Cisco EtherSwitch Modules for the Integrated Services Routers Routers

16- and 36-Port 10/100 Ethernet Modules for Cisco 2600/2800/2900/3600/3700/3800/3900 Series Routers

Figure 1. Cisco 16-Port and 36-Port EtherSwitch Network Modules

The Cisco 16- and 36-port 10/100 EtherSwitch modules for Cisco Integrated Services Routers series routers offer branch office customers the option to integrate switching and routing in one platform. Combining robust Layer 3 flexible WAN routing with low-density line-rate Layer 2 switching, the EtherSwitch modules provide straightforward configuration, easy deployment and integrated management in a single platform.

The EtherSwitch options include a 16-port network module (NM) and a 36-port high density service module (HDSM) version. The 36-port HDSM utilizes the extra capacity from the wider interface form factor available only on the Cisco 2851, 3660, 3700, and 3800 series routers to increase the maximum possible port densities. The 16-port EtherSwitch NM is available for the Cisco 2600, 2800, 3600, 3700, 3800, 2900 and 3900 series routers.

The combination of Cisco Integrated Services Routers and the EtherSwitch modules utilize the powerful features available in both Cisco IOS® software and Catalyst switching. The EtherSwitch module hardware supports 802.1p Layer 2 prioritization, while Cisco IOS software supports Layer 3 DiffServ and Class of Service (CoS) markings for critical business data. Coupling Layer 2/3 prioritization techniques, with the QoS for the WAN, this integrated routing and switching combination ensures low latency for critical business applications. The Cisco EtherSwitch modules includes 10/100 switched Ethernet ports with options for Cisco pre-standard power over ethernet and Gigabit Ethernet. Features such as port autosensing, QoS and VLAN support from 802.1p and 802.1Q standards, and 802.1D Spanning Tree protocols are standard on the EtherSwitch modules.

The Cisco 16- and 36-port EtherSwitch modules are available with optional Cisco pre-standard Power over Ethernet and Gigabit Ethernet support. EtherSwitch bundles are available with these options pre-installed for easy ordering. The integrated power over ethernet supports Cisco IP phones and Cisco Aironet wireless access points. An external power supply is needed for this feature in Cisco 2600/3600 platforms. An Internal power supply option is available on the Cisco 2800, 2900, 3700, 3800 and 3900 Series. For 802.3af power over Ethernet support one of the newer EtherSwitch Service Modules (NME-16ES-1G-P, NME-23ES-1G-P, NME-XD-48ES-2S-P, SM-ES2*-P family or SM-ES3*-P family) or one of the EtherSwitch HWICs (HWIC-4ESW-POE or HWIC-D-9ESW-POE) are recommended.

Figure 2.   Cisco 3725 and 3745 Series Platforms with EtherSwitch Modules

Cisco EtherSwitch Module Summary

- **NM-16ESW:** One 16-port 10/100 EtherSwitch Network Module
- **NM-16ESW-PWR[1]:** One 16-port 10/100 EtherSwitch NM with Cisco pre-standard PoE support
- **NM-16ESW-1GIG:** One 16-port 10/100 EtherSwitch NM with 1 GE (1000BaseT) port
- **NM-16ESW-PWR-1GIG[2]:** One 16-port 10/100 EtherSwitch NM with Cisco pre-standard PoE and GE
- **NMD-36-ESW:** One 36-port 10/100 EtherSwitch High Density Service Module
- **NMD-36-ESW-PWR[2]:** One 36-port 10/100 EtherSwitch HDSM with Cisco pre-standard PoE
- **NMD-36-ESW-2GIG:** One 36-port 10/100 EtherSwitch HDSM with 2 GE (1000BaseT)
- **NMD-36-ESW-PWR-2G[3]:** One 36-port 10/100 EtherSwitch HDSM + Cisco pre-standard PoE and 2GE

Options

- **PPWR-PS-CHASSIS:** One power supply chassis for Cisco 48V (360W) power supply
- **PWR-CHASSIS-360W:** One power supply chassis and 48V power supply for EtherSwitch
- **PPWR-PS-360W:** One 48V (360W) power supply for EtherSwitch Modules

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[1] This 16-port version should be ordered only if you require Cisco pre-standard Power over Ethernet (POE). To take advantage of this capability be sure to have or order an external power unit to support Power over Ethernet (POE) for the Cisco 2600 and 3600 or be sure to order the internal power supply upgrade when using the EtherSwitch Network module in combination with the Cisco 2800, 3700,and 3800 Series.
[2] This 36-port version should be ordered only if you require Cisco pre-standard Power over Ethernet (POE). To take advantage of this capability be sure to have or order an external power unit to support Power over Ethernet (POE) for the Cisco 3660 or be sure to order the internal power supply upgrade when using the EtherSwitch Network module in combination with the Cisco 2851, 3700,and 3800 Series.

