Cisco Catalyst 9600 Series Supervisor Engine

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 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 help customers 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) 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, Graceful Insertion and Removal (GIR), Cisco Nonstop Forwarding with Stateful Switchover (NSF/SSO), redundant platinum-rated power supplies, and fans.

The Foundation of Software-Defined Access

Advanced persistent security threats. The exponential growth of IoT devices. Mobility everywhere. Cloud adoption. All of these require a network fabric that integrates advanced hardware and software innovations to automate, secure, and simplify customer networks. The goal of this network fabric is to enable customer revenue growth by accelerating the rollout of business services.

The Cisco Digital Network Architecture (Cisco DNA) with Software-Defined Access (SD-Access) is the network fabric that powers business. It is an open, 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

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 of 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/10 Gigabit Ethernet SFP28/SFP+ ports with the Cisco Catalyst 9600 Series Supervisor Engine 1

- Up to 192 nonblocking 10 Gigabit Ethernet SFP+ ports

- Platinum-rated AC 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.

- Console supports mini USB and RJ-45 connectivity.

- Supports 2 x USB 3.0 ports.

- Management port supports RJ-45 (1 GE) and SFP+ (10 GE).

- 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 IPv4-to-IPv6 migration.

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

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.

---

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

- 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
  ◦ Encrypted Traffic Analytics (ETA): This technology uses the power of machine learning to identify and take action toward threats or anomalies in your network. It includes malware detection in encrypted traffic and distributed anomaly detection.
  ◦ Advanced Encryption Standard 256 (AES-256) support with the powerful MACsec-256 encryption algorithm is available in hardware.
  ◦ Trustworthy systems: 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

- SD-Access is Cisco's leading enterprise architecture. It includes:
  ◦ Policy-based automation from edge to cloud
  ◦ Segmentation and micro-segmentation made easy, with predictable performance and scalability
  ◦ Automation through the Cisco APIC Enterprise Module (APIC-EM)
  ◦ Policy through the Cisco Identity Services Engine (ISE)
  ◦ Network assurance through the Network Data Platform
  ◦ The ability to launch new business services faster and reduce issue resolution time significantly

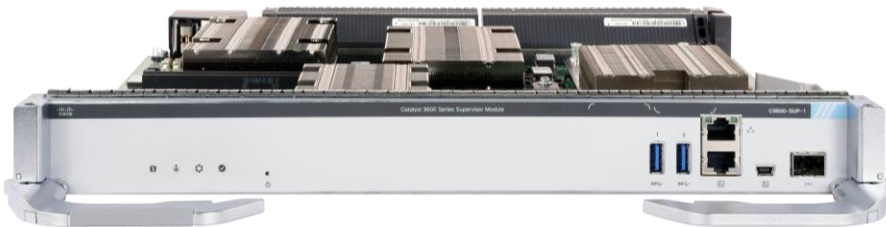## Cisco Catalyst 9600 Series Supervisor Engine 1

Figure 1.
Cisco Catalyst 9600 Series Supervisor Engine 1

Supervisor Engine 1 Chassis and Line-Card Support

Table 1 shows the supervisor engine and line-card slot assignment options in the Cisco Catalyst 9600 Series chassis.

Table 1.   Chassis Slot Assignment Options

Chassis	Single Supervisor Engine 1 slot assignments	Redundant Supervisor Engine 1 slot assignments	Line-card slot options
Cisco Catalyst 9606R	Slot 3 or 4	Slot 3 and 4	Slots 1 to 2 and 5 to 6

Table 2.   Minimum Software

Chassis	Minimum software
Cisco Catalyst 9606R	Cisco IOS XE 16.11.1

Table 3 summarizes the performance capacities of the Supervisor Engine 1.

Table 3.   Bandwidth Per Slot for the 9606R Chassis

	Bandwidth per slot
Supervisor Engine 1	2.4 Tbps per slot

Table 4 summarizes the line-card modules supported on the Supervisor Engine 1.

