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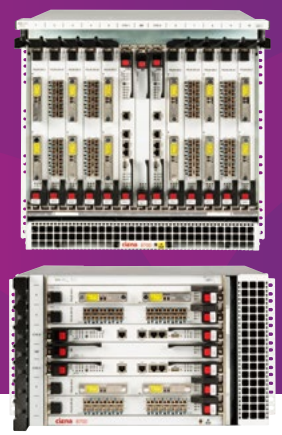
CE 2.0 MEF CERTIFIED

DATA SHEET

8700

Packetwave Platform



Ciena's 8700 Packetwave® Platform—a multi-terabit programmable coherent DWDM packet switch—addresses the growing need to efficiently aggregate and switch large quantities of packet traffic while guaranteeing stringent Service Level Agreements (SLAs), revolutionizing the capital and operational economics of 10GbE and 100GbE services in metro and regional networks.

As data center and end-user applications continue to proliferate, packet-dominated traffic is surging, running from user to content and from content to content. This growth creates significant changes to the patterns, dynamics, and scale of traffic within metro networks. The 8700 is purpose-built to provide seamless, MEF-compliant services, together with L3 services, over a carrier-class, connection-oriented infrastructure. The 8700 uses both MPLS-TE and MPLS-TP, with future support of segment routing for further scalability and programmability.

Due to continued bandwidth demand growth in metro networks worldwide, this particular part of the global network infrastructure has become crux of network transformation opportunity. The rising popularity of 10GbE and 100GbE ports, connections, and services has created a new business requirement for optimized 10GbE to 100GbE switching and aggregation that leverages the very latest in packet networking and Ciena's WaveLogic 3 Nano 100G coherent DWDM optical technologies. Available in both 4-slot and 10-slot variants (counting only I/O slots) the 8700 provides 1G/10G/40G/100G ports with up to 680Gb/s per slot, for a total non-blocking capacity of up to 2.7 Tb/s (4-slot) and 6.8 Tb/s (10-slot).

Features and Benefits

- Exceptional 1GbE, 10GbE, 40GbE, and 100GbE density to address space constraints
- Flexible port configurations up to 300 x 1GbE, 300 x 10GbE, 80 x 40GbE, 20x 100G DWDM, or 60 x 100GbE
- Low power consumption to keep operating expenses in check
- Multiple configuration options with fully modular 4-slot or 10-slot chassis variants
- MEF CE 2.0-certified for E-Line, E-LAN, E-Tree, and E-Access for improved service offerings; E-Line and E-Access up to and including 100GbE
- Hardware-assisted packet OAM capabilities for guaranteed SLA differentiation
- Zero-Touch Provisioning (ZTP) for rapid, secure, and error-free turn-up of packet services
- Ciena's Blue Planet MCP multi-layer provisioning support for end-to-end network management control and planning
- Integrated Service Activation Testing capabilities
- Seamless integration with Ciena's WaveLogic Photonics platforms

