



# Overview of the Cisco 4000 Series ISR

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- [Safety Warnings, page 1-6](#)
- [Chassis Views, page 1-6](#)
- [Locating the Serial Number, PID, VID, and CLEI, page 1-25](#)
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## About the Cisco 4000 Series ISR

The Cisco 4000 Series Integrated Services Routers (ISRs) are modular routers with LAN and WAN connectivity. They support several interface modules, including Cisco Enhanced Service Modules (SM-X), and Cisco Network Interface Modules (NIMs).

The Cisco 4000 Series ISR target these applications:

- Enterprise applications—Intended as the mid-size aggregation and gateway router typically residing in a regional or large branch office:
  - WAN aggregation at Cisco Enterprise core
  - Internet gateway
  - Branch or regional office aggregation
  - Remote access aggregation
- Service provider applications—Intended for high-end Enterprise Branch environments:
  - High-end customer premises equipment (CPE) for business-quality Internet access
  - Service provider leased line aggregation
  - Provider edge (PE) and high-end customer edge (CE) for Layer 2 VPN or Layer 3 VPN services
  - Low-end Ethernet aggregation

The Cisco 4000 Series ISR are available in these models:

- Cisco 4451-X ISR
- Cisco 4431 ISR
- Cisco 4351ISR
- Cisco 4331ISR
- Cisco 4321 ISR
- Cisco 4221 ISR

The sections in this documentation apply to all platforms unless explicitly stated otherwise.

## Cisco 4451-X ISR

The Cisco 4451-X ISR provides these capabilities:

- Two single-wide SM slots that can be converted into one double-wide SM slot.
- Three single-wide NIM slots that can be converted into one double-wide (NIM1 and NIM2) and one single wide NIM slot (NIM3).
- One 10/100/1000 RJ-45 Ethernet port for system management (labeled {GE 0} with {MGMT} on the left of the connector)
- Two USB Type A host ports
- One USB mini-Type B console (placed next to the RJ-45 console port)
- One RJ-45 console port
- One RJ-45 auxiliary port
- Four combo ports that can function as SFP or RJ-45 ports:
  - 4 10/100/1000 RJ-45 Ethernet ports (labeled GE 0/0/0, 0/0/1, 0/0/2, and 0/0/3)
  - 4 100/1000 SFP Ethernet ports (labeled SFP 0/0/0, 0/0/1, 0/0/2, and 0/0/3)
- LEDs for Ethernet and console status
- LED for the CompactFlash memory card
- Two DDR3-240 pin Control Plane DIMM (dual in-line memory module) slots supporting replaceable DIMM modules
- One DDR3-240 pin Forwarding Plane DIMM slot, which can be supporting replaceable DIMM modules
- One CompactFlash slot, which is serviceable when the fan tray is removed
- One internal 30-W PoE daughter card for two of the front Gigabit Ethernet ports (labeled GE 0/0/0 and 0/0/1)
- One available ISC slot for an optional serviceable daughter card high-density Packet Voice Digital Signal Processor Module (PVD4) to add IP voice and video capability
- Environment monitoring
- Field replaceable fan tray
- Dual redundant power supply units (PSUs)
- Support for dual 500-W PoE converter power supply module

## Cisco 4431 ISR

The Cisco 4431 ISR provides these capabilities:

- 3 single-wide NIM slots that can be combined into one double-wide (NIM1 and NIM2) and one single-wide NIM.
- 10/100/1000 RJ-45 Ethernet port for system management (labeled GE mgmt)
- Two USB 2 Type A host ports
- One USB mini-Type B console (placed next to the RJ-45 console port)
- One RJ-45 console port
- One RJ-45 auxiliary port
- Four combo ports that can function as SFP or RJ-45 ports:
  - 4 10/100/1000 RJ-45 Ethernet ports (labeled GE 0/0/0, 0/0/1, 0/0/2, and 0/0/3)
  - 4 100/1000 SFP Ethernet ports (labeled SFP 0/0/0, 0/0/1, 0/0/2, and 0/0/3)
- LEDs for Ethernet and console status
- Two DDR3 240-pin Control Plane DIMM (dual in-line memory module) slots supporting replaceable DIMM modules
- One DDR3 240-pin Forwarding Plane DIMM slot supporting replaceable DIMM modules
- One eUSB flash slot, which is serviceable
- One internal 30-W PoE daughter card for two of the front Gigabit Ethernet ports (labeled GE 0/0/0 and 0/0/1)
- One available ISC slot for an optional serviceable daughter card high-density Packet Voice Digital Signal Processor Module (PVDM4) to add IP voice and video capability
- Environment monitoring
- Field replaceable fan tray
- Dual redundant power supply units (PSUs)
- Support for dual 500-W AC+PoE power supply units

## Cisco 4351 ISR

The Cisco 4351ISR provides these capabilities:

- Two single-wide SM slots that can be converted into one double-wide SM slot.
- Three single-wide NIM slots that can be converted into one double-wide (NIM1 and NIM2) and one single-wide NIM slot (NIM3).
- One 10/100/1000 RJ-45 Ethernet port for system management (labeled {GE 0} with {MGMT} on the left of the connector)
- Two USB Type A host ports
- One USB mini-Type B console (placed next to the RJ-45 console port)
- One RJ-45 console port
- One RJ-45 auxiliary port

- Three combo ports that can function as SFP or RJ-45 ports:
  - 3 10/100/1000 RJ-45 Ethernet ports (labeled GE 0/0/0, 0/0/1, and 0/0/2)
  - 3 100/1000 SFP Ethernet ports (labeled SFP 0/0/0, 0/0/1, and 0/0/2)
- One optional internal SSD mSATA storage device
- LEDs for Ethernet and console status
- LED for SSD status
- Two DDR3 DIMM slots supporting replaceable DIMM modules
- One eUSB flash slot, which is serviceable
- One serviceable internal 30-W PoE daughter card for two of the front Gigabit Ethernet ports (labeled GE 0/0/0 and 0/0/1)
- One available ISC slot for an optional serviceable daughter card PVDM4 module to add IP voice and video capability
- Environment monitoring
- Field replaceable fan tray
- Single PSU
- Support for a single 500-W PoE converter power supply module

## Cisco 4331 ISR

The Cisco 4331 ISR provides these capabilities:

- One single-wide SM slot
- Two single-wide NIM slots that can combined into one double-wide (NIM1 and NIM2).
- One 10/100/1000 RJ-45 Ethernet port for system management (labeled {MGMT} on the right of the connector)
- One USB Type A host port
- One USB mini-Type B console (placed next to the RJ-45 console port)
- One RJ-45 console port
- One RJ-45 auxiliary port
- Three GE ports allocated among two RJ45 and two SFP as:
  - One combo port with 10/100/1000 RJ-45 Ethernet port or SFP Ethernet port (labeled GE0/0/0)
  - One dedicated 10/100/1000 RJ-45 Ethernet port (labeled GE0/0/1)
  - One dedicated SFP Ethernet port (labeled GE0/0/2)
- Optional internal SSD mSATA storage device
- LEDs for Ethernet and console status
- LED for SSD status
- Two DDR3 DIMMs slots supporting replaceable DIMM modules
- One eUSB flash slot, which is serviceable



- One available ISC slot for an optional serviceable daughter card PVDM4 module to add IP Voice and video capability
- Environment monitoring

## Cisco 4321 ISR

The Cisco 4321 ISR provides these capabilities:

- Two single-wide NIM slots that can be converted into one double-wide (NIM1 and NIM2).
- One 10/100/1000 RJ-45 Ethernet port for system management (labeled {MGMT} on the right of the connector)
- One USB Type A host port
- One USB mini-Type B console (placed next to the RJ-45 console port)
- One RJ-45 console port
- One RJ-45 auxiliary port
- Two GE ports allocated among two RJ45 and one SFP as:
  - One combo port with 10/100/1000 RJ-45 Ethernet port or SFP Ethernet port (labeled GE0/0/0)
  - One dedicated 10/100/1000 RJ-45 Ethernet port (labeled GE0/0/1)
- Optional internal SSD mSATA storage device
- LEDs for Ethernet and console status
- LED for SSD
- One DDR3 DIMMs slot supporting replaceable DIMM modules
- One eUSB flash slot, which is serviceable
- One available ISC slot for an optional serviceable daughter card PVDM4 module to add IP voice and video capability
- Environment monitoring

## Cisco 4221 ISR

The Cisco 4221 ISR provides these capabilities:

- Two single-wide NIM slots
- One USB Type A host port
- One RJ-45 shared console port and auxiliary port
- Two GE ports allocated among RJ45 and SFP as:
  - One combo port with 10/100/1000 RJ-45 Ethernet port or SFP Ethernet port (labeled GE0/0/0)
  - One dedicated 10/100/1000 RJ-45 Ethernet port (labeled GE0/0/1)
- LEDs for Ethernet and console status
- Environment monitoring

# Safety Warnings



Warning

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## IMPORTANT SAFETY INSTRUCTIONS

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.**  
Statement 1071

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## SAVE THESE INSTRUCTIONS

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Warning

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**Ultimate disposal of this product should be handled according to all national laws and regulations.**  
Statement 1040

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Warning

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**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

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## Safety Warnings for Finland, Norway, and Sweden

Warning statement 1017 applies to the countries of Finland, Norway, and Sweden.



Warning

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**This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.**  
Statement 1017

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## Chassis Views

This section contains views of the front and back panels of the Cisco 4000 Series ISR, showing locations of the power and signal interfaces, module slots, status indicators, and chassis identification labels:

- [Cisco 4451-X ISR Chassis](#)
- [Cisco 4431 ISR Chassis](#)
- [Cisco 4351 ISR Chassis](#)
- [Cisco 4331 ISR Chassis](#)
- [Cisco 4321 ISR Chassis](#)
- [Cisco 4221 ISR Chassis](#)

## Cisco 4451-X ISR Chassis


**Note**

The Cisco 4451-X ISR routers support these slot types:

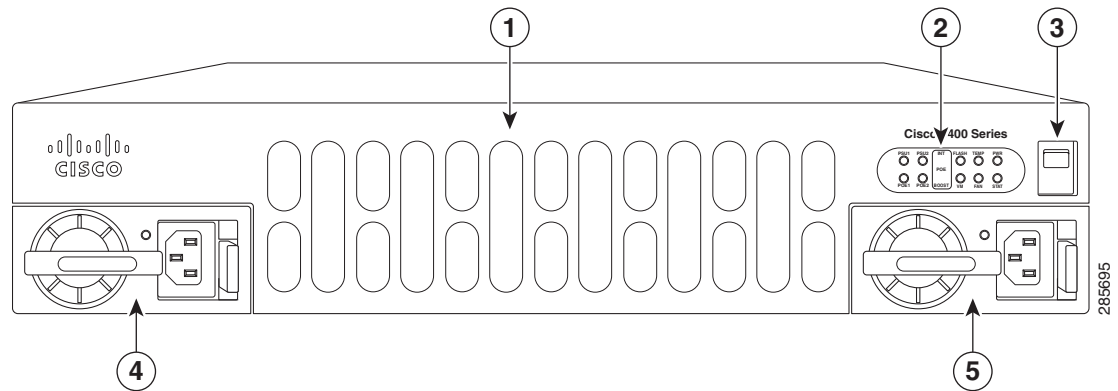
- Network Interface Modules (NIMs)
- Service modules (SM-X, like SM-X-1T3/E3)
- E-Series Server Modules

[Figure 1-1 on page 1-7](#)—Bezel view with two PSUs

[Figure 1-2 on page 1-8](#)—Back panel slots and ports

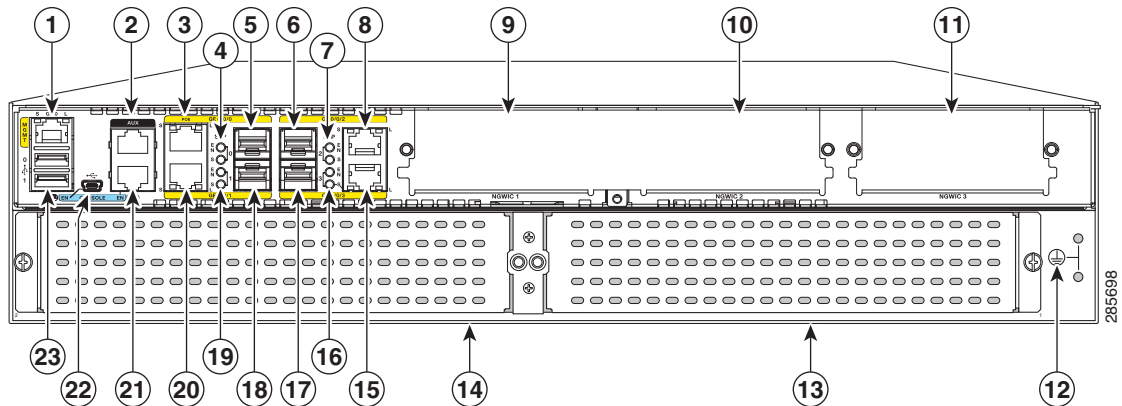
[Figure 1-3 on page 1-9](#)—Bezel side LEDs

**Figure 1-1** Bezel Side of the Cisco 4451-X ISR with Two PSUs



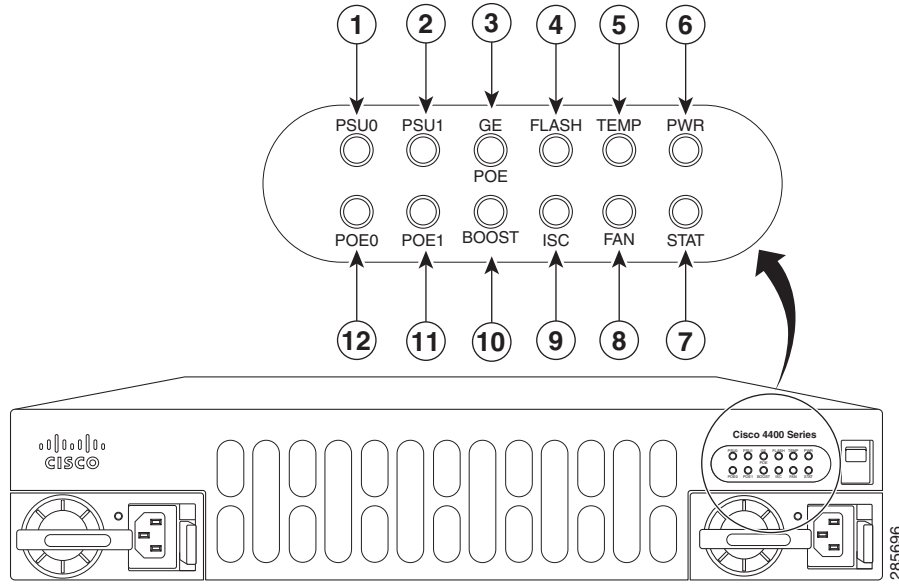
<b>1</b>	Router fan tray (hidden) behind removable bezel	<b>2</b>	LEDs
<b>3</b>	Router power On/Off switch	<b>4</b>	AC power supply unit (PSU0)
<b>5</b>	AC power supply unit (PSU1)		

