Release Notes for Cisco NCS 6000 Series Routers, Release 5.2.1

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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

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 single chassis with eight line cards per chassis.

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.

This release notes describe the features provided in the Cisco IOS XR Software Release 5.2.1 for the Cisco NCS 6000 series router and are updated as needed.

This 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 23 section.

For a list of software caveats that apply to Cisco IOS XR Software Release 5.2.1 see the Caveats section.

Cisco IOS XR Software running on the Cisco 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), PIM Source Specific Multicast (PIM SSM), Automatic Rendezvous Point (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 is New in Release 5.2.1

Software Features

- Multi-chassis configuration—Multiple Network Convergence System (NCS) 6008 single chassis can be connected using NCS 6000 fabric card chassis to form a multi-chassis system. This provides high scale of interfaces with single admin and control plane.

  In Release 5.2.1 Multi-chassis system supports up to 2 LCCs interconnected with up to 2 FCCs.

- OSPFv3 Graceful Restart—The OSPFv3 Graceful Restart preserves the data plane capability during route processor fail-over and planned and unplanned OSPFv3 restart.

- OSPFv2 Autoroute Exclude—The OSPFv2 Autoroute Exclude allows specific destinations and prefixes to route off TE tunnels, while other prefixes can still be forced to use TE tunnels.

- OSPFv2 Unequal Cost Load Balancing—Unequal Cost Load Balancing enables Unequal Cost Multipath (UCMP) calculation based on configured prefix-list and based on variance factor.

- BGP3107—BGP3107 allows customers to achieve higher level of convergence.

- BGP VRF Dynamic Route Leaking—To provide connectivity between a global and a VPN host, the Border Gateway Protocol (BGP) dynamic route leaking feature provides the ability to import routes between the default-vrf (Global VRF) and any other non-default VRF.

- VRF Import Policy Enhancement—The VRF RPL based import policy feature provides the ability to perform import operation based solely on import route-policy, by matching on route-targets (RTs) and other criteria specified within the policy.

- BGP DMZ Link Bandwidth for Unequal Cost Recursive Load Balancing—Border Gateway Protocol demilitarized zone (BGP DMZ) Link Bandwidth for Unequal Cost Recursive Load Balancing provides support for unequal cost load balancing for recursive prefixes on local node using BGP DMZ Link Bandwidth.

- BGP Nonstop Routing—The Border Gateway Protocol (BGP) Nonstop Routing (NSR) with Stateful Switchover (SSO) feature enables all bgp peerings to maintain the BGP state and ensure continuous packet forwarding during events that could interrupt service. Under NSR, events that might potentially interrupt service are not visible to peer routers. Protocol sessions are not interrupted and routing states are maintained across process restarts and switchovers.

- BGP Default Limits—BGP imposes maximum limits on the number of neighbors that can be configured on the router and on the maximum number of prefixes that are accepted from a peer for a given address family. This limitation safeguards the router from resource depletion caused by misconfiguration, either locally or on the remote neighbor.

- BGP Attribute Filtering—The BGP Attribute Filter feature checks integrity of BGP updates in BGP update messages and optimizes reaction when detecting invalid attributes.

- Link Layer Discovery Protocol (LLDP)—LLDP is a neighbor discovery protocol that is used by network devices to advertise information about themselves to other devices on the network. This protocol runs

over the Data Link Layer, which permits two systems, running different network layer protocols, to learn about each other. To support non-Cisco devices, and to allow for interoperability between other devices, the Cisco NCS 6000 Series Router supports the IEEE 802.1AB LLDP.

- VPN features are supported.
- Excessive ARP Punt Protection—The Excessive ARP Punt Protection feature attempts to identify and mitigate control packet traffic from remote devices that send more than their allocated share of ARP control packet traffic.
- ACL-based Forwarding—ACL-based forwarding feature enables you to choose services from multiple providers for broadcast TV over IP, IP telephony, data, and so on; this provides a cafeteria-like access to the Internet. Service providers can divert user traffic to various content providers.
- MPLS Traffic-engineering Point-to-multipoint support—MPLS TE P2MP supports up to mid-point configuration.
- MPLS OAM 3107 support—Supports MPLS P2MP Ping and Traceroute features and provide a means to check connectivity, isolate failure point, thus providing the MPLS Operations, Administration, and Maintenance (OAM) solution.
- PBTS support—Policy-Based Tunnel Selection (PBTS) provides a mechanism to direct traffic into specific traffic-engineering tunnels based on different criteria.
- LDP NSR support—LDP nonstop routing (NSR) functionality makes failures, such as Route Processor (RP) or Distributed Route Processor (DRP) failover, invisible to routing peers with minimal or zero disruption of convergence performance.
- IPv6 Multicast—Enabled support for IPv6 on Multicast.
- Equal Cost Multipath PIM Redirect—Enabled support for Equal Cost Multipath.
- Craft Panel Interface—The Craft Panel interface is an easily-accessible and user-friendly interface which assists the field operator in troubleshooting the router. It consists of a LCD display and three LEDs. The LEDs indicate minor, major and critical alarms.
- Lawful Intercepting—The Lawful Intercept feature allows law enforcement agencies to conduct electronic surveillance of circuit and packet-mode communications, authorized by judicial or administrative order.

