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EX4550 System Overview

11-Nov-20

EX4550 Switches Hardware Overview

Juniper Networks EX4550 Ethernet Switches provide high-density 10-gigabit ports for aggregation layers and data center top-of-rack deployments, and provide options for data center optimized airflow (hot aisle/cold aisle). EX4550 switches have a base port density of 32 fixed 10-Gigabit SFP+ or 10-Gigabit Ethernet BASE-T (10GBASE-T) ports that you can scale up to 48 ports by installing the optional expansion modules. You can configure EX4550 switches in a *Virtual Chassis*, or in a mixed Virtual Chassis with Juniper Networks EX4200 Ethernet Switches or Juniper Networks EX4500 Ethernet Switches or both, in a total of up to 10 members.

You can expand the number of ports on an EX4550 switch by installing up to two optional expansion modules in the module slots on either side of the chassis.

The optional modules for an EX4550 switch are:

- 8-port 10-Gigabit SFP+ expansion module—Provides eight ports for eight 1-gigabit small form-factor pluggable (SFP) transceivers or eight 10-gigabit small form-factor pluggable (SFP+) transceivers. You can install a total of eight SFP and SFP+ transceivers in any combination in these eight ports.
- 8-port 10GBASE-T expansion module—Provides eight ports for 100-Megabit Ethernet BASE-T, 1-Gigabit Ethernet BASE-T, or 10-Gigabit Ethernet BASE-T RJ-45 connectors.
- 2-port 40-Gigabit QSFP+ expansion module—Provides two ports for 40-gigabit quad small form-factor pluggable (QSFP+) transceivers.
- 128-Gigabit Virtual Chassis module—Provides two dedicated Virtual Chassis ports (VCPs) for connecting the switch in a Virtual Chassis. You can also connect Virtual Chassis members using the SFP+ network ports, SFP+ expansion module ports, 10GBASE-T network ports, 10GBASE-T expansion module ports, and QSFP+ expansion module ports configured as VCPs.

You can manage EX4550 switches by using the same interfaces that you use for managing other devices running Juniper Networks Junos operating system (Junos OS)—the CLI, the J-Web graphical interface, and Junos Space.

- Benefits of the EX4550 Switch
- Software
- EX4550 Switches First View
- Optional Modules
- Virtual Chassis

- Power Supplies
- Fan Modules
- Components on the EX4550 Switch

Benefits of the EX4550 Switch

Compact solution—The EX4550 switch supports up to 48 10-Gigabit Ethernet ports in a 1 rack unit (1 U) chassis.

Support for Virtual Chassis—EX4550 switches support Virtual Chassis technology. You can interconnect up to 10 EX4200 switches, EX4500 switches, or EX4550 switches to form a Virtual Chassis.

Energy efficiency—The 10-Gigabit Ethernet fiber ports consume less than five watts and the 10-Gigabit Ethernet copper ports consume less than nine watts, thereby offering a low power solution for top-of-rack, end-of-row, and aggregation deployments.

Software

Juniper Networks EX Series Ethernet Switches run Junos OS, which provides Layer 2 and Layer 3 switching, routing, and security services. The same Junos OS code base that runs on EX Series switches also runs on all Juniper Networks M Series, MX Series, and T Series routers, and SRX Series Services Gateways. For information about installing software for your switch, see Software Installation.

EX4550 Switches First View

EX4550 switches provide connectivity for high-density 10-Gigabit Ethernet data center top-of-rack, enterprise, and campus aggregation and core deployments. EX4550 switches can be used in large branch offices, campus wiring closets, and data centers where they can be positioned as the top device in a rack to provide connectivity for all devices in the rack.

EX4550 switches are available in two base switches—a 32-port SFP+ based switch (EX4550-32F), which provides 32 fixed 10-Gigabit SFP+ ports in which you can install 1-gigabit SFP or 10-gigabit SFP+ transceivers and a 32-port 10GBASE-T based switch (EX4550-32T), which provides 32 fixed 10-Gigabit Ethernet BASE-T ports in which you can install 100-Megabit, 1-Gigabit, or 10-Gigabit BASE-T connectors. See EX4550 Switch Models.

