Cisco Catalyst 9600 Series Switches

Contents

Cisco Catalyst 9600 Series Switches are purpose-built for resiliency at scale with the industry's most comprehensive security and allows your business to grow at the lowest total operational cost. Built upon the foundation of Catalyst 9000, the Catalyst 9600 Series offers scale and security when always-on is a must.

As foundational building blocks for the Cisco Digital Network Architecture, Catalyst 9600 Series switches helpcustomers simplify complexity, optimize IT, and reduce operational costs by leveraging intelligence, automation and human expertise that no other vendor can deliver regardless of where you are in the intent-based networking journey.

Catalyst 9600 Series Switches provide security features that protects the integrity of the hardware as well as the software and all data that flows through the switch. It provides resiliency that keeps your business up and running seamlessly. Combine that with open APIs of Cisco IOS XE and programmability of the UADP ASIC technology, Catalyst 9600 Series switches give you what you need now with investment protection on future innovations.

As the industry's first purpose-built 40 and 100 Gigabit Ethernet line of modular switches targeted for the enterprise campus, Catalyst 9600 Series switches deliver unmatched table scale (MAC, route, and Access Control List [ACL]) and buffering for enterprise applications. The Cisco Catalyst 9606R chassis is hardware ready to support a wired switching capacity of up to 25.6 Tbps, with up to 6.4 Tbps of bandwidth per slot. Cisco Catalyst 9600 Series switches support granular port densities that fit diverse campus needs, including nonblocking 40 and 100 Gigabit Ethernet (GE) Quad Small Form-Factor Pluggable (QSFP+, QSFP28) and 1, 10, and 25 GE Small Form-Factor Pluggable Plus (SFP, SFP+, SFP28) and 10, 5, 2.5 and 1 Gigabit Ethernet (GE) and 100, 10 Megabit (Mbps) RJ45 copper ports. The switches also support advanced routing and infrastructure services (such as Multiprotocol Label Switching [MPLS] Layer 2 and Layer 3 VPNs, Multicast VPN [MVPN], and Network Address Translation [NAT]); Cisco Software-Defined Access capabilities (such as a host tracking database, cross-domain connectivity, and VPN Routing and Forwarding [VRF]-aware Locator/ID Separation Protocol [LISP]); and network system virtualization with Cisco StackWise® virtual technology that are critical for their placement in the campus core. The Cisco Catalyst 9600 Series also supports foundational high-availability capabilities such as patching, Cisco Nonstop Forwarding with Stateful Switchover (NSF/SSO), redundant platinum-rated power supplies, and fans.

Product overview

Cisco Catalyst 9600 Series Chassis

- Hardware ready to support up to 25.6 Tbps in wired switching capacity, with up to 6.4 Tbps bandwidth per slot.

- Up to 9.6 Tbps in wired switching capacity, with 3 Bpps of forwarding performance with the Cisco Catalyst 9600 Series Supervisor Engine 1.

- Up to 48 nonblocking 100 Gigabit Ethernet QSPF28 ports with the Cisco Catalyst 9600 Series Supervisor Engine 1.

- Up to 96 nonblocking 40 Gigabit Ethernet QSFP+ ports with the Cisco Catalyst 9600 Series Supervisor Engine 1.

- Up to 192 nonblocking 25 Gigabit Ethernet /10 Gigabit Ethernet SFP28/SFP+ ports with the Cisco Catalyst 9600 Series Supervisor Engine 1.

- Up to 192 non blocking 10 Gigabit Ethernet / 5 Gigabit Ethernet / 2.5 Gigabit Ethernet / 1 Gigabit Ethernet / 100 Megabit / 10 Megabit RJ45 copper ports with the Cisco Catalyst 9600 Series Supervisor Engine 1.

- Platinum-rated AC and DC power supplies.

Cisco Catalyst 9600 Series Supervisor Engine 1 and Line Cards

- The UADP* 3.0 Application-Specific Integrated Circuit (ASIC) is future-ready for next-generation technologies, with a programmable pipeline, microengine capabilities, and template-based configurable allocation of Layer 2, Layer 3, forwarding, ACL, and Quality-of-Service (QoS) entries.

- It is the first ASIC to support double-width HW tables. This provides equivalent table size and processing performance for IPv4 and IPv6.

- The Supervisor Engine 1, with a 2.0-GHz Intel® x86 CPU with 8 cores, provides up to 960 GB of SATA SSD local storage for container-based application hosting.

- Up to 108 MB of buffer (36 MB of unified buffer per ASIC).

- Line-rate, hardware-based Flexible NetFlow (FNF) delivers flow collection for up to 294,000 flows.

- IPv6 support in hardware provides wire-rate forwarding for IPv6 networks.

- Dual-stack support for IPv4 and IPv6 and dynamic hardware forwarding table allocations enable easy IPv4-to-IPv6 migration.

- Flexible routing (IPv4, IPv6, and multicast) tables, Layer 2 tables, ACL tables, and QoS tables.

*The UADP ASIC resides in the Cisco Catalyst 9600 Supervisor Engine 1.

