Cisco Enhanced EtherSwitch Service Module

Q. What are the Cisco® Enhanced EtherSwitch® Service Modules?

A. These integrated switching modules for the Cisco integrated services routers expand router capabilities by integrating Layer 2 and Layer 3 switching with feature sets identical to those found in Cisco Catalyst® 3560-E and Catalyst 2960 Switches. The new modules also provide a 1-Gbps connection to the multigigabit fabric (MGF) for intermodule communication that does not burden the router CPU.

Q. What are the benefits of using the Cisco Enhanced EtherSwitch Service Modules?

A. Integrated switching and routing provides:

- **Lower cost of ownership:** It allows network administrators to manage a single device using the router command-line interface (CLI) or Cisco management tools for LAN and WAN management needs.
- **Lower mean time to repair (MTTR):** One vendor means one support center to decrease troubleshooting time and eliminate blaming among vendors.
- **Software parity:** Cisco Catalyst 2960 and Catalyst 3560-E software parity enables IT to certify and deploy the same services at the main and branch offices.
- **Single maintenance contract:** A Cisco SMARTnet® contract covers both the router and the Cisco EtherSwitch module.
- **Feature, schedule, and roadmap alignment:** The features, schedule, and roadmap of the Cisco Enhanced EtherSwitch Service Module and Cisco Catalyst 2960 and Catalyst 3560-E Switches are aligned to provide a consistent user experience and to help ensure that no new hardware is required to support the latest innovations.
- **Easy upgrades:** Cisco Enhanced EtherSwitch Service Modules run their own Cisco IOS® Software image and can be upgraded independently of the Cisco IOS Software release on the host router.
- **Fewer components:** Fewer power supplies, fans, etc. results in fewer failures and less downtime.
- **Mean time before failure (MTBF):** The MTBF is at least double that of a standalone switch.

Q. What platforms support the Cisco Enhanced EtherSwitch Service Module, and how many service modules can I install in each platform?

A. Table 1 lists the platforms that support the new service module and the maximum number of modules you can install in each platform.

Table 1. Platform Support

Model	Maximum ES2/ES3 Ports	1 Single	1 Double	2 Single	1 Single + 1 Double	2 Single + 1 Double	3 Single	4 Single
Cisco 2911	24	X						
Cisco 2921	50	X	X					
Cisco 2951	50	X	X	X				
Cisco 3925	74	X	X	X	X	X		
Cisco 3945	98	X	X	X	X	X	X	X

Q. Are there any feature differences between the ES3 and ES2?

A. The ES3 performs Layer 2/3 switching in hardware and offers full feature parity with the Cisco Catalyst 3560-E IP Base and IP Services universal feature sets. The ES2 service module is based on the Cisco Catalyst 2960 Series desktop switches; it performs Layer 2 switching in hardware and offers full feature parity with the Cisco Catalyst 2960 LAN Base image.

