



DATA SHEET

CISCO CATALYST 6500 SERIES/CISCO 7600 SERIES SUPERVISOR ENGINE 32

PRODUCT OVERVIEW

The Cisco® Catalyst® 6500 Series/Cisco 7600 Series Supervisor Engine 32 delivers industry-leading security, availability, and manageability services for the networks of small and medium-sized business, enterprises, and service providers. This supervisor engine is ideal for applications requiring maximum uptime and security for small and medium-sized LAN core functions, distribution, and access as well as enterprise LAN/WAN access and service provider edge applications. The Supervisor Engine 32 provides investment protection for current Cisco Catalyst 6500 Series and Cisco 7600 Series deployments by supporting all existing classic and Cisco Express Forwarding 256-based modules and enabling new applications.

The Supervisor Engine 32 is offered with the policy feature card 3B (PFC3B), delivering the same features and services available on the Supervisor Engine 720. Two uplink options are available: 8-port Gigabit Ethernet Small Form Pluggable (SFP)-based uplinks (Figure 1) and 2-port 10 Gigabit Ethernet XENPAK-based uplinks (Figure 2). In addition to these modular uplinks, the Supervisor Engine 32 also includes one port of 10/100/1000 RJ-45 for ease of network management and two USB 2.0 ports to enable high-speed, secure, direct access from laptops for network management and simplify software downloading using USB memory devices. All ports on the Supervisor Engine 32 can be active at the same time.

The Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32 offers:

- **Industry-leading integrated security**—The Supervisor Engine 32 helps mitigate damage from denial-of-service (DoS) attacks using multiple CPU rate limiters, hardware-based MAC learning, and user-based rate limiting. It limits threats from the Dynamic Host Configuration Protocol (DHCP) server, default gateway, or end-user IP address spoofing using features such as DHCP snooping, dynamic Address Resolution Protocol (ARP) inspection, and IP source guard. The supervisor engine allows close control over which users can access the network and what privileges they are granted through identity-based networking with IEEE 802.1x, port-based security, and port-based access lists. These integrated security features are hardware-based so they can be enabled concurrently without compromising system performance as traffic levels increase. The intrusion detection services module or firewall services module can be installed in the same chassis for maximum the highest level of security.
- **High availability**—The Supervisor Engine 32 helps ensure business continuity through minimizing network downtime with its support of Layer 2 stateful switchover (SSO), gateway load-balancing protocols, multimodule Cisco EtherChannel®, and rapid convergence protocols such as IEEE 802.1s and 802.1w. It also supports proactive detection and prevention of network equipment failures using Generic Online Diagnostics (GOLD).
- **Flexible, enhanced manageability**—Enhancements include support of two USB 2.0 ports to enable direct access from laptops for network management, simplify software downloading using USB memory devices, and enhance security by using a USB key to limit console access to authorized personnel; support of ACE counters for identifying the frequency that specific access-control-list (ACL) entries are hit; and support of Cisco SmartPort macros, config rollback, and switch profiles functions to simplify operational complexity. These enhanced capabilities enable network administrators to respond quickly to user access problems and simplify network management.
- **Slot efficiency**—Increased uplink density to eight Gigabit Ethernet SFP-based ports and increased bandwidth to two 10 Gigabit Ethernet XENPAK-based ports save slots for deployment of integrated service modules or higher-density chassis.
- **Investment protection**—The Supervisor Engine 32 supports all Cisco Catalyst 6500 Series classic modules and Cisco Express Forwarding 256-based modules and is backward-compatible with all Cisco Catalyst 6500 Series and Cisco 7600 Series chassis, allowing deployment of new, advanced services on existing equipment. The Supervisor Engine 32 also supports the Enhanced FlexWAN module and the new shared port adapters (SPA) and SPA interface processors (SIPs). This prolongs the deployment lifetime of interface modules and provides greater return on investment.