Figure 1.
Cisco Catalyst 9606R Chassis

Software

Platform Software Benefits

Cisco IOS XE

Cisco IOS XE Software opens a completely new paradigm in network configuration, operation, and monitoring through network automation. Cisco's automation solution is open, standards-based, and extensible across the entire lifecycle of a network device. The various automation mechanisms are outlined below.

- **Automated Device Provisioning** is the ability to automate the process of upgrading software images and installing configuration files on Cisco Catalyst switches when they are being deployed in the network for the first time. Cisco provides turnkey solutions such as Plug and Play and Preboot Execution Environment (PXE) that enable an effortless and automated deployment.

- **API-driven configuration** is available with modern network switches such as Cisco Catalyst 9600 Series switches. It supports a wide range of automation features and provides robust open APIs over NETCONF and RESTCONF using YANG data models for external tools, both off the shelf and custom built, to automatically provision network resources.

- **Granular visibility** enables model-driven telemetry to stream data from a switch to a destination. The data to be streamed is identified through subscription to a data set in a YANG model. The subscribed data set is streamed to the destination at specified intervals. Additionally, Cisco IOS XE enables the push model. It provides near-real-time monitoring of the network, leading to quick detection and rectification of failures.

- **Seamless software upgrades and patching** supports OS resilience. On Cisco Catalyst 9600 Series switches Cisco IOS XE supports hot patching without reboot, which provides fixes for critical bugs and security vulnerabilities between regular maintenance releases. This support lets you add patches without having to wait for the next maintenance release.

- **Trustworthy solutions built with Cisco Trust Anchor Technologies** provide a highly secure foundation for Cisco products. With Cisco Catalyst 9600 Series switches, these technologies enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks that compromise software and firmware. Trust Anchor capabilities include image signing, Secure Boot, and Cisco Trust Anchor module.

- **High Availability:** Cisco Catalyst 9600 Series switches support high-availability features, including the following:

  ◦ Multichassis EtherChannel can be configured across StackWise-Virtual members for high resiliency.

  ◦ IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) provides rapid spanning tree convergence independent of spanning tree timers and also offers the benefit of Layer 2 load balancing and distributed processing.

  ◦ Per-VLAN Rapid Spanning Tree (PVRST+) allows rapid spanning tree (IEEE 802.1w) reconvergence on a per-VLAN spanning tree basis, providing simpler configuration than MSTP. In both MSTP and PVRST+ modes, stacked units behave as a single spanning tree node.

  ◦ Switch-port auto-recovery ("err-disable" recovery) automatically attempts to reactivate a link that is disabled because of a network error.

  ◦ Cisco® Catalyst® 9600 platform StackWise® Virtual technology allows the clustering of two physical switches together into a single logical entity. The two switches operate as one; they share the same configuration and forwarding state. This technology allows for enhancements in all areas of network design, including high availability, scalability, management, and maintenance.

  ◦ Cisco® Catalyst® 9600 platform StackWise® Virtual Quad-Sup Route Processor Redundancy (RPR) mode that improves quad-sup functionality and failover behavior in case of supervisor failure which allows automatic failover between all supervisors in case of the failure.

The Foundation of Software-Defined Access

Secure Segmentation with SD-Access

The enterprise network lies at the heart of digital transformation. A network that is open, programmable, integrated, and secure maximizes business agility, allowing new business opportunities to be pursued and captured. But advanced and persistent security threats, the exponential growth of IoT devices and a mobility everywhere user experience requires a new type of network fabric that integrates advanced hardware and software innovations to automate, secure, and simplify customer networks.

The Cisco Digital Network Architecture (Cisco DNA) with Software-Defined Access (SD-Access) is the network fabric that powers business. It is an open and extensible software-driven architecture that accelerates and simplifies your enterprise network operations. The programmable architecture frees your IT staff from time-consuming, repetitive network configuration tasks so they can focus instead on innovation that positively transforms your business. SD-Access enables policy-based automation from edge to cloud with foundational capabilities. These include:

- Simplified device deployment
- Unified management of wired and wireless networks
- Network virtualization and segmentation
- Group-based policies
- Context-based analytics

- **SD-Access:** Cisco Catalyst 9600 Series switches are the entry-level devices for SD-Access, Cisco's lead enterprise architecture, with policy-based automation from edge to cloud.

  ◦ Simplified segmentation and micro-segmentation, with predictable performance and scalability

  ◦ Automation through Cisco DNA Center

  ◦ Policy handled through the Cisco Identity Services Engine (ISE)

  ◦ Faster launch of new business services and significantly improved issue resolution time

- **Assurance**

  ◦ Full network visibility and monitoring

  ◦ End-to-end Quality of Experience (QoE)

  ◦ Fast issue resolution and network remediation

- Plug and Play (PnP) enabled: A simple, secure, unified, and integrated offering to ease new branch or campus device rollouts or updates to an existing network.

Full Flexible NetFlow

- **Full Flexible NetFlow (FNF):**

  Cisco IOS FNF is the next generation in flow visibility technology. It enables optimization of the network infrastructure, reduces operation costs, and improves capacity planning and security incident detection with increased flexibility and scalability. Catalyst 9600 Series switches are capable of up to 294,000 flow entries.

