DATA SHEET

3906

Ciena's 3906 Platform is a compact, smart CPE that delivers gigabit Ethernet service capability with Virtual Network Function (VNF) integration.

By bundling VNFs with Ethernet connectivity services, today's service providers can field a virtually limitless portfolio of enhanced services that build reliable revenue streams and limit the endless upgrade cycles that only add cost and inefficiency to the network infrastructure. Network Functions Virtualization (NFV) enables agility and scalability that facilitates transformation of networks and the services they provide. Ciena's 3906 enables this transformation by hosting multiple VNFs at the customer premises or network edge.

Sized according to the number and nature of the VNFs, the platform accommodates an optional Intel-based server module capable of hosting a wide range of functions that are ideally distributed to the network edge to optimize last-mile bandwidth usage, such as encryption, WAN optimization, firewalls, service activation testing, service monitoring, and virtual routing. Service chaining several VNFs creates a library of value-added services that can be remotely provisioned, upgraded, maintained, and managed with no truck rolls and reduced probability of human error.

The 3906 is a carrier-grade platform based on the Service-Aware Operating System (SAOS) used in all of Ciena's Routing and Switching platforms, providing operational efficiency and consistent system attributes. SAOS delivers benefits across all Ethernet access and aggregation applications, including:

- Rapid implementation of the latest advances in Ethernet technologies, as well as new services and standards proposed by the IEEE, IETF, MEF, and ITU
- Improved efficiency and cost savings resulting from a common deployment and service provisioning model across Ciena's Routing and Switching platforms
- Service offering ubiquity, permitting rapid rollout of new services across the entire network
- MEF CE 2.0-certified Ethernet service offerings for E-Line, E-LAN, E-Tree, and E-Access port-based and VLAN based variants

Features and benefits

- Offers 6 Gb/s of non-blocking switching capacity in a compact service demarcation device, running Ciena's SAOS for advanced OAM and QoS functions
- Offers flexible VNF host for CPE deployment via optional Intel x86 server modules for support of VNFs from Ciena's Blue Planet® Ecosystem or third-party developers
- Provides orchestration via Ciena's Blue Planet MDSO or a third-party solution; a truly open platform for integration of best-in-breed software functions
- Features low-footprint packaging in a non-blocking architecture with:
  - 2 x 100M/1GbE SFP/RJ45 ports
  - 2 x 10/100/1000M RJ45 ports
  - 2 x 1GbE ports
- Uses redundant AC power in an efficient, 1RU package
- Supports ZTP to minimize OPEX and accelerate service turn up while providing line-rate, built-in service activation testing
- Complies with MEF CE 2.0 specifications for E-Line, E-LAN, E-Tree, and E-Access services

VNF host

Encryption, firewalls, enterprise routing, WAN optimization, and similar functions have been recognized as far more cost effective if integrated into a virtual platform that avoids 'sheet metal' dedicated to each. Service providers can thus differentiate their service offerings—improving revenue per user, minimizing churn, delivering increased value to end-users, and increasing overall revenue through partnerships.

Figure 1. Ciena 3906 Router

Ciena's 3906 serves as smart CPE for these deployments and complements other hosting capabilities offered in the CO, data center, or cloud deployments. In addition, new services in the future may offer additional benefits if they can be added to the service mix with minimal intervention.

NFV host, pluggable x86 server module (optional)

The 3906 can receive a field-replaceable server module to run a variety of NFV applications. The server module supports hot swap for live system insertion into the 3906 chassis without interruption to the native switch traffic flows.

The server module uses a multi-core Intel Xeon D-1500 processor for VNF hosting and control. Various server modules are planned with medium or large capacities to support multiple VNFs with different performance requirements driven by user demand and targeted cost point. A high-speed backplane connector passes high-speed (up to 10.125GHz) signals to the base service delivery platform.

Carrier Ethernet transport options

The 3906 provides unmatched flexibility to address multiple applications, business models, and deployment environments without sacrificing service capabilities or Quality of Service (QoS).

The 3906 provides a variety of transport options for Ethernet services including G.8032 rings, 802.1q VLANs, and 802.1ad provider VLANs (Q-in-Q).

Operators can use combinations of these capabilities to accommodate the specific needs of their network deployment. The platform supports interworking between these transport options via a sophisticated and scalable switching architecture, leading to complete service flexibility and optimal utilization of network resources.

