Operation



➤ SFP LED Behavior

| Status | Description | LED State | |
|-----------------|-----------------------------|-----------|-------|
| | | Green | Amber |
| SFP Plugout | SFP Plugout | OFF | OFF |
| Optic Link Fail | 1. Optic cable disconnected | OFF | ON |
| | 2. SFP fail | | |
| | 2.1 SFP fault | | |
| | 2.2 SFP warning | | |
| | 2.3 SFP alarm | | |
| | 3. CPRI link down | | |
| Optic Link Ok | 1. Optic cable connected | ON | ON |
| | 2. SFP ok | | |
| | 3. CPRI link down | | |
| CPRI Link Ok | 1. Optic cable connected | ON | OFF |
| | 2. SFP ok | | |
| | 3. CPRI link up | | |

The following tables describe the DRU LEDs and the LED behaviour:

| LEDs Type | Description and Behavior | Picture |
|-------------------|---|---|
| Remote (LPR) LEDs | <p><u>Description:</u> A pair of LEDs (Orange; Green) describes each port: the right pair relates to the upper slot; the left pair relates to the lower slot.</p> <p><u>Behaviour:</u> Right orange LED is lit during identification and when inserting the connector. Left green LED is lit after CPRI link connection</p> |  <p>Right pair: relates to upper slot</p> <p>Lower slot, indicated by left pair.</p> |
| Source LEDs | <p><u>Description:</u> A pair of LEDs (Orange; Green) describes each port.</p> <p><u>Behaviour:</u> Right orange LED is lit during identification and when inserting the connector. Left green LED is lit after link connection</p> |  |



| LEDs Type | Description and Behavior | Picture |
|------------------------------------|--|---|
| Power LED RUN LED STAtus LED | Lit after SW initialization and during operation. |  |
| LAN (Ethernet) LED | |  |
| General system LED behaviour | During power up all LEDs are lit After SW initialization only power, run and LAN are lit (The optical LEDs are off) | |

The following tables describe the DRU LEDs and the LED behaviour:

| LEDs Type | Description and Behavior |
|--|---|
| Remote unit LEDs | <p><u>Description</u>: A pair of LEDs (Orange; Green) describes each port: the right pair relates to the upper slot; the left pair relates to the lower slot.</p> <p><u>Behaviour</u>: Right orange LED is lit during identification and when inserting the connector. Left green LED is lit after CPRI link connection</p> |
| Source LEDs | <p><u>Description</u>: A pair of LEDs (Orange; Green) describes each port.</p> <p><u>Behaviour</u>: Right orange LED is lit during identification and when inserting the connector. Left green LED is lit after link connection</p> |
| Power LED RUN LED STAtus LED LAN (Ethernet) LED | Lit after SW initialization and during operation. |
| General system LED behaviour | During power up all LEDs are lit After SW initialization only power, run and LAN are lit (The optical LEDs are off) |




2.6 LRU Installation

Commented [RR1]: להחליף לתמונות של אדום



2.6.1 Verify box Contents

1. Open the package and verify all elements are available according to the following table:

Table 5: LRU Package Items List

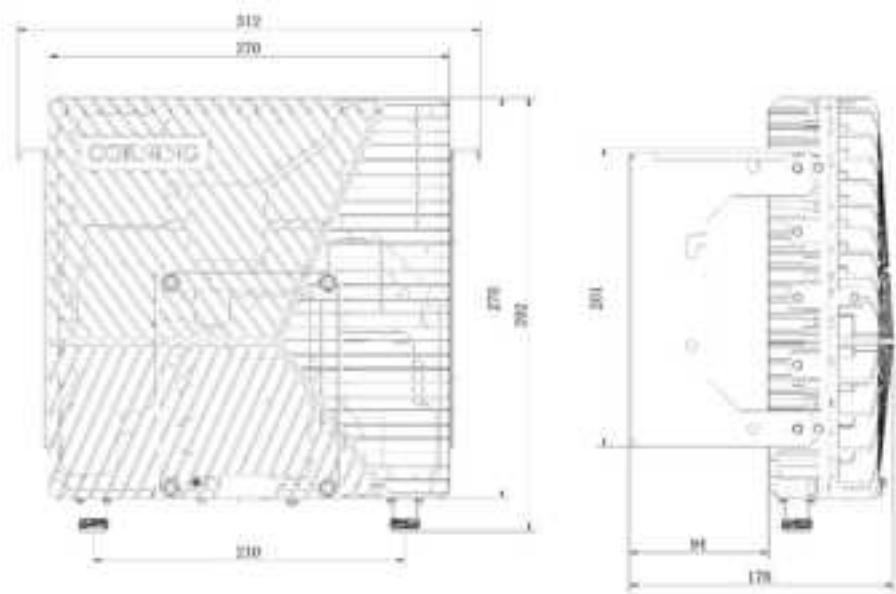
| Item | Quantity | Image | Part Number |
|---|----------|---|---|
| HARDWARE – provided in the box | | | |
| LRU unit | 1 |  | LRU-678 (supporting low bands in MIMO configuration: 600, 700 and 800/850) LRU-17192325 (supporting mid bands in MIMO configuration: PCS, AWS, WCS and 2500) |
| Wall Mounting Bracket (may also be used for pole) | 1 |  | BR-LRU |
| Side brackets for dual-unit configuration | |  | PN |
| Combiner – for dual unit configuration | |  | CR-LRU |



| Item | Quantity | Image | Part Number |
|--|----------|---|-------------|
| RF Jumper cables | |  | PN |
| DC Power Adapter | |  | 255760003 |
| HARDWARE – not provided | | | |
| 4 screws #8 or 4mm (for attachment to ceiling) | 4 | | |
| SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module); Support for option 8 line-rate 10.1 Gbps, single mode | |  | |
| Optical cables Up to 900 meters LC/UPC SM DX | |  | |
| SOFTWARE | | | |
| NA | | | |
| Required Tools | | | |
| Phillips Screwdriver | |  | |



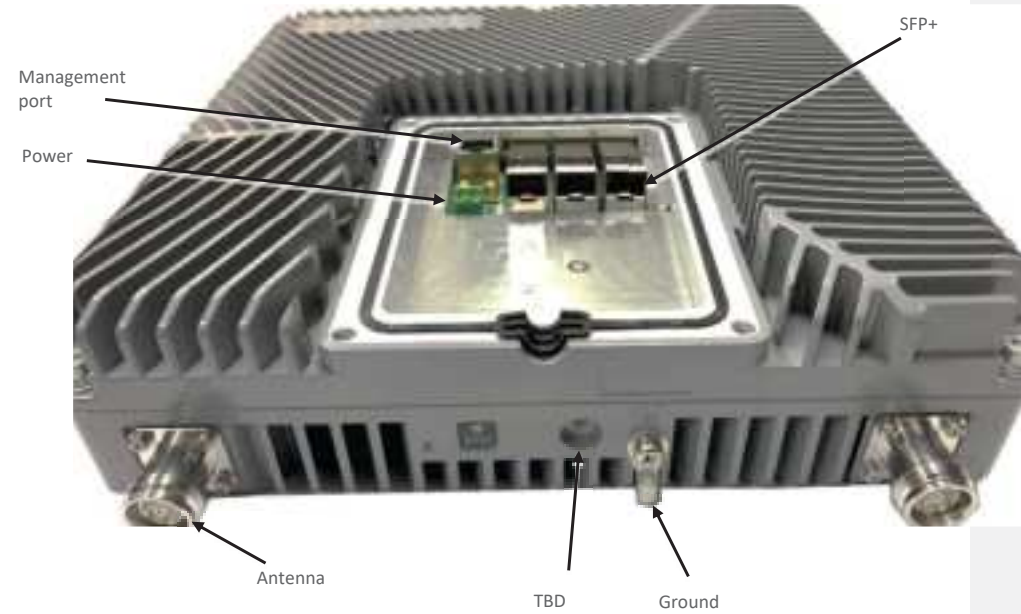
2.6.2 LRU Dimensions [mm]



| Physical Dimensions | | |
|-----------------------|-----------|-------------------------------------|
| Dimension (W x H x D) | Inch (mm) | 9.84 x 10.63 x 2.75 (250 x 270 x70) |
| Weight | Lbs (Kg) | 13 (6) |



