

Overview

The **ConRep** Dynamic Multi-Reach Transport System is a next generation optical transport platform that provides DWDM and CWDM in a single product and addresses backhaul, fronthaul, metro, regional and long haul applications.

At the heart of the **ConRep** lies the proprietary chip that enables fast, flexible and cost effective service delivery. This technology provides a programmable infrastructure capable of supporting any application type — both existing and future — from a common platform to speed the development and lower the cost of our transport solutions. The **ConRep** platform also supports a proprietary dynamic FEC that delivers superior Forward Error Correction (FEC) for greater reach even over older fiber.

The **ConRep** platform delivers transport rates from 100Mbps to 200Gbps today and can scale to 1Tbps and beyond. The **ConRep** also offers a wide range of optical layer solutions from "pay-as-you-grow" amplifiers to a truly scalable ROADM, to a complete line of low cost CWDM and DWDM filters and Optical Add & Drop Multiplexers (OADMs). These solutions allow our customers to minimize their upfront costs and grow their networks in a manner that provides a sustainable Return On Investment (ROI).

The **ConRep** can be managed locally or remotely using the craft terminal equipment management software tool, or via **ConRep** advanced Network Management System (NMS) that allows complete monitoring and control capability at all levels from the overall network to the individual services.



Product description



C200HC: 2RU chassis



C600HC: 7RU chassis



RM10001/10010: 1RU 100G shelf

The **ConRep** is a NEBS Level 3 certified and ETSI compliant rack mountable transport system that spans backhaul, fronthaul, metro, regional and long haul applications.

It supports a wide variety of data protocols and rates with channel plan options scaling to over 17 Tbps. In addition, the **ConRep** system offers a single fiber option that supports up to 640 bi-directional 10Gbps client ports or 32 bi-directional 100Gbps or 200Gbps client ports today with larger ports count options planned for the future.

The **ConRep** platform consists of a modular 7RU chassis for high density applications, a compact modular 2RU chassis for low density applications, as well as a dual profile 1RU 100G shelf. With its unique combination of programmability, service density and configurability, the **ConRep** platform offers unprecedented levels of flexibility to meet any network challenge.

The platform includes optical multiplexers (Mux/Demux), Reconfigurable Optical Add & Drop Multiplexers (ROADM) and Optical Amplifiers (OA). Mux/Demux filter modules are designed in a modular fashion to accommodate channel growth without service interruption.

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D-5170-Rev.A Multi-Reach Transport System

Key Features and Benefits

- Flexible architecture enabling highly scalability and low upfront costs
- The industry's only firmware upgradeable 100G solution (upgrades from a Muxponder to a Transponder to futureproof your investment)
- A single system that scales backhaul, fronthaul, metro, regional and long haul distances up to 10000 km with full channel counts, as well as submarine networks
- ConRep dynamic FEC is the industry's leading FEC technology, bringing reach through software rather than more expensive hardware solutions
- Advanced network management capabilities via ConRep next-generation NMS
- Remote network turn up to lower the cost and time required to commission a network and network resource optimization
- Scalable ROADMs that support in-service upgrades from 2 degrees to 8 degrees with a low upfront cost
- Scalable amplifier technology allows amplifier cost to be incurred incrementally with service growth
- Hybrid Raman-EDFA amplifiers for extended distance at high bit rates
- Aggregation of multiple protocols over a single wavelength (Ethernet, Video, SONET/SDH, Fibre Channel,

- FICON, ESCON, CPRI and more)
- Up to 400 km with no in-line amplifiers, at full channel capacity
- Single fiber bi-directional transport supporting up to 640Gbps per direction
- Cost-optimized service modules for common applications
- Gateway capability for protocol bridging:
 - LAN PHY to WAN PHY
 - OC -192 to LAN PHY
- Small footprint: 2RU and 7RU, as much as half the size of competitive solutions
- Low latency
- Low-power utilization, up to 40% less than competitive solutions
- Remote management utilizing a DCC separate from traffic but transported without a separate wavelength
- SONET/SDH Performance Monitoring (PM), Remote Monitoring (RMON) for Ethernet
- Standard SFP, SFP+, XFP, QSFP28 and CFP support
- DWDM and CWDM on a single platform
- Line side 1+1 redundancy
- Legacy DWDM system migration, aggregating multiple protocols into a single legacy system wavelength or service, protecting your past investment.

