

CORIANT IS NOW PART OF INFINERA

Coriant Groove™ G30 Network Disaggregation Platform – Open Line System

Innovative Open DWDM Optical Layer for Coherent and PAM4 Transmission

CATEGORY DEFINING OPEN LINE SYSTEM

Purpose-built as a disaggregated and compact open line system to manage surging data traffic volumes, the Coriant Groove™ G30 Open Line System (OLS) solution is a configuration of the Groove G30 Network Disaggregation Platform and leverages innovative Coriant® Pluggable Optical Layer devices. Through the Groove OLS configuration, network operators and cloud and data center operators can build their own customized, scalable optical line solution with best-in-class functions, all enabled through open APIs.

The Groove G30 OLS provides comprehensive optical layer functionality with discrete, standardized pluggable components. Capabilities integrated onto these components include Electronic Variable Optical Attenuators (EVOA), fixed and variable gain amplifiers (EDFA), Optical Supervisory Channel (OSC), Optical Channel Monitor (OCM), Tunable Dispersion Compensation Module (TDCM), Optical Time Domain Reflectometer (OTDR), Optical Protection Switch Module (OPSM), Optical Mux/Demux (OMD8/16/48/64/96), Colorless Add/Drop (CAD8/8E), etc. The result is a solution that provides up to 70% savings in price, power, and space by enabling network operators to choose only the functionality needed for specific applications. Configurations for both coherent and PAM4 optical layer applications are supported by simply choosing a particular combination of modules, all within a single rack unit. Additionally, the inherent operational simplicity of the Groove G30 OLS enables network operators to easily expand the capabilities of their optical network by simply adding more pluggable optical components.

Modeled after proven data center operations practices, the user interfaces and management tools of the Groove G30 OLS feature simple task-based operational procedures and server-like ease of use. Purpose-built to cost effectively power a better end-user cloud experience and manage growing data traffic volumes to and between data centers, the Groove G30 OLS sets new benchmarks in network performance.

Key benefits of the Groove G30 OLS modular solution include:

- **Open line system** – prevents vendor lock-in by disaggregating the optical layer from the transmission layer and enables the Groove OLS to be paired with Groove or third-party DCI transmission/transponder layer solutions
- **Industry-leading optical layer density** – supports up to 96 channels (up to 19.2 Tbps/fiber) in 1RU with full WDM terminal functionality, including passive and active optical layer functions and improved fiber management delivering three times the density over comparable solutions and enabling significant OpEx savings via minimized footprint and power efficiencies

BENEFITS OF THE CORIANT GROOVE™ G30 OPEN LINE SYSTEM

- **Supports** up to 96 channels in 1RU with full DWDM terminal functionality, including passive and active optical layer functions, delivering three times the density over comparable solutions
- **Prevents** vendor lock-in by disaggregating the optical layer from the transmission layer
- **Delivers** a truly open platform for rapid introduction and integration within any DC or telecom operating environment and seamless interoperability with existing metro and DCI transmission solutions
- **Offers** build your own optical layer based on plug-and-play configurable technology for either coherent or direct detect (PAM4) applications including a diverse range of additional optical layer functions (OSC, OTDR, Protection, Optical Channel Monitoring, etc.) in compact modular pluggable formats
- **Leverages** innovative Coriant® Pluggable Optical Layer technology
- **Provides** open APIs for rapid automation and integration within any IT operational environment to enable fast service roll out and activation (YANG/NETCONF/REST)



Coriant Groove™ G30
OLS

- **Unmatched configuration flexibility** – enables “build your own optical layer” based on plug-and-play configurable technology for either coherent or direct detect (PAM4) applications including a diverse range of optical layer functions in compact modular pluggable formats such as multiplexing/demultiplexing, preamplifier, booster amplifier, local add/drop amplifier, optical channel monitoring, optical protection, OSC, OTDR, and tunable DCM functions
- **Open management** – shares common YANG model based NETCONF and RESTCONF and other northbound management and control interfaces of the Groove G30 for fast deployment and ease of integration into any OSS environment

