

5171



Ciena's 5171 Platform empowers advanced access networks with 100GbE services beyond the Central Offices and POP sites, enabling deployment into street cabinets and other uncontrolled locations. The 5171 addresses the increasing need for 100GbE services and high-density 10GbE aggregation and delivers high-bandwidth enterprises, MBH, and MSO services with WaveLogic™ 5 DWDM.

Driving the industry toward 10GbE and 100GbE service delivery

Continued annual growth in metro network bandwidth demand is driving a change in the mix of connections and services, from 1GbE aggregation to 10GbE, and 10GbE aggregation to 100GbE. In addition, demand for high-speed 100GbE UNI services and the shift from 10GbE to 25GbE server connections is steadily increasing.

This shift toward higher-bandwidth services means metro and regional Ethernet networks, once optimized for lower 1GbE rates, are no longer aligned to changing metro network traffic trends.

Dense, compact form-factor platform

Efficient use of real estate assets is a growing concern for network operators, who either host their own network equipment or lease power and space in collocation facilities. As services multiply, operators have been forced to stack 10G-capable equipment, incurring additional collocation rental and power costs. The 5171's sleek, shallow depth and front access enable cabinet and controlled environmental vault deployment. In addition, extended temperature range can be used for uncontrolled environments for outdoor aggregation of 1/10/25/100GbE and 10G PON, enabling high capacity at the outdoor edge.

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

Features and Benefits

- Temperature-hardened (-40°C to +65°C) with 10"/254mm depth for temperature-challenged or space-constrained locations
- Two flexible slots provide maximum port speeds and capacities – 200G, 100G, 40G, 25G and 10G
- 4 x 1GbE/10GbE/25GbE and 36 x 1GbE/10GbE fixed ports
- Hardware-assisted OAM scaled to deliver 100GbE services with guaranteed SLA differentiation
- Advanced QoS with Hierarchical Egress Shaping and Ingress Metering
- Carrier Ethernet, IP routing, and MPLS
- Secure Zero-Touch Provisioning (SZTP) for rapid, secure, and error-free turn-up of services
- Advanced Synchronization including built-in GPS receiver
- Built-in RFC2544 and Y.1564 SAT with 100 Gb/s traffic generation and analysis
- Ciena's MCP multi-layer support for end-to-end network management control and planning
- Low power consumption
- Redundant or simplex AC or DC power

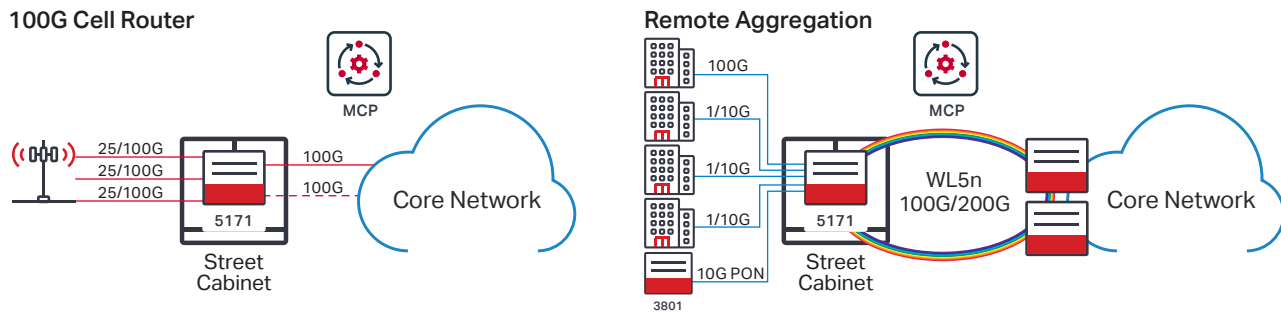


Figure 1. 5171 Outside service delivery and aggregation functions

environmentally. Ciena's 5171 cost-effectively offers dense 100GbE service delivery in 2RU, 254mm deep, fixed form factor with dual pluggable power supplies, optics, and coherent optics to minimize any downtime.

Differentiation through accelerated service velocity

Service velocity has become a critical competitive advantage for network operators. In many cases, service velocity is the determining factor in winning new service sales. The 5171 implements Ciena's unique ZTP capabilities, allowing network operators to rapidly deploy new IP/MPLS services in a fully automated manner. By reducing or eliminating costly and time-consuming manual intervention, provisioning errors are eliminated via ZTP. Most importantly, ZTP improves service deployment velocity and delivers a significant competitive advantage.