EX4550 switches have different airflow directions in the chassis. EX4550 switches provide two module slots, each of which can house any one of the following optional modules:

- 8-port 10-Gigabit SFP+ expansion module
- 8-port 10GBASE-T expansion module
- 2-port 40-Gigabit QSFP+ expansion module

- 128-Gigabit Virtual Chassis module

Figure 1 shows the front panel of an EX4550-32F switch.

Figure 1: Front Panel of an EX4550-32F Switch



Figure 2 shows the front panel of an EX4550-32T switch.

Figure 2: Front Panel of an EX4550-32T Switch

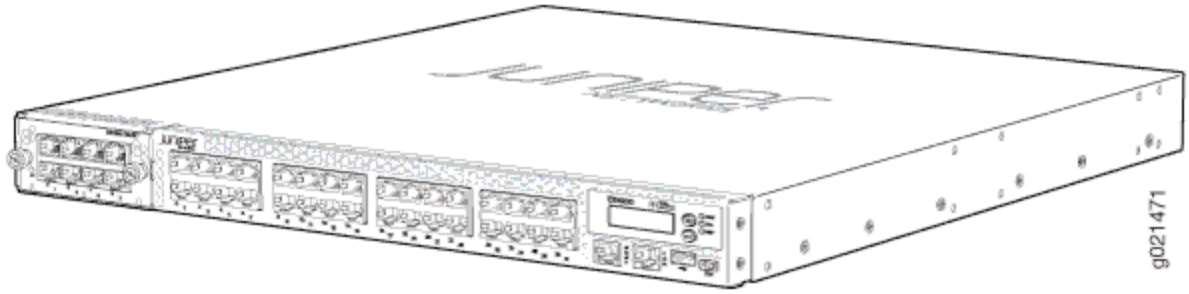
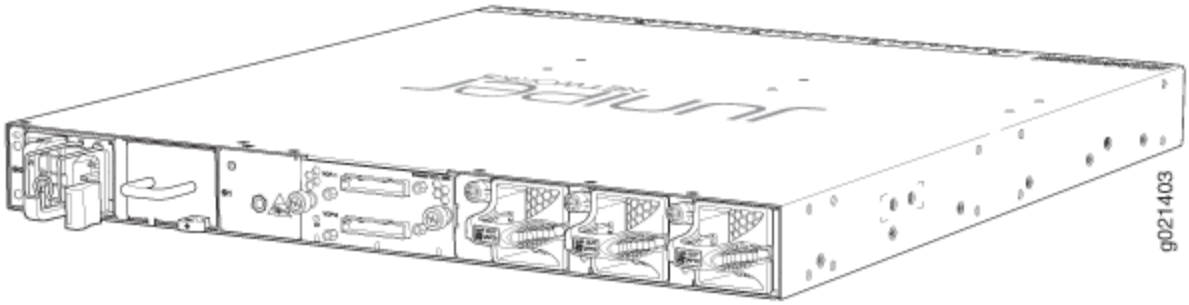


Figure 3 shows the rear panel of an EX4550 switch with power supplies and fan modules installed.

Figure 3: Rear Panel of an EX4550 Switch



To provide carrier-class reliability, EX4550 switches include:

- Dual redundant, load-sharing power supplies that are hot-insertable and hot-removable field-replaceable units.
- Three fan modules, which are field-replaceable units (FRUs).
- Redundant Routing Engines in a Virtual Chassis configuration. This redundancy enables *graceful Routing Engine switchover* (GRES).
- Junos OS with its modular design that enables failed system processes to gracefully restart.

Optional Modules

EX4550 switches support four types of optional modules: an 8-port 10-Gigabit Ethernet SFP+ expansion module, an 8-port 10GBASE-T expansion module, a 2-port 40-Gigabit Ethernet QSFP+ expansion module, and a 128-Gigabit Virtual Chassis module. You can install up to two modules, in any combination of these modules, one in each of the module slots. There is one module slot on the front panel and one on the rear panel of the switch.

