Cisco Catalyst 8000 Edge Platforms Family Gigabit Ethernet LAN/WAN Modules

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Contents

Product overview 3

Module feature comparison 6

Ordering information 14

Service and support 14

Cisco and Partner Services for the branch 15

Cisco Capital 15

Document history 16

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Product overview

The 4- and 8-port Cisco® Gigabit Ethernet LAN/WAN modules offer small to medium-sized business and enterprise branch-office customers a combination of switching and routing integrated into a single module within the Cisco Catalyst™ 8000 Edge Platforms Family. Integrating switched LAN ports and Layer 3 WAN ports into a single module will greatly reduce your company's Total Cost of Ownership (TCO).

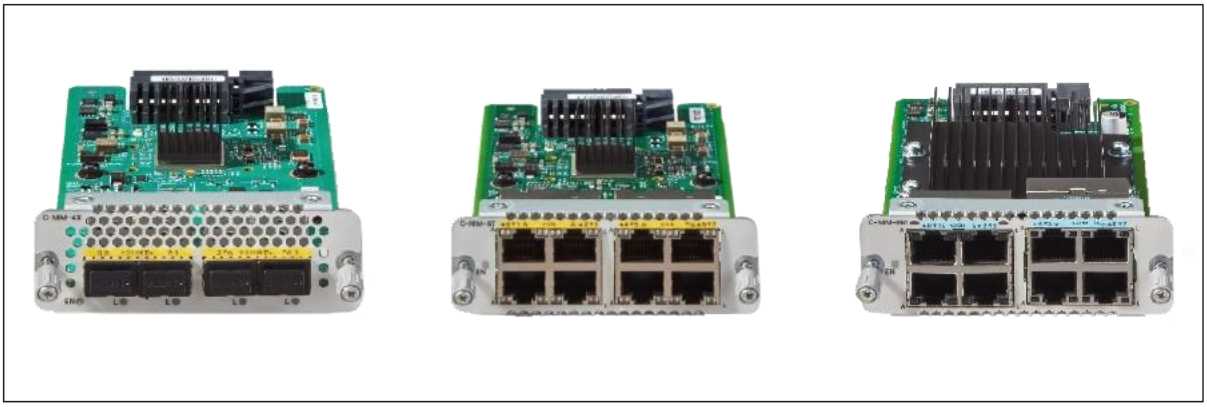


Figure 1.
Gigabit Ethernet LAN/WAN modules

These LAN/WAN modules provide line-rate Layer 2 switching across all onboard Gigabit Ethernet ports with full feature parity to the Cisco 4000 Series Integrated Services Routers (ISR 4000) Network Interface Modules (NIMs). In addition, the modules support enhanced features such as LAN MACsec on all ports, as well as 802.1X Change of Authorization (CoA) and posture validation. All three modules come with an option for configuring the two highest-numbered ports as native Layer 3 ports. Once configured as native Layer 3, these ports have full feature parity to the embedded WAN ports of the Catalyst 8300 and 8200 Series Edge platforms. All ports are also 128-/256-bit Media Access Control Security (MACsec)– capable with LAN MACsec switch-to-switch supported on all ports in Layer 2 mode, plus 256-bit WAN MACsec with Tag-in-Clear supported on ports in Layer 3 mode. LAN MACsec Switch-to-host, for user-facing downlink ports, is not supported at First Customer Shipment (FCS) of these modules.

The 4- and 8-port Gigabit Ethernet LAN/WAN modules provide maximum flexibility though a wide range of connectivity options plus software-configurable Layer 2 and Layer 3 support. The modules accelerate applications such as Ethernet WAN access, Cisco SD-WAN, and other high-speed connectivity options to the LAN, top-of-rack data center switches, and servers. SD-WAN and Cisco Catalyst SD-WAN Manager (vManage) support is available on all three modules.

Integration of these combined LAN switches and WAN ports with Cisco IOS® XE Software allows network administrators to manage a single device using Cisco management tools or the router Command-Line Interface (CLI) for LAN and WAN management needs. This approach reduces network complexity, lowers maintenance contract costs, and lessens staff training needs. It also simplifies software qualification efforts and delivers a consistent user experience at branch offices.

