Cisco Data Center Network Manager 11

Contents

Cisco® Data Center Network Manager (DCNM) is the comprehensive management solution for all NX-OS network deployments spanning LAN fabrics, SAN fabrics, and IP Fabric for Media (IPFM) networking in the data center powered by Cisco. DCNM 11 provides management, control, automation, monitoring, visualization, and troubleshooting across Cisco Nexus® and Cisco Multilayer Distributed Switching (MDS) solutions.

Product Overview

DCNM 11 supports multitenant, multifabric infrastructure management for Cisco Nexus Switches. DCNM also supports storage management with the Cisco MDS 9000 family and Cisco Nexus switch storage functions.

Note: There are two types of installations: Virtual Appliance (OVA or ISO) for LAN operations and Standalone Installer (Microsoft Windows Server or Red Hat) for SAN operations. This document spans both modes of operation.

The manager provides fabric-oriented configuration and operations management. It is optimized for large deployments with little overhead, but traditional deployments are supported as well for implementations that do not require automation. Fabric deployments can be customized by the user to meet business needs.

Multitenant cloud deployments and scalable fabric management are supported through integration with popular hypervisor solutions such as VMware vSphere. Representational State Transfer (REST) APIs allow easy integration from Cisco or third-party overlay managers.

DCNM 11 provides interfaces for reoccurring management tasks such as fabric bootstrap, compliance SAN zoning, device-alias management, slow-drain analysis, SAN host-path redundancy, and port-monitoring configuration. Some highlights of Cisco DCNM 11 are given below.

Highlights for DCNM Version 11

New features
LAN Fabric with VXLAN EVPN
• Dynamic, policy-based configuration for underlay, overlay, and interfaces.
• Fabric Builder for easy underlay bring-up and deployment.
• Simplified bootstrap using Power On Auto Provisioning (POAP) integrated into the Fabric Builder function.
• Configuration compliance that constantly monitors the fabric to ensure fabric consistency.
• Context-specific topology operation views for Fabric Builder and overlay network management.
• One-click virtual Port Channel (vPC) configuration.
• Global interface configuration for Cisco Fabric Extender (FEX), vPCs, port channels, and loopback, trunk, or access ports with customizable policy templates.
• Resource manager for fabric resources, including underlay, loopbacks, vPCs, port channels, FEX, VXLAN VNI, Layer 2 and Layer 3 VLANs, and sub-interfaces.
• Per-switch configuration deployment history of underlay, overlay, and interface configurations.
• Customizable Python++ templates for the Fabric Builder function.
• Easy Return Materiel Authorization (RMA) provisioning workflow.
• Simplified workflow for switch installation and upgrades.
• Multifabric support.
• Multisite domains for VXLAN EVPN multisite deployments.
• Overlay network provisioning for leaf and borders switches, including external connectivity.
• Underlay and overlay migration for NFM-deployed LAN fabrics.
Storage networking
• DCNM SAN insights telemetry.
• Integrated device manager for SAN.
• Virtual SAN (VSAN) management new look and feel.
• Port-channel management interface update.
• Switch-based license management.
• IVR Zoning GUI.
IP Fabric for Media (IPFM) deployments
• Flow visibility and endpoint monitoring via Cisco Nexus streaming telemetry.
• Enhanced host and flow policy management.
• Workflow extension to API and AMQP notifications to support new functions.

New features
• Increase in number of managed flows, endpoints, and host/flow policies.
• Batch deployment in static API for "join" and "leave" operations.
• Support for hybrid topologies – allows connecting endpoints to spine switches.
Installation / infrastructure and monitoring
• Environmental metrics (CPU, memory, power, fan, temperature) visualization based on data collected via streaming telemetry (preview feature).
• VMware vCenter compute integration on topology view (virtual machines, vSwitch/DVS, port group, vNIC, VMNIC).
• Simplified web installer for LAN Fabric, LAN Classic, and IP Fabric for Media deployments.
• Enhanced performance monitoring with user-defined policies to trigger alarms.
• Scalable application framework using Docker-based micro-services platform.
• Self-documented "Swagger"-style built-in documentation for REST APIs, with examples.

