Cisco Application Centric Infrastructure Fabric Hardware Installation Guide

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Preface

Audience

This publication is for hardware installers and network administrators who install, configure, and maintain Cisco Nexus switches.

Documentation Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
Italic	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x | y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x | y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
`variable`	Indicates a variable for which you supply values, in context where italics cannot be used.

Convention	Description
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
`screen font`	Terminal sessions and information the switch displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

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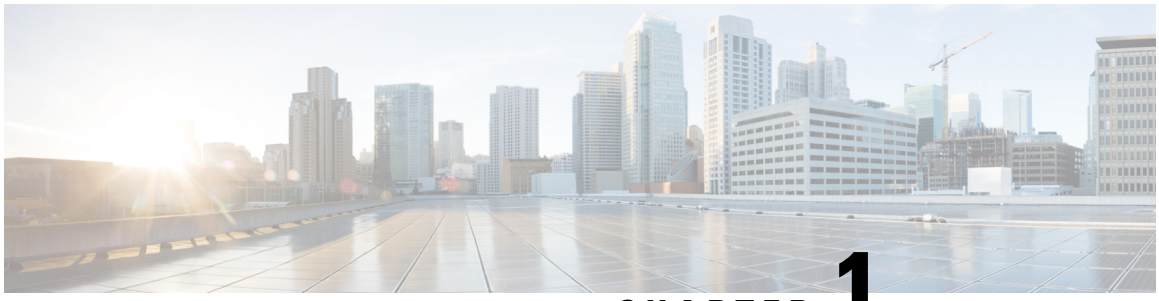


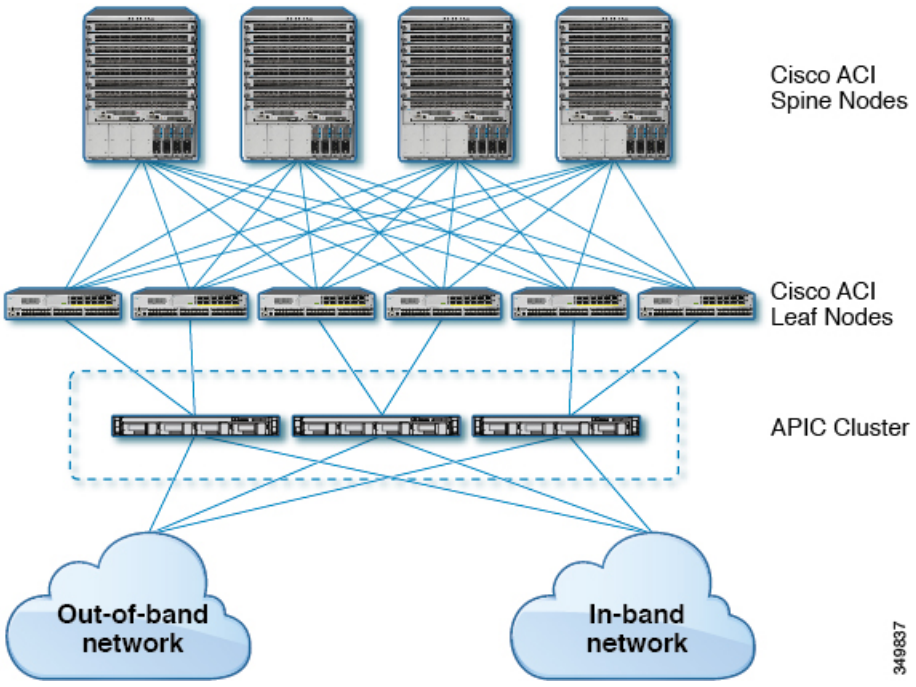
CHAPTER 1

Overview

Overview

The Application Centric Infrastructure (ACI) Fabric hardware includes an Application Policy Infrastructure Controller (APIC) appliance (a cluster of three controllers), one or more leaf switches, and one or more spine switches for each leaf switch (for switch compatibility, please see the Cisco Nexus 9000 Series Switches data sheets). The following figure shows how these components are interconnected to form the ACI Fabric.

Figure 1: Hardware Components in an ACI Fabric



This hardware installation guide explains how to set up the ACI fabric by connecting installed APIC controllers, leaf switches, and spine switches. For information on installing each of these components in racks, see the installation guide for that device.

For information about creating the initial switch configuration for the switches in the ACI fabric, see the *Cisco APIC Getting Started Guide*, which also explains how to connect the optional console, out-of-band, and in-band management interfaces, which you can use for monitoring and troubleshooting.

Cisco APIC Appliance Connection Features

The Cisco APIC appliance has two form factors for medium or large configurations. Medium configurations have medium-size CPU, hard drive, and memory for up to 1000 edge ports. Large configurations have large-size CPU, hard drive, and memory for more than 1000 edge ports.

Note For rack installation instructions using the **UCSC-RAIKB-M4=** Rail Kit, see the Installing the Server section of the *Cisco APIC M3/L3 Server Installation and Service Guide*.

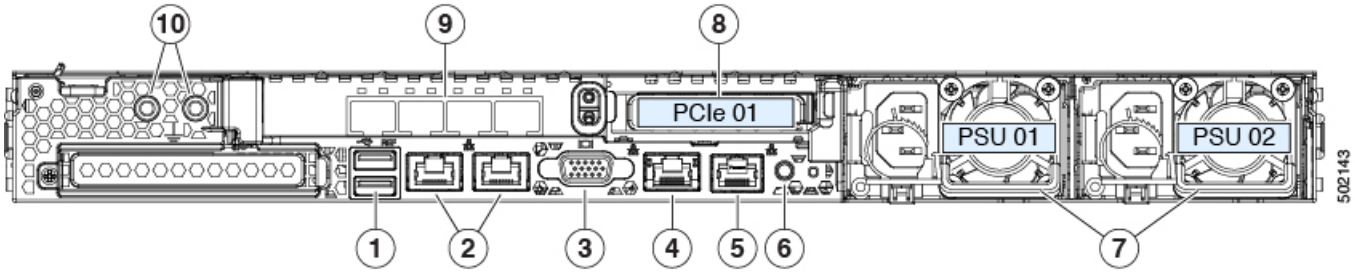
An APIC appliance comprises either a cluster of Cisco APIC M3/L3 (third generation appliance), Cisco UCS 220 M4 (second generation appliance) or Cisco UCS 220 M3 (first generation appliance) servers manufactured with an image secured with Trusted Platform Module (TPM), certificates, and an APIC product ID (PID). To order these appliance clusters (and additional controllers), you must use the part numbers listed in the following table.

Appliance Generation	Cisco APIC Configuration	Part Number	Description
Third	Large cluster	APIC-CLUSTER-L3	Cluster of three Cisco APIC third generation controllers with large size CPU, hard drive, and memory configurations for more than 1200 edge ports.
	Medium cluster	APIC-CLUSTER-M3	Cluster of three Cisco APIC third generation controllers with medium size CPU, hard drive, and memory configurations for up to 1200 edge ports.
	Large controller (spare)	APIC-L3	Third generation Cisco APIC with large CPU, hard drive, and memory.
	Medium controller (spare)	APIC-M3	Third generation Cisco APIC with medium CPU, hard drive, and memory.

