

DATA SHEET

RLS

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 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%, compared to traditional chassis-based systems, with its modular and compact form factor
- Eases deployment and operations with 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 L0 control plane accelerates wavelength turn-up and improves service availability

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 ROADMs configurations, with up to 768 C&L-band CDC add/drop channels for a 16-degree node.

The 6500 RLS supports Raman amplification for longer, higher-loss spans. It uses flexible-grid channel spacing 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 of L-band performance, and potential impacts to existing traffic associated with historical L-band network upgrades. 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 an 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. The 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, streaming telemetry, and open, microservices-based software architecture. 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 (26 lb)

Photonic modules

- ROADM with line amplifier (RLA) 32x1 C-band module: Double-width, single-height module integrating twin 1x32 flexible-grid wavelength selective switch (WSS), dual-line erbium-doped fiber amplifier (EDFA), bi-directional OTDR, integrated ASE, optical channel monitoring, and optical service channel (OSC) for high port count ROADM applications
- 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 OSC for C&L-band ROADM applications
- 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

- Integrated C&L-band RLA (iC&L-band RLA) 32x1 module: Double-width, single-height module with twin 1x32 iC&L-band flexible-grid WSS, EDFAs, bi-directional OTDR, integrated channelized C&L-band ASE, optical channel monitoring, and OSC, providing a single-card solution for improved density with C&L-band ROADM applications
- 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
- 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 OSC for C&L-band ROADM applications
- 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
- 300 mm RLA 12x1 C-band module: Three-slot 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 300 mm footprint
- 300 mm RLA 12x1 C&L-band module: Three-slot module integrating twin 1x12 flexible-grid WSS, EDFAs, bi-directional OTDR, integrated channelized C-band and

bulk L-band ASE, optical channel monitoring, and OSC for C&L-band ROADM applications at locations optimized for 300 mm footprint

- 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 two-slot module integrating bidirectional C-band EDFA line amplifiers, OSC, and bi-directional OTDR for line-amplification applications
- DLA C&L-band module: RLS double-width, single-height module and RLS R8-300 three-slot module integrating bi-directional C&L-band EDFA line amplifiers, OSC, and bi-directional OTDR for C&L-band line-amplification applications
- DLA with monitoring (DLM) C-band module: Double-width, single-height module integrating bi-directional EDFA line amplifier, OSC, bi-directional OTDR, and channel-monitoring capabilities
- DLA with equalization (DLE) C-band module: RLS double-width, single-height module and RLS R8-300 two-slot module integrating bi-directional C-band EDFAs, dynamic gain equalizer, optical channel monitoring, and OSC
- DLE C&L-band module: RLS double-width, single-height module and RLS R8-300 three-slot module integrating bi-directional C&L-band EDFA line amplifiers, dynamic gain equalizer, optical channel monitoring, and OSC

- Terminal line amplifier with monitoring (TLM) C-band module: single-width, single-height module integrating bi-directional C-band EDFAs, optical channel monitoring, and OSC
- Single-line Raman amplifier (SRA) C-band module: RLS single-width, single-height module and RLS R8-300 single-slot module providing raman amplification for the C-band
- SRA C&L-band module: RLS single-width, single-height module and RLS R8-300 two-slot 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 8 degrees for CDC-ROADM applications
- 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 8 degrees for CDC-ROADM applications
- CCMD 16x24 C-band module: Single-width, double-height module with twin contentionless WSS for interconnecting C-band add/drop channels to any of 16 degrees for CDC-ROADM applications
- CCMD 16x24 L-band module: Single-width, double-height module with twin contentionless WSS for interconnecting L-band add/drop channels to any of 16 degrees for CDC-ROADM applications

- CCMD 16-channel (CCMD16) C-band module: Single-width, single-height module for colorless muxing/demuxing of up to 16 C-band wavelengths onto a single common port for colorless direct attach (CDA) applications
 - CCMD16 L-band module: Single-width, single-height module for colorless muxing/demuxing of up to 16 L-band wavelengths onto a single common port for CDA applications
 - 300 mm CCMD16 C-band module: Single-slot module for colorless muxing/demuxing of up to 16 C-band wavelengths onto a single common port for CDA applications at locations optimized for 300 mm footprint
 - 24-channel mux/demux (CMD24): 1RU 200 GHz, C-band channel mux/demux for add/drop of up to 24 channels; optimized to support higher baud coherent interfaces, including WaveLogic 6 Extreme
 - 32-channel mux/demux (CMD32): 1RU 150 GHz, C-band channel mux/demux for add/drop of up to 32 channels; optimized for use with 800ZR (150 GHz) or 400ZR (75 GHz, when deployed with CMD32 Type 2)
 - 32-channel mux/demux Type 2 module (CMD32 Type 2): 1RU 150GHz C-band channel mux/demux (offset by 75GHz compared to CMD32) for add/drop of up to 32 channels; optimized for use with 400ZR signals
 - 48-channel mux/demux (CMD48): 2RU 100 GHz, C-band channel mux/demux for add/drop of up to 48 channels
 - 64-channel mux/demux (CMD64): 2RU 75 GHz, 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 4 degrees via multi-fiber push-on (MPO) cables. CFIM2 uses MPO cables to interconnect a group of 4 degrees to another group of 4 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 CCMD 8x24 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 -75 VDC
- 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 Navigator Network Control Suite (Navigator NCS)
 - 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 L0 control plane

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