Feature Details and Benefits

Feature	Benefits
LAN Fabric with VXLAN EVPN (software-defined networking [SDN] infrastructure)	
Fabric control and overlay visibility	• Provides fabric management for multiple types of LAN solutions, including VXLAN-EVPN, Cisco Fabric Path, and traditional 3-tier LAN deployments.
Fabric Builder with Power On Auto Provisioning (POAP) infrastructure	• Auto-detects unprovisioned switches for use in Fabric Builder. • Includes day-0 POAP for rapid policy-based bootstrapping of fabric infrastructure. • Includes Domain Host Configuration Protocol (DHCP) and file server functions along with best practices built in to the policy templates; ensures that deployments are consistent and properly configured. • Easy Return Material Authorization (RMA) function from the Fabric Builder topology.
Fabric and VXLAN compliance management	• Ensures that network is in-sync with intended deployment and notifies when out of compliance. • Corrects out-of-sync conditions but lets the user decide when to deploy corrections.
VXLAN overlay management	• Intuitive overlay management, allowing deployment of SDN networking with minimal input and maximum visibility (the user can inspect the configurations that are sent to devices). • Robust networking model using Cisco NX-OS configuration profiles. • Built-in best practices for overlay networks are included.
Global fabric interface manager for VXLAN fabrics	• Policy templates with built-in compliance checking. • Customizable "show" templates.
Top views and control	• In topology view, shows VXLAN tunnel endpoint (VTEP) status. Search allows users to visualize the extent of the VXLAN overlay in the fabric. • Shows VXLAN Network Identifier (VNI) status on a per-switch basis. • In the switch-inventory view, shows VXLAN details.
Unified topology views	• Presents topology views showing physical and overlay networks on the same page, helping IT administrators quickly identify the extent of virtual overlay networks on a programmable fabric. • Presents smart topology views showing virtual Port Channels (vPCs) and virtual device contexts for Cisco Nexus networks (topology views include VXLAN search).

Feature	Benefits
Multisite manager search, monitoring	• Provides a high-level dashboard for tracking and synchronizing data with other Data Center Network Manager deployments in remote or local data centers. • Allows searches to query across the enterprise to locate elements that match search criteria (for example, switch, virtual machine, MAC address, or segment ID).
Multifabric support	• Uses fabric as a managed object, allowing IT managers to keep resource pools for a given fabric separate while still using the same instance of the management tool.
Virtual machine and Virtual Routing and Forwarding (VRF) table search	• Shows which switches contain the tenant's virtual machine hosts or a Virtual Route Forwarding (VRF) table for a given tenant or organization, which helps users quickly identify where tenant traffic is located in a large fabric.
Per-fabric pool management	• Allows pool resources such as IP addresses and VXLAN segment IDs to be allocated on a per-fabric basis.
Role-Based Access Control (RBAC) for fabric objects	• Allows Role-Based Access Control (RBAC) within the fabric to separate administrative tasks between functional domains.
Storage networking (SAN)	
Telemetry and monitoring	• Provides SAN Telemetry function (optional, licensed feature). • Provides Port Monitoring (PMon) configuration that allows fabric-wide deployment and customization of PMon events and actions. • Historical trend data for SAN Inter-Switch Links (ISL). • Alarms and Event Forwarding via trap and email.
Storage topology and visibility	• Integrated device manager. • End-to-End Storage topology view from client to LUN. • Storage networking health color coding on topology views. • Storage Bandwidth. • Storage enclosure & VM visibility.
Zoning	• Easy-to-use web-based zoning interface to drastically reduce the cycle time for common administration tasks. Provides IVR Zoning function. • Provides a web-based device-alias configuration to ease transition to a web-based user interface for zoning and other management tasks.
Advanced analysis	• SAN host-path-redundancy feature to better organize and identify virtual and physical hosts with path-redundancy problems in the fabric. • Slow-drain analysis features to increase efficiency and reduce the time to discovery for slow-drain devices.
Storage integration	• Integration and discovery for popular storage LUN manufacturers.
IP Fabric for Media (IPFM)	
Flow control	• Flow and Host Policy Manager.
Visualization and health	• Topology and Endpoint Visibility. • End to End Flow Visualization. • Network Health Monitoring.
Provisioning and automation	• Fabric Bootstrap: Day 0 Provisioning. • API Gateway for Broadcast Controller.
Automation and REST APIs (common functions)	
REST APIs	• All northbound APIs are REST. DCNM's HTML5 GUI uses these REST APIs for all GUI functions.

