Cisco Network Convergence System 6000 Multi Chassis System

When it comes to scalability, service providers want to find solutions that can be deployed to address their immediate needs today while being able to grow and scale in the future to enhance their return on investment. Specifically, the platforms deployed in the core network must support hundreds of terabits of data. Cisco has led the industry with back-to-back (B2B) and multi-chassis solutions that allow service providers to economically grow their networks and meet bandwidth demands today and tomorrow. Customers can add additional systems from Cisco as needed and grow their networks to create a single large system that provides the scale needed without increasing the complexity of their routing architecture. Cisco has been shipping multi-chassis solutions for over 10 years in the core and has in turn offered service providers an innovation that provides network longevity, unmatched network scale, and reliability while doing so very cost effectively. The Cisco® Network Convergence System (NCS 6000) Series Multi Chassis System provides a scalable way to manage the overall network and to scale data and management control planes accordingly while maintaining full network reliability and availability.

The Cisco NCS 6000 Series Routers multi-chassis system (Figure 1) can be expanded to support up to 1Petabit of future forwarding throughput. NCS 6000 multichassis system consists of two major elements: a line card chassis (LCC) and a fabric card chassis (FCC). The LCC hosts route processor (RP) cards, the first and third stages of switch fabric cards, and line cards that provide the physical interface and process data packets. Each LCC in the multi-chassis system contains 8 line cards and each line card delivers up to 2 Tbps throughput using a mix of 10-Gbps, 40-Gbps, or 100-Gbps interfaces per card. The FCC hosts the second stage of the switch fabric cards. The LCC and FCC are connected by a set of optical cables. Expanding your core network capacity is a smooth process for the Cisco NCS 6000, supported by in-service hardware and software upgrades. The Cisco NCS 6000 also provides customer facing modular optics options to meet a wide range of distance requirements.

The NCS 6000 back-to-back system allows network operators to double the network capacity without the need for a Fabric Card Chassis (FCC) to handle the multidirectional data flow. A back-to-back system, also called a 2+0 system, includes two LCCs and no FCCs. With the back-to-back, network capacity can be increased in incremental steps and this provides a low entry point into the multi chassis architecture. It can be used by customers who need more capacity than a single chassis but are not targeting a large multi-chassis in the near future. When more network capacity is needed, chassis can be added to the system without complicating the network architecture. With these capabilities, the NCS 6000 back-to-back system offers an unprecedented level of investment protection. The 2+0 back-to-back system has all benefits of a 2+1 multichassis system while mitigating capital expenditures (CapEx) and operating expenses (OpEx) by eliminating the immediate need for an FCC. Pairing two LCCs to create a NCS back-to-back system does not require any dedicated slots for interconnection; switch fabric cards and optical cables connect the chassis to form a single logical system that maintains full bandwidth between chassis.

Figure 1. Cisco NCS 6000 Series Multi-Chassis System

Cisco NCS 6000 Series multi-chassis system features include:

- Easy scaling from 8T(1Tbps)/16T(2Tbps) in a single-chassis system to 1Petabit in a future multi-chassis system.
- Single point of management irrespective of the scale of the multi-chassis system.
- Simple in-service single chassis to multi-chassis upgrade procedure.
- Simple multi-chassis system scale upgrade.
- Redundant and operationally-efficient infrastructure. FCC components, switching fabric, fans, and power supplies are fully redundant.
- 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.
- The Cisco NCS 6000 Series multi-chassis system uses the Cisco IOS® XR Software, well known for its use in the highly successful Cisco Carrier Routing System (CRS) and Cisco ASR 9000 Series Aggregation Services Routers. Cisco IOS XR Software is the only fully modular, fully distributed internetworking operating system that uses control plane distribution to allow scaling from a single-chassis system to a large multichassis system. The Cisco IOS XR operating system is purpose-built for distributed systems.
- Further the NCS 6000 is the first platform to run 64-bit IOS XR and the OS capabilities are further extended by running in the virtual Cisco IOS XR environment. This modularity provides the path to nonstop operations during software image upgrades or module changes.
- Integrated technology includes IP and Multiprotocol Label Switching (MPLS) routing, network virtualization with secure domain routers (SDRs), capability for external control plane, 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 TCO.
- Optical extensions are supported to improve packet-data integration, by enhancing power, footprint, and future growth.
- The Cisco NCS 6000 Series provides outstanding support for control plane integration between the router and optical extensions, for configuration, monitoring, and proactive protection.