Appliance Generation	Cisco APIC Configuration	Part Number	Description
Second	Large cluster	APIC-CLUSTER-L2	Cluster of three Cisco APIC second generation controllers with large size CPU, hard drive, and memory configurations for more than 1000 edge ports.
	Medium cluster	APIC-CLUSTER-M2	Cluster of three Cisco APIC second generation controllers with medium size CPU, hard drive, and memory configurations for up to 1000 edge ports.
	Large controller (spare)	APIC-L2	Second generation Cisco APIC with large CPU, hard drive, and memory.
	Medium controller (spare)	APIC-M2	Second generation Cisco APIC with medium CPU, hard drive, and memory.
First	Large cluster	APIC-CLUSTER-L1	Cluster of three Cisco APIC first generation controllers with large size CPU, hard drive, and memory configurations for more than 1000 edge ports.
	Medium cluster	APIC-CLUSTER-M1	Cluster of three Cisco APIC first generation controllers with medium size CPU, hard drive, and memory configurations for up to 1000 edge ports.
	Large controller (spare)	APIC-L1	First generation Cisco APIC with large CPU, hard drive, and memory.
	Medium controller (spare)	APIC-M1	First generation Cisco APIC with medium CPU, hard drive, and memory.

The following figure identifies the ports and connectors that you use when connecting a third-generation APIC controller to the ACI Fabric.

Figure 2: Connection Features on a Third-Generation APIC Controller



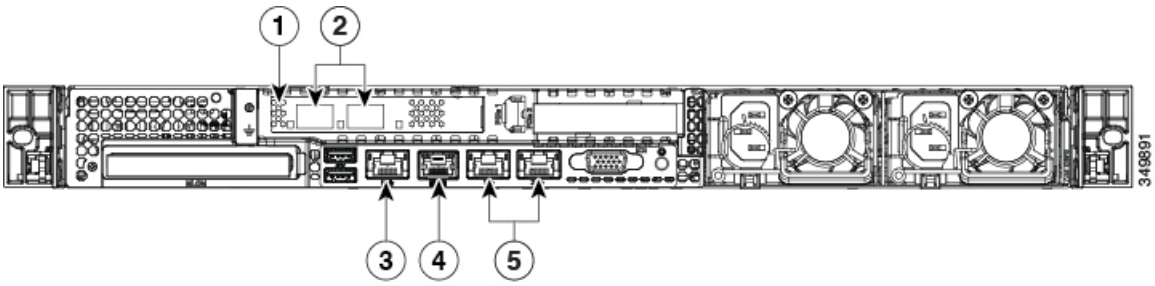
1	USB 3.0 ports (two)	**6**	Rear unit identification button/LED

2	Dual 1-Gb/10-Gb Ethernet ports (LAN1 and LAN2) The dual LAN ports can support 1 Gbps and 10 Gbps, depending on the link partner capability.	**7**	Power supplies (two, redundant as 1+1)
3	VGA video port (DB-15 connector)	**8**	PCIe riser 1/slot 1 (x16 lane)
4	1-Gb Ethernet dedicated management port	**9**	VIC 1455 with external 10/25-Gigabit Ethernet ports (4)
5	Serial port (RJ-45 connector)	**10**	Threaded holes for dual-hole grounding lug

Note VIC 1455 supports 10/25-Gigabit with the following restrictions:

- All ports must have the same speed.
- Port-1 and port-2 is one pair, corresponding to eth2-1 on APIC. Port-3 and port-4 is another pair, corresponding to eth2-2 on APIC. Only one connection is allowed for each pair (For example, you can connect one cable to either port-1 or port-2, and you can connect another one cable to either port-3 or port-4. Do not connect two cables on any pair.)

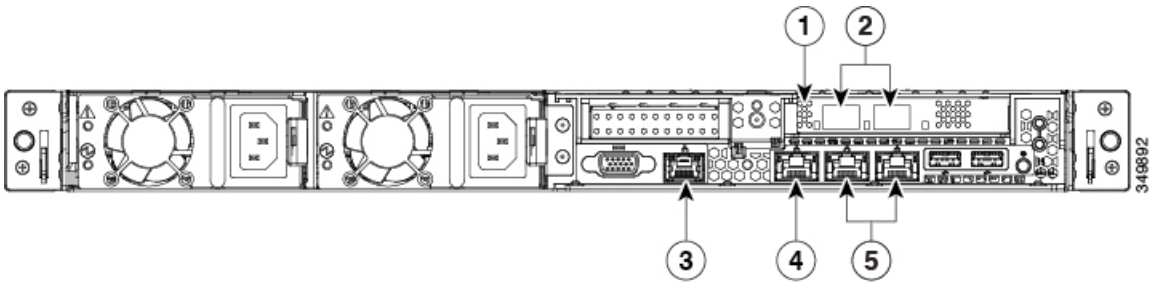
Figure 3: Connection Features on a Second-Generation APIC Controller



1	Virtual Interface Card (VIC) for either optical (VIC1225) connections or 10GBASE-T (VIC1225T) connections	4	Management port (RJ-45) for a direct connection to a console (you can use the console port on either side of the device)
2	Two fiber optic or 10GBASE-T ports for connections to a downlink port on one or two TOR switches	5	Out-of-band management ports for management of APIC OS only (cannot be used to access the CIMC management interface; APIC's only support the dedicated NIC mode in CIMC)
3	Cisco Integrated Management Controller (CIMC) port dedicated to a console (1-Gigabit Ethernet connection) connection		

The following figure identifies the ports and connectors that you use when connecting a first-generation APIC controller to the ACI Fabric.

Figure 4: Connection Features on a First-Generation APIC Controller



1	Virtual Interface Card (VIC) for either optical (VIC1225) connections or 10GBASE-T (VIC1225T) connections	4	Cisco Integrated Management Controller (CIMC) port dedicated to a console (1-Gigabit Ethernet) connection
2	Two fiber optic or 10GBASE-T ports for connections to a downlink port on one or two TOR switches	5	Out-of-band management ports for management of APIC OS only (cannot be used to access the CIMC management interface; APIC's only support the dedicated NIC mode in CIMC)
3	Management port (RJ-45) for a direct connection to a console (you can use the console port on either side of the device)		

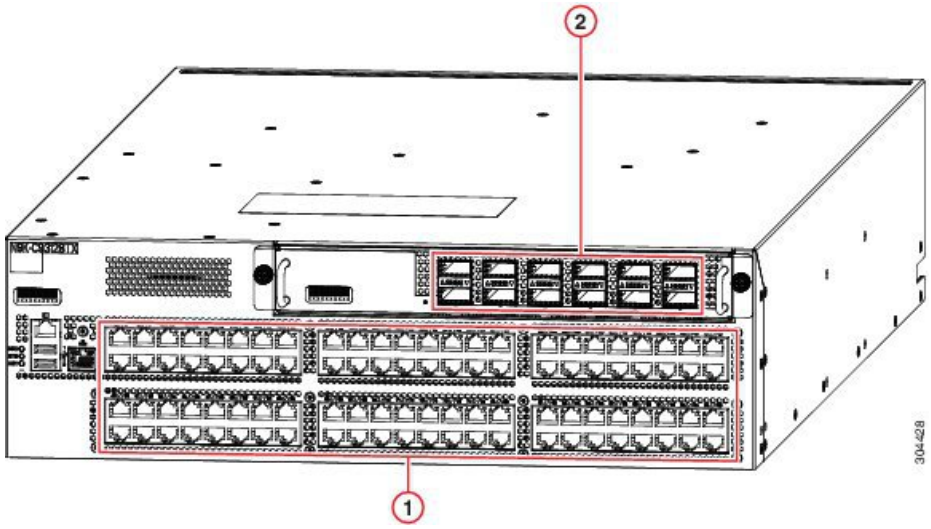
Cisco Leaf Switch Connection Features

This section identifies the connection features that you use when connecting the following leaf switches to the Cisco ACI Fabric:

- Cisco Nexus 93128TX ACI-mode switch
- Cisco Nexus 9332PQ ACI-mode switch
- Cisco Nexus 9372PX ACI-mode switch
- Cisco Nexus 9372PX-E ACI-mode switch
- Cisco Nexus 9372TX ACI-mode switch
- Cisco Nexus 9396PX ACI-mode switch
- Cisco Nexus 9396TX ACI-mode switch

The following figure identifies port features on the Cisco Nexus 93128TX ACI-mode switch.