Table 4.   Line-Card and Module Support

Supervisor engine	Line card	Description	Minimum software
Supervisor Engine 1	C9600-LC-48YL	Cisco Catalyst 9600 Series 48-Port 25GE/10GE/(1GE*)	Cisco IOS XE 16.11.1
	C9600-LC-24C	Cisco Catalyst 9600 Series 24-Port 40GE/12-Port 100GE	Cisco IOS XE 16.11.1

*Not available at First Customer Shipment (FCS).

Predictable Performance and Scalability

Table 5 highlights the performance and scalability enhancements of the Cisco Catalyst 9600 Series Supervisor Engine 1.

Table 5.   Performance and Scalability Features

Feature	Performance and scalability
System switching capacity	Up to 9.6 Tbps[1]
Per-slot switching capacity	2.4 Tbps
UADP ASICs	3

Feature	Performance and scalability
Total number of MAC addresses	Up to 82,000
FNF entries (IPv4/IPv6)	Up to 294,000 (98,000 per ASIC)
DRAM	16 GB
Flash	16 GB
VLAN IDs	4094
PVST Instances	1000
SSD capacity	Up to 960 GB
Total Switched Virtual Interfaces (SVIs)	1000
Jumbo frames	9216
Forwarding rate	3 Bpps (1 Bpps per ASIC)
Total number of IPv4 routes	Up to 212,000 (indirect + direct)[2,3]
Total number of IPv6 routes	Up to 212,000[2,3]
Address Resolution Protocol (ARP) entries	Up to 90,000
Multicast routes	Up to 32,000[2]
QoS ACL Scale	Up 16,000[2]
Security ACL Scale	Up 27,000[2]
Packet buffer	Up to 108 MB (36 MB per ASIC)

[1]Based on 9606R chassis with 4 line cards operating at 2.4 Tbps.

[2]Varies based on selected flexible ASIC template.

[3]Total routes are shared between IPv4 and IPv6.

Flexible ASIC Templates

Flexible ASIC templates enable universal deployments by leveraging the UADP's ability to create resources to optimize table sizes for different places in the network. Based on how the switch is used in the network, an appropriate flexible ASIC template may be selected to configure the switch for specific features.

The following flexible ASIC templates are supported on the Cisco Catalyst 9600 Series.

- Distribution: Maximizes system resources for MAC and security
- Core: Maximizes system resources for unicast and multicast routing
- NAT: Maximizes system resources for Layer 3 and NAT to support collapsed core WAN deployments
- SD-Access: Maximizes system resources to support fabric deployment

Table 6 describes the ASIC templates.

Table 6. ASIC Template Descriptions

Templates for Cisco Catalyst 9600 Series Supervisor Engine 1	Distribution template (per ASIC)	Core template (per ASIC) (default template)	NAT template (per ASIC)	SD-Access template (per ASIC)
IPv4/IPv6 routes (LPM/host)	114,000	212,000	212,000	212,000
Multicast routes	16,000	32,000	32,000	32,000
IGMP/MLD snooping	2,000	2,000	2,000	2,000
MAC address	82,000	32,000	32,000	32,000
SGT label	32,000	32,000	32,000	32,000
NetFlow	98,000	64,000	64,000	64,000
NetFlow ACL	1000 ingress, 1000 egress	1000 ingress, 1000 egress	1000 ingress, 1000 egress	1000 ingress, 1000 egress
Security ACLs	27,000[*]	27,000[*]	20,000[*]	27,000[*]
QoS ACLs	16,000[*]	16,000[*]	8,000[*]	16,000[*]
PBR/NAT	3,000	3,000	15,500	2,000
Tunnel/MACsec	3,000	3,000	2,000	3,000
LISP	1,000	1,000	1,000	2,000
STP instances	1,000	1,000	1,000	1,000
CoPP	1,000	1,000	1,000	1,000

[*]ACL allocation is configurable between ingress,egress, IPv4, non IPv4

Performance and scalability numbers are per ASIC where applicable, with three ASICs in the 9600 Series Supervisor Engine 1.

SD-Access Architecture

Enterprises are in search of ways to transform their operations to add digital capabilities that enhance service delivery and asset management. Cisco SD-Access provides this transformational shift in building and managing networks. It provides faster, easier, and improved business efficiency with investment protection for enhanced business outcomes. By decoupling network functions from hardware, SD-Access helps ensure policy compliance, allows you to launch new business services faster, and improves issue resolution times significantly. At the same time, it is open and extensible and can significantly reduce your operational expenses.