Zero-Touch Provisioning (ZTP)

Ciena's ZTP simplifies system turn up and enables device deployment, service turn up, and Service Level Agreement (SLA) performance testing to be run from the Network Operations Center (NOC). This efficiency can dramatically lower OPEX, eliminating the need for on-site personnel or adjunct test equipment and ensuring consistent, reproducible test reports ready for immediate transmission to the customer for service acceptance. Operators can ramp service rollouts faster, and at lower cost, because the minimized training requirement permits use of a wider pool of technicians.

The 3906 includes a hardware engine to provide RFC2544 and Y.1564 performance benchmark testing, enabling full line-rate traffic measurements end to end across the Ethernet virtual circuit. This approach can improve end-customer satisfaction by enabling NOC personnel to proactively respond to network events and increasing performance visibility for end-customer SLA reporting.

The design of the 3906 also provides flexibility to enable deployment in a wide range of physical operating environments, supporting:

- Commercial temperature range (0°C to +40°C)
- Fixed single or dual power options for high MTBF

	Small	Medium		Large	
	170-0121-901	170-0122-901	170-0122-903	170-0128-901	170-0128-903
Processor	D-1508	D-1527		D-1548	
Cores/Threads	2/4	4/8		8/16	
Core Frequency	2.2 GHz	2.2 GHz		2.0 GHz	
RAM	8GB	16 GB	16 GB	32 GB	64 GB
SSD	120GB	120 GB	480 GB	480 GB	1.9 TB
Target #VNFs	1	2-3		3+	

Figure 2. NFV server module details

Fine-grained SLA monitoring and enforcement

As end-customer applications become increasingly dependent on tight SLA guarantees, successful operators need to deliver advanced QoS offerings and accurately and efficiently monitor the health and performance of those services.

The 3906 implements carrier-class hierarchical QoS that permits delivery of a wide range of traffic types and rates over a single access infrastructure without interference or degradation. These capabilities enable greater revenue generation by utilizing available network resources efficiently while improving customer relations with enforceable and reliable SLAs.

Ciena's portfolio incorporates an extensive Operations, Administration, and Maintenance (OAM) feature suite providing comprehensive link, service, and network monitoring and performance metrics.

The 3906's OAM features include:

- ITU-T Y.1731 performance monitoring for delay, jitter, and loss with hardware-assisted performance
- IEEE 802.1ag Connectivity Fault Management (CFM) with hardware-assisted performance
- IEEE 802. 3ah Ethernet in the First Mile (EFM)
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- IETF RFC 5618 TWAMP sender and responder for L3 SLA Monitoring
- Full line-rate, built-in RFC 2544/ITU-T Y.1564 performance benchmark test generation and reflection

Network management and orchestration

Ciena's Manage, Control and Plan (MCP) domain controller offers a unique and comprehensive solution for the administration of mission-critical networks that span access, metro, and core domains, while providing unprecedented multi-layer visibility from the photonic to the packet layer. With this innovative management approach, MCP returns control of the metro 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.

With the addition of Blue Planet Multi-Domain Service Orchestration (MDSO) capabilities, operators can leverage an advanced software architecture and open design concept to deliver a single comprehensive platform that can be tailored to meet customers' SDN, NFV, and service orchestration use cases. These can be deployed across multi-vendor and multi-domain environments and scaled on demand. The result is a dramatic transformation of both how services are delivered and how networks are operated.

Blue Planet serves four primary use cases to meet customers' business and operational requirements:

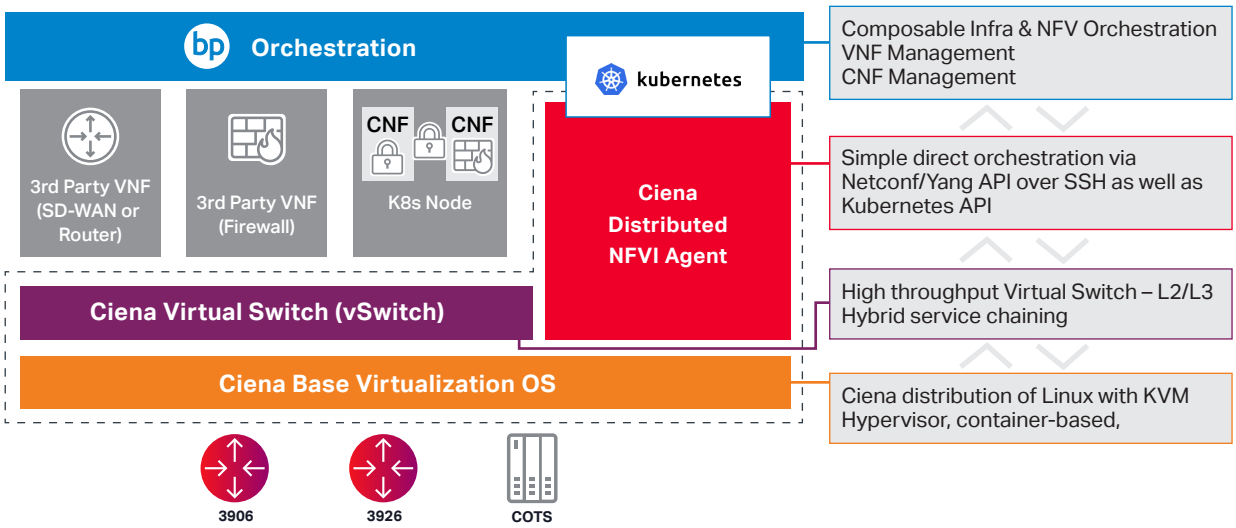
- MDSO: End-to-end service automation and orchestration across multiple technology (physical or virtual) and vendor domains
- NFV orchestration: Vendor-agnostic VNF instantiation, service chaining, and lifecycle management across one or more data centers
- Open Network Operating System (ONOS): Commercial grade open-source SDN controller optimized for data center and Central Office Re-architected as a Data Center (CORD) network domains
- SDN management and control: Fault, Configuration, Accounting, Performance, Security (FCAPS) management and control of multi-vendor and multi-layer physical network elements

Distributed NFV Infrastructure (D-NFVI) Software

Ciena's D-NFVI Software is purpose-built to address key challenges of distributed NFV in a large-scale network, allowing for rapid implementation of the latest advances in vCPE deployment. The solution provides flexibility addressing key concerns with security, lifecycle orchestration, vendor lock-in, and cost challenges.

Ciena's D-NFVI Software comprises three main components:

1. Ciena Base Virtualization OS includes an environment with kernel, user space, and application runtime framework as required by the VNFs to be deployed.
2. Ciena vSwitch is a Data Plane Development Kit (DPDK)-based switch that provides service function chaining as well as Ethernet and OAM functions.
3. Ciena NFVI Agent allows operators to configure and chain VNFs by means of a NETCONF/YANG API.



Technical Information

Interface Ethernet

2 x 100M/1GbE SFP/RJ45 ports
2 x 10/100/1000M RJ45 ports
2 x 1GbE ports
1 x 10/100/1000M RJ-45 management port
1 x console port (RJ-45, EIA-561)
1 x Module Slot
- 2 Core NFV compute FRU
- 4 Core NFV compute FRU
- 8 Core NFV compute FRU

Ethernet

IEEE 802.3 Ethernet
IEEE 802.3-2008 10-Gigabit 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)
C-VLAN Priority to S-VLAN priority mapping
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
Multi-Chassis LAG active/standby protection
ITU-T G.8032 Ethernet rngs protection switching
Jumbo frames to 9216 bytes
Layer 2 control frame tunneling
Private forwarding groups
MEF CE 2.0 certified
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)
ITU-T Y.1731 performance monitoring
RFC 2544 performance benchmarking test
Generation and Reflection up to 1Gb/s
ITU-T Y.1564 Ethernet service activation test methodology
S-VLAN Priority based on C-VLAN ID
RFC 5618 TWAMP responder and receiver
TWAMP sender
TWAMP +/- 1ms timestamp accuracy
Dying Gasp with syslog and SNMP traps

MAC Address Table Capacity

16,000 MAC addresses

Quality of Service

8 hardware queues per port
Committed, Excess Information Rate (CIR, EIR)
Classification based on
IEEE 802.1D priority
VLAN, source port, destination port
IP Precedence and IP-DSCP
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
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
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

Technical Information continued

Network Management continued

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 (VLLI/RLLF)
Dual-Stack IPv4/IPv6 management plane
Local console port
Comprehensive management via Ethernet services manager
Remote auto-configuration via TFTP, SFTP
Software download/upgrade via TFTP, SFTP

Service Security

Certified to Common Criteria Network Device Protection Profile (NDPP)
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 Requirements

Two built-in redundant power supplies
AC Input: 90V, 264V AC (nominal)
AC Frequency: 50/60 Hz
Maximum Power Input: 35W
Maximum Power Input (w/ server module): 125W