Feature Compatibility with Multi-Chassis System

This tables mentions feature compatibility with multi-chassis system:

Feature	Supported in Single Chassis	Supported in Multi-chassis
BGP3107	Yes	Yes
Link Layer Discovery Protocol	Yes	Yes
Layer-3 Virtual Private Networks	Yes	Yes
Virtual Private Wire Service or Ethernet over MPLS	Yes	Yes

Feature	Supported in Single Chassis	Supported in Multi-chassis
Connectivity Fault Management for Layer 2 interfaces	Yes	Yes
Per Interface ARP Protection	Yes	Yes
ACL-based Forwarding	Yes	Yes
MPLS Traffic-engineering Point-to-multipoint support	Yes	Yes
Policy-Based Tunnel Selection	Yes	Yes
QoS Policy Propagation Using Border Gateway Protocol	Yes	No
IPv6 Multicast	Yes	Yes
Craft Panel Interface	Yes	Yes
Lawful Intercepting	Yes	No

Hardware Features

The Cisco IOS XR Software Release 5.2.1 introduces the following hardware support:

- Multi-chassis support—Introduces the Cisco NCS 6000 Fabric Card Chassis (FCC). The Cisco NCS 6000 FCC is part of the Cisco NCS 6000 Multi-Chassis system that includes the Cisco NCS 6008 8-slot line card chassis (LCC). The system can expand from a single chassis to various multi-chassis configurations for increased routing capacity, and is capable of supporting up to 16 LCC interconnected to 4 FCCs. However, in Release 5.2.1 Multi-Chassis system supports up to 2 LCCs interconnected with up to 2 FCCs.
- Fabric cards for multi-chassis configurations:
  - NC6-FC-MC, NC6-FC-MC=(LCC only)—S13 fabric card for the LCC. Each S13 fabric card has 16 CXP ports for 100GE SR optics. Optics are sold separately (NCS-FAB-OPT).
  - NCS-F-FC, NCS-F-FC=(FCC only)—S2 fabric card for the FCC. Each S2 FC has 32 CXP ports for 100GE SR12 CXPs. Optics are sold separately (NCS-FAB-OPT)
- Shelf controller cards for multi-chassis configurations:
  - NCS-F-SC, NCS-F-SC=(spare)—FCC shelf controllers that control the multi-chassis system and interconnects the data plane between the RPs in the LCCs and shelf controllers in the FCCs.
  - NCS-F-SCSW, NCS-F-SCSW=(spare)—Combination FCC shelf controller and switch (SC-SW) card. Two SC-SW cards are required for a multi-chassis configuration. Each NCS-F-SC-SW card has 56 x 10GE SFP slots that connects the data plane to the RPs and shelf controller (SC) cards in the LCC. Two SC-SW cards interconnect to each other through their 40GE QSFP optical ports.
- Supported Optics:

- SFP-10G-SR—Short reach SFP 10GE transceiver module.
- SFP-10G-LR—Long reach SFP 10GE transceiver module.
- QSFP-40G-SR4—Short reach QSFP 40GE optical module (SC-SW card only).
- QSFP-40G-LR4—Long reach 40GE QSFP optical module (SC-SW card only).
- NCS-FAB-OPT—Optical module set that includes 96 CXP-100G-SR12 modules for multi-chassis configurations. Two optical modules sets are required for each LCC, one set plugs into the S13 FCs on the LCC, one set plugs into the S2 FC cards in the FCC, and one set plugs into the MC S13 FC cards in the LC.

- Supported PAY G cards are:
  - NC6-2-10x100G-M-K—2X100GE MS PAYG Card with CPAK
  - NC6-2-10x100G-L-K—2X100GE LSR PAYG Card with CPAK
  - NC6-30x10G-M-S—30x10GE MS PAYG Card with SFPP
  - NC6-30x10G-L-S—30x10GE LSR PAYG Card with SFPP

Related Documentation

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

http://www.cisco.com/c/en/us/support/routers/network-convergence-system-6000-series-router/tsd-products-support-series-home.html

The document containing Cisco IOS XR System Error Messages (SEM) is located at this URL:

https://www.cisco.com/c/en/us/td/docs/ios_xr_sw/error/message/ios-xr-sem-guide.html

Production Software Maintenance Updates (SMUs)

A production SMU is a SMU that is formally requested, developed, tested, and released. Production SMUs are intended for use in a live network environment and are formally supported by the Cisco TAC and the relevant development teams. Software bugs identified through software recommendations or Bug Search Tools are not a basis for production SMU requests.

For information on production SMU types, refer the Production SMU Types section of the *IOS XR Software Maintenance Updates (SMUs)* guide.

Caveats

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

Release 5.2.1

Bug ID	Severity	Headline
CSCuo82331	2	show inventory raw' shows special characters

Bug ID	Severity	Headline
CSCup55733	2	ISIS sessions flap after proc restart with NSR and NSF configured
CSCuq33664	2	On RP-FO Gennums get reset causing some links to stay DN after RP-FO
CSCup86121	6	copy to usb drive does not work
CSCul33665	2	NGN: lpts policer configuration for a slot is removed on LC OIR in that slot.