Cisco 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, and context-based analytics. With these fundamental features in place, key use cases can now be orchestrated. These use cases include user mobility, secure segmentation, user onboarding and policies, IoT integration, guest access, context-based troubleshooting, and data center and cloud integration.

Platform Benefits

Cisco IOS XE Software

The Cisco Catalyst 9600 Series 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 mechanisms that bring about network automation are outlined below, based on a device lifecycle.

- **Automated device provisioning:** This 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 both turnkey solutions such as Plug and Play and off-the-shelf tools such as Zero-Touch Provisioning (ZTP) and Preboot Execution Environment (PXE) that enable an effortless and automated deployment.

- **API-driven configuration:** Modern network switches such the Cisco Catalyst 9600 Series support a wide range of automation features and provide robust open APIs over Network Configuration Protocol (NETCONF) and RESTCONF using YANG data models for external tools, both off the shelf and custom built, to automatically provision network resources.

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

- **Seamless software upgrades and patching:** To enhance OS resilience, Cisco IOS XE supports patching, which provides fixes for critical bugs and security vulnerabilities between regular maintenance releases. This support allows customers to add patches without having to wait for the next maintenance release.

Security

- **Encrypted Traffic Analytics (ETA):** ETA is a unique capability for identifying malware in encrypted traffic coming from the access layer. Since more and more traffic is being encrypted, the visibility this feature provides related to threat detection is critical for keeping your network secure at different layers. ETA is not available at FCS, but will be available in future software releases.

- **AES-256 MACsec encryption:** AES is the IEEE 802.1AE standard for authenticating and encrypting packets between switches and endpoints. The Cisco Catalyst 9600 Series Switches support 256-bit and 128-bit AES on all ports at all speeds, providing the most secure link encryption
(switch to switch).

- **Trustworthy systems:** Cisco Trust Anchor Technologies provide a highly secure foundation for Cisco products. With the Cisco Catalyst 9600 Series, these trustworthy systems enable hardware and software authenticity assurance for supply chain trust and strong mitigation against man-in-the-middle attacks on software and firmware. Trust Anchor capabilities include:
  - **Image signing:** Cryptographically signed images provide assurance that the firmware, BIOS, and other software are authentic and unmodified. As the system boots, the system's software signatures are checked for integrity.
  - **Secure Boot:** Cisco Secure Boot technology anchors the boot sequence chain of trust to immutable hardware, mitigating threats against a system's foundational state and the software that is to be loaded, regardless of a user's privilege level. It provides layered protection against the persistence of illicitly modified firmware.
  - **Cisco Trust Anchor module:** A tamper-resistant, strong cryptographic, single-chip solution provides hardware authenticity assurance to uniquely identify the product so that its origin can be confirmed to Cisco, providing assurance that the product is genuine.

Resiliency and High Availability

- **Cisco StackWise® Virtual:** StackWise Virtual is an advanced stacking technology that supports both distribution and core deployments through multiple topologies. It provides higher scale for system virtualization at the network layer. StackWise Virtual is not available at FCS, but will be available in future software releases.

- **Software Maintenance Upgrade (SMU):** An SMU is a package that can be installed on a system to provide a patch fix or security resolution to a released image. SMUs allow you to address the network issue quickly while reducing the time and scope of the testing required. The Cisco IOS XE platform internally validates the SMU compatibility and does not allow you to install incompatible SMUs. All SMUs are integrated into the subsequent Cisco IOS XE Software maintenance releases.

- **Graceful Insertion and Removal (GIR):** GIR isolates a switch from the network to enable debugging or an upgrade operation. By using the switch maintenance mode, GIR can systematically eject a Cisco Catalyst 9600 Series Switch from the network with zero or minimal disruption to the network service. When a switch is in maintenance mode, it is isolated from the active forwarding paths in the network. Maintenance tasks, such as real-time debugging, hardware replacement, or software upgrade or downgrade, can be performed without affecting the production traffic. When maintenance tasks are completed, the GIR function places the switch back into the network without impact. The GIR function is not available at FCS, but will be available in future software releases.