Feature	Benefits
REST and JavaScript Object Notation (JSON) API	• Includes self-documented "Swagger" style built-in documentation, with examples. • Provides easy automation mechanism for automatic fabric control using custom automation solutions. • Enables integration with third-party or custom orchestration tools. • Allows deployment of DCNM 11 templates through an API for general-purpose switch updates across multiple devices in Classic mode.
Multi-orchestrator support	• Supports orchestration through REST APIs and Advanced Message Queuing Protocol (AMQP) event notification. Operation is not restricted to a single external orchestrator, so a mixed topology is possible. Operation for traditional IP solutions is available in Classic mode.
Automated discovery	• Using automated network discovery, provides up-to-date physical and logical inventory information. • Tracks inventory and performance information in real time.
Provisioning GUI, tools, and wizards	• In LAN Classic mode, DCNM provides prebuilt GUI, tools, and workflows for provisioning LAN services such as vPCs.
Customizable templates	• Includes best-practice policy templates for Easy Fabric Mode. • Includes Python support for complex policy templates. • Provides prebuilt templates for bulk-capable general purpose (Classic LAN mode) provisioning. • Provides a prebuilt template deployment scheduler and rollback mechanism. (Classic LAN mode). • Offers customizable templates with conditional statements. • Allows creation of new templates using template editor. • Allows import and conversion of configuration scripts to templates.
Configuration and change management	• Provides pre-deployment validation of configuration changes to help reduce human errors (POAP includes this feature as well) (Classic LAN mode). • Provides a general configuration archive to track changes, allowing rollback to a last-known good state (Classic LAN mode). • Provides capability to back up configuration files from all switches for Classic LAN mode operations (for example, non-VXLAN fabric mode).
Software image management	• Includes Cisco In-Service Switch Upgrade (ISSU) support. • Includes support for Graceful Insertion and Removal (GIR). • Includes installation of SMUs and RPMs for Cisco Nexus platforms.
Visibility, monitoring, and troubleshooting (common features)	
Dashboards	• Provides last-24-hours summary of events and top "talkers." • Offers custom summary view of LAN and SAN domains and topology groups. • Provides host, switch, and fabric dashboards. • Allows context-based searches from dashboards. • Provides views of configurations, events, and traffic. • Interface configuration and control on switch dashboard for "Classic" mode operations.
Topology views	• Displays topology in near-real time for data center infrastructure. • In topology views, shows link-layer and overlay status details alongside switch details to aid troubleshooting and visibility.
Topology overlays	• Provides general visibility into Layer 2 network connectivity mapped on the physical topology view. • Allows users to filter topology views by overlay. • Includes search functions for VLAN, VXLAN, VPC, and Layer 2 overlays.
Performance and capacity management	• Provides detailed visibility into real-time and historical performance statistics in the data center. • Provides insight into port and bandwidth use, error count, traffic statistics, etc. • Includes scheduled reports that can be offloaded for post-processing.

