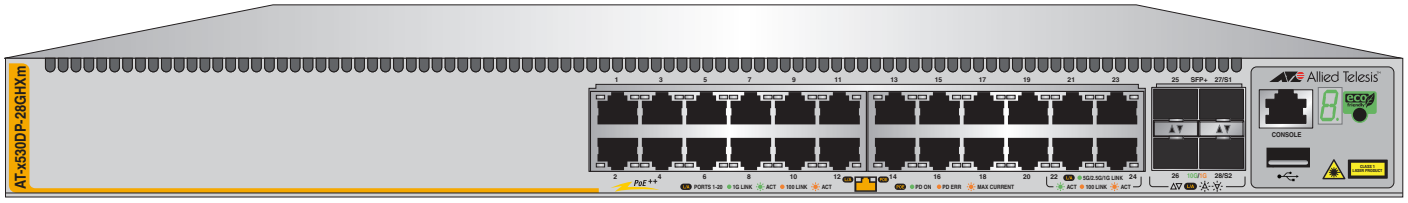
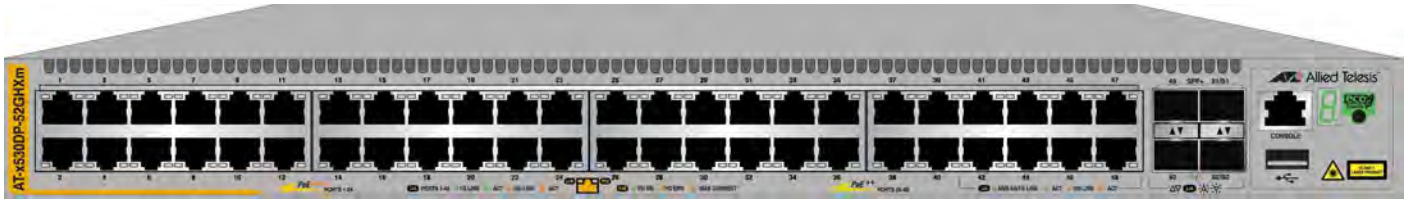
x530DP Series

Stackable Gigabit Layer 3+ Ethernet Switches
AlliedWare Plus™ v5.5.1-2.1

x530DP-28GHXm

x530DP-52GHXm





Installation Guide for Virtual Chassis Stacking

613-002695 Rev. C

Electrical Safety and Emissions Standards

This product meets the following standards.

U.S. Federal Communications Commission
Radiated Energy Note: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 5 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Note: Modifications or changes not expressly approved of by the manufacturer or the FCC, can void your right to operate this equipment.

Industry Canada
This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

RFI Emissions: FCC Class A, EN55032 Class A, EN6000-3-2, EN6000-3-3, EN55024, EN62368-, VCCI Class A, RCM

> **Warning:** In a domestic environment this product can cause radio interference in which case the user may be required to take adequate measures.

EMC (Immunity): EN55024

Electrical Safety: EN60950-1 (TUV), UL 60950-1 ($_{C}UL_{US}$), CSA-22-2 No. 60950-1 ($_{C}UL_{US}$)

 Laser Safety EN60825-(TUV

Translated Safety Statements

Important: Safety statements that have the ℘ symbol are translated into multiple languages in the *Translated Safety Statements* document at **www.alliedtelesis.com/en/documents/translated-safety-statements**.

Remarque: Les consignes de sécurité portant le symbole ℘ sont traduites dans plusieurs langues dans le document *Translated Safety Statements,* disponible à l'adresse **www.alliedtelesis.com/en/documents/translated-safety-statements**.

Contents

Figures

Tables

Preface

This guide contains the installation instructions for the x530DP Series of stackable Gigabit, Layer 3+ Ethernet switches. This preface contains the following sections:

Note

This guide explains how to install switches as a stack with Virtual Chassis Stacking (VCStack™). For instructions on how to install the devices as standalone switches, refer to the *x530DP Series Installation Guide for Standalone Switches*.

Document Conventions

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Warning
Warnings inform you that an eye and skin hazard exists due to the presence of a Class 1 laser device.

