Release Notes for Cisco NCS 6000 Series Routers, Release 5.0.0

The Cisco Network Convergence System (NCS) 6000 series router delivers outstanding network agility, packet optical convergence, and a system scale measured in petabits per second. It also facilitates the build-out of next-generation core to:

- support elastic capacity at the lowest total ownership cost
- deliver high-bandwidth mobile, video, and cloud services

Running the Cisco IOS XR operating system, Cisco's innovative virtualized operating environment, the Cisco NCS 6000 series router advances the concept of distributed routing and virtualization. With Cisco Virtualized IOS XR, the Cisco NCS 6000 series router brings new levels of programmability and virtualization to:

- enhance application service offerings
- increase provisioning speed
- optimize network economics

NCS 6000 Series Router Key Features [Infographic]

The Cisco NCS 6000 series router is engineered for environmental efficiency, with the use of adaptable power consumption. The Cisco NCS 6000 series router is powered by the Cisco nPower Network Processor Units (NPU). These technologies aid the Cisco NCS 6000 series router to achieve the lowest carbon footprint in service provider routing.

The Cisco NCS 6008 router, part of the Cisco NCS 6000 series routers, is the next-generation core routing system that provides industry-leading 8 Tbps of full-duplex network bandwidth through eight line cards.

The Cisco NCS 6008 router runs on Cisco IOS XR software with Linux as the underlying host operating system. A Kernel-based Virtual Machine (KVM) hypervisor provides a virtualized environment to independently run system administration and routing functions on separate virtual machines. This provision makes the new system versatile and robust, and provides immense flexibility for future expansion without the need for a complete system overhaul.

A multi-slice architecture of line cards enables the system to be configured in a mixed operating mode, simultaneously supporting traffic at 10 Gbps and 100 Gbps on slice-level granularity.

These release notes describe the features provided in the Cisco IOS XR Software Release 5.0.0 for the Cisco NCS 6000 series router and are updated as needed.

These electronic documents may contain updates and modifications. For more information on obtaining Cisco documentation, see the Obtaining Documentation and Submitting a Service Request, on page 12 section.

For a list of software caveats that apply to Cisco IOS XR Software Release 5.0.0, see the Caveats section. The caveats are updated for every release and are described at http://www.cisco.com.

Cisco IOS XR Software running on the Cisco NCS 6000 Series RouterCisco NCS 6000 series router provides the following features and benefits:

- IP features—This supports a wide range of IPv4 and IPv6 services and routing protocols such as IPv4 unicast services, IPv6 unicast services, IPv4 Multicast services, IPv4 and IPv6 equal-cost multipathing (ECMP), IPv4 and IPv6 load balancing), Cisco Discovery Protocol, IPv4 and IPv6 addressing, Internet Control Message Protocol (ICMP), IPv4 LFA FRR, HSRP, and VRRP.
- IP Multicast Features—Multicast forwarding with support for source-based and shared distribution trees and protocols such as Protocol Independent Multicast Sparse Mode (PIM-SM), Bi-directional PIM (Bidir-PIM), PIM Source Specific Multicast (PIM SSM), Automatic Route Processing (AutoRP), Internet Group Management Protocol (IGMP) versions 2 and 3, and Multicast reverse path forwarding (RPF). The Multicast nonstop forwarding (NSF) and Multicast forwarding information base (MFIB) protocols are supported.
- Layer 3 routing protocols—This supports routing protocols such as Border Gateway Protocol Version 4 (BGPv4), Open Shortest Path First Version 2 (OSPFv2) and Version 3 (OSPFv3), Intermediate System-to-Intermediate System (IS-IS) Protocol, NSF using graceful restart for IS-IS, OSPF, and BGP.
- Forwarding features—This supports routing protocols such as Access control lists (ACLs), Qos and class of service (CoS) using modular QoS command-line interface (CLI; MQC), IP packet classification and marking, Queuing (ingress and egress), Policing (ingress and egress), Diagnostic and network management support, Link Bundles, Bi-Direction Forwarding detection (BFD), LACP, and Ethernet OAM Link Monitoring (IEEE 802.3ah).
- Multiprotocol Label Switching (MPLS) Features—Supports MPLS features such as MPLS Label Distribution Protocol (LDP), Resource Reservation Protocol (RSVP), Diffserv Aware Traffic Engineering (TE), MPLS Traffic Engineering control plane (RFCs 2702 and 2430), MPLS forwarding, MPLS load balancing, NSF for RSVP and LDP, and MPLS FRR.
- Security—Features such as Message Digest Algorithm (MD5), Control packet policing, Dynamic control plane protection, and GTSM RFC 3682 (formerly BTSH) are supported.
- Accounting—This supports features such as IP and MPLS Accounting, Interface Counters and Statistics, and Sampled Netflow (IPv4, IPv6, and MPLS).
- Control packet policing
- Dynamic control plane protection
- GTSM RFC 3682 (formerly BTSH)
- Network Management—This supports features like