- **PPWR-DCARD-16ESW:** One Cisco pre-standard PoE daughtercard for 16 port EtherSwitch NM

- **PPWR-DCARD-36ESW:** One Cisco pre-standard PoE daughtercard for 36 port EtherSwitch HDSM

- **GE-DCARD-ESW:** One GE (1000BaseT) daughtercard for EtherSwitch Modules

Features and Benefits

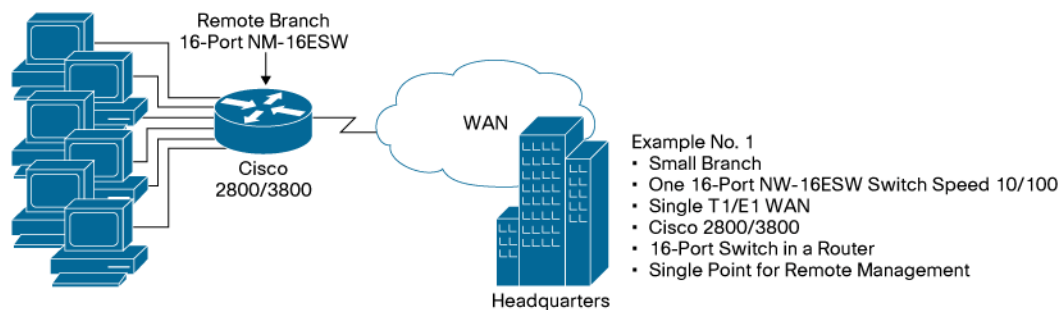**Table 1.**   Features and Benefits of Cisco EtherSwitch Modules

Features	Benefits
16/36 10BaseT/100BaseTX Ports	Delivers up to 200 Mbps of bandwidth (full duplex) Layer 2; forwards and filters backflow at full wire speed on each port
Autosensing on each port	Detects the speed of the attached device and automatically configures the port for 10- or 100-Mbps operation
Integrated Switching	Provides fewer points of management for remote and small branch offices
Support for 802.1P QoS	Supports QoS based on the Institute of Electrical and Electronics Engineers (IEEE) class-of-service (CoS) and port-based prioritization, allowing the switch to change the CoS settings of tagged packets on a per-port basis
802.1Q Trunking	Allows the setup of separate VLANs with tagged and untagged framing; trunking is used to save ports when creating a link between two devices implementing VLANs
802.1D Spanning Tree (a Layer 2 link-management protocol that provides path redundancy while preventing undesirable loops in the network)	Simplifies network configuration and improves fault tolerance
Voice Virtual LAN (VLAN) feature for IP Phones	Enables phones to be placed into their own VLANs without the need for end-user intervention; a user can plug the phone into the switch, and the switch provides the phone with the necessary VLAN information
Port-Based Reclassification for Queues on each 10/100 that are Configurable using a Weighted Round Robin (WRR) Scheduler	Enables users to prioritize mission-critical traffic, such as VoIP and IP-based video applications over regular traffic
Media Access Control (MAC)-Based Port-Level Security	Prevents unauthorized stations from accessing the switch; Cisco fully supports the entire set of Requests for Comments (RFCs)
Multifunction LEDs per Port for Port Status	Provide a comprehensive and convenient visual management system
Cisco IOS Command-Line Interface (CLI)	Provides configuration through Cisco IOS CLI and provides common user interface for all the router functions
Multicast Management Support	Offers Internet Group Management Protocol (IGMP) snooping in hardware for management support
Memory	Features 4-/8-MB shared-memory architecture that is shared across all ports
SNMP Management	Offers support for Simple Network Management Protocol (SNMP) Management Information Base (MIB) manageable via a MIB browser
Cisco Pre-standard Power over Ethernet (optional)	EtherSwitch with the external power chassis or internal power supply upgrades can power Cisco IP Phones and wireless access points
Gigabit Ethernet Support: One or Two 1000BaseT Ports per EtherSwitch	Allows external connections to other switches and Gigabit Ethernet file servers. Required for intra-chassis stacking of modules