Cisco Bug Search Tool

Bug Search Tool (BST), the online successor to Bug Toolkit, is designed to improve the effectiveness in network risk management and device troubleshooting. The tool allows partners and customers to search for software bugs based on product, release, and keyword, and aggregates key data such as bug details, product, and version. The tool has provision to filter bugs based on credentials to provide external and internal bug views for the search input.

Use the BST to view the list of outstanding and resolved bugs in a release.

The BST is available at Bug Search. To search for a specific bug, go to https://tools.cisco.com/bugsearch/bug/*bugid*. For more information on BST, see Bug Search Help.

Search Bugs in BST

Follow these instructions to search for bugs that are specific to Cisco IOS XR software release 5.2.1 in BST.

Procedure

Step 1 Go to https://tools.cisco.com/bugsearch/.

Log in to the tool using your Cisco.com user name and password. After successful login, the Bug Search Tool page opens.

Step 2 To search for release 5.2.1 bugs, enter the following parameters in the page:

- Product—Select **Series**, enter **Cisco NCS 6008 - 8-Slot Chassis** in the text box. You can alternately navigate to the product name from the **Select from list** link.
- Releases—Enter 5.2.1.
- Show Bugs—Select **Affecting or Fixed in these Releases**.

Step 3 Press **Enter**.

Note
- By default, the search results include bugs with all severity levels and statuses, and bugs that were modified during the life cycle of the bug. After you perform a search, you can filter your search results to meet your search requirements.
- An initial set of 25 search results is shown in the bottom pane. Drag the scroll bar to display the next set of 25 results. Pagination of search results is not supported.

Release 5.2.1 Packages

This table lists the Cisco IOS XR Software feature set matrix (packages) and associated filenames available for the Cisco IOS XR Software Release 5.2.1 that is supported on the Cisco NCS 6008 router.

Table 1: Cisco IOS XR Software Release 5.2.1 Packages

Feature Set	Filename	Description
Composite Package		
Cisco IOS XR IP Unicast Routing Core Bundle	ncs6k-mini-x.iso-5.2.1	Contains required core packages, including OS, Admin, Base, Forwarding, Modular Services Card, Routing, SNMP Agent, FPD, and Alarm Correlation.
Optional Individual Packages (packages that are installed individually)		
Cisco IOS XR Manageability Package	ncs6k-mgbl.pkg-5.2.1	Extensible Markup Language (XML) Parser and HTTP server packages.
Cisco IOS XR MPLS Package	ncs6k-mpls.pkg-5.2.1	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-5.2.1	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], and Multicast forwarding [MFWD]).
Cisco IOS XR Security Package	ncs6k-k9sec.pkg-5.2.1	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-5.2.1	*.man* pages for Cisco IOS XR Software.

This table lists the TAR files.

Table 2: Cisco IOS XR Software Release 5.2.1 TAR Files

Feature Set	Filename	Description
Cisco IOS XR IP/MPLS Core Software	NCS6000-iosxr-5.2.1.tar	• Cisco IOS XR IP Unicast Routing Core Bundle • Cisco IOS XR Manageability Package • Cisco IOS MPLS Package • Cisco IOS XR Multicast Package
Cisco IOS XR IP/MPLS Core Software 3DES	NCS6000-iosxr-k9-5.2.1.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. Use this command to validate that the Cisco IOS XR Software version is the latest on your router.

Procedure

Step 1 Establish a Telnet session with the router.

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

```
RP/0/RP0/CPU0:router# show version
Cisco IOS XR Admin Software, Version 5.2.1
Copyright (c) 2013-2014 by Cisco Systems, Inc.

Build Information:
 Built By     : vram
 Built On     : Mon Sep 22 08:57:56 PDT 2014
```

```
Build Host    : iox-lnx-003
Workspace     : /auto/srcarchive10/production/5.2.1/all/workspace
Version       : 5.2.1
Location      : /opt/cisco/calvados/packages/
```

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 5.2.1 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 table lists the supported hardware components on the Cisco NCS 6000 Series Router and the minimum required software release. For more information, see the *Firmware Support* section.

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

Component	Part Number	Support from Release
S13 fabric card for LCC with16 CXP ports for 100GE SR optics	NC6-FC-MC	5.2.1
S13 fabric card for LCC with16 CXP ports for 100GE SR optics Spare	NC6-FC-MC=	5.2.1
S2 fabric card for the FCC with 32 CXP ports for 100GE SR12 CXPs	NCS-F-FC	5.2.1
S2 fabric card for the FCC with 32 CXP ports for 100GE SR12 CXPs Spare	NCS-F-FC=	5.2.1
FCC shelf controllers	NCS-F-SC	5.2.1
FCC shelf controllers Spare	NCS-F-SC=	5.2.1