  Enhanced CLI, XML interface, Simple Network Management Protocol (SNMP) and MIB support - (SNMPv1,SNMPv2c,SNMPv3), and Cisco Prime Network
- System redundancy—Features such as Power redundancy 1:1 or 1:N, Fan tray redundancy 1:1, Route processor redundancy 1:1, Virtual machine redundancy, Line-card online insertion and removal (OIR) support, Fabric card OIR support, Out of resource management, and IOS XR redundancy.

What's New in Release 5.0.0

Software Features

Routing and System Administration by Virtual Machines—On the Cisco NCS 6008 system, the routing functions and the system administration functions are run on separate virtual machines (VMs) over a Linux host operating system. The VM simulates a physical computing environment over common hardware. Available hardware resources like processor, memory, hard disk, and so on, are virtualized and allocated to individual virtual machines by the hypervisor.

Hardware Features

- Cisco NCS 6008 Router
  - The Cisco NCS 6008 Router 8-Slot Line Card Chassis (LCC) is a fully distributed system. All packet-forwarding decisions and actions take place on the individual line cards to provide high-speed, flexible forwarding. The control plane is independently managed by the route processors, which communicate with other network elements, then send the feature and forwarding instructions to the line cards.
  - The Cisco NCS 6008 router provides an operationally efficient infrastructure. All common components, route processors, switching fabric, fans, and power supplies are fully redundant. In addition, the platform uses power on an as-needed basis, depending on system requirements. Power has been modularized to reduce capital expenditures (CapEx) and provide operationally efficient deployment. For environment efficiency, each line card's power consumption is adapted to the number of ports used.
  - Integrated technology includes IP and Multiprotocol Label Switching (MPLS) routing, fabric multicast replication, fabric quality of service (QoS), Cisco NetFlow Accounting, and a services implementation infrastructure to provide an outstanding quality of experience (QoE) at the lowest possible total cost of ownership (TCO).

- Cisco NCS 6000 Series 10-Port 100 Gbps Line cards

  The Cisco NCS 6000 series router delivers the highest throughput, while allowing for natural evolution of existing network architectures and for tighter integration between the routing and optical transport

networks. To help achieve these performance objectives, Cisco NCS 6000 series router line cards can be deployed in the following ways, based on the capabilities required:

- Multiservice (MS): Supports core and peering applications requiring high-scale IPv4/IPv6/MPLS forwarding and queuing capabilities.
- Label switch routing (LSR): Supports MPLS switching applications with limited IPv4/IPv6 capabilities.