Figure 5: Cisco Nexus 93128TX Switch ACI Fabric Connection Features

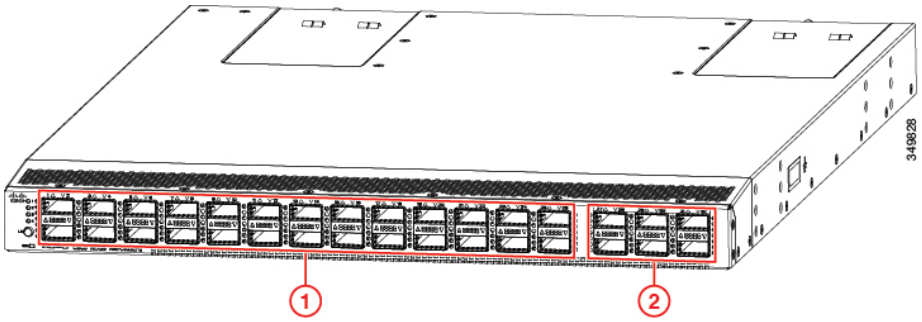


1	10GBASE-T, APIC-facing, SFP+ interface ports (48) (supporting 100-Megabit, 1-Gigabit, and 10-Gigabit speeds)	2	4 100-Gigibit or 6 40-Gigabit, or 12 40-Gigabit, spine-facing QSFP+ optical ports (12-port uplink module shown) **Note** For the 12-port uplink module, only the left-most eight ports are available for uplinks when using this switch.

For other features on this switch, see the *Cisco Nexus 93128TX ACI-Mode Switch Hardware Installation Guide*.

The following figure identifies port features on the Cisco Nexus 9332PQ ACI-mode switch.

Figure 6: Cisco Nexus 9332PQ Switch ACI Fabric Installation Features

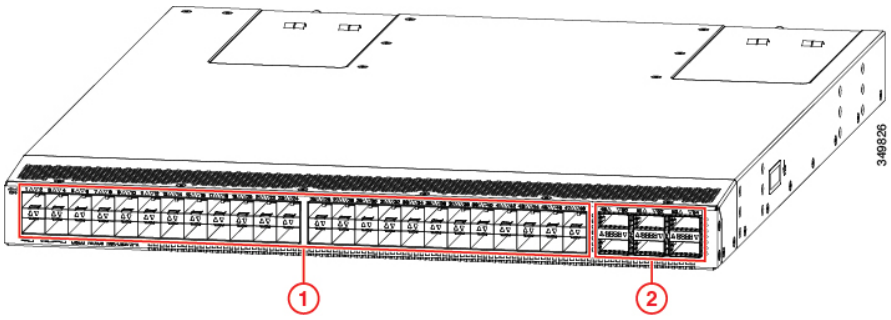


1	40-Gigabit, APIC-facing, QSFP+ interface ports (26). Ports 1 to 12 and 15 to 26 also support 40-Gigabit-to-4x10-Gigabit breakout cables with the Dynamic Breakout feature.	2	40-Gigabit, spine-facing, QSFP+ interface ports (6)

For other features on this switch, see the *Cisco Nexus 9332PQ ACI-Mode Switch Hardware Installation Guide*.

The following figure identifies port features on the Cisco Nexus 9372PX and 9372PX-E ACI-mode switch.

Figure 7: Cisco Nexus 9372PX and 9372PX-E Switch ACI Fabric Installation Features

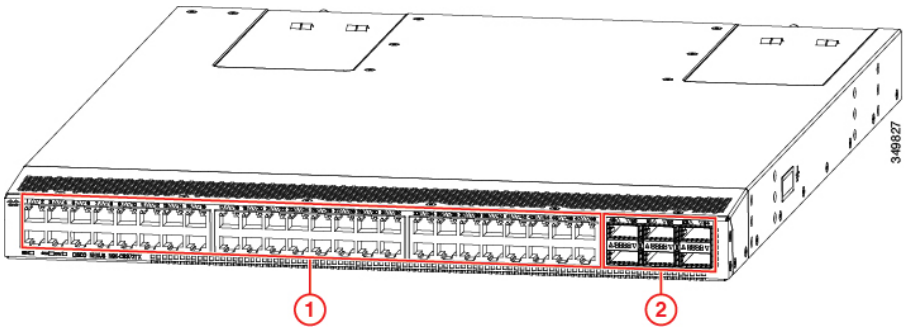


1	1- and 10-Gigabit, APIC-facing, SFP+ interface ports (48)	2	40-Gigabit, spine-facing, QSFP+ interface ports (6)

For other features on this switch, see the *Cisco Nexus 9372PX and 9372PX-E ACI-Mode Switch Hardware Installation Guide*.

The following figure identifies port features on the Cisco Nexus 9372TX ACI-mode switch.

Figure 8: Cisco Nexus 9372TX Switch ACI Fabric Installation Features

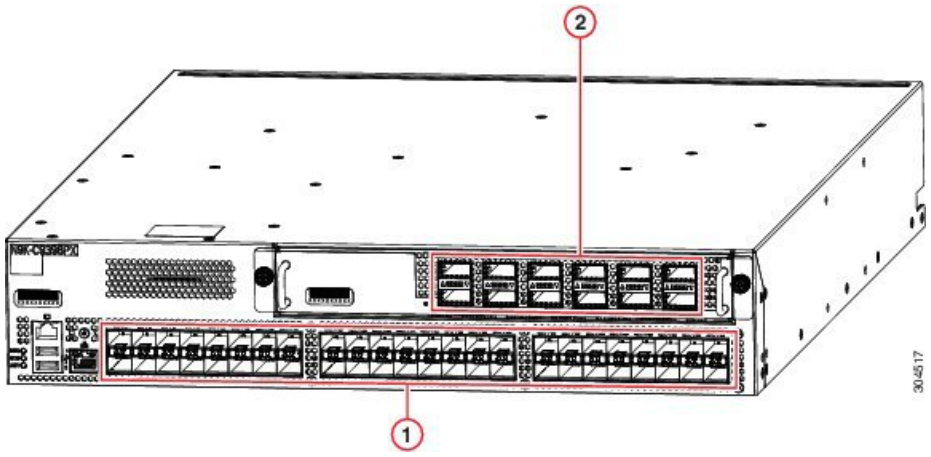


1	10GBASE-T, APIC-facing, SFP+ interface ports (48) (supporting 100-Megabit, 1-Gigabit, and 10-Gigabit speeds)	2	40-Gigabit, spine-facing QSFP+ interface ports (6)

For other features on this switch, see the *Cisco Nexus 9372TX ACI-Mode Switch Hardware Installation Guide*.

The following figure identifies port features on the Cisco Nexus 9396PX ACI-mode switch.

