

Coriant Groove™ G30 Network Disaggregation Platform – Muxponder

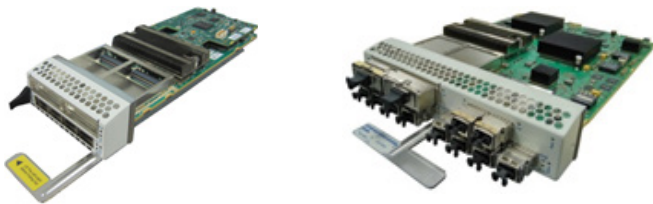
Innovative Connectivity Solution

The Coriant Groove™ G30 Muxponder (MUX) 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 solution simplifies provisioning of 10G, 40G, and 100G Wide Area Network (WAN) cloud connectivity services for metro, regional, and long haul DWDM transport applications. Designed to meet the scalability requirements of today's cloud and data center networks, the Groove G30 MUX features the industry's most compelling pay-as-you-grow approach that enables the lowest initial costs, reduced equipment sparing costs, and cost-effective scalability.

The Groove G30 MUX achieves its leading performance advantage by leveraging the latest innovations in high speed optics, photonic/electrical integration, and silicon photonics. Modeled after proven data center operations practices, the user interfaces and management tools of the Groove G30 MUX feature simple task-based 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 MUX sets new benchmarks in interconnectivity performance.

FEATURING MODULARITY AS A BUSINESS ENABLER

The Groove G30 MUX is based on the innovative three-tier modular architecture of the Groove G30 Network Disaggregation Platform providing a number of competitive advantages to DCI and telecom network planners and architects. Four service slots in the Groove G30 1RU chassis support up to four single-slot sleds/modules or two double-slot sleds/modules that are field replaceable, individually configurable, and hot swappable. Three 400G sleds (or field replaceable units, FRUs) are currently available for MUX applications: two single slot and one dual slot. The single slot 400G Coherent Module 1 (CHM1) and 400G Coherent Module 1G (CHM1G) can be equipped with up to two 200G line side interfaces (CFP2-ACO pluggables) and up to four 100G client side interfaces (QSFP28 pluggables).



Service Modules: 400G Coherent Module 1 (CHM1/CHM1G) and 400G Coherent Module 2 (CHM2)

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 modularity 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 DP-QPSK
- **Provides** open APIs for rapid automation and integration within any IT operational environment to enable fast service roll out and activation



The two slot 400G Coherent Module 2 (CHM2) can be equipped with up to two 200G line side interfaces (CFP2-ACO pluggables) and supports a mix of 10G, 40G, and 100G clients (QSFP28 and QSFP+ pluggables). The sleds/modules and the pluggable interfaces can be purchased and deployed one at a time as required.

KEY ADVANTAGES OF THE CORIANT GROOVE™ G30 MUX MODULAR ARCHITECTURE

- The lowest first cost for any single service (10G, 40G, 100G, or a combination) compared to the competition
- The most economical pay-as-you-grow concept enabling incremental in-service growth from 10 Gbps up to 1.6 Tbps of service capacity in 1RU
- Flexibility to mix and match 10G, 40G, and 100G clients according to network demand
- Power-as-you-grow with no phantom power drain for unused capacity
- Significant increase in network availability compared to non-modular solutions that require a complete chassis replacement
- The simplest and lowest cost sparing concept of all products in the market
- The lowest sparing cost per site of all competitive products (one SKU per sled for the entire C-band)
- Rapid adoption and deployment of future technologies with new sleds and without the need to replace and discard the entire chassis, thus preserving hardware investment

LEVERAGING PROGRAMMABLE MODULATION FORMATS

Powered by Coriant CloudWave™ Optics, the Groove G30 MUX supports programmable DWDM line interface bandwidth and performance to optimize high-capacity transmission from 100G to 400G in metro, regional, or long haul applications. The Groove G30 MUX features four different user programmable line rate/modulation formats to further cost optimize each network design for optimal transparent reach and fiber spectral utilization. Each of the eight Groove G30 MUX line side ports can be independently configured as either 100G DP-QPSK, 150G 8QAM, 200G 8QAM (CHM1G only), or 200 16QAM. Pairing the Groove G30 MUX with the Groove G30 OLS, which features pluggable form factor amplifiers, variable optical attenuators, power monitoring, combiners, splitters, WSS, and all other optical layer functions, is the simplest, most flexible, and most efficient DWDM transport solution currently available.

Coriant® Groove™ G30 Open Line System (OLS)

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.