A single system spanning Backhaul, Fronthaul, Metro and Long Haul







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Aggregation

Service aggregation is a critical functionality of optical networks just as it is in Layer 2 switched and Layer 3 routed networks. Network studies show that aggregation reduces the number of wavelengths in the network and lowers the overall cost of WDM networks by 30% - 50%.

Using the **ConRep** Technology, enabled by the proprietary chip, the **ConRep** platform is capable of aggregating multiple service types and rates over one wavelength at wire speed.

This includes aggregation of virtually any mix of 100Mb, GbE, Fibre Channel (1G/2G/4G), OC-3/12/48, STM-1/4/16 and uncompressed (HD-SDI, SD-SDI, ASI) video signals onto a 10G ITU-T G.709 or OC-192/STM-64 line rate. These services and rates can also be efficiently multiplexed with 8Gbps and 10Gbps traffic (OTN, SONET/SDH, Fibre Channel) into a 100Gbps line rate while up to twenty

10 GbE services can be multiplexed into a 200Gbps line rate.

ConRep does this by encapsulating multiple client inputs together with a digital wrapper that also contains a Data Communications Channel (DCC) and optional Forward Error Correction (FEC). FEC is used to correct errors in long haul transport applications.

Aggregation modules utilize pluggable SFP, SFP+ and QSFP28 client interfaces making it easy and economical to start with even just one client interface with the ability to scale rapidly and cost-effectively just by plugging in new optics. The benefit to this approach is that more services can be added to support more customers on the same wavelength without service interruption and at a minimal added cost.

Because of its unique multiplexing capability, the **ConRep** system can also act as a next generation ADM. With the proprietary chip functionality, different service types and rates that are multiplexed onto a single wavelength can be added and dropped selectively at multiple sites on a route with the use of only a single Muxponder at each site.

Applications

The **ConRep** Dynamic Multi-Reach Transport System is a highly versatile optical platform that covers a wide range of applications, from metro rings and high-capacity long haul to mobile backhaul and fronthaul to Data Center Interconnection (DCI) to enterprise networks and point-to-point 10G to 100G services using either DWDM or CWDM depending on network requirements. It is an optimal solution for:

• 10G to 200G Infrastructure

Scalable, programmable 10G to 200G capability to connect your most bandwidth intensive locations with regional transport capability of 200G up to 1000 km and ultra-long haul 100G transport up to 10 000 km at full channel count.

- Data Center Interconnect & Cloud Computing Low-cost and scalable 10G to 200G solutions for local and global applications.
- Ethernet Business Services Ethernet ADM capability and extended reach without regeneration provide for a cost-effective solution.
- Uncompressed Video Delivery HD-SDI, 3G-SDI, SD-SDI and ASI video on a single wavelength muxed with Ethernet for all-in-one transport.
- Wireless Backhaul & Fronthaul Ideal for migrating from 2G to 3G and 4G and beyond. Mix and match CPRI interfaces that enable migration to a

fronthaul architecture with Ethernet to support existing backhaul requirements.

- Triple/Quadruple Play Allows for muxing of TDM and Ethernet services over the same wavelength.
- Traditional Private Line
 Deliver TDM services at the cost of Ethernet.

 Managed services
 - Low-cost, low-power, scalable solution allows you to sell a pay-as-you-grow service to your customer.
 - SAN / Storage Extension Support for 1, 2, 4, 8, 10 and 16Gbps Fibre Channel for multi-rate, multi-distance connectivity supporting Business Continuance and Disaster Recovery (BC/DR) applications.
- Traffic aggregation and backhaul from DSLAMs CMTS, FTTH nodes or SONET/SDH ADMs Flexible multiplexing of multiple protocols over a single

wavelength.



V 1.3

Carrier-Grade Reliability and Availability



The **ConRep** system is a carrier-grade platform that offers customers maximum reliability and availability. All chassis include redundant power supplies and fans. Each service module is hot swappable and is independent from other modules in the chassis. The C200HC chassis comes in an Extended Temperature Range (ETR) variant for operation in harsh climates and can be deployed in virtually any location inside or outside.