Options

- **GE-DCARD-ESW:** This optional 1000BaseT Gigabit Ethernet port for NM-16ESW and NMD-36-ESW can be used for a gigabit connection for a file server or for intra-chassis stacking of the Cisco EtherSwitch module. Stacking is supported in Cisco IOS release 12.2(11)T and beyond.

- **PPWR-PS-CHASSIS:** The power chassis is an external chassis that can support up to four 360W power supplies, which can provide power over ethernet to Cisco phones or wireless access points. This chassis can support up to 144 IP phones @ 10W per port (or less devices at <10W per port). The external PPWR-PS-CHASSIS is for use with the Cisco 2600 and 3600 Series. The 2800, 3700, and 3800 Series internal power supply can be upgraded to provide Power over Ethernet and the external chassis is not used for these routers. Also available is a custom cable that connects the power supply to the Cisco EtherSwitch Modules. Cable options allowing for power supply redundancy are also available. The power over ethernet works over standard Category 5 unshielded twisted-pair (UTP) cable up to 100 meters and allows direct power instead of using wall power with a transformer. This allows customers to use existing Category 5 UTP installations. The Cisco EtherSwitch Module power over ethernet implementation passes the required U.S. and international safety regulations and compliance measures.

- **NM-16ESW-PWR and NMD-36ESW-PWR:** The 16- and 36-port Ethernet switch modules with power daughter cards support 48V inline power of IP telephones when either purchased with an external power chassis or when used with an internal power supply. This combination of components enables IP phones to be plugged into any EtherSwitch module port. Also, the integrated Cisco power over ethernet for the 10/100BaseTX autosensing ports provides DC power to devices that can accept power over traditional UTP cabling (such as the Cisco 7900 Family of IP phones). This allows a standard RJ-45 jack to be powered from this EtherSwitch module source rather than having a separate plug into an AC wall outlet. Delivery of -48V power must be made to the 16-port Ethernet switch. This daughter card is required for power over ethernet. An internal or external power supply is also required.

- **PPWR-PS-360W:** This single 360W power supply for the Cisco EtherSwitch module line power can be added to a power chassis or can added internally into the Cisco 3700 Series router to power additional IP phones or wireless access points. Each power supply supplies up to 360W and can power up to 36 IP phones. For the Cisco 2800 and 3800 Series an upgrade to the internal router power supply is required and the PPWR-PS-360W is not used.

Example Solutions

Figure 3.   Typical Deployments: Small Branch Data Only

Remote Branch
16-Port NM-16ESW

Cisco
2800/3800

WAN

Example No. 1
- Small Branch
- One 16-Port NW-16ESW Switch Speed 10/100
- Single T1/E1 WAN
- Cisco 2800/3800
- 16-Port Switch in a Router
- Single Point for Remote Management

Headquarters

Small Branch Data Only

A Cisco EtherSwitch Network Module in a branch data deployment provides the flexibility of integrated routing and switching functions in one unit for low port densities. This deployment provides high-speed connections between individual desktops, servers, and other network resources in a single unit for Layer 2 and allows WAN connection at Layer 3 through the router. The Cisco EtherSwitch NM and Cisco 2800 router also provide an ideal solution for Cisco 2505, 2507, and 2516 users whose requirements have expanded beyond the existing Cisco 2500 Router/hub capabilities.