Figure 1-2 Back Panel (I/O Side) Slots and Connectors on the Cisco 4451-X ISR



1	GE 0 management port	2	Auxiliary port
3	RJ-45 Gigabit Ethernet port (GE 0/0/0)	4	LEDs for the GE 0/0/0 interface (See <a href="#">Table 1-1</a> for detailed LED information)
5	SFP/Gigabit Ethernet port (GE 0/0/0)	6	SFP/Gigabit Ethernet port (GE 0/0/2)
7	LEDs for the GE 0/0/2 interface	8	RJ-45 Gigabit Ethernet port (GE 0/0/2)
9	NIM slot 1 (shown with slot divider removed).	10	NIM slot 2 (shown with slot divider removed).
11	NIM slot 3	12	Ground connection
13	Enhanced Service Module (SM-X) 2	14	Enhanced Service Module (SM-X) 1
15	RJ-45 Gigabit Ethernet port GE 0/0/3	16	LEDs for the GE 0/0/3 interface
17	SFP/Gigabit Ethernet GE 0/0/3	18	SFP Gigabit Ethernet GE 0/0/1
19	LEDs for the GE 0/0/1 interface	20	RJ-45 Gigabit Ethernet port GE 0/0/1
21	Serial console port	22	USB Type B mini port
23	USB 0 and USB 1		

**Figure 1-3 Bezel Side LEDs of the Cisco 4451-X ISR Model**

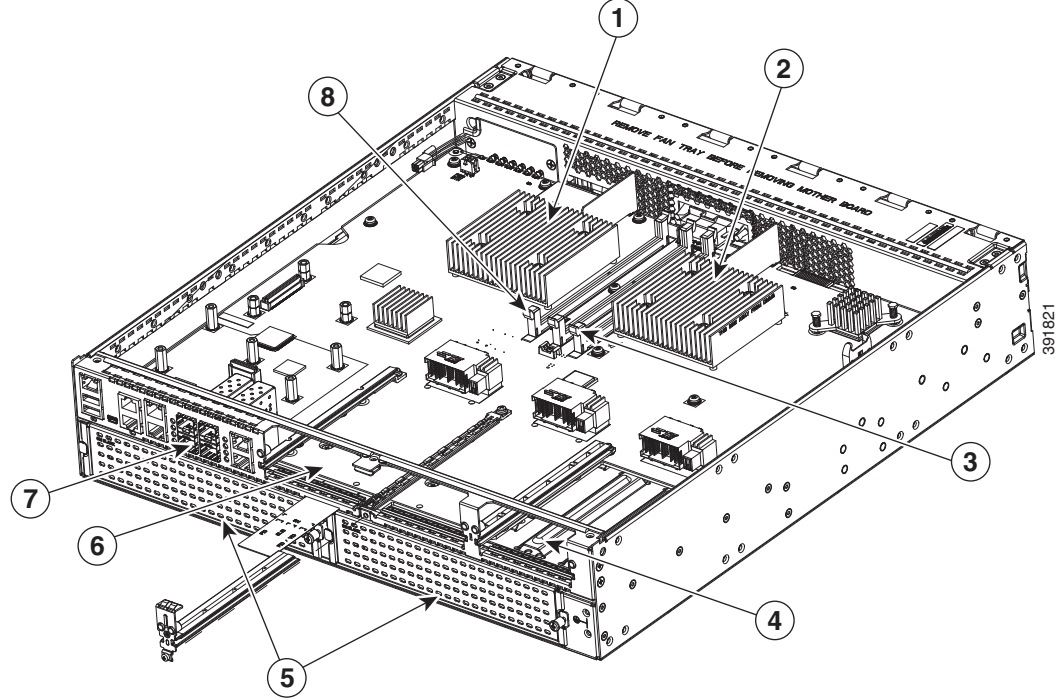


<b>1</b>	PSU0: Power supply unit 1	<b>2</b>	PSU1: Power supply unit 2
<b>3</b>	GE POE: Internal PoE daughter card status	<b>4</b>	FLASH: Compact flash status
<b>5</b>	TEMP: Temperature status	<b>6</b>	PWR: Power
<b>7</b>	STAT: System status	<b>8</b>	FAN: Fan status
<b>9</b>	ISC: Integrated Services Card status	<b>10</b>	POE BOOST: Power over Ethernet boost mode
<b>11</b>	POE 1: Power over Ethernet 1 status	<b>12</b>	POE 0: Power over Ethernet 0 status

## Platform Summary

Figure 1-4 shows an internal view of the Cisco 4451-X ISR with the parts and module locations.

**Figure 1-4 Platform Summary of the Cisco 4451-X ISR**



1	Forwarding plane processor	2	Control plane processor
3	Control plane processor DIMMs	4	NIM 3 (single-wide) slot
5	Enhanced Service Module (SM-X) slots	6	NIM slot 1 and 2 (shown with slot divider removed)
7	SFP GE ports	8	Forwarding plane processor DIMM

## Cisco 4431 ISR Chassis



**Note**

The Cisco 4431 ISR support the following slot types:

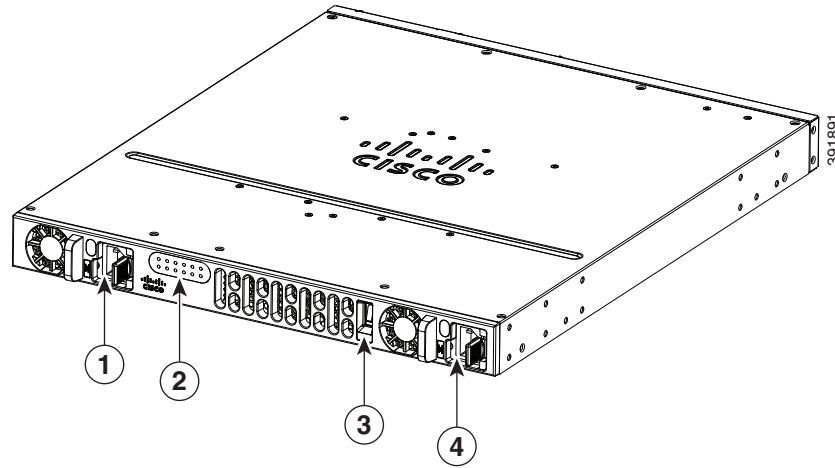
- Network Interface Modules (NIMs)
- Integrated Services Card (ISC slots for PVDM4s)

Figure 1-5 on page 1-11—Bezel view with two PSUs

Figure 1-6 on page 1-12—View of the chassis

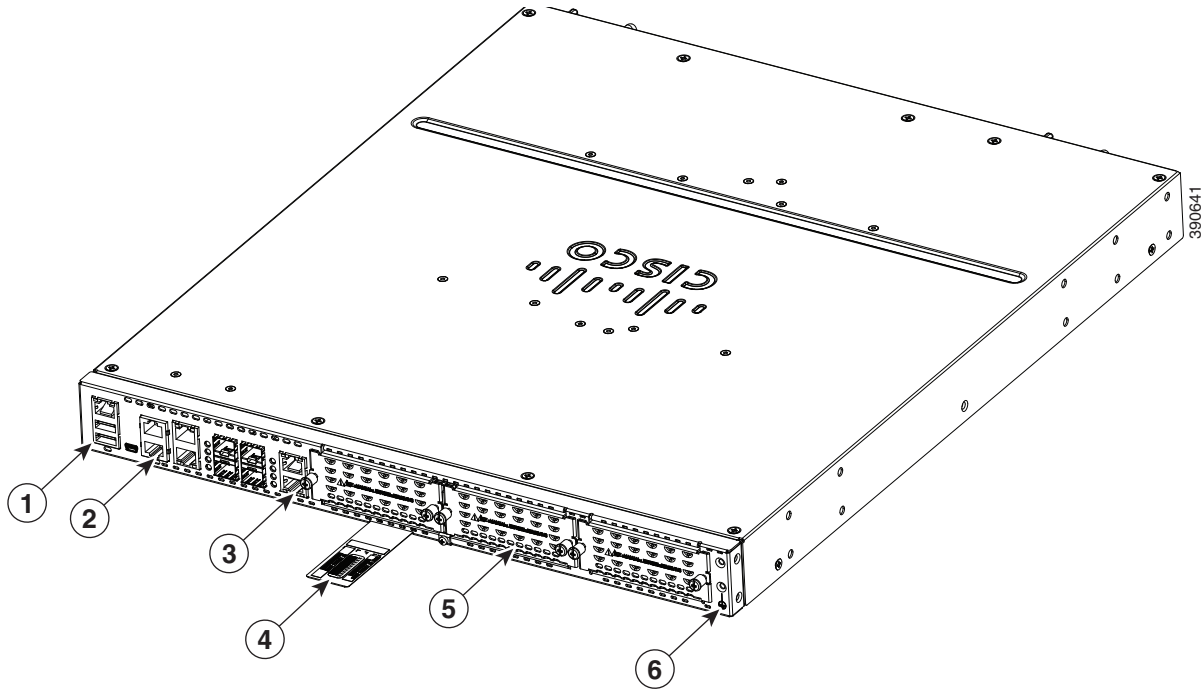
Figure 1-7 on page 1-12—Bezel side LEDs

**Figure 1-5 Bezel View of the Cisco 4431 ISR with Two Power Supply Units**



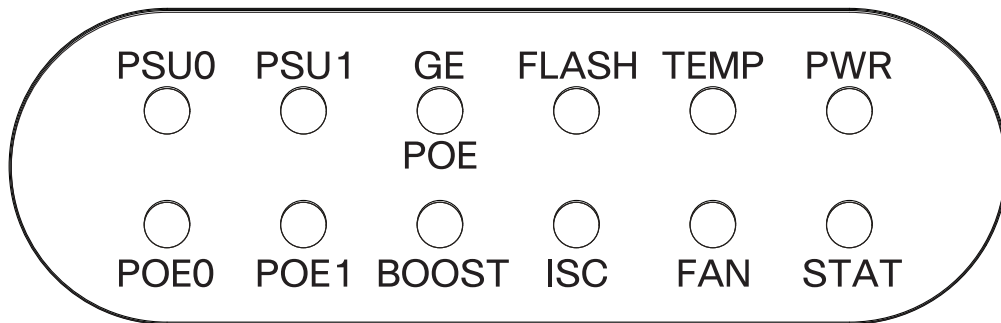
<b>1</b>	Power supply unit	<b>2</b>	LEDs
<b>3</b>	On/Off switch	<b>4</b>	Optional power supply unit

Figure 1-6 View of the Cisco 4431 ISR Chassis



1	USB ports	2	GE ports
3	Screws to open the NIM slot	4	Router label tray
5	NIM slot (with cover)	6	Ground connection

Figure 1-7 LEDs on the Cisco 4431 ISR



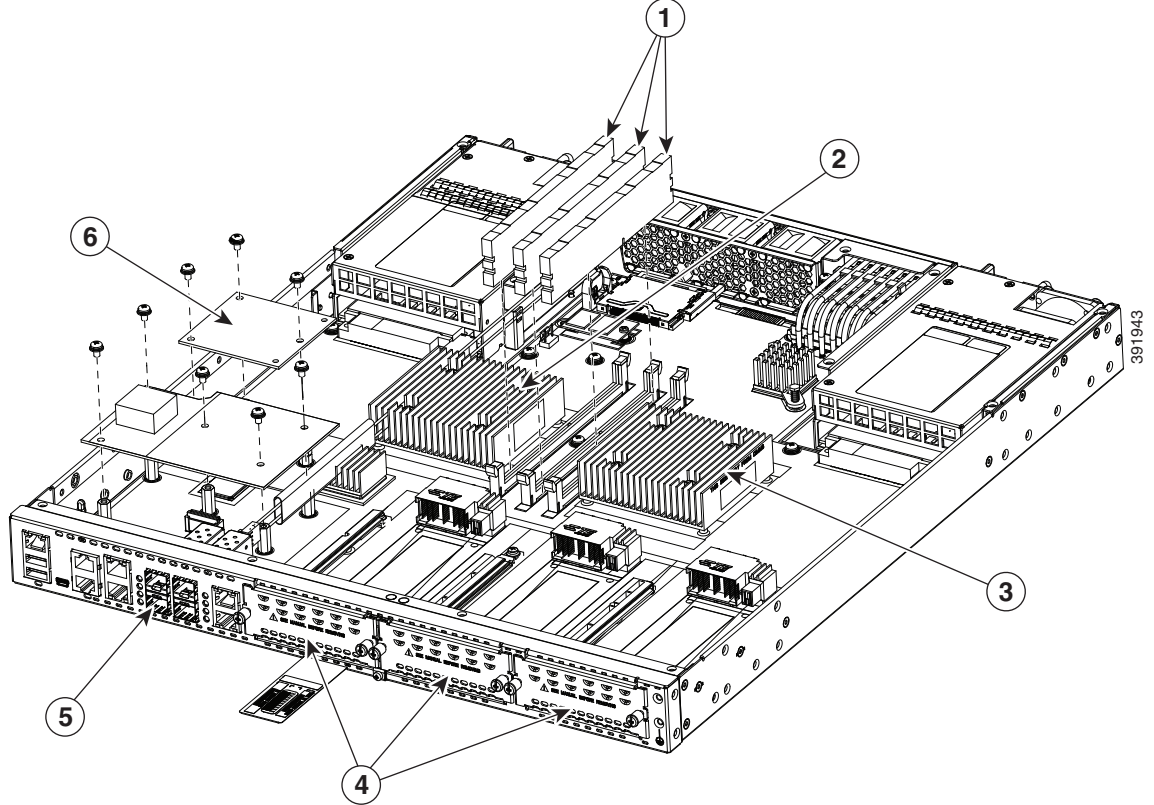
For detailed information on LEDs, see the [“LED Indicators”](#) section on page 1-28.



