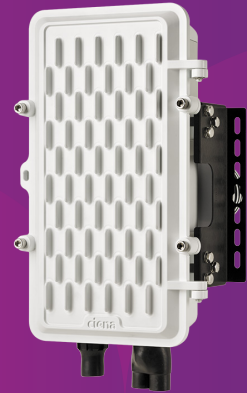


**DATA SHEET**

# 3905

## Service Delivery Switch



Ciena's 3905 Service Delivery Switch (SDS) is a hardened Ethernet platform purpose-built to address small cell mobile backhaul network needs by helping mobile network operators upgrade their networks for improved coverage, bandwidth, and overall quality of service.

The 3905 features an environmentally hardened and physically secure enclosure suitable for deployment outdoors or in unconditioned indoor environments, to enable support for a wide variety of small cell network backhaul application scenarios and topologies, as shown in Figure 1.

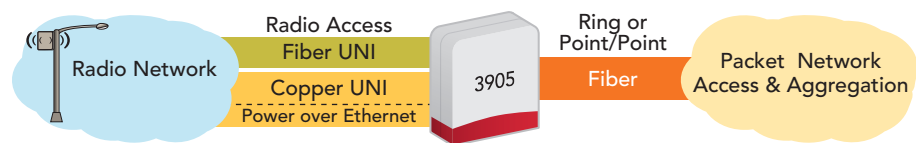


Figure 1. 3905 small cell network configuration

The 3905 is based on Ciena's field-proven packet technology, which is already deployed globally by network operators in both indoor and hostile outdoor environments. It combines the low cost and high capacity of Ethernet with the reliability, management, and service quality ensured by MEF Carrier Ethernet 2.0 compliance. The software architecture is based on a common Service-Aware Operating System (SAOS)—used across Ciena's entire line of packet-enabled platforms—that provides consistent system and service attributes and operational efficiency.

The core of the 3905 is a high-performance switching platform that incorporates the latest innovations in Ethernet switching technology and control plane protocols, along with Carrier Ethernet Operations, Administration, and Maintenance (OAM) capabilities. The result is a state-of-the-art compact design that enables the 3905 to deliver the

### Features and Benefits

- Provides high-capacity, next-generation Gigabit Ethernet (GbE) service delivery purpose-built for outdoor small cell mobile backhaul networks
- Includes environmentally hardened and physically secure enclosure and electronics (-40°C to +65°C), providing flexible deployment options
- Zero-Touch Provisioning (ZTP) for rapid, secure, and error-free turn-up of small cell packet-based services
- Supports 2 UNI ports with dual connectors: RJ-45 10/100/1000Base-TX and Small Form-factor Pluggable (SFP) optical 100/1000BaseX
- Supports 2 GbE NNI ports via SFP optics
- Features state-of-the-art hardware design and field-proven, modular, SAOS for reliability and resiliency
- Provides advanced Ethernet switching, control, and VLAN features with comprehensive QoS and Ethernet OAM for guaranteed SLAs right to the small cell radios
- Provides Power-over-Ethernet to facilitate deployment of subtended small cell radio air interfaces
- WiFi craft interface for easier onsite access for hard-to-reach small cell radios installations\*

sophisticated Quality of Service (QoS) capabilities, superior virtual switching features, robust management, and performance monitoring features required to support carrier-grade small cell backhaul networks.

The advanced design and service-rich architecture of the 3905 enable network operators to deploy reliable and scalable small cell backhaul offerings that leverage the inherent high capacity and cost-effectiveness of Ethernet technology for maximum revenue-generation. Ethernet mobile backhaul services can be rolled out quickly, reliably, and error-free, with scalable performance to ensure reduced operating expenses.

### **Purpose-built to Facilitate Small Cell Rollouts**

There are numerous challenges associated with rolling out small cells on a wide scale, such as varying and challenging mechanical installations, regulatory concerns, mounting rights, and even the desire for unobtrusive aesthetics. The small cell mobile network backhaul platform must take all of these factors into account by supporting a wide variety of mechanical mounting options, while still being physically compact and rather discreet. The 3905 is purpose-built to address these real-world concerns to facilitate the rollout of small cells in large-scale deployments.

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### **Flexible Platform for a Variety of Applications**

Although the 3905 is targeted primarily toward the network requirements related to small cell mobile network backhaul, it is equally applicable to other applications requiring reliable packet service delivery in difficult locations. Some applications include Intelligent Transport Systems (ITS), the Internet of Things with subtended sensors, video surveillance networks, and increasingly popular Ethernet business services. Support for Power-over-Ethernet (PoE) facilitates subtending Ethernet-enabled devices, such as cameras and sensors, for deployments that are rapid, reliable, simple, and low-cost.

### **Carrier-grade Small Cell Backhaul Network Services**

The 3905 features the very latest in high-performance hardware components and advanced software capabilities to support a wide variety of features to facilitate the rapid rollout and ongoing maintenance of carrier-grade small cell mobile backhaul networks, such as those listed in the following sections.