Table 2. Differences Between ES2 and ES3 EtherSwitch Service Modules

Cisco Enhanced EtherSwitch Service Module	Description
Cisco ES2 Enhanced EtherSwitch Service Module	• Entry-level, lower-cost solution • Layer 2 switching in hardware • Full feature parity with the Cisco Catalyst 2960 LAN Base image • Power over Ethernet; up to 1014 watts per chassis on Cisco 3900 Series router ◦ IEEE 802.3af PoE support, up to 15.4 watts per port ◦ Cisco Prestandard PoE
Cisco ES3 Enhanced EtherSwitch Service Module	• Best-of-class Ethernet switching • High-density Gigabit Ethernet support • Layer 2/3 switching in hardware ◦ Multicast routing ◦ IPv6 routing, and access control list (ACL) in hardware • Full feature parity with the Cisco Catalyst 3560-E IP Base and IP Services Universal images ◦ IP Base feature set, which includes advanced quality of service (QoS), a suite of security features, rate limiting, ACLs, basic static and Routing Information Protocol (RIP) routing capability, and Hot Standby Router Protocol (HSRP) ◦ The IP Services feature set, which provides a richer set of enterprise-class features, including advanced hardware-based IP Unicast and IP Multicast routing; Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Protocol Independent Multicast (PIM), and IPv6 routing; OSPFv3; EIGRPv6; IP Service-Level Agreement (IPSLA) packet monitoring; Cisco Port Security; and Virtual Route Forwarding Lite (VRF Lite) • Cisco EnergyWise technology, an innovative architecture that promotes companywide sustainability by reducing energy consumption across an entire corporate infrastructure; Cisco EnergyWise technology can help your company measure the power consumption of network infrastructure and network-attached devices and manage power consumption with specific policies, reducing power consumption to realize increased cost savings; potentially any powered device is affected • Power over Ethernet; up to 1014 watts per chassis on a Cisco 3900 Series router ◦ Cisco Enhanced PoE (ePoE), up to 20 watts per port ◦ IEEE 802.3af PoE support, up to 15.4 watts per port ◦ Cisco Prestandard PoE

Q. Can I upgrade from the ES2 to the ES3 module with software?

A. No, the ES3 service module performs Layer 2/3 switching in hardware and ES2 service module performs Layer 2 switching in hardware and cannot be upgraded with software.

Q. What are the differences between the Cisco Enhanced EtherSwitch Service Modules and the existing network modules (NME-X-23ES-1G-P, NME-X-23ES-1G, NME-16ES-1G-P, NME-16ES-1G)?

A. The Cisco Enhanced EtherSwitch Service Modules are based on Cisco Catalyst 3560-E desktop switches, and they offer the same features and software as these switches. Also, the new Cisco Enhanced EtherSwitch modules provide a 1-Gbps connection to the MGF for intermodule communication that does not burden the router CPU.

The existing Cisco EtherSwitch Network Modules (NME-X-23ES-1G-P, NME-X-23ES-1G, NME-16ES-1G-P, and NME-16ES-1G) offer the same features and software as the Cisco Catalyst 3750 Series desktop switches.

Q. Do the Cisco Enhanced EtherSwitch Service Modules interoperate with the existing Cisco EtherSwitch Network Modules?

A. Yes, a service-module adapter card provides backward compatibility with the existing network modules; therefore, both the new and NME-16ES-1G-P, NME-16ES-1G,NM-16ESW, and NM-16ESW-1GIG network modules can coexist in the ISR G2 integrated services routers.

Q. Should I expect the current Cisco EtherSwitch Network Modules to reach end-of-sale status soon?

A. No plan for end of sale of either of these cards currently exists. The existing Cisco EtherSwitch Network Modules provide a switching option to the installed base of Cisco 2811, 2821, 2851, 3825, and 3845 Integrated Services Routers.

Q. What are the part numbers and details?

A. For information regarding part numbers, please consult the Cisco Enhanced EtherSwitch Service Modules data sheet at: http://www.cisco.com/en/US/prod/collateral/routers/ps10536/data_sheet_c78-553980_ps10537_Products_Data_Sheet.html

Q. What Small Form-Factor Pluggables (SFPs) are supported?

A. For information regarding the supported SFPs, please consult the Cisco Enhanced EtherSwitch Service Modules data sheet at: http://www.cisco.com/en/US/prod/collateral/routers/ps10536/data_sheet_c78-553980_ps10537_Products_Data_Sheet.html

Q. What is the function of the Multi Gigabit Fabric Interface (MGFI)?

A. The MGFI provides direct high-performance connectivity between enhanced high-speed WAN interface cards (EHWICs), Cisco High-Density Packet Voice Digital Signal Processor Modules (PVDM3s), service modules, and Cisco Service Ready Engine (SRE) Internal Services Modules (ISMs) through the backplane without CPU involvement. It is not backward-compatible with the (HWIC-4ESW, HWIC-9ESW or NM-16ESW). The MGF switch supports frames sizes up to 9K, and it supports shaping of traffic going to a service module.