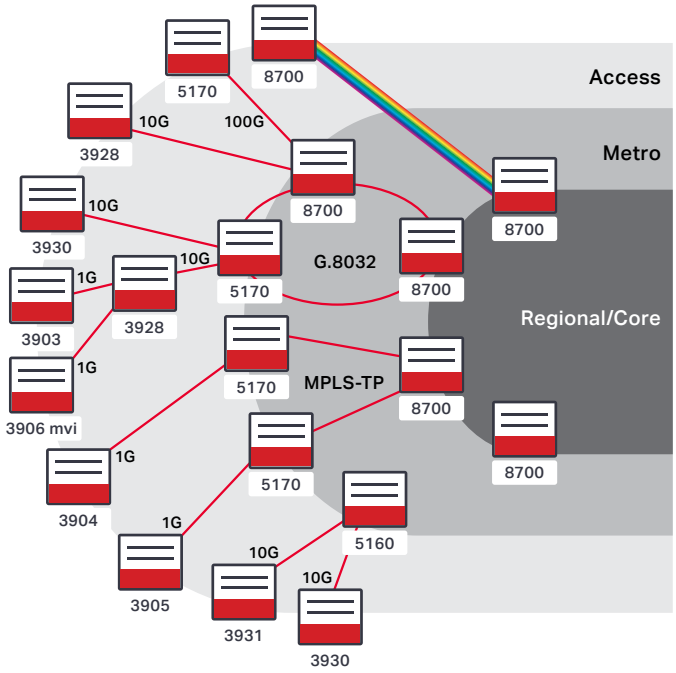


Figure 1. 8700 Packetwave Platform network applications

Industry-leading 10GbE and 100GbE density

Continued annual growth in metro networks bandwidth demand is driving a change in the mix of connections and services, from 1GbE aggregation into 10GbE to 10GbE aggregation into 100GbE. In addition, demand for high-speed 100GbE UNI services is steadily increasing. This shift toward higher bandwidth services means that metro and regional Ethernet networks, once optimized for lower, 1GbE rates, are no longer aligned to changing metro network traffic trends. The 8700 is specifically optimized for 10GbE to 100GbE switching and aggregation, allowing network operators to intercept a rapidly shifting market toward higher rate ports, services, and connections.

Three key factors are essential for designing today's packet networks: density, power consumption, and scalability. For density, it is important to integrate as much bandwidth as possible and use very high-speed links. Reducing power means using a minimum number of efficient integrated links and reducing the number of off-chip interfaces on a highly scalable fabric. Most importantly, networks should use a highly efficient scalable packet switching fabric to connect those high-speed links.

Compact, dense capacity

Efficient use of real estate assets is a growing concern for network operators who either house their own network equipment or lease space in collocation facilities. Financial margins are under pressure from over-the-top applications and services that drive network expansion faster than revenues.

Space is increasingly limited and expensive, and network operators face substantial capital expenditures to open up new locations, or must retire active equipment to free space for new, denser equipment. Addressing bandwidth demand growth by deploying more and larger equipment is simply not a sustainable business model.

Ciena's 8700 platform offers industry-leading 10GbE and 100GbE with high port density and multiple packet fabric options in two modular chassis, providing greater choice, flexibility, and capacity.

Energy-efficient 10GbE and 100GbE

Energy costs are the primary contributor to surging monthly operating expenses for most network operators, fueled by the massive demand for connectivity. The increasing affordability of smart devices, high-speed access, and seamless video streaming drive the pressing need for innovative networking solutions that consume significantly less energy for powering and cooling network equipment.

The 8700 achieves high energy efficiency and low energy consumption, so it is better for the environment and network operators' bottom line.

See how the 8700 can lower energy costs

Massive packet scalability

In addition to low power and footprint, the service aggregation switch should scale to support subscriber interfaces. Ciena's 8700 was purpose-built for new market trends, scaling to a massive 6.8 Tb/s.

Simpler metro and regional packet networks

With the changing scale and dynamics of metro and regional networks, continuing to build out packet networks in traditional ways is simply unsustainable. The platform leverages Ciena's Service-Aware Operating System (SAOS), which supports advanced OAM, QoS, and MPLS features and protocols. The platform paves the way for seamless MPLS, and future technologies such as segment routing.

Expanding Demands Need Packet Networking Perfomance I Download white paper

Game-changing WaveLogic Photonics integration

The two technologies that have most impacted the efficiency and economics of metro networking in the past decade are Ethernet and photonics. Technology in both of these areas continues to advance at a frenetic pace, with no signs of abating. By combining these two important technologies into a common Ethernet switching and aggregation platform, network operators can optimize their metro and regional networks, yielding measurable benefits in simplicity, capacity, scalability, power, and space efficiency, along with compelling economics. Ciena combines the advanced packet-networking capabilities of SAOS with the latest award-winning WaveLogic Photonics and WaveLogic 3 Nano technologies in the 8700 Packetwave platform, allowing network operators to build intelligent, packet-optimized photonic networks that are both simpler and highly cost-effective.

Differentiation through service velocity

Service velocity has become a critical competitive advantage for network operators the world over. In many cases, service velocity is the determining factor in winning new service sales. In most competitive markets, it is simply no longer viable to ask customers to wait months for new services to be provisioned. The 8700 implements Ciena's unique ZTP capabilities, allowing network operators to rapidly deploy new packet-based services in a completely automated manner. With no human intervention required, manual provisioning errors are eliminated. Most importantly, ZTP improves service deployment and velocity and offers significant competitive advantage.