QoS

- **Superior QoS:**

  Cisco Catalyst 9600 Series switches offers Gigabit Ethernet speeds up to 100 Gbps with intelligent services that keep traffic flowing smoothly, even at 10 times the normal network speed. Industry-leading mechanisms for marking, classification, and scheduling deliver superior performance for data, voice, and video traffic at wire speed. Superior QoS includes granular wireless bandwidth management and fair sharing, 802.1p Class of Service (CoS) and Differentiated Services Code Point (DSCP) field classification, Shaped Round Robin (SRR) scheduling, Committed Information Rate (CIR), and eight egress queues per port.

Smart Operation

- **WebUI:**

  WebUI is an embedded GUI-based device-management tool that provides the ability to provision the device, to simplify device deployment and manageability, and to enhance the user experience. It comes with the default image, so there is no need to enable anything or install any license on the device. You can use WebUI to build configurations, and to monitor and troubleshoot the device without having CLI expertise.

- **RFID Tags:**

  Cisco Catalyst 9600 Series switches have an embedded RFID tag that facilitates easy asset and inventory management using commercial RFID readers.

- **Blue Beacon:**

  Cisco Catalyst 9600 Series switches support both front and back blue beacon LEDs for easy identification of the switch being accessed.

- **Bluetooth Ready:**

  Cisco Catalyst 9600 Series switches have hardware support to connect a Bluetooth dongle to your switch, enabling you to use this wireless interface as an IP management port interface. The port can be used for configuration and troubleshooting using WebUI or the Command-Line Interface (CLI), and to transfer images and configurations.

High-Performance IP Routing

The Cisco Express Forwarding hardware routing architecture delivers extremely high-performance IP routing in Cisco Catalyst 9600 Series switches, based on:

- IP unicast routing protocols (including static, Routing Information Protocol Version 1 [RIPv1], RIPv2, RIPng, and Open Shortest Path First [OSPF], Routed Access) are supported for small network routing applications. Equal-cost routing facilitates Layer 3 load balancing and redundancy across the stack.

- Advanced IP unicast routing protocols (including Full [OSPF], Enhanced Interior Gateway Routing Protocol [EIGRP], and Intermediate System-to-Intermediate System Version 4 [IS-ISv4]) are supported for load balancing and for constructing scalable LANs. IPv6 routing (using OSPFv3 and EIGRPv6) is supported in hardware for maximum performance.

- Protocol-Independent Multicast (PIM) for IP multicast routing is supported, including PIM sparse mode (PIM SM), and Source-Specific Multicast (SSM).

- IPv6 addressing is supported on interfaces with appropriate show commands for monitoring and troubleshooting.

Licensing

Introduction to Smart Licensing

Cisco Smart Licensing is a flexible licensing model that provides you with an easier, faster, and more consistent way to purchase and manage software across the Cisco portfolio and across your organization. And it's secure – you control what users can access. With Smart Licensing you get:

- **Easy Activation:** Smart Licensing establishes a pool of software licenses that can be used across the entire organization—no more PAKs (Product Activation Keys).

- **Unified Management:** My Cisco Entitlements (MCE) provides a complete view into all of your Cisco products and services in an easy-to-use portal, so you always know what you have and what you are using.

- **License Flexibility:** Your software is not node-locked to your hardware, so you can easily use and transfer licenses as needed.

To use Smart Licensing, you must first set up a Smart Account on Cisco Software Central (software.cisco.com). For a more detailed overview on Cisco Licensing, go to cisco.com/go/licensingguide

Software Offers

Packaging: Network and Cisco DNA Licensing

The Cisco Catalyst 9000 family of switches introduces a new and simplified licensing package in the form of base and add- on licenses.

- **The base licensing** package includes Network Advantage licensing options that are tied to the hardware. The base licensing packages cover switching fundamentals, management automation, troubleshooting, and advanced switching features. These base licenses are perpetual.

- **The add-on licensing** package includes the Cisco DNA Premier, Cisco DNA Advantage options. In addition to on-box capabilities, the features available with this package provide Cisco innovations on the switch, as well as on Cisco DNA Center. The Cisco DNA add-on licenses are available as a subscription.

License consumption is easily determined by the package itself. While base licenses are always permanent and without an expiration date, add-on licenses have to be purchased for a 3, 5, or 7 year term (and hence are also known as term- based licenses). Table 9 shows the combinations of base and add-on licenses that must be purchased.

Supported Licensing Combinations

Table 1.   License Combinations

	Cisco DNA Premier	Cisco DNA Advantage
Network Advantage	Yes	Yes

Cisco DNA Premier Subscription

Cisco DNA Premier subscriptions offer a flexible way to buy software for the access, WAN, and data center domains. At each stage in the product lifecycle, Cisco DNA Premier subscriptions help make buying, managing, and upgrading your network and infrastructure software easier. Cisco DNA Premier subscriptions provide:

- Flexible licensing models to smoothly distribute customers' software spending over time

- Investment protection for software purchases through software services–enabled license portability

- Lower cost of entry with the new Cisco DNA Premier Subscription for Switching model

For ordering information for Cisco DNA Premier Software for Cisco Catalyst 9600 Series switches, go to: https://www.cisco.com/c/en/us/products/software/one-access/switching-part-numbers.html.

