DATA SHEET

800G WaveLogic 5 Extreme MOTR Module

Ciena's WaveLogic™ 5 Extreme MOTR (WL5e MOTR) is a single-carrier, coherent transceiver and service channel interface capable of transmitting and receiving up to an industry-leading 800 Gb/s of client payload on a single wavelength. Advanced coherent DSP technology, combined with state-of-the-art, high-bandwidth electro-optics, enables highly compact and flexible 200 Gb/s to 800 Gb/s coherent transmission to maximize capacity across any network path, while dramatically reducing footprint, power, and cost/bit.

The WaveLogic 5 Extreme Muxponder interface combines six client ports (5 QSFP28 + 1 QSFP28/DD) and one programmable 200-800 Gb/s coherent DWDM line interface in a single-slot form factor, doubling the amount of capacity that can be supported in a 6500 shelf while reducing footprint and power by at least 50 percent. With WL5e MOTR supported in all 6500 D-Series and S-Series shelves, network providers can mine their existing 6500 installed base to achieve greater capacity scale and improved footprint, power, and cost efficiencies.

Pay-as-you grow pluggable QSFP28/QSFP-DD client options allow users to accommodate a mix of high-bandwidth 100GbE, OTU4, and 400GbE connectivity and elegantly evolve to 400GbE-router architectures as needed. QSFP28 ports support both 100GbE and OTU4 protocols, and the QSFP-DD port supports both 400GbE and 4x100GbE client options to enable a maximum of 800 Gb/s throughput across the single-slot interface. High-density aggregation modules can be equipped alongside the WL5e MOTR that allow for aggregation of lower-speed 1G to 10G services.

WL5e MOTR supports flexible coherent wavelength capacity settings, from 200 to 800 Gb/s in 50 Gb/s steps, enabling users to optimize spectral efficiency for any network path. Network providers can achieve 800G for

Features and benefits

- Single-carrier 200-800 Gb/s coherent transmission to maximize capacity across any distance
- Compact single-slot form doubles capacity while reducing footprint and power by 50 percent in existing 6500 systems
- Versatile client interface support:
  - 100GbE
  - 400GbE
  - OTU4
- Enables ubiquitous 400GbE connectivity across any distance
- Offers frequency tunability in the C- or L-Band to maximize fiber capacity

shorter-reach applications, 600G for metro/regional distances, and a minimum of 400G for long-haul and uncompensated submarine applications. Ready for next-generation router architectures, WaveLogic 5 Extreme enables ubiquitous deployment and efficient 400GbE client connectivity at any distance, from across the metro to across the Pacific. Industry-leading performance is enabled through advanced high-speed analog design, best-in-class high-gain FEC algorithms, non-linear compensation, non-linear probabilistic constellation shaping, and next-generation high-bandwidth electro-optics leveraging photonic integration across both Indium Phosphide and Silicon Photonics technologies.

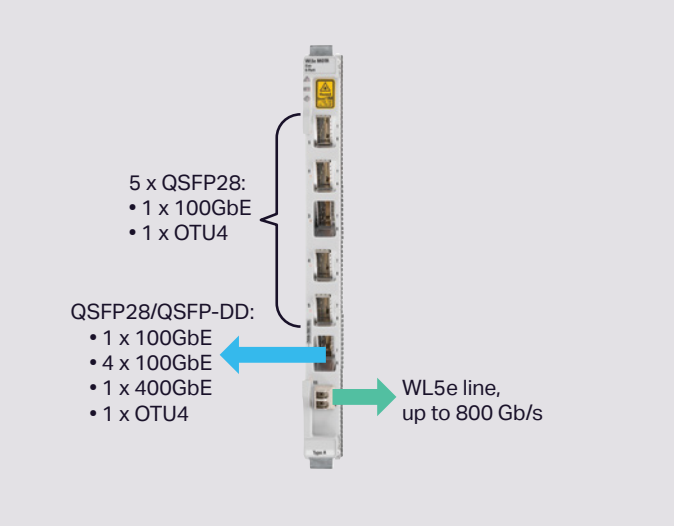

Figure 1. Flexible 100G/400G client mix supporting up to 800 Gb/s throughput

In addition to significant power and footprint savings that enable a 'greener' network, WL5e MOTR integrates link monitoring and other operational features to automate turn-up and simplify deployment and networking. As an example, eight integrated test sets, as well as client and facility loopbacks, facilitate remote testing of all paths—both the DWDM line and subtending equipment from the client port—to accelerate turn-up and troubleshooting. Extensive link monitoring, along with the programmability of the WL5e MOTR, provides real-time visibility of network performance and the ability to quickly adjust to unpredictable demands, enabling the evolution to the Adaptive NetworkTM. Features supporting tight integration between router and transport layers include LLDP automated topology discovery and link state holdoff to increase network resiliency and enable operational process automation across L0-L3 networks.

With 6500 WL5e MOTR, network providers can efficiently transport 100G-400G services, provide greater service differentiation through unique high-speed wavelength connectivity options up to 800 Gb/s, and gain dramatic improvements in networking efficiencies through reduced footprint, power and cost per bit. Extensive link monitoring combined with integrated operational features speed turn-up, provide real-time visibility into network performance and facilitate software automation across L0-L3 networks.