2.6.3 LRU Interfaces



| Connectors | |
|---------------|------------------|
| CPRI Port | 1, SFP+ 10.1Gbps |
| Antenna Ports | 2, 4.3-10 female |



2.6.4 Combiner Interfaces

The combiner has a total of 6 input ports and 2 output ports.



Notes:

1. To avoid MIMO disruption, ensure the antennas are connected correctly according to the combiner labels.
2. There may be some configurations/use-cases where a combiner is not required, as there is only one type of unit (either low or mid band)



➤ **Combiner Connection Interfaces Diagram**

The combiner connects between units:

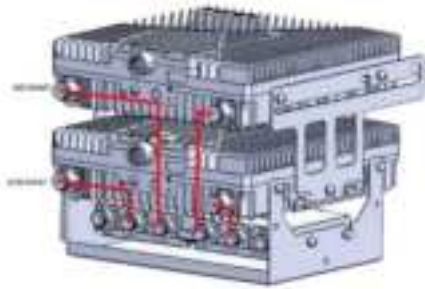
- Mid-band LRU
- Low-band LRU
- (In the future: High-band (CBRS) LRU)

The antennas are MIMO1, MIMO2

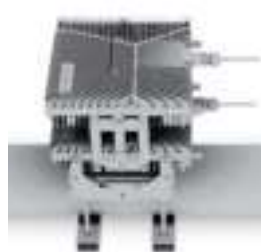


2.6.5 Fully connected system diagram

The following figure shows the connections in a system that includes two units and a combiner.



Connected
Cables





2.6.6 Connect under-lid cables

For each of the units, open the cover by removing 4 screws:



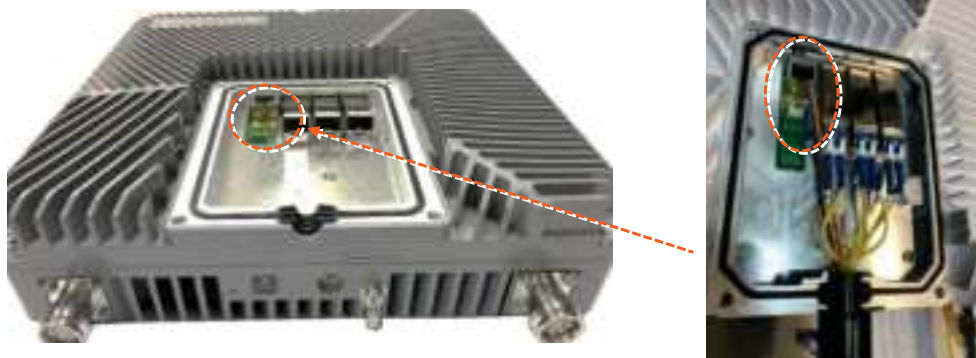
For each of the units connect the internal (under-cover) cables as follows:

- Power, See 2.6.6.1Error! Reference source not found.
- SFP+, see 2.6.6.2



2.6.6.1 Power

Connect the DC wire pair (48V) to the LRU connectors panel, via the DC power adapter (terminal block connector



2.6.6.2 SFP+ Cables

Remove the rubber stopper from the SFP+ connector located in the LRU RF port
Connect the SFP+ LC/UPC SM DX optic cable to the LRU optic connector.

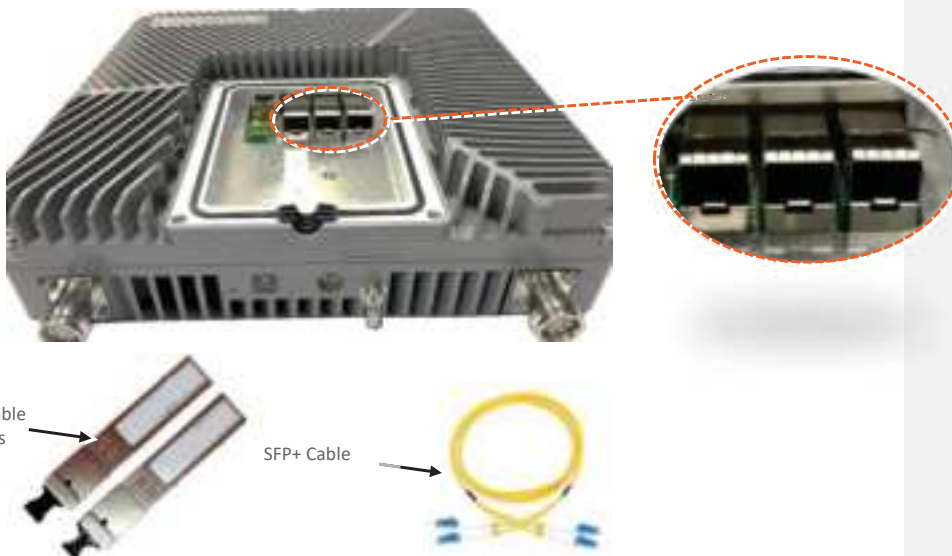


Figure 10 Remove rubber stopper from port and from SFP+ Pluggable Transceiver and insert the SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module) into the port.



2.6.7 Mount the LRU

The LRU may be mounted on a wall or on a pole; single or dual.

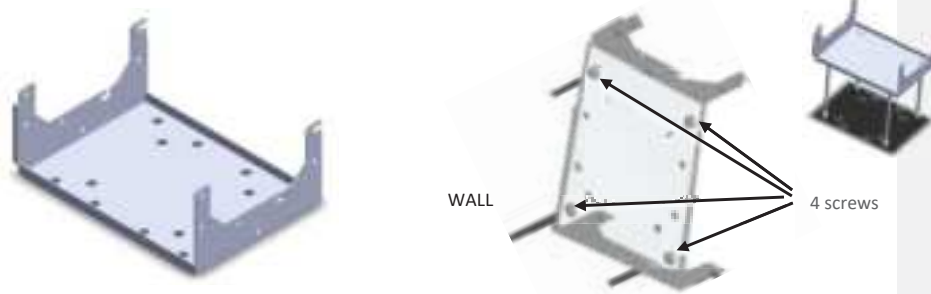
Select the configuration relevant to your deployment.

Note: For dual-unit installations, the internal RF connections must be connected before connecting between the units.