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Cisco offers three types of Ethernet LAN/WAN modules:

- **C-NIM-4X: Cisco 4-port 1G/10G LAN/WAN NIM with IEEE 802.1AE MACsec**

  4-port Gigabit Ethernet LAN/WAN with four 100M/1G/10G switched SFP/SFP+ ports

- **C-NIM-8T: Cisco 8-port 10M/100M/1G LAN/WAN NIM with IEEE 802.1AE MACsec**

  8-port Gigabit Ethernet LAN/WAN with eight 10M/100M/1G switched RJ-45 ports

- **C-NIM-8M: Cisco 8-port 100M/1G/2.5G LAN/WAN NIM with PoE and IEEE 802.1AE MACsec**

  8-port Gigabit Ethernet LAN/WAN with eight 100M/1G/2.5G switched RJ-45 ports



Figure 2.
C-NIM-4X: Cisco 4-port 1G/10G LAN/WAN NIM with IEEE 802.1AE MACsec

The C-NIM-4X is a Next-Generation 1G/10G LAN/WAN module with local Layer 2 switching capabilities on all four ports. This provides a price-effective, low-density 4-port Layer 2 LAN switch with capacity for switching four Small form-Factor Pluggable (SFP)/SFP+ ports at speeds up to 10 Gbps. The two highest-numbered ports can be configured for native Layer 3 operation. Configuring ports for Layer 3 will provide full feature parity with the router's embedded WAN ports. This module provides high-speed WAN connectivity through four ports supporting serial gigabit media-independent interface (SGMII)/1000BASE-X-based SFP and 10GBASE-R-based SFP+ pluggables. A 100-Mbps optic pluggable connection can also be supported by using the GLC-GE-100FX SFP transceiver. The four 1G/10G WAN ports are connected to the backplane using a single 10-Gbps-capable internal link. When used at maximum capacity, they thus form what is known as an oversubscribed connection of 4 to 1. IEEE 802.1AE MACsec is supported as described in the Product Overview.

The C-NIM-4X is supported on Catalyst 8300 Series platforms. It's not supported on Catalyst 8200 Series platforms.



Figure 3.
C-NIM-8T: Cisco 8-port 10M/100M/1G LAN/WAN NIM with IEEE 802.1AE MACsec

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The C-NIM-8T is a LAN/WAN module with eight RJ-45 copper line ports. It's intended primarily to replace the ISR 4000 Series NIM-ES2 switch module family, to which it has full feature parity for Layer 2 switching operation, and also includes added Layer 2 features. It supports 10BASE-T, 100BASE-TX, and 1000BASE-T Ethernet connections, providing a price-effective 8-port LAN switch. As with the C-NIM-4X and C-NIM-8M, the two-highest numbered ports can be configured to work as native Layer 3 ports with full feature parity to the router's embedded WAN ports. IEEE 802.1AE MACsec is supported as described in the Product Overview.

The C-NIM-8T is supported on all Catalyst 8200 and 8300 Series platforms.

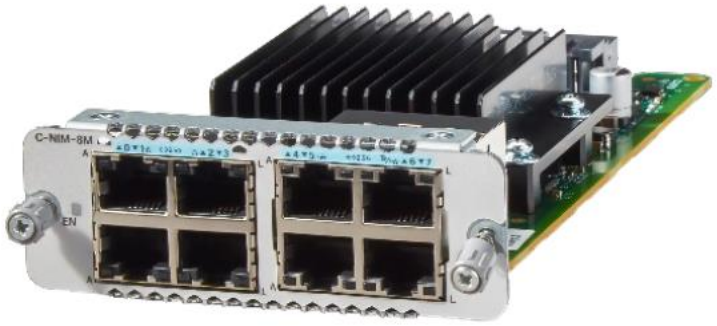


Figure 4.
C-NIM-8M: Cisco 8-port 100M/1G/2.5G LAN/WAN NIM with PoE and IEEE 802.1AE MACsec

The C-NIM-8M is a LAN/WAN module with eight 2.5G BASE-T (Multigigabit) RJ-45 copper line ports. Its eight ports support 100M/1G/2.5G BASE-T connections also known as Multigigabit or "mGig" ports. The 2.5G mGig ports accommodate full-speed connections for new high-speed branch devices with 2.5G mGig uplinks, such as Wi-Fi 6 Wireless Access Points and Cellular Gateways. 10M (10BASE-T) is not supported on the C-NIM-8M. Four of its ports support up to 90W Cisco Universal Power over Ethernet Plus (Cisco UPOE®+; 802.3bt-compliant) while being backward compatible with PoE, PoE+, and UPOE. The capability for providing 90W UPOE+ can be used for powering even the most demanding devices, such as high-performance Wireless Access Points and Cellular Gateways directly from the host router. As with the other LAN/WAN modules in this family, this module's two highest-numbered ports can be configured to operate in full Layer 3 mode with the added support of WAN MACsec.