Table 1 shows the module model numbers, names of the optional modules with a short description, and the Junos OS release in which each module was released.

Table 1: Optional Modules in EX4550 Switches

Model Number	Module Name	Description	First Junos OS Release
EX4550-EM-8XSFP	8-port 10-Gigabit SFP+ expansion module	An SFP+ expansion module can house up to eight 10-gigabit SFP+ transceivers or 1-gigabit SFP transceivers or a combination of SFP+ and SFP transceivers. You can use the ports on this expansion module to connect the switch to other devices. You can also configure these ports as VCPs and use them to connect the EX4550 switch with EX4200, EX4500, or EX4550 switches to form a Virtual Chassis.	12.2R1
EX4550-EM-8XT	8-port 10GBASE-T expansion module	A 10GBASE-T expansion module can house up to eight 100-Megabit, 1-Gigabit, or 10-Gigabit Ethernet BASE-T connectors. You can use the ports on this expansion module to connect the switch to other devices. You can also configure these ports as VCPs and use them to interconnect EX4550 switches to form a Virtual Chassis.	12.2R4
EX4550-EM-2QSFP	2-port 40-Gigabit QSFP+ expansion module	A QSFP+ expansion module has two ports, each of which can house a 40-Gigabit QSFP+ connector. You can also configure these ports as VCPs and use them to interconnect EX4550 switches to form a Virtual Chassis.	13.2X50-D10 Note: Starting with Release 13.2X50-D15, you can configure QSFP+ as VCPs.

Model Number	Module Name	Description	First Junos OS Release
EX4550-VC-128G	128-Gigabit Virtual Chassis module	You can install the 128-Gigabit Virtual Chassis module in the EX4550 switch to connect the switch to other switches in a Virtual Chassis configuration. The Virtual Chassis module has two dedicated VCPs, using which you can connect the EX4550 switch with EX4200, EX4500, or EX4550 switches to form a Virtual Chassis.	12.2R1

Virtual Chassis

You can interconnect the EX4550 switch with EX4200, EX4500, or EX4550 switches to form a Virtual Chassis. You can operate these interconnected switches as a single, logical device with a single IP address.

You can interconnect a maximum of 10 EX4550 switches to form a Virtual Chassis composed exclusively of EX4550 switches. You can interconnect EX4200 switches or EX4500 switches or both with EX4550 switches to form a mixed Virtual Chassis that has a maximum of 10 switches. See Understanding EX4200, EX4500, and EX4550 Virtual Chassis Hardware Configurations.

You can use the following ports to connect an EX4550 switch in a Virtual Chassis:

- Dedicated VCPs on the Virtual Chassis module installed in the switch
- SFP+ network ports and SFP+ expansion module ports configured as VCPs
- 10GBASE-T Ethernet network ports or 10GBASE-T expansion module ports configured as VCPs
- QSFP+ expansion module ports configured as VCPs

NOTE You can use the 10GBASE-T Ethernet network ports, 10GBASE-T expansion module ports, and QSFP+ expansion module ports configured as VCPs to interconnect only EX4550 switches in a Virtual Chassis. These ports cannot be used to connect an EX4550 switch with an EX4200 switch or an EX4500 switch in a Virtual Chassis.

NOTE Installing the Virtual Chassis module is not mandatory for using an EX4550 switch in a Virtual Chassis configuration.

For information about understanding and configuring Virtual Chassis, see EX2200, EX3300, EX4200, EX4500 and EX4550 Virtual Chassis.

Power Supplies

EX4550 switches support AC or DC power supplies with different airflow directions. Power supplies for the EX4550 switch are hot-removable and hot-insertable FRUs. All the EX4550 switch models, except the EX4550-32F-S switches are shipped with one power supply pre-installed in the rear panel of the switches. EX4550-32F-S switches are not shipped with pre-installed power supplies; you must order them separately.

You can install a second AC or DC power supply in the EX4550 switches. See AC Power Supply in EX4550 Switches and DC Power Supply in EX4550 Switches

Each power supply has a label—AFI or AFO—on the faceplate of the power supply that indicates the direction of airflow. AFI labels indicate back-to-front airflow whereas AFO labels indicate front-to-back airflow. See Cooling System and Airflow in an EX4550 Switch.