Agency Approvals

Agency Marks:
CE (Europe), RCM (Australia and New Zealand), SCC(Canada), NRTL VCCI(Japan),
Safety:
2006/95/EC — Low Voltage Directive
CAN/CSA 22.2 No. 60950-1-07 (Canada)
UL 60950-1 (US)
IEC 60950-1 (International)
EN 60950-1 (EU)
EMC:
2004/108/EC — EMC Directive
CISPR 22:2012, Class A
AS/NZS CISPR 32:2013
FCC Part 15:1998 Class A
VCCI V3, V4
ICES-003 Issue 6, Class A

Environmental:
RoHS 2002/95/EC
WEEE 2002/96/EC
Customer: ETSI/EN V1.6.1

Environmental Characteristics

Operating Temperature:
32°F to +104°F (0°C to +40°C)
Storage Temperature:
-40°F to +158°F (-40°C to +70°C)
Relative Humidity: 5% to 90% (non-condensing)

Physical Characteristics

Dimensions:
17.55" (W) x 11.5" (D) x 1.7"(H);
44.58cm (W) x 28.07cm (D) x 4.32cm (H)
Weight: 8.98 lbs.; 4.07kg
19" and 23" rack mount optional wall mount brackets

Ordering Information

Part Number	Description
Chassis	
170-3906-900	3906, (2)1GbE SFP, (2)100M/1GbE SFP/RJ45, (2)10M/100M/1GbE RJ45, NFV server slot, (1) AC PS, req. power cable 3906, (2)1GbE SFP, (2)100M/1GbE SFP/RJ45,(2)10M/100M/1GbE RJ45,NFV server slot, (2) AC PS, req. power cable,
170-3906-901	3906, (2)1GbE SFP, (2)100M/1GbE SFP/RJ45, (2)10M/100M/1GbE RJ45, NFV server slot, (1) AC PS, req. power cable 3906, (2)1GbE SFP, (2)100M/1GbE SFP/RJ45,(2)10M/100M/1GbE RJ45,NFV server slot, (2) AC PS, req. power cable
Field Replaceable Server Cards	
170-0121-901	SMALL NFV COMPUTE SERVER FRU FOR 3906MVI & 3926, BROADWELL D-1508, 8GB RAM, 120GB SSD
170-0122-901	16GB RAM, 120GB SSD, MEDIUM NFV COMPUTE SERVER FRU - 4 CORE
170-0122-903	16GB RAM, 480GB SSD, MEDIUM NFV COMPUTE SERVER FRU - 4 CORE
170-0128-900	LARGE NFV COMPUTE SERVER FRU FOR 3906 & 3926, BROADWELL D-1548, 16GB RAM, 120GB SSD 32GB RAM, 480GB SSD, LARGE NFV COMPUTE SERVER FRU - 8 CORE
170-0128-901	32GB RAM, 480GB SSD, LARGE NFV COMPUTE SERVER FRU - 8 CORE
170-0128-903	64GB RAM, 1.9TB SSD, LARGE NFV COMPUTE SERVER FRU - 8 CORE
Software	
Required OS Base System Perpetual Software Licenses	
S70-0033-900	SAOS ADVANCED ETHERNET PERPETUAL SOFTWARE LICENSE FOR 3906
S70-0033-901	SAOS ADVANCED OAM PERPETUAL SOFTWARE LICENSE FOR 3906
Optional OS Applications	
170-0204-901	SAOS ADVANCED ETHERNET PERPETUAL SOFTWARE LICENSE FOR USE WITH SAOS 6.X
ESM Related	
S70-0030-900	ESM CARRIER ED RIGHT TO MANAGE PERPETUAL SOFTWARE LICENSE FOR 3906
D-NFVI Software for 3906	
S75-LIC-MSBL-xx	Ciena Base Virtualization OS for medium x86 NFV Server Module
S75-LIC-MSFF-xx	Ciena vSwitch for medium x86 NFV Server Module
S75-LIC-MAGT-xx	Ciena D-NFVI Agent for medium x86 NFV Server Module
S75-LIC-MDNFV-xx	D-NFVI software bundle - includes Base Virtualization OS, vSwitch, and D-NFVI agent for medium x86 NFV Server Module
S75-LIC-SDNFV-P	BASE OS, KVM HYPERVISOR, SECURITY, VSWITCH SRVC FUNCT-FORWARD, D-NFVI AGENT, SM SERVER MODULE, PERPETUAL
S75-LIC-MDNFV-T	Trial License for 90 days, which includes D-NFVI software bundle - for medium x86 NFV Server Module
Notes	
Where "xx" = "1Y" for 1yr RTU, "3Y" for 3yr RTU, and "P" for perpetual RTU	

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