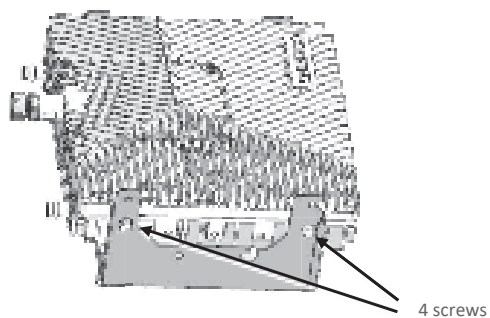
2.6.7.1 Mount on a wall

Note: for the rear cases of pole mounting, refer to...TBD

1. Connect the bracket to the wall, using 4 screws, as shown in the figure below:



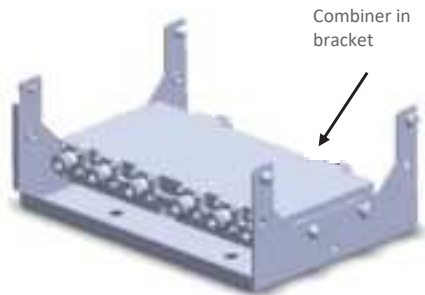
2. For a single unit: mount the LRU on the bracket, using 4 screws



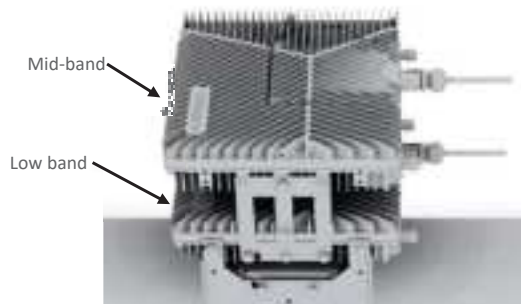


3. For a dual unit:

- Connect the combiner to the mounted bracket using 4 screws.

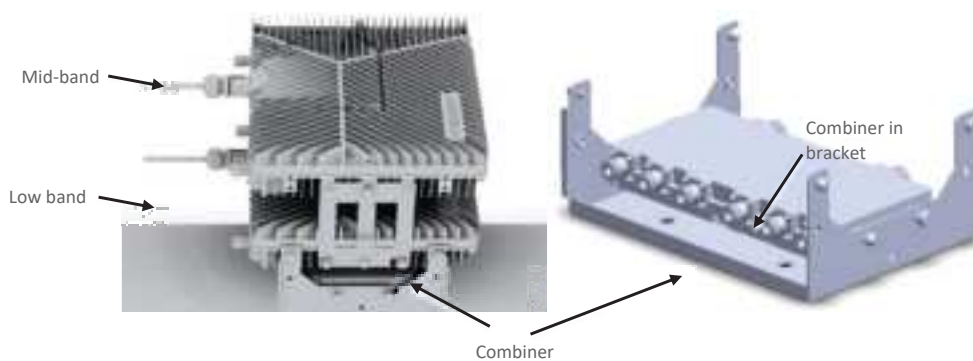


- Connect between the low band and mid-band units, using the side-bracket:



Note: Ensure the low band device is connected at the bottom, and the mid-band on top!

- Connect between the two devices and the base bracket (already carrying the combiner), using 4 screws, as shown below:





2.6.8 Connect the rest of the Cables

For each of the units, connect the cables as follows:

- Ground, see 2.6.8.1
- Antenna, see 2.6.8.2

2.6.8.1 Ground

Note: Ground according to local regulations

The following additional (not supplied) tools and components are required for connecting the system ground:

- Grounding wire - grounding wire should be sized according to local and national installation requirements. The provided grounding lug supports 14 AWG to 10 AWG stranded copper (or 12 AWG to 10 AWG solid) wire conductors.
1. Use a wire-stripping tool to remove approximately 0.4 inch (10.9 mm) of the covering from the end of the grounding wire
 2. Insert the stripped end of the grounding wire into the open end of the grounding lug
 3. Crimp the grounding wire in the barrel of the grounding lug. Verify that the ground wire is securely attached to the ground lug by holding the ground lug and gently pulling on the ground wire
 4. Prepare the other end of the grounding wire and connect it to an appropriate grounding point at the site to ensure adequate earth ground



2.6.8.2 Antenna

Connect the MRU male 4.3-10 Type duplexed RF “ANTENNA” port to the broadband antenna(s) using appropriate coax cables.



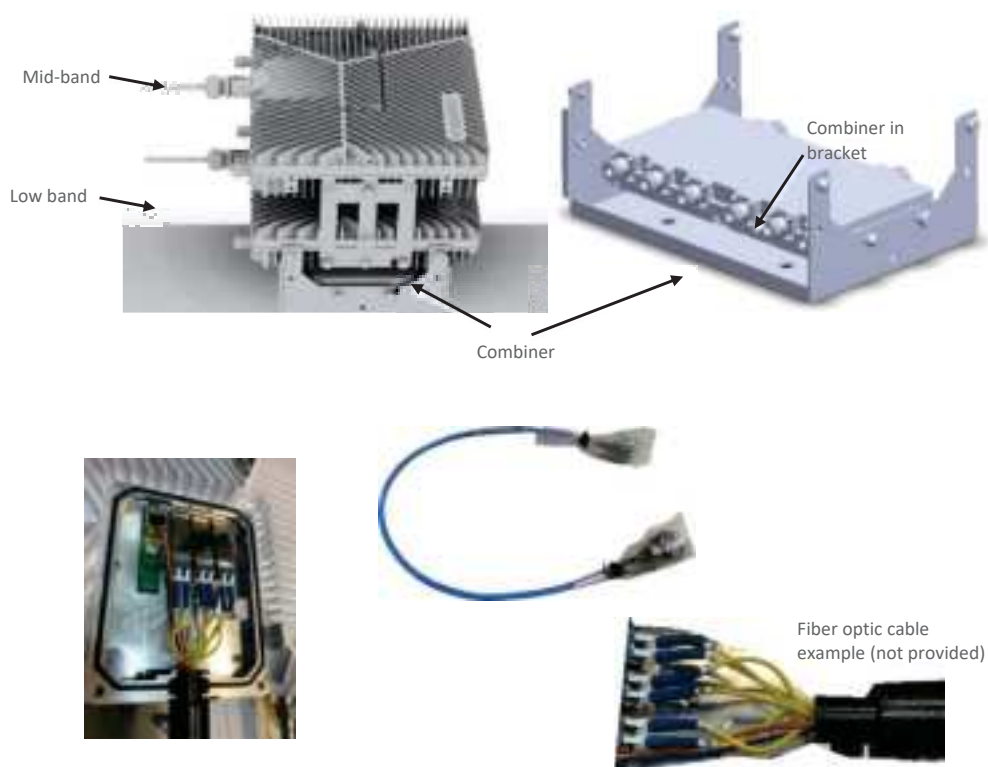
Notes:

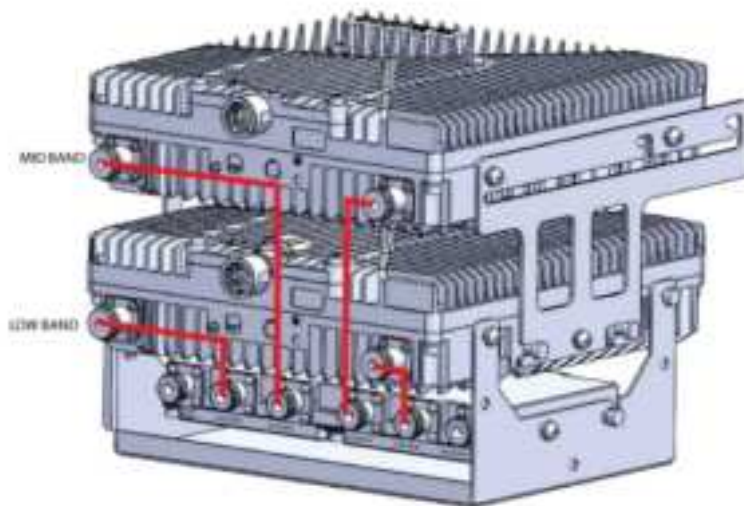
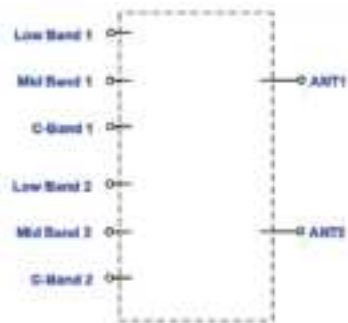
1. To avoid MIMO disruption, ensure the antennas are connected correctly according to the combiner labels.
 2. There may be some configurations/use-cases where a combiner is not required, as there is only one type of unit (either low or mid band)
-

2.6.9 Combiner cables

Connect the Antenna cables according to the figure below.

