Cisco NX-OS Software Release 5.1(3)N1(1) for Cisco Nexus 5000 Series Switches and 2000 Series Fabric Extenders

PB686744

Cisco® NX-OS Software is a data center-class operating system built with modularity, resiliency, and serviceability at its foundation. Based on the industry-proven Cisco MDS 9000 SAN-OS Software, Cisco NX-OS helps ensure continuous availability and sets the standard for mission-critical data center environments. The self-healing and highly modular design of Cisco NX-OS makes zero-effect operations a reality and enables exceptional operational flexibility.

Cisco NX-OS Software Release 5.1(3) N1(1) introduces the Cisco Nexus® 2248TP-E Fabric Extender. In addition, this release introduces several new software features such as Cisco FabricPath and Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) to improve the flexibility, performance, and scalability of the product line. Nexus Cisco NX-OS 5.1(3)N1(1) supports all hardware and software supported in previous Cisco NX-OS Software releases.

The combination of the Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 5000 Series Switches offers flexible connectivity options, highly cost-effective access-layer architecture for 100 Megabit Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, and mixed Gigabit Ethernet in 10 Gigabit Ethernet server<not clear>, Ethernet or unified fabric, and physical or virtual server environments.

Hardware Support

Cisco Nexus 2248TP-E Fabric Extender

The Cisco Nexus 2248TP-E is a stackable one-rack-unit (1RU) switch used in conjunction with Cisco Nexus 5000 Series Switches (Figure 1). This new product in the Cisco Nexus 2000 Series adds memory to the existing Cisco Nexus 2248TP GE Fabric Extender.

Figure 1. Cisco Nexus 2248TP-E GE Fabric Extender Front View

The Cisco Nexus 2248TP-E offers the following features:

- Compact 1RU form factor
- 32-MB buffer shared with egress ports
- Front-to-back cooling compatible with data center hot-aisle and cold-aisle designs, with all switch ports at the rear of the unit in close proximity to server ports
- Hot-pluggable capability
- Forty eight 100/1000BASE-T host ports on the rear panel, with four 10 Gigabit Ethernet Enhanced Small Form-Factor Pluggable (SFP+) uplink ports on the rear panel
- Host PortChannel and virtual PortChannel (vPC) support
- Support for up to 24 Cisco Nexus 2248TP-E Fabric Extenders per Cisco Nexus 5000 Series Switch
- Airflow from the power supply side to the port side
- Dual power supplies (1+1 redundant) in the default configuration, load sharing, and hot-swappable capability (same power supply shared across Cisco Nexus 2000 Series platforms)
- Hot-swappable fan tray with redundant fans

Software Support

Cisco NX-OS 5.1(3)N1(1) supports all the software features previously supported on the Cisco Nexus 5000 Series up through Cisco NX-OS 5.0(3). Cisco NX-OS 5.1(3)N1(1) is compatible with In-Service Software Upgrade (ISSU) with a Release 4.2 and 5.0 train, with the exception of Layer 3 features. In addition, Cisco NX-OS 5.1(3)N1(1) supports the new software features described in Table 1.

For more detailed information about features and ISSU, refer to the Cisco NX-OS 5.1(3)N1(1) release notes (see "For More Information" at the end of this document).

Table 1. New Features in Cisco NX-OS Release 5.1(3)N1(1)

Software Feature	Description
Cisco FabricPath	Cisco FabricPath is a Cisco NX-OS innovation that brings the stability and scalability of Layer 3 routing to Layer 2 switching. Cisco FabricPath offers the following benefits: • Simplified network operation with significant reduction in operating expenses (OpEx): Cisco FabricPath eliminates the need for configuration of Spanning Tree Protocol. • Efficiency and high performance: Because equal-cost multipath (ECMP) can be used in the data plane, the network can use all the links available between any two devices, thus doubling available cross-sectional bandwidth between adjacent switching layers. • Massive scalability: Cisco FabricPath needs to learn at the edge of the fabric only a subset of the MAC addresses present in the network, allowing massive scalability of the switched domain. Cisco FabricPath is supported only on the Cisco Nexus 5500 switch platform.
Cisco Adapter FEX	Cisco Adapter FEX uses an innovative server connectivity (I/O connectivity) technology that enables on-demand creation of virtual network interface cards (vNICs) or virtual host bus adapters (vHBAs) on a single NIC. Cisco Adapter FEX interfaces are local logical ports on the parent switch. With Cisco Adapter FEX, a single physical adapter is presented as multiple logical adapters to the server OS and the network as if it were multiple physical adapters. A dual-port 10 Gigabit Ethernet Cisco Adapter FEX can support hundreds of Peripheral Component Interconnect Express (PICe) standards-compliant virtual interfaces, which can be configured by the server administrator. Cisco Adapter FEX is supported only on the Cisco Nexus 5500 switch platform.