Cisco Catalyst 9600 Series switches run on Cisco IOS XE Release 16.11.1 or later. This software release includes all the features listed earlier in the Platform Software Benefits section.

Managing Licenses with Smart Accounts: Creating Smart Accounts by using the Cisco Smart Software Manager (Cisco SSM) enables you to order devices and licensing packages and also manage your software licenses from a centralized website. You can set up Cisco SSM to receive daily email alerts and to be notified of expiring add-on licenses that you want to renew.

You must order an add-on license in order to purchase a switch. When the license term expires, you can either renew the add-on license to continue using it or deactivate the add-on license and then reload the switch to continue operating with the base license capabilities.

Both the base and add-on licenses are also available for a 90-day evaluation period. An evaluation license is activated temporarily, without purchase. An expired evaluation license cannot be reactivated after reload.

Note: It is not required to deploy Cisco DNA Center, just to use one of the above packages.

Network Licensing

Table 2.   Network advantage package features

Features on Cisco Catalyst uplink switches	Network Advantage
Switch Fundamentals Layer 2, Routed Access (RIP, EIGRP Stub, OSPF), PBR, PIM Stub Multicast, PVLAN, VRRP, PBR, Cisco Discovery Protocol, QoS, FHS, 802.1X, CoPP, SXP, IP SLA Responder, SSO	✓
Advanced Switch Capabilities and Scale BGP, EIGRP, HSRP, IS-IS, BSR, MSDP, PIM SM, PIM SSM, PIM-BIDIR, IP SLA, OSPF	✓
Network Segmentation VRF, VXLAN, LISP, SGT, MPLS, mVPN	✓
Automation NETCONF, RESTCONF, gRPC, YANG, PnP Agent, ZTP/Open PnP, GuestShell (on-box Python)	✓
Telemetry and Visibility Model-driven telemetry, sampled NetFlow, SPAN, RSPAN	✓
Security MACsec-256	✓

Cisco DNA Licensing

Table 3.   Cisco DNA Advantage, and premier package features

Features	Cisco DNA Advantage	Cisco DNA Premier
Switch Features		
Advanced telemetry and visibility Full Flexible NetFlow, EEM	✓	✓
Cisco DNA Center Features		
Day-0 network bring-up automation Cisco Network Plug-and-Play application, network settings, device credentials, LAN automation, host onboarding	✓	✓
Element Management Discovery, inventory, topology, software image, licensing, and configuration management	✓	✓
Element Management Patch management	✓	✓
Basic Assurance Health dashboards – Network, Client, Application; switch and wired client health monitoring	✓	✓
SD-Access Policy-based automation and assurance for wired and wireless	✓	✓

Cisco IOS XE

- This modern operating system for the enterprise provides support for model-driven programmability, on-box Python scripting, streaming telemetry, container-based application hosting, and patching for critical bug fixes. Cisco IOS® XE also has built-in defenses to protect against runtime attacks.

- Plug and Play enabled: A simple, secure, unified, and integrated offering eases new branch or campus device rollouts and can also be used to provide updates to an existing network.

- **Advanced Security**

  ○ Advanced Encryption Standard 256 (AES-256) support with the powerful MACsec-256 encryption algorithm is available in hardware.

  ○ Trustworthy solutions: Secure Unique Device Identification (SUDI) support for Plug and Play (PnP) tamper-proof device identity capability secures zero-touch provisioning by allowing your device to show a certificate to the server to be able to get on your network.

- SD-Access is Cisco's leading enterprise architecture. It includes:

  - Policy-based automation from edge to cloud

  - Macro-segmentation and micro-segmentation made easy, with predictable performance and scalability

  - Automation through the Cisco DNA Center Appliance

  - Policy through the Cisco Identity Services Engine (ISE)

  - Network assurance through the Network Data Platform

Cisco Catalyst 9600 Series Chassis

Cisco Catalyst 9600 Series switches offers one chassis option and multiple line-card options (Table 1). It provides a common architecture that can scale up to 192 10 Gigabit or 25 Gigabit Ethernet ports. The Cisco Catalyst 9600 Series redundant chassis offer High Availability (HA) by supporting 1 + 1 redundant supervisor engines with full-image In-Service Software Upgrades (ISSU). NSF/SSO and ISSU help ensure continuous packet forwarding during supervisor engine switchover to enable HA for business-critical applications.

The Cisco Catalyst 9600 Series chassis is enterprise optimized, with efficient side-to-side airflow and full front accessibility for all removable components, including supervisors, line cards, power supplies, and fan tray. The chassis also supports optional rear accessibility for the fan tray to enable efficient cable management. The Cisco Catalyst 9600 Series chassis, supervisor, line cards, power supply, and fan tray have embedded RFID tags that facilitate easy asset and inventory management using commercial RFID readers.