NOTE: C-Band is for future use.





Fully connected system

Notes:

1. To avoid MIMO disruption, ensure the antennas are connected correctly according to the combiner labels.
2. There may be some configurations/use-cases where a combiner is not required, as there is only one type of unit (either low or mid band)

2.6.10 Verify normal operation

The following table describes the LRU LED behaviour.

| MODULE LED | | Outside the module | |
|------------------------------|---|--------------------|----------------|
| Status | Description | Color | State |
| Power Up | The LPR was powered up | Green | Solid |
| RUN | The system is up and running | Green | Blinking (1Hz) |
| Identify | Identify RU was activated | Green | Blinking (2Hz) |
| Over temperature | The LPR temperature exceeded the max. range | Red | Blinking (1Hz) |
| HW Failure | HW failure occurred | Red | Solid |
| SFP LED (Same as DRU) | | | |
| SFP LEDs | | Inside the module | |
| Status | Description | LED State | |
| | | Green | Amber |
| SFP Plugout | SFP Plugout | OFF | OFF |
| Optic Link Fail | 1. Optic cable disconnected | OFF | ON |
| | 2. SFP fail | | |
| | 2.1 SFP fault | | |
| | 2.2 SFP warning | | |
| | 2.3 SFP alarm | | |
| | 3. CPRs link down | | |
| Optic Link Ok | 1. Optic cable connected | ON | ON |
| | 2. SFP ok | | |
| | 3. CPRs link down | | |
| CPRs Link Ok | 1. Optic cable connected | ON | OFF |
| | 2. SFP ok | | |
| | 3. CPRs link up | | |



2.7 MRU (Digital Medium-power Remote Unit) Installation

- dMRU Notes:
- * Equipment with permanently connected to PE, conductor for installation of this conductor is carried by a skilled person.
 - * The shield of the coax cable shall be connected to PE .
 - * Equipment for use in locations where children not likely to be present.
 - * dMRU DC shall be provided with double pole circuit breaker rated maximum 20A and having contact separation at least 3mm.

2.7.1 Verify Box Contents

1. Open the package and verify all elements are available according to the following table.

- Notes:
- * for details see APPENDIX B: Ordering information
 - * See unpacking example underneath the table.

Table 6: MRU Package Items List

| Item Description | Flavor | PN | Image |
|---|---|---------------------|-------|
| Mid-power Remote Unit Chassis (includes two rack ears for 19-in rack – factory assembled onto sides of MRU) Quantity: 1 | AC Chassis | | |
| | dMRU Chassis Assembly with: DOPTM, FAM, Mid-Plane, Cavity Filter, MUX and AC power supply | dMRU-ASM-AC | |
| | dMRU-AC supported assembly with three dPAM modules - 600/700, PCS and WCS | dMRU-671923-AC | |
| | dMRU-AC supported assembly with four dPAM modules - 600/700, 800/850, AWS and PCS | dMRU-6781719-AC | |
| | dMRU-AC supported assembly with five dPAM modules - 600/700, 800/850, AWS, PCS, WCS and 2.5 | dMRU-67817192325-AC | |
| | dMRU-AC supported assembly with five dPAM modules - 600/700, 800/850, AWS, PCS and WCS | dMRU-678171923-AC | |



| Item Description | Flavor | PN | Image |
|------------------|---|---------------------|-------|
| | dMRU-AC supported assembly with three dPAM modules - 600/700, 800/850 and PCS | dMRU-67819-AC | |
| | dMRU-AC supported assembly with four dPAM modules - 600/700, 800/850, PCS and WCS | dMRU-6781923-AC | |
| | DC Chassis | | |
| | dMRU Chassis Assembly with: DOPTM, FAM, Mid-Plane, Cavity Filter, MUX and DC power supply | dMRU-ASM-DC | |
| | dMRU-DC supported assembly with three dPAM modules - 600/700, AWS and PCS | dMRU-671719-DC | |
| | dMRU-DC supported assembly with three dPAM modules - 600/700, PCS and WCS | dMRU-671923-DC | |
| | dMRU-DC supported assembly with four dPAM modules - 600/700, 800/850, AWS and PCS | dMRU-6781719-DC | |
| | dMRU-DC supported assembly with five dPAM modules - 600/700, 800/850, AWS, PCS and WCS | dMRU-678171923-DC | |
| | dMRU-DC supported assembly with five dPAM modules - 600/700, 800/850, AWS, PCS, WCS and 2.5 | dMRU-67817192325-DC | |
| | dMRU-DC supported assembly with three dPAM modules - 600/700, 800/850 and PCS | dMRU-67819-DC | |



| Item Description | | Flavor | PN | Image |
|---------------------------------|--|---|------------------------|---|
| | | dMRU-DC supported assembly with four dPAM modules - 600/700, 800/850, PCS and WCS | dMRU-6781923-DC | |
| | | dMRU CHASSIS ASSEMBLY WITH: DOPTM, FAM, MID-PLANE, CAVITY FILTER, MUX | dMRU-CHS-ASM | |
| Brackets | Wall mount bracket for dMRU Screws, flathead, 8-32X3/8 (Quantity: 11) | 1 | BR-dMRU-W |  |
| DC connector class 1 mating | | 1 | | |
| Not provided | | | | |
| AC Power Cable (AC models only) | Cable, power, straight, U.S 10 A ,UL, L = 1.8-2.5m ,black,110 V | 1 | | |
| | SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module); Support for option 8 line-rate 10.1 Gbps, single mode | ? | |  |
| | Termination plug (for test port and 3.5 GHz port) | | | |
| | Optical cables Up to 900 meters LC/UPC SM DX | | |  |
| | Grounding cable: The provided grounding lug supports 14 to 10 AWG stranded copper (or 12 to 10 AWG solid) wire conduction | | |  |
| | Service-specific power amplifier modules (PAMs), that are NOT provided | | HRU-dHPOM | |