Cisco NCS 6008 router supports the following line cards:

- 10-port 100-Gbps Multiservice Line Card with CXP optics
- 10-port 100-Gbps Multiservice Line Card with Cisco AnyPort technology and Cisco CPAK optics
- 10-port 100-Gbps Lean Core Line Card with CXP optics
- 10-port 100-Gbps Lean Core Line Card with Cisco AnyPort technology and Cisco CPAK optics

The Cisco NCS 6000 Series 10-port 100-Gbps Line Cards offer significant advantages:

- Throughput of 1 Tbps with full IPv4, IPv6, and MPLS forwarding capabilities, optimized for high-throughput LSR, Internet peering, and core applications.
- Advanced Cisco nPower Layer 3 forwarding NPU with wire-rate lookup, forwarding, and QoS performance for IP and MPLS flows.
- Built-in hardware acceleration for critical network control traffic.
- Support across all Cisco NCS 6000 Series single-chassis and multi-chassis configurations.
- Support for the Cisco AnyPort technology allowing short-reach solutions to mix and match 10 GigabitEthernet and 100 GigabitEthernet interfaces.
- Efficient environmental design by adapting the power consumption to active Cisco nPower resources.
- Independently programmable and upgradable NPUs with fault protection and isolation.
- Enhanced onboard multi-core CPU for accelerated and scalable software processing.

Related Documentation

The most current Cisco NCS 6000 Series Router software documentation is located at this URL:

http://www.cisco.com/en/US/products/ps13132/tsd_products_support_series_home.html

Caveats

Caveats describe unexpected behavior in Cisco IOS XR Software releases. Severity-1 caveats are the most serious caveats; severity-2 caveats are less serious.

Release 5.0.0

Bug ID	Severity	Headline
CSCui67903	2	PON exits with PGM_SIZE_EXCEPTION.
CSCui67287	2	BGP NSR sessions not synchronized.
CSCuj10061	2	OSPFv3 neighbors does not come up when IPSec authentication is used.
CSCuj21258	2	User-initiated dumpcore running can take more than 20 minutes to execute.
CSCui02391	3	CPAK Intermittent PCS Lane Bit Errors during power-cycle.
CSCuj05333	3	Insertion of optics takes more than 80 seconds to populate in inventory.
CSCui91589	6	Adding new card shows in "POWERED-OFF" state in **show platform** command output.

How to use the Bug Toolkit

Known problems (bugs) are graded according to severity level. These release notes contain descriptions of the following:

- All severity level 1 or 2 bugs
- Significant severity level 3 bugs
- All customer-found bugs

Before you begin

You can search for problems by using the Cisco Software Bug Toolkit. To access the Toolkit, you need these items:

- Internet connection
- Web browser
- Cisco.com user ID and password

Procedure

Step 1 Go to http://tools.cisco.com/Support/BugToolKit/action.do?hdnAction=searchBugs.

Step 2 Sign in with your Cisco.com user ID and password.

Step 3 Enter the ID number in the **Search for Bug ID** field, and click **Go** to look for information about a specific problem.

What to Do Next

For more information about how to search for bugs, create saved searches, and create bug groups, click **Help** on the Bug Toolkit page.

Release 5.0.0 PIEs

This table lists the Cisco IOS XR Software feature set matrix (PIEs) and associated filenames available for the Cisco IOS XR Software Release 5.0.0 supported on the Cisco NCS 6008 router.

Table 1: Cisco IOS XR Software Release 5.0.0 PIEs

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	ncs6k-mini-x.iso-5.0.0	Contains the required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, FPD, and Alarm Correlation.
Optional Individual Packages (Packages are installed individually)		
Cisco IOS XR Manageability Package	ncs6k-mgbl.pkg-5.0.0	Extensible Markup Language (XML) Parser and HTTP server packages.
Cisco IOS XR MPLS Package	ncs6k-mpls.pkg-5.0.0	MPLS Traffic Engineering (MPLS-TE), Label Distribution Protocol (LDP), MPLS Forwarding, MPLS Operations, Administration, and Maintenance (OAM), Link Manager Protocol (LMP), Optical User Network Interface (OUNI), Resource Reservation Protocol (RSVP), and Layer-3 VPN.