The C-NIM-8M is supported on all Catalyst 8200 and 8300 Series platforms.

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Module feature comparison

Table 1 compares the software and hardware features of the modules at a high level.

Table 1. Feature comparison

Variable	C-NIM-4X 4-port 1G/10G	C-NIM-8T 8-port 10M/100M/1G	C-NIM-8M 8-port 100M/1G/2.5G
Form Factor	Network Interface Module (NIM)	Network Interface Module (NIM)	Network Interface Module (NIM)
Catalyst 8000 Edge Platforms Family support	Catalyst 8300 Series	Catalyst 8300 and 8200 Series and 8200L	Catalyst 8300 and 8200 Series and 8200L
Minimum required Cisco IOS version	17.11.1	17.11.1	17.12.2
Number of LAN/WAN modules per chassis	1	1	1
Supported on C-SM-NIM-ADPT carrier card	No	No	No
Connection Media	4x SFP/SFP+	8x RJ-45	8x RJ-45
Power over Ethernet (PoE)	No	No	Yes 802.3af, 802.3at, and 802.3bt compliant
MACsec support (IEEE 802.1AE)	Yes	Yes	Yes
Native Layer 3 ports	Yes Configurable on last two ports	Yes Configurable on last two ports	Yes Configurable on last two ports
Layer 3 features	Feature parity with Catalyst 8300 Series onboard ports	Feature parity with Catalyst 8300 Series onboard ports	Feature parity with Catalyst 8300 Series onboard ports
Online insertion and removal	Yes	Yes	Yes
10G backplane connection	Yes	Yes	Yes

Supported C-NIM-4X optics and transceivers

For a full list of supported optics and transceivers, see the Cisco Optics-to-Device Compatibility Matrix.

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Layer 2 switch features and benefits

Table 2 provides an overview of the architecture, switch features, and benefits of the 4- and 8-port Cisco Gigabit Ethernet LAN/WAN modules. Table 3 lists other features of the LAN/WAN modules.

Table 2. Architecture, features, and benefits of the 4- and 8-port Gigabit Ethernet LAN/WAN modules

Feature	Benefit
4 or 8 Ethernet ports	• The switches offer line-rate forwarding for Layer 2 traffic on each port.
Autonegotiation and automatic Media-Dependent Interface Crossed Over (Auto-MDIX)	• Autonegotiation allows the switch to automatically select half- or full-duplex transmission mode to optimize bandwidth on all the ports of the module. • Auto-MDIX allows the switch to automatically detect cable type (straight-through vs. crossover) between an attached device and the switch port.
Integrated switching	• Integrated switching provides fewer points of management for remote and small branch offices.
IEEE 802.1P QoS (Traffic Prioritization)	• This feature supports Quality of Service (QoS) based on the IEEE 802.1P Class of Service (CoS) and port-based prioritization, allowing for configuring the CoS-to-queue settings. • Each port has eight QoS queues. Strict priority is enforced by default. The routers support Shaped Deficit Weighted Round Robin (SDWRR) with configurable weight on each queue.
802.1Q Trouncing	• This feature provides an industrywide VLAN tagging standard, allowing for trunks also to be set up to third-party devices.
802.1D Spanning Tree Protocol	• This industry-standard link layer network protocol ensures a loop-free topology between Layer 2 devices regardless of vendor. Note that IEEE 802.1D Spanning Tree Protocol is not turned on by default.
Voice VLAN (VVLAN)	• VVLANs enable Cisco IP phones to place voice and data in their own separate VLANs. The NIM switch port is manually configured as a trunk port to support voice and data VLANs on the same port. The switch then uses Cisco Discovery Protocol to dynamically configure the Cisco IP phones.
IEEE 802.1X Authentication	• This client-server-based access control and authentication protocol restricts unauthorized devices from connecting to a LAN through publicly accessible ports. These modules come with the added 802.1X features CoA (Change of Authorization) and Posture validation.
IP Multicast management support	• The platforms provide Internet Group Management Protocol (IGMP) snooping in hardware for management support.
SNMP management	• Simple Network Management Protocol (SNMP) allows management of the MIB through a MIB browser.
Cisco IOS Software CLI	• This feature enables configuration through the Cisco IOS Software CLI and provides a common user interface for all the router functions.
Cisco Discovery Protocol Versions 1 and 2	• This protocol enables a CiscoWorks network management station to automatically discover the switch in a network topology.
Cisco VLAN Trunk Protocol (VTP; client, server, and transparent modes)	• Cisco VTP supports dynamic VLAN configuration across Cisco switches.
Power over Ethernet up to 90W UPOE+ (C-NIM-8M only)	• Power over Ethernet ports (up to 802.3bt, 90W) can be used to power devices such as IP phones, Wireless Access Points or Cellular Gateways directly from the host router.