Key benefits of the 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 transmission/transponder layer solutions
- **Industry-leading optical layer density** – supports up to 96 channels in 1RU with full WDM terminal functionality, including passive and active optical layer functions, delivering three times the density over comparable solutions and enabling significant OpEx savings via minimized footprint and power efficiencies
- **Unmatched configuration flexibility** – enables “build your own optical layer” based on plug-and-play configurable technology for 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

Modulation Scheme	Application	Rate	Fiber Capacity	Reach	Forward Error Correction
DP-QPSK	Long Haul/Submarine	100 Gbps	9.6 Tbps	Up to 5,000 km/11,000 km	Up to 25% SDFEC
8QAM	Regional	150 Gbps	19.2 Tbps	Up to 2,000 km	Up to 25% SDFEC
16QAM	Metro, Metro Edge	200 Gbps	25.6 Tbps	Up to 1,200 km	Up to 25% SDFEC

SUPPORTING PROGRAMMABLE WAVELENGTHS

Each of the eight Groove G30 MUX line side port wavelengths can be independently tuned over the entire C-band to support either a 96 or 128 channel plan. In addition, the Groove G30 MUX supports multi-carrier super-channels for increased spectral utilization and seamless interworking with all of Coriant's flexi-grid capable line systems, including the Groove G30 OLS, Coriant® 7100 Nano™ Packet Optical Transport Platform for metro WAN interconnectivity applications, and Coriant® hiT 7300 Multi-Haul Transport Platform for long haul WAN interconnectivity applications, as well as any third-party line system that supports either fixed-grid or flexible spectrum provisioning. The wavelength tuning and optical interface parameters are configurable via Command Line Interface (CLI), Web GUI, SNMP, NETCONF, or RESTCONF. Optional management and control are available through the Coriant® Transport Network Management System (TNMS) and the Coriant Transcend™ SDN Transport Controller.

SIMPLIFYING INTEGRATION AND OPERATION IN CLOUD & DATA CENTER ENVIRONMENTS

The Groove G30 MUX 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 MUX 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 MUX into traditional telecommunications environments and data center software defined networking (SDN) environments. The Groove G30 MUX is fully integrated with Coriant planning, management, and control solutions, including TNMS and the Coriant Transcend™ SDN Solution.

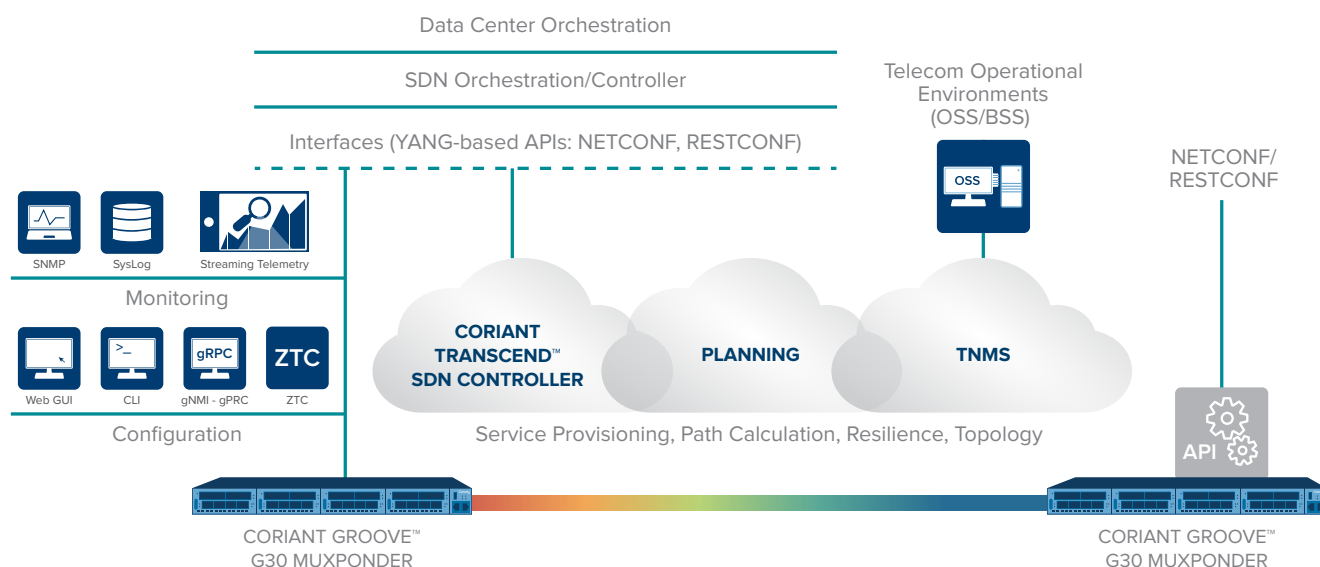


Figure 1: Coriant Groove™ G30 MUX Management and Control

Deploying over Third-party Line Systems

The Groove G30 MUX is based on open protocols and industry standards to interwork with almost every third-party metro and long haul line system currently deployed. This architecture enables the advanced transmission capabilities and benefits of the Groove G30 MUX to be added to existing deployments. As a purpose-built WAN transmission system, the Groove G30 MUX disaggregates the transponder and muxponder functions from the traditional telecom transport network element that also includes ROADM and optical amplification to enable rapid deployment in any existing network.

