Cisco NCS 2000 Shelf Virtualization Orchestrator

Contents

Cisco® NCS 2000 Shelf Virtualization Orchestrator(SVO) introduces programmability of optical network elements and automation with NETCONF/YANG, enabling end-to-end, software-defined automated networks that ease the turn-up, operations and maximize revenue to our customers.

Product overview

The Cisco Network Convergence System (NCS) 2000 platform is enhanced with the introduction of programmability onto the network with the inclusion of NETCONF interface and YANG models automating the network turn-up, operation, and maintenance. The NCS 2000 Shelf Virtualization Orchestrator is available with a server on a blade encasing a high-speed processor with virtualized instances of multiple Reconfigurable Optical Add/Drop Multiplexer (ROADM), Optical Line Amplifier (OLA), and Dynamic Gain Equalizer (DGE) sites of the network. An SVO line card along with the application software provides functionality-based licenses for alarm correlation, performance monitoring, connection verification, and Optical Time Domain Reflectrometry (OTDR).

Cisco NCS 2000 Shelf Virtualization Orchestrator will be supporting three modes of deployment in the optical network:

- SVO line card equipped inside the NCS 2000 chassis
- SVO application software hosted on an external server*
- SVO application software hosted on a cloud*

The Cisco NCS 2000 SVO will also be able to provide enhanced capabilities to the monitoring of network elements with the enablement of streaming telemetry in the future, driving enterprise, web, and service providers to adapt to the fast-paced bandwidth necessities of the end users with agility and automation toward cognitive intelligent transport networks.

* Future software release.

Figure 1.
Cisco NCS 2000 SVO line module

Challenge and solution

The bandwidth carried on core and metropolitan DWDM networks is growing exponentially, while operators' revenues struggle to keep pace. Internet traffic continues to grow at exponential rates, mainly due to demand for next-generation services such as quadruple play (data, voice, video, mobility, and 5G), video distribution, Internet Protocol Television (IPTV), and other high-bandwidth services. To adapt to the fast-paced bandwidth consumption, new bandwidth-catering models need to be driven by the service providers, operators, and web OTTs to support the end-user requirements. This implies that centralized control of the network along with automation capabilities with enhanced self-learning of the network are critical in the transport networks.

The Cisco NCS 2000 SVO helps to maintain and improve customers' profitability with the orchestration of network elements and their functionalities as mentioned by allowing the network elements to do only the forwarding functions, while the SVO at the node level maintains the configuration and monitoring of the same with a centralized controller.

Benefits

The Cisco NCS 2000 SVO provides benefits to in the areas of new interfacing and models by virtualizing the network elements and enhanced web applications.

Model-based Northbound Interface (NBI) leveraging on NETCONF protocol and YANG models

The NCS 2000 SVO line card along with the application software provides the latest standardized NETCONF interface toward the north bound, widely adopted for integration into the domain controllers. The new interface provides a simpler and more reliable equipment configuration, also allowing a faster and more scalable interaction between Evolved Programmable Network Manager (EPN-M) and Network Elements (NEs). Ready to be integrated in Cisco's automation solutions, NETCONF simplifies the interaction with multiple controllers and device elements with a standardized YANG model to interact in the manner a transport platform is expected to operate. Cisco NCS 2000 supports Cisco NCS 2000-specific YANG models developed in conjunction with EPN-M and will also support open ROADM YANG models in the future for wider inclusion into orchestrators/controllers to fall in the categories of controller or controllers.

Virtualization of network elements

The latest generation of computing involves virtualization, extending this to the network element by virtualizing the network functions over an SVO line module hosting multiple network elements of a network. Each network element is operating in high-availability mode of operation between the SVO line modules hosted inside the NCS 2006 or NCS 2015 chassis.

Increase network element resiliency

Complete decupling of Multi Shelf Management (MSM) and chassis management functionalities allows for the performing of an SW upgrade separately for each degree of the node, while preserving the full node visibility and management.