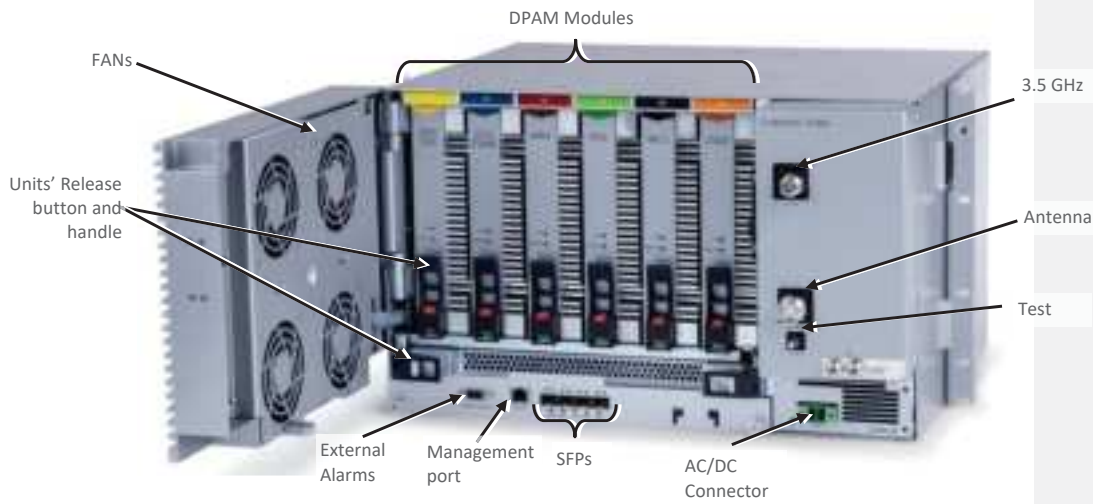
➤ **Example Package Unpacking**

For an ordered package of PN *dMRU-ASM-AC*: Open the box and verify the following units are available:
DOPTM, FAM, Mid-Plane, Cavity Filter, MUX and AC power supply.

The units are to be entered into the chassis according to the installation instructions below.



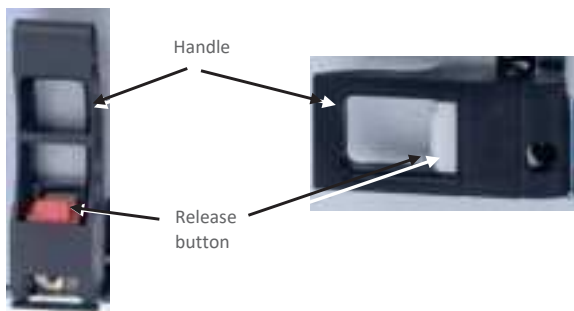
2.7.2 MRU Interfaces



Warning! In the event that a PAM or the OPTM needs to be removed from the chassis, make sure to first press the release button on the module and then pull out using the handle (see **Error! Reference source not found.**). Any attempt to pull out the module without first releasing may cause damage.

Corning will not be liable for damage of products resulting from improper handling during installation or repair.

PAMs are entered to their relevant slots by matching the color of the PAM and the color on top of the slot.



Notes:



- * MRU chassis requires 6U rack height availability
- * Rack nuts and screws not provided
- * Digital optical module & FAN are pre-installed in the chassis

2.7.3 Mount chassis in 19-in Rack

Note: for dimensions and specifications refer to chapter 8

1. Before mounting the chassis: unwrap each of the PAMs, and enter each PAM to its dedicated slot inside the chassis, according to the color-codes:



2. Determine the location of the MRU in the rack while considering additional units (e.g. power supply)
3. Referring to Figure 11 secure the units' rack ears to the rack frame as follows:
 - a. Insert two screws halfway into the rack frame (one on each side)
 - b. Position the bottom half slots of the chassis rack ears onto the screws
 - c. Secure the unit in the rack via remaining applicable bracket holes using the appropriate rack nuts and screws



Figure 11. Example of MRU Chassis Rack Installation



2.7.4 Wall Mount

This section provides instructions on how to assemble the wall-mount bracket onto the MRU and mount the assembly on the wall (belly-to-wall installation).



Note: The installer is responsible for accommodating the installation to the surface type. The mounting surface shall be capable of supporting the weight of the equipment. The weight of a fully populated MRU chassis is 92.59 lbs (42 kg).



ATTENTION! In the event that a PAM or the OPTM needs to be removed from the chassis, make sure to first press the release button on the module and then pull out using the handle (see Error! Reference source not found.). Any attempt to pull out the module without first releasing may cause damage.

Corning will not be liable for damage of products resulting from improper handling during installation or repair.



Caution: Due to the chassis + 6 DPAMS weight, it is recommended the unit is carried by two persons, to avoid damage to the system.

➤ To mount the MRU onto the wall

1. Select location and mark and drill appropriate holes in the wall

IMPORTANT! MRU is installed belly-to-the-wall with door opening rightward.



Note: Make sure that there is at least 16 inches of clearance to open the MRU door to the right and to successfully remove and replace all modules.

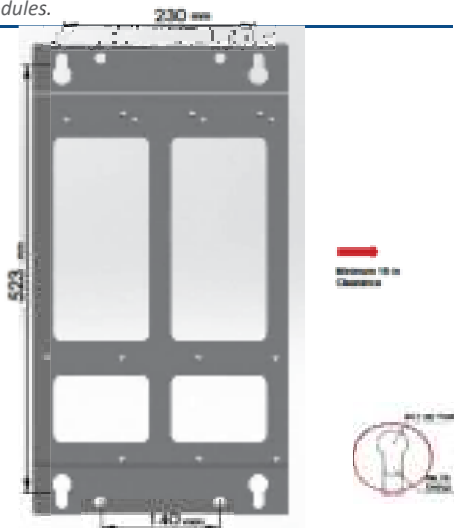
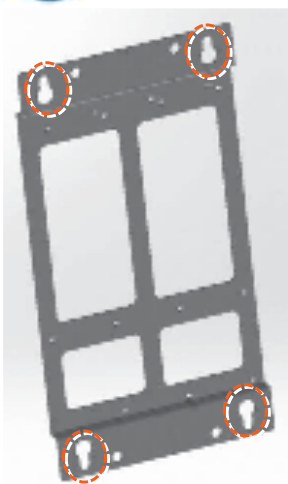


Figure 12: Wall Mount Bracket

-

-

UM - Everon 6000 DAS - 14-APR-2021 - clear of comments.docx | March 2021



2.7.5 Ground MRU Chassis

The grounding connection is performed via a two-hole, standard barrel grounding lug located on the front of the MRU chassis.

➤ Required tools and components

The following additional (not supplied) tools and components are required for connecting the system ground:

- Grounding wire - grounding wire should be sized according to local and national installation requirements. The provided grounding lug supports 14 AWG to 10 AWG stranded copper (or 12 AWG to 10 AWG solid) wire conductors.

Note: The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.

- Phillips-head screwdriver
 - Crimping tool to crimp the grounding wire to the grounding lug.
 - Wire-stripping tool to remove the insulation from the grounding wire
4. Use a wire-stripping tool to remove approximately 0.4 inch (10.9 mm) of the covering from the end of the grounding wire
 5. Insert the stripped end of the grounding wire into the open end of the grounding lug
 6. Crimp the grounding wire in the barrel of the grounding lug. Verify that the ground wire is securely attached to the ground lug by holding the ground lug and gently pulling on the ground wire
 7. Prepare the other end of the grounding wire and connect it to an appropriate grounding point at the site to ensure adequate earth ground



Figure 14: MRU Grounding Lug



2.7.6 Connect Fiber SFP+

Note: use SFP+ from the approved list provided by Corning.

1. Remove the rubber stopper from the source port.
2. Push the SFP+ connector into the port, until it clicks (note that there is only one correct direction for plugging-in).
3. Remove the white plug-protectors from the end of the SFP+ cable.
4. Plug the SFP+ cable into the D-MRU port until it clicks.
5. connect the other edge of the cable to the source unit



Figure 15 Remove rubber stopper from port and from SFP+ Pluggable Transceiver and insert the SFP+ Pluggable Transceivers (hot-pluggable optical transceiver module) into the port.