Physical Dimensions

- 440 x 43.7 x 510 mm / 17.32 x 1.72 x 20.08 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: 6.4 kg / 14 lb for 3.2 Tbps configuration without pluggables

System Capacity and Scalability

- Maximum line side capacity: 1.6 Tbps
- Maximum client side capacity: 1.6 Tbps
- Maximum capacity per fiber: 25.6 Tbps
- Maximum capacity per rack: 134.4 Tbps

System Configuration and Modularity

- Four individually configurable and hot-swappable single slot FRUs (400G sleds)
- Two individually configurable and hot-swappable dual slot FRUs (400G sleds)
- Single slot FRUs (400G sleds) and dual slot FRUs (400G sleds) can be mixed within the same system
- Up to 8 x CFP2-ACO Pluggable (100G/150G/200G)
- Up to 16 x QSFP28 Pluggable (100G)
- Up to 20 x QSFP+ Pluggable (4x10G/40G)

Service Modules/Sleds

- Single slot 400G Coherent Module 1 (CHM1/CHM1G) FRU
 - Two 200G line side CFP2-ACO pluggable interfaces
 - Four 100G client side QSFP28 pluggable interfaces
- Dual slot 400G Coherent Module 2 (CHM2) FRU
 - Two 200G line side CFP2-ACO pluggable interfaces
 - Ten QSFP28/QSFP+ client pluggable interfaces with a total capacity of 200G supporting a mix of 10G, 40G, and 100G client interfaces
 - Twenty 10G clients are supported via the use of a 4 x 10G breakout cable per 40G client interface

Electrical Power

- 20W per 100G (CHM1G Muxponder with Coriant CFP2-ACO and client optics)
- 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 RJ45 front access
- 2 x RJ45 rear access
- 1 x USB front access
- Field replaceable SD memory card

In-band General Communication

Channel (GCC) Support

- Support for GCC0 on line port OTUk (CHM1/CHM1G/CHM2)
- 2 GCC channels per module (CHM1/CHM1G/CHM2)

Client Side Interfaces 100G

- QSFP28 SR4 (100 m) 100 GbE
- QSFP28 LR4 (10 km) 100 GbE
- QSFP28 LR4 (10 km) Dual Rate (100 GbE and OTU4)
- QSFP28 CWDM4 (2 km) 100 GbE
- QSFP28 PSM4 (500 m) 100 GbE
- QSFP28 ER4 (30 km) 100GbE
- QSFP28 4x8/16G Fiber Channel (SMF) (10 km)
- QSFP28 Active Optical Cable (3 m and 10 m) 100 GbE

Client Side Interfaces 10G/40G

- QSFP+ SR4 (100 m) 40 GbE and 4 x 10 GbE
- QSFP+ LR4 (10 km) 40 GbE
- QSFP+ LR4 (10 km) 40 GbE and OTU3, and 4 x 10G with support of OTU2 and OC-192
- QSFP+ IR4 (2 km) 40 GbE
- QSFP+ LR4 (10 km) 4 x 10 GbE/for 40 GbE <-> 10 GbE with breakout fiber (without cable), OTU2/2e and OC-192/STM-64
- QSFP+ eSR4 (300 m) for 40 GbE <-> 10 GbE with breakout fiber (without cable)
- QSFP+ ER4 (40 km) 40 GbE and 4 x 10 GbE (10 GbE, OC-192, OTU2/2e)
- QSFP+ 8G/16G Fiber Channel (reach 190 m / 125 m)

Line Side Interfaces

- Tunable C-band CFP2-ACO Coherent

Bidirectional Optical Transceiver

- Tunable C-band CFP2-ACO Coherent Optical Transceiver (100G DP-QPSK, 150G 8QAM, 200G 8QAM (CHM1G only), 200G 16QAM)
- Transparent Reach: up to 4000 km
- Chromatic Dispersion Tolerance
 - DP-QPSK 280 ns/nm
 - 8QAM/16QAM 45 ns/nm
- PMD Tolerance: 40 ps mean DGD

Data Encryption

- Integrated wire-speed AES-256 OTN payload encryption (10G, 40G, 100G)
- Diffie-Hellman (D-H) dynamic key exchange
- Secure key transmission via local OTUk GCC0 communications channel

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
- 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

Performance Monitoring

- Ethernet PMs: 24 hour, 15 min, 1 week, 1 month
- OTN PMs: Tx/Rx, FEC

Management Options

- Management and control platforms:
 - Coriant® Transport Network Management System (TNMS)
 - Coriant Transcend™ SDN Solution
- NETCONF and RESTCONF YANG model based machine-to-machine APIs
- Command Line Interface (CLI)
- Zero Touch Commissioning (ZTC)
- SNMP fault management
- GUI based Craft Terminal

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