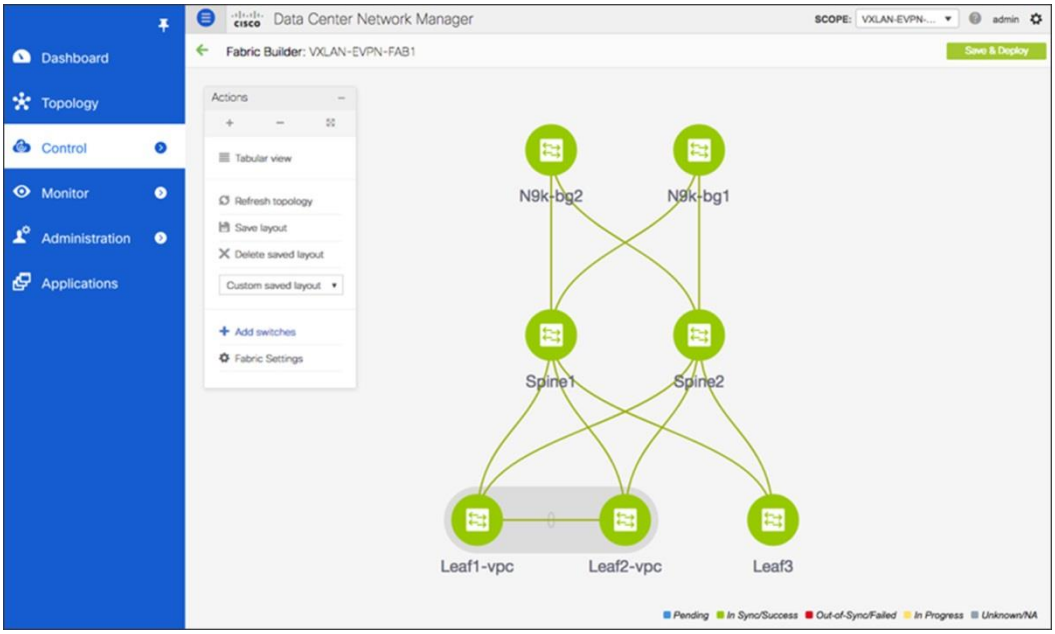
Feature	Benefits
Health check and correction	• Health algorithm to gauge switch health. • Auto-resolves for vPC inconsistencies in Classic operations. • DCNM server health MIB.
Host tracking	• Tracks the details and connectivity of servers (hosts) that are connected to NX-OS devices.
VMware visibility	• Brings the DCNM computing dashboard into the VMware vCenter for dependency mapping and inventory, performance, configuration, and event views. • Provides topology, configuration, and information for virtual machines, port groups, DVS/vSwitches, vNICs, and VMNICs correlated with the physical network topology.
Event management and alarms	• Provides real-time network-health summary with detailed views of individual network components, enabling operations staff to respond quickly to events based on event severity. • Forwards syslog alerts based on a monitored facility. • Alarms function provides stateful alarm monitoring to show if an error condition is active. You can define an alarm policy for the device, interface, or syslog conditions.
Reports	• Provides reports using predefined templates, including inventory, use, and health reports. • Provides easy-to-schedule reports that can be exported for postprocessing or sent by email. • Creates custom port groups related to tenants, applications, or organizations for performance reporting.
Operations	
Embedded database for enterprise deployments	• Does not require any external database or database administrator to manage large installations.
High availability deployment	• Supports high availability deployment for either SAN or LAN deployments.
Event handling / forwarding	• Integrates with the enterprise operations console (the Network Operations Center [NOC]) for alerts and events. • Uses email messages and traps to notify operations staff of service disruptions. • Adds context to path alerts by identifying the name of the host, Inter-Switch Link (ISL), and storage entity. • Allows creation of custom port groups based on priority and severity level of the application and implementation of rule-based event-forwarding to notify the system or user of traps and syslog messages generated for the custom port group.

Multifabric Manager / Multidomain Manager

DCNM Version 11 lets you manage multiple NX-OS fabrics. Each fabric has its own policy configurations and pool management. This makes it easy to grow your enterprise as needed without having to deploy another manager.

DCNM Version 11 includes not only VXLAN fabric functions but also "Classic" LAN management, SAN management, and IP Fabric for Media Solution management. You install the option for the kind of manager you need.

Simplified VXLAN Fabric Deployment



DCNM 11 brings an easy-to-understand and simple deployment approach to bootstrapping a new VXLAN fabric.

The system monitors the management network and auto-populates the fabric with your switch targets – no more transcribing or importing serial numbers. Cisco's best practices are built in to the VXLAN-enabled policy templates, and automatic bootstrap occurs with the click of a button.

Automatic topology configuration is based on the device's role in the fabric, such as leaf, spine, border gateway, etc. Automatic VPC-pair matching is also included to reduce deployment time. DCNM 11's Fabric Builder includes Closed-Loop Configuration Compliance (below) for reliable fabric deployments and no surprises.

Closed-Loop Configuration Compliance

DCNM 11 monitors the underlay (VXLAN tunnel endpoints; VTEP), overlay VXLAN SDN, and port configuration on your fabric.

DCNM 11 constantly monitors your VXLAN-EVPN fabric to know if there are unanticipated or uncontrolled changes. The system will identify any such changes, and let you decide when and how to remediate the issues. Remediation is straightforward and simple – all you have to do is review and deploy the synchronization corrections to restore the fabric to its intended configuration.

Active Topology Fabric Views

DCNM 11 maintains the same active topology monitoring views per fabric (or scope) from earlier versions, but now that same active topology is carried into the new Fabric Builder views. This helps you know what the network intent is, and dynamically changes as you build your fabric. Device discovery and Power On Auto Provisioning (POAP) are incorporated directly into the Fabric Builder view.