Component	Part Number	Support from Release
FCC shelf controller and switch (SC-SW) card	NCS-F-SCSW	5.2.1
FCC shelf controller and switch (SC-SW) card Spare	NCS-F-SCSW=	5.2.1
Short reach SFP 10GE transceiver module	SFP-10G-SR	5.2.1
Long reach SFP 10GE transceiver module	SFP-10G-LR	5.2.1
Short reach QSFP 40GE optical module (SC-SW card only)	QSFP-40G-SR4	5.2.1
Long reach QSFP 40GE optical module (SC-SW card only)	QSFP-40G-LR4	5.2.1
96 CXP-100G-SR12 optical module	NCS-FAB-OPT	5.2.1
2X100GE MS PAYG Card with CPAK	NC6-2-10x100G-M-K	5.2.1
2X100GE LSR PAYG Card with CPAK	NC6-2-10x100G-L-K	5.2.1
30x10GE MS PAYG Card with SFPP	NC6-30x10G-M-S	5.2.1
30x10GE LSR PAYG Card with SFPP	NC6-30x10G-L-S	5.2.1
Craft Panel	NCS-CRFT	5.2.1
60-port 10Gbps SFP+ Lean Core Line card	NC6-60X10GE-L-S	5.0.1
60-port 10Gbps SFP+ Multi-Service Core Line card	NC6-60X10GE-M-S	5.0.1
Cisco 10GBASE-SR SFP+ Module for MMF	SFP-10G-SR	5.0.1
Cisco 10GBASE-SR SFP+ Module for MMF, extended temperature range	SFP-10G-SR-X	5.0.1
Cisco 10GBASE-LR SFP+ Module for SMF	SFP-10G-LR	5.0.1

Component	Part Number	Support from Release
Cisco multirate 10GBASE-LR, 10GBASE-LW and OTU2e SFP+ Module for SMF, extended temperature range	SFP-10G-LR-X	5.0.1
Cisco 10GBASE-ER SFP+ Module for SMF	SFP-10G-ER	5.0.1
Cisco 10GBASE-ZR SFP+ Module for SMF	SFP-10G-ZR	5.0.1
NCS 6008 - 8-Slot Chassis	NCS-6008	5.0.0
NCS 6008 Fabric Card	NC6-FC	5.0.0
NCS 6008 Route Processor	NC6-RP	5.0.0
NCS 6008 Chassis Fan Tray	NC6-FANTRAY	5.0.0
NCS AC Power Tray	NCS-AC-PWRTRAY	5.0.0
NCS DC Power Tray	NCS-DC-PWRTRAY	5.0.0
NCS PDU Bracket	NCS-PDU-BRKT	5.0.0
NCS 6008 3-to-1 Phase DELTA PDU	NCS-PDU-DELTA	5.0.0
NCS 6008 3-to-1 Phase WYE PDU	NCS-PDU-WYE	5.0.0
NCS 100x10GE Patch Panel Short Reach	NCS-PP-100X10-SR	5.0.0
NCS 6000 10x100G Multi-Service CPAK	NC6-10X100G-M-K	5.0.0
NCS 6000 10x100G Multi-Service CXP	NC6-10X100G-M-P	5.0.0
NCS 6000 10x100G LSR CPAK	NC6-10X100G-L-K	5.0.0
NCS 6000 10x100G LSR CXP	NC6-10X100G-L-P	5.0.0
NCS Craft Panel Display Kit	NCS-CRFT	5.0.0
NCS 6008 Chassis Front Doors	NC6-DOOR-F	5.0.0
NCS 6008 Chassis Rear Doors	NC6-DOOR-R	5.0.0
NCS 6008 Chassis Drill Template	NC6-DRILLTEMP	5.0.0
NCS 6008 Chassis Front-Bottom Grille	NC6-GRILLE-FB	5.0.0

Component	Part Number	Support from Release
NCS 6008 Chassis Front-Top Grille	NC6-GRILLE-FT	5.0.0
NCS 6008 Chassis Rear Grille	NC6-GRILLE-R	5.0.0
NCS 6008 Power Control Module	NC6-PCM	5.0.0
NCS 6008 Chassis Trough	NC6-TROUGH	5.0.0
NCS 6008 Chassis Trough Wide	NC6-TROUGH-W	5.0.0
NCS 6008 & NCS Fabric Chassis Lift Dolly	NCS-LIFT	5.0.0
10X10G-LR Cisco CPAK module for SMF	CPAK-10X10G-LR	5.0.0
CPAK-100G-LR4 Transceiver module, 10 km SMF	CPAK-100G-LR4	5.0.0
CXP-100G-SR10 transceiver Module	CXP-100G-SR10	5.0.0