2.7.7 Connect Antenna

NOTE: The MRU has one output, that can be split via passive splitters.

1. Connect the MRU male 4.3-10 Type duplexed RF "ANTENNA" port to the broadband antenna(s) using appropriate coax cables.



Note: The test port is used for coupling; used for measuring the power without disconnecting the antenna.

2.7.8 External RF Source (3.5 GHz)

The MRU includes one N-Type Female RF port used for connecting to an external RF source, such as, a small cell or pico cell.

Note: This external RF cavity port is market specific and may not be applicable to certain markets For future CBRS/C-Band services at 3.5 GHz.





2.7.9 Connect Power & POWER UP

The MRU PSM is located on the bottom right of the chassis front. The PSM type (AC/DC) is model dependent.

- Refer to section 2.4.7.1 for AC models.
- Refer to section 2.4.7.2 for DC models

2.7.9.1 AC models



WARNING! Approved power cable – the entire length of the power cable (or flexible cord) and the insulation must be intact. The cable must be firmly connected to both the electrical plug and the unit itself.

Standard plug – the use of a standard plug is mandatory. The use of a non-standard power plug can cause electrocution! Also, plugging a non-standard plug into a standard socket that does not correspond to the plugs' shape, can damage the socket making it a safety hazard



AC Power Connection

Connect the MRU power connector to the AC power source using the provided AC power cable:

- Power input: 100-240 VAC/50-60 Hz
- Power consumption: 620 W (maximum)
- Maximum AC current consumption: 7 A



2.7.9.2 DC Models

DC model includes Class 1 terminal block connector:

- Power input: 36-60VDC
- Power consumption: 580W (maximum)
- Maximum DC current consumption: 16A



1. Open PSM captive screws and pull-out module from chassis.
2. Set DC input source type to "CLASS1" connector and secure PSM module back in place. See Figure 8.
3. Route DC pair from CLASS1 connector to local power source; Power input: 48 VDC (40-60 VDC) 15 A max



2.7.10Verify Normal Operation



LEDs

- 1. Verify that fans are operational.
- 2. Refer to status LEDs on the top-left of the chassis door and on each PAM to confirm normal system operation according to the following table:

Table 7: MRU Chassis and DOPTM LEDs

| LED Name | Status | Description | Color | State |
|----------|-----------------------------|---|--------|----------------|
| Power | Power on | The dMAB was powered up | Green | Solid |
| | Run mode | The system is up and running | Green | Blinking (1Hz) |
| Run | Identify | Identify RU was activated | Green | Blinking (3Hz) |
| | System OK | System up and running | Green | Solid |
| Status | HW Failure/TSD Sync Loss | HW failure or sync loss at the TDD PAM occurred | Red | Solid |
| | Fan working properly | Fan working properly | Green | Solid |
| FAN | Minor problem in fan module | One or more fans exceed the expected fan velocity | Yellow | Solid |
| | Major problem in fan module | One or more of the fans stopped working | Red | Solid |
| Link | Link OK | There is a connection to the head end equipment | Green | Solid |
| | Link is down | There is no connection to the head end equipment | - | Off |

Table 8: PAM LEDs

| LED Name | Status | Description | Color | State |
|--------------|--------------------|--|-------|-----------------|
| Power/Status | PAM OK | Power good and no alerts | Green | Solid |
| | HW Failure | There is any alert in the PAM | Red | Solid |
| | TDD Sync occurring | The TDD PAM is in process of final syncing on TDD system | Green | Blinking (1Hz)* |
| Run | Run mode | The system is up and running | Green | Blinking (1Hz)* |



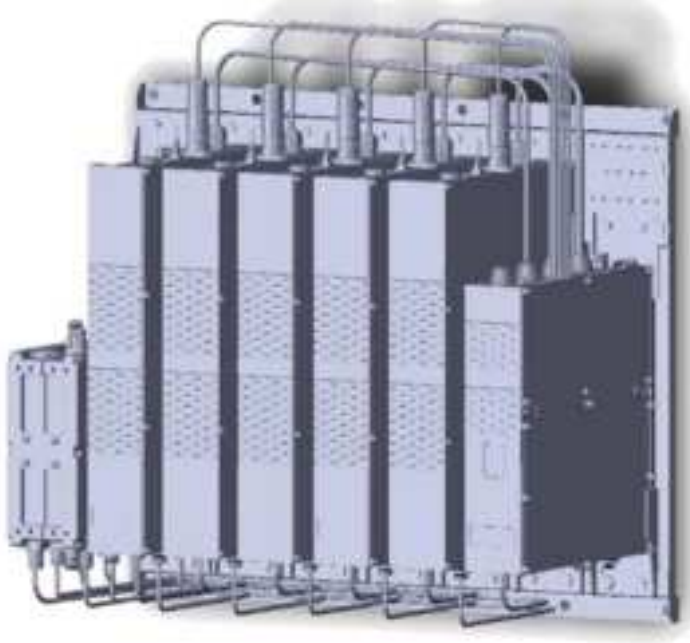
Table 9: SFP LEDs

| Status | Description | LED State | |
|-----------------|-----------------------------|-----------|-------|
| | | Green | Amber |
| SFP Plug out | SFP Plug out | OFF | OFF |
| Optic Link Fail | 1. Optic cable disconnected | OFF | ON |
| | 2. SFP fail | | |
| | 2.1 SFP fault | | |
| | 2.2 SFP warning | | |
| | 2.3 SFP alarm | | |
| Optic Link Ok | 3. CPRI link down | ON | ON |
| | 1. Optic cable connected | | |
| | 2. SFP ok | | |
| CPRI Link Ok | 3. CPRI link down | ON | OFF |
| | 1. Optic cable connected | | |
| | 2. SFP ok | | |
| | 3. CPRI link up | | |
| | | | |



2.8 HRU Installation

dHRU comes in various formats, according to customer needs. An example is brought bellow:



To install the dHRU, follow these steps:

1. Verify your box contents, according to the specific model ordered, see 2.8.1
2. Review the system elements and interfaces, see 2.8.2
3. Install the system, see 0







2.8.1 Verify Box Contents

- 2. Open the package and verify all elements are available according to the following table.

Notes:
* for details see APPENDIX B: Ordering information
* See unpacking example underneath the table.