Change the Fabric on the Fly

DCNM 11 Fabric Builder collects the network configuration into a set of policy "atoms" that can be updated at any time, so updates have a minimum impact.

Simplified RMA

Large networks need to be maintained efficiently. DCNM 11 includes maintenance-mode and RMA actions right on the actual topology display – you can put a switch into maintenance mode and swap serial numbers with a replacement unit with a few clicks.

VXLAN EVPN Multisite

Now you can extend a VXLAN Network Interface (VNI) across multiple sites using DCNM. Connected fabrics appear in the topology views after DCNM configures the border-leaf connections between the fabrics.

Telemetry-Enabled Environment Monitors

DCNM 11 includes active telemetry monitors for CPU, power, memory, fan, and temperature. The telemetry function shows side-by-side switch views and allows drill-down for details. For example, you can select a switch CPU monitor to drill down to the individual processes' CPU consumption.

Programmable Interface Control

The Fabric Control feature includes a fabric-global interface control page. From this page, the operator can provision access ports, create new SVIs, view the interface history, and view interfaces using customizable "Show" templates.

REST APIs for Automation

Automation of DCNM is straightforward and simple: the DCNM web page includes a local URL to access the Swagger-style REST API documentation with some useful code examples.

Compute Visibility on Fabric Topology View

DCNM 11 integrates VMware topology onto its dynamic topology views. You simply "Discover" a VCenter that controls the host-based networking on the fabric to show how the virtual machine, host, and virtual switches are interconnected. This is a great benefit for the network operator since it gives compute visibility, which is ordinarily the purview of compute administration.

DCNM SAN Insights Brings Switch Telemetry to Life

One of DCNM 11's big new features is SAN Insights, which provides collection and visualization of the MDS 32GB devices' telemetry data. This data will be streamed out using industry standard delivery methods to DCNM, where the data will be analyzed and presented. This new feature provides insight into end-to-end flow-based metrics, custom graphing, outlier detection, ECT analysis, summary dashboard, and telemetry configuration, to name a few. This new set of features also provides health data that shows the health of your host, storage, and IT pairs across all of your fabrics. SAN Insights also include new infrastructure to help consume all of the new telemetry data available only on the new 32GB MDS switches from Cisco. Find issues quickly with SAN Insights, and leverage this data to reduce downtime and increase reliability.

Integrated Device Manager for SAN

DCNM 11 integrates Cisco's Device Manager directly within the web user interface. You simply select the tab on the switch view, and, voila, it is right there, to manage fully every detail of the switch. This feature is also available directly from the Topology page and offers seamless integration of the device within context.

VSAN Management gets a New Look

DCNM 11 also includes a newly redesigned interface to manage and maintain all of the VSANs in your physical fabrics. Many new features that allow you to visualize all of the VSANs and quickly distinguish between up and down VSANs simply by color and associated icons. Intelligence within the feature can help you determine where those VSANs currently

reside and how to extend them to all of the switches in your fabrics. Manage, maintain, and control access within your fabrics with the all new VSAN management feature of DCNM 11.

Port Channel Management Updated

DCNM 11 also includes a newly redesigned interface to manage and maintain all of the port channels within your fabrics. Build, maintain, and control access to the port channels using DCNM 11. This new interface in the web-user interface provides the features and controls needed to build out transport across your fabrics simply and easily.