Firmware Support

To check the firmware code running on the Cisco NCS 6008 router, Release 5.2.1 , run the **show hw-module fpd** command in System Admin EXEC mode.

```
RP/0/RP0/CPU0:router(admin)#show hw-module fpd
=============================== ==============================================
                                       Field Programmable Device Package
                                 ==============================================
                                          Req      SW       Min Req   Min Req
Card Type            FPD Description      Reload   Ver      SW Ver    Board Ver
==================== ==================== ======= ======== ========= =========
NCS-F-SCSW (SW)      CCC-FPGA              YES      1.01       1.01       0.0
                     CCC-Power-On          YES      1.36       1.36       0.0
-------------------------------------------------------------------------------
NCS-F-SC             CCC-FPGA              YES      2.01       2.01       0.0
                     CCC-Bootloader        YES      2.01       2.01       0.0
                     CCC-Power-On          YES      1.38       1.38       0.0
                     Backup-CCC-PwrOn      YES      1.38       1.38       0.0
                     Ethernet-Switch       YES      1.33       1.33       0.0
                     Backup EthSwitch      YES      1.33       1.33       0.0
                     Primary BIOS          YES     14.00      14.00       0.0
                     Backup BIOS           YES     14.00      14.00       0.0
                     CPU Complex FPGA      YES      4.06       4.06       0.1
                     CPU Complex BOOT      YES      4.06       4.04       0.1
                     CPU Complex FPGA      YES      0.01       0.01       0.0
                     CPU Complex BOOT      YES      0.01       0.01       0.0
-------------------------------------------------------------------------------
NCS-F-SCSW           CCC-FPGA              YES      2.01       2.01       0.0
                     CCC-Bootloader        YES      2.01       2.01       0.0
                     CCC-Power-On          YES      1.38       1.38       0.0
                     Backup-CCC-PwrOn      YES      1.38       1.38       0.0
                     Ethernet-Switch       YES      1.33       1.33       0.0
                     Backup EthSwitch      YES      1.33       1.33       0.0
                     Primary BIOS          YES     14.00      14.00       0.0
```

	Backup BIOS	YES	14.00	14.00	0.0
	CPU Complex FPGA	YES	4.06	4.06	0.1
	CPU Complex BOOT	YES	4.06	4.04	0.1
	CPU Complex FPGA	YES	0.01	0.01	0.0
	CPU Complex BOOT	YES	0.01	0.01	0.0
PROTO-F-SC	CCC-FPGA	YES	2.01	2.01	0.0
	CCC-Bootloader	YES	2.01	2.01	0.0
	CCC-Power-On	YES	1.38	1.38	0.0
	Backup-CCC-PwrOn	YES	1.38	1.38	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.33	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
	CPU Complex FPGA	YES	4.06	4.06	0.1
	CPU Complex BOOT	YES	4.06	4.04	0.1
	CPU Complex FPGA	YES	0.01	0.01	0.0
	CPU Complex BOOT	YES	0.01	0.01	0.0
NC6-30/60X10G-L-S	BAO-MB FPGA	NO	0.23	0.23	0.0
	BAO-DB FPGA	NO	0.23	0.23	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	Slice-2 GN2411	YES	5.86	5.86	2.0
	Slice-3 GN2411	YES	5.86	5.86	2.0
	Slice-4 GN2411	YES	5.86	5.86	2.0
	Slice-2 GN2411	YES	7.58	7.58	0.0
	Slice-3 GN2411	YES	7.58	7.58	0.0
	Slice-4 GN2411	YES	7.58	7.58	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-30/60X10G-M-S	BAO-MB FPGA	NO	0.23	0.23	0.0
	BAO-DB FPGA	NO	0.23	0.23	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
	Modena 0 PHY	YES	0.13	0.13	0.0
	Modena 1 PHY	YES	0.13	0.13	0.0
	Modena 2 PHY	YES	0.13	0.13	0.0
	Modena 3 PHY	YES	0.13	0.13	0.0

	Modena 4 PHY	YES	0.13	0.13	0.0
	Modena 5 PHY	YES	0.13	0.13	0.0
	Modena 6 PHY	YES	0.13	0.13	0.0
	Modena 7 PHY	YES	0.13	0.13	0.0
	Modena 8 PHY	YES	0.13	0.13	0.0
	Modena 9 PHY	YES	0.13	0.13	0.0
	Modena 10 PHY	YES	0.13	0.13	0.0
	Modena 11 PHY	YES	0.13	0.13	0.0
	Modena 12 PHY	YES	0.13	0.13	0.0
	Modena 13 PHY	YES	0.13	0.13	0.0
	Modena 14 PHY	YES	0.13	0.13	0.0
	Modena 15 PHY	YES	0.13	0.13	0.0
NC6-2/10X100G-M-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	CPAK bay 0 LR4	YES	1.16	1.16	0.0
	CPAK bay 1 LR4	YES	1.16	1.16	0.0
	CPAK bay 2 LR4	YES	1.16	1.16	0.0
	CPAK bay 3 LR4	YES	1.16	1.16	0.0
	CPAK bay 4 LR4	YES	1.16	1.16	0.0
	CPAK bay 5 LR4	YES	1.16	1.16	0.0
	CPAK bay 6 LR4	YES	1.16	1.16	0.0
	CPAK bay 7 LR4	YES	1.16	1.16	0.0
	CPAK bay 8 LR4	YES	1.16	1.16	0.0
	CPAK bay 9 LR4	YES	1.16	1.16	0.0
	CPAK bay 0 SR10	YES	2.03	2.03	0.0
	CPAK bay 1 SR10	YES	2.03	2.03	0.0
	CPAK bay 2 SR10	YES	2.03	2.03	0.0
	CPAK bay 3 SR10	YES	2.03	2.03	0.0
	CPAK bay 4 SR10	YES	2.03	2.03	0.0
	CPAK bay 5 SR10	YES	2.03	2.03	0.0
	CPAK bay 6 SR10	YES	2.03	2.03	0.0
	CPAK bay 7 SR10	YES	2.03	2.03	0.0
	CPAK bay 8 SR10	YES	2.03	2.03	0.0
	CPAK bay 9 SR10	YES	2.03	2.03	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-2/10X100G-L-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	CPAK bay 0 LR4	YES	1.16	1.16	0.0
	CPAK bay 1 LR4	YES	1.16	1.16	0.0
	CPAK bay 2 LR4	YES	1.16	1.16	0.0
	CPAK bay 3 LR4	YES	1.16	1.16	0.0
	CPAK bay 4 LR4	YES	1.16	1.16	0.0
	CPAK bay 5 LR4	YES	1.16	1.16	0.0
	CPAK bay 6 LR4	YES	1.16	1.16	0.0
	CPAK bay 7 LR4	YES	1.16	1.16	0.0
	CPAK bay 8 LR4	YES	1.16	1.16	0.0
	CPAK bay 9 LR4	YES	1.16	1.16	0.0
	CPAK bay 0 SR10	YES	2.03	2.03	0.0
	CPAK bay 1 SR10	YES	2.03	2.03	0.0