Flexible NetFlow

- **Flexible NetFlow (FNF):** FNF is the next generation in flow visibility technology, allowing optimization of the network infrastructure, reducing operation costs, and improving capacity planning and security incident detection with increased flexibility and scalability. The Cisco Catalyst 9600 Series is capable of up to 98,000[*] flow entries. ([*]with the Distribution SDM template).

Application Visibility and Control

- **Next-Generation Network-Based Application Recognition (NBAR2):** NBAR2 enables advanced application classification techniques, accuracy with up to 1400 predefined and well-known application signatures, and up to 150 encrypted applications on the Cisco Catalyst 9600 Series. Some of the most popular applications included are Skype, Office 365, Microsoft Lync, Cisco Webex®, and Facebook. Many others are already predefined and easy to configure. NBAR2 provides the network administrator with an important tool to identify, control, and monitor end-user application usage while helping ensure a quality user experience and securing the network from malicious attacks. It uses FNF to report application performance and activities within the network to any supported NetFlow collector, such as Cisco Prime®, Cisco Stealthwatch®, or any compliant third-party tool. NBAR2 is not available at FCS, but will be available in future software releases.

QoS

Superior QoS: QoS technologies are a set of tools and techniques for managing network resources and are considered the key enabling technologies for the transparent convergence of voice, video, and data networks. QoS on the Cisco Catalyst 9600 Series consists of classification and marking, policing and markdown, scheduling, shaping, and queuing functions. A modular QoS command-line framework provides consistent platform-independent and flexible configuration behavior. The 9600 Series also supports 2-level hierarchical or nested policies.

Service Discovery

- Multicast DNS (mDNS) gateway: This service discovery gateway capability facilitates the sharing of services advertised using the Apple mDNS (Bonjour) protocol (such as printers, Apple TVs, and file services across the network). Additionally, the administrator can create policies defining which services can be seen and accessed by the users in the network. This capability facilitates a Bring-Your-Own-Device (BYOD) rollout.

Smart Operation

- **Bluetooth ready:** The Cisco Catalyst 9600 Series has hardware support to connect a Bluetooth dongle to your switch, enabling you to use this wireless interface as a management port. This port functions as an IP management interface and can be used for configuration and troubleshooting using WebUI or the Command-Line Interface (CLI), and to transfer images and configurations. Bluetooth dongle support is not available at FCS, but will be available in future software releases.

- **WebUI:** WebUI is an embedded GUI-based device-management tool that provides the ability to provision the device, simplifying device deployment and manageability and enhancing the user experience. WebUI comes with the default image. There is no need to enable anything or install any license on the device. You can use WebUI to build a day-1 configuration and from then on monitor and troubleshoot the device without knowing how to use the CLI.

- **RFID tags:** The Cisco Catalyst 9600 Series Switches have an embedded RFID tag that facilitates easy asset and inventory management using commercial RFID readers.

- **Blue beacon:** The Cisco Catalyst 9600 Series Switches support a blue beacon LED for easy identification of the switch being accessed.

High-Performance IP Routing

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

- IP routing protocols provide the fundamental infrastructure for the delivery of advanced IP services across the Cisco Catalyst 9600 Series. Whether based on Internet Engineering Task Force (IETF) standards or Cisco innovations, these protocols enable Cisco to offer the broadest portfolio of IP routing technologies. All share industry-leading scalability, availability, manageability, fast convergence, and high-performance capabilities.

- IP unicast routing protocols (including static; Routing Information Protocol version 1 [RIPv1], version 2 [RIPv2], and next generation [RIPng]; and Open Shortest Path First [OSPF] routed access) are supported for small network routing applications.

- Advanced IP unicast routing protocols (such as OSPF, Enhanced Interior Gateway Routing Protocol [EIGRP], Border Gateway Protocol Version 4 [BGPv4], 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), bidirectional PIM,[*] and Source-Specific Multicast (SSM).

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

- [*]Feature not available at FCS, but will be available in future software releases.

