3911
Service Delivery Switch

Ciena's 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.
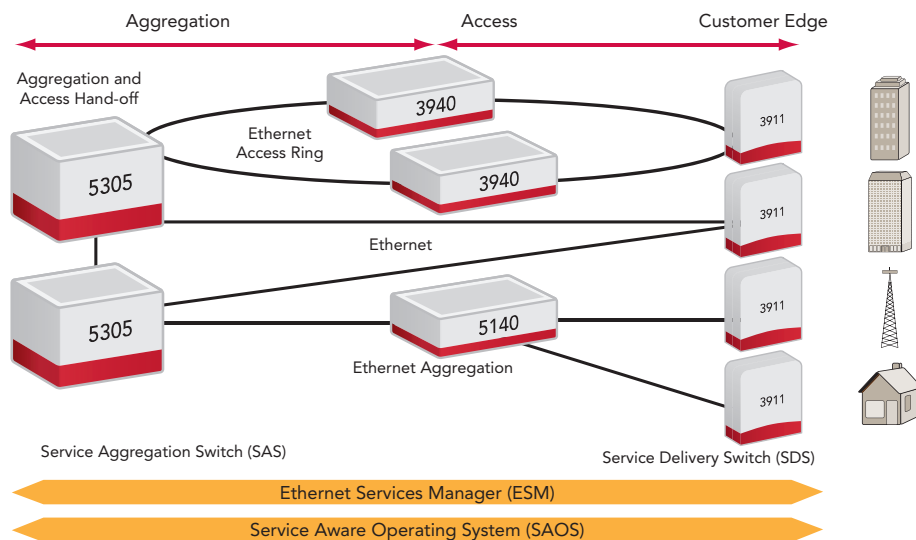

Figure 1. 3911 deployment options

The 3911 is based on Ciena's field-proven packet networking 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

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

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

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

Figure 2. 3911 with UAM Subsystem

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

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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 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 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 60950I 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

Ordering Information
3911, (2) 10/100/1000M RJ-45 or 100/1000M
  SFP, (8) 10/100/1000 RJ-45, hardened;
  Part/Kit#: 170-3911-900