Service traffic is kept on the Muxponder/Transponder and is not carried across a backplane, which eliminates failures as well as any backplane speed limitations and lowering device-based latency. This architectural approach also allows for infinite scalability of the system to higher rates as the industry moves to 1Tbps transport rates and beyond.

In addition, once a system is configured, it is fully operational even in the event of a management card failure.

The **ConRep** platform includes protection switching capability for delivering protected services in ring or point-to-point configurations. Protection is used for restoring and maintaining service in case of fiber cuts or other network outages.

Specifications

PHYSICAL SPECIFICATIONS

| Chassis | Capacity | Height | Width* | Depth | AC Power | DC Power |
|-------------------------------------------------|---------------------------|---------------------------|----------------------------------------|--------------------|------------------------------------|-----------------------------|
| C200HC ¹ | 6 modules | 2RU | 442 mm 17.4" | ETSI 300mm | Internal Option – AC/DC version | Standard Ins available _ |
| C600HC | 20 modules | 7RU | 442 mm 17.4" | ETSI 300mm | External Option | Standard |
| RM10001 RM10010 *Note: standard | N/A 19" ETSI - ETSI 21 | 1RU " and 23" mounting | 442 mm 17.4" options also availat | ETSI 300mm ble. | External Option | Standard |
| Operating Temperature5 to +50°C / +23 to +122°F | | | | | | |

Power Consumption

| C200HC maximum fully loaded | 500W |
|-----------------------------|-------|
| C600HC maximum fully loaded | 1000W |
| RM 10001/10010 | 200W |

| Compliance | CE, | UL, | CSA, | NEBS, | , ET | SI |
|------------|-----|-----|------|-------|------|----|
|------------|-----|-----|------|-------|------|----|

Management

| Protocol | |
|---------------------------|----------------------------------|
| CLI | |
| Web Based Craft Interface | HTTP; 10/100 Base-T Ethernet |
| Management Card Interface | Dual RJ45 10/100, RS232 |
| Security | HTTPS,RADIUSauthentication |
| Network Manager | ConRep Network Management System |

 $^{^1}$ Extended Temperature Range Chassis and Modules available (operating temp: -40 to +65 $^\circ$ C / -40 to +149 $^\circ$ F)

D-5170-Rev.A Multi-Reach Transport System

ConRep Platforms and Modules

200G MUXPONDER MODULES



PM 20002 / 20020MR: 2x100G Muxponder and 20x10G Muxponder

Coherent 200G transport solution for metro-regional applications. (3 slots)

PM 20002MR: 2-Port Metro-Regional Muxponder, 200G tunable onboard line interface and QSFP28 client interfaces.

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PM 20020MR: 20-Port Metro-Regional Muxponder, 10GbE, 40GbE, 100GbE clients, on board line interface and SFP+ client interfaces.



PM 20002 / 20020MA: 2x100G Muxponder and 20x10G Muxponder

Coherent 200G transport solution for metro-access applications. (3 slots)

PM 20002MA: 2-Port Metro-Access Muxponder, 200 G, tunable onboard line interface and QSFP28 client interfaces.

PM 20020MA: 20-Port Metro-Access Muxponder, 10 GbE, 40 GbE, 200 G, tunable onboard line interface and SFP+ client interfaces.



PM 200FRS02 Single Slot FlexRate pluggable Transponder / Muxponder, 200 G, tunable onboard line interface and QSFP28 client interfaces, for Metro 200G or Ultra Long Haul 100G

100G TRANSPONDER AND MUXPONDER MODULES





PM 10001 / 10010ULH: 100G Ultra-Long Haul Transponder / Muxponder with VOA

PM 10001ULH: Single-port 100G coherent long haul Transponder with VOA supporting pluggable client and onboard line interface with DCC; QSFP28 for client.

PM 10010ULH: 10x10G coherent long haul Muxponder with VOA supporting ten pluggable Gigabit Ethernet client interfaces and onboard line interface with DCC; SFP+ for client.



PM 10001 / 10010MP: 100G Transponder and 10G 12 Port Multirate, Multiprotocoll Muxponder

The PM 10001 / 10010MP is a highly compact 100G for long haul transport. (3 slots)

PM 10001: 100G Transponder onboard line interface and CFP client interface.