Figure 9: Cisco Nexus 9396PX Switch ACI Fabric Installation Features

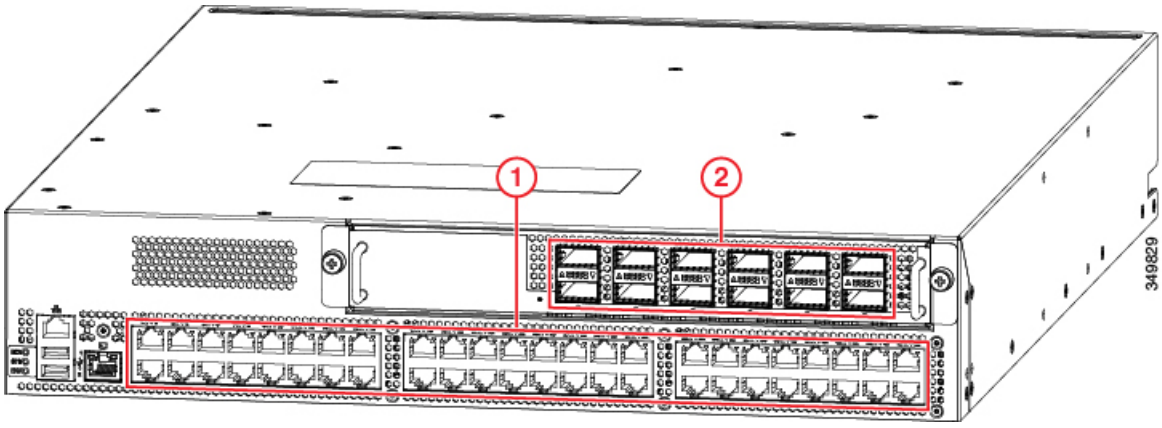


1	10-Gigabit, APIC-facing, SFP+ interface ports (48)	2	4 100-Gigibit or 6 40-Gigabit, or 12 40-Gigabit, spine-facing QSFP+ optical ports (12-port uplink module shown)

For other features on this switch, see the *Cisco Nexus 9396PX ACI-Mode Switch Hardware Installation Guide* .

The following figure identifies port features on the Cisco Nexus 9396TX ACI-mode switch.

Figure 10: Cisco Nexus 9396TX Switch ACI Fabric Installation Features



1	10GBASE-T, APIC-facing, SFP+ interface ports (48) (supporting 100-Megabit, 1-Gigabit, and 10-Gigabit speeds)	2	4 100-Gigibit or 6 40-Gigabit, or 12 40-Gigabit, spine-facing QSFP+ optical ports (12-port uplink module shown)

For other features on this switch, see the *Cisco Nexus 9396TX ACI-Mode Switch Hardware Installation Guide*.

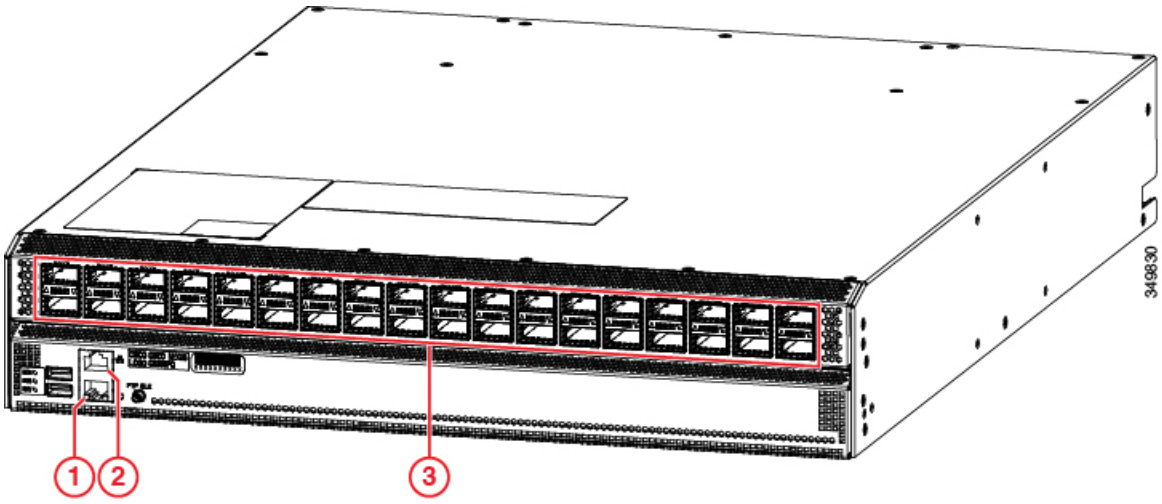
Cisco Spine Switch Connection Features

This section identifies the connection features that you use when connecting the following spine switches to the Cisco ACI Fabric:

- Cisco Nexus 9336PQ ACI-mode switch
- Cisco Nexus 9504 ACI-mode switch
- Cisco Nexus 9508 ACI-mode switch
- Cisco Nexus 9516 ACI-mode switch

The following figure identifies port features on the Cisco Nexus 9336PQ ACI-mode switch.

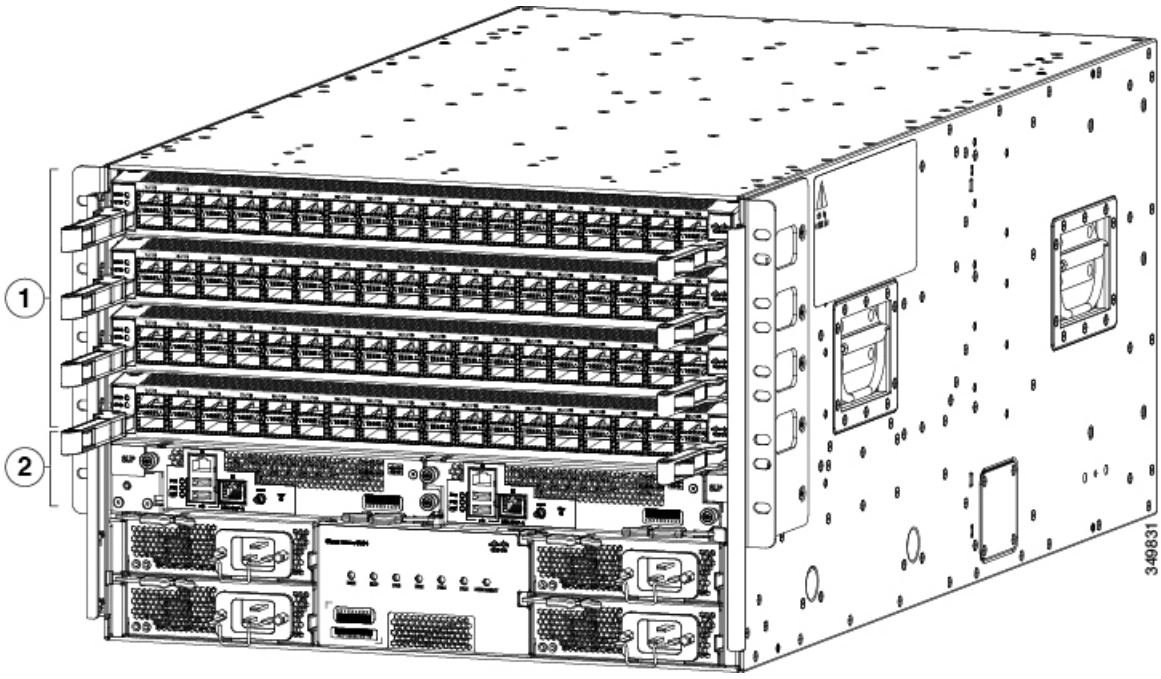
Figure 11: Cisco Nexus 9336PQ Switch ACI Fabric Connection Features



1	Out-of-band management port	3	40-Gigabit QSFP+ ports (36)
2	Console port		

The following figure identifies the features that you use when installing the Cisco Nexus 9504 switch with the Cisco ACI Fabric hardware.