Table 10: dHRU Package Items List


| Item Description | | Flavor | PN | Image |
|------------------|--|--|----|--|
| dHRU-dHPOM | | HRU Digital High Power Optical Module | |  |
| dHRU-dHPAM-6 | | HRU Digital High Power Amplifier Module supporting 600 | |  |
| dHRU-dHPAM-7 | | HRU Digital High Power Amplifier Module supporting 700 | |  |
| dHRU-dHPAM-85 | | HRU Digital High Power Amplifier Module supporting 800/850 | |  |

Commented [RR2]: OEU

Commented [RR3]: לשים אחד מהאחרים ולשים בכולם

Commented [RR4]: גונזילה יותר מהאחרים (האמצעי בצילום מספר 7)



| Item Description | | Flavor | PN | Image |
|------------------|--|--|----|--|
| dHRU-dHPAM-19 | | HRU Digital High Power Amplifier Module supporting PCS | |  |
| dHRU-dHPAM-17 | | HRU Digital High Power Amplifier Module supporting AWS | | |
| dHRU-dHPAM-23 | | HRU Digital High Power Amplifier Module supporting WCS | | |
| dHRU-dHPAM-25 | | HRU Digital High Power Amplifier Module supporting TDD 2500, 100MHz contiguous BW | | |
| dHRU-COMB-L | | HRU combiner module supporting low bands 600,700,800/850 including cables | | |
| dHRU-COMB-M | | HRU combiner module supporting low bands AWS,PCS,WCS and TDD 2500 including cables | | |
| dHRU-TL | | HRU termination load | | |
| BR-dHRU-L | | HRU bracket to support low band modules | | |
| BR-dHRU-M | | HRU bracket to support mid band modules | | |
| dHRU-CABLE | | HRU 4.3-10 RF Jumper Cable | | |
| dHRU-INT-SFP | | HRU Internal SFPs (from dHRU-dHPOM to modules) and Fiber | | |



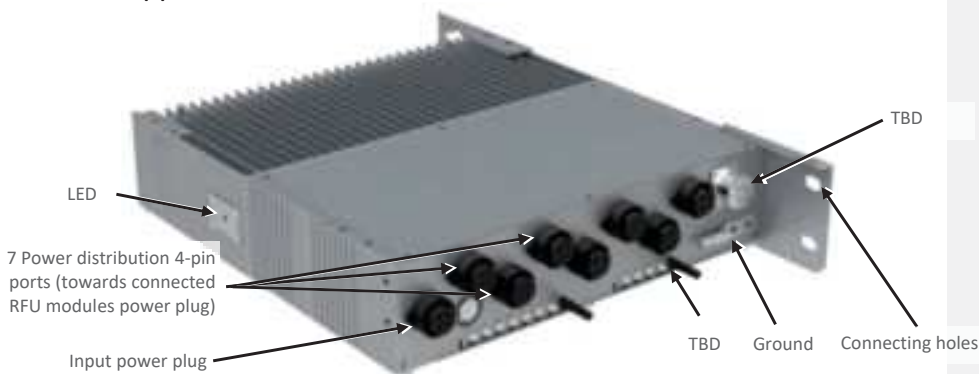
2.8.2 dHRU Interfaces, Connections, Dimensions

This section details the interfaces of the system sub-elements, as well as the fully connected system internal and external interfaces:

- OEU interfaces, see 2.8.2.1
- RFU interfaces, see 2.8.2.2
- Fully connected system interfaces, see 2.8.2.3
- System connection architecture, see 2.8.2.4

2.8.2.1 OEU interfaces

➤ Top panel



➤ Bottom panel



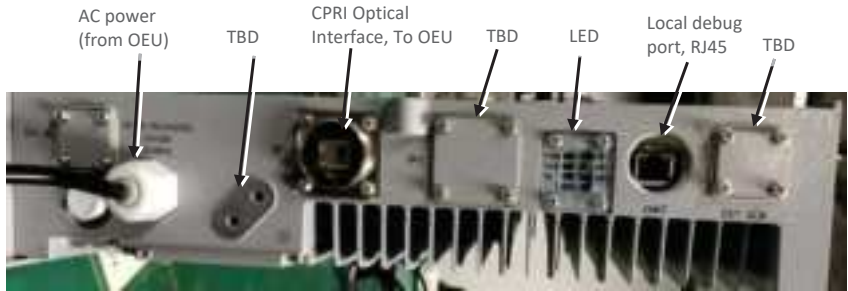


➤ OEU Dimensions

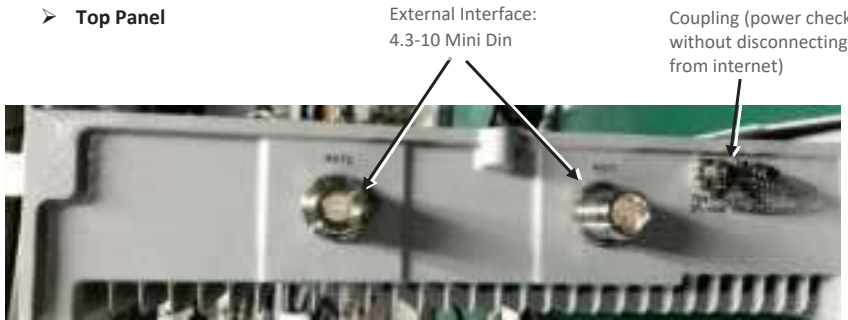
| Dimensions, H x W x D | mm | 3.70 x 88 x 353 |
|-----------------------------|-----------|----------------------------------|
| Weight (approx.) | kg | 12 |
| Power Supply | VAC | AC100-240/50-60Hz |
| Power Consumption (approx.) | W | 50 |
| Fiber Connectors | | LC/PC |
| Interfaces | SFP 1-4 | Optical port to DBU |
| | SFP 4-B | Optical port for OEU daisy chain |
| | SFP-SFP10 | Optical port to RFU |
| | Power | To RFU LWF power supply |

2.8.2.2 RFU Interfaces

➤ Bottom Panel



➤ Top Panel





➤ Mechanical dimensions

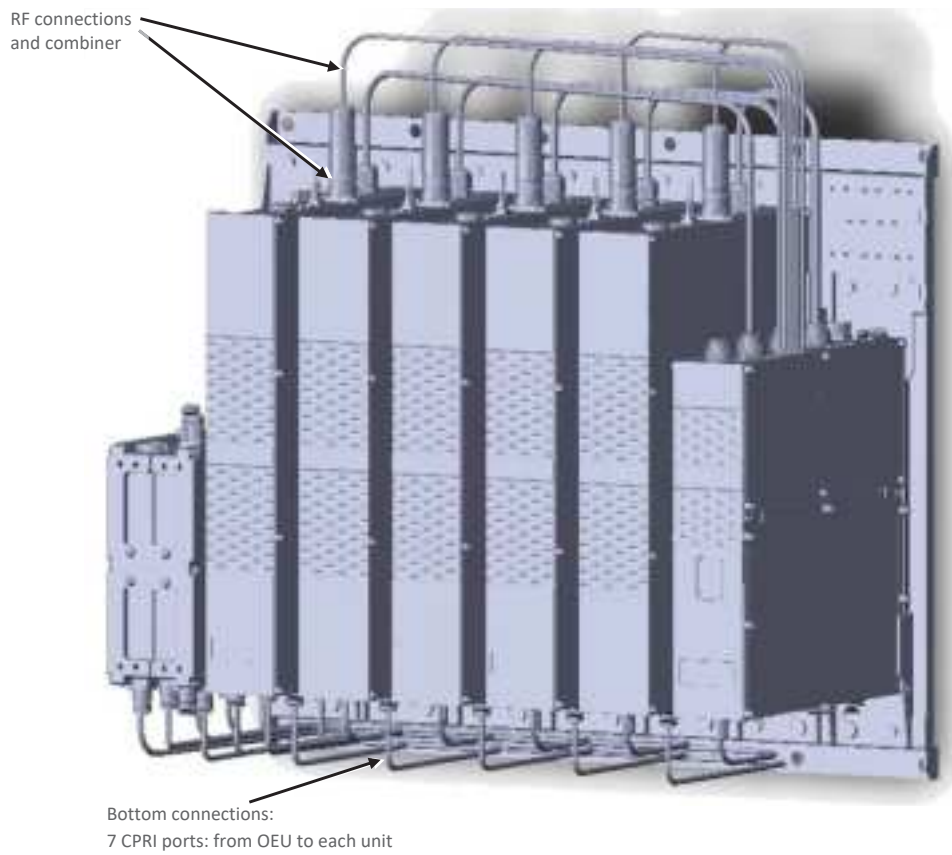
| | | |
|-----------------------------|-----|---|
| Dimensions, H x W x D | mm | 500 x 80 x 355 (per RFU); 500 x 121 x 355 (700L+700U) |
| Weight (approx.) | kg | 18 (per RFU); 20 (700L+700U RFU) |
| Power Supply | VAC | AC100-240/50-60Hz |
| Power Consumption (approx.) | W | 220 (per band) |
| RF Connectors | | 4-3-10, duplex per band |
| Fiber Connectors | | LC/PC |
| Operating Temperature | °C | -40 to +55 |

