

CORIANT IS NOW PART OF INFINERA

Coriant CloudWave™ CHM2T/ CHM1T Multiservice Transponder

Doubles the Density, Halves the Power, and Ups the Speed by 50%

The Coriant CloudWave™ CHM2T/CHM1T Multiservice Transponder is a hot-swappable slide-in unit of the Coriant Groove™ G30 Network Disaggregation Platform (NDP). Using Coriant CloudWave™ T Optics, the latest generation of Coriant coherent detection interface technology, the CHM2T/CHM1T multiservice transponder sets a new world record in capacity, density, and low footprint. Delivering 2.4/4.8 Terabits of capacity in a compact two-slot/one-slot wide sled form factor, the new transponder sleds simplify 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, CloudWave T technology 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.

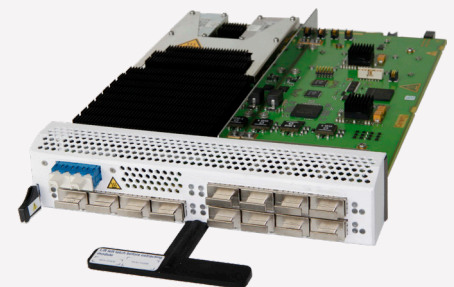
CloudWave T achieves its leading performance advantage by leveraging the latest innovations in digital signal processing and photonic/electrical integration. This latest generation of optical technology allows the user to increase optical bandwidth to 38.4 Tbps per fiber pair, using advanced modulation formats and programmable spectrum per wavelength. CloudWave T technology enables a single optical wavelength to carry as much as 600 Gbps of capacity. For long distance applications such as transcontinental or submarine networks, CloudWave T offers the opportunity to tailor the system to achieve an optimal balance between reach and performance thus maximizing spectral efficiency. Advanced programmability of the line side in terms of baud rate, FEC, and modulation depth allow adaptation to any boundary condition to an extent that it is even possible to provide 400G wavelengths on a 50 GHz installed base or improve current 200G reach on a 50 GHz installed base by 40%.

FEATURING MODULARITY AS A BUSINESS ENABLER

The CHM1T and CHM2T CloudWave T sleds in the Groove G30 NDP are based on the innovative three-tier modular architecture 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 CHM1T sleds or two double-slot CHM2T sleds that are field replaceable, individually configurable, and hot swappable. Both the CHM2T and CHM1T provide two integrated 600G line side interfaces. The two-slot CHM2T module can be equipped with up to 12x100G or 3x400G client interfaces (QSFP28/QSFP28-DD). The one-slot CHM1T module provides up to 3x400G client interfaces based on QSFP28-DD pluggables. The sleds/modules and the pluggable interfaces can be purchased and deployed one at a time as required.

BENEFITS OF THE CORIANT CLOUDWAVE™ CHM2T/CHM1T MULTISERVICE TRANSPONDER

- **Supports** up to 2.4/4.8 Tbps client and 2.4/4.8 Tbps line traffic in a compact 1RU high-density and scalable platform that cost effectively scales DC transport capacity up to 38.4 Tbps per fiber pair and up to 200/400 Tbps per 42RU rack
- **Offers** leading energy efficiency due to ultra-low power consumption of 16W per 100G and integrated state-of-the-art dual-carrier 1.2 Tbps coherent DSP, employing recent advancements in photonic integration and ultra-dense client optics
- **Enables** the lowest first cost 10G, 40G, 100G, and above 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 unlimited combinations of modulation schemes and baud rates
- **Provides** open APIs for rapid automation and integration within any IT operational environment to enable fast service roll out and activation



KEY ADVANTAGES OF THE CORIANT CLOUDWAVE™ CHM2T/CHM1T MULTISERVICE TRANSPONDER

- Highest density
 - 9.6 Tbps of capacity in compact and modular 1RU
 - 2x improvement over the closest comparable solution
 - Unprecedented OpEx savings as networks scale
- Lowest power consumption
 - 0.16 Watts per Gigabit
 - Up to ½ the power consumption of competing solutions
 - Ultra-power efficient, power-as-you-grow operations
- Advanced programmability
 - Programmable baud rate (30-70G baud); FEC (0-27%); fractional QAM and geometrical shaping
 - Optimal spectral efficiency, lowest latency and reach
 - Encryption at line speed
- Unmatched speed and reach
 - 600 Gbps transmission over a single wavelength (up to 38.4 Tbps of capacity per fiber)
 - Support for 1000 km terrestrial reach at 400G per wavelength, 4000 km at 200G
 - Support for 400G wavelengths over a deployed 50 GHz grid