Table 4.   Chassis Features

Feature	Cisco Catalyst 9606R chassis
Total number of slots	6
Line Card slots	4
Supervisor Engine slots	2
Dedicated Supervisor Engine slot numbers	3 and 4
Supervisor Engine Redundancy	Yes
Supervisor Engines Supported	C9600-SUP-1
Maximum bandwidth scalability per Line Card slot	6.4 Tbps** 2.4 Tbps***
Number of Power Supply bays	4
Minimum number of Power Supplies	2*

Feature	Cisco Catalyst 9606R chassis
Power Supplies supported	2000W AC, 2000W DC
Number of Fan-tray bays	1

*Fully loaded 9606R chassis, Minimum 3 power supplies required if input voltage is 110V

**Hardware ready

***With C9600-SUP-1

Supervisor configuration

Cisco Catalyst 9600 Series switches offers an industry-leading supervisor engine built for secure networks, IoT applications, next-generation mobility, and cloud adoption. Supervisor Engine 1 is built with the latest UADP ASIC, with its programmable pipeline and template-based, configurable allocation of Layer 2, Layer 3, forwarding, ACLs and QoS entries, making it ready for next-generation technologies. Table 5 lists the maximum bandwidth per slot.

Table 5. Supervisor Engine 1 maximum bandwidth per slot

Feature	Cisco Catalyst 9600 Series Supervisor Engine 1
Cisco Catalyst 9606R Chassis	2.4 Tbps per slot

Table 6 lists the minimum software requirements for the Cisco Catalyst 9600 Series Supervisor Engine 1.

Table 6. Supervisor Engine 1 minimum software requirements

Chassis	Supervisor Engine	Minimum Software Requirement
Cisco 9606R	Cisco Catalyst 9600 Series Supervisor Engine 1	Cisco IOS XE Software Release 16.11.1

Line Card Configuration Options

Cisco Catalyst 9600 Series switches offers the ability to mix and match a range of line cards to support numerous cores and aggregation deployments. Supported line cards are listed in Table 7 by part number.

Table 7. Line Cards

Product Number	Description	Minimum Software Requirement
Cisco Catalyst 9600 Series Line Cards		
C9600-LC-24C	Cisco Catalyst 9600 Series 24-port 40GE/12-Port 100GE	Cisco IOS XE Software Release 16.11.1
C9600-LC-48YL	Cisco Catalyst 9600 Series 48-port 25GE/10GE/(1GE*)	Cisco IOS XE Software Release 16.11.1
C9600-LC-48TX	Cisco Catalyst 9600 Series 48-port RJ45 Copper - 10GE/5GE/2.5GE/1GE/100Mbps/10Mbps	Cisco IOX XE Software Release 17.1.1
C9600-LC-48S	Cisco Catalyst 9600 Series 48-Port 1GE	Cisco IOX XE Software Release 17.2.1

*Not available at First Customer Shipment (FCS), supported from IOX-XE 16.12.2

Cisco Catalyst 9600 Series switches has flexible interface types and port densities that allow you to mix and match network configurations to meet the specific needs of campus networks (Table 8).

Table 8.   Maximum Chassis Port Densities

Cisco Catalyst 9606R Chassis	C9600-SUP-1
100G	48
40G	96
25G	192
10G	192
5G**	192
2.5G**	192
1G	192
100M**	192
10M**	192

** - Using C9600-LC-48TX

Physical specifications

Table 9 lists physical specifications of the Cisco Catalyst 9606 chassis.

Table 9.   Physical specifications of Cisco Catalyst 9606 chassis

Description	Specifications
SKU	C9606R
Dimensions (H x W x D)	35.43 x 44.2 x 40.9 cm 13.95 x 17.4 x 16.1 in.
Rack Units (RU)	8
Chassis Weight with 2 Power Supplies (AC) and Fan tray	31.31 kg (69.03 lb)
Input Voltage	AC: 90V to 264V, 47 to 63 Hz AC DC: –40V to –72V
Operating Temperature	–5° to 45° C (23° to 113° F) up to 6000 feet –5° to 40° C (23° to 104° F) up to 10,000 feet
Storage Temperature	–40° to 75° C (40° to 167° F)

Description	Specifications
Relative Humidity, Operating and Non-operating, Non-condensing	10% to 95%, Non-condensing
Altitude	-60 to 3000 m (-197 to 9843 feet)
Mean Time Between Failures (MTBF) (hours)	C9606R chassis: 4,113,900 C9606 fan tray: 452,570 C9600-PWR-2KWAC: 300,000 C9600-PWR-2KWDC: 300,000
Chassis Weight (without Fan tray, without PSU)	25.36 kg (55.90 lb)
Weight of Fan-tray	3.56 kg (7.85 lb)
Weight of individual PSUs	AC PSU: 1.2 kg (2.65 lb) DC PSU: 1.28 kg (2.82 lb)

Power supply

The Cisco Catalyst 9600 Series power supplies support two modes of operation.