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Table 3. Switch features of 4- and 8-port Gigabit Ethernet LAN/WAN C-NIMs

Feature
10/100/1000BASE-T, depending on model
1G/10G, depending on model
IEEE 02.1Q Trunking
IEEE 802.1D Spanning Tree
Static and dynamic MAC address learning
IEEE 802.1X port-based and multiple supplicant
IEEE 802.1u (guest VLAN)
IGMP Snooping
Auxiliary VLANS
Voice VLANS
Maximum number of VLANs supported: 1024
Maximum number of VLAN IDs: 4095
SDWRR and fixed scheduling
Eight QoS queues per port
IEEE 802.1p for 802.1q tagged packets
Port-based priority for untagged packets
Priority override
Switched Port Analyzer (SPAN)
Number of Spanning Tree Protocol instances: 1 per VLAN (max 128)
Per-port storm control
Media Access Control (MAC) notification
Dynamic secure port
Secure port filtering (port security)
Up to 100 secure MAC addresses
Private VLAN edge (protected port)
Protected port
Bridge protocol data unit (BPDU) guard

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Feature
PortFast
Jumbo Frames, 8kB
VTP (client, server, and transparent modes)
Per-VLAN Spanning Tree (PVST)
Per-port power monitoring and policing
Hot Standby Router Protocol (HSRP), Virtual Router Redundancy Protocol (VRRP), and Gateway Load Balancing Protocol (GLBP) on VLAN interfaces
Remote Monitoring (RMON) support
Auto-MDIX

SD-WAN/Cisco Catalyst SD-WAN Manager (vManage) support

- SD-WAN support for C-NIM-4X and C-NIM-8T is available as of version 20.11.
- SD-WAN support for C-NIM-8M is available as of version 20.12.
- Layer 2 support in Cisco Catalyst SD-WAN Manager has parity to ISR 4000 Switch module NIM
- Layer 3 support in Cisco Catalyst SD-WAN Manager has parity to Catalyst 8000 Routed port modules.
- Software toggling of a port between Layer 2 and Layer 3 is supported on Cisco Catalyst SD-WAN Manager UX2.0.

Layer 3 Features

The Cisco Catalyst 8000 Series Gigabit Ethernet LAN/WAN modules are based on the same technology used for the Cisco Catalyst 8000 Edge Platforms Family and its C-NIM Layer 3 modules. Layer 3 feature support is therefore identical to that of these Layer 3 modules as well as to the embedded Ethernet WAN ports of the Catalyst 8300 and 8200 Series and the Catalyst 8200L.

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C-NIM-8M Power over Ethernet

Cisco Universal Power Over Ethernet (UPOE+ helps enable a more flexible hybrid workplace. The C-NIM-8M supports 90W UPOE+ (802.3bt) on ports 4, 5, 6, and 7.

UPOE+ delivers industry-leading density of standards-based IEEE 802.3bt 90W PoE with per-port PoE and PoE+ power monitoring. Per-port monitoring is provided with a software API that allows the host to manage the total system draw on its PoE power supply. This will enhance the ability of the branch office to scale to higher performance requirements and still meet environmental initiatives for IT teams to operate a power-efficient network.

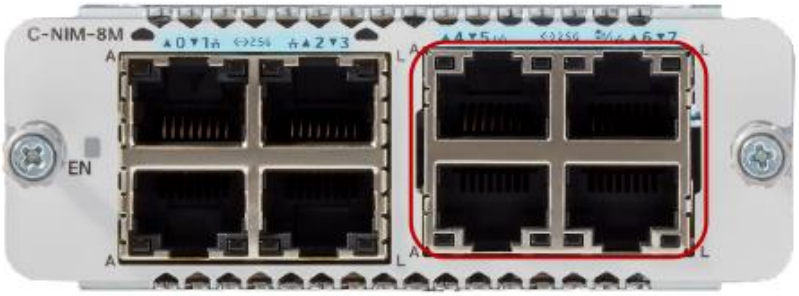


Figure 5.
UPOE+ ports are defined on ports 4, 5, 6 and 7 (highlighted red circle)

Table 4. UPOE+ power supply specifications

	C-NIM-8M
UPOE+ power	Up to 360W (4x 90W)
UPOE+ voltages	Nominal: -54V Range: -53V to -55.8V

Module LED indicators

The Cisco Gigabit Ethernet LAN/WAN modules have EN (Enabled), A (Activity), and L (Link) LEDs located around the SFP, SFP+, and RJ-45 ports. The LEDs indicate that the module has passed its self-test and is available to the router.