Software Feature	Description
Cisco Data Center VM-FEX	Cisco Data Center VM-FEX extends the fabric all the way to the virtual machine. Each virtual machine is associated with a vNIC on the adapter and therefore to a virtual Ethernet (vEth) port on the parent switch. This dedicated virtual interface can be managed, monitored, and spanned just like a traditional physical interface. Local switching in the hypervisor is therefore eliminated, freeing host CPU cycles. Cisco Data Center VM-FEX has two primary benefits: • Simplified infrastructure and management: Cisco Data Center VM-FEX collapses the virtual and physical access layers. Data center administrators can now provision, manage, monitor, and troubleshoot the entire infrastructure, both virtual and physical, holistically from a consolidated point. • Improved application performance: Cisco Data Center VM-FEX provides near-bare-metal I/O performance for applications for which throughput, latency, and jitter are important. Cisco Data Center VM-FEX is supported only on the Cisco Nexus 5500 switch platform.
Enhanced vPC	Beginning with Cisco NX-OS Release 5.1(3)N1(1), vPC topology can be extended to two layers within the access layer: • vPC between hosts and Cisco Nexus 2000 Series Fabric Extenders • vPC between Cisco Nexus 2000 Series Fabric Extenders and upstream Cisco Nexus 5000 Series Switches This feature provides greater flexibility in configuring vPC across single- and dual-attached servers hosts.
Cisco TrustSec® security	Cisco TrustSec security enhances the flexibility of role-based access control (RBAC) for businesses by: • Simplifying the management of security policy and access control for all users and access types: wired, wireless, and VPN • Enabling comprehensive support of all user needs through complete security lifecycle services, from guest access to posture and profiling Security group tag (SGT) and security group ACL (SGACL) support are now available on the Cisco Nexus 5500 switch platform, enabling topology-independent enforcement at the data center access layer. In addition, SGA now extends RBAC to virtual desktop environments.
Multicast VLAN Registration (MVR)	MVR-Multicast VLAN Registration allows a Layer 2 switch to deliver multicast packet received from one VLAN to multiple receivers reside in different VLANs without L3 replication. This reduces the overhead of L3 multicast replication on multicast router which in turn reduces the bandwidth consumption for the link between L2 switch and multicast router. MVR will be supported on both Nexus 5000 and 5500 series.
Control Plane Policing (CoPP)	CoPP helps to classify and police the individual traffic flows that are coming to the control-plane of the switch. CoPP ensures control-plane can gracefully handle such situations and has headroom to attend to genuine system traffic. For Nexus 5000 and 5500 series, CoPP implementation provides 3 Pre-Defined COPP policies for different deployment environments: Default, Scaled Layer 2 & Scaled Layer 3.
Fibre Channel over Ethernet (FCoE) enhancements	The following FCoE Enhancements have been added in this software release: • Boot from SAN over VPC
Encapsulated Remote Switched Port Analyzer (ERSPAN)	The Cisco Nexus 5500 switch platform already provides powerful network traffic monitoring functions through Cisco SPAN. ERSPAN introduces an additional level of flexibility to the monitoring capability, because it allows the source and destination ports of the monitored data to be in different locations on the routed or switched network. ERSPAN offers this feature by encapsulating the mirrored traffic in a Layer 3 routable generic routing encapsulation (GRE) tunnel. As extension to this feature, ERSPAN access control lists (ACLs), is supported as well.
Port Security	The Cisco Nexus 5500 and 5000 switch platform supports Port Security, which is used to restrict input to an interface by limiting and identifying MAC addresses of the end host that are allowed to access the port.
XML infrastructure enhancements	• Extensions to support Network Configuration (NetConf) Protocol • Tools to detect backward-compatibility changes
Other features	• Support for Simple Network Management Protocol (SNMP) over IPv6 management switch virtual interface (SVI) • Support for up to eight syslog servers
ER Optics	Added support for ER Optics - Cisco SFP-10G-ER (10GBASE-ER-SFP+ module (single-mode fiber))

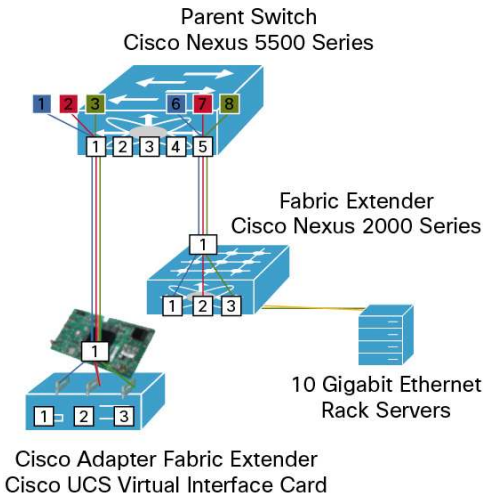
Cisco Adapter FEX and Data Center VM-FEX

Cisco NX-OS 5.1(3)N1(1) introduces Cisco Adapter FEX and VM-FEX technology, which provides exceptional scalability and flexibility for both virtualized and non-virtualized environments, enabling on-demand, cost-effective solutions for data center server connectivity. These two technologies can be used as building blocks to improve infrastructure efficiency through consolidation, simplifying networks through reduced use of adapters, cable, and network ports and consequent reduced number of network devices and decreased management overhead, thus lowering capital expenditures (CapEx) and OpEx.