## Platform Summary

Figure 1-4 shows an internal view of the Cisco 4431 ISR with the parts and module locations.

**Figure 1-8 Platform Summary of the Cisco 4431 ISR**



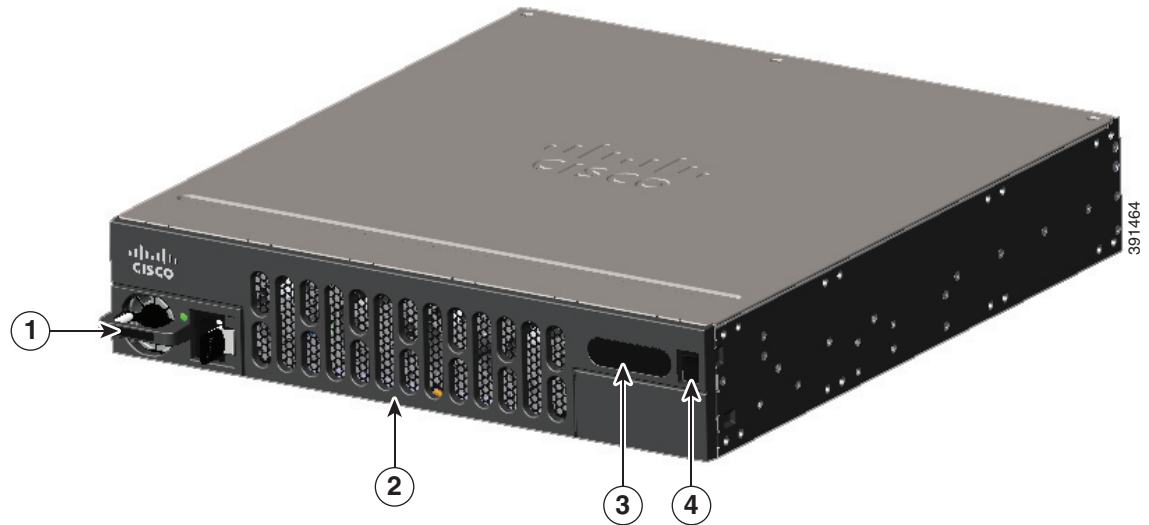
1	DIMMs	2	Forwarding plane processor
3	Control plane processor	4	NIMs
5	SFP GE ports	6	PVDM card

## Cisco 4351 ISR Chassis

This section contains the following views of the Cisco 4351ISR chassis:

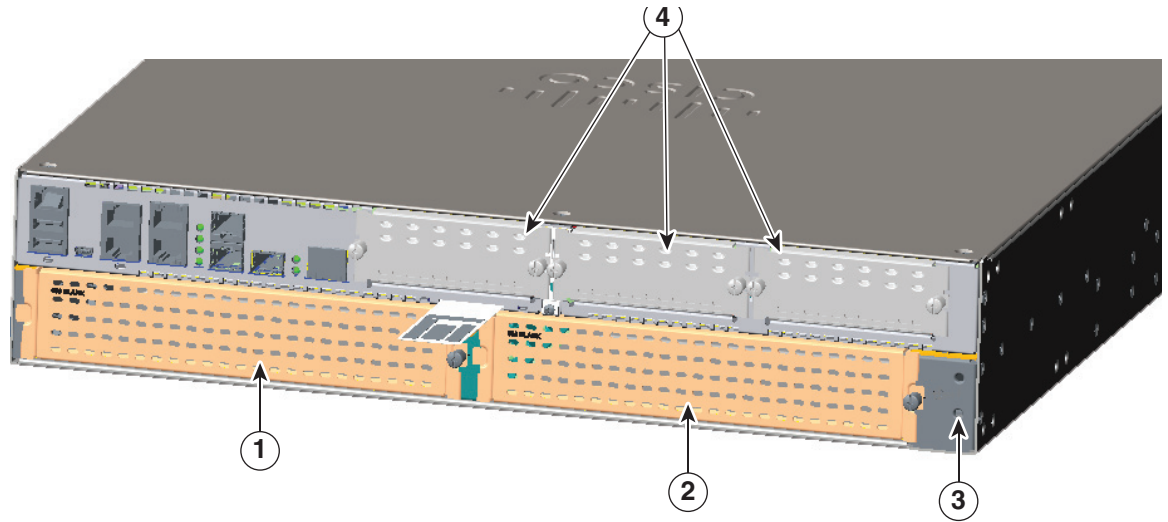
- [Power Supply and Bezel Side View of the Cisco 4351 ISR \(Figure 1-9\)](#)
- [Back Panel Ports, Slots, and Serial Number on the Cisco 4351 ISR \(Figure 1-10\)](#)
- [Ports on the Cisco 4351 ISR \(Figure 1-11\)](#)
- [LEDs on the Cisco 4351 ISR \(Figure 1-12\)](#)

**Figure 1-9** Power Supply and Bezel Side View of the Cisco 4351 ISR



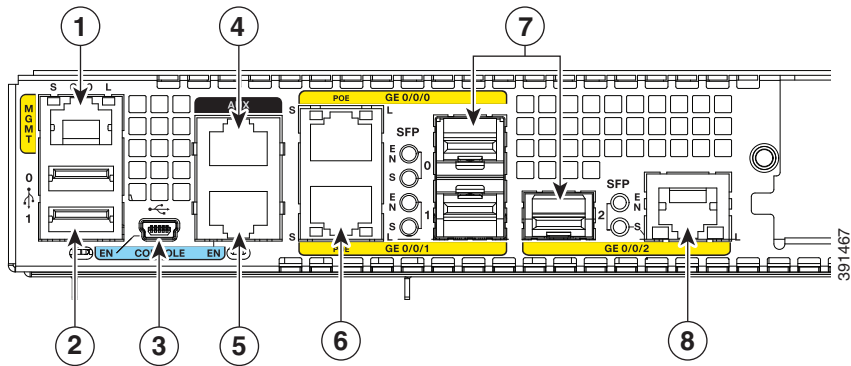
<b>1</b>	Power supply unit	<b>2</b>	Router fan tray (hidden behind the removable bezel)
<b>3</b>	LEDs	<b>4</b>	Router power On/Off switch

**Figure 1-10 Back Panel Ports, Slots, and Serial Number on the Cisco 4351 ISR**



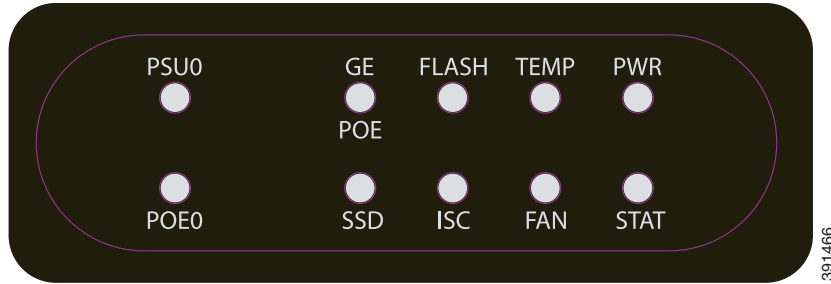
<b>1</b>	Enhanced Service Module (SM-X) slot	<b>2</b>	Enhanced Service Module (SM-X) slot
<b>3</b>	Ground connection	<b>4</b>	NIM slots

**Figure 1-11 Ports on the Cisco 4351 ISR**



<b>1</b>	GE management port	<b>2</b>	USB Type A port
<b>3</b>	USB Type B mini port	<b>4</b>	Auxiliary port
<b>5</b>	Console port	<b>6</b>	RJ-45 port (GE 0/0/1)
<b>7</b>	SFP port (GE 0/0/0)	<b>8</b>	RJ-45 port (GE/0/0/2)

Figure 1-12 LEDs on the Cisco 4351 ISR

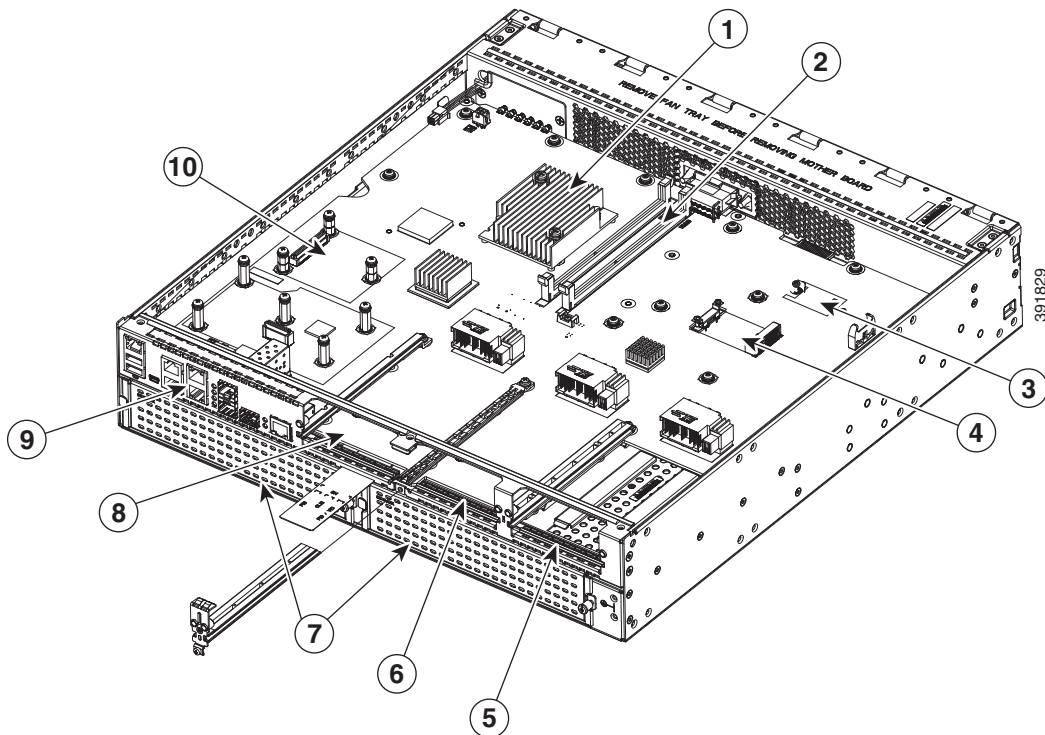


For detailed information on LEDs, see the “LED Indicators” section on page 1-28.

## Platform Summary

Figure 1-4 shows an internal view of the Cisco 4351 ISR chassis with the parts and module locations.

Figure 1-13 Platform Summary of the Cisco 4351 ISR Chassis



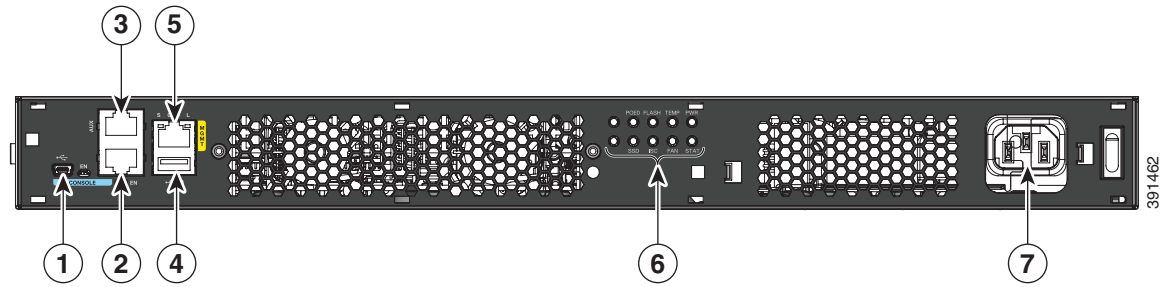
1	CPU	2	DIMMs
3	Flash memory card connector	4	SSD mSATA connector
5	NIM slot 3	6	NIM slot 2
7	SM-X slots	8	NIM slot 1
9	RJ-45 GE ports	10	ISC slot

# Cisco 4331 ISR Chassis

This section contains the following views of the Cisco 4331 ISR router:

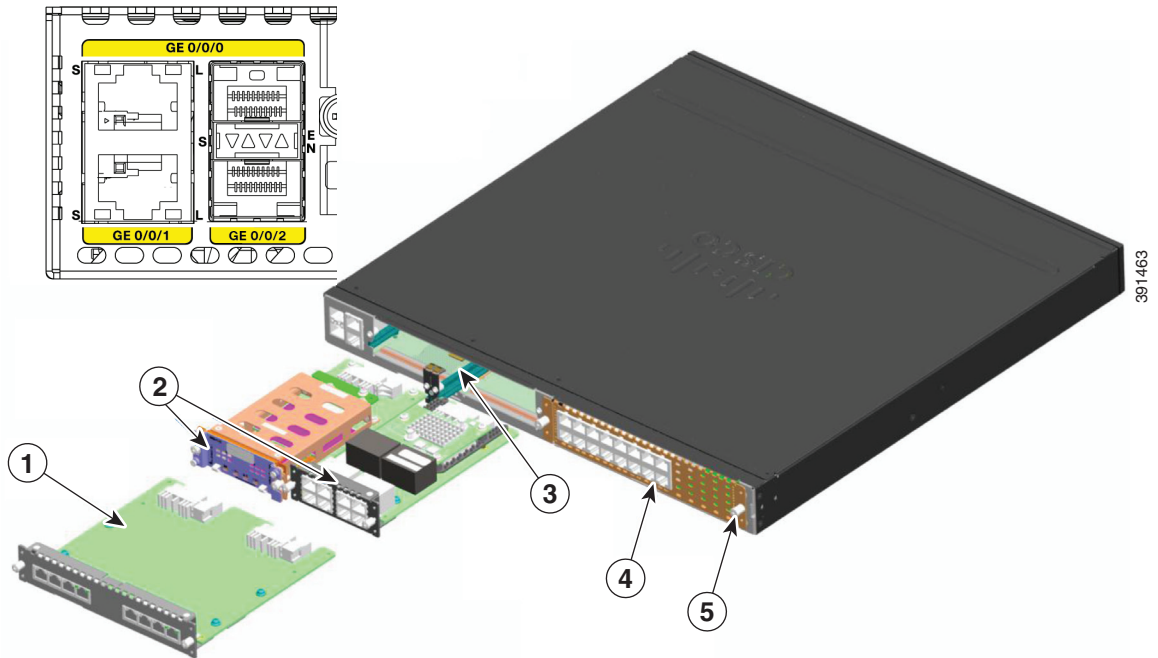
- [Bezel Side Ports and LEDs on the Cisco 4331 ISR \(Figure 1-14\)](#)
- [Back Panel Ports and Slots on the Cisco 4331 ISR \(Figure 1-15\)](#)