Combined Mode

In combined mode, the power available for the entire chassis is equal to the sum of the output power of all of the power supplies multiplied by the share ratio. Additional power supply units operate at ~90% capacity. In combined mode, the power supplies need to be of equal wattage. The power supplies can be AC and DC mixed provided AC input voltage is 220V. Table 10 shows the power output for one, two, three, and four PSUs.

P = Power output of one PSU

Total combined mode power = $P + (N-1) * P * (\text{share ratio})$

N = 1, 2, 3, or 4

Table 10.   Power output in combined mode

Input Voltage	1 PSU	2 PSUs	3 PSUs	4 PSUs
110V	1050W	2040W	3030W	4020W
220V	2000W	3940W	5880W	7820W

Redundant N+1 Mode

The Cisco Catalyst 9600 Series chassis also supports N+1 redundancy, with N independent input circuits and safeguards against the failure of one (+1) of the circuits during a PSU failure. Additional PSUs operate at ~90% capacity. In redundant mode, the power supplies need to be of equal wattage. The power supplies can be AC and DC mixed provided AC input voltage is 220V. Table 11 shows the power output with two, three, and four PSUs.

Table 11. Power Output in N+1 Mode

Input Voltage	2 PSUs	3 PSUs	4 PSUs
110V	1050W	2040W	3030W
220V	2000W	3940W	5880W

Table 12 gives the power supply specifications for Cisco Catalyst 9600 Series switches. Table 13 shows the BTU output.

Table 12. Power Supply Specifications

Power Supply Feature	C9600-PWR-2KWAC	C9600-PWR-2KWDC
Max power rating	2000W	2000W
Input voltage range and frequency	90VAC to 140VAC and 180VAC to 264VAC 47 to 63 Hz	-40VDC to -72VDC
Power supply efficiency	94% (typical)	92% (typical)
Input current	AC 10.5A max at 115VAC (1050W) 7.8 A max at 230VAC (2000W)	Maximum: 60A per DC input at -40VDC input (when full PSU loading)
Output ratings	12Vmain at 167A	12Vmain at 167A
Output holdup time	AC = 20 ms minimum for system	AC = 5 ms minimum for system
Power-supply input receptacles	AC IEC 60320 C16	Amphenol C10-638976-000
Power cord rating	AC 15A	DC 70A

Table 13. BTU details for 9606R chassis with Fan tray

Total output BTU	BTU
C9606R + C9606-FAN	1621 (max)[*]

[*]The power listed in Table 13 is the absolute maximum. Typically, the power would be 70% of absolute maximum

Table 14. Cisco Catalyst 9600 Series Power Cord Options

C9600-PWR-2KWAC	
CAB-TA-CN	China AC Type A Power Cable
CAB-TA-IS	Israel AC Type A Power Cable
CAB-TA-AP	Australia AC Type A Power Cable
CAB-TA-AR	Argentina AC Type A Power Cable
CAB-TA-DN	Denmark AC Type A Power Cable
CAB-TA-EU	Europe AC Type A Power Cable
CAB-TA-IN	India AC Type A Power Cable
CAB-TA-IT	Italy AC Type A Power Cable
CAB-TA-SW	Switzerland AC Type A Power Cable
CAB-TA-UK	United Kingdom AC Type A Power Cable
CAB-TA-NA	North America AC Type A Power Cable
CAB-C15-CBN	Cabinet Jumper Power Cord, 250 VAC 13A, C14-C15 Connectors
CAB-TA-JP	Japan AC Type A Power Cable
CAB-C15-CBN-JP	Japan Cabinet Jumper Power Cord, 250 VAC 12A, C14-C15
CAB-TA-250V-JP	Japan 250V AC Type A Power Cable
CAB-ACBZ-12A	AC Power Cord (Brazil) 12A/125V BR-3-20 plug up to 12A
PWR-2KW-DC-CBL	Power Cord - 2KW DC

Fan tray

Each Cisco Catalyst 9600 Series switches uses a single serviceable fan tray for cooling. The switches can optionally be accessed from the rear for flexible cable management. The chassis is optimized for enterprise closets, with side-to-side airflow. All fan trays are composed of multiple independently controlled fans. If any single fan fails, the system will continue to operate without a significant degradation in cooling. Fan speeds change dynamically to compensate for fan failure. Cisco Catalyst 9600 Series fans have a barometric sensor, which allows slower fan speed curves at lower altitudes. The fans also have individual Pulse-Wide Modulation (PWM) fine-tuning to reduce variability in fan revolutions per minute (rpm) under throttled conditions. The measured acoustic noise in a formal NEBS test environment is 77.7 Lwad (dB). The chassis are designed to accommodate fanless operation of up to 90 seconds to enable serviceability.

Figure 2.
Cisco Catalyst 9606R Chassis with Fan Tray

Regulatory standards compliance

Table 15 lists the regulatory standards compliance for Cisco Catalyst 9600 Series switches.