Web-based local craft, fully integrated with EPN-M

NCS 2000 nodal craft adopts a web-based local craft user interface for network element provisioning, configuration, and operations and provides a rich and enhanced user experience across provisioning, alarms, history, performance monitoring, and node functional views. NCS 2000 nodal craft also provides the node-level functions at the craft level over the network and allows multiple network elements to be launched over the web interface via tabs in the web browser

Streaming telemetry-ready architecture

The NCS 2000 SVO software architecture is focused on providing a seamless migration path from a classic telco Performance Monitoring (PM) collection model (15 minutes, 24 hours) toward supporting streaming telemetry having a granularity of up to few seconds.

Feature	Benefit
NETCONF/YANG	Open-source models for network automation
Virtualization of NE	Scope for scalability of the node remote management
Web interface	Faster, smooth, elegant design with look and feel similar to the Network Management System (EPN-M)
Automation	Inclusion of open interface supporting YANG models allows automation of provisioning and configuration on the fly toward the south bound
Streaming telemetry*	Allows continuous polling with smaller intervals for quick analysis of the network functions, any moment of the day

Product description

The NCS 2000 Shelf Virtualization Orchestrator (SVO) (Figure 1) is a two-slot-wide line card that provides eight high-speed Ethernet RJ 45 ports capable of 100/1000 Mbps transmission toward the external switch or associated NCS 2000 chassis. The SVO line card also features four SFP ports that can be used for 1G/10G high availability and Data Communication Network (DCN) connection with external switches depending on the usage for the operator at the operations center.

The NCS 2000 SVO supports the following 1G and 10G SFP pluggables:

- ONS-SC+-10G-SR=
- ONS-SC+-10G-LR=
- SFP-10G-SR=
- SFP-10G-LR=
- ONS-SI-GE-SX=
- ONS-SI-GE-LX=
- ONS-SE-ZE-EL=

Management

The Cisco NCS 2000 system provides comprehensive management capabilities to support operations, administration, maintenance, and provisioning (OAM&P) capabilities through the new Cisco NCS 2000 nodal craft that is launched as a web-based craft interface with support from the Cisco Evolved Programmable Network Manager (EPN-M) network management system.

Licensing

The Cisco NCS 2000 Shelf Virtualization Orchestrator is a line module, and the SVO application software is available with licensing options depending on the node size, functionalities, and features that are necessary for the network operation.

Customers can adopt the full version of the software to enable add-on functionalities on the network elements of choice with no further cost. The provision of licensing allows customers to choose from the list of functionalities per network element as listed in the ordering and licensing information section of the data sheet catering to the specific needs of the different NE type: OLA, DGE, and ROADM with add/drop functions.

Product specifications

Regulatory compliance

Table 1 lists regulatory compliance information for the Cisco NCS 2000 SVO line card. Note that all compliance documentation may not be completed at the time of product release. Please check with your Cisco sales representative for countries other than Canada, the United States, and the European Union.

Table 1. Regulatory compliance

ANSI system	ETSI system
Countries and regions supported	
Canada	European Union
United States	Africa
Korea	CSI
Japan	Australia
European Union	New Zealand
	China
	Korea
	India
	Saudi Arabia
	South America