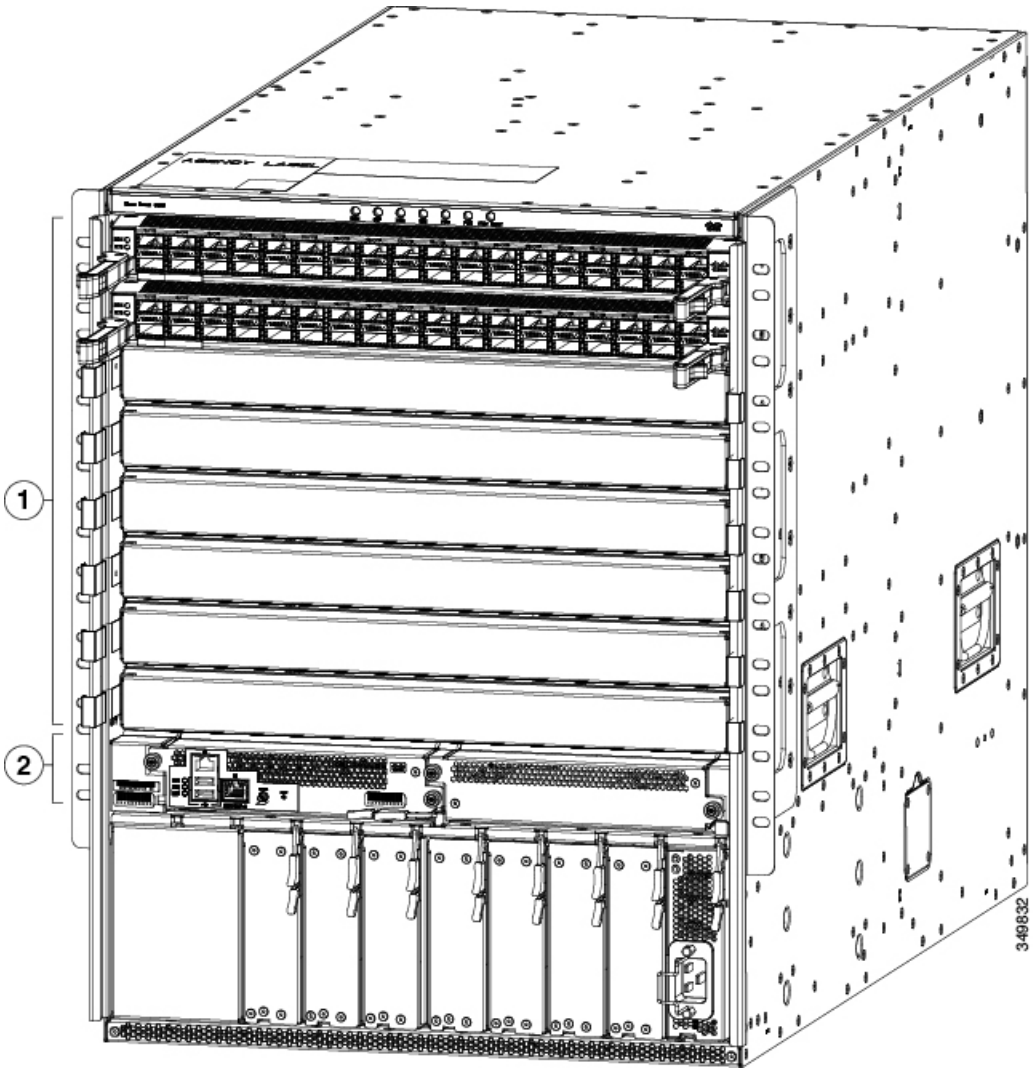
Figure 12: ACI Fabric Installation Features on the Cisco Nexus 9504 Switch Chassis



1	Line cards (such as the N9K-X9736PQ line card) in slots LC 1 to LC 4	2	Supervisor modules (one or two) in slots SUP 1 and SUP 2 with console and management ports

The following figure identifies the features that you use when installing the Cisco Nexus 9508 switch with the Cisco ACI Fabric hardware.

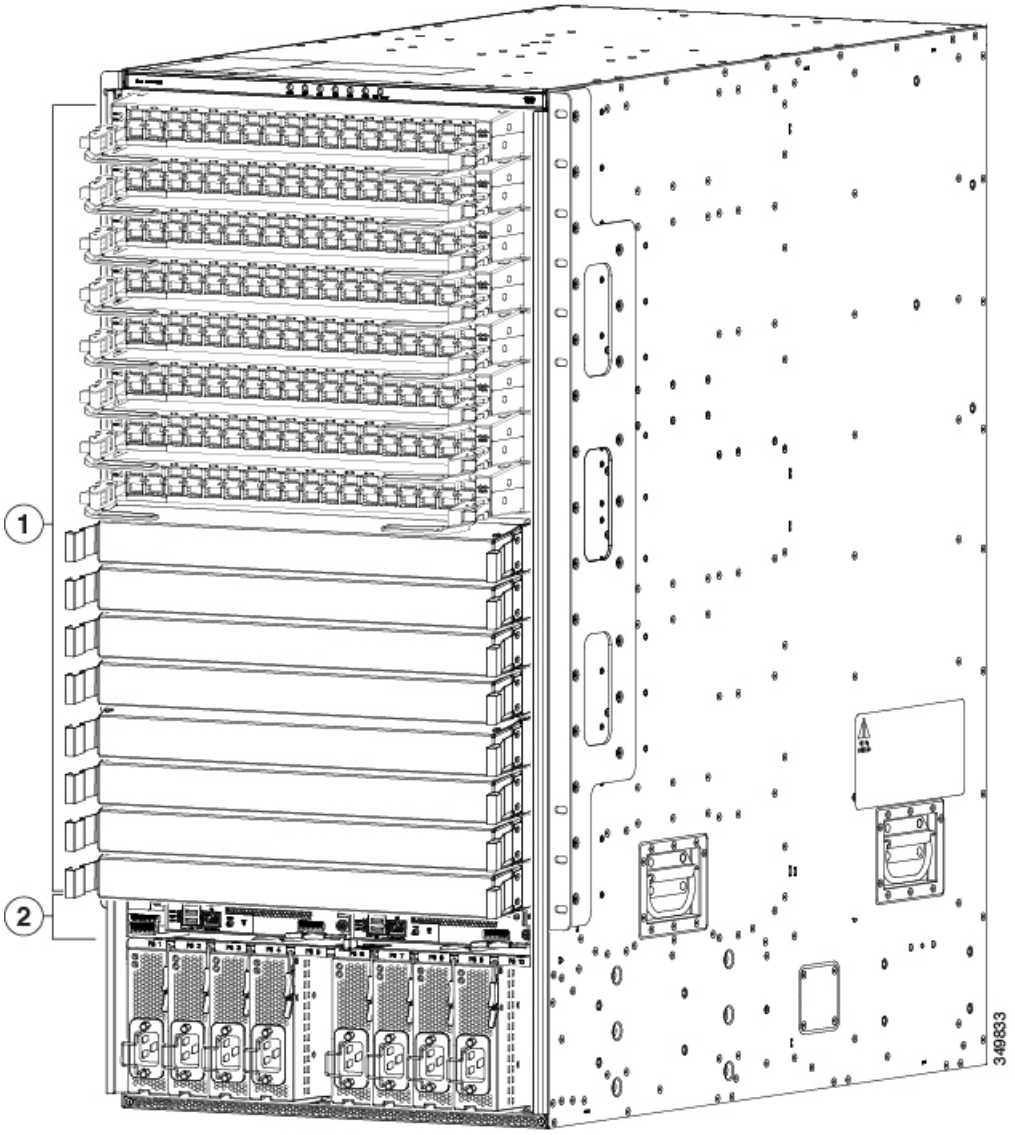
Figure 13: ACI Fabric Installation Features on the Cisco Nexus 9508 Switch Chassis



1	36-port 40-Gigabit line cards (such as the N9K-X9736PQ line card) in slots 1 to 8	2	Supervisor modules (one or two) in slots 27 and 28 with console and management ports

The following figure identifies the features that you use when installing the Cisco Nexus 9516 switch with the Cisco ACI Fabric hardware.