Contacting Allied Telesis

If you need assistance with this product, you may contact Allied Telesis technical support by going to the Services & Support section of the Allied Telesis web site at **www.alliedtelesis.com/support**. You can find links for the following services on this page:

- Helpdesk (Support Portal) - Log onto Allied Telesis interactive support center to search for answers to your questions in our knowledge database, check support tickets, learn about Return Merchandise Authorizations (RMAs), and contact Allied Telesis technical experts.
- Software Downloads - Download the latest software releases for your product.
- Licensing - Register and obtain your License key to activate your product.
- Product Documents - View the most recent installation guides, user guides, software release notes, white papers and data sheets for your product.
- Warranty - View a list of products to see if Allied Telesis warranty applies to the product you purchased and register your warranty.
- Allied Telesis Helpdesk - Contact a support representative.

To contact a sales representative or find Allied Telesis office locations, go to **www.alliedtelesis.com/contact**.

Chapter 1
Overview

This chapter contains the following sections:

Note
This guide explains how to install switches as a stack with Virtual Chassis Stacking (VCStack™). For instructions on how to install the devices as standalone switches, refer to the *x530DP Series Installation Guide for Standalone Switches*.

Front and Rear Panels

The front panel of the x530DP Series switch is shown in Figure 1 and Figure 2.

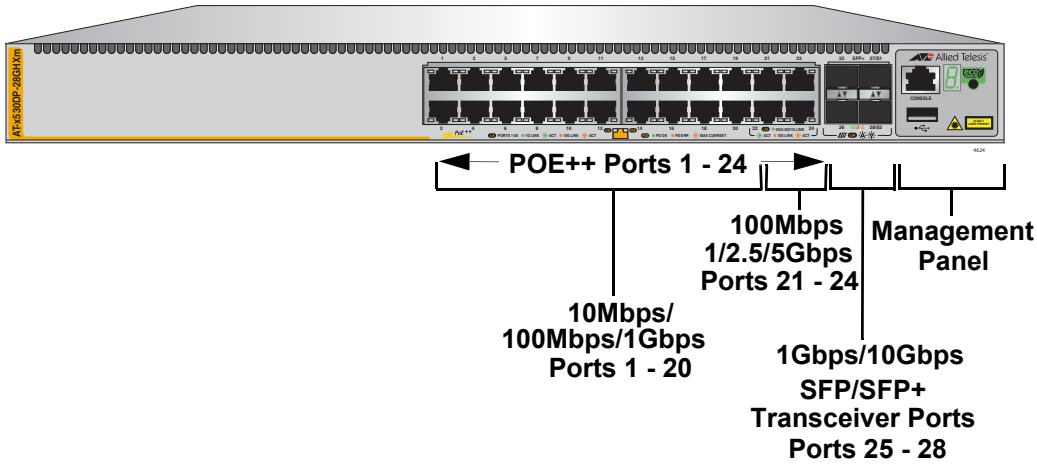


Figure 1. Front Panel of the x530DP-28GHXm Switch

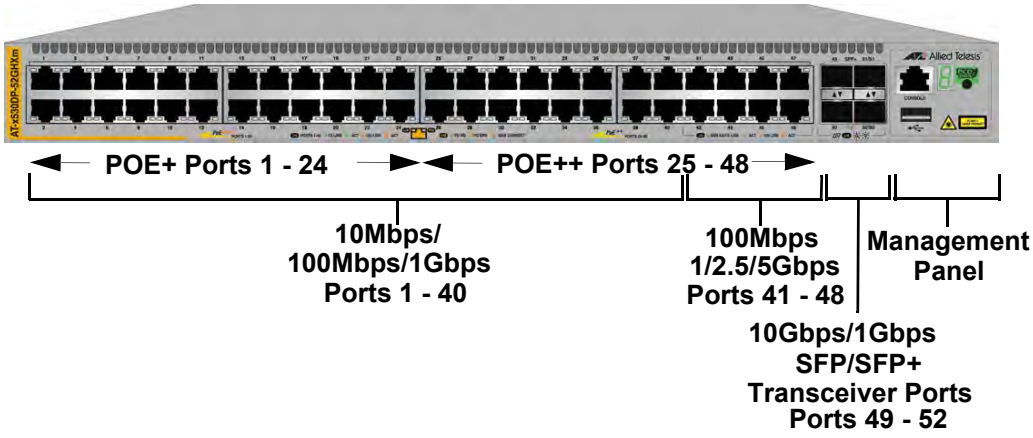


Figure 2. Front Panel of the x530DP-52GHXm Switch

The back panel of the x530DP Series switch is shown in Figure 3.