- **Superior traffic management**—Uplinks are available with four transmit queues per port, with one strict priority queue for quality of service (QoS) and two receive queues per port. Each port supports Weighted Random Early Detection (WRED) for congestion avoidance within each queue, and Shaped Round Robin (SRR) as well as Deficit Weighted Round Robin (DWRR) for scheduling between queues to aid in traffic prioritization. Up to eight thresholds can be configured to manage differentiated levels of service.
- **Extensive management tools**—The Supervisor Engine 32 supports the CiscoWorks network management platform; Simple Network Management Protocol (SNMP) Versions 1, 2, and 3; and four Remote Monitoring (RMON) groups (statistics, history, alarms, and events).

Figure 1. Supervisor Engine 32 with 8-Port Gigabit Ethernet and PFC3B



Figure 2. Supervisor Engine 32 with 2-Port 10 Gigabit Ethernet and PFC3B



APPLICATIONS

Small and Medium-Sized LAN Deployments

The Supervisor Engine 32 provides enhanced services like security, high availability, and manageability and is ideal for small and mid-size core, distribution, and collapsed core/distribution LAN deployments.

Enterprise LAN Access

The Supervisor Engine 32 provides high levels of security, availability, and manageability for enterprise LAN access. Equipped with the PFC3B, the Supervisor Engine 32 extends the intelligent services of the Supervisor Engine 720 to the access layer, and at the same time provides performance suitable for LAN access. Enhanced uplink density to eight Gigabit Ethernet SFP-based ports and support of Gigabit Cisco EtherChannel technology enables larger uplink and downlink pipes between floors and enhanced resiliency. Enhanced uplink bandwidth to two 10-Gigabit Ethernet XENPAK-based ports further improves network scalability for support of bandwidth-intensive applications such as daily desktop backups, e-learning, and video broadcasting.

Service Providers or Enterprise Edge Services

The Supervisor Engine 32 is targeted for the WAN edge and Metro Ethernet access layer. Equipped with PFC3B, the Supervisor Engine 32 extends the intelligence of Supervisor Engine 720 to the access layer, providing an end-to-end architecture and features consistency. It offers advanced hardware-accelerated IP services such as Multiprotocol Label Switching (MPLS), IPv6, Network Address Translation (NAT), generic routing encapsulation (GRE) tunneling, ACLs, rate limiting, and advanced QoS to enable service providers to build feature-rich networks. The uplinks of Supervisor Engine 32 can also support SRR for rate limiting traffic.

Service Appliance

The Cisco Catalyst 6504 or Cisco 7604 chassis, together with Supervisor Engine 32 and up to three service modules, forms an ideal service appliance. Service modules like the content services module (CSM) and Secure Sockets Layer (SSL) module can be deployed together for content switching services. The firewall module and intrusion detection services (IDS) module can be deployed together as a security appliance. The wireless services module (WLSM) with GRE tunneling capability on the Supervisor Engine 32 supports mobile IP. These advanced services can then be distributed in the network over the integrated eight-port Gigabit Ethernet uplinks or two-port 10 Gigabit Ethernet uplinks from the Supervisor Engine 32.

FEATURES AND BENEFITS

Table 1 lists the features and benefits of the Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32.

Table 1. Features and Benefits of Supervisor Engine 32

Features	Benefits
Identity-based networking services with IEEE 802.1x: <ul style="list-style-type: none">• VLAN ID assignment• Security ACL assignment• QoS policy assignment• Unidirectional controlled port for "wake-on-LAN" applications• Authentication identity-to-port description mapping• Domain Name System (DNS) resolution for RADIUS server configuration	Allows close control over which users can access the network and what privileges they are granted
Intrusion detection and spoofing protection mechanisms: <ul style="list-style-type: none">• DHCP snooping, dynamic ARP inspection, IP source guard—Cisco Catalyst 6500 Security Toolkit• CPU rate limiting• Control Plane Policing• Port-based ACLs• User-based rate limiting• Hardware-based MAC learning• Cisco Catalyst 6500 IDS module• Broadcast and multicast suppression• Port Security on Access, 802.1Q Trunks and 802.1Q Tunneling ports	Provides local containment of security threats and protects networks against security vulnerabilities, including malicious and inadvertent intrusion