PM 10010MP: 10 Port Muxponder, 10 Access Ports – 10 GbE, 8GFC, OC-192/STM-64, OTU2, OTU2e, OTU1e, onboard line interface and SFP+ client interfaces.

PM 10010 E40: 10 Port Muxponder, 10 Access Ports – 10 GbE, 40 GbE, onboard line interface and SFP+ client interfaces.



PM 10001 / 10010MR: Metro Regional Transponder / Muxponder family

The PM 10001MR / PM 10010MR family provides greater performance for metro-regional transport of any service over longer distances. (3 slots)

PM 10001MR: 100GbE Metro Regional Transponder, 100GbE interface with CFP client, on board tunable line interface.

PM 10010MR: 10x10GbE Metro Regional Muxponder, SFP+ client interface, on board tunable line interface.

PM 10010MP-MR: 10x10G Metro Regional Muxponder, 8G FC, 10G FC, OC-192/STM-64, OTU2, OTU2e, 10 GbE clients with SFP+ interface, on board tunable line interface.







PM 10001 / 10010MA: Metro Access Transponder / Muxponder family

The PM 10001MA / PM 10010MA family is cost and performance optimized for metro-access transport of any service over shorter distances. (3 slots)

PM 10001MA: 100 GbE Metro Access Transponder, 100GbE interface with CFP client, on board tunable line interface.

PM10010MA: 10x10GbE Metro Access Muxponder, SFP+ client interface, on board tunable line interface.

PM 10010MP-MA: 10x10G Metro Access Muxponder, 8G FC, 10G FC, OC-192/STM-64, OTU2, OTU2e, 10 GbE clients with SFP+ interface, on board tunable line interface.

RM 10001/10010: 100G Transponder and Muxponder in One

The RM10001/10010 is a 1 RU chassis that acts as both a 10x10G into 100G Muxponder as well as a 100G Transponder.

RM 10001/10010 can be firmware upgraded from a Muxponder to a Transponder or vice versa. When used as a Muxponder, it supports the aggregation of 10xGbE, 40 GbE (2x40 GbE and 2x10 GbE), 8xOTU2, 12x8G FC or 8xOC-192/STM-64 (or a mix: 8xOTU2 / 2xGbE or 8xOC-192 / 2xGbE) into 100G.

Its line output uses ConRep proprietary framing for extended reach up to 6000 km and is fully tunable. It supports a standard CFP client interface for 100G and SFP+ interfaces for lower rate aggregation when acting as a Muxponder.

10G AGGREGATION MODULES

PM C1008 family: Aggregates GbE, Fiber Channel, SONET/SDH over 10G

The PM C1008 is a 2-slot module capable of aggregating any mix of GbE, 1/2/4Gbps Fiber Channel, OC-12/48, STM-4/16 onto a 10G link. (2 slots)



PM C1008MPHC: Eight access ports aggregated over 10G. The PM C1008MPHC can be user programmed in the field to any protocol (GbE, 1/2/4Gbps Fibre Channel, OC-48/ STM-16, OC-12/ STM-4). It features dynamic FEC for ultra-long reach. All versions of PM C1008 use SFPs for the client interfaces and XFPs for the line side (fixed or tunable wavelength). XFPs interfaces can be grey or colored (DWDM).



PM C1008MPLH: Eight access ports aggregated over 10G. The PM C1008MPLH can be user programmed in the field to any protocol (GbE, 1/2/4Gbps Fibre Channel, OC-48/STM-16, OC-12/STM-4). The PM C1008MPLH Add & Drop capability allows for linear and ring 1+1 protected configurations. The PM C1008MPLH features standard FEC for longer reach.

10G MODULES FOR UNCOMPRESSED VIDEO



PM 1004V: Aggregates and Transports 4 SD/HD-SDI with 1x1 GbE and 1xFE over a 10G link (3 slots)

PM 1004V aggregates four SD-SDI or HD-SDI with one GbE and one Fast Ethernet (FE) signal over a 10Gbps wavelength. The line side interface can be an XFP or OTX. The PM 1004V is also available with a second line interface that provides 1+1 protection.