Figures 6 shows the front panel LED layout. Table 5 lists the LED colors and functions.

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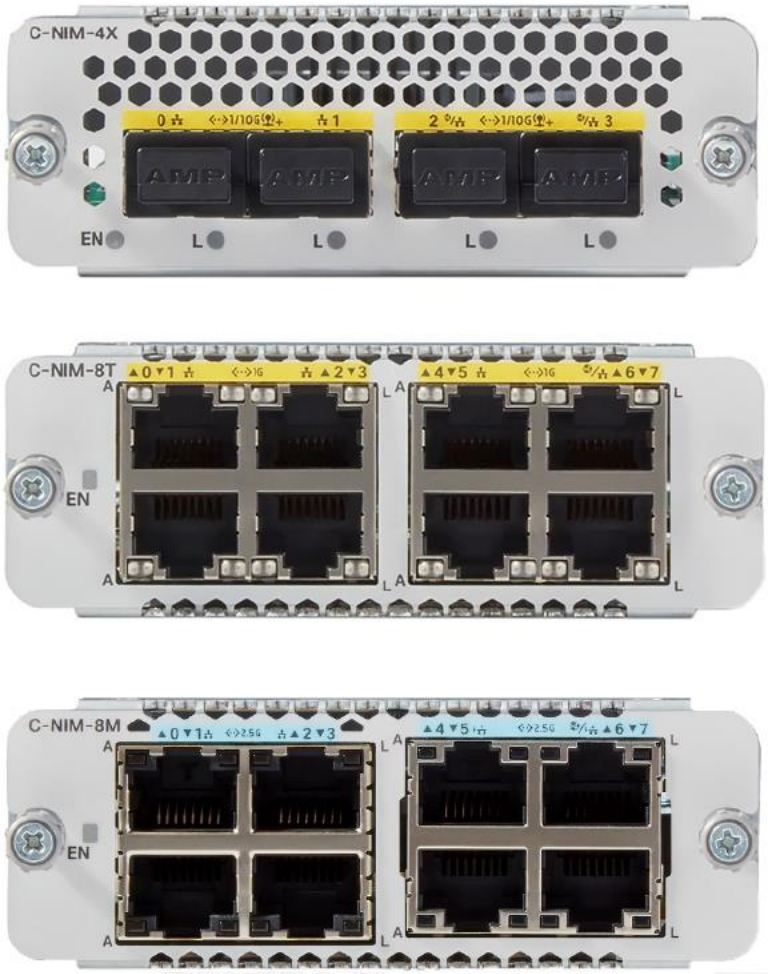


Figure 6.
C-NIM-4X, C-NIM-8T, and C-NIM-8M front panels and LEDs

LED Status

Table 5 shows the LED status indicators on the C-NIM-4X, C-NIM-8T, and C-NIM-8M.

Table 5. LED Status

LED	Color	Description
EN **C-NIM-4X** **C-NIM-8T** **C-NIM-8M**	Green/ Amber	**System status** **Off:** No power **Green Steady On:** The module is powered on and is functioning correctly **Green Blink:** Boot up phase or in ROM Monitor mode **Amber Steady On:** The module has some failure

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LED	Color	Description
RJ-45 ports without PoE **C-NIM-8T** **C-NIM-8M**	Green	**LED L:** Link LED **Off:** No link **Green Steady On:** Link up
	Green	**LED A:** **OFF:** No data **Green Blink:** TX/RX data
RJ-45 ports with PoE **C-NIM-8M**	Green/ Amber	**LED L:** Link LED **Off:** No link Green Steady On: Link up Solid Amber – PoE power denied due to fault (power denied or short detected)
	Green	**LED A:** **Off:** No data Green Blinking: TX/RX data
SFP/SFP+ port **C-NIM-4X**	Green/ Amber	**LED L:** **Off:** No SFP detected or inserted **Green Steady On:** SFP is powered up and enabled, no activity **Green Blink:** SFP is powered up and enabled, active **Amber Steady On:** The module has some failure

Installation

You can install service modules and network modules either before or after mounting the router. When installing in a NIM slot, online insertion only is supported, not online removal. When installed in a NIM slot, you can insert the modules into the router while the router is powered on, but you can't remove them unless the router is powered off.