Rich Operations, Administration, and Maintenance (OAM) suite of capabilities

As network operators and their customers increasingly rely on new IP/MPLS networks, providers must maintain guaranteed service levels. Routing and switching networks must support a broad array of 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 5171 also supports a comprehensive set of hardware-assisted OAM capabilities. It is architected to power Service Level Agreement (SLA) metrics and OAM at a high scale, enabling operators to take full advantage of the port density and 800 Gb/s fabric for delivering the maximum number of services at the lowest cost. Additionally, the 5171 has an embedded line-rate Service Activation Test (SAT) engine (RFC2544, Y.1564) with traffic generation to a full 100 Gb/s to guarantee strict, market-differentiating SLAs, without relying on costly external test equipment.

Simplified multi-layer management and control

Ciena's Manage, Control and Plan (MCP) software offers a unique and comprehensive solution for the administration of mission-critical networks that span access, metro, and core domains, and provides unprecedented multi-layer visibility from the photonic to the packet layer. With this innovative management approach, MCP supports a programmable and automatable solution that provides a fully open approach to installing, manipulating, and monitoring service behaviors in an SDN environment.

Advanced QoS support

The 5171 supports fine-grained SLA monitoring and enforcement techniques to help operators successfully deliver on stringent SLA guarantees. These capabilities enable greater revenue generation by optimizing available asset utilization. The platform offers deep buffers managed by Ciena's Service-Aware Operating System (SAOS) to adapt to specific application requirements. Sophisticated VLAN tag manipulation and control supports innovative customer traffic separation approaches alongside a rich set of classification-of-service flows through the platform's fabric.

Ingress metering can be configured for packet, offering the ultimate in flexible flow control based on Layer 2, 3, and 4 classification. In addition, egress bandwidth shaping on a per-EVC basis is built to allow fine-tuning delay and buffering efficiency within the platform. The 5171 also provides deep