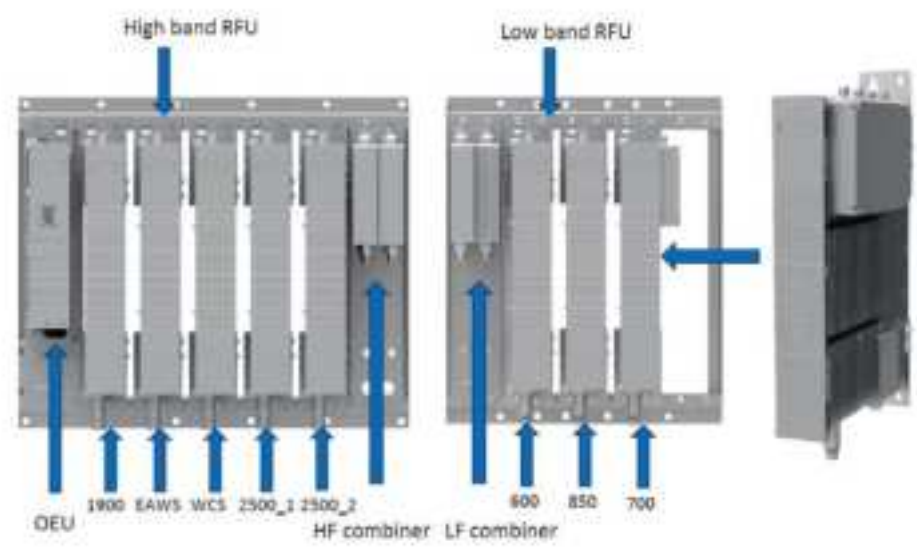


2.8.2.3 Full System Interfaces

The system includes two combiners and several band modules.

Note: There are labels on the combiners, indicating the RFU band names, to which they connect (two of each, as this is MIMO)







2.8.2.4 System Connection Architecture

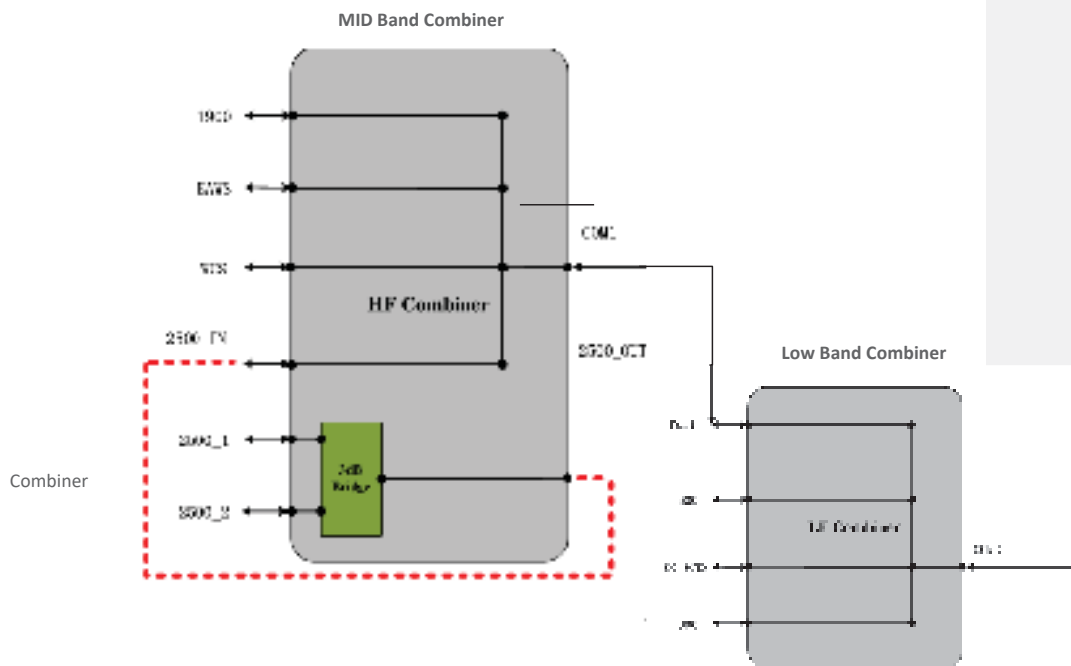
Note: all internal connectors from OEUs to RFUs are provided. All external SFPs (OEUs to DRU) are purchased seperately.

The following figure indicates the system internal and external interfaces.

The system includes two combiners:

- 1) **Low band:** Ports for: 600, 700, 850 + a port that receives the combined RF signal from the mid-band combiner (entry coming from the Mid-band)
- 2) **Mid band:** Ports: sums all bands – 1 port per band (except TDD).

For TDD: 2 entry ports (2500_1, 2500_2) – to sum 2 modules. The output is bridged towards the 2500_IN entry through an external jumper (marked in RED in the above figure; provided).





2.8.3 Installation steps Overview

- 1) Mount the system , see 2.8.3.1
- 2) Connect the internal cables (CPRIs, RFs), see 2.8.3.2
- 3) Connect external cables (OEUs to DRUs) see 2.8.3.3
- 4) Connect the other cables (ground, power), see 2.8.3.4
- 5) Power up and verify normal operation, see 0

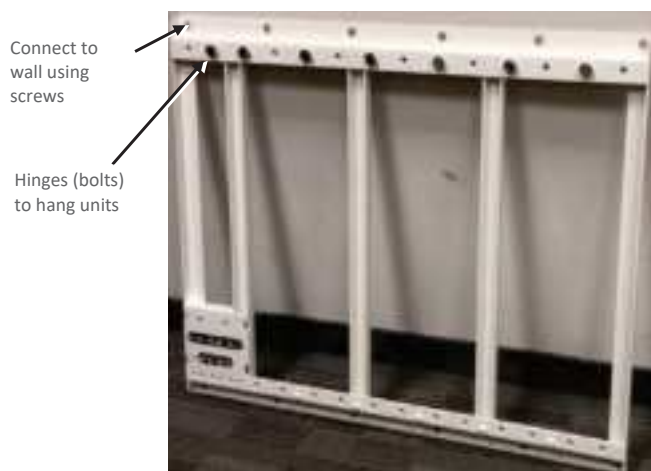


2.8.3.1 Mount chassis on the wall

Note: for dimensions and specifications refer to chapter 8

Mount each of the two brackets (Low and Mid) on the wall, and connect the modules to the bracket using screws as follows:

1. Before mounting the dHRU: unwrap each of the elements.
2. Determine the location of the dHRU on the wall, while considering accessibility
3. Connect the mounting bracket to the wall, using M10x110 screws:



4. Connect each of the modules to its dedicated position, according to the labels on the bracket:
 - Hang the unit on the hinge
 - using two screws M8X16