**Figure 1-14 Bezel Side Ports and LEDs on the Cisco 4331 ISR**



1	USB Type B mini port	2	Serial console port
3	AUX port	4	USB Type A port
5	Management port	6	LEDs
7	AC Power		

**Figure 1-15 Back Panel Ports and Slots on the Cisco 4331 ISR**



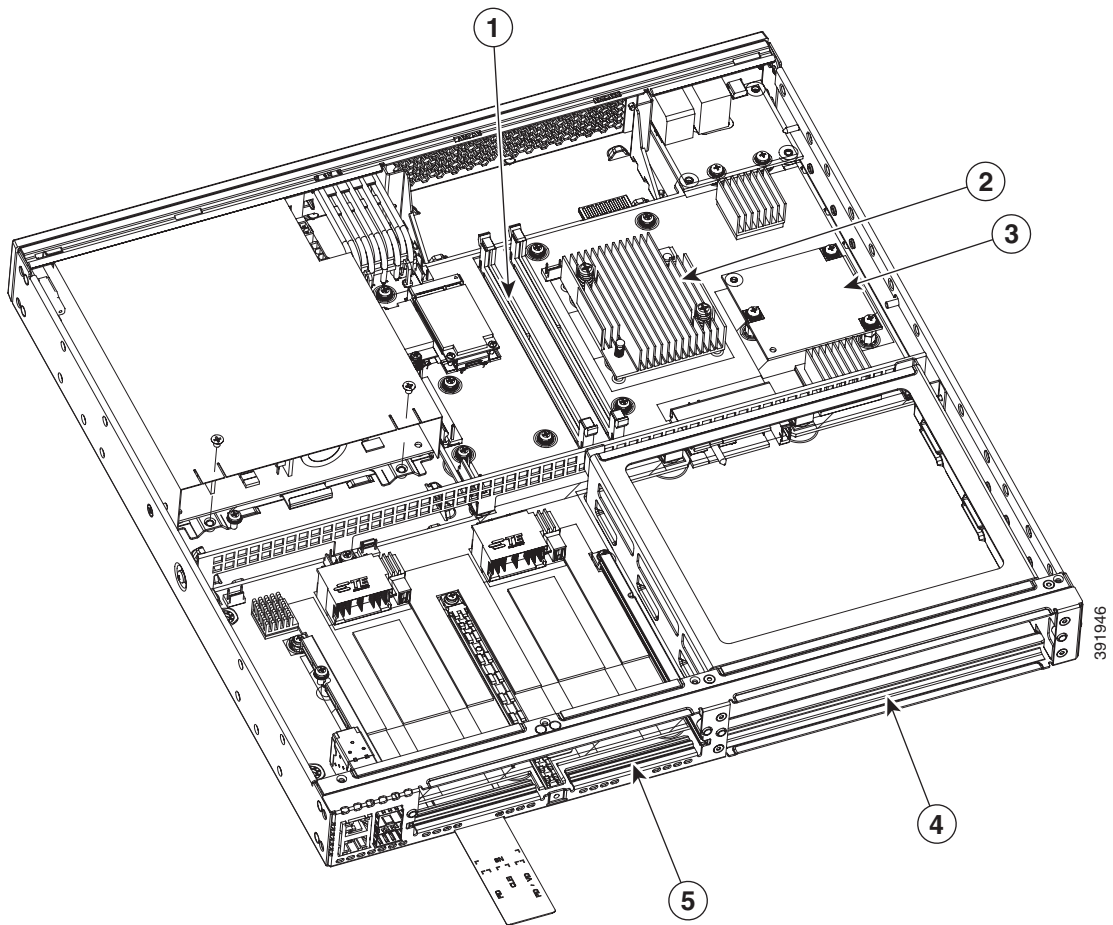
1	Double-wide NIM	2	NIMs
3	Removable module slot divider	4	SM-X slot
5	Ground connection		

For detailed information on LEDs, see the “LED Indicators” section on page 1-28.

## Platform Summary

Figure 1-16 shows an internal view of the Cisco 4431 ISR with the parts and module locations.

**Figure 1-16** Platform Summary of the Cisco 4331 ISR Chassis



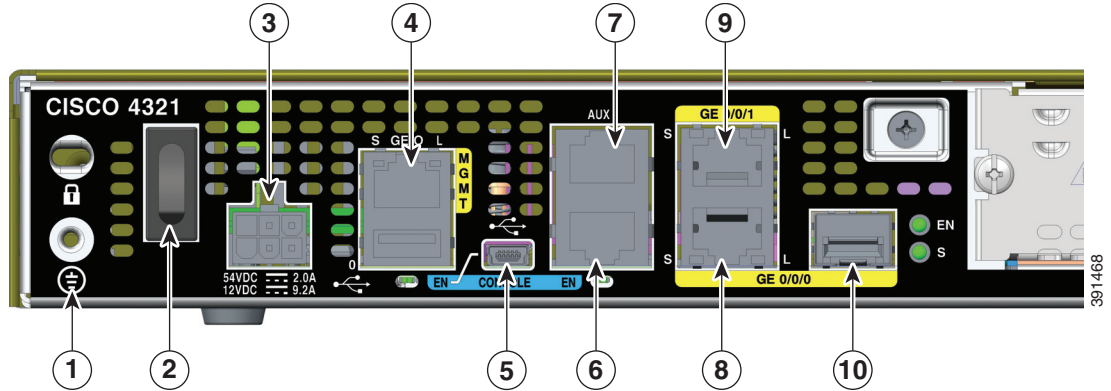
1	DIMMs	2	CPU
3	ISC slot	4	SM-X slot
5	NIM slot		

# Cisco 4321 ISR Chassis

This section contains the following views of the Cisco 4321 ISR router:

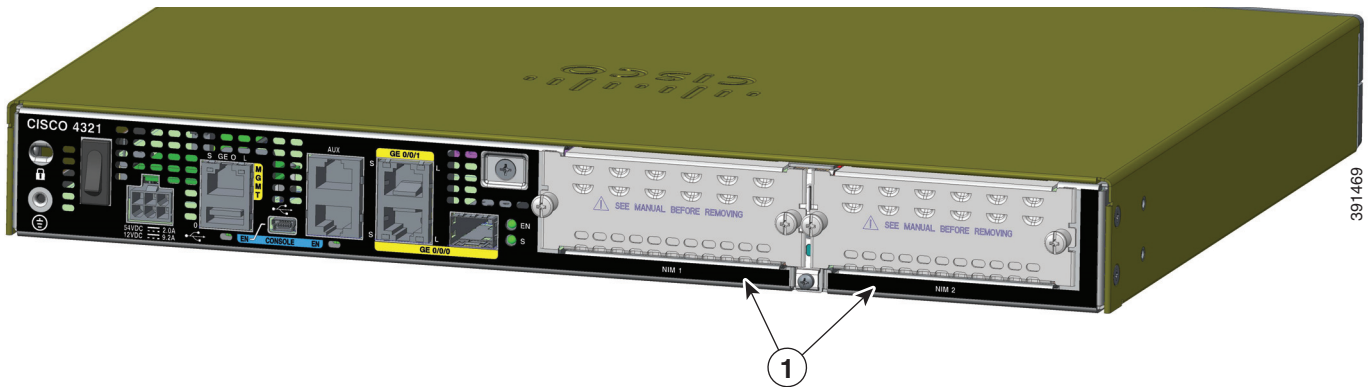
- [Back Panel Ports on the Cisco 4321 ISR](#)
- [LEDs on the Cisco 4321 ISR \(Figure 1-17\)](#)
- [LEDs on the Cisco 4321 ISR \(Figure 1-18\)](#)

**Figure 1-17 Back Panel Ports on the Cisco 4321 ISR**



1	Grounding	2	Power switch
3	Power input connector	4	GE “MGMT” port (with USB port below)
5	USB Type B mini port	6	Console port
7	Auxiliary port	8	GE 0/0/1 (copper cable) port
9	GE 0/0/0 RJ-45 (copper cable) port	10	GE 0/0/0 SFP (fiber-optic) port

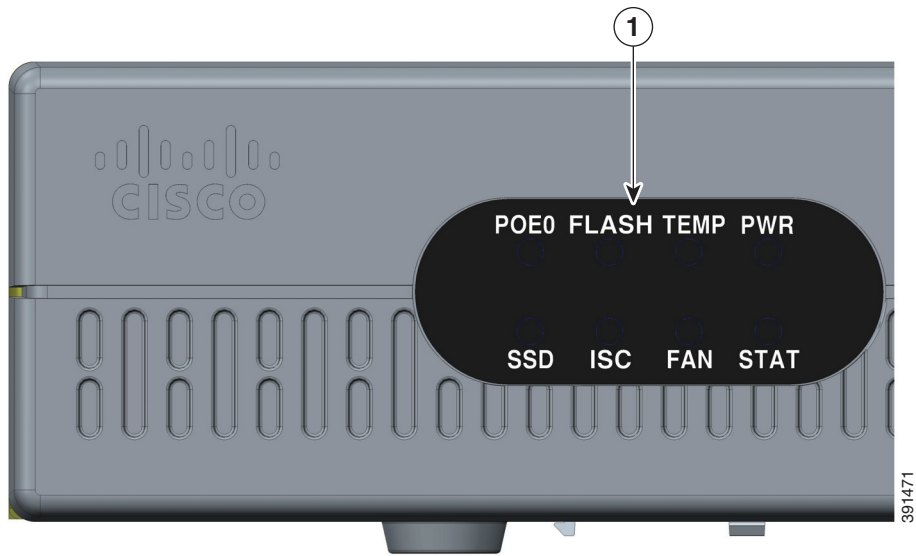
**Figure 1-18 Back Panel (I/O Side) View of the Cisco 4321 ISR**



1	NIM slots
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Figure 1-19 LEDs on the Cisco 4321 ISR



1	LEDs
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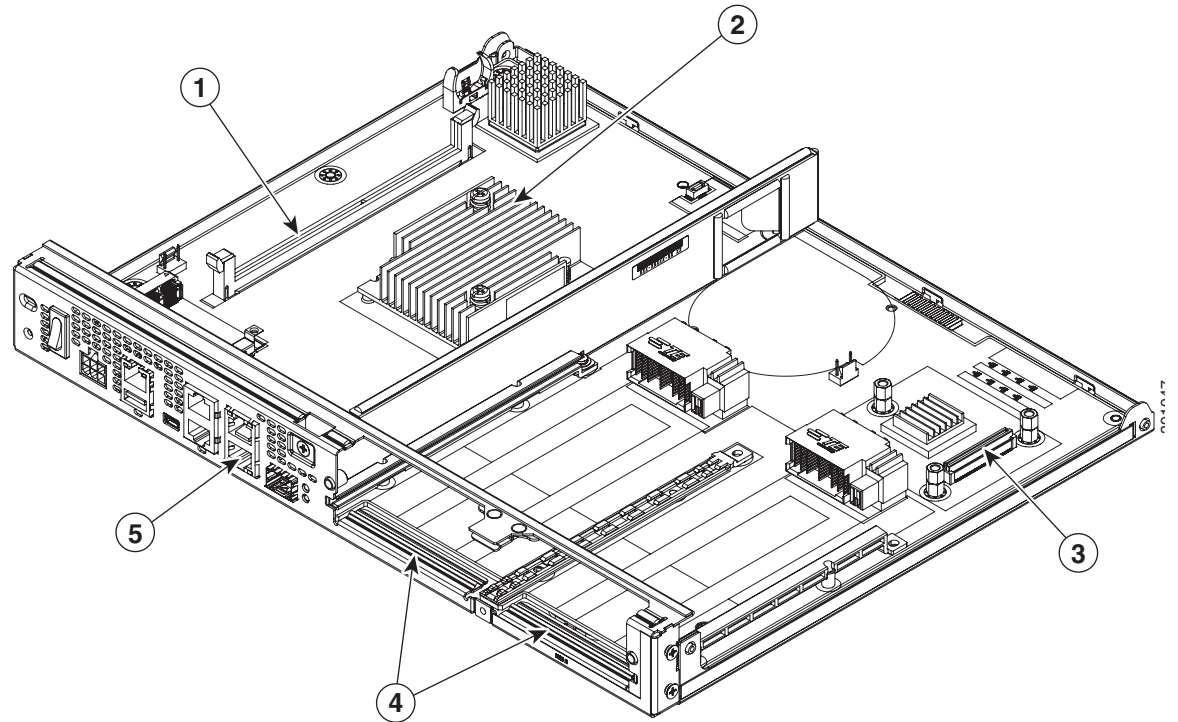
For detailed information on LEDs, see the [“LED Indicators”](#) section on page 1-28.

## Platform Summary



Figure 1-20 shows an internal view of the Cisco 4321 ISR with the parts and module locations.