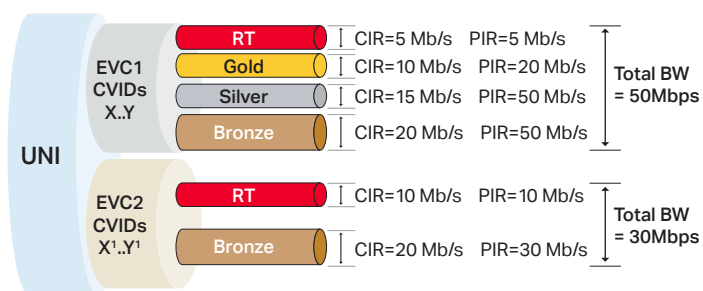


Figure 2. Hierarchical QoS supports multiple services

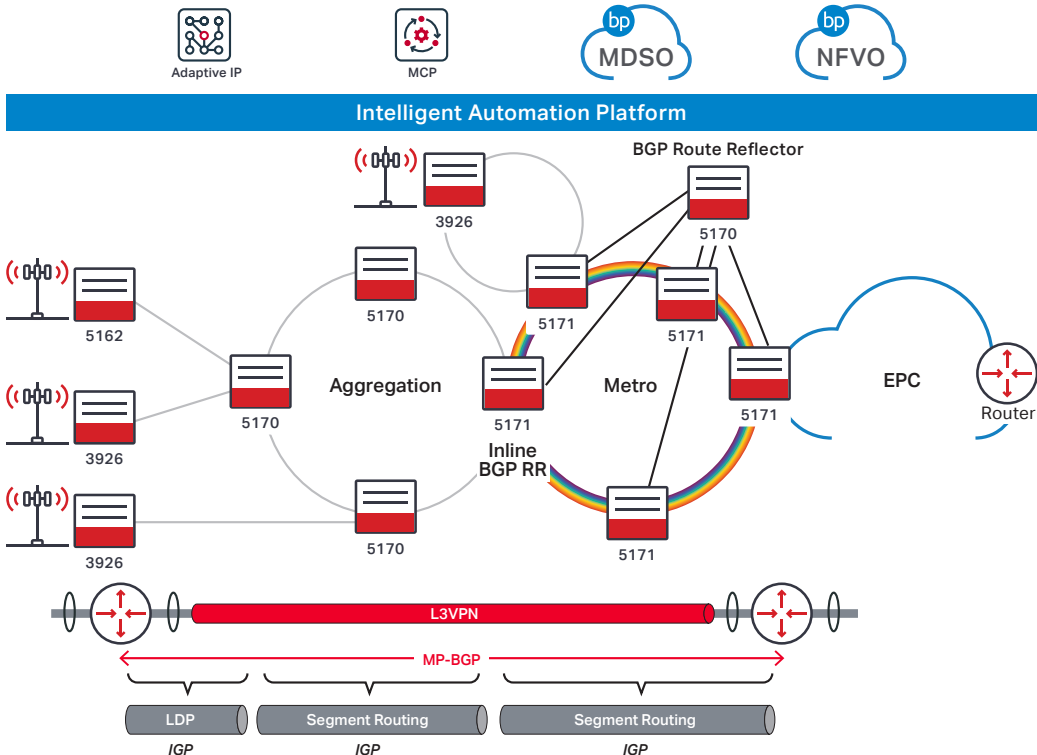


Figure 3. Ciena's Adaptive IP™ solution supporting mobile network evolution

buffers to maximize traffic throughput and reliability by enabling operators to optimize and/or adjust buffer depths to match service types and SLA requirements, such as minimizing latency or maximizing service delivery.

IP Router Configuration (SAOS 10.x)

When configured with SAOS software stream 10.x, the 5171 operates as an IP router supporting NETCONF/YANG to enable an open SDN environment with full visibility via telemetry and automated provisioning using open APIs. The 5171 is purpose-built to provide Layer 2 and Layer 3 services over carrier-grade

infrastructure by supporting a rich suite of Ethernet, IP/MPLS, BGP, IS-IS, OSPF, and Segment Routing.

Universal Aggregation Configuration (SAOS 8.x)

When configured with the SAOS 8.x software stream, the 5171 supports a wide range of service offerings, including MEF CE-compliant E-Line, E-LAN, E-Tree, and E-Access services, over a carrier-grade, connection-oriented infrastructure. It also supports a rich suite of L2 Ethernet, MPLS, OAM, Sync, ACL, and QoS capabilities to support a broad range of applications.

Technical information (SAOS 10.x) – Router Configuration

Ethernet

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 and 100GbE
IEEE 802.3z Gigabit Ethernet Layer 2 Control Frame Tunneling
Link Aggregation (LAG): Active/Active; Active/ Standby
Jumbo frames to 9216 bytes
VLAN tunneling (Q-in-Q) for Transparent LAN Services (TLS)

MEF CE 3.0 Compliant

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

Dying Gasp with Syslog and SNMP Traps
IEEE 802.1ab Link Layer Discovery Protocol (LLDP)
IEEE 802.1ag Connectivity Fault Management (CFM)
ITU-T.Y.1731 Performance Monitoring (SLM; DMM)

Synchronization

External Timing Interfaces:

- ITU-T G.703 Frequency in or out (2.048MHz, and 10MHz)
- ITU-T G.703 1pps and ToD in or out
- Integrated GNSS receiver
- ITU-T G.8262/G.8264 EEC option1 and option2
- ITU-T G.8275.1 full timing support T-GM, T-BC and T-TSC
- G.8275.2 clock, Class C
- Stratum 3E oscillator

Networking Protocols

ISO10598 IS-IS intra-domain routing protocol
OSFP Segment Routing extension
OSFP TI-LFA Topology Independent Fast Reroute using Segment Routing
RFC1195 Use of OSI Is-Is for Routing in TCP/IP and Dual Environments
RFC1997 BGP Community Attribute
RFC2328 OSPF Version 2
BGP Prefix Independent Convergence
EVPN FXC draft-ietf-bess-evpn-vpws-fxc-03.txt
RFC2698 A Two Rate Three Color Marker
RFC2865 Remote Authentication Dial in User Service (RADIUS)
RFC3031 Multiprotocol Label Switching (MPLS) Architecture
RFC3032 MPLS label stack encoding
RFC3107 Support BGP carry Label for MPLS
RFC4271 A Border Gateway Protocol 4 (BGP-4)
RFC4360 BGP Extended Communities Attribute
RFC4364 BGP/MPLS IP Virtual Private Networks (VPNs)
RFC4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC4632 Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan
RFC4760 Multiprotocol Extensions for BGP-4
RFC4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling (HVPLS)
RFC5004 Avoid BGP Best Path Transitions from One External to Another
RFC5036 LDP Specification
RFC5037 Experience with the LDP protocol
RFC5301 Dynamic Hostname Exchange Mechanism for IS-IS
RFC5302 Domain-Wide Prefix Distribution with Two-Level IS-IS
RFC5303 Three-Way Handshake for IS-IS Point-to-Point Adjacencies
RFC5309 Point-to-Point Operation over LAN in Link State Routing Protocols
RFC5396 Textual Representation of Autonomous System (AS) Numbers

