



# ACTIVEDGE 3911 SERVICE DELIVERY SWITCH

## Features and Benefits

- Provides high-capacity, next-generation Gigabit Ethernet (GbE) service delivery for business, residential, and transport applications (including wireless backhaul)
- Includes environmentally hardened and physically secure enclosure and electronics (-40°C to +65°C), providing flexible deployment options
- Supports 8 GbE 10/100/1000 BaseTX subscriber UNI ports with RJ-45 connectors
- Supports 2 GbE NNI/UNI ports with dual connectors: RJ-45 10/100/1000BaseTX and Small Form-factor Pluggable (SFP) Optical 100/1000BaseX
- Features state-of-the-art hardware design and field-proven, modular service-aware operating system for reliability and resiliency
- Provides advanced Ethernet switching, control, and VLAN features with comprehensive QoS and Ethernet OAM, for guaranteed SLAs
- Ensures future-proof investment protection with all ports GbE ready for easy upgrade from 100 Mb/s to GbE
- Provides a complete "System-in-a-Box" including switching module, interface connectors, fiber management, optional UPS power system and optional Voice Module

Ciena's ActivEdge 3911 Service Delivery Switch (SDS) is a next-generation Ethernet access system that cost-effectively delivers business, transport, and residential Ethernet services via fiber or copper connections.

The 3911 features an environmentally hardened and physically secure enclosure suitable for deployment outdoors or in unconditioned indoor environments, enabling support for a wide variety of service application scenarios and network topologies, as shown in Figure 1.

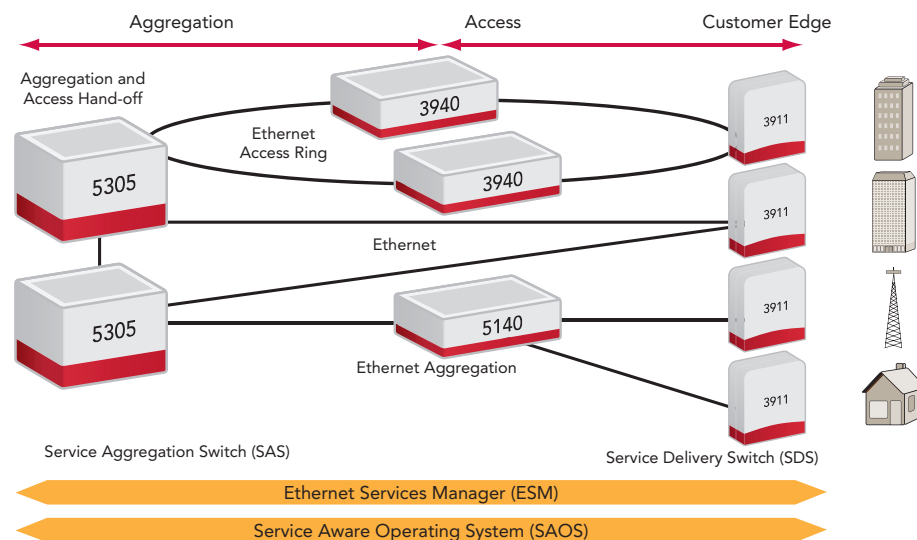


Figure 1. 3911 deployment options

The 3911 is based on Ciena's field-proven True Carrier Ethernet® technology, deployed by dozens of network operators in tens of thousands of homes and businesses. It combines the low cost and high capacity of Ethernet with the reliability, management, and service quality usually associated with SONET/SDH networking systems. The 3911 software architecture is based on a common service-aware operating system, used in all Ciena Service Delivery and Service Aggregation Switches to provide consistent system and service attributes and operational efficiency.

The core of the 3911 is a high-performance switching platform that incorporates the latest innovations in Ethernet switching technology, Ethernet control plane protocols, and Carrier Ethernet Operations, Administration, and Maintenance (OAM) mechanisms. The result is a state-of-the-art design that enables the 3911 to deliver the sophisticated Quality of Service (QoS) capabilities, superior Virtual LAN (VLAN) and virtual switching functions, and robust management and performance monitoring features required to support carrier-grade Layer 2 Virtual Private Networks (L2 VPNs), mission-critical data, and high-speed Internet.

The advanced design and service-rich architecture of the 3911 enable network operators to deploy reliable and scalable offerings that leverage the inherent high capacity and cost-effectiveness of Ethernet technology to generate maximum revenue. Ethernet business and transport services can be rolled out quickly and reliably, with scalable performance that ensures reduced Operating Expenses (OPEX) for low cost per subscriber in the short term, while delivering high system productivity and availability over the long term.