Q. What is the function of High-speed Intra chassis Module (HIMI)?

A. HIMI provides the capability to establish a 1-Gbps aggregate connection between two switch modules over the MGF. Any service module, ISM, and EHWIC can be interconnected through HIMI. A high-speed WAN interface card (HWIC) cannot participate in HIMI. Each HIMI connection could have up to 1-Gbps throughput.

Q. Which platforms support HIMI and how many HIMI connections can be supported in each platform?

A. Table 2 lists the platforms that support HIMI.

Table 3. Platforms that Support HIMI

Model	Cisco 29211	Cisco 2921	Cisco 2951	Cisco 3925	Cisco 3945
HIMI Connection	1	1	1	2	2

Q. What is the function of VLAN Connect, and how many Connect VLAN can be supported in each platform?

A. VLAN Connect enables traffic in a certain VLAN from one module to be directed to another module through the MGF. This feature should be enabled if traffic within a VALN needs to be sent from one module to another; therefore the traffic can be monitored on a particular port or VLAN. This feature is supported only with EHWICs and service modules.

Table 4. Table 4: Platforms that support VLAN connect

Model	1941	2901	Cisco 29211	Cisco 2921	Cisco 2951	Cisco 3925	Cisco 3945
VLAN connection	3	3	5	5	7	7	11

Q. Can I mix ES2 and ES3 modules in the same chassis and insert them into any slots?

A. Yes.

Q. Can I mix POE and non-POE modules in the same chassis and insert them into any slots?

A. Yes.

Q. How do I configure the Cisco Enhanced EtherSwitch Service Modules?

A. First, configure the router connection; it is an internal Gigabit Ethernet connection to the Cisco Enhanced EtherSwitch Service Module through the MGF. Then issue the session command to connect to the CLI of the Cisco Enhanced EtherSwitch Service Module itself. At this point you may configure all of the ports and interfaces on the module.

For specific details about configuring selected switch features, refer to the Cisco IOS Software Release 12.2(52)EX or later release notes. You can also configure and manage the Cisco EtherSwitch Service Module using a combination of the Cisco Router and Security Device Manager (SDM) and the embedded Cisco EtherSwitch device manager. Both of these tools come preinstalled by default.

Q. Is local switching between two Cisco Enhanced EtherSwitch modules supported?

A. Yes, it is supported and is accomplished through the MGF, which provides direct high-performance connectivity between two Cisco Enhanced EtherSwitch modules through the backplane without CPU involvement.

Q. Is online insertion and removal (OIR) supported?

A. Yes, but first you must stop the Cisco Enhanced EtherSwitch module with the hw-module sm X oir-stop CLI command. After you insert the new module, then issue the hw-module sm X oir-start CLI command. The part numbers of the replacement module and the one removed must be the same.

Q. Which Cisco IOS Software releases support the Cisco Enhanced EtherSwitch Service Modules?

A. The Cisco Enhanced EtherSwitch Service Modules require two Cisco IOS Software releases, one for the router and one for the switching module. Table 3 shows the minimum required Cisco IOS Software combinations.

Table 5. Cisco IOS Software Combinations

Cisco Enhanced EtherSwitch Service Modules	Cisco IOS Software Release for Switching Software Image	Cisco IOS Software Release for Router Image
ES2	12.2(52)EX LAN Base Image	15(0)1M
ES3	12.2(52)EX Universal Image	15(0)1M

Q. Do these enhanced modules support licensing? Which feature sets do they support?

A. The ES3 modules support both IP Base and IP Services licensing. The ES2 modules support only LAN Base licensing.

For more information about software activation, please visit: http://www.cisco.com/go/sa.