RFC5398 Autonomous System (AS) Number Reservation for Documentation Use
RFC5492 Capabilities Advertise with BGP-4
RFC5561 LDP Capabilities
RFC5668 4-Octet AS Specific BGP Extended Community
RFC6241 Network Configuration Protocol (NETCONF)
RFC6310 Pseudowire (PW) Operations, Administration, and Maintenance (OAM) Message Mapping
RFC6793 BGP Support for Four-Octet Autonomous System (AS) Number Space
RFC7432 EVPN VPWS/VPLS
RFC7737 Label Switched Route (LSP) Ping and Traceroute Reply Mode Simplification
SR-MPLS TI-LFA Topology Independent Loop Free Alternate
Reroute using Segment Routing draft-ietf-rtgwg-segment-routing-ti-lfa-03
RFC7911 Advertisement of Multiple Paths in BGP
RFC8214 Virtual Private Wire Service Support in Ethernet VPN

Network Management

Alarm Management and Monitoring Configuration
Comprehensive Management via CLI
Event and Alarm Notification/Generation
gRPC base Telemetry
IPv4 and IPv6 Management Support
Management via NetConf/YANG Models
RADIUS, AAA
Remote Auto configuration via TFTP, SFTP
Remote Link Loss Forwarding (RLLF)
RFC1350 Trivial File Transfer Protocol (TFTP)
RFC2131 DHCP Client
RFC5905 NTP Client
Secure File Transfer Protocol (SFTP)
Secure Shell (SSHv2)
Software upgrade via FTP, SFTP
Syslog Accounting
TACACS + AAA
Zero Touch Provisioning

Technical Information (SAOS 8.x) – Universal Aggregation Configuration

Ethernet

Hierarchical Quality of Service (HQoS) including Ingress Metering/Egress shaping Private Forwarding Groups

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 and 100GbE

IEEE 802.3z Gigabit Ethernet

Jumbo frames to 10,222 bytes

Layer 2 Control Frame Tunneling

Link Aggregation (LAG): Active/Active; Active/Standby

MEF 10.2 Egress Bandwidth Shaping per EVC per COS

Multi-chassis LAG (MC-LAG) Active/Standby

Per-VLAN MAC Learning Control Private Forwarding Groups

VLAN tunneling (Q-in-Q) for Transparent LAN Services (TLS)

MEF 3.0 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

Dying Gasp with Syslog and SNMP Traps EVC Ping (IPv4)

Generation and Reflection at 100GbE

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 (SLM; DM) with simultaneous session

RFC2544 Benchmarking Methodology for Network Interconnect Device

RFC5618 TWAMP Responder and Receiver TWAMP Sender

Synchronization

External Timing Interfaces:

- ITU-T G.703 Frequency in or out (2.048MHz, and 10MHz)
- ITU-T G.703 1pps and ToD in or out
- Integrated GNSS receiver
- ITU-T G.8262/G.8264 EEC option1 and option2
- ITU-T G.8275.1 full timing support T-GM, T-BC and T-TSC
- G.8275.2 clock, Class C
- Stratum 3E oscillator

Networking Protocols

Alarm Indication Signaling (AIS) with Link Down Indication (LDI) and Remote Defect Indication (RDI)

Control Channel types CC1, CC2, CC4

Connectivity Verification types 1, 2

DHCPv4 Relay Agent with Option 82

G.8032/IGMP interworking

DHCPv6

IGMPv3 with SSM IGMP over MPLS-TP

IS-IS Route Summarization

ITU-T G.8032 v1, v2, v3 Ethernet Ring Protection Switching

Layer 2 Control Frame Tunneling over MPLS Virtual Circuits

LSP Dynamic provisioning 1:1 Tunnel protection

MPLS AIS-LDI with Signal Degrade

MPLS Label Switch Path (LSP) Tunnel Groups

MPLS Label Switch Path (LSP) Tunnel

MPLS Multi-Segment Pseudo wires

MPLS Static VC Shaping Automatic

MPLS Virtual Private Wire Service (VPWS)

OSPF/IS-IS for Dynamic MPLS-TP Control Plane

Pseudowire Reversion

Redundancy Topology LDP

RFC2205 RSVP IS-IS L1/L2

RFC3031 MPLS architecture

RFC3209 RSVP-TE: Extensions to RSVP for LSP

RFC3630 OSPF-T

RFC4447 Pseudo wire Setup and Maintenance using Label Distribution Protocol (LDP)