Features	Benefits
<p>Hot-Swapping of Standby Supervisor Engines</p> <ul style="list-style-type: none"> • Layer 2 rapid convergence protocol suite includes: <ul style="list-style-type: none"> – IEEE 802.1s, multiple spanning trees – IEEE 802.1w, rapid reconfiguration of spanning tree – Per-VLAN rapid spanning tree (PVRST) • Hardware redundancy with subsecond stateful failover and Layer 2 resiliency through 802.1x high availability • Fault management: <ul style="list-style-type: none"> – Fault detection and troubleshooting – System health check – Enhanced memory protection – Proactive detection and prevention of network equipment failures using GOLD 	<p>Ensures business continuity through minimizing network downtime for mission-critical applications</p>
<p>Switched Port Analyzer (SPAN), Remote SPAN (RSPAN)</p>	<p>Enables remote troubleshooting from anywhere, reducing troubleshooting time and tool costs</p>
<p>Two USB 2.0 ports (hardware ready, software support post-first customer shipment [FCS])</p>	<p>Enables direct access from laptops for network management, simplifies software downloading using USB memory devices, and enhances security by enabling USB keys on console port to limit access to authorized personnel</p>
<p>ACE counters</p>	<p>Identifies frequency that specific ACL entries are hit for ease of management</p>
<p>Cisco SmartPort macros, config rollback, and switch profiles</p>	<p>Simplifies operational complexity</p>
<p>SNMPv3, SSH Protocol Version 2, Secure Copy Protocol (SCP)</p>	<p>Provides secure management</p>
<p>Multicast capabilities:</p> <ul style="list-style-type: none"> • Hardware-based multicast • Bidirectional Protocol Independent Multicast (PIM) • Internet Group Management Protocol (IGMP) Querier • Router-port Group Management Protocol (RGMP), Multiprotocol Border Gateway Protocol (MBGP) • PIM SM, PIM SSM and PIM snooping • IGMP version 3 	<p>Enables efficient video broadcasting, e-learning, and information sharing</p>
<p>Integrated high-density uplinks—eight Gigabit Ethernet SFP-based ports or two 10-Gigabit Ethernet XENPAK-based ports</p>	<p>Increases uplink density and saves slots to deploy integrated service modules or higher-density chassis</p>
<p>Backward compatibility—supports all Cisco Catalyst 6500 classic and Cisco Express Forwarding 256-based modules and services modules; supported in all Cisco Catalyst 6500 Series and Cisco 7600 Series Router chassis</p>	<p>Allows deployment of new advanced services on existing equipment, prolonging the deployment lifetime of interface modules and providing greater return on investment</p>
<ul style="list-style-type: none"> • Advanced QoS uses packet classification and marking and congestion avoidance based on Layer 2–4 header information • User-based rate limiting enforces any of 64 policy rates, maintaining service-level agreements on a per-user basis independent of traffic type or IP address • QoS scheduling rules with thresholds can be configured in the switch for multiple receive 	<p>Superior traffic management enables efficient handling of converged networks that carry a mix of mission-critical, time-sensitive, and bandwidth-intensive multimedia applications</p>

Features	Benefits
and transmit queues	
<ul style="list-style-type: none"> Hardware-enabled MPLS—Enables use of VPNs and Layer 2 tunneling while improving traffic engineering for QoS and adding multiprotocol support Hardware-enabled IPv6—Expands available IP addresses, enabling better address allocation and address aggregation and supporting greater end-to-end connectivity and services Hardware-enabled GRE tunnels for IP traffic NAT (hardware ready, software support post-FCS)—Translates addresses for inbound and outbound traffic in hardware, allowing clean separation between internal and external networks 	Advanced Layer 2–4 forwarding enables service providers and enterprises to build feature-rich networks

Note: Not all Supervisor Engine 32 features are enabled in the first software release. Refer to the release notes for up-to-date software version information for support of different features at <http://www.cisco.com/univercd/cc/td/doc/product/lan/cat6000/relnotes/index.htm>.