Q. Can I upgrade images and feature sets independently on the module and hosting router?

A. Yes, as long as the minimum Cisco IOS Software release requirements are met, you can change images on either the router or the module without affecting the other. You can upgrade, reboot, and reload each component independently, without affecting the other component.

Q. How do I purchase the feature-set upgrades for the module?

A. Table 4 provides ordering information for Cisco Enhanced EtherSwitch Service Modules. To place an order, visit the Cisco Ordering Home Page and refer to Table 4.

Table 6. Ordering Information

Upgrade Quantity License	SL-ES3=
IP Services License Upgrade 16 Port FE ES3 EtherSwitch	SL-ES3-16-IPS
IP Services License Upgrade 16 Port GE ES3 EtherSwitch	SL-ES3G-16-IPS
IP Services License Upgrade 24/48 Port FE ES3 EtherSwitch	SL-ES3-24-48-IPS
IP Services License Upgrade 24/48 Port GE ES3 EtherSwitch	SL-ES3G-24-48-IPS
IP Services License Upgrade 16 Port FE ES3 EtherSwitch Spare	SL-ES3-16-IPS=

IP Services License Upgrade 16 Port GE ES3 EtherSwitch Spare	SL-ES3G-16-IPS=
IP Services License Upgrade 24/48 Port FE ES3 EtherSwitch Spare	SL-ES3-24-48-IPS=
IP Services License Upgrade 24/48 Port GE ES3 EtherSwitch Spare	SL-ES3G-24-48-IPS=
Upgrade Quantity License eDelivery	L-ES3=
IP Services License Upgrade 16 Port FE ES3 EtherSwitch eDelivery	L-ES3-16-IPS
IP Services License Upgrade 16 Port GE ES3 EtherSwitch eDelivery	L-ES3G-16-IPS
IP Services License Upgrade 24/48 Port FE ES3 EtherSwitch eDelivery	L-ES3-24-48-IPS
IP Services License Upgrade 24/48 Port GE ES3 EtherSwitch eDelivery	L-ES3G-24-48-IPS
IP Services License Upgrade 16 Port FE ES3 EtherSwitch eDelivery	L-ES3-16-IPS
IP Services License Upgrade 16 Port GE ES3 EtherSwitch eDelivery Spare	L-ES3G-16-IPS=
IP Services License Upgrade 24/48 Port FE ES3 EtherSwitch eDelivery Spare	L-ES3-24-48-IPS=
IP Services License Upgrade 24/48 Port GE ES3 EtherSwitch eDelivery Spare	L-ES3G-24-48-IPS=

Q. Where do I download the software for the ES2 and ES3 versions?

The software will be downloaded from the Cisco website in a section under the ISR 2900/3900. Note: unlike some earlier versions of EtherSwitches, it will not be downloaded from the switch portal. The software is located on the same CCO landing page as Cisco 2911, 2921, 2951, 3924, 3945 routers.

Q. How do I control the boot sequence of the Cisco Enhanced EtherSwitch Service Modules and the hosting router?

A. The default behavior of the module is to boot automatically with the router. Using the boot manual global configuration command, you can boot the module separately from the router. With this approach, you can boot or reload the router and service module individually.

Q. Is Cisco EnergyWise supported on the Cisco Enhanced EtherSwitch Service Modules?

A. Yes, this technology is supported on all Cisco Enhanced EtherSwitch Service Modules.

Q. What benefits does Cisco EnergyWise bring?

A. Cisco EnergyWise is an innovative architecture that reduces energy consumption across an entire corporate infrastructure. It enables companies to measure the power consumption of network infrastructure and network-attached devices and manage power consumption with specific policies, reducing power consumption to realize increased cost savings, potentially affecting any powered device.

Cisco EnergyWise encompasses a highly intelligent network-based approach to communicate messages that measure and control energy between network devices and endpoints. The network discovers Cisco EnergyWise manageable devices, monitors their power consumption, and takes action based on business rules to reduce power consumption. Cisco EnergyWise thereby extends the network as a platform for the power control plane for gathering, managing, and reducing power consumption of all devices, resulting in companywide optimized power delivery and reduced energy costs.