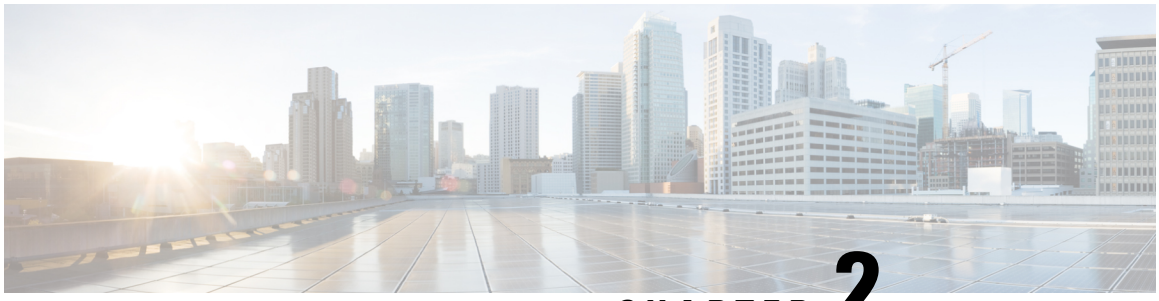
Figure 14: ACI Fabric Installation Features on the Cisco Nexus 9516 Switch Chassis



1	36-port 40-Gigabit line card (such as the N9K-X9736PQ line card) in slots 1 to 16	2	Supervisor modules (one or two) in slots 27 and 28 with console and management ports

For information about installing these switches in racks, see the following documents:

- *Cisco Nexus 9336PQ Switch Hardware Installation Guide*
- *Cisco Nexus 9504 ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9508 ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9516 ACI-Mode Switch Hardware Installation Guide*



CHAPTER 2

Connecting the Switch to the ACI Fabric

ACI Fabric Topology

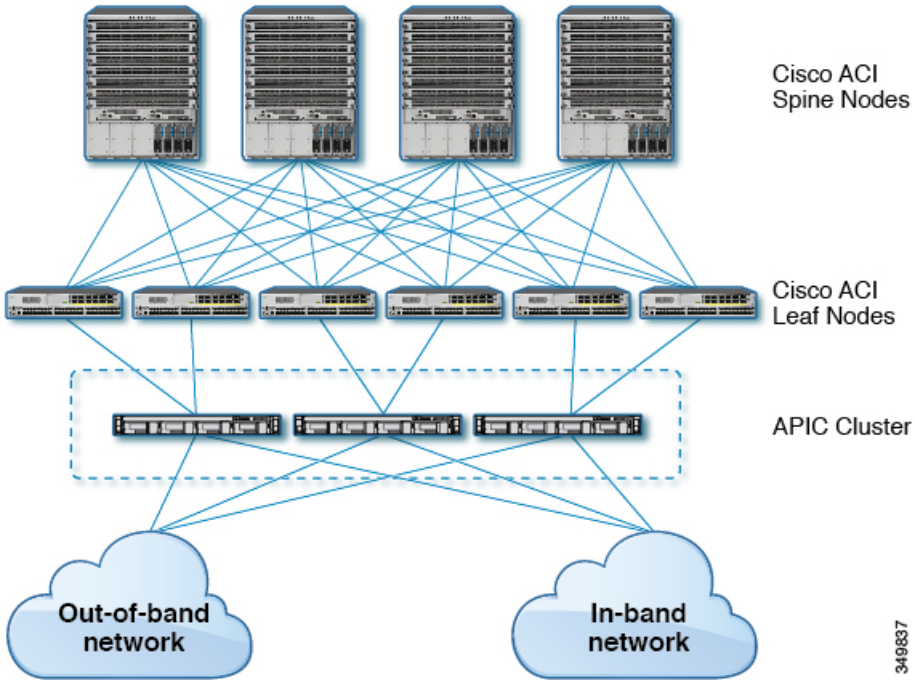
The ACI fabric topology includes the following major components:

- Application Centric Infrastructure Controller (APIC) appliance (cluster of APICs)
- Leaf switches (for switch compatibility, please see the data sheets here: https://www.cisco.com/c/en/us/products/switches/nexus-9000-series-switches/datasheet-listing.html
- Spine switches (for switch compatibility, please see the data sheets here: https://www.cisco.com/c/en/us/products/switches/nexus-9000-series-switches/datasheet-listing.html

As shown in the following figure, each APIC is connected to one or two leaf switches and each leaf switch should be connected to every spine switch in the same fabric.

Note To prevent sub-optimal forwarding between endpoints, connect every leaf switch in the fabric to every spine switch in the same fabric.

Figure 15: Connections Between APIC Clusters, Leaf Nodes, and Spine Nodes



Preparing to Connect to Other Devices

When preparing to connect the fabric devices, consider the following for each type of interface, and gather all of the required equipment before making the connections:

- Cabling type required for each interface type
- Distance limitations for each signal type
- Additional interface equipment required

Note When running power and data cables in overhead or subfloor cable trays, we strongly recommend that you locate power cables and other potential noise sources as far away as practical from network cabling that terminates on Cisco equipment. In situations where long parallel cable runs cannot be separated by at least 3.3 feet (1 meter), we recommend that you shield any potential noise sources by housing them in a grounded metallic conduit.

The optical transceivers that are not already assembled to their cables come separate from their cables. To prevent these transceivers and their cables from being damaged, we recommend that you keep the transceivers disconnected from their cables when installing them in ports and then insert the optical cable into the transceiver. When removing transceivers from ports, remove their cables before removing the transceivers.

To maximize the effectiveness and life of your transceivers and optical cables, do the following:

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The switch is typically grounded when you install transceivers and provides an ESD port to which you

can connect your wrist strap. If you cannot find an ESD port, connect the wrist strap to an earth ground (such as the grounding connection for the chassis).

- Do not remove or insert a transceiver more often than necessary. Repeated removals and insertions can shorten its useful life.
- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) increases with contamination and should be kept below 0.35 dB.
  - Clean these parts before installing them to prevent dust from scratching the fiber-optic cable ends.
  - Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
  - Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

Connecting Leaf Switches to APICs

You must downlink one or two (recommended for redundancy) Cisco Nexus 9300 platform ACI-mode leaf switches to each Application Policy Infrastructure Controller (APIC) in your ACI fabric. The type of virtual interface card (VIC) installed on the APIC determines the types of interface cables that you can use to connect the leaf switches to the APICs.

- The **VIC 1225T** module supports copper connectors, copper cables, and switches with copper downlink ports (such as: Cisco Nexus 93108TC-EX, 93108TC-FX, 93120TX, 93128TX, 9372TX, 9372TX-E, and 9396TX switches).
- The **VIC 1225** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 93180LC-EX, 93180YC-EX, 93180YC-FX, 9332PQ, 9336C-FX2, 9348GC-FXP, 9372PX, 9372PX-E, 9396PX, and 93600CD-GC switches).
- The **VIC 1455** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 9336C-FX2, 93180LC-EX, 93180YC-EX, 93180YC-FX, 93240YC=FX2, and 93600CD-GC switches).

Before you begin

The APIC and leaf switches in the fabric must be fully installed in their racks and grounded.

Step 1 Connect an interface cable to one of the two to four ports on the virtual interface card (VIC) installed on the APIC. If the cable is not already assembled to its transceivers, insert the transceiver into the VIC port and then connect the optical interface cable to the transceiver.

