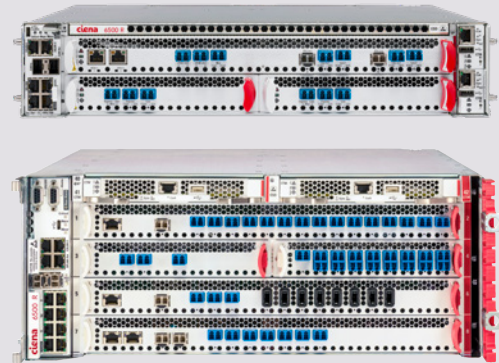


DATA SHEET

# 6500

Reconfigurable Line System



## Delivering scale and programmability for the photonic layer while maximizing operational efficiencies

Ciena’s 6500 Reconfigurable Line System (RLS) empowers network operators to efficiently address the highest-capacity networking requirements in today’s metro, long-haul, and Data Center Interconnect (DCI) networks. The 6500 RLS is an open and programmable photonic networking platform that is simple to deploy and operate, and optimized for space-constrained, multi-vendor environments.

Compact, modular transport devices have emerged to solve footprint challenges in networks requiring massive capacity scalability. However, footprint and scalability challenges also exist within the photonic layer, driving the need to minimize footprint while scaling for capacity growth. As hyperscale data center networks light thousands of fiber pairs over the coming years, line system technologies will not scale with minimal footprint without the introduction of compact solutions for the photonic line. The 6500 RLS was designed to address evolving density and footprint requirements for the photonic layer while integrating tools and capabilities to simplify installation, turn-up, and management.

The 6500 RLS provides network operators with choice in how they deploy their photonic line systems, whether integrated or disaggregated. It is highly programmable, and its open APIs enable integration into existing management and back-office systems. The 6500 RLS improves service velocity through significant operational savings and provides the scale network operators need to increase their competitive edge and elevate their end-customers’ experience.

## Features and benefits

- Efficiently scales to meet the highest capacity network requirements with an optimized ultra-dense design
- Reduces footprint by as much as 70 percent, compared to traditional chassis-based systems, with its modular and compact form factor
- Eases deployment and operations with Zero-Touch Provisioning (ZTP), network auto-discovery, and full network visibility for simplified troubleshooting
- Provides openness and programmability with a full suite of open APIs and a microservices-based software architecture
- Doubles the fiber capacity with optimized C&L-band
- Intelligent LO control plane accelerates wavelength turn-up and improves service availability

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## **Ultra-dense design for optimal photonic line system scale and efficiencies**

The 6500 RLS addresses scalability needs with an ultra-dense design optimized for capacity and efficiency. With support for both large and small sites, it can be deployed into a variety of applications including simple, mux/demux configurations for DCI, Colorless Direct Attach, Colorless Transponder Direct Attach, or fully-flexible Colorless, Directionless, Contentionless (CDC) photonic architectures. The 6500 RLS provides a greater level of scale for both metro and long-haul applications by supporting C-band and C&L-band 12-port and 32-port ROADM configurations, with up to 768 C&L-band CDC add/drop channels for a 16-degree node.

The 6500 RLS supports Raman amplification to ensure the network is future-proof—enabling network operators to deploy frequent technology updates, including next-generation, high-baud coherent modem technologies to achieve higher line rates, longer distance transmission, and improved spectral efficiency.

The 6500 RLS doubles available fiber capacity for fiber constrained networks with its integrated C&L-band architecture. Optimized for both C&L-band performance, it provides the photonic layer foundation for over 60 Tb/s of capacity on a single fiber pair without the cumbersome upgrade process, uncertainty with L-band performance, and potential impacts to existing traffic, associated with historical L-band upgrade networks. Increasing fiber capacity with the L-band is just as easy as lighting the C-band, giving network operators double the capacity with no surprises or impact to existing C-band traffic.

## **Simple to deploy and operate**

The 6500 RLS provides operational simplicity, deployment velocity, and integrated instrumentation, allowing users to easily turn-up the system and add new channels. The 6500 RLS eases line system

deployments with a rich set of instrumentation features to speed up installation, turn-up, and troubleshooting. Zero-Touch Provisioning (ZTP) automates commissioning of the 6500 RLS shelf, and photonic connection validation ensures users can easily identify manual fiber errors or dirty fiber connections. The platform provides full network visibility and simplified troubleshooting with channel monitoring and integrated bi-directional Optical Time Domain Reflectometer (OTDR). When fiber cuts occur, the 6500 RLS pinpoints fiber fault locations to speed up technician deployment for fiber repairs and reduce network downtime. Integrated channelized Amplified Spontaneous Emission (ASE) fully loads the system day-one, maintaining constant optimal system performance throughout the life of the network and allowing for faster turn-up of wavelengths for significantly faster wavelength restoration times during fault conditions. Intelligent L0 control plane on the 6500 RLS automates network functions to simplify operations, accelerate service creation, and improve resiliency with photonic layer restoration.