	CPAK bay 2 SR10	YES	2.03	2.03	0.0
	CPAK bay 3 SR10	YES	2.03	2.03	0.0
	CPAK bay 4 SR10	YES	2.03	2.03	0.0
	CPAK bay 5 SR10	YES	2.03	2.03	0.0
	CPAK bay 6 SR10	YES	2.03	2.03	0.0
	CPAK bay 7 SR10	YES	2.03	2.03	0.0
	CPAK bay 8 SR10	YES	2.03	2.03	0.0
	CPAK bay 9 SR10	YES	2.03	2.03	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NCS-F-FANTRAY	Fantray FPGA	NO	2.01	2.01	0.0
NCS-F-FC	CCC-FPGA	YES	1.23	1.23	0.0
	CCC-Power-On	YES	1.37	1.37	0.0
	CRE-FPGA-MB	YES	1.00	1.00	0.0
	Back-CRE-FPGA-MB	YES	1.00	1.00	0.0
	CRE-FPGA-DC	YES	1.00	1.00	0.0
	Back-CRE-FPGA-DC	YES	1.00	1.00	0.0
	GN2411 BUS 0	YES	5.86	5.86	2.0
	GN2411 BUS 1	YES	5.86	5.86	2.0
	GN2411 BUS 2	YES	5.86	5.86	2.0
	GN2411 BUS 3	YES	5.86	5.86	2.0
	GN2411 BUS 4	YES	5.86	5.86	2.0
	GN2411 BUS 0	YES	7.58	7.58	0.0
	GN2411 BUS 1	YES	7.58	7.58	0.0
	GN2411 BUS 2	YES	7.58	7.58	0.0
	GN2411 BUS 3	YES	7.58	7.58	0.0
	GN2411 BUS 4	YES	7.58	7.58	0.0
NC6-FC-MC	CCC-FPGA	YES	1.23	1.23	0.0
	CCC-Power-On	YES	1.37	1.37	0.0
	CRE-FPGA-MB	YES	1.00	1.00	0.0
	Back-CRE-FPGA-MB	YES	1.00	1.00	0.0
	GN2411 BUS 0	YES	5.86	5.86	2.0
	GN2411 BUS 1	YES	5.86	5.86	2.0
	GN2411 BUS 2	YES	5.86	5.86	2.0
	GN2411 BUS 0	YES	7.58	7.58	0.0
	GN2411 BUS 1	YES	7.58	7.58	0.0
	GN2411 BUS 2	YES	7.58	7.58	0.0
NC6-RP	CCC-FPGA	YES	2.04	2.04	0.0
	CCC-Bootloader	YES	2.04	2.03	0.0
	CCC-Power-On	YES	1.37	1.37	0.0
	Backup-CCC-PwrOn	YES	1.37	1.32	0.0
	Ethernet-Switch	YES	1.33	1.33	0.2
	Backup EthSwitch	YES	1.33	1.32	0.2
	Ethernet-Switch	YES	1.33	1.33	0.1
	Backup EthSwitch	YES	1.33	1.32	0.1
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
	CPU Complex FPGA	YES	4.06	4.06	0.1

	CPU Complex BOOT	YES	4.06	4.04	0.1
	CPU Complex FPGA	YES	0.01	0.01	0.0
	CPU Complex BOOT	YES	0.01	0.01	0.0
PROTO-1XPAT-SFP	BAO-MB FPGA	NO	0.29	0.29	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
PROTO-2XPAT-SFP-L	BAO-MB FPGA	NO	0.29	0.29	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-6-10X100G-L-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-4-10X100G-M-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
PROTO-1XPAT-QSFP	BAO-MB FPGA	NO	0.29	0.29	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0