### **Weather-Proof Platform Delivers Packet Networking Where It's Needed**

The 3905 is designed to operate over an extended temperature range by providing advanced thermal management features, resulting in an environmentally hardened enclosure suitable for mounting in harsh outdoor locations where environmental controls are not available. This yields significant savings in equipment, installation, and utility costs, as the 3905 does not require environmentally controlled cabinets or huts.

The enclosure allows access to the Ethernet UNI ports and service provider Ethernet NNI fiber ports, while providing visual port and system status indicators. When closed, the enclosure provides physical security for all system components. The door cover supports open/removal door alarms for enhanced security and remote system status indication.

The 3905's flexible, rugged, and cost-effective design enables mobile network operators and wholesale small cell backhaul network service providers to rapidly and deploy small cells networks on a wide scale. The 3905 supports a rich packet OAM feature set coupled with MEF Carrier Ethernet 2.0 compliance to ensure that, once small cells are rolled out, they can be properly managed remotely to meet SLAs.

### **Flexible Power Options**

Various power options enhance the utility and flexibility of the 3905 and facilitate its deployment in diverse environments for a wide variety of small cell backhaul applications. Supported AC and DC power options include the following:

- +24V, -24V, -36V, -48V DC power module
- 100V-240V 50Hz/60Hz AC power module

### **Flexible Outdoor Mounting Options**

Flexible mounting hardware is available, allowing the 3905 to be mounted on strands, poles, masts, and wall- and surface-mount applications. These options allow a single demarcation platform to be rapidly and reliably deployed in a wide variety of field applications. Multiple mounting options facilitate time to market by allowing network operators to deploy the 3905 in locations where mounting rights have already been secured, to avoid being locked into limited mounting options or any lengthy and costly mounting right negotiations.

## PoE+ Support

The 3905 supports the industry standard IEEE 802.3at PoE+ specification that facilitates the deployment of small cells, whereby the antenna can be directly connected and powered by the 3905. This ensures simple, rapid deployments to keep network installation and operational costs at a minimum.

## Technical Information

### Interfaces

2 x 100/1000M SFP NNI/UNI ports  
2 x 10/100/1000M RJ-45; 100/1000M SFP NNI/UNI combo ports  
1 x Console Port (RJ-45, EIA-561)  
1 x Wi-Fi IEEE 802.11b/g/n management port\*

### Ethernet

IEEE 802.3 Ethernet  
IEEE 802.3z Gigabit Ethernet  
IEEE 802.3ab 1000Base-T  
IEEE 802.3u 100Base-TX  
IEEE 802.1D MAC Bridges  
IEEE 802.1Q VLANs - Including .1p Priority  
IEEE 802.1ad Provider Bridging (Q-in-Q) VLAN full S-VLAN range  
VLAN tunneling (Q-in-Q) for Transparent LAN Services (TLS)  
Per-Port MAC Learning Control  
Rapid / Multiple Spanning Tree (RSTP/MSTP)  
IEEE 802.3ad Link Aggregation Control Protocol (LACP)  
Multi-Chassis LAG Active/Standby Protection  
ITU-T G.8032 Ethernet Rings Protection Switching  
Jumbo Frames to 9216 bytes  
Layer 2 Control Frame Tunneling  
Private Forwarding Groups  
MEF CE 2.0 Compliant  
E-LINE: EPL, EVPL  
E-LAN: EP-LAN, EVP-LAN  
E-Access: Access EPL, Access EVPL  
E-Tree: EP-Tree, EVP-Tree

### Carrier Ethernet OAM

IEEE 802.1ag Connectivity Fault Management (CFM)  
IEEE 802.3ah Ethernet in the First Mile (EFM)  
IEEE 802.1ab Link Layer Discovery Protocol (LLDP)

## WiFi Console Management Port

The 3905 supports a secure and encrypted Wi-Fi management interface, allowing onsite support personnel to access the platform wirelessly without having to physically connect to the platform. This simplifies access to the 3905, which may be installed in difficult-to-reach locations, such as atop a pole, mast, high-rise building, or strand, greatly facilitates its management due to significantly reduced support times and associated costs, and improves the physical safety of onsite support crews.

ITU-T Y.1731 Performance Monitoring  
RFC 2544 Performance Benchmarking Test Generation and Reflection up to 1GE  
ITU-T Y.1564 Ethernet Service Activation Test Methodology  
RFC 5618 TWAMP Responder and Receiver TWAMP Sender  
TWAMP +/- 1ms timestamp accuracy  
Dying Gasp with Syslog and SNMP Traps

### Quality of Service

8 Hardware Queues per Port  
Committed, Excess Information Rate (CIR, EIR)  
Classification based on IEEE 802.1D priority, VLAN source port, or destination port  
Layer 2, 3, 4 Quality of Service  
Ingress metering per-port  
Ingress metering per-port per-CoS  
Ingress metering per-port per-VLAN  
Up to 1,000 Ingress Meters per-port  
Up to 1,000 Ingress Meters per-system  
C-VLAN Priority to S-VLAN Priority Mapping  
S-VLAN Priority based on C-VLAN ID  
Per-VLAN Classification, Metering, and Statistics  
Per-port, per-VLAN QoS with CIR and EIR traffic on Egress Queues