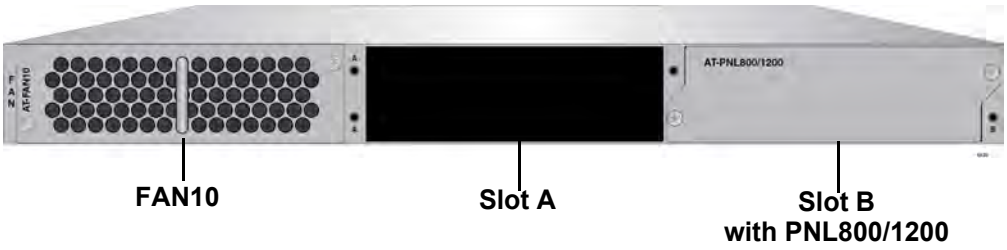


Figure 3. Back Panel of the x530DP Series Switch

Management Panel

Figure 4 identifies the components on the management panel.

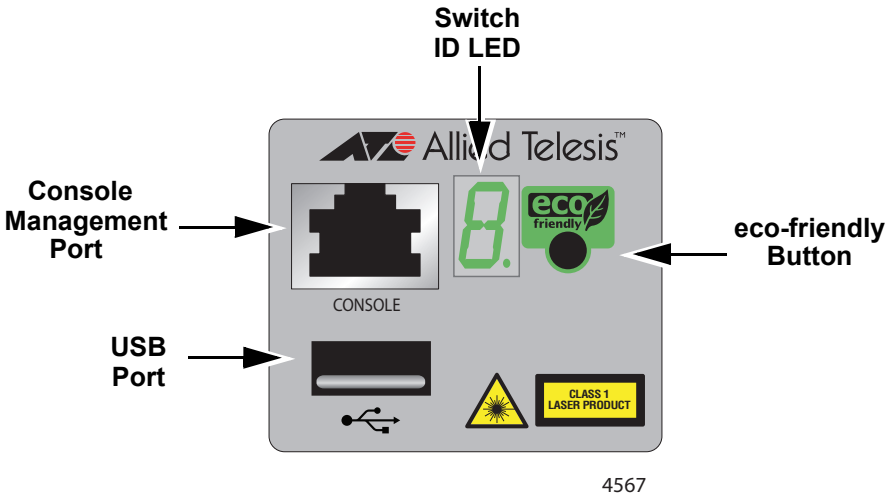


Figure 4. Management Panel

Features

The Allied Telesis x530DP Series switches are stackable Gigabit, Layer 3+ Ethernet switches. The following sections list the features:

x530DP Models

Table 1 lists the basic features for the switch model.

Table 1. Basic Features

Model	10/100/1000T PoE+ Copper Ports	10/100/1000T PoE++ Copper Ports	100/1G/2.5G/5G PoE++ Copper Ports
x530DP-28GHXm	-	20	4
x530DP-52GHXm	24	16	8

Each switch model comes with one pre-installed fan (FAN10). The FAN10R is an option and does not come pre-installed. The power supplies (PWR150-AC, PWR150R-AC, PWR250-AC, PWR250-80(DC), PWR800-AC or PWR1200-AC) and FAN10R must be purchased separately.

The x530DP Switches support the following PoE devices:

- All copper ports on the switches support PoE+ IEEE 802.3at Classes 0 to 4 devices (maximum 30.0W at the switch ports).
- All copper ports on the x530DP-28GHXm Switch and ports 25 to 48 on the x530DP-52GHXm Switch support PoE++ IEEE 802.3bt Classes 5 and 6 devices (maximum 60.0W at the switch ports).

Note
The maximum number of powered devices that the switches can support simultaneously will depend on the power requirements of the devices.