⚠ CAUTION Do not mix:

- AC and DC power supplies in the same chassis.
- Power supplies with different airflow labels (AFI and AFO) in the same chassis.

Fan Modules

Fan modules for the EX4550 switches are hot-insertable and hot-removable field-replaceable units (FRUs).

All the EX4550 switchmodels, except the EX4550-32F-S switches are shipped with three fan modules pre-installed in the rear panel of the switches. EX4550-32F-S switches are not shipped with pre-installed fan modules; you must order them separately.

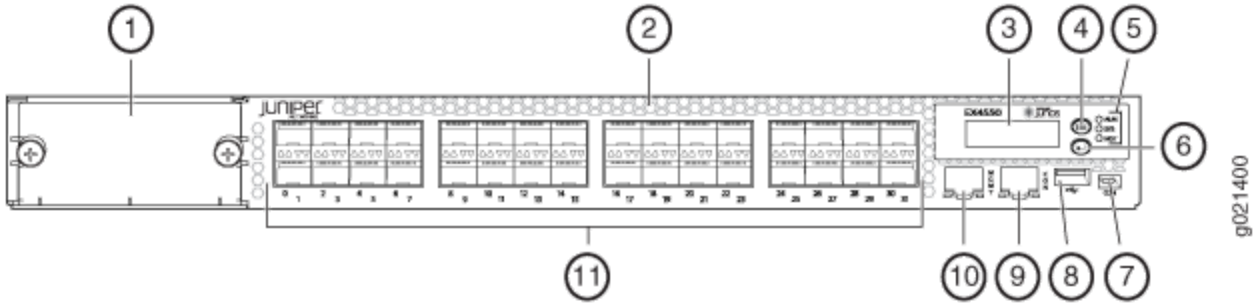
Two variants of fan modules are available, each with a different airflow direction—back-to-front airflow, indicated by the label AIR IN (AFI) and front-to-back airflow, indicated by the label AIR OUT (AFO). See Cooling System and Airflow in an EX4550 Switch.

⚠ CAUTION Do not mix fan modules with different airflow labels (AIR IN (AFI) and AIR OUT (AFO)) in the same chassis.

Components on the EX4550 Switch

Figure 4 shows the components on the front panel of an EX4550-32F switch (with the module slot cover panel installed).

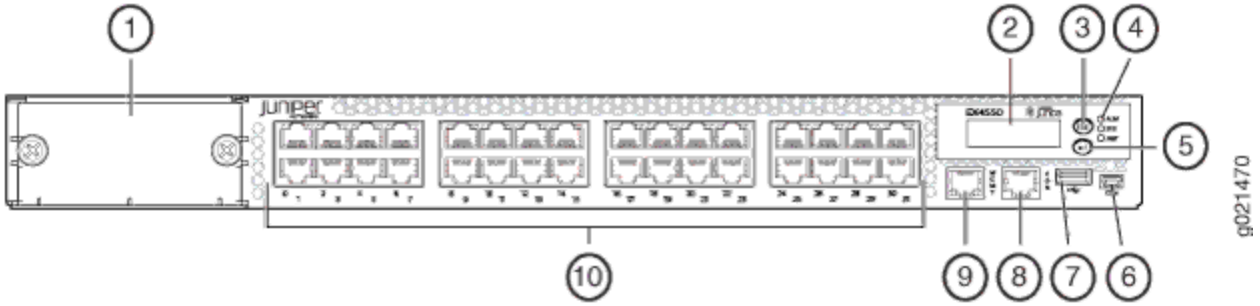
Figure 4: Components on the Front Panel of an EX4550-32F Switch



1 — Module slot cover panel	7 — Mini-USB console port
2 — Air vents	8 — USB port
3 — LCD panel	9 — RJ-45 console port
4 — LCD panel Menu button	10 — Management port
5 — Chassis status LEDs	11 — SFP+ network ports
6 — LCD panel Enter button	

Figure 5 shows the components on the front panel of an EX4550-32T switch (with the module slot cover panel installed).