ANSI system	ETSI system
EMC (Class A)	
ICES-003, 2004 **GR-1089-CORE Issue 4, NEBS EMC and Safety, June 2006** **FCC 47CFR15, 2007**	ETSI EN 300 386 V1.4.1 (2008-04) Telecommunication Network Equipment EMC Requirements (Note: EMC-1) CISPR22:2008 and EN55022:2006/A1:2007 Information Technology Equipment (Emissions) (EMC-2) CISPR24: 1997/A1:2001/A2:2002 and EN55024:1998/A1:2001/A2:2003: Information Technology Equipment – Immunity Characteristics – Limits and Methods of Measurement (Test Levels)
Safety	
CSA C22.2 #60950-1 – Edition 7, March 2007 **UL 60950-1 – Edition 2, March 2007** **GR-1089-CORE Issue 4, NEBS EMC and Safety, June 2006**	UL 60950-1 – Edition 2, March 2007 IEC 60950-1 Information Technology Equipment Safety Part 1: General Requirements – Edition 2, 2005 and National Differences as per CB Bulletin 112A IEC/EN 60950-1 (2006/10) with Amendment 11:2004 to EN 60950-1:2001, 1st Edition and National Differences as per CB Bulletin 112A. EN 60950-1, Edition 2 (2006) Information technology equipment – Safety – Part 1: General requirements CE Safety Directive: 2006/95/EC
Laser	
UL 60950-1 – Edition 2, March 2007 **IEC 60825-1: 2001 Ed.1.2 (incl. am1+am2) Safety of laser products Part 1: Equipment classification, requirements and users guide** **IEC60825-2 Ed.3 (2004) Safety of laser products Part 2: Safety of optical fiber communication systems + A1:2006**	IEC 60825-1: 2001 Ed.1.2 (incl. am1+am2) Safety of laser products Part 1: Equipment classification, requirements and users guide IEC60825-2 Ed.3 (2004) Safety of laser products Part 2: Safety of optical fibre communication systems + A1:2006 21CFR1040 (2008/04) (Accession Letter and CDRH Report) Automatic Laser Shutdown and restart (ALS) according to ITU-T G.664 (03/06). Guidance for Industry and FDA Staff (Laser Notice No. 50), June 2007 Laser Products: Conformance with IEC 60825-1 and IEC 60601-2-22; Guidance for Industry and FDA Staff (Laser Notice No. 50), June 2007
Environmental	
GR-63-CORE Issue 3,Network Equipment Building Standards (NEBS) Physical Protection, March 2006	ETS 300-019-2-1 V2.1.2 (Storage, Class 1.1) ETS 300-019-2-2 V2.1.2 (1999-09): Transportation, Class 2.3 ETS 300-019-2-3 V2.2.2 (2003-04):Operational, Class 3.1E
Optical	
GR-253-CORE – Issue 04 **ITU-T G.691**	ITU-T G.709 ITU-T G.975

ANSI system	ETSI system
Quality	
TR-NWT-000332, Issue 4, Method 1 calculation for 20-year Mean Time Between Failure (MTBF)	
Miscellaneous	
GR-1089-CORE Issue 4, NEBS EMC and Safety (June 2006) (Note: NEBS-1)	
GR-63-CORE Issue 3, NEBS Physical Protection (March 2006) (Note: NEBS-2)	
ATT-TP-76200: 2008	
ANSI T1.315-2001	
GR-499: 2004 Transport Systems Generic Requirements (TSGR): Common Requirements	

Other specifications

Table 2 lists system requirements for the Cisco NCS 2000 SVO line card. Table 3 provides card specifications, and Table 4 gives ordering information.

System requirements

Component	Cisco NCS 2000M6
Processor	TNC-E/TSC-E/TNC-S/TNCS-O
Shelf assembly	Cisco NCS2006, NCS2015
System software	Release 12.0 or later

Card specifications

Management	
Card LEDs	
Failure (FAIL)	Red
Active/standby (ACT/STBY)	Green/yellow
Signal fail (SF)	Yellow
Client port LEDs (per port)	
Active input signal	Green
DWDM port LEDs	
Active input signal	Green
Output wavelength	Green

Management	
Power (including pluggable)	
Typical **Maximum**	330 W 350 W
Physical	
Dimensions	Occupies 2 slot
Weight	6.8 lb (3.1 kg)
Reliability and availability	
Mean time between failures (MTBF)	272,380 hrs
Storage temperature	-40° C to 70° C (-40° F to 158° F)
Operating temperature **Normal** **Short-term**[1]	 0° C to 40° C (32° F to 104° F) -5° C to 55° C (23° F to 131° F)
Relative humidity **Normal** **Short-term**[1]	 5% to 85%, noncondensing 5% to 90% but not to exceed 0.024 kg water/kg of dry air