SUPERVISOR ENGINE 32 ARCHITECTURE

The Supervisor Engine 32 extends the intelligent services of the Supervisor Engine 720 to the access layer, and at the same time provides performance and price points suitable for the LAN access, WAN edge, and Metro Ethernet access.

Table 2. Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engines Feature Comparison

Feature	Supervisor Engine 720	Supervisor Engine 32	Supervisor Engine 2	Supervisor Engine 1A (Cisco Catalyst 6500 Series only) EOS—3/25/2005
Uplinks	Two Gigabit Ethernet ports—one gigabit interface converter (GBIC) based and one configurable to GBIC based or 10/100/1000 RJ-45 based	<ul style="list-style-type: none"> Eight Gigabit Ethernet ports, SFP based + one 10/100/1000 RJ-45 port OR <ul style="list-style-type: none"> Two 10 Gigabit Ethernet ports, XENPAK based + one 10/100/1000 RJ-45 port 	Two Gigabit Ethernet ports, GBIC based	Two Gigabit Ethernet ports, GBIC based
Uplink Queue Structure	<ul style="list-style-type: none"> Tx 1p2q2t Rx 1p1q4t 512 KB buffer per port 	<ul style="list-style-type: none"> Tx 1p3q8t Rx 2q8t 9.5 MB buffer per Gigabit Ethernet port 100 MB buffer per 10 Gigabit Ethernet port 	<ul style="list-style-type: none"> Tx 1p2q2t Rx 1p1q4t 512 KB buffer per port 	<ul style="list-style-type: none"> Tx 1p2q2t Rx 1p1q4t 512 KB buffer per port
Uplink Port Scheduler	WRR	DWRR or SRR	WRR	WRR
USB Port	No	Two USB 2.0 ports—one host port and one device port	No	No
Self-Power Cycling	No, power cycle line cards only	Yes, power cycle remotely through console port	No, power cycle line cards only	No, power cycle line cards only
Backplane	720 Gbps integrated switch fabric module (SFM)	32 Gbps shared bus	32 Gbps shared bus or 256 Gbps with SFM	32 Gbps shared bus