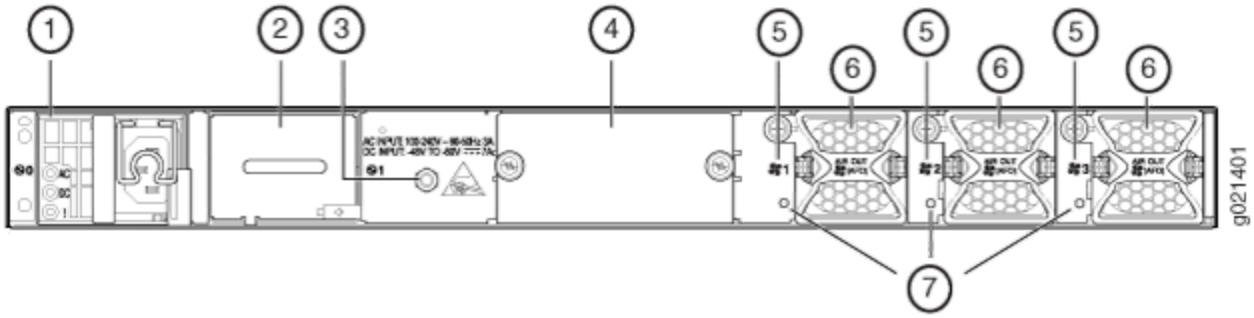
Figure 5: Components on the Front Panel of an EX4550-32T Switch



1 — Module slot cover panel	6 — Mini-USB console port
2 — LCD panel	7 — USB port
3 — LCD panel Menu button	8 — RJ-45 console port
4 — Chassis status LEDs	9 — Management port
5 — LCD panel Enter button	10 — Ethernet network ports

Figure 6 shows the components on the rear panel of an EX4550 switch (with the module slot cover panel, an AC power supply, and three fan modules installed).

Figure 6: Components on the Rear Panel of an EX4550 Switch



1 — An AC power supply (in power supply slot 0)	5 — Fan module slot labels
2 — Power supply cover panel (in power supply slot 1)	6 — Fan modules
3 — ESD point	7 — Fan status LEDs
4 — Module slot cover panel	

NOTE The protective earthing terminal is located on the left side of the chassis. See Connect Earth Ground to an EX Series Switch.

SEE ALSO

- Understanding EX Series Virtual Chassis

EX4550 Switch Models

Table 2 lists the available EX4550 switches.

Table 2: EX4550 Switch Model Number, Shipped Components, and Supported Junos OS Release

Model Number	Number and Types of Ports	Direction of Airflow	Fan Modules	Power Supply	First Junos OS Release

Model Number	Number and Types of Ports	Direction of Airflow	Fan Modules	Power Supply	First Junos OS Release
EX4550-32F-AFI	32-port 10-Gigabit SFP+	Back-to-front—air intake to cool the chassis is through the vents on the rear panel of the chassis, and hot air exhausts through the vents on the front panel of the chassis.	Three fan modules; each with an `AIR IN (AFI)` label	One AC power supply (with power cord) with an `AFI` label on its handle	12.2R1
EX4550-32F-AFO	32-port 10-Gigabit SFP+	Front-to-back—air intake to cool the chassis is through the vents on the front panel of the chassis, and hot air exhausts through the vents on the rear panel of the chassis.	Three fan modules; each with an `AIR OUT (AFO)` label	One AC power supply (with power cord) with an `AFO` label on its handle	12.2R1
EX4550-32F-DC-AFI	32-port 10-Gigabit SFP+	Back-to-front—air intake to cool the chassis is through the vents on the rear panel of the chassis, and hot air exhausts through the vents on the front panel of the chassis.	Three fan modules; each with an `AIR IN (AFI)` label	One DC power supply with an `AFI` label on its handle	12.2R1