- For a **VIC 1225T** 10GBASE-T copper module, use 10GBASE-T cables with RJ-45 connectors.
- For a **VIC 1225** optical module, use one of the following sets of transceivers and cables:

- For a **VIC 1455** SFP28 module, 10-Gigabit only, use one of the following sets of transceivers and cables:
  - Cisco 10GBASE-LR transceivers (SFP-10G-LR) supporting a link length of up to 6.1 miles (10 km)
  - Cisco 10GBASE-SR transceivers (SFP-10G-SR) supporting the following link lengths:
    - Using 2000 MHz MMF (OM3) for up to 984 feet (300 m)
    - Using 4700 MHz MMF (OM4) for up to 1312 feet (400 m)
  - Cisco SFP+ Active Optical Cables (SFP-10G-AOC*x*M [where *x*=1, 2, 3, 5, 7, or 10 for lengths in meters])
  - Cisco SFP+ Twinax Cables (SFP-H10GB-CU*x*M [where *x*=1, 2, 3, 5, 7, or 10 for lengths in meters])

Note The VIC 1455 has 4 ports, port-1, port-2, port-3, and port-4 from left to right.

- All ports must have the same speed, either 10-Gigabit or 25-Gigabit.
- Port-1 and port-2 is one pair, corresponding to eth2-1 on APIC and port-3 and port-4 is another pair, corresponding to eth2-2 on APIC. Only one connection is allowed for each pair. For example, you can connect one cable to either port-1 or port-2, and connect another cable to either port-3 or port-4 (**please do not connect two cables on any pair**).

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

To see the transceiver specifications and installation information, see Transceiver Module Installation Guides.

Step 2 Connect the other end of the interface cable to a downlink port on a leaf switch.

- For a Cisco 10GBASE-LR or -SR transceiver and cable, insert the transceiver into a downlink optical port on a leaf switch before connecting the cable to the transceiver.
- For Cisco SFP+ Active Optical Cables, insert the transceiver on the cable into a downlink optical port on a leaf switch.
- For a 10GBASE-T copper cable, insert the RJ-45 connector on the cable into a downlink BASE-T port on a leaf switch.

Note To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

Connecting Leaf Switches to Spine Switches

For optimal forwarding between endpoints, you must connect each leaf switch to every spine switch in the same ACI fabric.

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

To see the transceiver specifications and installation information, see Transceiver Module Installation Guides.

Warning Warning – Invisible Laser Radiation. Do not expose users of telescopic optics. Class 1/1M Laser Products.

Warning Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

Before you begin

- The leaf and spine switches in the fabric (such as: N9k-C9364C, N9K-C9332C, and N9K-C9316D-GX) must be fully installed in their racks and grounded.
- If there are modular switches in the fabric, their ACI-mode line cards must already be installed. The line cards can be of the following types:
  - 36-port 40-Gigabit (such as: N9K-X9736PQ)
  - 32-port 100-Gigabit (such as: N9K-X9732C-EX) (supported by Cisco Nexus 9504 and 9508 modular switches)
  - 36-port 100-Gigabit (such as: N9K-X9736C-FX)

Note You cannot include NX-OS line cards in the same chassis when running in ACI mode.

Note Multiple uplinks from a leaf switch to a spine switch is supported. A symmetrical topology is recommended so that all devices have equal access to resources.

Step 1 For the transceivers with removable cables, make sure that the transceivers are separated from their interface cables.

Step 2 Insert the appropriate transceiver into an active uplink port on the leaf switch.

Step 3 Insert the same type of transceiver in the spine switch port on the line card.

Step 4 For transceivers with removable cables, insert the interface cable into the open end of each of those transceivers.

Step 5 Repeat Steps 1 through 4 for each spine switch in the ACI fabric.
The leaf switch is connected to each spine switch in the ACI fabric.

Step 6 Repeat Steps 1 through 5 for each leaf switch in the ACI fabric.

Each leaf switch in the ACI fabric is connected to each spine switch in the network,

The fabric automatically implements Equal Cost Multi-Pathing (ECMP) and enables all links. You do not need to configure the links.

Installing a Gigabit Ethernet module (GEM)

Step 1 Clear the switch's current configuration by using the `setup-clean-config` command.

Step 2 Power off the switch by disconnecting the power.

Step 3 Replace the current GEM card with the new GEM card.

Step 4 Power on the switch.

Virtual Port Channel Migration - Migration of Nodes from a First-Generation Switch to a Second-Generation Switch

Initially the fabric is configured with vPCs between two first-generation switches. Traffic flows are designed so that only these vPCs are used for data traffic. Now that you want to migrate both of the first-generation switches to second-generation switches, the following steps are required.

For this procedure, vPC primary and vPC secondary are first generation switches in vPC pair, sending traffic as described above.

To determine which transceivers, adapters, and cables support this switch, see the Cisco Transceiver Modules Compatibility Information document.

To see the transceiver specifications and installation information, see Transceiver Module Installation Guides.

Before you begin

You have two first-generation Cisco Nexus 9000 Series switches comprising a virtual port channel (vPC). You are migrating to two second-generation Cisco Nexus 9000 Series switches using the same cables.

First-generation Cisco Nexus 9000 Series switches include those switches that do not contain an EX or an FX in the PID (product identification).

Second-generation Cisco Nexus 9000 Series switches include those switches that have an EX or an FX in the PID.

Move any APIC controllers that are connected to the migrating vPC first-generation switches to any other switches in the fabric and wait for the APIC cluster to become "Fully Fit".

Step 1 From the APIC GUI, perform the **Remove From Controller** operation for vPC secondary. The switch is clean rebooted by the APIC. Wait for about 10 minutes for this operation to finish. This action prompts all traffic to use the other first-generation switch for data traffic. Disconnect the cabling from vPC secondary.

Step 2 Uninstall the first-generation switch by reversing the order of the steps in the Installing the Switch Chassis section, of the switch specific Hardware Installation Guide.

Step 3 Install the second-generation switch by following the steps in the Installing the Switch Chassis section, of the switch specific Hardware Installation Guide.

Step 4 Connect the loose cabling that you removed from the first-generation switch, to the same ports on the second-generation switch.

Step 5 Now you register the new second-generation switch with the APIC. Register the new node with the same node name and node ID. This switch becomes part of the fabric. Policies are pushed to the new switch and the vPC legs are kept down since there is a mismatch of generation switches. At this point, vPC primary continues to send the data traffic.

Step 6 From the APIC GUI, perform the **Remove From Controller** operation for vPC primary. This switch is clean rebooted by the APIC.

Wait for about 10 minutes for this operation to finish. The vPC leg on the second-generation switch, which was kept down earlier comes up. This action prompts all traffic to move to the new second-generation switch. Please note the vPC ports on the new second-generation switch will come up in about 10 to 22 seconds when STP is disabled for the deployed VLANs on the remote devices, and there will be traffic drops in the range of 10 to 40 seconds, depending upon the flows in the fabric. When STP is enabled on the VLANs on the remote devices, the traffic loss will be in the range of 40 to 75 seconds, depending upon the flows in the fabric.

Step 7 Disconnect the cabling from the other first-generation switch.

Step 8 Uninstall the first-generation switch, like you did in step 2.

Step 9 Install the second-generation switch, like you did in step 3.

Step 10 Connect the loose cabling, like you did in step 4.

Step 11 Register the new second-generation switch with the APIC. Register the new node with the same node name and node ID. This switch becomes part of the fabric. Policies are pushed to the new switch and the vPC legs comes up and starts passing traffic.

Setting Up an Optional Console Interface

You can optionally set up a console interface for performing the initial configuration of the switch. To do this, use the interface cable provided in the accessory kit to connect the switch to your console device. You can connect the console port on the switch to a modem. If you do not connect it to a modem, make the connection either before powering up the switch or after completing the boot process for the switch.

Before you begin

The console device must support VT100 terminal emulations and asynchronous transmissions.