Cisco Adapter FEX

Figure 2 shows a deployment of Cisco Adapter FEX with the Cisco Nexus 5000 and 2000 Series and Cisco virtual interface card (VIC).

Figure 2. Deployment of Cisco Adapter FEX with Cisco Nexus 5000 and 2000 Series and Cisco VIC



The Cisco Adapter FEX is logically an extension of the parent switch inside the server.

Each vNIC and vHBA created on the adapter automatically corresponds to a virtual Ethernet port on the parent switch to which the Cisco Adapter FEX is connected. Network properties are then assigned to each of the logical interfaces by the network administrator to help guarantee advanced quality of service (QoS) and detailed bandwidth allocation.

The Cisco Adapter FEX technology extends the current benefits of the Cisco Fabric Extender architecture to the server NICs. It provides architecture flexibility and high scalability, with 4000 logical interfaces supported by one single point of management and policy enforcement, resulting in increased business benefits.

An ecosystem of adapter vendors are now supporting this technology using the prestandard IEEE 802.1Qbr:

- Cisco UCS™ P81E VIC is designed for use with Cisco UCS C-Series Rack-Mount Servers.
- Broadcom BCM57712 CNA is designed for use with third-party Rack-Mount Servers.

Both the Cisco Nexus 5500 switch platform and the Cisco Nexus 2232PP and 2232TM 10GE Fabric Extenders support Cisco Adapter FEX technology Cisco Adapter FEX technology provides exceptional scalability and flexibility both for virtualized and nonvirtualized environments, enabling on-demand, cost-effective solutions for data center server connectivity.

Cisco Data Center VM-FEX

The Cisco Adapter Fabric Extender (A-FEX) technology can be leveraged in virtualized server environments to make the network infrastructure virtual machine aware: in this context it is referred to as Virtual Machine aware Fabric Extender (VM-FEX). This integrates with the server virtualization management tool, allowing the user to bind a Virtual Machine to a vNIC carved out of the Adapter FEX. This makes it possible to use an external hardware switch for switching the virtual machines traffic, having a single point of management and policy enforcement on the switch and enabling for virtual machine migration support with port profile consistency. It provides tools with the same level of visibility, security, and troubleshooting for virtual machines as customers are accustomed to using for physical devices.

An ecosystem of adapter vendors are now supporting this technology using the prestandard IEEE 802.1Qbr:

- Cisco UCS™ P81E VIC is designed for use with Cisco UCS C-Series Rack-Mount Servers.

The portfolio of Cisco Virtual Machine Networking products provides a variety of options that meet a range of customer needs:

- Hypervisor switching with the Cisco Nexus 1000V
- Hardware switching with VM-FEX and the Cisco Nexus 5500
- Hardware switching with VM-FEX and Cisco Unified Computing System

Across all the above solutions, Cisco Virtual Machine Networking enables:

- Policy-based virtual machine networking
- Transparent network and security policy mobility with virtual machine migration
- Non-disruptive operational model, with the network administrator managing both virtual and physical networking resources with a consistent set of tools

Enhanced vPC

Cisco NX-OS 5.1(3)N1(1) introduces Enhanced vPC to support redundant links connecting from server to N2K and between N2K and N5K. vPC allows formation of PortChannels across two Cisco Nexus 5000 Series and/or 2000 Series platforms. This capability allows formation of scalable Layer 2 topologies that do not depend on Spanning Tree Protocol for redundancy and loop avoidance and at the same time provides higher cross-sectional bandwidth by using all physical links that interconnect the devices, whether they be networking equipment, Cisco Nexus 2000 Series Fabric Extenders, or end host systems such as servers. Enhanced vPC takes this concept further and enables creation of vPC between N5K and N2K, and between servers (end nodes) and N2K at same time, which was not possible in earlier releases.

Licensing Information

Following new licenses have been added in this software releases:

Table 2. New License Packages added in Cisco NX-OS 5.0(3)N1(1)

License	Part Number	Supported Features and Platforms
Cisco Nexus 5500 VM-FEX software license	N55-VMFEXK9	Cisco VM-FEX supported on Cisco Nexus 5548 and Cisco Nexus 5596
Cisco Nexus 5548 Enhanced Layer 2 software license	N5548-EL2-SSK9	Cisco FabricPath supported on Cisco Nexus 5548
Cisco Nexus 5596 Enhanced Layer 2 software license	N5596-EL2-SSK9	Cisco FabricPath supported on Cisco Nexus 5596

Cisco Services and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing Cisco Nexus 5000 Series Switches in your data center. Cisco's innovative services are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operation efficiency and improve your data center network. Cisco Advanced Services uses an architecture-led approach to help you align your data center infrastructure with your business goals and achieve long-term value.

Cisco SMARTnet® Service helps you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. With this service, you can take advantage of the Cisco Smart Call Home service capability, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 5000 Series Switches. Spanning the entire network lifecycle, Cisco Services helps protect your investment, optimize network operations, support migration, and strengthen your IT expertise. For more information about Cisco Data Center Services, visit http://www.cisco.com/go/dcservices.

For More Information

For more information about Cisco Nexus switches, please visit http://www.cisco.com/go/nexus5000 and http://www.cisco.com/go/nexus2000.

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