Model Number	Number and Types of Ports	Direction of Airflow	Fan Modules	Power Supply	First Junos OS Release
EX4550-32F-DC-AFO	32-port 10-Gigabit SFP+	Front-to-back—air intake to cool the chassis is through the vents on the front panel of the chassis, and hot air exhausts through the vents on the rear panel of the chassis.	Three fan modules; each with an `AIR OUT (AFO)` label	One DC power supply with an `AFO` label on its handle	12.2R1
EX4550-32F-S	32-port 10-Gigabit SFP+	–	Fan modules for this model are not shipped by default; you must separately order either three AIR OUT (AFO) labelled or three AIR IN (AFI) labelled fan modules.	Power supplies for this model are not shipped by default; you must separately order either AC power supplies or DC power supplies.	12.3R5
EX4550-32T-AFI	32-port 10-Gigabit BASE-T	Back-to-front—air intake to cool the chassis is through the vents on the rear panel of the chassis, and hot air exhausts through the vents on the front panel of the chassis.	Three fan modules; each with an `AIR IN (AFI)` label	One AC power supply (with power cord) with an `AFI` label on its handle	12.2R4

Model Number	Number and Types of Ports	Direction of Airflow	Fan Modules	Power Supply	First Junos OS Release
EX4550-32T-AFO	32-port 10-Gigabit BASE-T	Front-to-back—air intake to cool the chassis is through the vents on the front panel of the chassis, and hot air exhausts through the vents on the rear panel of the chassis.	Three fan modules; each with an `AIR OUT (AFO)` label	One AC power supply (with power cord) with an `AFO` label on its handle	12.2R4
EX4550-32T-DC-AFI	32-port 10-Gigabit BASE-T	Back-to-front—air intake to cool the chassis is through the vents on the rear panel of the chassis, and hot air exhausts through the vents on the front panel of the chassis.	Three fan modules; each with an `AIR IN (AFI)` label	One DC power supply with an `AFI` label on its handle	12.2R4
EX4550-32T-DC-AFO	32-port 10-Gigabit BASE-T	Front-to-back—air intake to cool the chassis is through the vents on the front panel of the chassis, and hot air exhausts through the vents on the rear panel of the chassis.	Three fan modules; each with an `AIR OUT (AFO)` label	One DC power supply with an `AFO` label on its handle	12.2R4

NOTE The optional modules, the Virtual Chassis cable, the Virtual Chassis cable connector retainers, and transceivers are not part of the EX4550 switch shipping configuration. If you want to purchase any of these components, power supplies, or fan modules for your switch, you must order them separately.

Identifying EX4550 Switch Models

Purpose

Identify the model number of your EX4550 switch.

Action

Check the value of the FRU Model Number field in the Routing Engine section in the output of the `show chassis hardware extensive` CLI command.

user@switch> `show chassis hardware extensive`

```
....
Routing Engine 0 REV 03   750-039067   LX0212079218      EX4550-32F
 Jedec Code:   0x7fb0            EEPROM Version:    0x02
 P/N:          750-039067        S/N:               LX0212079218
 Assembly ID:  0x0b39            Assembly Version:  03.03
 Date:         03-03-2012        Assembly Flags:    0x00
 Version:      REV 03
 ID: EX4550-32F                  FRU Model Number:  EX4550-32F-AFO
...
```

The model number of your switch is one of the following:

- EX4550-32F-AFI
- EX4550-32F-AFO
- EX4550-32F-DC-AFI
- EX4550-32F-DC-AFO
- EX4550-32T-AFI
- EX4550-32T-AFO
- EX4550-32T-DC-AFI
- EX4550-32T-DC-AFO

Meaning

In EX4550 switch model numbers:

- The 32F or 32T in the model number indicates:
  - 32F—The switch has 32 1G/10G SFP+ Ethernet network ports.
  - 32T—The switch has 32 100M/1G/10G BASE-T Ethernet network ports.
- AFI or AFO in the model number indicates:
  - AFI indicates that the switch is shipped with three fan modules, each bearing an `AIR IN (AFI)` label and a power supply bearing an `AFI` label.
  - AFO indicates that the switch is shipped with three fan modules, each bearing an `AIR OUT (AFO)` label and a power supply bearing an `AFO` label.