Rich packet OAM capabilities

As network operators and their customers migrate away from legacy TDM-based ports, connections, and services to new packet-based networks, guaranteed service levels must be maintained, and, in many cases, improved. Packet networks must support a broad array of packet Operation, Administration, and Maintenance (OAM) capabilities to ensure network operators can proactively and reactively maintain and report on the ongoing health of their metro Ethernet networks and services. The 8700 supports a comprehensive set of hardware-assisted packet OAM capabilities, including per-service Ethernet fault (IEEE 802.1ag) and performance monitoring (ITU-T Y.1731 and TWAMP) and embedded Service Activation Test (RFC2544 and Y.1564 KPI's) to help guarantee and manage strict, market-differentiating SLAs.

Simplified multilayer management and control

Ciena's Blue Planet Manage Control and Plan (MCP) system offers a unique and comprehensive solution for the administration of mission-critical networks that span across access, metro, and core domains. The system provides unprecedented multi-layer visibility from the photonic layer to the packet layers. With this innovative management approach, Blue Planet MCP returns control of the metro packet network and services directly to the network operator. By providing a unified view to the network from the photonic to the packet layer, network operations are simple, secure, and highly cost-effective.

Flexible service delivery configurations

The 8700 Packetwave platform supports a flexible menu of service offerings, including MEF-compliant E-Line/E-LAN/E-Tree/E-Access and L3 services, over a carrier-class, connection-oriented infrastructure using both MPLS-TE and MPLS-TP. Integrated Routing and Bridging (IRB) functions support efficient L3 packet forwarding that facilitates specific scenarios common in LTE-A and future 5G scenarios

Future-proof scalability

Making liberal use of Ethernet, IP, and MPLS technology, the 8700 can scale to support any number of network architectures in view of varying market requirements for 5G mobile backhaul, Ethernet Business Service delivery, and datacenter interconnect applications, to name a few. For example, the use of Seamless MPLS using BGP-LU creates a scalable network hierarchy extending across regional RSVP-TE domains that would otherwise become complex and unwieldy. The solution works with today's MPLS environments, and can evolve to support modern packet technologies such as seamless MPLS and segment routing while leveraging SDN control and programmability.

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Technical Specifications

Physical Specifications

Description	4-Slot	10-Slot
W X D X H (mm)	483 X 600 X 267	483 X 600 X 445
W X D X H (Inches)	19 X 23.5 X 10.5	19 X 23.5 X 17.5
Chassis Per Rack	7	4
Weight (Max)	91Lb/42Kg	147Lb/66Kg
DC Input	-40Vdc to -60Vdc	
AC Input	180Vac to 265Vac	
Power Consumption (Watts@ 25°C/ -48V DC) (no optics)	1201 (Typical) 1960 (Maximum)	2113 (Typical) 3043 (Maximum)
Operating Temperature	32°F to 104°F 0°C to 40°C The system has been tested and complies with the NEBS short-term operating requirement of -5°C to 55°C (23°F to 131°F). Short-term is defined in NEBS as a period of not more than 96 consecutive hours and a total of not more than 15 days in one year. (This refers to a total of 360 hours in any given year, but not more than 15 occurrences during that one-year period.)	
Storage Temperature	-40°F to 158°F (-40°C to 70°C)	
Relative Humidity	5% To 90% (Non-Condensing)	
Air Flow	Right Front to Left Rear	Lower Front to Upper Rear

Service Line Modules (SLM):

- PSLM-680-8: 6x QSFP28, 2x QSFP+ ports
- PSLM-400-31: 30x SFP/SFP+, 1x QSFP28 ports
- PSLM-200-20: 20x 1GbE/10GbE SFP/SFP+ ports
- PSLM-200-2: 2x 40GbE/100GbE CFP ports
- CSLM-200-2: 2x 100G OTU-4 wrapped 100GbE over WaveLogic 3 Nano DWDM ports
- PSLM-200-11: 10x SFP/SFP+, 1x QSFP28 ports

Any module; any slot

Control Timing & Switch Module (CTX/CTX-HD):