Figure 4.   Typical Deployment: Small Branch Data and IP Phones using Cisco 2600, 2800, 3600, 3700 and 3800 Series Routers
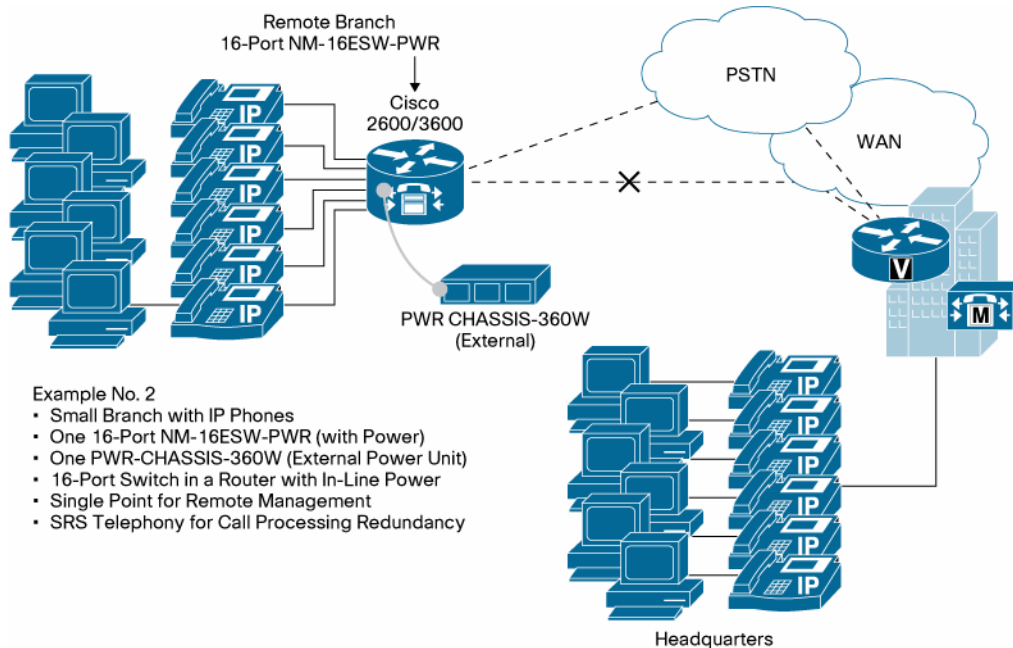
Small Branch Data and IP Phones

The Cisco EtherSwitch Network Module combined with analog or digital voice modules for the Cisco Integrated Services Routers provide a small branch office infrastructure for IP Telephony deployments. This solution can be combined with Cisco CallManager IP Telephony and the Cisco IOS Survivable Remote Site Telephony (SRS Telephony) solution. SRS Telephony runs on the local branch office router allowing it to automatically detect a failure in the network, and initiates a process to intelligently auto-configure the router to provide call-processing backup redundancy for the IP phones in that office.

The Cisco EtherSwitch NM with the external power chassis provides IP Phone power and phone discovery for Cisco IP phones. In addition, the Cisco EtherSwitch NM supports automatic VLAN configuration for IP Phones. The auxiliary VLAN feature allows network administrators to segment phones into separate logical networks even though the data and voice infrastructures are physically the same. The phone discovery allows the EtherSwitch NM-16ESW-PWR to automatically detect the presence of an IP phone and supplies Cisco pre-standard power over Ethernet[3].

For more information on the voice features for the Cisco 2600, 2800, 3600, 3700, and 3800 series routers, visit:

- **Cisco 2600 Series** http://www.cisco.com/en/US/products/hw/routers/ps259/index.html

- **Cisco 2800 Series** http://www.cisco.com/en/US/products/ps5854/index.html

- **Cisco 2900 Series** http://www.cisco.com/en/US/products/ps10537/index.html

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[3] For 802.3af power over Ethernet support one of the newer EtherSwitch Service Modules (NME-16ES-1G-P, NME-23ES-1G-P, or NME-XD-48ES-2S-P) or one of the EtherSwitch HWICs (HWIC-4ESW-POE or HWIC-D-9ESW-POE) are recommended.

- **Cisco 3600 Series** http://www.cisco.com/en/US/products/hw/routers/ps274/index.html

- **Cisco 3700 Series** http://www.cisco.com/en/US/products/hw/routers/ps282/index.html