Twisted Pair Ports

The 48 twisted pair ports on the x530DP-52GHXm switch have these features:

- Ports 1 to 40 support 10/100/1000Mbps operation
- Ports 41 to 48 support 1/2.5/5Gbps operation
- 100 meters (328 feet) maximum operating distance per port
- Auto-negotiation for speed
- Half- and Full-duplex mode at 10/100Mbps
- Full-duplex only at 1Gbps and higher speeds

- MDI/MDI-X at 100Mbps
- PoE+ supported on ports 1 to 24
- PoE++ supported on ports 25 to 48
- Port Link/Activity (L/A) and PoE LEDs

The 24 twisted pair ports on the x530DP-28GHXm switch have these features:

- Ports 1 to 20 support 10/100/1000Mbps operation
- Ports 21 to 24 support 100Mbps/1/2.5/5Gbps operation
- 100 meters (328 feet) maximum operating distance per port
- Auto-negotiation for speed
- Half- and Full-duplex mode at 10/100Mbps
- Full-duplex only at 1Gbps and higher speeds
- MDI/MDI-X at 10/100Mbps
- Power over Ethernet (PoE++) supported on all 24 ports
- Port Link/Activity (L/A) and PoE LEDs

Power Over Ethernet

The basic features of PoE of the twisted pair ports on the switches are:

- Supports PoE (15.4W maximum), PoE+ (30W maximum), and PoE++ (60W maximum) powered devices
- When using the PWR1200 power supply, the power budget per power supply is 740W, up to 1480W maximum
- When using the PWR800 power supply, the power budget per power supply is 370W, up to 740W maximum
- Supports powered device classes 0 to 6
- Port prioritization
- Mode A wiring
- IEEE802.3af/at/bt compliant

SFP+ Transceiver Ports

The SFP/SFP+ transceiver ports support the following types of transceivers:

- x530DP-28GHXm: ports 25 to 28
- x530DP-52GHXm: ports 49 to 52

Examples of SFP 1Gbps transceivers include:

- AT-SPSX and LR short and long distance transceivers using multi-mode or single mode fiber optic cable.
- AT-SPTX transceiver series with RJ-45 connector for twisted pair cable.

- AT-SPEX transceivers with a maximum distance of two kilometers with multi-mode fiber optic cable.

Examples of SFP+ 10Gbps transceivers include:

- AT-SP10SR, LR, ER and ZR series of short or long distance transceivers using multi-mode or single mode fiber optic cable.
- AT-SP10TW series of direct attach cables in lengths of 1 meter and 3 meters.
- AT-SP10BD series of bidirectional transceivers for single mode fiber optic cable with maximum distances of 10 to 40 kilometers.
- AT-SP10T transceiver with RJ-45 connector for links up to 20 meters at 10Gbps with Category 6a or better twisted pair cable, or 100 meters at 1Gbps.

Note
Industrial (-40 to 85° C) and extended (-40 to 105° C) temperature transceivers are available.

Note
For a current list of supported transceiver modules refer to the *x530DP Series Data Sheet.*

The following restrictions on SFP+ transceivers apply:

- 100Mbps transceivers are not supported
- Supports full-duplex mode only

SFP and SFP+ transceivers must be purchased separately.

LEDs

The port LEDs are:

- Link/speed/activity LEDs for the twisted pair ports
- Link/speed/activity LEDs for the SFP and SFP+ transceiver ports
- PoE PD On/PD Err/PD Max Current LEDs for the twisted pair ports
- PoE LEDs for the twisted pair ports
- Switch ID number LED

Installation Options

The installation options are:

- Desk or tabletop
- 19-inch equipment rack
- Wooden or concrete wall

Management Software and Interfaces

The management software and interfaces are:

- AlliedWare Plus Management Software
- Command line interface (CLI)

Management Methods

The following methods are used for managing the switches:

- Local management through the Console port
- Remote Telnet or Secure Shell management
- Vista Manager mini
- Autonomous Management Framework (AMF) with Vista Manager EX
- Autonomous Wave Control for wireless networks
- SNMPv1, v2c, and v3

Power Supplies

This section describes the two types of power supplies for the x530DP switches:

- “Non-PoE Power Supplies,” next
- “System and PoE Power Supplies” on page 25:

Non-PoE Power Supplies

Here are the non-PoE power supplies:

- PWR150
- PWR150R
- PWR250
- PWR250-80

Here are the guidelines:

- Non-PoE power supplies provide system power for the switch, but no power for PoE devices.
- One non-PoE power supply can provide full system power for the switch. Installing a second power supply provides system power redundancy.
- Non-PoE power supplies should only be used in x530DP switches connected to non-PoE devices.
- The airflow direction of the fans in the PWR150, PWR250, and PWR250-80 power supplies is from the front panel to rear panel of the switch. The fans draw air out of the switch.
- The airflow direction of the fans in the PWR150R power supply is from the rear panel to the front panel. The fans force air into the device.
- The PWR150, PWR250, and PWR250-80 power supplies must be used with the FAN10 module, which comes pre-installed in the switch.
- The PWR150R power supply must be used with the FAN10R module. The FAN10R module is sold separately.

Caution

The airflow directions of the power supplies and fan module must be the same to ensure adequate ventilation and cooling inside the switch.

- The PWR150, PWR150R, and PWR250 power supplies have AC power connectors. The PWR250-80 power supply has a DC connector for DC wiring environments.

Figure 5. Non-PoE Power Supplies

System and PoE Power Supplies

Here are the system and PoE power supplies:

- PWR800
- PWR1200

Here are the guidelines for the PWR800 power supply:

- A single PWR800 power supply can provide both full system power for the switch and up to 370W of power for PoE devices on the ports.
- Installing a second PWR800 power supply adds system power redundancy and an additional 370W of power for PoE devices, for a total of 740W.

Here are the guidelines for the PWR1200 power supply:

- A single PWR1200 power supply can provide both full system power and up to 740W of power for PoE devices on the ports.
- Installing a second PWR1200 power supply adds system power redundancy as well as an additional 740W of power for PoE devices, for a total of 1480W.

Figure 6. System and PoE Power Supplies

The PoE power budgets and the maximum number of supported ports are summarized in Table 2.

Table 2. System and PoE Power Supply Summary

System and PoE Power Supply	Number of Power Supplies	PoE Budget	Maximum Supported PoE Ports		
			15.4W	30W	60W
PWR800	1	370W	24	‘12	6
PWR800	2	740W	24	24	12
PWR1200	1	740W	24	24	12
PWR1200	2	1480W	24	48	24

General Guidelines

Here are additional power supply guidelines:

- Power supplies are sold separately.
- If you are installing two power supplies in the switch, both power supplies must be the same model. Do not install different power supplies in the switch.
- All power supplies, except for the PWR150R power supply, must be used together with the FAN10 module, which comes pre-installed in the switch.
- The PWR150R power supply must be used with the FAN10R fan module. The FAN10R module is sold separately.

Caution
The airflow directions of the power supplies and fan module must be the same to ensure adequate ventilation and cooling inside the switch.

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ↷ E3

Warning
This unit might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing the unit. ↷ E30

Note
The PWR150, PWR150R, PWR250, PWR800, and PWR1200 power supplies are powered on and off by connecting and disconnecting the power cords. The PWR250-80 power supply is powered on and off by deactivating the DC circuit.

FAN10 and FAN10R Cooling Fans

The cooling units for the chassis are the FAN10 and FAN10R fan modules. Refer to Figure 7.

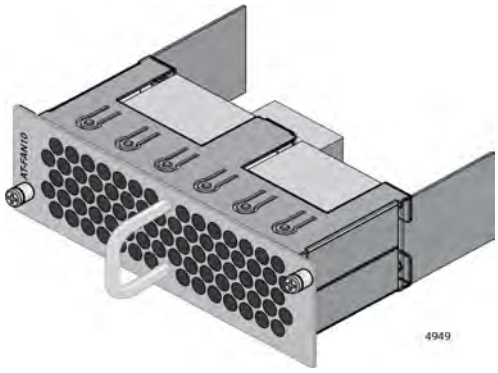


Figure 7. FAN10 and FAN10R Fan Modules

Here are the fan module guidelines:

- The fan modules have different airflow directions. The FAN10 airflow direction is from front to back.
- The FAN10R airflow direction is from back to front.
- The switch comes with the FAN10 module pre-installed on the rear panel.
- The FAN10R module is sold separately.

Caution
The FAN10R module must be used with the PWR150R power supply. Using the FAN10R module with any other power supply may result in inadequate ventilation and cooling inside the switch, which may cause the device to overheat and fail.