Packaging: Network and Cisco DNA Licensing

The Cisco Catalyst 9000 family of switches introduces new packaging that includes vastly simplified base network packages (Network Advantage) and term-based software packages (Cisco DNA Advantage, and Cisco DNA Premier) as add-ons. The Cisco DNA packages, in addition to on-box capabilities, also unlock additional functionality in Cisco DNA Center, enabling controller-based software-defined automation in your network.

For information about feature support on specific models, please refer to the Cisco Feature Navigator (https://cfn.cloudapps.cisco.com/ITDIT/CFN/jsp/index.jsp) and the Cisco Catalyst 9600 Series Release Notes.

License consumption is further simplified to the following combinations:

Advantage: This consists of Perpetual Network Advantage and a term-based (3-, 5-, or 7-year) Cisco DNA Advantage package.

Note that it is not required to deploy Cisco DNA Center just to use one of the above packages. Refer to https://www.cisco.com/c/dam/en/us/products/collateral/software/one-wireless-subscription/q-and-a-c67-739601.pdf for additional details about Advantage packages.

Cisco DNA Premier Subscription

Cisco DNA Premier subscriptions offer a flexible way to buy software for the access, WAN, core, 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-subscription-switching/index.html.

Table 7 lists the features of the Network Advantage packages. Table 8 lists the features of the Cisco DNA Advantage, and Cisco DNA Premier packages.

Table 7.   Network Advantage Package Features

Features	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	✓
High availability and resiliency NSF, GIR, ISSU,[*] StackWise Virtual[*]	✓
Security MACsec-256	✓

[*]Feature not available at FCS, but will be available in future software releases.

Table 8.   Cisco DNA Advantage, and Cisco DNA Premier Package Features

Features	Cisco DNA Advantage	Cisco DNA Premier
Switch features		
Optimized network deployments Cisco DNA Service for Bonjour	✓	✓
Advanced telemetry and visibility	✓	✓

Features	Cisco DNA Advantage	Cisco DNA Premier
Full FNF, EEM		
Optimized telemetry and visibility ERSPAN, AVC (NBAR2),[*] app hosting (in containers/VMs), Wireshark	✓	✓
Advanced security ETA[*]	✓	✓
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	✓	✓
Network assurance and analytics Global insights, trends, compliance, custom reports; Switch 360, Wired Client 360; fabric and non-fabric insights; app health, App 360, app performance (loss, latency, jitter)	✓	✓

[*]Feature not available at FCS, but will be available in future software releases.

Physical Specifications

Table 9 lists physical specifications of the Cisco Catalyst 9600 Series Supervisor Engine 1.

Table 9.   Physical Specifications

Description	Specifications
SKU	C9600-SUP-1
Dimensions (H x W x D)	1.7 x 15.0 x 13.41 in. (4.32 x 38.1 x 34.06 cm) to faceplate 1.7 x 15.0 x 15.7 in. (4.32 x 38.1 x 39.88 cm) to ejector
Weight	5.45 Kg (12.02 lb)
Rack Units (RU)	1 RU
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)
Relative humidity, operating and nonoperating,	10% to 95%, noncondensing

Description	Specifications
noncondensing	
Altitude	-60 to 3000 m (-197 to 9843 feet)
Mean Time Between Failures (MTBF) (hours)	271,420

Supported Optics

For details about the different optical modules and the minimum Cisco IOS Software release required for each of the supported optical modules, visit https://tmgmatrix.cisco.com/

Management and Standards Support

Table 10 shows management and standards support for the Cisco Catalyst 9600 Series.

Table 10. Management and Standards Support

Description	
Management	BGP4-MIB
	BRIDGE-MIB
	CISCO-ACCESS-ENVMON-MIB
	CISCO-AUTH-FRAMEWORK-MIB
	CISCO-BGP4-MIB
	CISCO-BRIDGE-EXT-MIB
	CISCO-BULK-FILE-MIB
	CISCO-CABLE-DIAG-MIB
	CISCO-CALLHOME-MIB
	CISCO-CDP-MIB
	CISCO-CEF-MIB
	CISCO-CLASS-BASED-QOS-MIB
	CISCO-CONFIG-COPY-MIB
	CISCO-CONFIG-MAN-MIB
	CISCO-CONTEXT-MAPPING-MIB
	CISCO-DATA-COLLECTION-MIB
	CISCO-DHCP-SNOOPING-MIB
	CISCO-EIGRP-MIB
	CISCO-EMBEDDED-EVENT-MGR-MIB
	CISCO-ENHANCED-IMAGE-MIB
	CISCO-ENHANCED-MEMPOOL-MIB
	CISCO-ENTITY-ASSET-MIB
	CISCO-ENTITY-EXT-MIB
	CISCO-ENTITY-FRU-CONTROL-MIB
	CISCO-ENTITY-SENSOR-MIB
	CISCO-ENTITY-VENDORTYPE-OID-MIB
	CISCO-ENVMON-MIB