- **Cisco 3800 Series** http://www.cisco.com/en/US/products/ps5855/index.html

- **Cisco 3900 Series** http://www.cisco.com/en/US/products/ps10536/index.html

Figure 5.   Typical Deployment: Small Branch Data and IP Phones
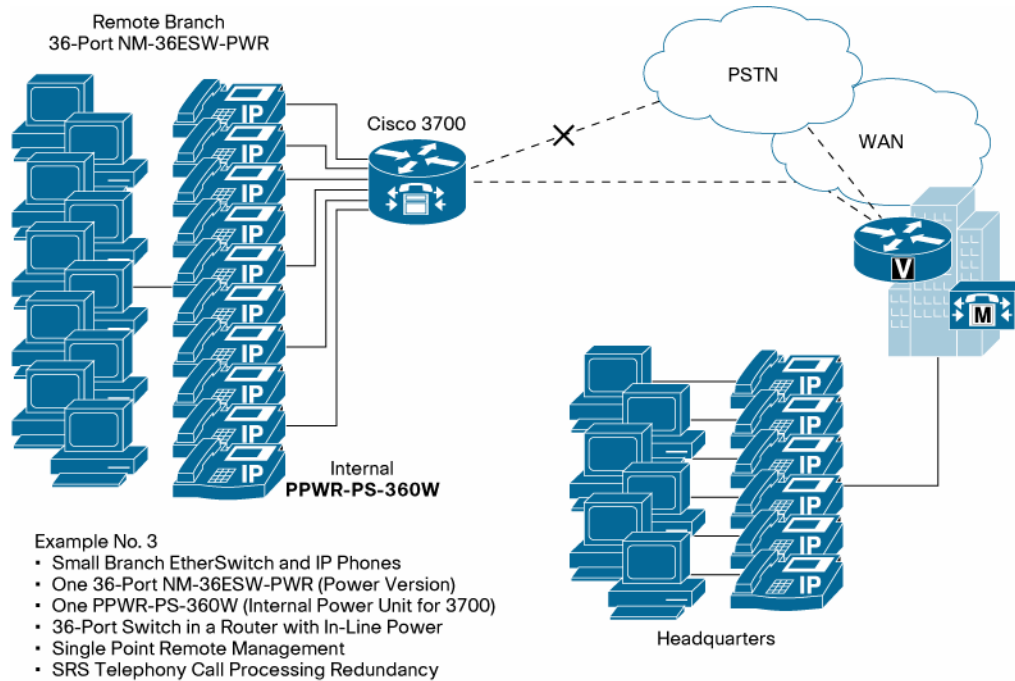
Small Branch Data and IP Phones with 2851, 2951, 3700, 3800 and 3900 Series

In this example we maintain all the features of Figure 4 above but we have now used the internal IP Phone Power
capabilities from the Cisco 2851, 3700, and 3800 series and added the 36-port EtherSwitch HDSM. The Cisco
EtherSwitch HDSM combined with analog or digital voice modules for the Cisco 2851, 2951, 3700, 3800 and 3900
routers provide a small branch office infrastructure for IP Telephony deployments at a higher port density. This solution
can also be combined with Cisco CallManager IP Telephony and the Cisco IOS Survivable Remote Site Telephony
(SRS Telephony) solution.

Data Communications Networks (DCN)

Another unique application of the Cisco EtherSwitch NM with Cisco 2600, 2800, 2900, 3600, 3700, 3800, 3900 Series
routers is in a Cisco DCN (Data Communications Network) operations and facilities management solution. The Cisco
DCN solution can be deployed using Cisco routers and Catalyst switches and delivers an out-of-band network used by
service providers and large enterprises for managing their primary network. By integrating the routing and switching
functionality into one form factor, service providers and enterprises can achieve a cost-effective solution for their
facilities management, monitoring and billing applications. The benefit is the reduction in valuable floorspace use as
well as the advantages of reduced management, maintenance and training costs.

Software for the Cisco Etherswitch Network Modules

The Cisco 16-port EtherSwitch NM and 36-port EtherSwitch HDSM are supported on Cisco IOS Software release
12.2(8)T and greater versions. Table 2 gives software requirements for the Cisco IOS

2600/2800/2900/3600/3700/3800/3900 Series Software, Table 3 gives memory requirements, and Table 4 gives product numbers and descriptions.