Feature	Supervisor Engine 720	Supervisor Engine 32	Supervisor Engine 2	Supervisor Engine 1A (Cisco Catalyst 6500 Series only) EOS—3/25/2005
Performance	Up to 400 Mpps for Cisco Express Forwarding interface modules	Up to 15 Mpps IPv4 services	<ul style="list-style-type: none"> • 15 Mpps without SFM • 30 Mpps with SFM and no distributed forwarding cards (DFCs) • Up to 210 Mpps with SFM and DFCs 	15 Mpps
Cisco Express Forwarding	Yes	Yes, hardware-based forwarding with MSFC2A	Yes, hardware-based forwarding with MSFC2	No, flow-based forwarding
Distributed Cisco Express Forwarding	Yes, with a DFC3 present	No	Yes, with a DFC present	No
SP NVRAM	2 MB (SP)	2 MB (SP)	512 KB (SP)	512 KB (SP)
SP Dynamic RAM (DRAM)	512 MB default, upgradeable to 1 GB on Supervisor Engine 720 and Supervisor Engine 720-3B; 1 GB default on Supervisor Engine 720-3BXL	512 MB default, upgradeable to 1 GB	256 MB default, upgradeable to 512 MB	128 MB default
SP Onboard Flash (BootFlash)	64 MB upgradeable to 512 MB, 1GB	256 MB, through internal compact flash (referred to as bootdisk in command-line interface), upgradeable to 512 MB, 1 GB	32 MB	16 MB
Removable Memory	Compact flash type II—64, 128, and 256 MB; hardware capable to support 512 MB, 1 GB	Compact flash type II—64, 128, and 256 MB; hardware capable to support 512 MB, 1 GB; USB	PCMCIA 16, 24, and 64 MB; ATA 64 MB	PCMCIA 16, 24, and 64 MB; ATA 64 MB
Chassis Supported	All Cisco Catalyst 6500 Series chassis and Cisco 7600 Series chassis with fan tray 2 or E-Series fan tray and 2500W power supplies or above	All Cisco Catalyst 6500 Series chassis with fan tray 2 or E-Series fan tray and 2500W power supplies or above; Cisco 7604, Cisco 7606, Cisco 7609, and Cisco 7613 with high speed fan tray	All Cisco Catalyst 6000 Series chassis, Cisco Catalyst 6500 Series chassis, and Cisco 7600 Series chassis with any fan tray	All Cisco Catalyst 6000 Series chassis, Cisco Catalyst 6500 Series chassis, and Cisco 7600 Series chassis with any fan tray
Minimum Software Support	<ul style="list-style-type: none"> • Cisco Catalyst 6500 Series: <ul style="list-style-type: none"> – CatOS 8.1(1) – Cisco IOS® Software 12.2(14)SX • Cisco 7600 Series: Future 	<ul style="list-style-type: none"> • Cisco Catalyst 6500 Series: <ul style="list-style-type: none"> – CatOS 8.4(1) – Cisco IOS 12.2(18)SX • Cisco 7600 Series: IOS 12.2.18SXF 	<ul style="list-style-type: none"> • Cisco Catalyst 6500 Series: <ul style="list-style-type: none"> – CatOS 6.1 – Cisco IOS 12.1(8a)E • Cisco 7600 Series: IOS 12.1E, 12.2.SX 	<ul style="list-style-type: none"> • Cisco Catalyst 6500 Series: <ul style="list-style-type: none"> – CatOS 5.3 – Cisco IOS 12.0(7)XE1 • Cisco 7600 Series: Not supported

Feature	Supervisor Engine 720	Supervisor Engine 32	Supervisor Engine 2	Supervisor Engine 1A (Cisco Catalyst 6500 Series only) EOS—3/25/2005
Slot Requirements	Slots 1 and 2 in a 3-slot chassis, slots 5 and 6 in a 6- or 9-slot chassis, and slots 7 and 8 in a 13-slot chassis	Slots 1 and 2 in a 3-slot and 4 slot chassis, slots 5 and 6 in a 6- or 9-slot chassis, and slots 7 and 8 in a 13-slot chassis	Slots 1 and 2 in all chassis	Slots 1 and 2 in all chassis
Hardware-Based Forwarding Engine	PFC3A, PFC3B, or PFC3BXL onboard	PFC3B onboard	PFC2 onboard; not field-upgradeable	Two versions: with and without PFC onboard; not field-upgradeable
MSFC Daughter Card Version	MSFC3 ONBOARD	MSFC2A onboard; Layer 3 support with layer 3 license	MSFC2 optional	MSFC2 optional; not field upgradeable

The Supervisor Engine 32 PFC3B and MSFC2A daughter cards provide the following functions:

- **PFC3B:** Performs hardware-based Layer 2–4 packet forwarding as well as packet classification, traffic management, and policy enforcement
- **MSFC2A:** Performs Layer 3 control-plane functions, including address resolution and routing protocols; compared with MSFC2, MSFC2A supports more memory (1 GB)

ORDERING INFORMATION

Table 3 provides part numbers for the Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32.