Step 1 Configure the terminal emulator program to match each of the following default port characteristics:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

Step 2 Insert the RJ-45 connector on the interface cable found in the accessory kit into the RS-232 port on the switch and insert the DB-9 connector on the other end of the cable to the serial port on the console device.

What to do next

You can now perform the initial configuration for the switch (see the *Cisco ACI Getting Started Guide*).

Setting Up an Optional Management Connection

You can optionally set up an out-of-band management connection for monitoring and troubleshooting purposes. To do this, depending on your switch, you connect either the RJ-45 management port or the SFP management port on the switch to an external hub, switch, or router.

Before you begin

To prevent an IP address conflict, you must complete the initial configuration for the switch and establish an IP address before you create the management connection.

Step 1 Connect the interface cable to a management port on the switch.

Step 2 Connect the other end of the cable to an external hub, switch, or router.

Optic Transceiver Removal Using the Optics Extraction Tool

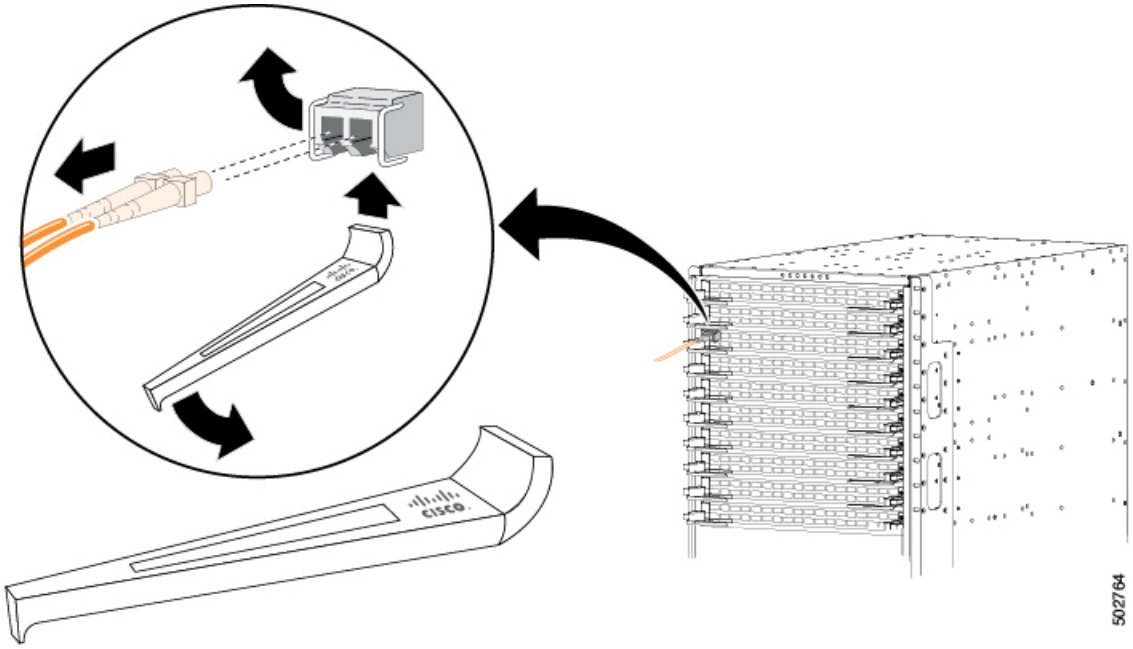
You use both ends of the optics extraction tool in this procedure. You use the wide end for releasing the bale latch, and the narrow end for removing the transceiver module.

Before you begin

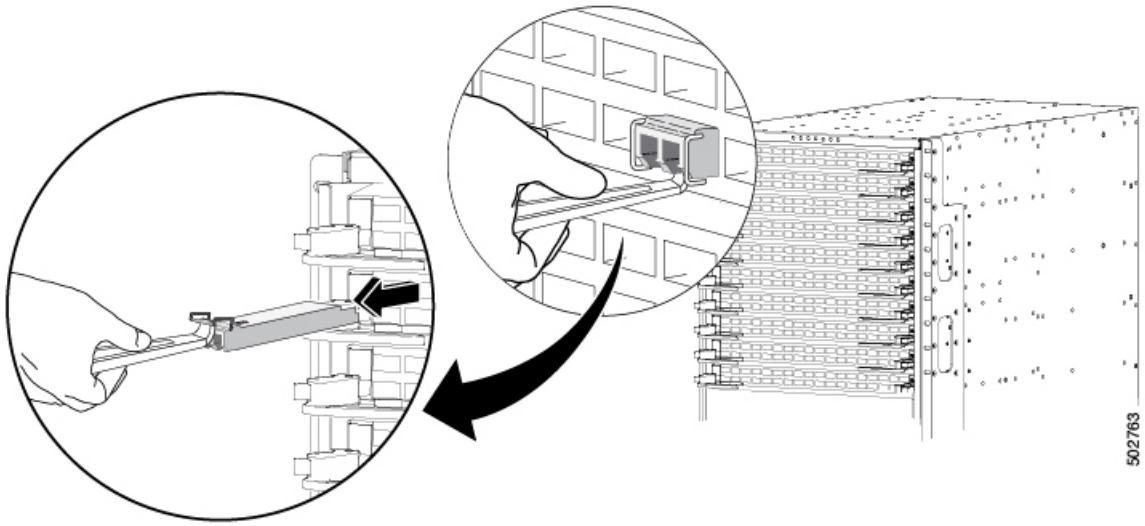
Ensure that before you handle any switch components, you are wearing a grounded electrostatic discharge (ESD) strap. To ground the strap, attach it directly to earth ground or to a grounded rack or chassis. There must be a metal-to-metal connection to earth ground.

Step 1 Remove the fiber-optic cables from the transceiver module before removing the transceiver module.

Step 2 Use the wide side of the optics extraction tool to release the bale latch (see the following image).



Step 3 Use the narrow end of the optics extraction tool to carefully remove the transceiver module (see the following image).



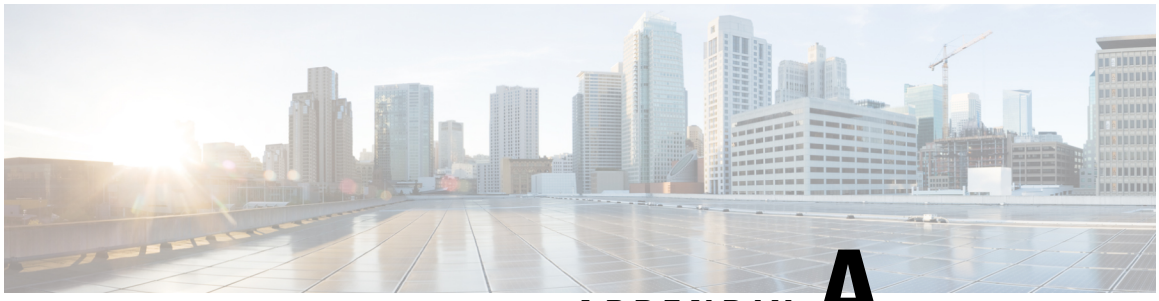
Step 4 Place the transceiver module in an antistatic bag or other protective environment.

Maintaining Transceivers and Optical Cables

Transceivers and fiber-optic cables must be kept clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Contamination increases attenuation (loss of light) and should be below 0.35 dB.

Consider the following maintenance guidelines:

- Transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventative wrist strap that is connected to the grounded chassis.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before using to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to the fiber-optic connection cleaning procedures for your site.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.



APPENDIX A

Technical Specifications

Transceiver and Cable Specifications

To determine which transceivers, adapters, and cables are supported by this switch, see https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html.

To see the transceiver specifications and installation information, see https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html.

Technical Specifications