- 1x 10/100/1000M RJ-45 Management DCN port
- 1x Console Port (RJ-45, EIA-561)
- CTX, 1 Tb/s
- CTX-HD, 2.27 Tb/s

Switch Module (SM/SM-HD):

- No external interfaces
- SM, 800 Gb/s
- SM-HD, 2.27 Tb/s

Input / Output Module (IOM):

- 16x External alarm inputs; 4 x External alarm outputs
- 2x RJ-45 sync input/output port
- 4x SMB sync input/output ports

Ethernet

Hierarchical Quality of Service (HQoS) including Ingress Metering/Egress shaping
IEEE 802.1ad Provider Bridging (Q-in-Q) VLAN full S-VLAN range
IEEE 802.1D MAC Bridges
IEEE 802.1p Class of Service (CoS) prioritization
IEEE 802.1Q VLANs
IEEE 802.3 Ethernet
IEEE 802.3ab 1000Base-T via copper SFP
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3ba-2010 40GbE & 100GbE
IEEE 802.3z Gigabit Ethernet
Jumbo Frames to 9,600 bytes
Layer 2 Control Frame Tunneling
Link Aggregation (LAG): Active/Active; Active/Standby
Multi Chassis-LAG (MC-LAG): Active/Active
MEF 10.2 Egress Bandwidth Shaping per EVC per COS
Per-VLAN MAC Learning Control
Private Forwarding Groups
VLAN tunneling (Q-in-Q) for Transparent LAN Services (TLS)

MEF CE 2.0 Certified

- E-Access: Access EPL, Access EVPL
- E-LAN: EP-LAN, EVP-LAN
- E-LINE: EPL, EVPL
- E-Tree: EP-Tree, EVP-Tree

Carrier Ethernet OAM

EVC Ping (IPv4)
IEEE 802.1ab Link Layer Discovery Protocol (LLDP)
IEEE 802.1ag Connectivity Fault Management (CFM)
IEEE 802.3ah EFM Link-fault OAM
ITU-T Y.1564 Ethernet Service Activation Test Methodology
ITU-T Y.1731 Performance Monitoring (S-LM, DM)
RFC 2544 Benchmarking Methodology for Network Interconnect Devices
RFC 5618 TWAMP Responder and Receiver TWAMP Sender

Synchronization

Line Timing Interfaces:

- 1GbE/10GbE In and Out (PSLM-200-20)
- 40GbE/100GbE In and Out (PSLM-200-2)
- OTU-4 wrapped 100GbE In and Out (CSLM-200-2)

External Timing Interfaces:

- BITS In or Out (T1: 1.544Mb/s, E1: 2.048MHz and 2.048Mb/s)
- GPS Frequency In or Out (1.544MHz, 2.048MHz, and 10MHz)

GR-1244
ITU-T G.813
ITU-T G.823/G.824
ITU-T G.8262 Synchronous Ethernet
ITU-T G.8262/G.8264 EEC option1 and option2
ITU-T G.781
ITU-T G.8261
Stratum 3E oscillator

Technical Specifications continued

Networking Protocols

Alarm Indication Signaling (AIS) with Link Down Indication (LDI) and Remote Defect Indication (RDI)
Automatic Pseudowire Reversion
ITU-T G.8032 v1, v2, v3 Ethernet Ring Protection Switching
Layer 2 Control Frame Tunneling over MPLS Virtual Circuits
MPLS Label Switch Path (LSP) Tunnel Groups MPLS Label Switch Path (LSP) Tunnel Redundancy
MPLS Multi-Segment Pseudowires
MPLS Virtual Private Wire Service (VPWS) OSPF/IS-IS for Dynamic MPLS-TP Control Plane RFC 2205 RSVP
RFC 3031 MPLS architecture
RFC 3209 RSVP-TE: Extensions to RSVP for LSP RFC 3630 OSPF-TE
RFC 4447 Pseudowire Setup & Maintenance using Label Distribution Protocol (LDP)
RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks (PW over MPLS)
RFC 4664 Framework of L2VPN (VPLS/VPWS) RFC 4665 Service Requirement of L2 VPN
RFC 4762 VPLS (Virtual Private LAN Service) and Hierarchical VPLS (H-VPLS)
RFC 5654 MPLS-Transport Profile(TP)
- LSP Static provisioning
- LSP Dynamic Provisioning
- 1:1 Tunnel protection

