Experience. Outcomes.

DATA SHEET

3906mvi
Service Virtualization Switch

Ciena's 3906mvi Service Virtualization Switch is a compact, smart CPE platform that delivers gigabit Ethernet service capability with virtual network function integration.

By bundling Virtual Network Functions (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 3906mvi 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 3906mvi is a carrier-grade platform based on the Service-Aware Operating System (SAOS) used in all Ciena packet switches, 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 Packet Networking products

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 VNF functions 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:
  - Two 100M/1GE SFP/RJ45 ports
  - Two 10/100/1000M RJ45 ports
  - Two 1G SFP ports

- Uses redundant AC power in an efficient, 1RU package

- Supports zero-touch provisioning 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

- 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

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 their overall revenue through partnerships.
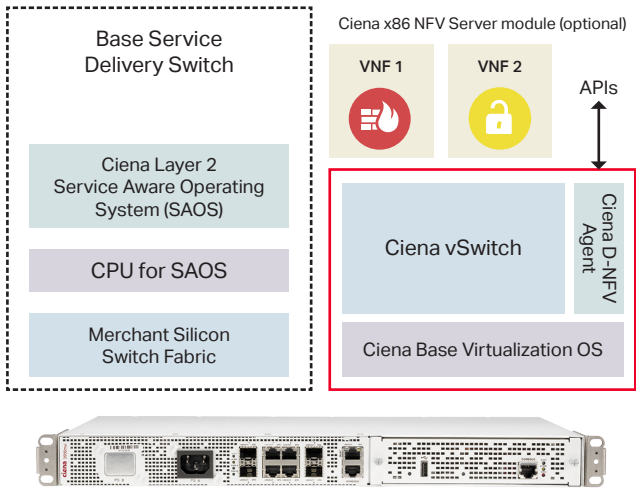

Figure 1. VNF Host functional components

Ciena's 3906mvi 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 3906mvi is capable of receiving a field-replaceable server module to run a variety of NVF applications. The server module supports hot swap for live system insertion into the 3906mvi 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 small/medium/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 switch.

	Low End*	Mid-range	High End*
Broadwell SKU	D-1508	D-1527	D-15xx
Hyper Threaded Cores	2	4	8
Core Freq.	2.2GHz	2.2GHz	2.2GHz
RAM	8 GB	16 GB	32 GB
SSD	64 GB	120 GB	TBD
Target #VNFs	1	2-3	3+

Figure 2. Server module options

Carrier Ethernet Transport Options

The 3906mvi provides unmatched flexibility to address multiple applications, business models, and deployment environments without sacrificing service capabilities or quality of service.

The 3906mvi provides a variety of packet transport options for Ethernet services including G.8032 rings, 802.1q VLANs, and 802.1ad provider VLANs (Q-in-Q).
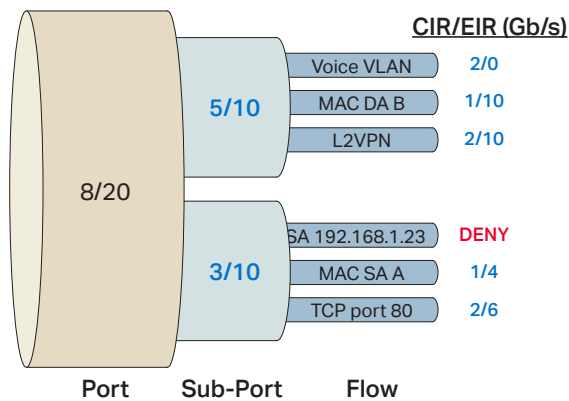
Operators can use combinations of these capabilities to accommodate the specific needs of their packet network deployment. The platform supports interworking between these transport options via a sophisticated and scalable switching architecture, leading to complete service flexibility and optimal utilization of network resources.

Zero-touch Provisioning

Ciena's zero-touch provisioning 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 roll-outs faster, and at lower cost, because the minimized training requirement permits use of a wider pool of technicians.

The 3906mvi 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 3906mvi 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

Figure 3. Granular classification and SLA enforcement

Fine-grained SLA Monitoring and Enforcement

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

The 3906mvi 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 3906mvi'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 OneControl offers a unique and comprehensive solution to manage mission-critical networks that span across domains (access, metro, and core), with unprecedented visibility through protocol layers. With this innovative approach, OneControl returns network and services control to the operator.

OneControl unites the management of Ciena's portfolio under a single solution. With its unique toolset of comprehensive management features, OneControl puts the control of critical networks at the operator's fingertips. Through a unified GUI and common management model, operators can rapidly deploy service offerings that cut across domains and coordinate across network protocol layers to ensure efficient use of critical network assets and bandwidth optimization.

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.

Figure 4. Example D-NFV wide area network
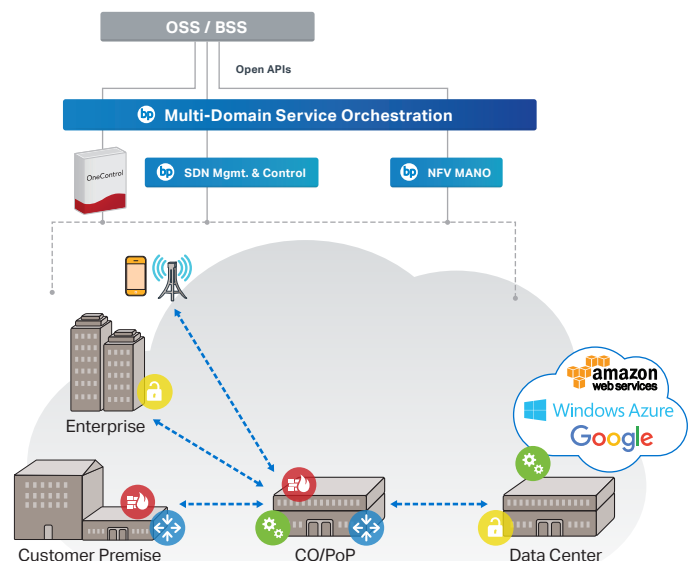
Blue Planet serves four primary use cases to meet customers' business and operational requirements:

- 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 Software (optional)

The Ciena 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.

The Ciena D-NFVI Software comprises three main components:

Ciena Base Virtualization OS includes an environment with kernel, user space, and application runtime framework as required by the VNFs to be deployed

Ciena vSwitch is a Data Plane Development Kit (DPDK)-based switch that provides service function chaining as well as Ethernet and OAM functions

Ciena NFVI Agent allows operators to configure and chain VNFs by means of a NETCONF/YANG API

Technical Information

Interfaces
2 x 100M/1GE SFP/RJ-45 ports
2 x 10/100/1000M RJ-45 ports
2 x 1G SFP ports
1 x 10/100/1000M RJ-45 management port
1 x console port (RJ-45, EIA-561)

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)
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 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

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
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
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 (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

* Denotes feature available in a future release

Ordering Information

Part Number	Description
Chassis	
170-3906-900	3906mvi, (2)1G SFP, (2)100M/1G SFP/RJ45, (2)10M/100M/1G RJ45, NFV server slot, (1) AC PS, req. power cable
170-3906-901	3906mvi, (2)1G SFP, (2)100M/1G SFP/RJ45,(2)10M/100M/1G RJ45,NFV server slot, (2) AC PS, req. power cable
Field Replaceable Server Cards	
170-0121-900	Small NFV Compute Server FRU for 3906mvi - 2 Core
170-0122-900	Medium NFV Compute Server FRU for 3906mvi - 4 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 SECURITY 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 3906mvi	
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-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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