DISAGGREGATION AND INNOVATION ACCELERATION





Disaggregation and open line systems are important industry trends that are playing significant roles in the evolution of transport and data center interconnect networks. Disaggregation separates functions into open best-of-breed functions, integrated by software with open APIs and interfaces. The value of disaggregation includes the lowering of IT integration costs, the decoupling and acceleration of innovation cycles, the reduction of vendor lock-in, and the deployment of targeted solutions to different business models and network operators. The Coriant Groove™ Open Line System (OLS) Solution, Coriant® Pluggable Optical Layer, Coriant® hiT 7300 OLS, and our approach to open APIs (e.g., the Coriant Transcend™ Symphony and direct open interfaces) are concrete examples of Coriant’s commitment to open networking and ability to leverage disaggregation to drive value for customers.

SUPPORTING THIRD-PARTY WAVELENGTHS

The Groove G30 OLS is based on open protocols and industry standards to interwork with almost any third-party transmission (transponder/muxponder) solution currently deployed. This architecture enables the advanced optical layer capabilities and benefits of the Groove G30 OLS to be added to existing or greenfield deployments, for either coherent or PAM4 applications. Both fixed grid and flexible grid options are supported.

FEATURING MODULARITY AS A BUSINESS ENabler

The Groove G30 OLS is based on the innovative three-tier modular architecture of the Groove G30 Network Disaggregation Platform enabling DCI and telecom network planners and architects to build their own optical layer to exactly meet their requirements. Four service slots in the Groove G30 1RU chassis support up to four single-slot sleds or two double-slot sleds that are field replaceable, individually configurable, and hot swappable. Two types of sleds for OLS applications are currently available: the double-slot passive Optical Multiplexer/Demultiplexer Module (OMD48/96) and the Optical Carrier Card (OCC-2). The OMD96 module is the most compact 96 channel 50GHz optical mux/demux in the industry, and the OCC-2 module supports a diverse range of optical layer functions such as preamplifier, booster amplifier, local add/drop amplifier, optical channel monitoring, optical protection, OSC, OTDR, and tunable DCM. No other commercially available platform can support this range of functionality within 1RU.

Coriant Groove™ G30 Module/Sled	OLS Function
OCC-2 (Optical Carrier Card) 	2 slot active module 3 x OFP2 sub-slots 2 x SFP ports
OMD96 (96 Channel Optical Multiplexer/Demultiplexer) 	2 slot passive module 96 channel optical layer multiplexer and demultiplexer for coherent applications
OMD48 (48 Channel Optical Multiplexer/Demultiplexer) 	2 slot passive module 48 channel optical layer multiplexer and demultiplexer for coherent and PAM4 applications
OMD64C (64 Channel Optical Multiplexer/Demultiplexer) 	2 slot passive module 64 channel optical layer multiplexer for high baud rate coherent applications, 75 GHz grid

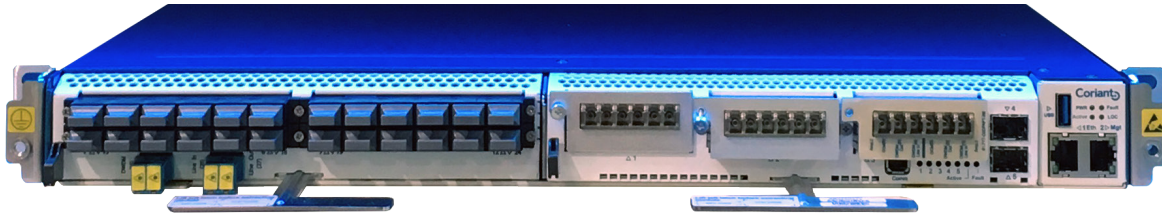


Figure 1: Typical Groove G30 OLS Configuration with an OMD96 (left) and OCC-2 (right)

CUSTOMIZING WITHOUT COMPROMISING

With the unmatched flexibility of the OCC-2 module, different modular optical components can be installed to meet the specific requirements of coherent or PAM4 optical layer applications. Coriant supports a wide range of capabilities to build your own optical layer as outlined in the following table.