Cisco IOS XR Multicast Package	ncs6k-mcast.pkg-5.0.0	Multicast Routing Protocols (PIM, Multicast Source Discovery Protocol [MSDP], Internet Group Management Protocol [IGMP], Auto-RP), Tools (SAP, MTrace), and Infrastructure [(Multicast Routing Information Base [MRIB], Multicast-Unicast RIB [MURIB], Multicast forwarding [MFWD]), and Bidirectional Protocol Independent Multicast (BIDIR-PIM).
Cisco IOS XR Security Package	ncs6k-k9sec.pkg-5.0.0	Support for Encryption, Decryption, IP Security (IPSec), Secure Shell (SSH), Secure Socket Layer (SSL), and Public-key infrastructure (PKI) (Software based IPSec support—maximum of 500 tunnels)
Cisco IOS XR Documentation Package	ncs6k-doc.pkg-5.0.0	.man pages for Cisco IOS XR Software.

This table lists the TAR files.

Table 2: Cisco IOS XR Software Release 5.0.0 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	ncs6K-iosxr-5.0.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS MPLS Package • Cisco IOS XR Multicast Package

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software 3DES	ncs6K-iosxr-k9-5.0.0.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS XR MPLS Package • Cisco IOS XR Multicast Package • Cisco IOS XR Security Package

The show version Command

To determine the version of Cisco IOS XR Software running on your router, log in to the router and enter the **show version** command:

Procedure

Step 1 Establish a Telnet session with the router.

Step 2 Enter **show version** command from EXEC mode.

```
RP/0/RP0/CPU0:router show version
Cisco IOS XR Software, Version 5.0.0
Copyright (c) 2013 by Cisco Systems, Inc.

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.
```

System Requirements

Memory Requirements

Caution If you remove the media in which the software image or configuration is stored, the router may become unstable and fail.

The minimum memory requirements for a Cisco NCS 6008 router running Cisco IOS XR Software Release 5.0.0 consist of the following:

- 48 GB memory on the NCS 6008 Route Processors (NCS6-RP)
- 16-GB memory on line cards

Supported Hardware

The following tables lists the supported hardware components on the Cisco NCS 6000 Series RouterCisco NCS 6008 router and the minimum required software versions. For more information, see the Firmware Support section.

Table 3: Cisco NCS 6008 Router Hardware and Software Compatibility Matrix

Component	Part Number	Support from Version
NCS 6008 - 8-Slot Chassis	NCS-6008	Release 5.0.0
NCS 6008 Fabric Card	NC6-FC	Release 5.0.0
NCS 6008 Route Processor	NC6-RP	Release 5.0.0
NCS 6008 Chassis Fan Tray	NC6-FANTRAY	Release 5.0.0
NCS AC Power Tray	NCS-AC-PWRTRAY	Release 5.0.0
NCS DC Power Tray	NCS-DC-PWRTRAY	Release 5.0.0
NCS PDU Bracket	NCS-PDU-BRKT	Release 5.0.0
NCS 6008 3-to-1 Phase DELTA PDU	NCS-PDU-DELTA	Release 5.0.0
NCS 6008 3-to-1 Phase WYE PDU	NCS-PDU-WYE	Release 5.0.0
NCS 100x10GE Patch Panel Short Reach	NCS-PP-100X10-SR	Release 5.0.0
NCS 6000 10x100G Multi-Service CPAK	NC6-10X100G-M-K	Release 5.0.0
NCS 6000 10x100G Multi-Service CXP	NC6-10X100G-M-P	Release 5.0.0
NCS 6000 10x100G LSR CPAK	NC6-10X100G-L-K	Release 5.0.0
NCS 6000 10x100G LSR CXP	NC6-10X100G-L-P	Release 5.0.0
NCS Craft Panel Display Kit	NCS-CRFT	Release 5.0.0