Cisco NCS 6000 Multichassis Scaling Options with 1Tbps/slot

Table 1. Cisco NCS 6000 MultiChassis Configurations and Scaling options

Chassis	NCS 6000 B2B/2+0	NCS 6000 2+x Multichassis (X = 1 to 2)	NCS 6000 4+x Multichassis (X = 1 to 2)	NCS 6000 5+2 Multichassis
Min Software Version	XR 6.2.1	XR 5.2.1	XR 5.2.3	XR 6.1.2
Aggregate switching capacity	16 Tbps to 32 Tbps	16 Tbps to 32 Tbps	32 Tbps to 64 Tbps	40 Tbps to 80 Tbps
Product Ordering PIDs	NCS-6208-SYS-S	NCS-6008-SYS-S NCS-F-SYS-S	NCS-6008-SYS-S NCS-F-SYS-S	NCS-6008-SYS-S NCS-F-SYS-S

Cisco NCS 6000 Series

- Running the industry-leading virtualized Cisco IOS® XR Software, Cisco's innovative, industry-leading virtualized operating environment, the Cisco NCS 6000 Series advances the concept of distributed routing and virtualization. With Cisco virtualized IOS XR Software the Cisco NCS 6000 Series brings new levels of programmability and virtualization to enhance application service offerings, increase provisioning speed, and optimize network economics.
- The Cisco NCS 6000 Series is powered by the Cisco nPower Network Processor Unit (NPU), an innovative programmable forwarding application-specific integrated circuit (ASIC). The Cisco nPower X1 is designed to deliver the industry's first zero packet loss (ZPL) and zero topology loss (ZTL) In-Service Software Upgrade (ISSU) capability.

The Cisco NCS 6000 Series is engineered for environmental efficiency, using an adaptable power consumption model for both the ASIC and complementary metal-oxide semiconductor (CMOS) photonics technology. These technologies give the Cisco NCS 6000 Series among the lowest carbon footprint in service provider routing.

Cisco NCS Fabric Card Chassis (FCC) System

The Cisco NCS 6000 Series Fabric Card Chassis (FCC) System, also known as a switch fabric chassis, is referred in this document as the Cisco NCS 6000 Series FCC.

The Cisco NCS 6000 Series multi-chassis system consists of two major components:

- The Cisco NCS 6008 - 8-Slot Chassis and
- The Cisco NCS 6000 Series FCC

Each Cisco NCS 6000 Series FCC has a capability of interconnecting 4 line card chassis (LCC) using 64 Tbps non-blocking switching capability. Interconnection between the Cisco NCS 6008 LCC and the Cisco NCS 6000 Series uses standard OM4, commercially available, standard Multimode Fiber ribbon cables.

Figure 2. Cisco NCS 6000 Series Fabric Card Chassis (FCC) System

Product Specifications

Table 1 lists specifications for the Cisco NCS 6000 Series FCC System. For more information about the Cisco NCS 6000 Series, visit: http://www.cisco.com/go/ncs6000.

Table 2. Cisco NCS FCC Product Specifications

Feature	Description
Software compatibility	Cisco IOS XR Software Release 5.2.1 or later
Components	Each Cisco NCS 6000 Series fabric card chassis includes: • Standalone chassis (no rack required) • 12 FCC fabric card slots • 6 FCC fabric cards upgradeable to 12 fabric cards • 2 fan trays • Air inlet filter • 4 power shelves (DC or AC)
LCC Connectivity	32 CXP ports/FCC fabric card
Management	Shelf Controller or Shelf Controller Switch Combo in various configurations
System capacity	64 Tbps per FCC Up to 256 Tbps total switching capacity in a multi-chassis configuration
Reliability and availability	System redundancy: • Power redundancy 1:1 or 1:N • Fan tray redundancy 1:1 • Shelf Controller redundancy 1:1