  The labels on the fan modules and power supplies indicate the direction of airflow in the switch. `AFI` and `AIR IN (AFI)` labels indicate back-to-front airflow, and `AFO` and `AIR OUT (AFO)` labels indicate front-to-back airflow.
- The DC in the model number indicates that the switch works on DC power supply. Switches that do not have DC in their model numbers work on AC power supply.

EX4550 Switch Hardware and CLI Terminology Mapping

This topic describes the hardware terms used in EX4550 switch documentation and the corresponding terms used in the Junos OS CLI. See Table 3.

Table 3: CLI Equivalents of Terms Used in the Documentation for EX4550 Switches

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item in Documentation	Additional Information
Chassis	One of the following: • EX4550-32F • EX4550-32T	–	Switch chassis	Chassis Physical Specifications for EX4550 Switches

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item in Documentation	Additional Information
Routing Engine (*n*)	One of the following: • EX4550-32F • EX4550-32T	*n* is a value in the range 0 through 9. • On a standalone switch, the default value is 0. • On a Virtual Chassis configuration, the values correspond to the member ID assigned to the switches configured in the primary role and the backup role in the Virtual Chassis.	Routing Engine	–
FPC (*n*)	Abbreviated name of the Flexible PIC Concentrator (FPC)	*n* is a value in the range 0 through 9.		Understanding Interface Naming Conventions
	One of the following: • EX4550-32F • EX4550-32T	On a standalone switch, the default value is 0.	The switch does not have actual FPCs. In this case, FPC refers to the switch itself.	
		On a Virtual Chassis configuration, the values correspond to the assigned member ID of switches in the Virtual Chassis.	In this case, the FPC number refers to the member ID assigned to the switch.	
PIC (*n*)	Abbreviated name of the Physical Interface Card (PIC)	*n* is a value in the range 0 through 2.	The switch does not have actual PIC devices; see entries for PIC 0 through PIC 2 for the equivalent item on the switch.	Understanding Interface Naming Conventions

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item in Documentation	Additional Information
	One of the following: • 32x 1G/10G SFP/SFP+ • 32x 100M/1G/10G BASE-T	PIC 0	Built-in network ports on the switch.	EX4550 Switches Hardware Overview
	One of the following: • 8x 1G/10G SFP/SFP+ • 8x 100M/1G/10G BASE-T • 2x40GE QSFP+ • 2x 32GE Virtual Chassis	PIC 1	The expansion module or the Virtual Chassis module installed in the module slot on the front panel of the switch.	• Expansion Modules in EX4550 Switches • Virtual Chassis Module in EX4550 Switches
	One of the following: • 8x 1G/10G SFP/SFP+ • 8x 100M/1G/10G BASE-T • 2x40GE QSFP+ • 2x 32GE Virtual Chassis	PIC 2	The expansion module or the Virtual Chassis module installed in the module slot on the rear panel of the switch.	• Expansion Modules in EX4550 Switches • Virtual Chassis Module in EX4550 Switches

Hardware Item (CLI)	Description (CLI)	Value (CLI)	Item in Documentation	Additional Information
Xcvr (*n*)	Abbreviated name of the transceiver	*n* is a value equivalent to the number of the port in which the transceiver is installed	Optical transceivers	Pluggable Transceivers Supported on EX4550 Switches
Power supply (*n*)	One of the following: • JPSU-650W-AC-AFO • JPSU-650W-AC-AFI • JPSU-650W-DC-AFO • JPSU-650W-DC-AFI	*n* has a value 0 or 1, corresponding to the power supply slot number. Caution: Do not mix: • AC and DC power supplies in the same chassis • Power supplies with different airflow labels (`AFI` and `AFO`) in the same chassis	AC power supply or DC power supply.	• AC Power Supply in EX4550 Switches • DC Power Supply in EX4550 Switches
Fan tray	One of the following: • Fan module, Airflow In (AFI) • Fan module, Airflow Out (AFO)		Fan module Note: The EX4550 switch has three fan modules, which are collectively referred to as *fan tray* in the CLI.	Cooling System and Airflow in an EX4550 Switch

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