[1] **Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year (a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period). The values shown are valid for M6 or M2 chassis.**

Ordering and licensing information

Product ID	Description
NCS2K-SVO-K9=	Shelf Virtualization Orchestrator - LC
Chassis expansion licenses	
E-NCS2K-S-L-1CS=	NCS 2000 Expansion License, 1 Chassis, Per NE
E-NCS2K-S-L-5CS=	NCS 2000 Expansion License, 5 Chassis, Per NE
E-NCS2K-S-L-10CS=	NCS 2000 Expansion License, 10 Chassis, Per NE
E-NCS2K-S-L-20CS=	NCS 2000 Expansion License, 20 Chassis, Per NE
E-NCS2K-S-L-50CS=	NCS 2000 Expansion License, 50 Chassis, Per NE

Product ID	Description
Functionality licenses	
E-NCS2K-STEL-K9=*	SVO License, Streaming Telemetry, per NE
E-NCS2K-HA-K9=	NCS 2000 Network Element License, HA on SVO SW per NE
E-NCS2K-AC-K9=	NCS 2000 Alarm Correlation License, per NE, 3rd-Party NBI
E-NCS2K-NBI-K9=*	NCS 2000 License to Enable 3rd-Party NBI, SVO, per NE
E-NCS2K-PM-K9=	NCS 2000 Performance Monitor License, per NE, 3rd-Party NBI
E-NCS2K-CV-K9=	SW License to Enable Connection Verification on SVO, per NE
E-NCS2K-CP-K9=*	NCS 2000 Circuit Provisioning License, per NE, 3rd-Party NBI
E-NCS2K-Flex-K9=	SW License to Enable Flex Spectrum on SVO, per NE
Software package product IDs	
E-NCS2K-B1200K9=	NCS 2000 Release 12.0 NE SW, SVO Base License, One Chassis, E-del
E-NCS2K-S1200K9=	NCS 2000 Release 12.0 NE Software, Full SVO Functionalities, One Chassis, E-del
NCS2K-R-B1200K9=	NCS 2000 Release 12.0 NE SW, SVO Base License, One Chassis, USB
NCS2K-R-S1200K9=	NCS 2000 Release 12.0 NE Software, Full SVO Functionalities, One Chassis, USB

*Future software releases shall support the functionalities

Warranty

The following warranty terms apply to the Cisco NCS 2002, NCS 2006, and NCS 2015, as well as services you may use during the warranty period. Your formal warranty statement appears in the Cisco information packet that accompanies your Cisco product.

Hardware warranty duration: 5 years

Software warranty duration: 1 year

Hardware replacement, repair, or refund procedure: Cisco or our service center will use commercially reasonable efforts to ship a replacement part for delivery within 15 working days after receipt of the defective product at Cisco's site. Actual delivery times of replacement products may vary depending on customer location.

Product warranty terms and other information applicable to Cisco products are available at: https://www.cisco.com/go/warranty.

Cisco environmental sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environment Sustainability" section of Cisco's Corporate Social Responsibility (CSR) report.

Reference links to **information about key environmental sustainability topics** (mentioned in the "Environment Sustainability" section of the CSR report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE Compliance

Reference links to **product-specific environmental sustainability information** that is mentioned in relevant sections of this data sheet are provided in the following table:

Sustainability topic	Reference
General	
Eco-design compliance (EU ErP Lot, etc.)	Table AA. Product compliance
Environmental certifications (EPEAT, Energy Star, etc.)	Table BB. Product compliance or platform features/benefits
Power	
Idle, typical, or max product power	Table CC. Product specifications
Hardware-enabled energy features	Table DD. Platform features/benefits
Software-enabled energy features	Table EE. Platform features/benefits
Power supply information	Table FF. Product specifications
Power calculator	Table GG. Product specifications
Material	
Unit weight	Table HH. Product specifications
System weight (product + packaging)	Table II. Product specifications
Recycled content	Table JJ. Product specifications

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Printed in USA C78-743433-00 03/20