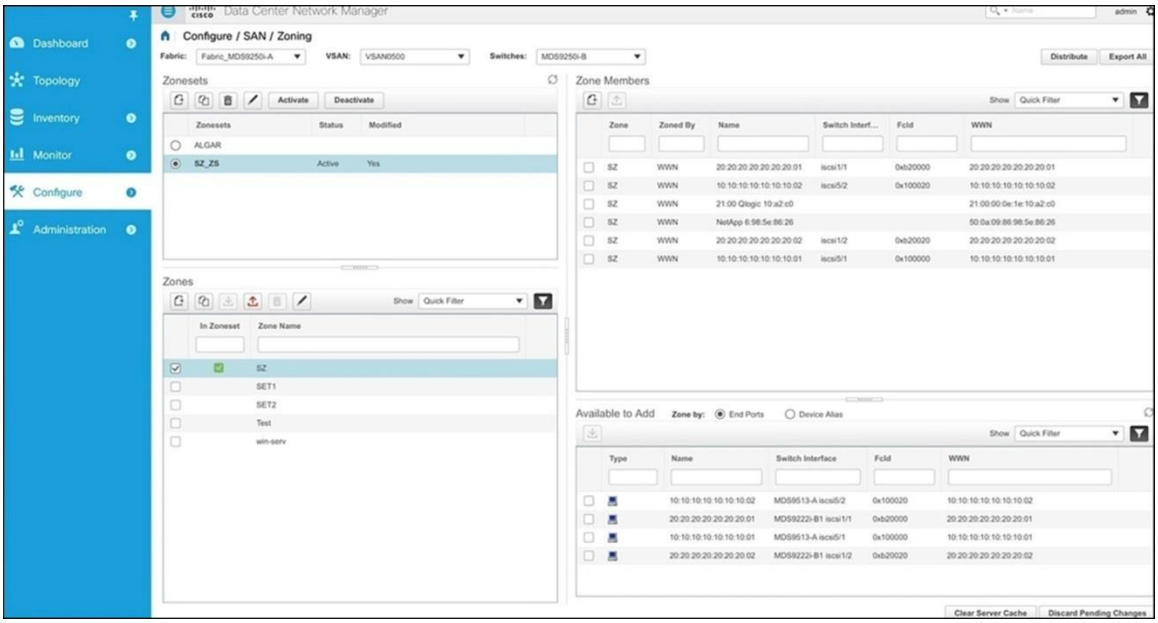
Switch-Based License Management

DCNM 11 also includes a new feature that allows customers the capability to install switch-based licenses from within DCNM. DCNM 11 will transport the license and install it on the switch in minimal time. This feature can be used on any switch for all switch-based licenses. Install the enterprise license, DCNM SAN Advanced, IOA, port activation, or the new SAN Insights license, all from within the same DCNM interface.

IVR Zoning Interface

DCNM 11 also includes a new interface in the web user interface that focuses on managing IVR zones. This is a very critical feature for customers who do site-to-site replication, and even for customers who do inter-VSAN routing within their data centers. This feature has the same look and feel as the regular Zoning interface, so transitions between the two are meant to be seamless and easy.

IVR Zoning Interface



Platform Support Information

Product family	Platforms supported
Cisco Nexus Switches	Cisco DCNM supports most current Nexus switch family product offerings. See the Compatibility Matrix and Release Notes for DCNM 11.0(1) details.
Cisco MDS Storage Switches	Cisco DCNM supports most current MDS switch family product offerings. See the Compatibility Matrix and Release Notes for DCNM 11.0(1) details.

Server Requirements

Cisco DCNM, Release 11.0(1), supports the Cisco DCNM Server on these 64-bit operating systems:

- LAN deployments (LAN Fabric, Classic LAN, and IP Fabric for Media (IPFM) deployments)
  - Open Virtual Appliance (OVA) with integrated Operating System (CentOS 7.4) installed on VMware vCenter 5.5 or later.
  - ISO Virtual Appliance (ISO) with integrated Operating System (CentOS 7.4) installed on bare-metal Cisco UCS® C-Series servers or Red Hat 7 KVM.
- SAN deployments:
  - Microsoft Windows 2012 R2.
  - Red Hat Enterprise Linux Release 7.0, 7.3 and 7.4.

Host Requirements

The table below lists the server resource requirements for deploying the Data Center Network Manager 11.

Host requirements for Cisco Data Center Network Manager 11 Deployment

Installation type	Small	Large
OVA	8 vCPUs and 24G RAM, 500G disk	16 vCPUs and 32G RAM, 2TB Disk
ISO	8 vCPUs and 24G RAM, 500G disk	16 vCPUs and 32G RAM, 2TB Disk
Windows, Linux (standalone or virtual machine)	8 vCPUs and 24G RAM, 2TB disk (if SAN Insight enabled) or 500GB (without SAN Analytics)	16 vCPUs, 32G (without SAN Insight)/64G RAM (with SAN Insight), 500GB (without SAN Insight)/10 TB Disk (with SAN Insight)

Ordering Information

To order Data Center Network Manager 11 licenses, contact your Cisco sales representative. Or access Cisco Commerce Workspace at Cisco.com.

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