PM 1004VE aggregates and transports with encryption of video signals over a 10Gbps wavelength. **PM 1004VDC** aggregates and transports with Drop & Continue of video signals over a 10Gbps wavelength.







10G TRANSPONDERS FOR 8GBPS AND 10GBPS



PM C1001HC / PM C1001HC-ETR: 10G Transponder and 10G ETR Transponder

The PM C1001HC is a 10G Transponder supporting any protocol from 9.95Gbps to 10.709Gbps.

PM C1001HC is a long haul Transponder supporting the industry-leading 10 dB dynamic FEC. The PM C1001HC supports 10G Ethernet and OC-192/STM-64. It supports either XFP or OTX line interfaces (fixed or tunable wavelength). (1 slot)

PM C1001HC-ETR is the 10G Extended Temperature Transponder for harsh environments. (2 slots)

PM C1002: Dual 10G Transponder, 10G Regen or Single 10G with Protection

PM C1002 can be used in 3 different modes (field selectable). It can be utilized as a dual 10G Transponder, a single 10G Regenerator, or as a single 10G Transponder with onboard line protection. It uses SFP+ client interfaces. It supports 10 GbE and STM-64/OC-192. The line side interface can be OTXs or XFPs. (2 slots)



PM 1001RR: 10G Transponders

PM LMAD10: CPRI Muxponder

PM 1001RR is a 10G Transponder supporting any protocol from 9.95Gbps to 10.709Gbps. It can be used as a short haul Transponder or a 3R signal regenerator. It supports 10G Fibre Channel, OTU2, 10G Ethernet and OC-192/ STM-64. It supports either XFP or OTX line interfaces (fixed or tunable wavelength). (1 slot)



PM 801RR: 8G Fibre Channel Transponder

PM 801RR is a 2R regenerator module that transports 8G Fibre Channel. No FEC for lowest latency. The client side interface is an 8G FC XFP. The line side interface is an OTX. (1 slot)



PM 1604: Quad 16G Fibre Channel Transponder

PM 1604 Transponder has eight SFP+ ports providing four bidirectional interfaces. The eight ports of the PM 1604 are split into four pairs of client and line ports, creating four WDM Transponders on a card. It supports 16G FC on both client and line interfaces and uses SFP+ optics for both client and line ports. (1 slot)



PM C1001PC: 10G LAN PHY to 10G WAN PHY Converter

PM C1001PC converts between 10G LAN PHY and 10G WAN PHY or vice versa. It is a cost-effective solution for connecting 10 Gigabit LAN routers to OC-192/STM-64 SONET/SDH and DWDM equipment. (2 slots)

10G MODULES FOR MOBILE FRONTHAUL



PM LMAD10 aggregates CPRI clients with SyncE onto a 10Gbps wavelength for mobile fronthaul applications. It aggregates up to four CPRI interfaces per 10Gbps wavelength with dual Muxponder (8xCPRI to 2x10G lines) capability on a single module. Alternately, it can aggregate up to 9 CPRI interfaces onto a 20G line. (2 slots)

D-5170-Rev.A Multi-Reach Transport System

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SUB 10G MODULES FOR LOW SPEED AGGREGATION AND MEDIA CONVERSION



PM 404: Quad Any-Rate Transponder

PM 404 Transponder has eight SFP ports providing four bidirectional multi-rate interfaces. The eight ports of the PM 404 are split into four pairs of client and line ports, creating four WDM Transponders on a card. It supports any protocol from 100Mb to 4Gbps. It supports any SFP type and can reach distances of 100km and beyond with 1550nm or DWDM wavelengths. (1 slot)



PM 253: 1G SONET/SDH Muxponder

PM 253 aggregates two GbE or GFC inputs over an OC-48 or STM-16 line. It offers a 1+1 protection option and accepts standard SFP optics. The OC-48 line interface is fully compatible with SONET/SDH equipment, which makes the PM 253 an ideal solution for transporting Gigabit Ethernet over SONET or SDH networks. It can also be used as an OC-48 or STM-16 Transponder with 1+1 protection. (1 slot)