RFC4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks (PW over MPLS)

RFC4664 Framework of L2VPN (VPLS/VPWS)

RFC4665 Service Requirement of L2 VPN

RFC4762 VPLS (Virtual Private LAN Service) and Hierarchical VPLS (H-VPLS)

RFC5654 MPLS-Transport Profile (TP) LSP Static provisioning

RFC5884 LSP Bidirectional Forwarding Detection (BFD) via GAL/G-Ach channels

RFC6215 MPLS Transport Profile User-to-Network and Network-to-Network Interfaces

RFC6426 MPLS On-demand Connectivity Verification and Route Tracing

RFC6428 LSP and PW Connectivity Verification and Trace Route Static ARP and MAC Destination Address Resolution

VCCV (Virtual Circuit Continuity Check) Ping and Trace Route VCCV BFD based PW Pseudo wire Switchover Multicast

Network Management

Alarm Management and Monitoring Configuration

Event and Alarm Notification/Generation

IPv4 & IPv6 Management Support

Integrated Firewall

Local Console Port

Per-VLAN Statistics Port State Mirroring

RADIUS, AAA

RADIUS Client and RADIUS Authentication

Remote Auto configuration via TFTP, SFTP

Remote Link Loss Forwarding (RLLF)

RFC1213 SNMP MIB II

RFC1350 Trivial File Transfer Protocol (TFTP)

RFC1493 Bridge MIB

RFC1573 MIB II Interfaces

RFC1643 Ethernet-like Interfacing MIB

RFC1757 RMON MIB-including persistent configuration

RFC2021 RMON II and RMON Statistics

RFC2131 DHCP Client

RFC2877 Alarm MIB

RFC4291 IPv6 addressing (for management plane)

RFC4443 ICMPv6

RFC4862 Stateless address auto-configuration

RFC5905 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 Accounting

TACACS + AAA

Telnet Server

Virtual Link Loss Indication (VLLI)

Zero Touch Provisioning

Technical information (Common)

Interfaces

Fixed Ethernet Ports:

4 x 1GbE/10GbE/25GbE SFP28+
36 x 1GbE/10GbE/SFP+ / 10G PON
36 x 10G PON

2 x Module Slots:

2 x 40GbE/100GbE QSFP28
1 x 40G/1GbE/10GbE/25GbE QSFP28 +
100 Gb/s CFP2
1x 200G/100G CFP2
2x 100G CFP2
8 x 25G SFP28

Other:

1 x 10/100/1000M RJ-45 mgmt. port
1 x serial console (RJ-45, EIA-561)
1 x USB
1 x RJ45 BITS
1 x Mini coax frequency in or out
1 x Mini coax 1 PPS in or out
1 x coax GNSS antenna

Agency Approvals

Anatel (Brazil)
Australia RCM (Australia/New Zealand)
CE mark (EU)
EMC Directive (2014/30/EU)
ETSI 300 019 Class 1.2, 2.2, 3.2
GR-1089 Issue 6 – NEBS Level 3, Zone 4
Earthquake
GR-63-CORE, Issue 4 – NEBS Level 3

LVD Directive (2006/95/EC)
NOM (Mexico)
NRTL (NA)
RoHS2 Directive (2011/65/EU)
VCCI (Japan)

Service Security

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

Physical Characteristics

Dimensions:
17.5"(W) x 10"(D) x 3.5"(H);
444mm (W) x 254mm (D) x 88mm (H)

Weight: 34.2 lb (15.5kg)

Power Requirements:

Typical Power Consumption 328W (includes
2x 170-0315-900)
Maximum Power Consumption 800W

Standards Compliance

Emissions:
CISPR 22 Class A CISPR 32 Class A EN 300 386
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)
WEEE 2002/96/EC
GR-3108 Issue 2 Network Equipment
in the Outside Plant (OSP) Class 2

Operating Temperature:

-40°F to + 149°F (-40°C to + 65°C)

Storage Temperature:

-40°F to + 158°F (-40°C to + 70°C)

Relative Humidity:

Non-condensing 5% to 90%

Immunity (EMC):

GR-1089 Issue 6 Power:
CISPR 24
EN 300 386
EN 55024

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)