## **Advanced programmability and openness**

The 6500 RLS provides advanced programmability and openness for the photonic layer through a full suite of open APIs, model-driven configuration, an open, microservices-based software architecture, and streaming telemetry. Its open APIs also enable the platform to easily integrate into existing operational tools and back-office systems.

With the 6500 RLS, network operators can efficiently scale their networks to meet the largest bandwidth requirements with minimal footprint. It provides choice in how photonic line systems are deployed, supporting fully integrated or disaggregated configurations. Its ease of deployment, flexible configuration options, and programmable open APIs help network operators speed up service activation and increase their competitive edge.

## Technical Information

### Physical dimensions

#### R2 4-slot shelf:

- 2U  
88 mm (H) x 440 mm (W) x 580 mm (D)  
3.5 in. (H) x 17.33 in. (W) x 22.83 in. (D)

#### R4 8-slot shelf:

- 4U  
177 mm (H) x 440 mm (W) x 580 mm (D)  
6.97 in. (H) x 17.33 in. (W) x 22.83 in. (D)

#### R8-300 8-slot shelf:

- 7.5U
- 330 mm (H) x 440 mm (W) x 281 mm (D)
- 12 in. (H) x 17.3 in. (W) x 11.1 in. (D)

### Weight (chassis only)

#### R2 4-slot shelf

- 8.8 kg (19.4 lb)

#### R4 8-slot shelf

- 11.8 kg (26lb)

### Photonic modules

- ROADM with Line Amplifier (RLA) 32x1 C-band Module: Double-width, single height module integrating twin 1x32 flexible grid WSS, dual-line EDFA, bi-directional OTDR, integrated ASE, optical channel monitoring, and Optical Service Channel (OSC) for high port count ROADM applications
- ROADM with Line Amplifier (RLA) 12x1 C-band Module: Double-width, single height module integrating twin 1x12 flexible grid WSS, dual-line EDFA, bi-directional OTDR, integrated ASE, optical channel monitoring, and OSC for ROADM applications
- ROADM with Line Amplifier (RLA) 32x1 C&L-band Module: Double-width, single-height module integrating twin 1x32 flexible grid WSS, EDFAs, bi-directional OTDR, integrated channelized C-band and bulk L-band ASE, optical channel monitoring, and optical service channel (OSC) for C&L-band ROADM applications
- ROADM with Line Amplifier (RLA) 12x1 C&L-band Module: Double-width, single-height module integrating twin 1x12 flexible grid WSS, EDFAs, bi-directional OTDR, integrated channelized C-band and bulk L-band ASE, optical channel monitoring, and optical service channel for C&L-band ROADM applications
- 300mm ROADM with Line Amplifier (RLA) 12x1 C-band Module: Three-slot wide module integrating twin 1x12 flexible grid WSS, EDFAs, bi-directional OTDR, integrated ASE, optical channel monitoring, and OSC for ROADM applications at locations optimized for 300mm footprint
- 300mm ROADM with Line Amplifier (RLA) 12x1 C&L-band module: Three-slot wide module integrating twin 1x12 flexible grid WSS, EDFAs, bi-directional OTDR, integrated channelized C-band and bulk L-band ASE, optical channel monitoring, and optical service channel for C&L-band ROADM applications at locations optimized for 300mm footprint
- L-band ROADM upgrade (LRU) 32x1 module: double-width, single-height module integrating 1x32 flexible grid WSS, EDFA, channelized L-band ASE, and optical channel monitoring for C&L-band ROADM applications
- L-band ROADM upgrade (LRU) 12x1 module: Double-width, single-height module integrating 1x12 flexible grid WSS, EDFA, channelized L-band ASE, and optical channel monitoring for C&L-band ROADM applications
- monitoring for C&L-band ROADM applications
- C-band 32x1 WSS Module: Double-width, single-height module integrating twin 1x32 flexible grid WSS and C-band ASE for Submarine Line Terminal Equipment (SLTE) applications
- Dual Line Amplifier (DLA) C-band module: RLS double-width, single-height module and RLS R8-300 single-width, double-height module integrating bi-directional C-band EDFA line amplifiers, Optical Service Channel (OSC), and bi-directional OTDR for line amplification applications
- Dual Line Amplifier (DLA) C&L-band module: RLS double-width, single-height module and RLS R8-300 double-width, triple-height module integrating bi-directional C&L-band EDFA line amplifiers, Optical Service Channel (OSC), and bi-directional OTDR for C&L-band line amplification applications
- Dual Line Amplifier with Monitoring (DLM) C-band module: Double-width, single height module integrating bi-directional EDFA line amplifier, Optical Service Channel (OSC), bi-directional OTDR, and channel monitoring capabilities
- Dual Line Amplifier with Equalization (DLE) C-band Module: RLS double-width, single height module and RLS R8-300 single width, double-height module integrating bi-directional C-band EDFAs, dynamic gain equalizer, optical channel monitoring, and Optical Service Channel (OSC)
- Dual Line Amplifier with Equalization (DLE) C&L-band Module: RLS double-width, single height module and RLS R8-300 single-width, triple-height module integrating bi-directional C&L-band EDFAs, dynamic gain equalizer, optical channel monitoring, and Optical Service Channel (OSC)
- Terminal Line Amplifier with Monitoring (TLM) C-band Module: RLS single-width, single height module integrating bi-directional C-band EDFAs, optical channel monitoring, and Optical Service Channel (OSC)
- Raman Amplifier (SRA) C-band Module: RLS single-width, single height module and RLS R8-300 single-width, single height module providing Raman amplification for the C-band
- Raman Amplifier (SRA) C&L-band Module: RLS single-width, single height module and RLS R8-300 single-width, double height module providing Raman amplification for C&L-bands
- Trunk Protection Switch (TPS, TPS2): Single width, single height module for trunk protection applications
- Colorless Channel Mux/Demux (CCMD) 8x24 C-band module: Single-width, double-height module with twin contentionless WSS for interconnecting C-band add/drop channels to any of the eight degrees for CDC-ROADM applications
- Colorless Channel Mux/Demux (CCMD) 8x24 L-band module: Single-width, double-height module with twin contentionless WSS for interconnecting L-band add/drop channels to any of the eight degrees for CDC-ROADM applications
- Colorless Channel Mux/Demux (CCMD) 16-channel C-band