Table 2. Product Number and Description

Product Numbers	Description
NM-16ESW	One 16 port 10/100 EtherSwitch Network Module
NM-16ESW-PWR	One 16 port 10/100 EtherSwitch NM with Cisco pre-standard Power over Ethernet support
NM-16ESW-1GIG	One 16 port 10/100 EtherSwitch NM with 1 GE (1000BaseT) port
NM-16ESW-PWR-1GIG	One 16 port 10/100 EtherSwitch NM with Cisco pre-standard Power over Ethernet and GE
PPWR-DCARD-16ESW	One Cisco pre-standard power over ethernet power daughter card for 16 port EtherSwitch NM
NMD-36-ESW	One 36 port 10/100 EtherSwitch High Density Service Module
NMD-36-ESW-PWR	One 36 port 10/100 EtherSwitch HDSM with Cisco pre-standard Power over Ethernet Power
NMD-36-ESW-2GIG	One 36 port 10/100 EtherSwitch HDSM with 2 GE (1000BaseT)
NMD-36-ESW-PWR-2G	One 36 port 10/100 EtherSwitch HDSM with Cisco pre-standard Power over Ethernet and 2GE
PPWR-DCARD-36ESW	One Cisco pre-standard Power over Ethernet daughter card for 36 port EtherSwitch HDSM
GE-DCARD-ESW	One GE (1000BaseT) daughter card for EtherSwitch Modules
PPWR-PS-360W	One 48V (360W) power supply for EtherSwitch Modules[4]
PPWR-PS-CHASSIS	One power supply chassis for Cisco 48V (360W) power supply[5]
PWR-CHASSIS-360W	One power supply chassis and 48V power supply for EtherSwitch[6]
CAB-PPWR-PS1-1	Connects 1 EtherSwitch power supply to 1 EtherSwitch Module
CAB-PPWR-PS1-2	Connects 1 EtherSwitch power supply to 2 EtherSwitch Modules
CAB-PPWR-PS2-1	Connects 2 EtherSwitch power supplies to 1 EtherSwitch Module

Cisco EtherSwitch Network Modules are supported in the following platforms.

Table 3. Supported Platforms

	NM-16ESW, NM-16ESW-PWR, NM-16ESW-1GIG, NM-16ESW-PWR-1GIG	NMD-36-ESW, NMD-36-ESW-PWR, NMD-36-ESW-2GIG, NMD-36-ESW-PWR-2GIG
Cisco 2600 Series	Yes	No
Cisco 2801 Series	No	No
Cisco 2811 and 2821 Series	Yes	No
Cisco 2851 Series	Yes	Yes
Cisco 3620 and 3640 Series	Yes	No
Cisco 3660 Series	Yes	Yes
Cisco 3700 Series	Yes	Yes
Cisco 3800 Series	Yes	Yes
Cisco 2911, 2921, 2951	NM-16ESW and NM-16ESW-1GIG only*	No
Cisco 3900 Series	NM-16ESW and NM-16ESW-1GIG only*	No

***Note**: Of the modules outlined in this datasheet, only the NM-16ESW can be used in the Cisco 2911, 2921, 2951, 3925, 3945 routers. Support for the NM-16ESW in the 2911, 2921, 2951, 3925, and 3945 will be via the network module adapter card (SM-NM-ADPTR).

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[4] Can be used in an external power shelf with the Cisco 2600 or 3600 Series router or internally with the Cisco 3700 Series routers. For Cisco 2800 and 3800 the internal router power supply should be swapped out for a new power supply with Power over Ethernet capabilities if Power over Ethernet is required (examples of PoE enabled power supplies include PWR-2811-AC-IP=, PWR-2821-51-AC-IP=, PWR-3825-AC-IP=, and PWR-3845-AC-IP=).
[5] Only utilize the external power shelf with the Cisco 2600 and 3600 Series routers, for all other supported routers an upgrade to the internal power supply is required.

A maximum of two EtherSwitch Network Modules are supported in a Cisco Router.

HWIC-4ESW, WIC-4ESW, or HWIC-D-9ESW can also be used in combination with the EtherSwitch network module. A total of two EtherSwitch modules (HWICs or NMs) can be used in any router. If multiple EtherSwitches are used in a single chassis external stacking is required.

Cisco Etherswitch Modules are supported in IP Plus or above in Cisco IOS releases 12.2T. Beginning with Cisco IOS 12.3 Mainline and 12.3T, the Cisco Etherswitch modules are supported in IP Base or above.