- The fan modules contain two fans. If a single fan fails, the switch may be able to continue operating for up to 24 hours without overheating, depending on the ambient temperature and ventilation.
- The fan module is field-replaceable and hot-swappable. You do not have to power off the switch to replace it.
- The switch automatically adjusts the fan speeds according to the ambient temperature.

Twisted Pair Ports

The specifications of the twisted pair ports are listed in Table 3 and Table 4 on page 30.

Table 3. x530DP-28GHXm Switch Twisted Pair Port Specifications

Specification	Description
Port Speed	Ports 1 - 20: 10/100Mbps or 1Gbps. Ports 21 - 24: 100Mbps or 1/2.5/5Gbps. Ports 1 - 20: Set the port speed manually at 10/100Mbps or with Auto-Negotiation at all speeds. 1Gbps requires Auto-Negotiation. Ports 21 - 24: Set with Auto-Negotiation only, at 1Gbps and higher. The default is Auto-Negotiation for all ports.
Duplex Mode	Ports 1 - 20: Full- or half-duplex mode at 10/100Mbps. Full-duplex only at 1Gbps. Supports Auto-Negotiation at all speeds. Ports 21- 24: Full-duplex only at all speeds.
Maximum Distance	100 meters (328 feet).
Connector	8-pin RJ-45.

Table 4. x530DP-52GHXm Switch Twisted Pair Port Specifications

Specification	Description
Port Speed	Ports 1 - 40: 10/100Mbps or 1Gbps. Ports 41 - 48: 1/2.5/5Gbps Ports 1 - 40: Set the port speed manually or with Auto-Negotiation at 10/100Mbps. Ports 41 - 48: The port speed is set with Auto-Negotiation only, at 1Gbps and higher. The default is Auto-Negotiation for all ports.
Duplex Mode	Ports 1 - 40: Full- or half-duplex mode at 10/100Mbps. Full-duplex only at 1Gbps. Supports Auto-Negotiation at 100Mbps. Ports 41- 48: Full-duplex only at all speeds.
Maximum Distance	100 meters (328 feet).
Power over Ethernet	PoE (15.4W maximum per port), PoE+ (30W maximum per port) and PoE++ (60W maximum per port).
Maximum Power Budget	370W.
PoE Mode	Mode A.
Connector	8-pin RJ-45.

Speed

The speed characteristics of the switch follows:

- On x530DP-28GHXm ports 1 to 20 operate at 10/100Mbps or 1Gbps and ports 21 to 24 operate at 100 Mbps or 1/2.5/5Gbps.
- On x530DP-52GHXm ports 1 to 40 operate at 10/100Mbps or 1Gbps and ports 41 to 48 operate at or 1/2.5/5Gbps.
- All speeds, with the exception of 100Mbps, require Auto-Negotiation (IEE 802.3u), which automatically sets port speeds based on the highest common speeds of ports and the connected network devices. 100Mbps can be set with Auto-Negotiation or manually. Auto-Negotiation is the default setting.

Note
The ports must be set to Auto-Negotiation to function at 1/2.5/5Gbps speeds and are not compatible with devices that are not IEEE 802.3u-compliant.

Duplex Mode

The twisted pair ports can operate in either half- or full-duplex mode at 10/100Mbps and full-duplex mode only at higher speeds.

The duplex mode of a port operating at 10/100Mbps, like port speed, can be set manually using the management software or automatically with Auto-Negotiation (IEEE 802.3u), the default setting.

The speed and duplex mode settings of a port can be set independently of each other. For example in the case of a 100Mbps port, it can be configured such that its speed is set manually while its duplex mode is established through Auto-Negotiation.

Note
Switch ports default to half-duplex mode when connected to 10 Mbps/100 Mbps network devices that do not support Auto-Negotiation. If a network device supports full-duplex only, a duplex mode mismatch can occur, resulting in poor network performance. To prevent this, disable Auto-Negotiation and set the duplex mode manually on ports connected to 100Mbps devices that support full-duplex only.

Wiring Configuration

The wiring configuration of a port operating at 10/100Mbps can be MDI or MDI-X. The wiring configurations of a switch port and a network device connected with straight-through twisted pair cabling must be opposite, such that one device is using MDI and the other MDI-X. For example, a switch port must be set to MDI-X if it is connected to a network device set to MDI.