**Figure 1-20 Platform Summary of the Cisco 4321 ISR Chassis**



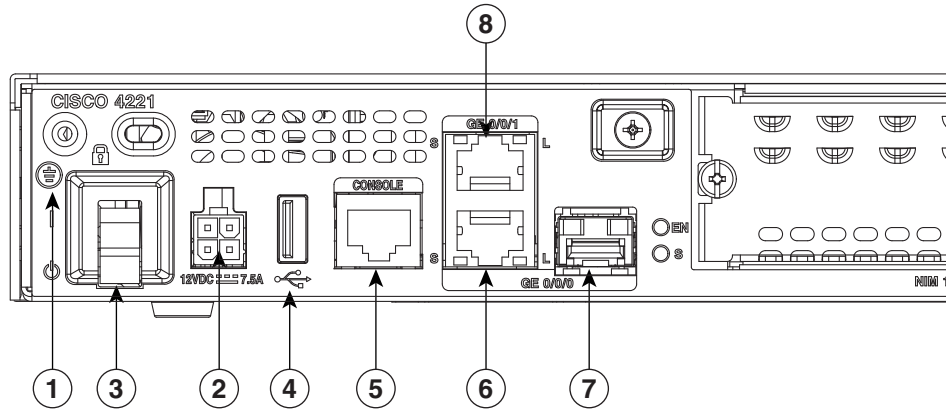
<b>1</b>	DIMM	<b>2</b>	CPU
<b>3</b>	ISC slot	<b>4</b>	NIM slots
<b>5</b>	GE ports		

## Cisco 4221 ISR Chassis

This section contains the following views of the Cisco 4221 ISR router:

- [Back Panel Ports on the Cisco 4221 ISR \(Figure 1-21\)](#)
- [Back Panel \(I/O Side\) View of the Cisco 4221 ISR \(Figure 1-22\)](#)
- [LEDs on the Cisco 4221 ISR \(Figure 1-23\)](#)

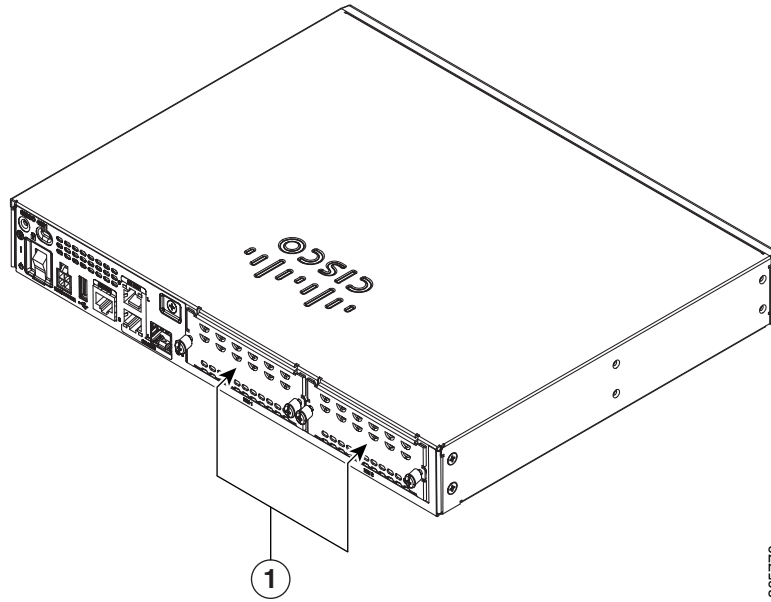
Figure 1-21 Back Panel Ports on the Cisco 4221 ISR



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1	Grounding	2	Power input connector
3	Power switch	4	USB
5	Console port	6	GE 0/0/0 RJ-45 (copper cable) port
7	GE 0/0/0 SFP (fiber-optic) port	8	GE 0/0/1 (copper cable) port

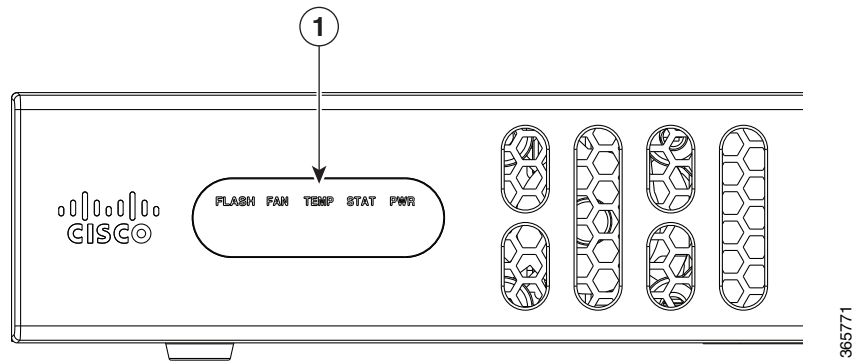
Figure 1-22 Back Panel (I/O Side) View of the Cisco 4221 ISR



365770

1	NIM slots
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**Figure 1-23** LEDs on the Cisco 4221 ISR



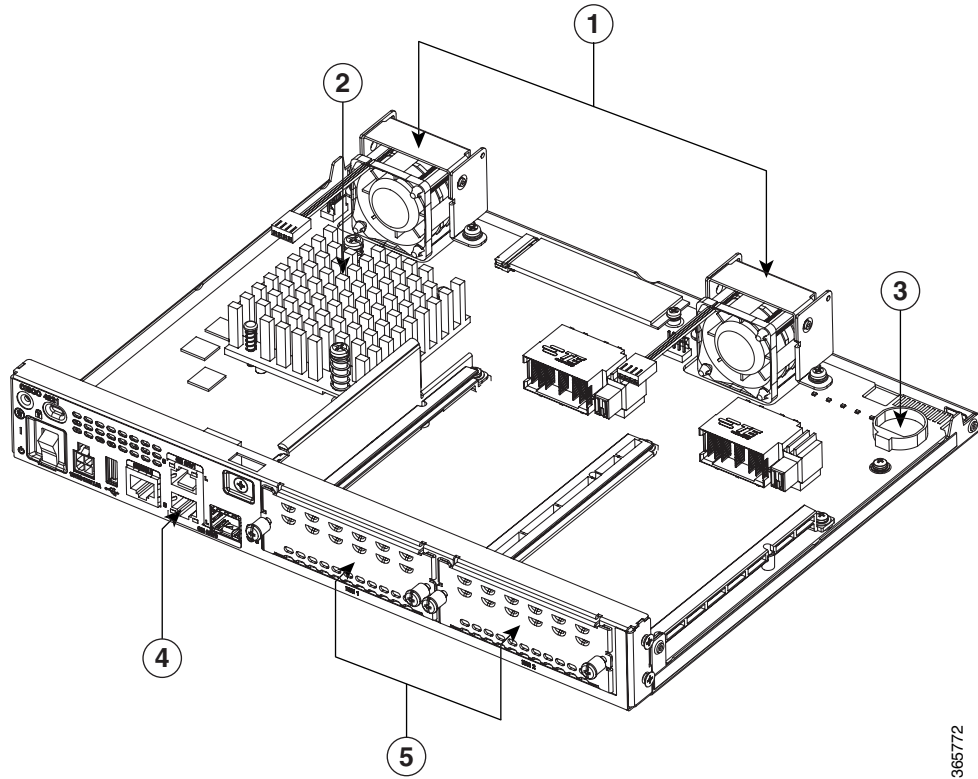
<b>1</b>	LEDs
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For detailed information on LEDs, see the [“LED Indicators”](#) section on page 1-28.

## Platform Summary

Figure 1-24 shows an internal view of the Cisco 4221 ISR with the parts and module locations.

**Figure 1-24 Platform Summary of the Cisco 4221 ISR Chassis**



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<b>1</b>	Fan	<b>2</b>	CPU
<b>3</b>	Battery	<b>4</b>	GE 0/0/0/0 RJ-45 (copper cable) port
<b>5</b>	NIM slots		

## Hardware and Module Configuration

Table 1-1 shows the key hardware and module configurations in the Cisco 4000 Series ISRs.

**Table 1-1 Hardware Features and Module Configuration in the Cisco 4000 Series ISRs**

Interface	Cisco 4451-X ISR	Cisco 4431 ISR	Cisco 4351 ISR	Cisco 4331 ISR	Cisco 4321 ISR	Cisco 4221 ISR
<b>DRAM</b>	3 DIMMs 2 GB for each slot	3 DIMMs 2 GB for each slot	2 DIMMs 2 GB for each slot	2 DIMMs 2 GB for each slot	1 DIMM (4 GB DIMM supported) <sup>1</sup> 4 GB on board memory	4 Gb on board memory
<b>NIMs</b>	3 single-wide or 1 double-wide + 1 single-wide	3 single-wide or 1 double-wide + 1 single-wide	3 single-wide or 1 double-wide + 1 single-wide	2 single-wide or 1 double-wide	2 single-wide or 1 double-wide	2 single-wide NIM slots or 1 double-wide
<b>SM-X</b>	2 single-wide or 1 double-wide	NA	2 single-wide or 1 double-wide	1 single-wide	NA	NA
<b>SSD or HDD NIM</b>	1 single-wide	1 single-wide	1 single-wide	1 single-wide	1 single-wide	1 single-wide
<b>Internal mSATA Interface</b>	NA	NA	1 mSATA slot	1 mSATA slot	1 mSATA slot	NA
<b>Front Panel PoE</b>	2 PoE ports	2 PoE ports	2 PoE ports	NA	NA	NA
<b>Front Panel GE</b>	4 ports	4 ports	3 ports	3 ports	2 ports	2 ports
<b>ISC Slot</b>	All ISC card types	All ISC card types	All ISC card types	All ISC card types	All ISC card types	NA
<b>USB Type A Ports</b>	2 USB Type A	2 USB Type A	2 USB Type A	1 USB Type A	1 USB Type A	1 USB Type A

1. There is no DIMM installed by default. DIMM is optional.

## Locating the Serial Number, PID, VID, and CLEI

### Software License

To obtain a software license, you need a product authorization key (PAK) and the unique device identifier (UDI) of the device where the license will be installed.

The serial number (SN), product ID (PID), version ID (VID), and Common Language Equipment Identifier (CLEI) are printed on a label on the back of the router or on a label tray located on the router chassis or motherboard. The UDI can be viewed using the **show license udi** command in privileged Exec mode in Cisco Internet Operating System (IOS) software. For additional information on the UDI or how to obtain a PAK, see the [Cisco Software Activation on Integrated Services Routers and Cisco Integrated Service Routers Generation 2](#) document on Cisco.com.

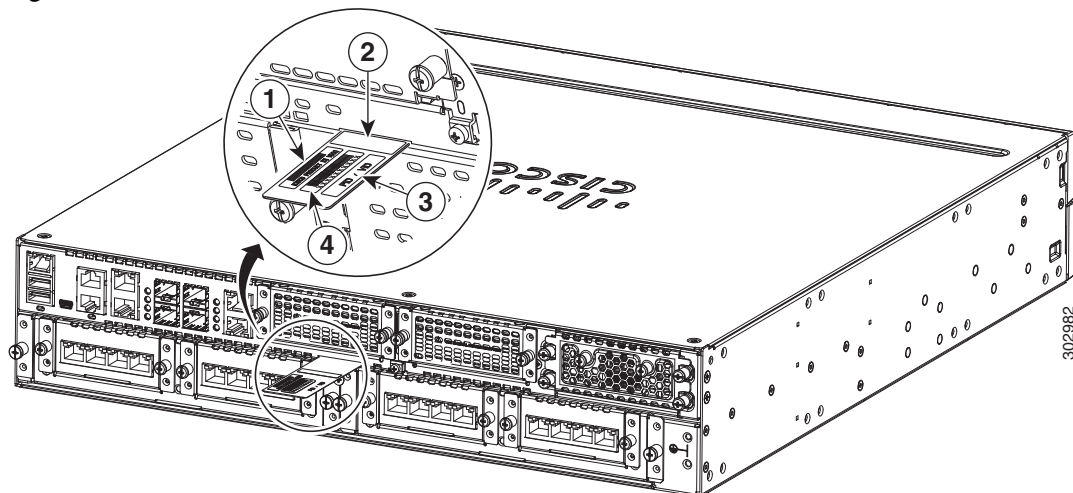
The UDI has two main components:

- Product ID (PID)
- Serial number (SN)

## Labels on the Router

Though your router might be different from the one shown in [Figure 1-25](#), the label location is similar for all routers in the Cisco 4000 Series ISR. [Figure 1-25](#) shows the location of the labels on the Cisco 4451-X ISRs.

**Figure 1-25** Label Location on the Cisco 4451-X ISR



1	Product ID	2	Serial Number
3	PID/VID	4	CLEI

## For Additional Help Locating Labels on the Router

Use the Cisco Product Identification (CPI) tool to find labels on the router. The tool provides detailed illustrations and descriptions of where the labels are located on Cisco products. It includes the following features:

- A search option that allows browsing for models by using a tree-structured product hierarchy
- A search field on the final results page that makes it easier to look up multiple products
- End-of-sale products clearly identified in results lists

The tool streamlines the process of locating serial number labels and identifying products. Serial number information expedites the entitlement process and is important for access to support services.

## Hardware Features

This section describes the hardware features in the routers.

- [Built-In Interface Ports](#), page 1-27
- [LED Indicators](#), page 1-28
- [Fans, Ventilation, and Airflow](#), page 1-38

## Built-In Interface Ports

The Cisco 4000 Series ISR have multiple 10/100/1000 front panel ports, SFPs, and 10/100/1000 management ports.

### Dual Mode GE/SFP Ports

There are dual mode ports available on the router that can function as GE or SFP ports.

#### GE Ports

The GE RJ-45 copper interface ports support 10BASE-T, 100BASE-TX, and 1000BASE-T.

#### SFP Ports

The small-form-factor pluggable (SFP) ports support, but are not restricted to 1000BASE-LX/LH, 1000BASE-SX, 1000BASE-ZX, and Coarse Wavelength-Division Multiplexing (CWDM-8) modules, as well as 100Mbs SFP modules.

The SFP port shares the same physical port as an RJ-45 GE port with the same number. It can only be used for one or the other function at one time. The SFP port supports auto-media-detection, auto-failover and remote fault indication (RFI), as described in the IEEE 802.3ah specification.

Use the **media-type {rj45{auto-failover}} | {sfp{auto-failover}}** command to enable the auto-media-detection and auto-failover features. Use the Command Lookup Tool for details about this command.

The SFP port can be configured for the following behaviors:

- Always use the RJ-45 port.
- Always use the SFP port.
- Always use the RJ-45 port but fail over to the SFP port if the RJ-45 port fails. This is the default configuration.
- Always use the SFP port but fail over to the RJ-45 port if the SFP port fails.

### USB Serial Console Port

The Mini-USB type B serial port can be used as an alternative to the RJ-45 console port. For Windows operating systems older than Windows 7, you must install a Windows USB device driver before using the USB console port.