Table 15. Safety and Compliance Information (TBD)

Description	Specification
Safety certifications	C9606R • IEC 60950-1 plus Am1, Am2, Am9, Am10, Am11, Am12 and all deviations and differences • AS/NZS 60950.1.2011 • CAN/CSA-C22.2 No. 60950-1-07 • GB 4943-95 • EN 60950-1; 2006 plus Am1, Am 2, Am9, Am10, Am11, Am12 and all deviations and differences • NOM-019-SCFI-1998 • UL 60950-1, Second Edition

Description	Specification
EMI and EMC Compliance	47 CFR Part 15 Class A
	CNS13438: 2006 Class A
	EN 300 386 V1.6.1
	EN61000-3-2: 2014
	EN61000-3-3: 2013
	ICES-003 Issue 6: 2016 Class A
	KN 32: 2015 Class A
	TCVN 7189: 2009 Class A
	EN 55032:2012/ AC:2013 Class A
	EN 55032:2015 Class A
	CISPR 32 Edition 2 Class A
	V-2/2015.04 Class A
	V-3/2015.04 Class A
	CISPR24: 2010 + A1: 2015
	EN 300 386 V1.6.1
	EN55024: 2010 + A1: 2015
	KN35: 2015
	TCVN 7317: 2003

Ordering information

Table 16 lists the ordering information for chassis, power supplies, supervisor engines, and memory that are commonly used with the Cisco Catalyst 9600 Series, as well as the Cisco DNA term licenses.

Table 16. Ordering Information

Product Number	Description
C9606R (=)	Cisco Catalyst 9600 Series 6 Slot Chassis
C9600-SUP-1 (=)	Cisco Catalyst 9600 Series Supervisor 1 Module
C9600-SUP-1/2	Cisco Catalyst 9600 Series Redundant Supervisor 1 Module
C9600-LC-24C (=)	Cisco Catalyst 9600 Series 24-Port 40GE/12-Port 100GE
C9600-LC-48YL (=)	Cisco Catalyst 9600 Series 48-Port 25GE/10GE/1GE
C9600-LC-48TX (=)	Cisco Catalyst 9600 Series 48-port RJ45 Copper - 10GE/5GE/2.5GE/1GE/100Mbps/10Mbps
C9600-LC-48S (=)	Cisco Catalyst 9600 Series 48-Port 1GE
C9606-FAN (=)	Cisco Catalyst 9600 Series C9606 Chassis Fan Tray

Product Number	Description
C9K-F2-SSD-240GB (=)	Cisco Catalyst 9600 Series 240GB SSD Storage
C9K-F2-SSD-480GB (=)	Cisco Catalyst 9600 Series 480GB SSD Storage
C9K-F2-SSD-960GB (=)	Cisco Catalyst 9600 Series 960GB SSD Storage
Cisco DNA Term Licenses	**Description**
C9600-DNA-A	C9600 Cisco DNA Advantage Term License
C9600-DNA-A-3Y	C9600 Cisco DNA Advantage 3 Year License
C9600-DNA-A-5Y	C9600 Cisco DNA Advantage 5 Year License
C9600-DNA-A-7Y	C9600 Cisco DNA Advantage 7 Year License
C9600-DNA-P	C9600 Cisco DNA Premier License
C9600-DNA-P-3Y	C9600 Cisco DNA Premier 3 Year Term License
C9600-DNA-P-5Y	C9600 Cisco DNA Premier 5 Year Term License
C9600-DNA-P-7Y	C9600 Cisco DNA Premier 7 Year Term License
CAT-DNA-P-ADD	Cisco DNA Premier Catalyst Add-on
CAT-DNA-P-ADD-3Y	Cisco DNA Premier Catalyst Add-on, 3 Year Term License
CAT-DNA-P-ADD-5Y	Cisco DNA Premier Catalyst Add-on, 5 Year Term License
CAT-DNA-P-ADD-7Y	Cisco DNA Premier Catalyst Add-on, 7 Year Term License
Power Supplies	**Description**
C9600-PWR-2KWAC (=)	Cisco Catalyst 9600 Series 2000W AC Power Supply
C9600-PWR-2KWDC (=)	Cisco Catalyst 9600 Series 2000W DC Power Supply
Spare Accessories and Kits	**Description**
C9606-SLOT-BLANK (=)	Cisco Catalyst 9600 Series Blank for Chassis Module Slot
C9606-PWR-BLANK (=)	Cisco Catalyst 9600 Series Blank for Chassis Power Supply Slot
CAB-CONSOLE-USB	Console Cable 6ft with USB Type A and mini-B
CAB-CONSOLE-RJ45	Console Cable 6ft with RJ45 and DB9F
C9606-RACK-KIT=	Cisco Catalyst 9600 Series 6 slot chassis Rack Mount

Product Number	Description
C9606-ACC-KIT=	Cisco Catalyst 9600 Series 6 slot chassis Accessory Kit
C9606-SHELF-KIT=	Cisco Catalyst 9600 Series 6 slot chassis Shelf Install Kit
C9606-FB-23-KIT=	Cisco Catalyst 9600 Series 6 slot chassis Front to Back Kit

Cisco environmental sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environment Sustainability" section of Cisco's Corporate Social Responsibility (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the "Environment Sustainability" section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE compliance

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

Cisco Enhanced Limited Lifetime Hardware Warranty

Cisco Catalyst 9600 Series switches come with an Enhanced Limited Lifetime Warranty (E-LLW) that includes Next-Business-Day (NBD) delivery of replacement hardware where available and 90 days of 8x5 Cisco Technical Assistance Center (TAC) support. Your formal warranty statement, including the warranty applicable to Cisco software, appears in the information packet that accompanies your Cisco product. We encourage you to carefully review the warranty statement shipped with your specific product before use. Cisco reserves the right to refund the purchase price as its exclusive warranty remedy. For further information about warranty terms, visit https://www.cisco.com/go/warranty.