Form Factor	Pluggable Components for OCC-2 Sled	
OF2 	EDFA Pre-Amp w/ OSC	Pre-amplifier with add/drop of Optical Supervisory Channel (various)
	EDFA Pre-Amp + Booster	96 channel Pre and Booster Amplifiers
	EDFA Booster Amp	96 channel EDFA Booster amplifier (various)
	TDCM	Tunable Dispersion Compensation Module
	OTDR	4 Ports Optical Time Domain Reflectometer; each OTDR port can be used for one direction OTDR testing
	Optical Protection Switch Module (OPSM)	Single Span OTS protection, common OMS protection, filterless and non-filterless colorless OCH protection, client PSM protection
	Optical Channel Monitor	4 Ports for Ingress & Egress in two directions (2D)
	OMD8-1 OMD8-2	8 Channel fixed filter (two versions)
	CAD8 CAD8E	8 Channel Colorless Add/Drop and 8 Channel Colorless Add/Drop Expandable

Table 2: Groove OCC-2 Sled Pluggable Optical Components Options

M	Type	OSC	LS	MS	AM	CD	Gain	PSat	Use
OF2 Preamp with OSC	P	Y			Y		0-18dB	15dBm	CHR
OF2 Preamp and Booster Amp	P&B						(P)10-27dB/ (B)8dB	(P)15dBm/ (B)18dBm	CHR
OF2 Preamp OSC High Channel Count IR	P	Y		Y	Y		0-18dB	19.8dBm	CHR
OF2 Preamp OSC High Channel Count LR	P	Y		Y	Y		14-26dB	19.8dBm	CHR
OF2 Preamp OSC High Channel Count ER	P	Y		Y	Y		25-35dB	19.8dBm	CHR
OF2 Booster Amp High Channel Count	B						4-16dB	21.3dBm	CHR
OF2 Booster Amp Ultra High Power	B		Y				11-23dB	24.5dBm	CHR, DD
OF2 Preamp OSC Ultra High Power	P	Y	Y	Y	Y	Y	14-23dB	24.5dBm	DD

Type: P Preamplifier, B Booster
LS: Laser Safety

MA: Mid Stage Access
AM: Automatic Span Loss/Gain Measurement

CD: Automatic CD Measurement
Use: CHR Coherent, DD Direct Detect (PAM4, DMT)

Table 3: OF2 Amplifier Specifications

THE CORIANT® GROOVE™ G30 NETWORK DISAGGREGATION PLATFORM – MUXPONDER

The Coriant Groove™ G30 Muxponder (MUX) solution is a configuration of the Groove G30 Network Disaggregation Platform. Delivering 3.2 terabits of capacity in a compact 1RU form factor, the Groove G30 MUX simplifies provisioning of 10G, 40G, and 100G Wide Area Network (WAN) cloud connectivity services for metro, regional, and long haul applications.



BENEFITS OF THE CORIANT GROOVE™ MUXPONDER

- **Supports** 1.6 Tbps client and 1.6 Tbps line traffic in a compact 1RU high-density and scalable platform that cost effectively scales DC transport capacity up to 25.6 Tbps per fiber and up to 134 Tbps per 42RU rack
- **Offers** leading energy efficiency due to ultra-low power consumption of 20W per 100G, including CFP2-ACO and client optics, by employing state-of-the-art dual-carrier 400G coherent DSP and recent advancements in photonic integration
- **Enables** the lowest first cost 10G, 40G, and 100G services with an innovative three-tier modular concept for capacity growth that includes differentiated pay-as-you-grow service planning and rollout and supports the lowest cost for onsite passive and active sparing
- **Delivers** a truly open platform free of proprietary software and hardware components for rapid introduction and integration within any DC or telecom operating environment and seamless interoperability with any existing metro or long haul line system
- **Leverages** optical reach and spectrum programmability with line side support for 200G 16QAM, 200G 8QAM, 150G 8QAM, and 100G QPSK
- **Provides** open APIs for rapid automation and integration within any IT operational environment to enable fast service roll out and activation