Visit the Ciena Community
Answer your questions



| Ordering information (SAOS 10.x) – Router Configuration | |
|---|--|
| Part Number | Description |
| 170-5171-910 | 5171,(36)10/1G SFP+,(4)25/10/1G SFP28,(2)SLOTS 200G MODULES,SAOS 10.X,SYNC, EXT. TEMP,(2) Slots AC OR DC PLUG POWER SUPPLY |
| 170-0310-900 | 5171,DC PLUGGABLE POWER SUPPLY, -48V |
| 170-0311-900 | 5171,AC PLUGGABLE POWER SUPPLY, WIDE RANGE 120/240V |
| 170-0312-900 | 5171,MODULE, (2) 40GbE/100GbE QSFP28 |
| 170-0313-900 | 5171,MODULE, (2) 100GbE CFP2 |
| 170-0314-900 | 5171,MODULE, (1) 100/200 Gb/s CFP2 |
| 170-0315-900 | 5171,MODULE, (1) 100 Gb/s CFP2,(1)40GbE/100GbE QSFP28 |
| 170-0317-900 | 5171,PLUGGABLE SPARE FAN MODULE |
| 170-0318-900 | 5171,FILLER COVER |
| Required OS Base System Perpetual Software Licenses | |
| S75-LIC-5171EO-P | SAOS ETHERNET & OAM PERPETUAL SOFTWARE LICENSE FOR 5171 |
| Optional OS Applications | |
| S75-LIC-5171MPLS-P | SAOS IP/MPLS APPLICATION PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S75-LIC-5171SYNC-P | SAOS SYNCHRONIZATION PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S75-LIC-5171100G-P | SAOS 100G PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S75-LIC-5171SEC-P | SAOS SECURITY PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S75-LIC-5171HOST-P | SAOS APPLICATION HOSTING SOFTWARE LICENSE FOR 5171, PERPETUAL |
| S75-LIC-5171BNDL01-P | SAOS-AE-OAM,MPLS,SYNCH,SECURITY,APP HOST,100G LICENSE FOR 5171, PERPETUAL |
| S75-LIC-5171BNDL01-T | SAOS-AE-OAM,MPLS,SYNCH,SECURITY,APP HOST,100G LICENSE FOR 5171, 90 DAY TRIAL |

| Ordering information (SAOS 8.x) – Universal Aggregation Configuration | |
|---|--|
| Part Number | Description |
| 170-5171-900 | 5171,(36)10/1G SFP+,(4)25/10/1G SFP28,(2)SLOT 200G MOD,SAOS 8.X,SYNC, EXT.TMP,(2)SLOT AC DC PLUG PSU |
| 170-0310-900 | 5171,DC PLUGGABLE POWER SUPPLY, -48V |
| 170-0311-900 | 5171,AC PLUGGABLE POWER SUPPLY, WIDE RANGE 120/240V |
| 170-0312-900 | 5171,MODULE, (2)40GbE/100GbE QSFP28 |
| 170-0313-900 | 5171,MODULE, (2) 100GbE CFP2 |
| 170-0314-900 | 5171,MODULE, (1) 100/200 Gb/s CFP2 |
| 170-0315-900 | 5171,MODULE, (1) 100 Gb/s CFP2,(1)40GbE/100GbE QSFP28 |
| 170-0317-900 | 5171,PLUGGABLE SPARE FAN MODULE |
| 170-0318-900 | 5171,FILLER COVER |
| Required OS Base System Perpetual Software Licenses | |
| S70-0050-900 | SAOS ADVANCED ETHERNET & OAM PERPETUAL SOFTWARE LICENSE FOR 5171 |
| Optional OS Applications | |
| S70-0050-902 | SAOS ADVANCED MPLS APPLICATION SOFTWARE LICENSE FOR 5171, PERPETUAL |
| S70-0050-903 | SAOS ADVANCED SYNCHRONIZATION PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S70-0050-904 | SAOS ADVANCED 100G PERPETUAL SOFTWARE LICENSE FOR 5171 |
| S70-0050-905 | SAOS ADVANCED SECURITY PERPETUAL SOFTWARE LICENSE FOR USE WITH 5171 |
| S70-0051-900 | ESM CARRIER ED RIGHT TO MANAGE PERPETUAL SOFTWARE LICENSE FOR 5171 |

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CIENA 5171 PLATFORM EQUIPMENT



5171 Platform

Ciena's 5171 Platform empowers advanced access networks with 100GbE packet services beyond the Central Offices and POP sites, enabling deployment into street cabinets and other uncontrolled locations.

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