### **Advanced Features Deliver Carrier-Grade Data, Voice, and Video Services**

The 3911 design features the latest high-performance hardware components and advanced software capabilities, including:

#### **Advanced Ethernet control plane features**

- IEEE 802.1D STP/RSTP
- IGMPv2 and Multicast
- Per-port Broadcast Containment and Media Access Control (MAC) learning control
- Link Aggregation (LAG) with Manual LAG
- Link Aggregation Control Protocol (LACP)

#### **Sophisticated VLAN encapsulation and tagging**

- IEEE 802.1Q C-VLANs
- IEEE 802.1ad Provider Bridging (Q-in-Q) S-VLANs
- VLAN priority and VLAN tag manipulation
- Untagged frames to default provider S-VLAN
- C-VLAN to S-VLAN priority tag mapping

#### **Hierarchical QoS for strict Service Level Agreements (SLAs)**

- Eight hardware queues/port, up to 64 ingress meters per port
- Per-port per-VLAN QoS with CIR/EIR settings
- Two rate Three Color Metering (trTCM), marking, policing, shaping
- Random Early Detection (RED), flexible Deficit Weighted Round Robin (DWRR) and Strict Priority Scheduling

### **Superior remote monitoring capabilities**

- Outer door and inner cover removal alarms
- Temperature and battery alarms
- Dying gasp messaging

### **Carrier-class Ethernet OAM**

- IEEE 802.3ah EFM
- IEEE 802.1ag Connectivity Fault Management (CFM)
- ITU-T Y.1731 performance management
- ITU-T 802.1AB Link Layer Discovery Protocol (LLDP)
- IETF RFC 5618 Two Way Active Management Protocol (TWAMP) with complete sender and receiver capabilities

### **Comprehensive management and security**

- SNMPv2/v3
- SSHv2
- SFTP
- Telnet
- DHCP
- DNS
- NTP
- Syslog
- RMON Statistics
- RADIUS
- TACACS+AAA
- IEEE 802.1x
- Port Mirroring
- Enhanced CLI
- Ciena Ethernet Services Manager
- Remote auto-configuration and software download

### **Complete MEF-compliant Ethernet service offerings**

- Ethernet Private Line
- Ethernet Private LAN
- Ethernet Virtual Private Line
- Ethernet Virtual Private LAN
- All conform to MEF 9 and MEF 14

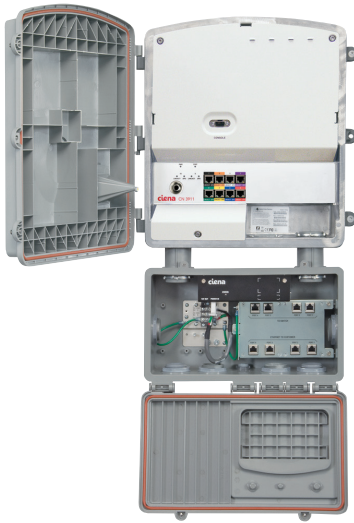


Figure 2. 3911 with UAM Subsystem

### Ruggedized System for Outdoor or Unconditioned Indoor Installation

The 3911 Service Delivery Switch, designed to operate over an extended temperature range, is housed in an environmentally hardened enclosure, shown in Figure 2, suitable for mounting outdoors or indoors on a building wall or similar sturdy surface. The enclosure includes advanced thermal management mechanisms, an outer door and inner cover. The outer door permits customer access to the 3911 RJ-45 Ethernet UNI ports. The inner cover features visual port and system status indicators and provides physical security for all system components, service provider fiber connections and Ethernet NNI/UNI ports. The 3911 enclosure also includes outer door and inner cover removal alarms for enhanced security and remote system status indication.

The compact form factor and hardened design of the 3911 enables deployment in a wide variety of locations for diverse application scenarios. The 3911 saves important equipment and utility costs because it does not require a protected or conditioned physical environment, a special telecom closet or hut, or equipment racks for system mounting.

The 3911's flexible and cost-effective design enables service providers to utilize this service delivery switch as a service access/demarcation system for residential, business and data transport applications, including wireless backhaul.

### Flexible Power Options

Various power options enhance the utility and flexibility of the 3911 and facilitate its deployment in diverse environments for a wide variety of applications. These power options include the following:

- Extended temperature wide range (+24/-24/-48V) DC power supply module (housed in UAM)
- Extended temperature wide range (100-240V) AC power supply module (housed in UAM)
- Wide range (100-240V) AC power adapter for indoor use
- UPS power system, including battery charger module and battery for backup power

### Mounting Options

Mounting ears are included with the 3911 base system for wall and surface mount applications. An H-frame mounting kit and a pole mounting kit are available to support additional locations and mounting scenarios.