For more information regarding Cisco EnergyWise, please consult the Cisco Catalyst 3560-E (ES3) webpage at: http://www.cisco.com/go/energywise.

Q. Which Cisco Enhanced EtherSwitch Service Modules provide PoE?

A. Table 5 lists the service modules that support PoE.

Table 7. Service Modules that Support PoE

Model	Fast Ethernet Ports	Gigabit Ethernet Ports	SFP	Layer 2	Layer 2/L3	PoE	Width
SM-ES2-16-P	15	1		X		Yes	single
SM-ES2-24	23	1		X			Single
SM-ES2-24-P	23	1		X		Yes	Single
SM-D-ES2-48	48		2	X			Double
SM-ES3-16-P	15	1			X	Yes	Single
SM-ES3-16G-P		16			X	Yes	Single
SM-ES3-24-P	23	1			X	Yes	Single
SM-ES3G-24-P		24			X	Yes	Single
SM-D-ES3-48-P	48		2		X		Double
SM-D-ES3G-48-P		48	2		X	Yes	Double

Q. What is Cisco Enhanced PoE (ePoE)?

A. Cisco Enhanced PoE supports up to 20 watts per port.

Q. Is Cisco ePoE 802.3at-compliant?

A. No, ePoE is not part of the standard yet.

Q. Can the Cisco Enhanced EtherSwitch Service Modules provide high-power IEEE 802.3af-compliant power to all ports?

A. The IEEE 802.3af PoE supports up to 15.4 watts per port and Cisco ePoE supports up to 20 watts per port. The amount of power available to the enhanced Ethernet ports is limited by the power-supply capabilities of the hosting platform. Table 6 shows the maximum power available per platform for PoE applications.

Table 8. Power per Platform for PoE Applications

Integrated Services Router Platforms	PoE (watts)	PoE Boost from Redundant Power Supply (RPS) (watts)	Dual AC-IP PSU (watts)
Cisco 2911	200W	750	
Cisco 2921	280W	750	
Cisco 2951	370W	750	
Cisco 3925	520		1040
Cisco 3945	520		1040

Q. Can I deploy both PoE and non-PoE Cisco Enhanced EtherSwitch modules together in the same chassis?

A. Yes, and you can deploy them in any slot.

Q. Can I upgrade the non-PoE models to support PoE?

A. No, the Cisco Enhanced EtherSwitch Service Modules do not support a field upgrade to add PoE. You must order the modules in the correct configuration.

Q. What are the features of the Cisco Enhanced EtherSwitch Service Modules?

A. The Cisco Enhanced EtherSwitch Service Modules share common software and features with the Cisco Catalyst 3560-E (ES3) and Catalyst 2960 (ES2) desktop switches.

Q. Can I manage the Cisco Enhanced EtherSwitch Service Modules using the Cisco SDM?

A. Cisco SDM Version 2.2 supports routers with the Cisco Enhanced EtherSwitch Service Modules installed.

Q. Can I manage the Cisco Enhanced EtherSwitch Service Modules with Cisco Network Assistant?

A. Yes, Cisco Network Assistant supports the Cisco EtherSwitch Service Modules.

Q. Can I use the Cisco Configuration Engine to deploy the router and Cisco Enhanced EtherSwitch Service Modules?

A. Yes, Cisco IE 2100 Series agents are embedded in Cisco IOS Software; they run on both Cisco integrated services routers and Cisco Enhanced EtherSwitch Service Modules.

Q. Can I access the Cisco Enhanced EtherSwitch Service Modules using Secure Shell (SSH) Protocol?

A. You can if you have an encryption image installed on the hosting module; that is, if you have an image with the designation K9 in the image name, you can use SSH to access and configure the Cisco Enhanced EtherSwitch Service Modules.

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