Feature	Description	
MIBs	SNMP framework support: • SNMPv1 • SNMPv2c • SNMPv3 • MIB II, including interface extensions (RFC 1213) • SNMP-FRAMEWORK-MIB • SNMP-TARGET-MIB • SNMP-NOTIFICATION-MIB • SNMP-USM-MIB • SNMP-VACM-MIB System management: • CISCO- BULK-FILE-MIB • CISCO-CONFIG-COPY-MIB • CISCO-CONFIG-MAN-MIB • CISCO-FLASH-MIB • CISCO-MEMORY-POOL-MIB • Cisco FTP Client MIB • Cisco Process MIB • Cisco Syslog MIB • CISCO-SYSTEM-MIB • CISCO-CDP-MIB • IF-MIB (RFC 2233/RFC 2863)	Chassis: • ENTITY-MIB (RFC 2737) • CISCO-entity-asset-MIB • CISCO-entity-sensor-MIB • CISCO-FRU-MIB (Cisco-Entity-FRU-Control-MIB) Fabric: • CISCO-Fabric-Mcast-MIB • CISCO-Fabric-Mcast-Appl-MIB Traps: • RFC 1157 • Authentication • Linkup • Linkdown • ColdstartWarmstart
Network management	Enhanced CLI XML interface Simple Network Management Protocol (SNMP) and MIB support Cisco Prime™ Network	
Programmatic interfaces	XML schema support	
Physical dimensions	Chassis height: • 84 in. (213.36 cm) Chassis width: • 23.6 in. (59.94 cm) Chassis depth: (inclusive of external cosmetic doors) • 42 in. (106.68 cm)	
Power	• Support for both DC and AC power modules[1] (AC ranges:200-240V; 50-60 Hz; 16A maximumWorldwide ranging DC (-40 to -72V; 50A nominal, and 60A maximum)	
Environmental conditions	Storage temperature: -40 to 158°F (-40 to 70°C) Operating temperature: • Normal: 41 to 104°F (5 to 40°C) • Short term*: 23 to 122°F (-5 to 50°C) (see note) Relative humidity: • Normal: 5 to 85% • Short-term*: 5 to 90% but not to exceed 0.024 kg water per kg of dry air *Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.)	

[1] Mixing of AC and DC modules is not supported.

Approvals and Compliance

Table 2 lists compliance and agency approvals for both models of the Cisco NCS 6000 Series multi-chassis system.

Table 3. Compliance and Agency Approvals for the Cisco NCS 6000 Series Multi-chassis System

Feature	Description
Safety standards	• UL/CSA/IEC/EN 60950-1 • IEC/EN 60825 Laser Safety • FDA: Code of Federal Regulations Laser Safety
Electromagnetic interference (EMI)	• FCC Class A • ICES 003 Class A • CISPR 22 (EN55022) Class A • VCCI Class A • IEC/EN 61000-3-2: Power Line Harmonics • IEC/EN 61000-3-3: Voltage Fluctuations and Flicker
Immunity (basic standards)	• IEC/EN-61000-4-2: Electrostatic Discharge Immunity (8-kV contact, 15-kV air) • IEC/EN-61000-4-3: Radiated Immunity (10V/m) • IEC/EN-61000-4-4: Electrical Fast Transient Immunity (2-kV power, 1-kV signal) • IEC/EN-61000-4-5: Surge AC Port (4-kV CM, 2-kV DM) • IEC/EN-61000-4-5: Signal Ports (1 kV) • IEC/EN-61000-4-5: Surge DC Port (1 kV) • IEC/EN-61000-4-6: Immunity to Conducted Disturbances (10 Vrms) • IEC/EN-61000-4-8: Power Frequency Magnetic Field Immunity (30A/m) • IEC/EN-61000-4-11: Voltage Dips, Short Interruptions, and Voltage Variations
ETSI and EN	• EN300 386: Telecommunications Network Equipment (EMC) • EN55022: Information Technology Equipment (Emissions) • EN55024: Information Technology Equipment (Immunity) • EN50082-1/EN-61000-6-1: Generic Immunity Standard
Network Equipment Building Systems (NEBS)	This product is designed to meet the following requirements (qualification in progress): • SR-3580: NEBS Criteria Levels (Level 3) • GR-1089-CORE: NEBS EMC and Safety • GR-63-CORE: NEBS Physical Protection

Ordering Information

To place an order, visit the Cisco Ordering Home Page.

Expanding a Single Chassis to a Back-to-Back System

The new 2nd generation fabric, Universal Fabric Card (UFC) is a prerequisite for Back-to-Back system. Upgrading from a NCS6000 single chassis system to a back-to-back system, the new Universal Fabric card (UFC) is required in both NCS6000 systems. This new Universal Fabric Card, which replaces the existing fabric card in the NCS6000, is the next generation of fabric card for NCS6000. It can support the next generation of 2T line card, and will also be the future fabric card for all NCS6000 systems.

Table 4. Ordering Information

Part Number	Description Name
NCS-6208-SYS-S	NCS 6208 system (2RPs, 6 UFCs, Fans and Power - for 2T)
NC6-FC2-U=	NCS6000 2T(2nd Gen) Universal Fabric

Expanding to a Full Multichassis System

To expand beyond a back-to-back system, a fabric card chassis (FCC) is needed for interconnections to multiple Cisco NCS 6000 systems.

Table 5. Ordering Information

Part Number	Description Name
NCS-F-SYS-S	Cisco NCS 6000 FCC System

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For More Information

For more information about the Cisco NCS 6000 Series multi-chassis system, contact your local account representative or visit Cisco at: http://www.cisco.com/go/ncs6000.

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Printed in USA C78-732556-01 03/17