RFC 5884 LSP Bidirectional Forwarding Detection (BFD) via GAL/G-Ach channels
RFC 6215 MPLS Transport Profile User-to-Network and Network-to-Network Interfaces
RFC 6426 MPLS On-demand Connectivity Verification and Route Tracing
RFC 6428 LSP and PW Connectivity Verification and Trace Route
Static ARP and MAC Destination Address Resolution
VCCV (Virtual Circuit Continuity Check) Ping and Trace Route
Multicast
DHCPv4 Relay Agent with Option 82 G.8032/IGMP interworking
IGMP over MPLS-TP
IGMPv3 with SSM

CSLM-200-2 Optical Performance

50GHz/100GHz grid support
FEC Net coding gain: 12.1dB
Nominal full-fiber reach: 120km unamplified to 1,000km amplified
PMD Tolerance: 150ps mean; 450ps instantaneous
Rx Sensitivity: -26 dBm
Service and Photonic Line Interoperability (SPLI) Tunable from 1528.77nm to 1566.72nm
Tx Output Power, provisionable: -11dBm to +7.5dBm

Network Management

Alarm Management & Monitoring Configuration
Comprehensive Management via OneControl Enhanced CLI
Integrated Firewall
IPv4 & IPv6 Management Support Local Console Port
Per-VLAN Statistics Port State Mirroring
RADIUS Client and RADIUS Authentication Remote Auto configuration via TFTP, SFTP Remote Link Loss Forwarding (RLLF)
RFC 959 File Transfer Protocol (FTP)
RFC 1035 DNS Client
RFC 1213 SNMP MIB II
RFC 1350 Trivial File Transfer Protocol (TFTP)
RFC 1493 Bridge MIB
RFC 1573 MIB II interfaces
RFC 1643 Ethernet-like Interface MIB
RFC 1757 RMON MIB - including persistent configuration
RFC 2021 RMON II and RMON Statistics
RFC 2131 DHCP Client
RFC 3877 Alarm MIB
RFC 4291 – IPv6 addressing (for Management Plane)
RFC 4443 – ICMPv6
RFC 4862 – Stateless address auto-configuration
RFC 5905 NTP Client
Secure File Transfer Protocol (SFTP) Secure Shell (SSHv2)
SNMP v1/v2c/v3
SNMP v3 Authentication and Message Encryption
Software upgrade via FTP, SFTP Syslog with Syslog Accounting
TACACS + AAA
Telnet Server
Virtual Link Loss Indication (VLLI)
Zero Touch Provisioning

Service Security

Broadcast Containment Egress Port Restriction
Hardware-based DOS Attack Prevention Layer 2, 3, 4 Protocol Filtering
User Access Rights

Agency Approvals

Australia C-Tick (Australia/New Zealand) CE mark (EU)
- EMC Directive (2014/30/EU)
- LVD Directive (2006/95/EC)
- RoHS2 Directive (2011/65/EU)

ETSI 300 019 Class 1.2, 2.2, 3.2
GR-1089 Issue 6 – NEBS Level 3
GR-63-CORE, Issue 4 – NEBS Level 3, Zone 4 Earthquake
NRTL (NA)
VCCI (Japan)

Standards Compliance

Emissions:
CISPR 22 Class A CISPR 32 Class A EN 300 386
EN 55022
EN 55032
FCC Part 15 Class A GR-1089 Issue 6
Industry Canada ICES-003 Class A VCCI Class A

Environmental:
RoHS2 Directive (2011/65/EU)
Immunity (EMC):
CISPR 24
EN 300 386
EN 55024
GR-1089 Issue 6 Power:
ETSI EN 300 132-2
ETSI EN 300 132-3

Safety:
ANSI/UL 60950-1 2nd edition 2007 CAN/CSA C22.2 No. 60950-1-07 EN 60950-1
IEC 60825-1 2nd edition (2007)
IEC 60825-2 3rd edition (2004)
IEC 60950-1