Description	
	CISCO-ERR-DISABLE-MIB
	CISCO-FLASH-MIB
	CISCO-FTP-CLIENT-MIB
	CISCO-HSRP-EXT-MIB
	CISCO-HSRP-MIB
	CISCO-IETF-BFD-MIB
	CISCO-IETF-DHCP-SERVER-EXT-MIB
	CISCO-IETF-DHCP-SERVER-MIB
	CISCO-IETF-ISIS-MIB
	CISCO-IETF-PPVPN-MPLS-VPN-MIB
	CISCO-IF-EXTENSION-MIB
	CISCO-IGMP-FILTER-MIB
	CISCO-IMAGE-LICENSE-MGMT-MIB
	CISCO-IMAGE-MIB
	CISCO-IP-CBR-METRICS-MIB
	CISCO-IP-STAT-MIB
	CISCO-IP-URPF-MIB
	CISCO-IPMROUTE-MIB
	CISCO-IPSLA-AUTOMEASURE-MIB
	CISCO-IPSLA-ECHO-MIB
	CISCO-IPSLA-JITTER-MIB
	CISCO-L2-CONTROL-MIB
	CISCO-L2L3-INTERFACE-CONFIG-MIB
	CISCO-LAG-MIB
	CISCO-LICENSE-MGMT-MIB
	CISCO-LISP-EXT-MIB
	CISCO-LOCAL-AUTH-USER-MIB
	CISCO-MAC-AUTH-BYPASS-MIB
	CISCO-MAC-NOTIFICATION-MIB
	CISCO-MEMORY-POOL-MIB
	CISCO-MPLS-LSR-EXT-STD-MIB
	CISCO-NHRP-EXT-MIB
	CISCO-NTP-MIB
	CISCO-OSPF-MIB
	CISCO-OSPF-TRAP-MIB
	CISCO-PAE-MIB
	CISCO-PAGP-MIB
	CISCO-PIM-MIB
	CISCO-PING-MIB
	CISCO-PKI-MIB
	CISCO-PORT-SECURITY-MIB
	CISCO-PORT-STORM-CONTROL-MIB
	CISCO-PRIVATE-VLAN-MIB
	CISCO-PROCESS-MIB
	CISCO-PRODUCTS-MIB

Description	
	CISCO-RESILIENT-ETHERNET-PROTOCOL-MIB
	CISCO-RTTMON-ICMP-MIB
	CISCO-RTTMON-IP-EXT-MIB
	CISCO-RTTMON-MIB
	CISCO-RTTMON-RTP-MIB
	CISCO-SNMP-TARGET-EXT-MIB
	CISCO-STP-EXTENSIONS-MIB
	CISCO-SYSLOG-MIB
	CISCO-TCP-METRICS-MIB
	CISCO-TCP-MIB
	CISCO-TRUSTSEC-INTERFACE-MIB
	CISCO-TRUSTSEC-MIB
	CISCO-TRUSTSEC-POLICY-MIB
	CISCO-TRUSTSEC-SERVER-MIB
	CISCO-TRUSTSEC-SXP-MIB
	CISCO-UDLDP-MIB
	CISCO-VLAN-IFTABLE-RELATIONSHIP-MIB
	CISCO-VLAN-MEMBERSHIP-MIB
	CISCO-VRF-MIB
	CISCO-VTP-MIB
	ENTITY-MIB
	ENTITY-STATE-MIB
	EtherLike-MIB
	HC-ALARM-MIB
	HC-RMON-MIB
	IEEE8021-PAE-MIB
	IEEE8023-LAG-MIB
	IF-MIB
	IGMP-STD-MIB
	IP-FORWARD-MIB
	IP-MIB
	IPMROUTE-STD-MIB
	LISP-MIB
	LLDP-EXT-MED-MIB
	LLDP-MIB
	MAU-MIB
	MPLS-L3VPN-STD-MIB
	MPLS-LDP-GENERIC-STD-MIB
	MPLS-LDP-MIB
	MPLS-LSR-STD-MIB
	MPLS-VPN-MIB
	MSDP-MIB
	NHRP-MIB
	NOTIFICATION-LOG-MIB
	NTPv4-MIB