Component	Part Number	Support from Version
NCS 6008 Chassis Front Doors	NC6-DOOR-F	Release 5.0.0
NCS 6008 Chassis Rear Doors	NC6-DOOR-R	Release 5.0.0
NCS 6008 Chassis Drill Template	NC6-DRILLTEMP	Release 5.0.0
NCS 6008 Chassis Front-Bottom Grille	NC6-GRILLE-FB	Release 5.0.0
NCS 6008 Chassis Front-Top Grille	NC6-GRILLE-FT	Release 5.0.0
NCS 6008 Chassis Rear Grille	NC6-GRILLE-R	Release 5.0.0
NCS 6008 Power Control Module	NC6-PCM	Release 5.0.0
NCS 6008 Chassis Trough	NC6-TROUGH	Release 5.0.0
NCS 6008 Chassis Trough Wide	NC6-TROUGH-W	Release 5.0.0
NCS 6008 & NCS Fabric Chassis Lift Dolly	NCS-LIFT	Release 5.0.0
CPAK-100G-LR4 Transceiver module, 10 km SMF	CPAK-100G-LR4	Release 5.0.0
CXP-100G-SR10 transceiver Module	CXP-100G-SR10	Release 5.0.0

Firmware Support

To check the firmware code running on the Cisco NCS 6008 router, Release 5.0.0, run the **show hw-module fpd** command in admin mode.

```
RP/0/RP0/CPU0:router(admin)#show hw-module fpd

                                                                          FPD Versions
                                                                         ================
Location      Card type     HWver   FPD device       Status    Running Download
-------------------------------------------------------------------------------

0/3           NC6-10X100G-M 0.4     CCC FPGA         READY       1.14    1.14
0/3           NC6-10X100G-M 0.4     BAO-MB FPGA      READY       1.00    1.00
0/3           NC6-10X100G-M 0.4     CCC Power-On     READY       1.30    1.30
0/3           NC6-10X100G-M 0.4     Ethernet Switch  READY       1.32    1.32
0/3           NC6-10X100G-M 0.4     BIOS FPD         READY       9.10    9.10
0/3           NC6-10X100G-M 1.0     Slice-0 GN2411   READY       2.07    2.07
0/3           NC6-10X100G-M 1.0     Slice-1 GN2411   READY       2.07    2.07
0/3           NC6-10X100G-M 0.4     BAO-DB FPGA      READY       1.00    1.00
0/3           NC6-10X100G-M 1.0     S2 GN2411        READY       2.07    2.07
0/3           NC6-10X100G-M 1.0     S3 GN2411        READY       2.07    2.07
0/3           NC6-10X100G-M 1.0     S4 GN2411        READY       2.07    2.07
0/3           NC6-10X100G-M 1.0     Slice-2 GN2411   READY       2.07    2.07
```

```
0/3          NC6-10X100G-M 1.0     Slice-3 GN2411   READY       2.07    2.07
0/3          NC6-10X100G-M 1.0     Slice-4 GN2411   READY       2.07    2.07
0/RP0        NC6-RP        0.3     CCC FPGA         READY       1.00    1.00
0/RP0        NC6-RP        0.3     CCC Power-On     READY       1.31    1.31
0/RP0        NC6-RP        0.3     Ethernet Switch  READY       1.32    1.32
0/RP0        NC6-RP        0.3     CPU Complex FPD  READY       3.06    3.06
0/RP0        NC6-RP        0.3     BIOS FPD         READY       9.10    9.10
0/FC0        NC6-FC        0.2     CCC FPGA         READY       1.14    1.14
0/FC0        NC6-FC        0.2     CCC Power-On     READY       1.31    1.31
0/FT0        NC6-FANTRAY   0.4     Fantray FPGA     READY   2.01    2.01
0/FT1        NC6-FANTRAY   0.4     Fantray FPGA     READY   2.01    2.01
0/PT0        PWR-3KW-AC-V2 1.0     PM0-DT-PriMCU    READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM0-DT-Sec54vMCU READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM0-DT-Sec5vMCU  READY   6.03    6.03
0/PT0        PWR-3KW-AC-V2 1.0     PM1-DT-PriMCU    READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM1-DT-Sec54vMCU READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM1-DT-Sec5vMCU  READY   6.03    6.03
0/PT0        PWR-3KW-AC-V2 1.0     PM2-DT-PriMCU    READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM2-DT-Sec54vMCU READY   6.01    6.01
0/PT0        PWR-3KW-AC-V2 1.0     PM2-DT-Sec5vMCU  READY   6.03    6.03
0/PT1        PWR-3KW-AC-V2 1.0     PM0-DT-PriMCU    READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM0-DT-Sec54vMCU READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM0-DT-Sec5vMCU  READY   6.03    6.03
0/PT1        PWR-3KW-AC-V2 1.0     PM1-DT-PriMCU    READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM1-DT-Sec54vMCU READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM1-DT-Sec5vMCU  READY   6.03    6.03
0/PT1        PWR-3KW-AC-V2 1.0     PM2-DT-PriMCU    READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM2-DT-Sec54vMCU READY   6.01    6.01
0/PT1        PWR-3KW-AC-V2 1.0     PM2-DT-Sec5vMCU  READY   6.03    6.03
```