- module: Single-width, single-height module for colorless muxing/demuxing of up to sixteen C-band wavelengths onto a single common port for Colorless Direct Attach (CDA) applications
- Colorless Channel Mux/Demux (CCMD16) 16-channel L-band module: Single-width, single-height module for colorless muxing/demuxing of up to sixteen L-band wavelengths onto a single common port for Colorless Direct Attach (CDA) applications
  - 42-channel Mux/Demux (CMD42): 1RU 112.5GHz, C-band channel mux/demux for add/drop of up to 42 channels; optimized to support coherent interfaces with higher baud signals, including 95Gbaud
  - 48-channel mux/demux (CMD48): 2RU 100GHz, C-band channel mux/demux for add/drop of up to 48 channels

- 64-channel mux/demux (CMD64): 2RU 75GHz, C-band channel mux/demux for add/drop of up to 64 channels; including support for coherent pluggables
- Compact Fiber Interconnect Module (CFIM1, CFIM2, CFIM3): CFIM1 interconnects up to four degrees via MPO cables. CFIM2 uses MPO cables to interconnect a group of four degrees to another group of four degrees or to the add/drop interconnections between RLAs and CCMDs. CFIM3 interconnects RLAs and CCMD16s via MPO cables for CDA configurations using RLA 32x1
- Fiber Interconnect Module (FIM) Type 4A: 1RU module used to interconnect RLA 32x1 modules and CCMD8x24 modules in C-band or C&L-band CDC ROADM applications
- Shared Spectrum Monitor (SSM) C-band Module:

Single-width, single-height module with optical channel monitoring for use in submarine GeoMesh applications to enable spectrum sharing for multiple customers on a single fiber pair

#### Common equipment

- Redundant, field-replaceable power supplies
- Redundant, field-replaceable fan units
- Redundant control and timing module

#### Power options

- AC or DC power
- Operational AC input voltage range: 100 Vac to 240 Vac
- Operational DC input voltage range: -40 Vdc to -75Vdc

#### Environmental characteristics

- Normal operating temperature: 5 °C to 40 °C (41 °F to 104 °F)
- Normal operating humidity: 5% to 85% RH

- Operational altitude: -60 m to 1800 m at 40°C (-197 ft to 5906 ft) and from 1800 m to 4000 m at 30°C (5906 ft to 13123 ft)
- Earthquake/Seismic: Zone 4

#### Security

- TACACS+, SSHv2, SFTPv3/SFTPv4, SCP, TLS, RADIUS, Secure Erase

#### Management

- CLI, Nodal Web UI, SNMP, Ciena's MCP
- API: NETCONF, REST, gRPC, Websocket, declarative configuration, streaming telemetry
- OpenConfig data models
- Zero-Touch Provisioning
- Service and Photonic Layer Interworking (SPLI) with 6500 and Waveserver family
- Intelligent LO Control Plane

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