Description	
	OLD-CISCO-CHASSIS-MIB
	OLD-CISCO-CPU-MIB
	OLD-CISCO-INTERFACES-MIB
	OLD-CISCO-IP-MIB
	OLD-CISCO-MEMORY-MIB
	OLD-CISCO-SYS-MIB
	OLD-CISCO-SYSTEM-MIB
	OLD-CISCO-TCP-MIB
	OLD-CISCO-TS-MIB
	OSPF-MIB
	OSPF-TRAP-MIB
	OSPFV3-MIB
	PIM-MIB
	RFC1213-MIB
	RMON-MIB
	RMON2-MIB
	SNMP-COMMUNITY-MIB
	SNMP-FRAMEWORK-MIB
	SNMP-MPD-MIB
	SNMP-NOTIFICATION-MIB
	SNMP-PROXY-MIB
	SNMP-TARGET-MIB
	SNMP-USM-MIB
	SNMP-VIEW-BASED-ACM-MIB
	SNMPv2-MIB
	TCP-MIB
	UDP-MIB
	CISCO-802-TAP-MIB
	CISCO-TAP2-MIB
	CISCO-IP-TAP-MIB
Standards	IEEE 802.1s
	IEEE 802.1w
	IEEE 802.1X
	IEEE 802.3ae for 10G SKU
	IEEE 802.3ae, IEEE 802.3ba, IEEE 802.3by
	IEEE 802.1X-Rev
	IEEE 802.3ad
	IEEE 802.3x full duplex on 10BASE-T, 100BASE-TX, and 1000BASE-T ports
	IEEE 802.1D Spanning Tree Protocol
	IEEE 802.1p CoS prioritization
	IEEE 802.1Q VLAN
	IEEE 802.3 10BASE-T specification
	IEEE 802.3u 100BASE-TX specification
	IEEE 802.3ab 1000BASE-T specification
	IEEE 802.3z 1000BASE-X specification

Description	
	RMON I and II standards
	SNMPv1, SNMPv2c, and SNMPv3

Safety and Compliance

Table 11.   Safety and Compliance Information

Description	Specification
Safety certifications	9606R • 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
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

Cisco Enhanced Limited Lifetime Hardware Warranty

The 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 review the warranty statement shipped with your specific product carefully 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 12 provides information about the E-LLW.

Table 12.   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 13.   Technical Services

Cisco Technical Services
Cisco Smart Net Total Care® Service

Cisco Technical Services
- 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 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

Software Policy for Network Stack Components

Customers with the Network Essentials Stack and Network Advantage Stack software feature sets will be provided with maintenance updates and bug fixes designed to maintain the 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 up to one year from the end-of-sale date for this product, whichever occurs earlier.

Cisco Software Support Service for Cisco DNA Term Components

Cisco Software Support Service (SWSS) delivers the right support for Cisco software products and suites. It will keep your business applications performing as expected and protects your investment. Cisco SWSS for Cisco DNA Essentials and Cisco DNA Advantage term components is included as part of the switch value. SWSS 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.

Ordering Information

Table 14 contains ordering information for the Cisco Catalyst 9600 Series.

Table 14.   Cisco Catalyst 9600 Series 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-48YL (=)	Cisco Catalyst 9600 Series 48-Port 25GE/10GE/1GE
C9600-LC-24C (=)	Cisco Catalyst 9600 Series 24-Port 40GE/12-Port 100GE
C9606-FAN (=)	Cisco Catalyst 9600 Series C9606 Chassis Fan Tray
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

Product number	Description
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
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 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.