### Front Panel PoE+ Ports

On the Cisco 4451-X ISR, Cisco 4431 ISR, and Cisco 4351 ISR two of the front panel Ethernet ports are PoE+ (802.3at) compliant ports. These are ports GE 0/0/0 and GE 0/0/1. The Cisco 4431 ISR and Cisco 4421 ISR do not support front panel PoE+.

System PoE power supplies do not provide power to the front panel ports.

### Internal PoE Daughter Card

The internal PoE daughter card provides a total of 30.8 watts of power across the two ports.

## LED Indicators

Table 1-2 summarizes the LED indicators that are located in the router bezel or chassis, but not on the interface cards and modules.


**Note**

For module LEDs, please refer to the respective module installation guides for each module.

**Table 1-2 LED Descriptions (Applies to the Cisco 4451-X ISR, Cisco 4431 ISR, and Cisco 4351 ISRs)**

LED	Represents	Color	Description	Location	Available On
STAT	System Status	Solid green	System operating normally.	Bezel side	All models
		Blinking amber	BIOS/Rommon is booting.		
		Amber	BIOS/Rommon has completed booting, and system is at Rommon prompt or booting platform software.		
		Off	System is not out of reset or BIOS image is not loadable.		
TEMP	Temperature Status	Solid green	All temperature sensors in the system are within acceptable range.	Bezel side	All models
		Amber	One or more temperature sensors in the system are outside the acceptable range.		
		Off	Temperature is not being monitored.		
FAN	Fan Status	Green	All fans are operating.	Bezel side	All models
		Amber	One fan has stopped working.		
		Blinking Amber	Two or more fans have stopped working, or the fan tray has been removed.		
		Off	Fans are not being monitored.		
L (left)	Ethernet ports 0 and 1 Link	Green	Ethernet cable is present and link is established with other side or PoE power is enabled for this port.	I/O side	All models
		Off	No link.		
S (left)	Speed of Ethernet ports 0 and 1	Green	Blink frequency indicates port speed: <ul style="list-style-type: none"> <li>1 blink+ pause - FE or GE port operating at 10 Mb/s</li> <li>2 blinks + pause - FE or GE port operating at 100 Mb/s</li> <li>3 blinks + pause - GE port operating at 1000 Mb/s</li> </ul>	I/O side	All models
		Blinking			
		Off			



Table 1-2 LED Descriptions (Applies to the Cisco 4451-X ISR, Cisco 4431 ISR, and Cisco 4351 ISRs) (continued)

LED	Represents	Color	Description	Location	Available On
L (right)	Ethernet ports 2 and 3 <sup>1</sup> and Management Ethernet Link	Green	Ethernet cable is present and link is established with other side.	I/O side	All models
		Off	No link.		
S (right)	Ethernet ports 2, and 3 <sup>1</sup> and Management Ethernet Speed	Green	Blink frequency indicates port speed: <ul style="list-style-type: none"> <li>• 1 blink+ pause - FE or GE port operating at 10 Mb/s</li> <li>• 2 blinks + pause - FE or GE port operating at 100 Mb/s</li> <li>• 3 blinks + pause - GE port operating at 1000 Mb/s</li> </ul>	I/O side	All models
		Off	No link		
SFP EN	Port 0, 1, 2, and 3 Enable	Green	Present and enabled.	I/O side	All models <sup>1</sup>
		Amber	Present with failure.		
		Off	Not present.		
SFP S	Status of Ports 0, 1, 2, and 3	Blinking Green	Blinking frequency indicates port speed. See the definition for the S LED.	I/O side	All models <sup>1</sup>
		Amber	Initialized with error.		
		Off	Not present.		
SER CON (right)	Serial Console Active	Green	Indicates that the active console port is RJ-45. <b>Note</b> When this LED is on, the USB CON LED will be off.	I/O side	All models
USB CON (left)	USB Console Active	Green	Green indicates that the active console port is USB. <b>Note</b> When this LED is on, the SER CON LED will be off.	I/O side	All models
SSD	mSATA Slot Status	Green	SSD mSATA present and enabled.	Bezel side	Cisco ISR4351
		Amber	Initialized with error.		
		Off	Not present.		
ISC	ISC Slot Status	Green	PVDM4 is present and is enabled.	Bezel side	All models
		Amber	Initialized with error.		
		Off	Not present.		
FLASH	System Flash Status	Blinking Green	Compact flash/eUSB flash is present and is currently being accessed. <b>Note</b> Do not remove the flash device while the system is powered on.	Bezel side	All models

Table 1-2 LED Descriptions (Applies to the Cisco 4451-X ISR, Cisco 4431 ISR, and Cisco 4351 ISRs) (continued)

LED	Represents	Color	Description	Location	Available On
PSU	Power Supply Unit (P0 and P1) Status	Green	PSU is on and is providing power.	Bezel side	All models <sup>2</sup>
		Amber	PSU is on but with errors or in a failure condition.		
		Off	Power supply is turned off.		
POE PSU (not supported in Cisco IOS XE 3.8)	Power Over Ethernet Power Supply Unit 0 and 1 Status	Green	PSU is on and providing power.	Bezel side	All models <sup>1,2</sup>
		Amber	PSU is on but with errors or in a failure condition.		
		Off	PSU is off.		
POE Boost (not supported in Cisco IOS XE 3.8)	Power Over Ethernet Boost Mode	Green	Two PoE power supplies are installed and operating in boost mode.	Bezel side	Cisco 4451-X ISR, Cisco ISR4431
		Off	This can mean one of the following: <ul style="list-style-type: none"> <li>No PoE PSU installed.</li> <li>One PoE PSU installed.</li> <li>Two PoE PSUs installed and operating in redundant mode.</li> </ul>		
GE POE	Internal PoE Daughter Card Status	Green	PSU is installed and providing power	Bezel side	All models
		Amber	PSU is installed but in a failure condition.		
		Off	PSU is off.		
PWR	System Power	Green	System power is on and functioning correctly.	Bezel side	All models
		Green blinking	System power is in the process of shutting down.		
		Amber	System power is up, but low level initialization failed.		
		Amber blinking:	System power is up, but the system failed to come out of reset.		
		Off	System power is off.		
AC OK	AC power status	Green	AC power is on.	On each power supply unit	All models
		Off	AC power is off.		

1. The Cisco ISR4351 does not have SPF 3.

2. The Cisco ISR4351 does not support POE PSU 1.

**Table 1-3 LED Descriptions (Applies to the Cisco 4331 ISR and the Cisco 4321 ISR Routers)**

LED	Represents	Color	Description	Location	Available On
STAT	System Status	Solid green	System operating normally.	Bezel side	All models
		Blinking amber	BIOS/Rommon is booting.		
		Amber	BIOS/Rommon has completed booting, and system is at Rommon prompt or booting platform software.		
		Off	System is not out of reset or BIOS image is not loadable.		
TEMP	Temperature Status	Solid green	All temperature sensors in the system are within acceptable range.	Bezel side	All models
		Amber	One or more temperature sensors in the system are outside the acceptable range.		
		Off	Temperature is not being monitored.		
FAN	Fan Status	Green	All fans are operating.	Bezel side	All models
		Amber	One fan has stopped working.		
		Blinking Amber	Two or more fans have stopped working, or the fan tray has been removed.		
		Off	Fans are not being monitored.		
L	Ethernet ports 0 and 1 <sup>1</sup>	Green	Ethernet cable is present and link is established with other side.	I/O side	All models
		Off	No link.		
S	Speed of Ethernet ports 0 and 1	Green	Blink frequency indicates port speed: <ul style="list-style-type: none"> <li>• 1 blink - 10-Mbps link speed</li> <li>• 2 blinks - 100-Mbps link speed</li> <li>• 3 blinks - 1000-Mbps link speed</li> </ul>	I/O side	All models
		Blinking			
		Off			
SFP EN	Port 0, and 1 (for Cisco 4331 ISR), and Port 0 for Cisco 4321 ISR) Enable	Green	Indicates that the SFP module detected and recognized.	I/O side	All models
		Amber	Initialized with error.		
		Off	Not present.		
SFP S	Status of port 0, and 1 (for Cisco 4331 ISR), and Port 0 for Cisco 4321 ISR)	Green	Indicates that the SFP module is detected and recognized.	I/O side	All models
		Amber	Initialized with error.		
		Off	Not present.		
		Off	Not present.		
SER CON (right)	Serial Console Active	Green	Indicates that the active console port is RJ-45.  <b>Note</b> When this LED is on, the USB CON LED will be off.	I/O side <sup>2</sup>	All models

LED	Represents	Color	Description	Location	Available On
USB CON (left)	USB Console Active	Green	Green indicates that the active console port is USB. <b>Note</b> When this LED is on, the SER CON LED will be off.	I/O side <sup>2</sup>	All models
SSD	mSATA Slot Status	Green	SSD mSATA is present and enabled.	Bezel side	All models.
		Amber	Initialized with error.		
		Off	Not present.		
POE0	POE PSU	Green	PoE is on and providing power.	Bezel side	All models.
		Amber	PoE is in a failed condition.		
		Off	PoE supply is not present.		
ISC	ISC Slot Status	Green	PVDM4 is present and enabled.	Bezel side	All models
		Amber	Initialized with error.		
		Off	Not present.		
FLASH	System Flash Status	Blinking Green	Compact flash/eUSB flash is present and currently being accessed. <b>Note</b> Do not remove the flash device while the system is powered on.	Bezel side	All models
PWR	System Power	Green	System power is on and functioning correctly.	Bezel side	All models
		Green blinking	System power is in the process of shutting down.		
		Amber	System power is up, but low level initialization failed.		
		Amber blinking:	System power is up, but the system failed to come out of reset.		
		Off	System power is off.		

1. Management Ethernet Link on bezel side on the Cisco 4331 ISR.

2. These LEDs are on the bezel side for the Cisco 4331 ISR

**Table 1-4 LED Descriptions (Applies to the Cisco 4221 ISR Router)**

LED	Represents	Color	Description	Location	Available On
STAT	System Status	Solid green	System operating normally.	Bezel side	All models
		Blinking amber	BIOS/Rommon is booting.		
		Amber	BIOS/Rommon has completed booting, and system is at Rommon prompt or booting platform software.		
		Off	System is not out of reset or BIOS image is not loadable.		

LED	Represents	Color	Description	Location	Available On
TEMP	Temperature Status	Solid green	All temperature sensors in the system are within acceptable range.	Bezel side	All models
		Amber	One or more temperature sensors in the system are outside the acceptable range.		
		Off	Temperature is not being monitored.		
FAN	Fan Status	Green	All fans are operating.	Bezel side	All models
		Amber	One fan has stopped working.		
		Blinking Amber	Two or more fans have stopped working, or the fan tray has been removed.		
		Off	Fans are not being monitored.		
L	Ethernet ports 0 and 1 <sup>1</sup>	Green	Ethernet cable is present and link is established with other side.	I/O side	All models
		Off	No link.		
S	Speed of Ethernet ports 0 and 1	Green	Blink frequency indicates port speed: <ul style="list-style-type: none"> <li>1 blink - 10-Mbps link speed</li> <li>2 blinks - 100-Mbps link speed</li> <li>3 blinks - 1000-Mbps link speed</li> </ul>	I/O side	All models
		Blinking			
		Off			
SER CON (right)	Serial Console Active	Green	Indicates that the active console port is RJ-45. <b>Note</b> When this LED is on, the USB CON LED will be off.	I/O side <sup>2</sup>	All models
USB CON (left)	USB Console Active	Green	Green indicates that the active console port is USB. <b>Note</b> When this LED is on, the SER CON LED will be off.	I/O side <sup>2</sup>	All models
		Off	PoE supply is not present.		
ISC	ISC Slot Status	Green	PVDM4 is present and enabled.	Bezel side	All models
		Amber	Initialized with error.		
		Off	Not present.		
FLASH	System Flash Status	Blinking Green	Compact flash/eUSB flash is present and currently being accessed. <b>Note</b> Do not remove the flash device while the system is powered on.	Bezel side	All models

LED	Represents	Color	Description	Location	Available On
PWR	System Power	Green	System power is on and functioning correctly.	Bezel side	All models
		Green blinking	System power is in the process of shutting down.		
		Amber	System power is up, but low level initialization failed.		
		Amber blinking:	System power is up, but the system failed to come out of reset.		
		Off	System power is off.		

1. Management Ethernet Link on bezel side on the Cisco 4221 ISR.
2. These LEDs are on the bezel side for the Cisco 4221 ISR

## Removable and Interchangeable Modules and Cards

Table 1-1 on page 1-25 summarizes the type of removable modules and cards that can be installed in the router to provide specific capabilities. Service Modules (SM-Xs), Network Interface Modules (NIMs), and E-Series Server Modules, fit into external slots and can be removed or replaced without opening the chassis.

### External Slots

- [Network Interface Modules and Service Modules, page 1-35](#)
- [Cisco UCS E-Series Server Modules, page 1-35](#)
- [Solid State Drives, page 1-36](#)

### Internal Slots

- [Packet Voice Digital Signal Processor Modules, page 1-36](#)
- [Memory, page 1-37](#)
- [System Flash, page 1-36](#)



**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030



**Warning**

**This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both.** Statement 1043

See the [Overview of Cisco Network Modules and Service Modules for Cisco Access Routers](#) document for general information and single- and double-wide slot numbering.

See the [“Installing and Removing NIMs and SM-Xs”](#) section on page 6-29 for instructions that describe how to install SM-Xs and NIMs in the router.

See the [Overview of Cisco Interface Cards for Cisco Access Routers](#) for general interface card information.

See the [Installing Cisco Interface Cards in Cisco Access Routers](#) document, for instructions that describe how to install legacy interface cards in the router.

**Note**

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See the router product page on Cisco.com for a list of supported network modules and interface cards.

---

## Network Interface Modules and Service Modules

To install NIMs and SM-X s on the router chassis, see the [“Installing and Removing NIMs and SM-Xs” section on page 6-29](#).

## Cisco UCS E-Series Server Modules

The Cisco UCS E-Series Servers (E-Series Servers) are the next generation of Cisco UCS Express servers. E-Series Servers are a family of size, weight, and power efficient blade servers that are housed within the Generation 2 Cisco Integrated Services Routers (ISR G2) and the Cisco 4000 Series Integrated Services Router. These servers provide a general-purpose compute platform for branch-office applications deployed either as bare-metal on operating systems, such as Microsoft Windows or Linux; or as virtual machines on hypervisors, such as VMware vSphere Hypervisor™, Microsoft Hyper-V, or Citrix XenServer.