PM 124: Low Speed SONET/SDH Transponder/Muxponder

Designed for transporting lower speed protocols, this module aggregates four 100Mbps Fast Ethernet ports or four OC-3/STM-1 ports or one OC-12 over a 1.25 Gbps line rate. It can be used with WDM SFPs on the line side to transmit over fiber or it can be inserted into a Gig port of another **ConRep** aggregation module, such as the PM 253 or PM C1008. (1 slot)



PM O6006: Hex 10G OTN OTU2 Transponder

PM ORA14: Raman Amplifier

Two-slot module with six independent OTN Transponders. G709 FEC & DCC, supporting 6x10 GbE on client to 6xOTU2e on the line, 3xOTU2(e) regen, SFP+ for client and tunable line interfaces.



PM O10001 / O10010: 100G OTN OTU4 Transponder/Muxponder

The O-Series modules combine our market leading transport technology with a standard-based G.709 OUT line interface.

PM 010001: Single-port 100G OTN Transponder with G709 FEC & DCC, supporting 100 GbE on client to 1xOTU4 on the line, CFP for client, CFP for line Interface. (3 slots)
 PM 010010: Ten-port 100G OTN muxponder with G709 FEC & DCC, supporting 10x10 GbE on client to 1xOTU4 on the line, SFP+ for client, CFP for line Interface. (3 slots)

INFRASTRUCTURE ELEMENTS



The **PM ORA14** Raman Amplifier uses enhanced Raman amplification to extend the span reach of optical DWDM networks and improves Optical Signal to Noise Ratio (OSNR). It offers a maximum output power of 28.5 dBm and up to 14 dB gain. (1 slot)

D-5170-Rev.A Multi-Reach Transport System

PM OA: Optical Amplifier Family



The PM OA family are Erbium Doped Fiber Amplifiers (EDFA) that allow optical signals to be transmitted over longer distances without the need for regeneration. All variants may be ordered as a booster/pre-amplifier or as an in-line amplifier.(2 slots)

PM OA HCS: The HCS amplifier family automatically compensates the gain settings as fibers degrade over time due to aging or splicing and seamlessly adjusts the optical power as channels are added and removed. This eliminates the need to manually adjust the network as it evolves. HCS amplifiers have up to 23 dBm of output power and variable gain from 10 dB to 32 dB.

PM OA HC: The HC amplifies optical signals in bi-directional modes with up to 23 dBm of output power and variable gain from 10 dB to 32 dB. An in-line version of this module with Extended Temperature Range (ETR) operation is also available.

PM OA LC: The LC amplifiers are designed to be the most cost efficient amplification solution for metro and regional applications with up to 17 dBm of output power and gain of 23 dB and is protocol and data rate independent.



NC DCU: Network Cube Dispersion Compensation Modules

NC DCU offers a wide range of dispersion compensation modules to meet all transport needs.



NC WDM: Network Cube WDM Mux/Demux Modules and Units

Cube Optics' passive Optical Mux/Demux/OADM units support up to 96 channels and are available in different form-factors and port counts. They can be used for single or dual fiber CWDM & DWDM applications and are designed to allow a Mux with a low channel count to be upgraded in the field to up to 96 channels without service interruption.

PM ROADM: Reconfigurable Optical Add/Drop Multiplexer

The **ConRep** ROADMs use new cost-effective ROADM technology to reduce the cost of ROADMs in an optical network while still providing the same flexibility as more expensive solutions. PM ROADMs allow users to remotely insert, terminate and redirect wavelengths across the network. The PM ROADM solution comes in two flavors: (2 slots)

PM ROADM F40-H4 is a scalable, ROADM designed for 40 channels. The ROADM F40-H can be used for configurations ranging from 4 to 8 degrees and can be scaled in service without disrupting traffic.

PM ROADM F80-H4 is a scalable ROADM designed for 80 channels. The ROADM F80-H4 can be used for configurations ranging from 2 to 8 degrees and can be scaled in service without disrupting traffic.

PM OC: Optical Coupler for ROADM expansion

PM OC is an optical coupler that can be installed with ROADMs to facilitate degree upgrades and simplify future network expansion.