	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
PROTO-2XPAT-SFP	BAO-MB FPGA	NO	0.29	0.29	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
	Modena 0 PHY	YES	0.13	0.13	0.0
	Modena 1 PHY	YES	0.13	0.13	0.0
	Modena 2 PHY	YES	0.13	0.13	0.0
	Modena 3 PHY	YES	0.13	0.13	0.0
	Modena 4 PHY	YES	0.13	0.13	0.0
	Modena 5 PHY	YES	0.13	0.13	0.0
	Modena 6 PHY	YES	0.13	0.13	0.0
	Modena 7 PHY	YES	0.13	0.13	0.0
P-L-20X40G-QSFP	BAO-MB FPGA	NO	0.29	0.29	0.0
	BAO-DB FPGA	NO	0.29	0.29	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	Slice-2 GN2411	YES	5.86	5.86	2.0
	Slice-3 GN2411	YES	5.86	5.86	2.0
	Slice-4 GN2411	YES	5.86	5.86	2.0
	Slice-2 GN2411	YES	7.58	7.58	0.0
	Slice-3 GN2411	YES	7.58	7.58	0.0
	Slice-4 GN2411	YES	7.58	7.58	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-60X10GE-M-S	BAO-MB FPGA	NO	0.29	0.29	0.0
	BAO-DB FPGA	NO	0.29	0.29	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
	Modena 0 PHY	YES	0.13	0.13	0.0

	Modena 1 PHY	YES	0.13	0.13	0.0
	Modena 2 PHY	YES	0.13	0.13	0.0
	Modena 3 PHY	YES	0.13	0.13	0.0
	Modena 4 PHY	YES	0.13	0.13	0.0
	Modena 5 PHY	YES	0.13	0.13	0.0
	Modena 6 PHY	YES	0.13	0.13	0.0
	Modena 7 PHY	YES	0.13	0.13	0.0
	Modena 8 PHY	YES	0.13	0.13	0.0
	Modena 9 PHY	YES	0.13	0.13	0.0
	Modena 10 PHY	YES	0.13	0.13	0.0
	Modena 11 PHY	YES	0.13	0.13	0.0
	Modena 12 PHY	YES	0.13	0.13	0.0
	Modena 13 PHY	YES	0.13	0.13	0.0
	Modena 14 PHY	YES	0.13	0.13	0.0
	Modena 15 PHY	YES	0.13	0.13	0.0
NC6-60X10GE-L-S	BAO-MB FPGA	NO	0.29	0.29	0.0
	BAO-DB FPGA	NO	0.29	0.29	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	Slice-2 GN2411	YES	5.86	5.86	2.0
	Slice-3 GN2411	YES	5.86	5.86	2.0
	Slice-4 GN2411	YES	5.86	5.86	2.0
	Slice-2 GN2411	YES	7.58	7.58	0.0
	Slice-3 GN2411	YES	7.58	7.58	0.0
	Slice-4 GN2411	YES	7.58	7.58	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-10X100G-L-P	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	Slice-2 GN2411	YES	5.86	5.86	2.0
	Slice-3 GN2411	YES	5.86	5.86	2.0
	Slice-4 GN2411	YES	5.86	5.86	2.0
	Slice-2 GN2411	YES	7.58	7.58	0.0
	Slice-3 GN2411	YES	7.58	7.58	0.0
	Slice-4 GN2411	YES	7.58	7.58	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0

	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-10X100G-M-P	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	Slice-2 GN2411	YES	5.86	5.86	2.0
	Slice-3 GN2411	YES	5.86	5.86	2.0
	Slice-4 GN2411	YES	5.86	5.86	2.0
	Slice-2 GN2411	YES	7.58	7.58	0.0
	Slice-3 GN2411	YES	7.58	7.58	0.0
	Slice-4 GN2411	YES	7.58	7.58	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-10X100G-L-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	CPAK bay 0 LR4	YES	1.16	1.16	0.0
	CPAK bay 1 LR4	YES	1.16	1.16	0.0
	CPAK bay 2 LR4	YES	1.16	1.16	0.0
	CPAK bay 3 LR4	YES	1.16	1.16	0.0
	CPAK bay 4 LR4	YES	1.16	1.16	0.0
	CPAK bay 5 LR4	YES	1.16	1.16	0.0
	CPAK bay 6 LR4	YES	1.16	1.16	0.0
	CPAK bay 7 LR4	YES	1.16	1.16	0.0
	CPAK bay 8 LR4	YES	1.16	1.16	0.0
	CPAK bay 9 LR4	YES	1.16	1.16	0.0
	CPAK bay 0 SR10	YES	2.03	2.03	0.0
	CPAK bay 1 SR10	YES	2.03	2.03	0.0
	CPAK bay 2 SR10	YES	2.03	2.03	0.0
	CPAK bay 3 SR10	YES	2.03	2.03	0.0
	CPAK bay 4 SR10	YES	2.03	2.03	0.0
	CPAK bay 5 SR10	YES	2.03	2.03	0.0
	CPAK bay 6 SR10	YES	2.03	2.03	0.0
	CPAK bay 7 SR10	YES	2.03	2.03	0.0
	CPAK bay 8 SR10	YES	2.03	2.03	0.0
	CPAK bay 9 SR10	YES	2.03	2.03	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0