SIMPLIFYING INTEGRATION & OPERATION IN CLOUD & DATA CENTER ENVIRONMENTS

The Groove G30 OLS provides standards-based interfaces that simplify integration and operation within cloud and data center environments, including support for open Northbound Interfaces (NBIs) and APIs. The supported interfaces include CLI, Web GUI, SNMP Fault and Performance Management, Syslog, Zero Touch Commissioning (ZTC), NETCONF, RESTCONF, and gRPC machine-to-machine APIs. The Groove G30 OLS provides a set of native YANG models that can map into any industry standard defined or proprietary YANG model. These interfaces enable rapid integration of the Groove G30 OLS into traditional telecommunications environments and data center software defined networking (SDN) environments. The Groove G30 OLS is fully integrated with Coriant planning, management, and control solutions, including the Coriant Transcend™ Software Suite, with the Coriant Transcend™ Chorus for Transport and the Coriant Transcend™ Symphony.

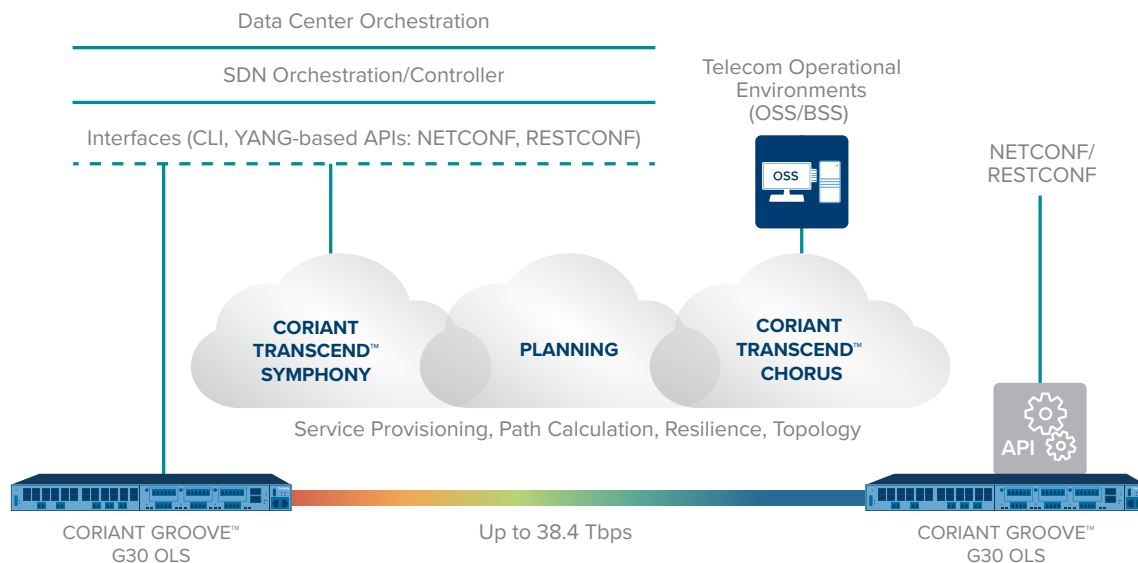


Figure 2: Coriant Groove™ G30 OLS Management and Control

OPTIMIZING RESOURCES WITH STREAMLINED PLANNING

Coriant provides advanced software tools to simplify the planning and system management of the Groove G30 OLS. The Coriant® 7196 Optical Planning Tool enables streamlined network design planning, ordering, and installation for optimal resource utilization. Transcend Chorus and the Coriant Transcend™ Solution ensure full end-to-end management of Groove G30 OLS network deployments.

TECHNICAL SPECIFICATIONS

Product features and specifications are subject to change

Groove G30 Physical Dimensions

- 440 x 44 x 510 mm / 17.3 x 1.73 x 20.1 in (W x H x D)
- Supports 600 mm depth with cabling
- Rack installation into 2 or 4 post standard 19-inch, 21-inch, and 23-inch racks
- Height: 1RU
- Weight: 3.2 kg/7.1 lb configuration without sleds/modules