Table 3. Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32 Part Numbers

Product Number	Description
WS-SUP32-GE-3B	Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32 with 8 ports Gigabit Ethernet, PFC3B, and MSFC2A
WS-SUP32-10GE-3B	Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 32 with 2 ports 10 Gigabit Ethernet, PFC3B, and MSFC2A

SPECIFICATIONS

Standard Network Protocols

- Ethernet: IEEE 802.3
- IEEE 802.1d, 802.1p, 802.1q, 802.1s, 802.1w, 802.3x, 802.3z, 802.3ab, 802.3ad, 802.3ae, and 802.3ak

Physical Specification

- Occupies one slot in a Cisco Catalyst 6500 Series or Cisco 7600 Series Router chassis
- Dimensions (H x W x D): 1.6 x 15.3 x 16.3 in. (4.0 x 37.9 x 40.3 cm)

Environmental Conditions

- Operating temperature: 32 to 104°F (0 to 40°C)
- Storage temperature: –40 to 167°F (–40 to 75°C)
- Relative humidity: 10 to 90 percent, noncondensing
- Operating altitude: Sea level to 6500 ft (1981 m)

Safety Compliance

- UL 60950
- CSA-C22.2 No. 60950
- EN 60950
- IEC 60950
- AS/NZS 60950/TS001

EMC Compliance

- FCC Part 15 (CFR 47) Class A
- VCCI Class A
- EN55022 Class A
- CISPR 22 Class A
- CE marking
- AS/NZS 3548 Class A
- ETS300 386
- EN55024
- EN61000-6-1
- EN50082-1

Network Management

- ETHERLIKE-MIB (RFC 1643)
- IF-MIB (RFC 1573)
- Bridge MIB (RFC 1493)
- CISCO-STACK-MIB
- CISCO-VTP-MIB
- CISCO-CDP-MIB
- RMON MIB (RFC 1757)
- CISCO-PAGP-MIB
- CISCO-STP-Extensions-MIB
- CISCO-VLAN-Bridge-MIB
- CISCO-VLAN-Membership-MIB
- CISCO-UDLD-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-COPS-CLIENT-MIB
- ENTITY-MIB (RFC 2037)
- HC-RMON
- RFC1213-MIB (MIB-II)
- SMON-MIB

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The Cisco Technical Support Services organization offers the following features, providing network investment protection and minimal downtime for systems running mission-critical applications:

- Provides Cisco networking expertise online and on the telephone
- Creates a proactive support environment with software updates and upgrades as an ongoing integral part of your network operations, not merely a remedy when a failure or problem occurs
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- Augments the resources of your technical staff to increase productivity
- Complements remote technical support with onsite hardware replacement

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- Cisco Software Application Services, including Software Application Support and Software Application Support plus Upgrades

For more information, visit: http://www.cisco.com/en/US/products/svcs/ps3034/serv_category_home.html

FOR MORE INFORMATION ON CISCO CATALYST 6500 SERIES

Visit http://www.cisco.com/en/US/products/hw/switches/ps708/products_data_sheets_list.html to view the following data sheets:

- Cisco Catalyst 6500 Series Data Sheet
- Cisco Catalyst 6500 Series Supervisor Engine 1A and Supervisor Engine 2
- Cisco Catalyst 6500 Series Supervisor Engine 720
- Cisco Catalyst 6500 Series Gigabit Ethernet Interface Modules
- Cisco Catalyst 6500 Series 10 Gigabit Ethernet Interface Modules
- Cisco Catalyst 6500 Series FlexWAN Interface Modules
- Cisco Catalyst 6500 Series Switch Fabric Interface Modules
- Cisco Catalyst 6500 Series Content Services Module (CSM)
- Cisco Catalyst 6500 Series Firewall Services Module

FOR MORE INFORMATION ON CISCO 7600 SERIES

Visit http://www.cisco.com/en/US/products/hw/routers/ps368/products_data_sheets_list.html to view the following data sheets:

- Cisco 7600 Series Data Sheet
- Cisco Catalyst 6500 Series/Cisco 7600 Series Supervisor Engine 720
- Cisco 7600 Series/Cisco Catalyst 6500 Series FlexWAN Interface Modules
- Cisco 7600 Series SPA Interface Processor-400
- Cisco 7600 Series SPA Interface Processor-200

**Corporate Headquarters**

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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