### Hardened UNI Access Module (UAM) Subsystem

The 3911 can be deployed with an optional environmentally hardened and physically secure UNI Access Module (UAM) to provide separate customer access to user ports. The UAM interfaces directly to a 3911 base system and accommodates the following additional system components:

- Field replaceable, extended temperature wide range (+24/-24/-48V) DC power supply module (optional)
- Field replaceable, extended temperature wide range (100-240V) AC power supply module (optional)
- Field replaceable 2-port protection modules for power surge and lightning protection, with customer-accessible patch panel for GbE RJ-45 subscriber ports (optional)
- Conduit adapter kit (optional) to accommodate different sizes of conduit for a variety of installation options

## Technical Information

### Interfaces

2 x 10/100/1000M RJ-45; 100/1000M SFP  
NNI/UNI ports  
8 x 10/100/1000M RJ-45 UNI ports  
1 x RS-232 Console Port DB-9 connector

### Ethernet

IEEE 802.3 Ethernet  
IEEE 802.3u Fast Ethernet  
IEEE 802.3z Gigabit Ethernet  
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 VLAN MAC Learning Control  
Per-Port MAC Learning Control  
IEEE 802.3ad Link Aggregation Control  
Protocol (LACP)  
ITU-T G.8032 Ethernet Ring Protection  
Switching  
Jumbo Frames to 9216 bytes  
Layer 2 Control Frame Tunneling

### 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)  
ITU-T Y.1731 Performance Monitoring  
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 and Excess Information Rate  
(CIR and EIR)  
Classification based on IEEE 802.1D priority  
Classification based on VLAN, source port,  
destination port, TCP/UDP port  
Classification based on IP Precedence and  
IPDSCP  
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 64 Ingress Meters per port  
Up to 512 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

### Multicast Management

RFC 2236 IGMPv2 Snooping  
IGMP Domains  
IGMP Message Filtering  
IGMP Inquisitive Leave  
Broadcast/Multicast Storm Control  
Unknown Multicast Filtering  
Well-known Protocol Forwarding

### Service Security

IEEE 802.1x Port-based Network Access  
Control  
Egress Port Restriction  
Layer 2, 3, 4 Protocol Filtering  
Broadcast Containment  
User Access Rights  
Per-port or per-VLAN Service Access Control  
Hardware-based DOS Attack Prevention  
Hardware-based Access Control Lists (ACLs)

### 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 Statistic  
RMON Statistics  
Per-VLAN Statistics  
RADIUS Client and RADIUS Authentication  
TACACS + AAA  
RFC 2131 DHCP Client  
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  
Local Console Port  
Comprehensive Management via Ethernet  
Services Manager  
Remote Autoconfiguration via TFTP, SFTP  
Software download/upgrade via TFTP, SFTP

### MAC Address Table Capacity

16,000 MAC addresses

### Power Requirements

DC Input: -48, -24, +24 VDC (nominal)  
AC Input: 100V, 240V AC (nominal)  
AC Frequency: 50/60 Hz  
Maximum Power Input: 30 W

### Agency Approvals

**Safety:** European Union, CE mark (Declaration  
of Conformity); UL 60950 IEC 60950 (CB);  
EN 60950; CAN/CSAC22.2 No. 60950-00  
(Canadian Safety)

**Emissions:** FCC Part 15:1998 Class B; EN55022  
(1994) Class B (with amendments A1 and  
A2); EN61000-3-2 (1995) Harmonic current  
emissions; EN61000-3-3 (1995) Voltage  
fluctuations and flicker

**Telecom:** FCC Part 68: Subpart D; Industry  
Canada (CS-03, Issue 8, Part 1)

**Environmental:** WEEE 2002/96/EC

**Immunity:** ETSI/EN 300 386:V1.3.2 (2003-05) (EU  
Telecommunication Emissions and Immunity)

**Laser Safety:** CDRH Letter of Approval (US  
DA Approval); Europe: EN60825-1:1994  
+A11:1996+A2:2001 (European Safety of  
Lasers)

### Environmental Characteristics

**Operating Temperature:** (including solar  
load) -40°F to +149°F (- 40°C to +65°C)

**Storage Temperature:** -40°F to +185°F (-40°C  
to +85°C)

**Relative Humidity:** 0% to 100% (condensing)  
ATT-TP-76200 uncontrolled OSP  
GR-3108

### Physical Characteristics

#### Dimensions:

#### 3911:

17.2" (H) x 16.1" (W) x 6.4" (D);  
437 mm (H) x 408.9 mm (W) x 162.6 mm (D)

#### 3911 with UAM:

27.2" (H) x 16.2" (W) x 6.4" (D);  
690.9 mm (H) x 408.9 mm (W) x 162.6 mm (D)

#### Weight:

**3911:** 24 lbs; 10.9 kg

#### 3911, UAM and components:

32.8 lbs; 14.9 kg

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