Groove G30 OLS Capacity and Scalability

- 25.6 Tbps in 1RU with OMD-128 based OLS for coherent applications; maximum capacity per fiber: 25.6 Tbps (200G@37.5GHz)
- 38.4 Tbps in 1RU with OMD-64 based OLS for coherent applications; maximum capacity per fiber: 38.4 Tbps (600G@75GHz)
- 19.2 Tbps in 1RU with OMD-96 based OLS for coherent applications; maximum capacity per fiber: 19.2 Tbps (200G@50GHz)
- 9.6 Tbps in 1RU with OMD-48 based OLS for coherent; maximum capacity per fiber: 9.6 Tbps (200G@100GHz)
- 4.0 Tbps in 1RU with OMD-8 for PAM4 applications; maximum capacity per fiber: 4.0 Tbps (100G@100GHz)

Groove G30 System Configuration and Modularity

- Four individually configurable and hot-swappable single slot FRUs
- Two individually configurable and hot-swappable dual slot FRUs
- Single slot FRUs and dual slot FRUs can be mixed within the same system

OLS Service Modules/Sleds

- Dual slot Optical Carrier Card (OCC-2) Module/Sled FRU
 - Two OCC-2 modules can be supported within a single Groove G30
- 198.5 x 39.5 x 333 mm / 7.8 x 1.56 x 13.1 in. (W x H x D)

- 1.5 kg / 3.33 lb
- Two SFP pluggable interfaces
- Three OFP2 pluggable interfaces
- Power consumption is 16 W typical for the OCC-2 without any interfaces equipped, the total power consumption will depend on the type and quantity of inserted SFP/OFP2 modules
- Example power consumption for PABA OFP2 is 5.2W/unit typical and BAH OFP2 is 8W/unit typical
- Dual slot Optical Multiplexer/Demultiplexer OMD Module/Sled FRU
 - 198.5 x 39.5 x 333 mm / 7.8 x 1.56 x 13.1 in. (W x H x D)
 - 2.55 kg / 5.67 lb
 - OMD96 - 96 Channels Multiplexer/Demultiplexer
 - Two OMD96-2 modules can be supported within a single Groove G30
 - Coherent applications
 - Operating wavelengths: 191.35~196.1 THz
 - Channel number: 96
 - Channel spacing: 50 GHz
 - Low insertion loss: 8.2dB, 44 GHz 3dB Bandwidth
 - 24 MTP® ports for 96 A/D, each has 4 channels of TX and RX
 - 1 x dual LC connector for DWDM Port, 2xLC connector for DWDM In/Out power monitor
 - OMD48 - 48 Channels for point-to-point applications
 - Two OMD48-2 modules can be supported within a single Groove G30
 - Coherent and PAM4 applications
 - Operating wavelengths: ITU standard grid C-band channels: 196.1, 196.0, 191.5, 191.4 THz
 - Channel number: 48
 - Channel spacing: 100 GHz
 - Insertion loss: 6dB

- Connectors: 12 MTP® connectors ports for 48 A/D, each has 4 channels TX and RX; 1 x dual LC connector for DWDM Port, 2XLC connector for DWDM In/Out power monitor
- OMD64C - 64 Channels for point-to-point applications
 - Two OMD64C modules can be supported within a single Groove G30
 - Coherent applications with up to 70 GBaud signal rate
 - Operating wavelengths: ITU C-band 191.5 to 196.1 THz
 - Channel number: 64
 - Channel spacing: 75 GHz
 - Insertion loss: 8dB (tbc)
 - Connectors: 16 MTP® connectors ports for 64 A/D, each has 4 channels TX and RX. 1 x dual LC connector for DWDM Port, 2XLC connector for DWDM In/Out power monitor
- Power consumption for both modules is 0.8 W typical

Electrical Power

- Groove G30 (without OCC-2 or OMD96-2/OMD48-2 sleds, with 40% fan speed) is 62.8 W typical
- AC PSU Input Voltage Range 100-240VAC 50/60Hz, 1:1 FRU redundancy
- DC PSU Input Voltage Range -40V DC to -72V DC, 1:1 FRU redundancy
- HV D/C PSU, 1:1 FRU redundancy

Cooling and Fans

- Front to back straight through air flow
- 4:1 FRU fans, indefinite operation with a single fan failure
- Filler cards required in unused slots