For clarification on the various offered feature sets go here:
http://www.cisco.com/en/US/products/sw/iosswrel/ps5460/index.html

Table 4. Software Requirements

	Minimum Supported Cisco IOS Release	
	NM-16ESW, NM-16ESW-PWR, NM-16ESW-1GIG	**NMD-36-ESW, NMD-36-ESW-PWR, NMD-36-ESW-2GIG**
Cisco 2600 Series	12.2(8)T	Not supported
Cisco 2811-21 Series	12.3(8)T	Not supported
Cisco 2851 Series	12.3(8)T	12.3(8)T
Cisco 3620 and 3640 Series	12.2(8)T	Not supported
Cisco 3660 Series	12.2(8)T	12.2(8)T
Cisco 3700 Series	12.2(8)T	12.2(8)T
Cisco 3800 Series	12.3(11)T	12.3(11)T
Cisco 2911, 2921, 2951	NM-16ESW and NM-16ESW-1GIG only 15.0(1)M*, IP Base License	Not supported
Cisco 3900 Series	NM-16ESW and NM-16ESW-1GIG only 15.0(1)M*, IP Base License	No

*Note: Of the modules outlined in this datashet, only the NM-16ESW can be used in the Cisco 2911, 2921, 2951, 3925, 3945 routers. Support is available in the IP Base license package.

Specifications

- Standards network protocols
- Ethernet: IEEE 802.3, 10BaseT
- Fast Ethernet: IEEE 802.3u, 100BaseTX
- Fast Ethernet: IEEE 802.3, 100BaseFX
- IEEE 802.1D Spanning-Tree Protocol
- IEEE 802.1p CoS
- IEEE 802.1Q VLAN
- Gigabit Ethernet: IEEE 802.3z, IEEE 802.3x, IEEE 802.3ab
- Dimensions and Weight of NM-16ESW and NM-16ESW-PWR:
  - Dimensions (H x W x D): 1.55 x 7.10 x 7.2 in.
  - Weight: 2 lb maximum
- Dimensions and Weight of PPWR-PS-CHASSIS:
  - Dimensions (H x W x D): 17.1 X 3.50 X 12 in.
  - Weight: 11 lb maximum
  - Environmental
  - Operating humidity: 5 to 95%, noncondensing
  - Operating temperature: 32°F to 104°F (0°C to 0° C)

◦ Nonoperating temperature: -40°F to185°F (-40°C t o 85°C)

Regulatory Compliance, Safety, EMC, Telecom, Network Homologation

When installed in a Cisco 2600/2800/3600/ 3700/3800 Router, the Cisco EtherSwitch Network Module does not change the standards (regulatory compliance, safety, EMC, telecom, network homologation) of the router itself. See data sheets for the Cisco 2600/2800/3600/3700/3800 routers at:

- http://www.cisco.com/en/US/prod/collateral/routers/ps259/product_data_sheet0900aecd800fa5be.html
- http://www.cisco.com/en/US/prod/collateral/routers/ps5854/ps5882/product_data_sheet0900aecd8016fa68.html
- http://www.cisco.com/en/US/products/hw/routers/ps274/products_data_sheet09186a0080091f6f.html
- http://www.cisco.com/en/US/prod/collateral/routers/ps282/product_data_sheet09186a008009203f.html
- http://www.cisco.com/en/US/prod/collateral/routers/ps5855/product_data_sheet0900aecd8016a8e8.html

Cisco and Partner Services for the Branch

Services from Cisco and our certified partners can help you transform the branch experience and accelerate business innovation and growth in the Borderless Network. We have the depth and breadth of expertise to create a clear, replicable, optimized branch footprint across technologies. Planning and design services align technology with business goals and can increase the accuracy, speed, and efficiency of deployment. Technical services help improve operational efficiency, save money, and mitigate risk. Optimization services are designed to continuously improve performance and help your team succeed with new technologies. For more information, visit http://www.cisco.com/go/services.

Additional Information

- **Cisco Etherswitch Portfolio Q&A:**
  http://www.cisco.com/en/US/products/ps5854/products_qanda_item0900aecd802a9470.shtml
- **Cisco EtherSwitch Service Modules:**
  http://www.cisco.com/en/US/products/ps5854/products_data_sheet0900aecd8028d15f.html
- **Cisco EtherSwitch HWICs:**
  http://www.cisco.com/en/US/products/ps5854/products_data_sheet0900aecd8016bf0b.html

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