LEVERAGING PROGRAMMABLE MODULATION FORMATS AND BAUD RATES

Powered by Coriant CloudWave™ Optics, the CloudWave T coherent transponder modules, the CHM2T and CHM1T, support programmable DWDM line interface bandwidth and performance to optimize high-capacity transmission from 100G to 600G per wavelength in metro, regional, or long haul applications. The CHM2T/CHM1T feature an almost infinite number of different user programmable line rates and modulation formats to further cost optimize each network design for optimal transparent reach and fiber spectral utilization. Each CloudWave T line side port can be independently configured with modulation formats ranging from QPSK to 64QAM, including space partitioning (e.g., SP-16QAM) or hybrid modulation formats. Advancements in Forward Error Correction (FEC) algorithms provide industry-leading signal robustness. The size of the FEC overhead can be programmed up to 27% of the payload signal used. The resulting bandwidth of each individual wavelength is measured by its signal rate, which can range from 30 to 70 GBaud, with the corresponding spectrum used per channel between 31 and 75 GHz (or higher, if desired). Existing networks with a fixed channel grid can be easily reused when adapting the used baud rates to the spectral width of the existing filters.

MODULATION SHAPING IN THREE DIMENSIONS

Fractional QAM: Shape probability of constellation points to adapt capacity to reach

Geometrical Shaping: Shape location of constellation points to optimize sensitivity

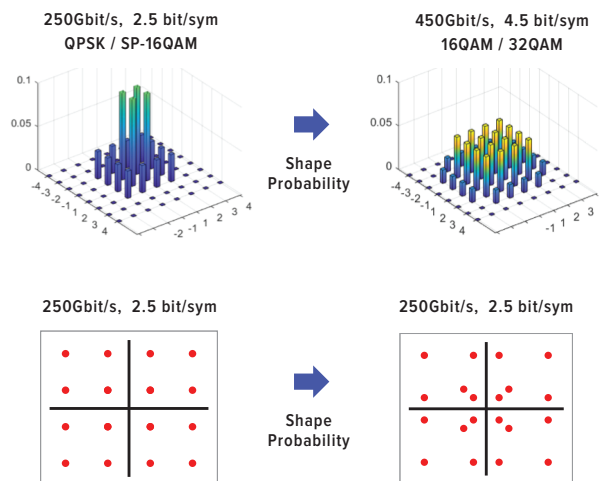
Adaptive Baud Rate: Shape spectrum to available passband

ENHANCED SD-FEC

Configurable overhead and FEC iterations
15% overhead and 27% overhead

LOW POWER CONSUMPTION

Constellations, FEC bandwidth, and baud tuned to desired reach/capacity



Maximum capacity for any network, any distance, any passband

Figure 1: Modulation Shaping with Coriant CloudWave™ Optics

SUPPORTING OPEN, FLEXIBLE BANDWIDTH

Each of the eight CloudWave T line side wavelengths can be independently tuned over the entire C-band supporting full flexibility per channel. This means that 96 or 128 channel plans are history and each service will only use the spectrum necessary for its error-free transmission. CloudWave T supports seamless interworking with all Coriant and third-party flexi-grid capable line systems. This includes the Groove G30 OLS and Coriant® hiT 7300 Multi-Haul Transport Platform for long haul interconnectivity applications, as well as any third-party line system that supports either fixed-grid or flexible spectrum provisioning. Optional management and control are available through the Coriant Transcend™ Software Suite, including the Coriant network management system, Coriant Transcend™ Chorus for Transport, and the Coriant multi-vendor SDN controller, Coriant Transcend™ Symphony.

SIMPLIFYING INTEGRATION AND OPERATION IN CLOUD AND DATA CENTER ENVIRONMENTS

The CHM2T and CHM1T are delivered within the Groove G30 NDP and provide 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 NDP into traditional telecommunications environments and data center software defined networking (SDN) environments. The Groove G30 including CloudWave T is fully integrated with Coriant planning, management, and control solutions, including Transcend Chorus and the Coriant Transcend™ Software Suite.