PM OPS2/OPS2D: Single/Dual optical protection switch modules

The **PM OPS2** and **PM OPS2D** modules provide a flexible 1+1 optical protection solution in either single or dual configurations. The modules are head-end split, tail - end select optical protection switches. These modules can be deployed in front of transponders for card and service protection, behind the transponder but in front of the system filter for individual service line protection and behind the system filter for composite line protection.







PM DGE / DGE2: Dynamic Gain Equalization Modules

The modules equalize per channel power to optimize the Optical Signal to Noise Ratio (OSNR) to allow for greater distance reach. (2 slots)

PM DGE module can be used in conjunction with the PM OPM8 to allow for automatic power balancing.

PM DGE2 module has the PM OPM8 functionality embedded and can provide in real time the number of installed channels, the total power and the per-channel power available on the network.



PM OPM8: Optical Performance Measurement Card

The **PM OPM8** monitors the service state of each individual channel as well as the aggregated DWDM signal. (1 slot)

It provides information about optical power, channel presence/absence and channel mismatch due to out of service channels. It can also compensate for the insertion loss of the monitoring ports on a per channel basis.



PM OSC: Optical Supervision Channel Card

The **PM OSC** provides dedicated management connectivity between nodes using a 1510 nm/1590 nm wavelength outside of the C-band. (1 slot)

It carries management information related to the service state of the device and provides alarms and remote connectivity that enables **ConRep** device to be monitored from a centralized Network Operations Center (NOC). This module is also available for Extended Temperature Range (ETR) operation.

Management

At the node level, the **ConRep** can be managed through the **ConRep Network Management System** (NMS) or the **ConRep Craft** web-based craft terminal equipment manager. **ConRep NMS** is both a network and service layer management application that covers all operations activities from network design to service deployment and monitoring.

In addition to providing standard FCAPS (Fault, Configuration, Accounting, Performance and Security) and service level fault isolation features, the **ConRep NMS** provides configuration and provisioning capabilities.

It is one common tool for equipment provisioning, network monitoring, service level operations, alarms, scheduling and all other operations associated with NMS functionality.

ConRep NMS is one of the first NMS systems fully integrated with a real world map provided by OpenStreetMap®.





V 1.3

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The **ConRep Craft** provides element-level management and provides a graphical view of the box and of the SNMP managed objects. It also provides alarms, maintenance, configuration, inventory, monitoring and administration. **ConRep Craft** is a Java applet which can be run on a standard PC and only needs a Web browser to provide an intuitive, easy to use graphical user interface without the need to install a specific application. **ConRep Craft** can be launched remotely from **ConRep NMS** or accessed locally. Remote access is provided via HTTPS for **ConRep NMS** or using RADIUS authentication for the **ConRep Craft** element manager.



Data Communications Channel

The **ConRep** includes an embedded Data Communications Channel (DCC) for remote monitoring and management. Management information is embedded and transported in the same wavelength but outside of the client traffic, eliminating the need for allocating a special wavelength.

Optical Line Interfaces

ConRep uses a variety of both pluggable and integrated optics on its equipment. Pluggable options include SFP, SFP+, XFP, CFP and QSFP28 and will vary depending on the individual line card. **ConRep** integrated OTX optics are used on our 10G line cards where wavelength extension is required. The OTX is a special optical module designed by **ConRep** to achieve exceptional span distances without in-line amplification. It is mounted on the module and is not pluggable. It has a duplex LC connector and provides the same management information as XFPs.

OTX interfaces can reach up to 400 km distances with full channel counts without the need for mid-span (in-line) amplification or regeneration through the use of booster, preamps and Raman amplifiers at either end of the span. This lowers initial and ongoing costs by eliminating the need for facilities and power to house in-line amplifiers in remote or expensive areas. This is also useful for undersea applications.

The OTX optical interface can be ordered with 1550 nm C-band tunable optics and can be mounted on all **ConRep** PM modules supporting a tunable 10G, line interface. All fixed 10G wavelength configurations are supported by XFPs.





HUBER+SUHNER Cube Optics AG is certified according to ISO 9001.

WAIVER

It is exclusively in written agreements that we provide our customers with warrants and representations as to the technical specifications and/or the fitness for any particular purpose. The facts and figures contained herein are carefully compiled to the best of our knowledge, but they are intended for general informational purposes only.

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