	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
NC6-10X100G-M-K	BAO-MB FPGA	NO	1.06	1.06	0.0
	BAO-DB FPGA	NO	1.06	1.06	0.0
	CPAK bay 0 LR4	YES	1.16	1.16	0.0
	CPAK bay 1 LR4	YES	1.16	1.16	0.0
	CPAK bay 2 LR4	YES	1.16	1.16	0.0
	CPAK bay 3 LR4	YES	1.16	1.16	0.0
	CPAK bay 4 LR4	YES	1.16	1.16	0.0
	CPAK bay 5 LR4	YES	1.16	1.16	0.0
	CPAK bay 6 LR4	YES	1.16	1.16	0.0
	CPAK bay 7 LR4	YES	1.16	1.16	0.0
	CPAK bay 8 LR4	YES	1.16	1.16	0.0
	CPAK bay 9 LR4	YES	1.16	1.16	0.0
	CPAK bay 0 SR10	YES	2.03	2.03	0.0
	CPAK bay 1 SR10	YES	2.03	2.03	0.0
	CPAK bay 2 SR10	YES	2.03	2.03	0.0
	CPAK bay 3 SR10	YES	2.03	2.03	0.0
	CPAK bay 4 SR10	YES	2.03	2.03	0.0
	CPAK bay 5 SR10	YES	2.03	2.03	0.0
	CPAK bay 6 SR10	YES	2.03	2.03	0.0
	CPAK bay 7 SR10	YES	2.03	2.03	0.0
	CPAK bay 8 SR10	YES	2.03	2.03	0.0
	CPAK bay 9 SR10	YES	2.03	2.03	0.0
	S2 GN2411	YES	5.86	5.86	2.0
	S3 GN2411	YES	5.86	5.86	2.0
	S4 GN2411	YES	5.86	5.86	2.0
	S2 GN2411	YES	7.58	7.58	0.0
	S3 GN2411	YES	7.58	7.58	0.0
	S4 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
PROTO-CXP-2XPITA	BAO-MB FPGA	NO	1.06	1.06	0.0
	Slice-0 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-0 GN2411	YES	7.58	7.58	0.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0
	Ethernet-Switch	YES	1.33	1.33	0.0
	Backup EthSwitch	YES	1.33	1.32	0.0
	Primary BIOS	YES	14.00	14.00	0.0
	Backup BIOS	YES	14.00	14.00	0.0
PROTO-CXP-1XPITA	BAO-MB FPGA	NO	1.06	1.06	0.0
	Slice-1 GN2411	YES	5.86	5.86	2.0
	Slice-1 GN2411	YES	7.58	7.58	0.0
	CCC-FPGA	YES	2.09	2.09	0.0
	CCC-Bootloader	YES	2.09	2.07	0.0
	CCC-Power-On	YES	1.36	1.36	0.0
	Backup-CCC-PwrOn	YES	1.36	1.31	0.0

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                    Ethernet-Switch           YES     1.33      1.33      0.0
                    Backup EthSwitch          YES     1.33      1.32      0.0
                    Primary BIOS              YES    14.00     14.00      0.0
                    Backup BIOS               YES    14.00     14.00      0.0
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NC6-FANTRAY         Fantray FPGA              NO      2.01      2.01      0.0
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NC6-FC              CCC-FPGA                  YES     1.23      1.23      0.0
                    CCC-Power-On              YES     1.37      1.37      0.0
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PWR-2KW-DC-V2       DT-PriMCU                 NO      6.03      6.03      0.12
                    DT-Sec54vMCU              NO      6.02      6.02      0.12
                    DT-Sec5vMCU               NO      6.03      6.03      0.12
                    EM-PriMCU                 NO      3.12      3.12      0.21
                    EM-Sec54vMCU              NO      3.19      3.19      0.21
                    EM-Sec5vMCU               NO      3.19      3.19      0.21
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NCS-CRFT            Craft-LCC                 NO      1.04      1.04      0.1
                    Craft-FCC                 NO      1.04      1.04      0.1
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PWR-3KW-AC-V2       DT-PriMCU                 NO      6.02      6.02      1.0
                    DT-Sec54vMCU              NO      6.02      6.02      1.0
                    DT-Sec5vMCU               NO      6.04      6.04      1.0
                    EM-Sec54vMCU              NO      3.12      3.12      0.21
                    EM-Sec5vMCU               NO      3.18      3.18      0.21
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Minimum Firmware Requirement

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

After completing an Return Material Authorization (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

- 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 *Cisco Network Convergence System 6000 Series Routers Hardware Installation Guide* 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 for your purpose.
- **reload**—The reload command in the system admin mode reloads a VM, not a line card.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation.

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the What's New in Cisco Product Documentation RSS feed. RSS feeds are a free service.