Minimum Firmware Requirement

The following table provides the procedures and resources for minimum firmware requirements:

After completing an RMA, upgrade the firmware as per the matrix in this link, which also links to PDF copies of the IOS XR Firmware Upgrade Guides	http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html
For the upgrade procedure, see the *Performing System Upgrade and Installing Feature Packages* chapter of the *Cisco NCS 6008 System Setup and Software Installation Guide*	http://www.cisco.com/en/US/products/ps13132/tsd_products_support_series_home.html

Important Notes

- **Default timestamp setting—**The timestamp prompt that precedes console output is enabled by default. To disable the timestamp prompt, use the **no service timestamp** command. For more information, refer to the .

- **Country-specific laws, regulations, and licenses—**In certain countries, use of these products may be prohibited and subject to laws, regulations, or licenses, including requirements applicable to the use of

the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries in which they intend to use the products.

- **Field replacable unit (FRU) removal—**For all card removal and replacement (including fabric cards, line cards, fan controller, and RP) follow the instructions provided by Cisco to avoid impact to traffic. See the for procedures.
- **Exceeding Cisco testing—**If you intend to test beyond the combined maximum configuration tested and published by Cisco, contact your Cisco Technical Support representative to discuss how to engineer a large-scale configuration maximum for your purpose.

MIBs Reference

These MIBs are not supported in Cisco IOS XR Release 5.0.0:

BRIDGE-MIB	CISCO-IETF-VPLS-GENERIC-MIB	CISCO-SONET-MIB
CISCO-DS3 -MIB	CISCO-IETF-VPLS-LDP-MIB	DS3-MIB
CISCO-ENHANCED-IMAGE-MIB	CISCO-IP-CBR-METRICS-MIB	FRAME-RELAY-DTE-MIB
CISCO-FLASH-MIB	CISCO-IP-STAT-MIB	IANA-MAU-MIB
CISCO-FRAME-RELAY-MIB	CISCO-OAM-MIB	IEEE8021-CFM-MIB
CISCO-IETF-PW-ENET-MIB	CISCO-OTN-IF-MIB	LLDP-MIB
CISCO-IETF-PW-MIB	CISCO-P2P-IF-MIB	MFR MIB
CISCO-IETF-PW-MPLS-MIB	CISCO-RTTMON-MIB	mgmtrap
CISCO-IETF-PW-TC-MIB	CISCO-SESS-BORDER-CTRLR-CALL-STATS-MIB	SONET-MIB
CISCO-IETF-VPLS-BGP-EXT-MIB	CISCO-SESS-BORDER-CTRLR-EVENT-MIB	VPN-TC-STD-MIB

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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