Management and Console Ports

- 2 x RJ-45 front access
- 2 x RJ-45 rear access
- 1 x USB front access
- Field replaceable SD memory card

Regulatory and Compliance

- RoHS-6 compliant and lead-free per Directive 2002/95/EC
- GR-3160-Core Generic Requirements for Telecommunications Data Center Equipment and Spaces
- Telcordia GR-326-Core Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
- Telcordia GR-1435-Core Generic Requirements for Multi-Fiber Optical Connectors
- Emissions: FCC Part 15 Class A, EN55022/CISPR Class A Compliant, CE Laser Safety: ANSI Class 1M, IEC Class 1M, EN 60825-1/2, 21 CFR 1040 US FDA CDR, Class 1
- Electrical Safety: UL 60950, CSA22.2 60950 and IEC 60950

Environmental

- Operating Temperature: 0°C to 40°C / 32°F to 104°F
- Transport and Storage: -40°C to +70°C / -40°F to 158°F / 40°C +93% RH
- Humidity: 5% to 90% non-condensing

Management Options

- Management and control platforms:
 - Coriant Transcend™ Chorus
 - Coriant Transcend™ Solution
- Command Line Interface (CLI)
- Zero Touch Commissioning (ZTC)
- Syslog
- TACACS+
- Web GUI
- NETCONF, RESTCONF and gRPC machine-to-machine APIs
- Set of native YANG models
- SNMP Fault and Performance Management

EDFA OFF2 Module Common

Specifications

- Operating ambient temperature: -5°C to 50°C
- Operating relative humidity: 5% to 90% non-condensing
- Storage temperature: -40°C to +70°C (GR-63-CORE)
- Physical dimensions:
 - Height: 1.99 in (50.5 mm)
 - Width: 0.77 in (19.5 mm)
 - Depth: 6.08 in (154.4 mm)
- Regulatory compliances: GR-468-CORE, “Generic Reliability Assurance Requirements for Optoelectronic Devices Used in Telecommunications Equipment”
- Weight: 6.5 oz (0.185 kg)
- Equipped in a OCC-2 in the OFF2 slots (three per OCC-2)
- MBTF: 25 years per SR-332 (40°C, 50% electrical stress, 90% confidence interval)
- RoHS: 6/6 compliant assembly
- Automatic Gain Control (AGC) that maintains a constant gain output power to prevent far end transceiver input overload. The module maintains constant gain for each channel in the aggregated optical signal according to the gain as long as the total output power does not exceed the maximum rated value.
- Automatic power shutdown when the aggregate input falls below the threshold

TDCM OFF2 Module

- Supports up to 96 channels/carriers
- Designed for Direct Detect (PAM4 or DMT) line system

OTDR OFF2 Module

- Supports 4 x OTDR ports
- Each port can be used for one direction OTDR testing
- Can be used for two degrees with four fibers of OTDR application
- In-service monitoring and out-of-service diagnostic

OPSM OFF2 Module

- Single span and multi span (OSC presence) OTS protection
- Common OMS protection
- OCh protection for both colored and colorless add/drop
- Client protection
- ASE power interfering signal channel power detection, e.g., OCh protection

OCM OFF2 Module

- Per channel optical power monitoring
- Channel frequency channel monitoring

OMD8 OFF2 Module

- 8 channel Fixed Filter Multiplexer/Demultiplexer
- Upgradeable to 16

CAD8/CAD8E OFF2 Module

- 8 channel coherent colorless add/drop
- Extendable to 16 channels

These trademarks are owned by Coriant or its affiliates: Coriant®, Coriant CloudWave™, Coriant Dynamic Optical Cloud™, Coriant Groove™, Coriant Transcend™, mTera®, Nano™, and Pico™. Other trademarks are the property of their respective owners. Statements herein may contain projections regarding future products, features, or technology and resulting commercial or technical benefits, which may or may not occur. This publication does not constitute legal obligation to deliver any material, code, or functionality. This document does not modify or supplement any product specifications or warranties. Copyright © 2018 Coriant. All Rights Reserved. 74C.0168 Rev. C 04/18