Limitations

- Only a single LAN/WAN module, regardless of type, is supported per chassis.
- These LAN/WAN modules are supported only for operation in embedded NIM slots. Installation in the C-SM-NIM-ADPT carrier card is not supported.
- Being discrete switches, multiple LAN/WAN modules are not supported for operation in the same chassis, nor is any combination with NIM-ES2 or the C-SM switch modules. This limitation is similar to that of the ISR 4000 Series, in which only a single NIM-ES2 or SM-X switch is supported and cannot be combined with other switch modules.

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Warning: To comply with the Telcordia GR-1089 Network Equipment Building Standards (NEBS) for electromagnetic compatibility and safety, connect the Gigabit Ethernet ports only to intrabuilding or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intrabuilding port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the Outside Plant (OSP) or its wiring. These interfaces are designed for use as intrabuilding interfaces for only Type 2 or Type 4 ports as described in Telcordia GR-1089-CORE, and they require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection to connect these interfaces metallically to OSP wiring.

Configuration

For configuration instructions, refer to the “Configuring Ethernet, Fast Ethernet, or Gigabit Ethernet Interfaces” chapter of Configuring LAN Interfaces. The guidelines in this chapter apply to all Cisco modular access routers.

Physical Specifications

Tables 6 and 7 list the physical and environmental specifications, respectively, of the Gigabit Ethernet LAN/WAN modules.

Table 6. Physical Specifications

	C-NIM-4X	C-NIM-8T	C-NIM-8M
Form Factor	C-NIM	C-NIM	C-NIM
Dimensions (H x W x D)	1.25 x 3.50 x 7.24 in. (32 x 89 x 184 mm)	1.25 x 3.50 x 7.24 in. (32 x 89 x 184 mm)	1.25 x 3.50 x 7.24 in. (32 x 89 x 184 mm)
Weight	6.9 oz (195 g)	8.1 oz (230 g)	10.7 oz (300 g)

Table 7. Environmental Specifications

	C-NIM-4X	C-NIM-8T	C-NIM-8M
Operating temperature at sea level	23 to 131°F (–5 to 55°C)	23 to 131°F (–5 to 55°C)	23 to 131°F (–5 to 55°C)
Storage temperature	–38 to 150°F (–40 to 70°C)	–38 to 150°F (–40 to 70°C)	–38 to 150°F (–40 to 70°C)
Relative humidity	5 to 95%	5 to 95%	5 to 95%
Operating humidity	5 to 85%	5 to 85%	5 to 85%

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Cisco IOS Software Support

The Cisco Gigabit Ethernet LAN/WAN modules are supported by the Catalyst 8300 and 8200 Series in all Cisco DNA subscriptions.

Table 8. Minimum Cisco IOS Software Release

LAN/WAN Module	Catalyst 8000 Platform	Minimum Cisco IOS Software release
C-NIM-4X	Catalyst 8300 Series	IOS XE 17.11.1 Universal Image
C-NIM-8T	Catalyst 8200 and 8300 Series	IOS XE 17.11.1 Universal Image
C-NIM-8M	Catalyst 8200 and 8300 Series	IOS XE 17.12.2 Universal Image
C-NIM-4X, C-NIM-8T	Cisco Catalyst SD-WAN Manager	vmanage-20.11
C-NM-8M	Cisco Catalyst SD-WAN Manager	vmanage-20.12

Ordering information

Table 9 gives ordering information for the Cisco Gigabit Ethernet LAN/WAN Service Modules.

Table 9. Ordering information

Part Number	Description
C-NIM-4X (=)	Cisco 4-port 1G/10G LAN/WAN with IEEE 802.1AE MACsec
C-NIM-8T (=)	Cisco 8-port 10M/100M/1G LAN/WAN with IEEE 802.1AE MACsec
C-NIM-8M (=)	Cisco 8-port 100M/1G/2.5G LAN/WAN with PoE and IEEE 802.1AE MACsec

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- Access to the industry's largest dedicated technical support staff 24 hours a day.

For more information about Cisco services, refer to Cisco Technical Support Services or Cisco Advanced Services.

Technical Assistance

The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical problems with Cisco products and technologies.

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Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.

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