### Synchronization

ITU-T G.8262/G.8264 EEC option1 and option2  
ITU-T G.781  
1588v2 Precision Time Protocol  
ITU-T G.8261  
ITU-T G.8265/G8265.1 (OC slave and BC)  
ITU-T G.8271  
ITU-T G.8273.2  
ITU-T G.8275/G.8275.1 (T-GM, T-BC, T-TSC)  
ITU-T G.813  
GR-1244  
Stratum3E oscillator

### Multicast Management

RFC 2236 IGMPv2 Snooping

IGMPv3 PDU support  
IGMP Domains  
IGMP Message Filtering  
IGMP Inquisitive Leave  
Broadcast/Multicast Storm Control  
Unknown Multicast Filtering  
Well-known Protocol Forwarding

### Network Management

Enhanced CLI  
CLI-based configuration files  
SNMP v1/v2c/v3  
SNMPv3 Authentication and Message Encryption  
RFC 1213 SNMP MIB II  
RFC 1493 Bridge MIB  
RFC 1643 Ethernet-like Interface MIB  
RFC 1573 MIB II interfaces  
RFC 1757 RMON MIB - including persistent configuration  
RFC 2021 RMON II and RMON Statistics  
Per-VLAN Statistics  
RADIUS Client and RADIUS Authentication  
RFC 2866 RADIUS Accounting  
TACACS + AAA  
RFC 2131 DHCP Client  
RFC 3315 DHCP for IPv6 (DHCPv6)  
RFC 6221 Lightweight DHCPv6 Relay Agent (LDRA)  
RFC 1305 NTP Client  
RFC 1035 DNS Client  
Telnet Server  
RFC 1350 Trivial File Transfer Protocol (TFTP)  
RFC 959 File Transfer Protocol (FTP)  
Secure File Transfer Protocol (SFTP)  
Secure Shell (SSHv2)  
Syslog with Syslog Accounting  
Port State Mirroring  
Virtual Link Loss Indication/Remote Link Loss Forwarding  
Dual-Stack IPv4/IPv6 management plane  
Local Console Port

## Technical Information continued

Comprehensive Management via Ethernet Services Manager

Remote Auto-Configuration via TFTP, SFTP  
Software download/upgrade via TFTP, SFTP

### Service Security

Common Criteria EAL2 compliant and certified  
Egress Port Restriction  
IEEE 802.1X Port-Based Network Access Control (RADIUS/MD5)  
Layer 2, 3, 4 Protocol Filtering  
Broadcast Containment  
User Access Rights  
Per-port or per-VLAN Service Access Control  
Hardware-based DOS Attack Prevention

### Power over Ethernet (PoE)

2 x Power sourcing equipment (PSE) ports  
IEEE 802.3at-2009 PoE+

### MAC Address Capacity

16,000 MAC Addresses

### Power Requirements

DC Input: -48,+/-36, +/-24 VDC (nominal)  
AC Input: 100V, 240V AC (nominal)  
AC Frequency: 50/60 Hz

Maximum: 125W  
Typical with 2x PoE+ ports: 100W  
Typical without 2x PoE+ ports: 35W

### Agency Approvals

Agency Marks:  
NRTL (Canadian Standards Association)  
CE mark (European Union)  
EMC Directive (2004/108/EC)  
LVD Directive (2006/95/EC)  
RoHS2 Directive (2011/65/EU)  
Australia C-Tick (Australia/New Zealand)  
VCCI (Japan)  
Emissions:  
FCC Part 15 Class A  
Industry Canada ICES-003 Class A  
VCCI Class A  
CISPR 22 Class A  
EN 55022  
Immunity (EMC):  
CISPR 24  
EN 55024  
GR-1089 Issue 6  
EN 300 386  
Power:  
ETSI EN 300 132

### Safety:

EN 60950-1  
CAN/CSA C22.2 No. 60950-1-07  
UL 60950-1 2nd Ed  
IEC 60950-1

### Environmental:

RoHS2 Directive (2011)

### Environmental Characteristics

GR-63-CORE, Issue 4 – NEBS Level 3  
GR-950 Issue 2 Optical Network Unit  
GR-3108 Issue 2 Network Equipment in the Outside Plant (OSP) Class 4  
ETSI 300 019 Class 1.2, 2.2, 4.1  
NEMA Type 4X  
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:  
5% to 100% (condensing)

### Physical Characteristics

#### Dimensions:

7.8" (W) x 3.7" (D) x 14.7"(H);  
198mm (W) x 94mm (D) x 373mm (H)

#### Weight:

9.0 pounds / 4.1 kilograms

\* Feature to be available in a future release.

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