## System Flash

The routers use a CompactFlash or an eUSB flash for the internal bootflash memory depending on the model that you have purchased. The CompactFlash and eUSB flash stores the operating system software image.

The CompactFlash is applicable only to the Cisco 4451-X ISR. Each model supports 1 internal CompactFlash 8-GB, 16-GB, or 32-GB memory card. The CompactFlash is located behind the fan tray on the router chassis.

The Cisco 4431 ISRs have a eMMC flash device. It supports 8GB, 16GB, or 32 GB.

The Cisco 4300 Series ISRs have an onboard flash device or a eMMC flash device. It supports 8GB or 16GB.

**Note**

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For the Cisco 4451-X ISR, you must use Cisco-qualified CompactFlash cards. Use of any other cards during normal network operation can affect system performance or reliability.

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**Note**

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Do not run the router without a CompactFlash card installed. Cisco IOS XE software will not boot without a flash card in the router.

---

## Solid State Drives

The NIM slots in the router support a field-replaceable solid state drive module with a dual-SSD SATA slot. The NIM can be installed in any bay slot 0. The SSDs are hot-swappable as part of normal operation. See the [“Locating Internal and External Slots for Modules on the Cisco 4331 ISR Router” section on page 6-9](#) section for more information.

The Cisco ISR4300 platforms support optional internal SSD mSATA. This device is not hot-swappable and requires opening the chassis to service or upgrade.

## Packet Voice Digital Signal Processor Modules

The Packet Voice Digital Signal Processor Modules (PVDM4s) add additional voice capabilities to the routers. The PVDM4 is installed inside the chassis of the router. See the [“Installing the PVDM4 on the Motherboard of the Router” section on page 6-33](#) for installation instructions.



## Memory

The routers contain the following types of memory:

- DIMMs—Stores the running configuration and routing tables and is used for packet buffering by the network interfaces. Cisco IOS XE software executes from memory. Supported module types are Dual In-Line Memory Modules (DIMMs).



### Note

The DIMMs are interchangeable although the same sizes are not supported in all locations. The Cisco 4300 ISRs use a different type of DIMM compared to the 4400 ISRs. For proper operation, the DIMMs for the Cisco 4400 ISR should not be installed in an Cisco 4300 ISR and vice versa. The single forwarding plane DIMM must have a 2-GB DIMM that is exactly like one of the two DIMMs used for the control plane with 4 GB of default memory. The control plane uses two DIMMs and they must be exactly the same type and density. This applies to the Cisco ISR4400 series only. The Cisco 4300 ISRs do not have a distinct forwarding plane DIMM.

- Boot/NVRAM—Stores the bootstrap program (ROM monitor), and the configuration register. The boot/NVRAM is not serviceable.
- Flash memory—Internal bootflash memory. For details, see the “[System Flash](#)” section on [page 1-36](#).
- CompactFlash memory card (Cisco ISR4451-X routers)—Available in 8 GB, 16 GB, or 32 GB.
- eUSB flash card (Cisco ISR 4300 router)—Available in 8 GB or 16 GB.

## Power Supply

The routers support a variety of power supply configurations. The power supplies are field-replaceable and externally accessible. The Cisco 4331 ISR power supply is not externally accessible, it is inside the chassis.

The Cisco 4451-X ISR and Cisco 4431 ISRs support dual, hot-swappable power supplies. The PoE Power Supply Converter on the Cisco 4451-X ISR is also dual and hot-swappable.

[Table 1-5](#) summarizes the power options.

**Table 1-5** Field Replaceable Unit Power Options

Router Model	AC Input PSU	DC Input PSU	Dual, Hot Swap Power Supply	PoE Power Supply Converter
Cisco 4451-X ISR	X		X	X
Cisco 4431 ISR	X	X	X	
Cisco ISR4351	X			X
Cisco 4331 ISR	X			
Cisco 4321 ISR	X			
Cisco 4221 ISR	X	X		

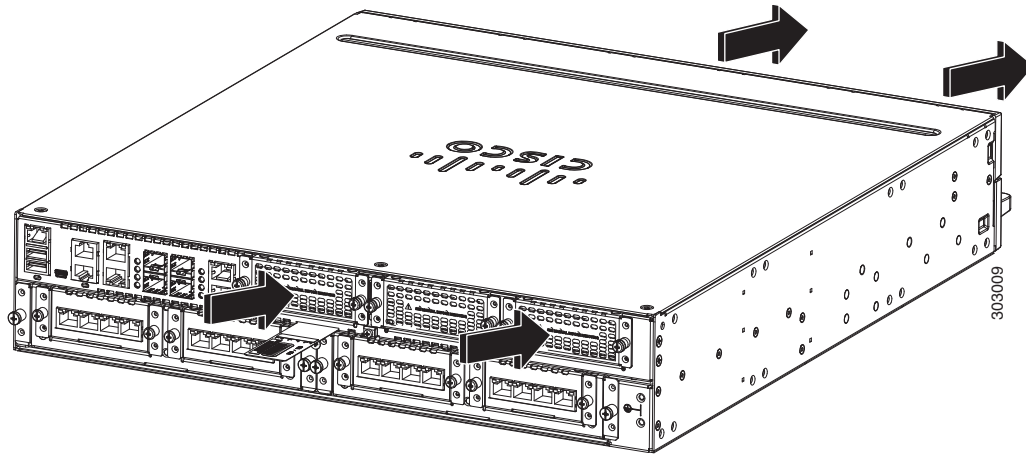
# Fans, Ventilation, and Airflow

## Chassis Ventilation

Cooling is supported with internal fans. An onboard temperature sensor controls the fan speed. The fans are always on when the router is powered on. Under most conditions, the fans operate at the slowest speed to conserve power and reduce fan noise. The fans operate at the higher speeds when necessary under conditions of higher ambient temperature. To replace the Cisco 4451-X ISR, Cisco 4431 ISR, and Cisco ISR4351 fan trays, see the “[Replacing a Fan Tray](#)” section on page 6-55.

[Figure 1-26](#) shows the Cisco 4451-X ISR airflow, [Figure 1-27](#) shows the Cisco 4431 ISR airflow, [Figure 1-28](#) shows the Cisco 4321 ISR airflow, and [Figure 1-29](#) shows the Cisco 4221 ISR airflow.

**Figure 1-26** Cisco 4451-X ISR Airflow



**Figure 1-27** Cisco 4431 ISR Airflow

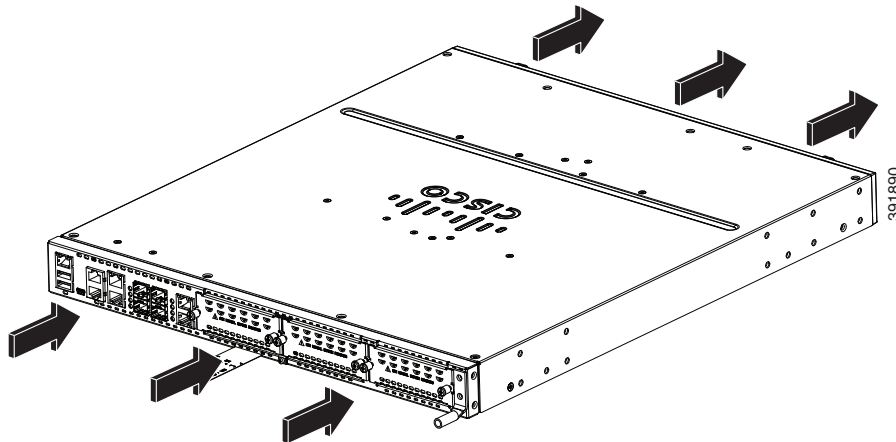
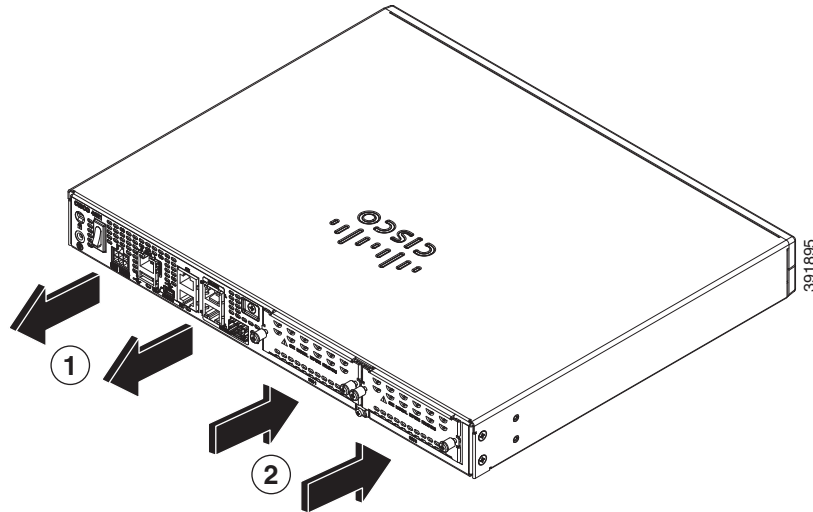
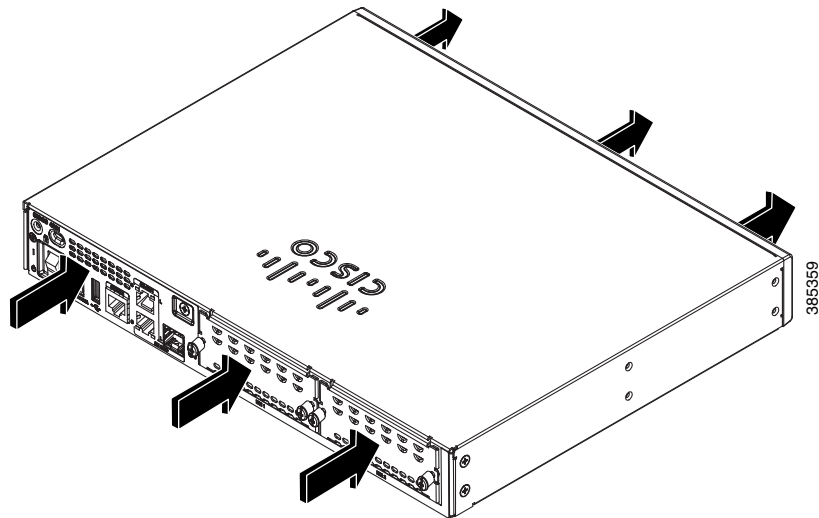


Figure 1-28 Cisco 4321 ISR Airflow



<b>1</b>	Exhaust	<b>2</b>	Intake
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Figure 1-29 Cisco 4221 ISR Airflow



## About Slots and Interfaces

This section covers the following topics:

- [About Slot, Subslot \(Bay\), and Port Numbering, page 1-40](#)
- [Slot Numbering, page 1-41](#)
- [Subslot/Bay Numbering, page 1-42](#)
- [Gigabit Ethernet Management, page 1-42](#)

## About Slot, Subslot (Bay), and Port Numbering

The routers supports two types of interface modules: Enhanced Service Modules (SM-X) and Network Modules (NIMs).

In most cases, the router designates its interfaces using a 3-tuple notation that lists the slot, bay, and port. The 3-tuple value is zero based. An example of a 3-tuple is 0/1/2. This refers to slot 0, the second bay in slot 0 (the first bay is 0 so the second bay is 1), and the third port in bay 1. See [Table 1-6](#) for more examples.

**Table 1-6 Slot, Subslot (Bay) and Port Numbering**

3-Tuple Example	Slot	Bay	Port
0/1/2	0	2nd	3rd
0/0/1	0	1st	2nd
1/1/1	1	2nd	2nd

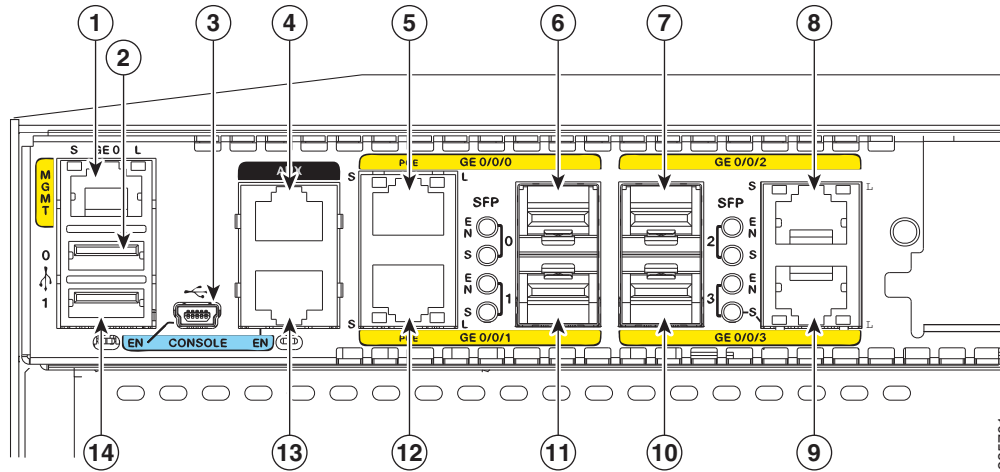
- Slots and bays are numbered from the left to the right, and from the top to the bottom.
- NIMs are designated by the number of the first slot that they occupy. A double-wide NIM occupies two slots, but its designation is only the left-most slot number.
- The auxiliary (AUX) serial port and console (CON) serial port do not have slot, bay, or port numbers.
- The GE management port is named GE 0 and has a port number. It does not have a slot or bay number.
- The two USB ports are named USB0 and USB1. They do not have slot or bay numbers. The Cisco ISR4331 and Cisco ISR4321 only have one USB port.



**Note** USB0 and USB1 can be used to insert flash drives.

[Figure 1-30](#) shows the ports and slots on the Cisco 4451-X ISRs.