Table 17 provides information about the E-LLW.

Table 17. E-LLW Details

	Cisco E-LLW
Devices Covered	Applies to Cisco Catalyst 9600 Series switches.
Warranty Duration	As long as the original customer owns the product.
End-of-Life Policy	In the event of discontinuance of product manufacture, Cisco warranty support is limited to 5 years from the announcement of discontinuance.
Hardware Replacement	Cisco or its service center will use commercially reasonable efforts to ship a replacement for NBD delivery, where available. Otherwise, a replacement will be shipped within 10 working days after receipt of the Return Materials Authorization (RMA) request. Actual delivery times might vary depending on customer location.
Effective Date	Hardware warranty commences from the date of shipment to customer (and in case of resale by a Cisco reseller, not more than 90 days after original shipment by Cisco).
TAC Support	Cisco will provide during business hours, 8 hours per day, 5 days per week, basic configuration, diagnosis, and troubleshooting of device-level problems for up to a 90-day period from the date of shipment of the originally purchased Cisco Catalyst 9600 Series product. This support does not include solution or network-level support beyond the specific device under consideration.
Cisco.com access	Warranty allows guest access only to Cisco.com.

Cisco Services

Successfully deploy, manage, and support Cisco Catalyst 9000 switches with a full life cycle of Cisco Services including implementation, optimization, technical, managed and training services. Our team of experts can help you speed deployment, reduce costs and minimize risk as you introduce new hardware, software and protocols into the network. As your trusted advisor, we help you achieve extraordinary business outcomes, minimize risk and disruption so you can anticipate change and pivot quickly, securely, and confidently.

Table 18. Technical Services

Cisco Technical Services
Cisco Smart Net Total Care® Service • Around-the-clock, global access to the Cisco TAC • Unrestricted access to the extensive Cisco.com knowledge base and tools • NBD, 8x5x4, 24x7x4, and 24x7x2 advance hardware replacement and onsite parts replacement and installation available • Ongoing operating system software updates within the licensed feature set[1] • Proactive diagnostics and real-time alerts on Smart Call Home-enabled devices

Cisco Technical Services
Cisco Solution Support Service • Provides a team of experts who act as primary point of contact to deliver centralized support, including in multivendor network environments • Speed is paramount when problems arise, so we deliver on a 30-minute service level objective and prioritize Solution Support cases • Expert guidance helps to enhance IT operations with fewer outages and faster problem resolution while maximizing performance and reliability of Catalyst 9600 Series switches • We even look beyond identified problems and provide the necessary guidance needed to help you avoid any pitfalls before they can disrupt IT or your business

[1] Cisco operating system updates include the following: maintenance releases, minor updates, and major updates within the licensed feature set

[Learn more about available services](.).

Software Policy for Cisco Catalyst 9600 Series Switches

[Cisco DNA Software for Access Switching](.) is available for the Cisco Catalyst 9600 Series.

Cisco DNA Software for Access Switching offers comprehensive solutions for the enterprise campus and branch offices. Cisco ONE for Access Switching introduces a simpler and more economical way to deploy access, aggregation, and core switches across enterprise campus and branch locations.

The Cisco DNA Subscription for Switching offer delivers an unbound network on an open and extensible architecture to help you navigate the digital journey. This subscription offer simplifies the buying process and includes lower initiation costs and flexible terms. It includes Cisco DNA Advantage with full Cisco Digital Network Architecture (Cisco DNA) capabilities and Cisco SD-Access.

For ordering information for Cisco DNA Software for the Cisco Catalyst 9600 Series, go to https://www.cisco.com/c/en/us/products/software/one-access/switching-part-numbers.html.

Software Policy for Network Stack components

Customers with the Network Essential Stack and Network Advantage Stack software feature sets will be provided with maintenance updates and bug fixes. These are designed to maintain compliance of the software with published specifications, release notes, and industry standards as long as the original end user continues to own or use the product or for up to one year from the end-of-sale date for the product, whichever occurs earlier.

Cisco Embedded Support for Cisco DNA Term Components

Cisco Embedded Support delivers the right support for Cisco software products and suites. It will keep your business applications performing as expected and protect your investment. Cisco Embedded Support for the Cisco DNA Essentials and Cisco DNA Advantage term components is included as part of the switch value. Embedded Support provides access to TAC support, major software updates, maintenance and minor software releases, and the Cisco Software Support site, for increased productivity with anytime access.

Cisco Capital

Flexible payment solutions to help you achieve your objectives

Cisco Capital makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments. Learn more.

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