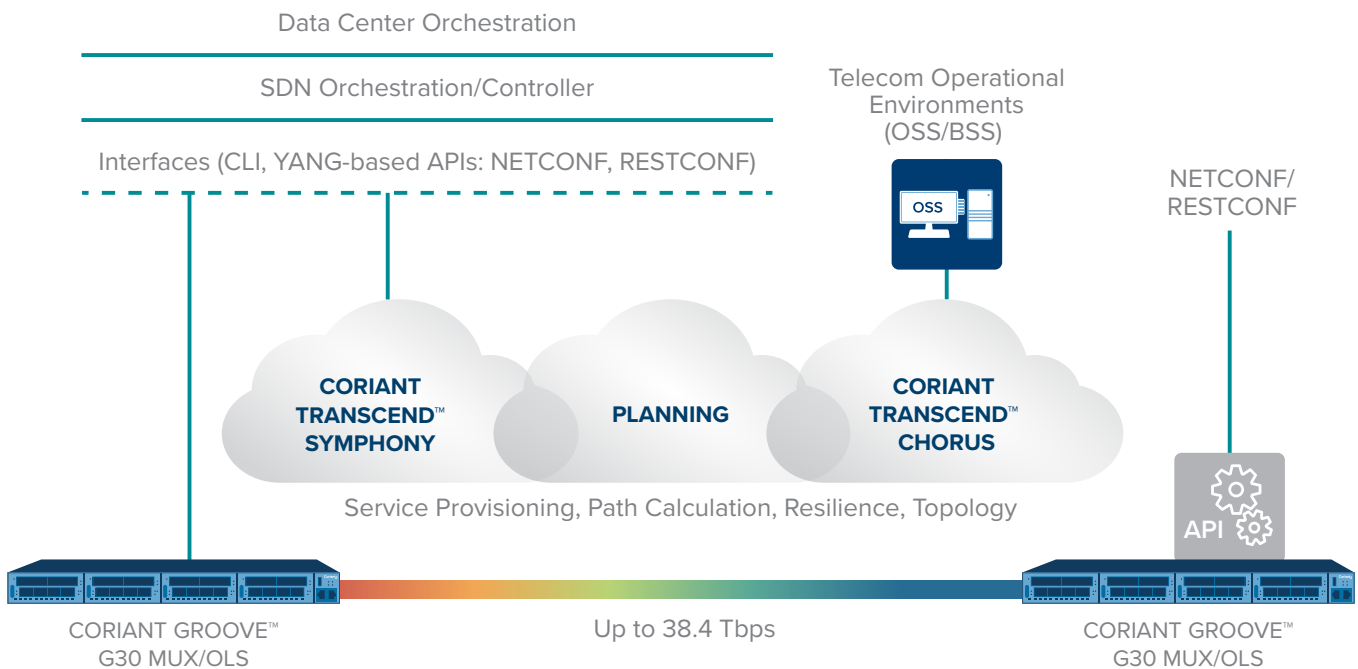


Figure 2: Coriant Groove™ G30 MUX and OLS Management and Control

Physical Dimensions of Groove G30

- 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

CHM2T System Capacity and Scalability

- Maximum line side capacity: 2.4 Tbps
- Maximum client side capacity: 2.4 Tbps
- Up to 12 x QSFP28 Pluggable (100G)
- Up to 3 x QSFP28-DD Pluggable (400G)

CHM1T System Capacity and Scalability

- Maximum line side capacity: 4.8 Tbps
- Maximum client side capacity: 4.8 Tbps
- Up to 3 x QSFP28-DD Pluggable (400G)

System Configuration and Modularity in Groove G30

- Maximum capacity per fiber: 38.4 Tbps
- Maximum capacity per rack: ~400 Tbps
- Four individually configurable and hot-swappable single slot FRUs (1.2T sleds CHM1T)
- Two individually configurable and hot-swappable dual slot FRUs (1.2T sleds CHM2T)
- Single slot FRUs and dual slot FRUs can be mixed within the same system
- Up to 24 x QSFP28 Pluggable (100G) in 1RU
- Up to 12 x QSFP28-DD Pluggable (400G)

Electrical Power

- 16W per 100G
- Typical: 200W, Maximum 240W

In-band General Communication

Channel (GCC) Support

- Support for GCC0 on line port OTUk (CHM1T/CHM2T)
- 2 GCC channels per module (CHM1T/CHM2T)

Client Side Interface 400G

- QSFP28-DD LR4, FR4

Client Side Interfaces 100G/OTU4

- QSFP28 SR4 (100 m) 100 GbE
- QSFP28 LR4 (10 km) 100 GbE
- QSFP28 CWDM4 (2 km) 100 GbE
- QSFP28 PSM4 (500 m) 100 GbE
- QSFP28 Active Optical Cable (3 m and 10 m) 100 GbE

Line Side Interfaces

- Integrated Tunable Optical Transceiver
- Line Rate 100 Gbps to 600 Gbps
- Tunable Signal Rate 30 Gbaud to 70 Gbaud
- Modulation Formats: CP-QPSK, SP-16QAM, 16QAM, 32QAM, 64QAM, Hybrid

Data Encryption

- Integrated wire-speed ODU4 AES-256 payload encryption
- 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 in Groove G30 NDP

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

Groove G30 NDP Management Options

- Management and control platforms:
 - Coriant Transcend™ Chorus for Transport
 - Coriant Transcend™ Symphony
- 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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