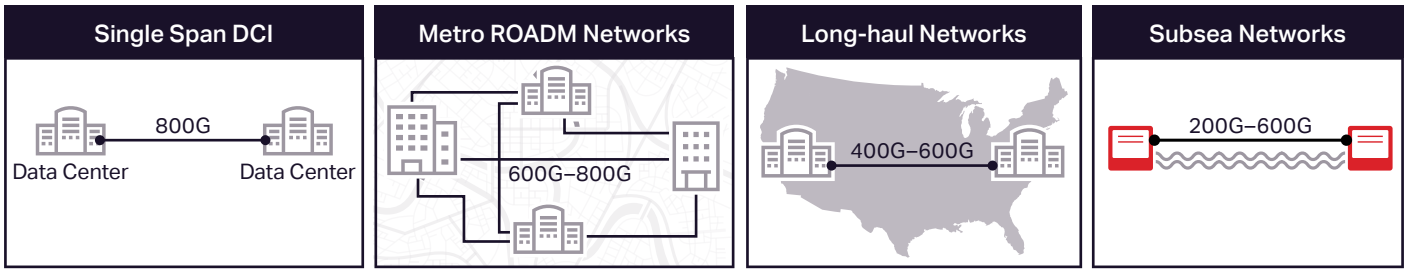

Figure 2. 6500 WL5e MOTR well suited for all applications requiring highest spectral efficiency

General specifications

Ports
- 1 coherent DWDM line port, 6 client ports

Weight
- 2.0kg (4.4lbs)

Symbol rates
- Adjustable baud from 82 to 95 GBaud

Single-carrier channel capacity
- 200 Gb/s to 800 Gb/s in
- 50 Gb/s increments

Photonic line channel plan
- Flexible grid colorless configurations
- Fixed grid (100GHz, 112.5GHz)

Client interfaces
- 100GbE
- OTU4
- 400GbE

Transmitter/Receiver specifications

Laser frequency tuning range
- C-Band: 191.25 to 196.125 THz
- L-Band: 186.0875 to 190.9562 THz
- 100MHz tuning granularity

Tx Output power
- -9 to +4 dBm

Rx Sensitivity
- -25dBm for most rates
- -15dBm for 800G

Rx damage level
- +17dBm

PMD tolerance
- 50ps mean, 150ps peak

CD tolerance
- -45,300 ps/nm to +469,200 ps/nm

ROADM support
- Up to 28

Operational features

Loopbacks
- Line facility and terminal loopback
- Client facility and terminal loopback

Integrated Test Set
- Up to 8 independent ITS per card
- Test patterns: 100GbE/400GbE 802.3, OPU4/OPUflex (PRBS31)

Topology Discovery
- 100GbE/400GbE LLDP snooping
- Trail Trace Indicator (TTI)
- Neighbor Discovery Protocol (NDP)

Router Signaling
- 100GbE/400GbE link signaling holdoff

Link Monitoring
- Pre-FEC BER (avg, max)
- Pre-FEC Q (min, avg, max, stdev)
- Post-FEC Error Count
- SNR External (current, min, avg, max)
- Effective SNR (current, min, avg, max)
- Tx power (current, min, avg, max)
- Rx total/channel power (current, min, avg., max)
- Polarization Mode Dispersion (current, avg, max)
- Polarization Dependent Loss (current, avg., max)
- Total Rx link dispersion (current, min, avg., max)
- Total Tx link dispersion (current)
- Cycle slip count (min, avg, max)
- Estimated fiber length
- Estimated unidirectional latency
- Delay measurement (min, avg, max)

Protection
- 1+1 OPS optical channel path protection
- 1+1 OPS optical trunk protection
- 1+1 OPS client-layer optical path protection
- Layer 0 Control Plane restoration

Shelf/system specifications

6500-D2
- 800 Gb/s

6500-D4
- 3.2 Tb/s

6500-D7
- 5.6 Tb/s

6500-S8
- 6.4 Tb/s

6500-S14 1
- 1.2 Tb/s

6500-S32
- 25.6 Tb/s

C-band capacity (4800GHz)
- 33.6 Tb/s

L-band capacity (4800GHz)
- 33.6 Tb/s

Environmental specifications

Storage temperature -
- 40C to +70C

Operating temperature
- -5C to +55C (except 32-Slot: -5C to +50C)

Storage humidity
- 5%-93%, non-condensing

Operating humidity
- 5%-93%, non-condensing

Laser safety
- IEC/EN 60825-1 Edition 3 - Class 1
- IEC/EN 60825-2 Edition 3.2 - Hazard
- Level 1M
- FDA CDRH 21-CFR-1040

ESD
- GR-1089-CORE Issue 7
- ETSI EN 300 386 (other than telecom centres)
- EN 55035 / CISPR 35
- Electromagnetic emission FCC 47 CFR Part 15, Class A
- GR-1089-CORE, Class A
- ETSI EN 300 386, Class A
- EN 55032/CISPR 32, Class A

Electromagnetic Immunity
- GR-1089-CORE
- ETSI EN 300 386 (other than telecom centres)
- EN 55035/CISPR 35

Office vibration/ Earthquake/shock
- GR-63-CORE, Zone 4
- ETSI EN 300 091-1-3, Class 3.1

Flammability
- GR-63-CORE, Section 4.2.3
- RoHS RoHS 2011/65/EU

Reliability
- GR-468-CORE
- GR-63-CORE,
- GR-326-CORE