Figure 1-30 Ports and Slots on the Cisco 4451-X ISRs



1	Gigabit Ethernet management port	2	USB port 0
3	USB Type B mini port	4	Auxiliary port
5	RJ-45 Gigabit Ethernet port (GE 0/0/0)	6	Small-form-factor pluggable (SFP) 0/Gigabit Ethernet port (GE 0/0/0)
7	SFP 2/Gigabit Ethernet port (GE 0/0/2)	8	RJ-45 Gigabit Ethernet port (GE 0/0/2)
9	RJ-45 Gigabit Ethernet port GE 0/0/3	10	SFP 3/Gigabit Ethernet GE 0/0/3
11	SFP 1/Gigabit Ethernet GE 0/0/1	12	RJ-45 Gigabit Ethernet port GE 0/0/1
13	Console port	14	USB port 1

## Slot Numbering

Slots are numbered 0, 1 and 2.

### About Slot 0

The following are the main features of Slot 0:

- Slot 0 is the motherboard and not removable. It is reserved for integrated ports and NIMs.
- The front panel GE ports (or native interface ports) always reside in slot 0 and bay 0. The ports are called Gigabitethernet 0/0/0, Gigabitethernet 0/0/1, Gigabitethernet 0/0/2, and Gigabitethernet 0/0/3 (up to as many ports supported on the particular router).
- PVDM4s do not have an external slot number. Therefore, the nomenclature for PVDM4s always has 0 in the first tuple. For example, the 3-tuple for an PVDM4 might be 0/4/x.

## Subslot/Bay Numbering

- Integrated devices, also known as integrated ports or FPGEs, and integrated NIMs reside in a fixed section of bay 0.
- Main board NIMs bays start at bay 1, since the integrated devices and integrated NIMs take up bay 0.
- The bay numbers for PVDM4s start with the next bay number after the last NIM bay number.

## Gigabit Ethernet Management

The Cisco 4000 Series ISR provides a Gigabit Ethernet Management port, called GE0. This port is the only 1-tuple port on the system. See the [Gigabit Ethernet Management Port](#) section in the *Software Configuration Guide for the Cisco ISR 4400 Series and Cisco ISR 4300 Series Routers* for additional information about the Gigabit Ethernet Management port.

## Specifications

The following table provide Cisco 4451-X ISR specifications.

**Table 1-7 Cisco 4451-X ISR Router Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	3.5 x 17.25 x 18.7 in. (88.9 x 438.2 x 474.9 mm) 2 RU height
Weight with AC PS (w/o modules)	28.5 lbs (12.92 kg)
Weight with dual AC-PoE PS (w/o modules)	30.0 lbs (13.6 kg)
Weight with dual AC + PoE Adaptor (w/o modules)	38.0-40.0 lbs (17.23-18.14 kg)
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current	5.3 A
• Input current with PoE Power Adaptor	7.4 A
• Surge current	60 A peak and less than 12 Arms per half cycle
Power consumption	
• With AC-PoE	75 to 320 W, 256 to 1092 BTU/hr (configuration dependent) 80 to 750 W, 273 to 2560 BTU/hr (configuration dependent)
<b>Ports</b>	
Console port	One RJ-45 connector and one mini USB Type B, USB 2.0 compliant

**Table 1-7 Cisco 4451-X ISR Router Specifications (continued)**

Description	Specification
Auxiliary port	RJ-45 connector
USB ports	Two USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max <sup>1</sup>
10/100/1000 Gigabit Ethernet	Four RJ-45 connectors (GE0/0/0, GE0/0/1, GE0/0/2, GE0/0/3), auto-MDIX
SFP	Once an SFP module is installed the adjacent RJ-45 GE connector is disabled.

1. 480 Mb/s individually, bandwidth is shared when both are used

The following table provide Cisco 4431 ISR specifications.

**Table 1-8 Cisco 4431 ISR Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	1.73 x 17.25 x 19.97 in. (43.9 x 438.15 x 507.2 mm)
Weight with 1 400-WAC power supply (no modules)	18.5 lb (8.4 kg)
Weight with 1 500-W AC+PoE power supply (no other modules)	18.6 lb (8.4 kg)
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current	2.88 A to 1.2 A
• Input current with AC+PoE power supply	5.76 A to 2.4 A
• Surge current	60 A peak and less than 12 Arms per half cycle
Power consumption	
• With AC+PoE	60 to 250 W (205 to 853 BTU/hr) (configuration dependent)
• With AC+PoE	60 to 440 W (205 to 1500 BTU/hr) (configuration dependent)
DC input power	
• Input voltage	-48 V to -60 V
• Input current	6 A to 4.8 A
• Power consumption	60 to 250 W
• Maximum output power	350 W
<b>Ports</b>	

**Table 1-8 Cisco 4431 ISR Specifications (continued)**

Description	Specification
Console port	One RJ-45 connector and one mini USB Type B, USB 2.0 compliant
Auxiliary port	RJ-45 connector
USB ports	Two USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max <sup>1</sup>
10/100/1000 Gigabit Ethernet	Four RJ-45 connectors (GE0/0/0, GE0/0/1, GE0/0/2, GE0/0/3), auto-MDIX
SFP	When SFP0 is installed, GE0/0/0 is disabled. SFP/2 is dedicated (always on).

1. 480 Mb/s individually, bandwidth is shared when both are used

The following table provide Cisco 4351ISR specifications.

**Table 1-9 Cisco 4351 ISR Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	3.5 x 17.25 x 18.7 in. (88.9 x 438.2 x 474.9 mm), 2 RU height
Weight with AC PS (w/o modules)	28.8 lb (13.1 kg)
Weight with one AC 1,100 PS (w/o modules)	30.5 lbs (13.9 kg)
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current	5.3 A
• Input current with PoE Power Adaptor	7.4 A
• Surge current	60 A peak and less than 12 Arms per half cycle
Power consumption	
• With AC-PoE	80 to 750 W, 273 to 2560 BTU/hr (configuration dependent)
<b>Ports</b>	
Console port	One RJ-45 connector and one mini USB Type B, USB 2.0 compliant
Auxiliary port	RJ-45 connector
USB ports	Two USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max <sup>1</sup>



**Table 1-9 Cisco 4351 ISR Specifications (continued)**

Description	Specification
10/100/1000 Gigabit Ethernet	Three RJ-45 connectors (GE0/0/0, GE0/0/1, GE0/0/2), auto-MDIX
SFP	Manual configuration is required to switch between the RJ-45 and the SFP module.

1. 480 Mb/s individually, bandwidth is shared when both are used

The following table provide Cisco 4331 ISR specifications.

**Table 1-10 Cisco 4331 ISR Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	1.75 x 17.25 x 17.25 in. (44.45 x 438.2 x 438.2 mm)
Weight with one AC PS (w/o modules)	13.50 lb (6.12 kg)
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current	2.4 A
• Input current with PoE Power Adaptor	4.8 A
• Surge current	60 A peak and less than 12 Arms per half cycle
Power consumption	
• With AC-PoE	60 to 440 W (205 to 1500 BTU/hr) (configuration dependent)
<b>Ports</b>	
Console port	One RJ-45 connector and one mini USB Type B, USB 2.0 compliant
Auxiliary port	RJ-45 connector
USB port	One USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max <sup>1</sup>
10/100/1000 Gigabit Ethernet	Three Gigabit Ethernet ports, 2 RJ-45 connectors (GE 0/0/0, GE 0/0/1, GE 0/0/2), auto-MDIX
SFP	Manual configuration is required to switch between RJ-45 and SFP type. SFP/2 is dedicated (always on).

1. 480 Mb/s individually, bandwidth is shared when both are used

The following table provide Cisco 4321 ISR specifications.

**Table 1-11 Cisco 4321 ISR Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	1.75 x14.55 x11.60 in. (44.5 x 369.6.15 x 294.6 mm)
Weight with AC PS (w/o modules)	8.2 lb (3.7 kg)
<b>Power</b>	
AC input power	
• Input voltage	100 to 240 VAC, autoranging
• Frequency	47 to 63 Hz
• Input current	1 A
• Input current with PoE Power Adaptor	2.5 A
• Surge current	90 A peak and less than 8 Arms per half cycle
Power consumption	30 to 80 W (102 to 280 BTU/hr) (configuration dependent)
• With AC-PoE	30 to 200 W (102 to 675 BTU/hr) (configuration dependent)
<b>Ports</b>	
Console port	1 RJ-45 connector and one mini USB Type B, USB 2.0 compliant DONE
Auxiliary port	RJ-45 connector DONE
USB port	1 USB Type A, USB 2.0 compliant, 2.5 W (500 mA) max <sup>1</sup> DONE
10/100/1000 Gigabit Ethernet	2 RJ-45 connectors and 1 SFP, (GE0/0/0, GE0/0/1, SFP0) auto-MDIX
SFP	Manual configuration is required to switch between RJ-45 and SFP type.

1. 480 Mb/s individually, bandwidth is shared when both are used

The following table provide Cisco 4221 ISR specifications.

**Table 1-12 Cisco 4221 Specifications**

Description	Specification
<b>Physical</b>	
Dimensions (H x W x D)	1.73 x12.7 x10.00 in. (44.5 x 369.6.15 x 294.6 mm)
Weight with AC PS (w/o modules)	5.3 Lbs. (2.4 kg) Router w/o modules + 1.5 Lbs. (0.68 kg) Power Supply (AC PSU)
<b>Power</b>	

Description	Specification
AC input power	
• Input voltage	85VAC to 264VAC (Label: 100-240VAC)
• Frequency	47 to 63 Hz
• Input current	1 A
• Input current with PoE Power Adaptor	2.5 A
• Surge current	90 A peak and less than 8 Arms per half cycle
Power consumption	Maximum power output 90W No load input power <= 0.15W at 230VAC input
DC input power	
• Input voltage	11.4 V to 12.6V(12V+/-5%)
• Input current	Maximum 7.5A
• Power consumption	The maximum continuous output power shall not exceed 90Watts
• Maximum output power	90 W
<b>Ports</b>	
Console port	One RJ-45: shared console port and auxiliary port
USB port	One USB Type A host port max
10/100/1000 Gigabit Ethernet	Two GE ports allocated among RJ45 and SFP as: One combo port with 10/100/1000RJ-45 Ethernet port or SFP Ethernet port (labeled GE0/0/0) One dedicated 10/100/1000RJ-45 Ethernet port (labeled GE0/0/1)
SFP	One SFP port (GE0/0/0)

**Table 1-13 Environmental Specifications**

<b>Environmental</b>	
Operating humidity	5 to 85% RH
Operating temperature	32 to 104°F (0 to 40°C)
Altitude in China	0-6560 ft (0-2000 m)
Altitude in all other countries	0-10,000 ft (0-3050 m)

**Table 1-13 Environmental Specifications**

<b>Environmental</b>	
<b>Transportation and Storage</b>	
Nonoperating temperature	-13 to 158°F (-25 to 70°C)
Nonoperating humidity	5 to 95% RH
Nonoperating altitude	15,000 ft (4570 m)
<b>Acoustic (for ISR4451-X)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	54.4 to 67.4 dBA
Acoustic: Sound Power (Typical/Maximum)	62.6 to 74.5 dBA
<b>Acoustic (for ISR4431)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	54.3 to 79.1 dBA
Acoustic: Sound Power (Typical/Maximum)	57.2 to 80.8 dBA
<b>Acoustic (for ISR4351)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	50.6 to 73.1 dBA
Acoustic: Sound Power (Typical/Maximum)	58.2 to 78.8 dBA
<b>Acoustic (for ISR4331)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	52.8 to 74.8 dBA
Acoustic: Sound Power (Typical/Maximum)	61.2 to 81.6 dBA
<b>Acoustic (for ISR4321)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	24.2 to 51.9 dBA
Acoustic: Sound Power (Typical/Maximum)	31.9 to 59.9 dBA
<b>Acoustic (for Cisco 4221 ISR)</b>	
Acoustic: Sound Pressure (Typical/Maximum)	28.4 to 55.3 dBA
Acoustic: Sound Power (Typical/Maximum)	41 to 68 dBA

**Table 1-14** Regulatory Compliance Table

Safety compliance	<p>IEC 60950-1, Safety of information technology equipment [world-wide]</p> <p>EN 60950-1:2006, Safety of information technology equipment [EU]</p> <p>UL 60950-1, Second Edition, Standard of safety for information technology equipment [US]</p> <p>CAN/CSA C22.2 No. 60950-1-07, Safety of information technology equipment including electrical business equipment [Canada]</p> <p>AS/NZS 60950.1: 2011 [Australia]</p> <p>GB 4943[PRC]</p> <p>IEC 60950-1: 2005 plus Am1: 2009, [World-wide]</p> <p>For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for the Cisco ISR 4400 and Cisco ISR 4300 Series Routers</a> document.</p>
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**Table 1-14 Regulatory Compliance Table**

Immunity compliance	<p>CISPR24 ITE-Immunity characteristics, Limits and methods of measurement</p> <p>EN 55024 ITE-Immunity characteristics, Limits and methods of measurement</p> <p>EN 50082-1 Electromagnetic compatibility - Generic immunity standard - Part 1</p> <p>EN 300-386 V1.6.1 Electromagnetic compatibility for TNE</p> <p>EN 61000</p> <p>For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for the Cisco ISR 4400 and Cisco ISR 4300 Series Routers</a> document.</p>
EMC compliance	<p>EN 55022, class A</p> <p>CISPR22, class A</p> <p>CFR47, Part 15, Subpart B, class A</p> <p>AS/NZS CISPR22, Class A</p> <p>VCCI, Class A</p> <p>CNS13438 (Taiwan)</p> <p>KN22:2009 (Korea)</p> <p>ICES-003</p> <p>Harmonic Current Emission</p> <p>EN 61000</p> <p>Voltage Fluctuation Flicker</p> <p>EN61000</p> <p>For detailed compliance information, see the <a href="#">Regulatory Compliance and Safety Information for the Cisco ISR 4400 and Cisco ISR 4300 Series Routers</a> document.</p>

# Periodic Inspection and Cleaning

Periodic inspection and cleaning of the external surface of the router is recommended to minimize the negative impact of environmental dust or debris. The frequency of inspection and cleaning is dependent upon the severity of the environmental conditions, but a minimum of every six months is recommended. Cleaning involves vacuuming of router air intake and exhaust vents. See the [“Fans, Ventilation, and Airflow”](#) section on page 1-38.



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**Caution**

Sites with ambient temperatures consistently above 25°C or 77°F and with potentially high levels of dust or debris might require periodic preventative maintenance cleaning.

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