The wiring configurations of the ports can be set manually or automatically by the switch with auto-MDI/MDI-X (IEEE 802.3ab-compliant). This feature enables the switch to automatically negotiate with network devices to establish their proper settings.

The MDI and MDI-X settings do not apply when ports are operating at a speed of 1Gbps or higher.

Maximum Distance

The ports have a maximum operating distance of 100 meters (328 feet).

Cable Requirements

The minimum category of twisted pair cable requirements are as follows:

- 10/100Mbps ports: Standard TIA/EIA 568-B-compliant Category 3 unshielded cabling.
- 1000Mbps ports: Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) unshielded cabling.
- 1/2.5/5Gbps ports: Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) unshielded cabling.

Port Pinouts

Refer to Table 35 on page 193 for the port pinouts of the 100Mbps and 1/2.5/5Gbps twisted pair ports.

LEDs

Each twisted pair port has two LEDs that display the port status.

x530DP-28GHXm

The x530DP-28GHXm LEDs indicate Link/Activity (L/A) and PoE (PD ON/PD ERR/MAX CURRENT) information. These LEDs are shown in Figure 8.

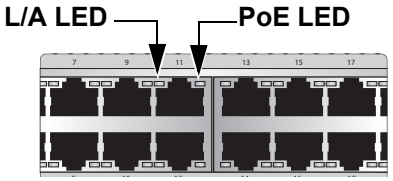


Figure 8. x530DP-28GHXm Twisted Pair Ports1-24 LEDs

The states of the x530DP-28GHXm LEDs are described in Table 5 on page 33.

Table 5. x530DP-28GHXm Twisted Pair Ports 1 - 24 LED Functions

LED	Ports	State	Description
L/A	1 - 20	Solid Green	The port has established a 1Gbps link to a network device.
		Flashing Green	The port is transmitting or receiving data at 1Gbps.
	21 - 24	Solid Green	The port has established a 1/2.5/5Gbps link to a network device.
		Flashing Green	The port is transmitting or receiving data at 1/2.5/5Gbps.
	1 - 24	Solid Amber	The port has established a 10/100Mbps link to a network device.
		Flashing Amber	The port is transmitting or receiving data at 10/100Mbps.
		Off	Possible causes of this state are: - The port has not established a link with another network device. - The LEDs are turned off. To turn on the LEDs, use the eco-friendly button.
PoE	1 - 24	Solid Green	PD On - The switch is delivering power to a powered device connected to the port.
		Solid Amber	PD Error - The switch has shut down PoE on the port because of a fault condition.
		Flashing Amber	PD Max Current - The switch has detected a powered device on the port but is not delivering power to it because doing so would exceed its available power budget.
		Off	No PD - This LED state can result from the following conditions: - The port is not connected to a non-PoE device or the device is powered off. - The port is disabled in the management software. - PoE is disabled on the port. - The LEDs are turned off. To turn on the LEDs, use the eco-friendly button.

x530DP-52GHXm

The x530DP-52GHXm LEDs indicate Link/Activity (L/A) and PoE (PD ON/PD ERR/MAX CURRENT) information. These LEDs are shown in Figure 9.

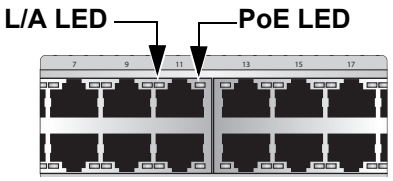


Figure 9. x530DP-52GHXm Twisted Pair Ports 1-48 LEDs

The states of the x530DP-52GHXm LEDs are described in Table 6.

Table 6. x530DP-52GHXm Twisted Pair Ports 1 - 48 LED Functions

LED	Ports	State	Description
L/A	1 - 40	Solid Green	The port has established a 1Gbps link to a network device.
		Flashing Green	The port is transmitting or receiving data at 1Gbps.
	41 - 48	Solid Green	The port has established a 1/2.5/5Gbps link to a network device.
		Flashing Green	The port is transmitting or receiving data at 1/2.5/5Gbps.
	1 - 48	Solid Amber	The port has established a 10/100Mbps link to a network device.
		Flashing Amber	The port is transmitting or receiving data at 10/100Mbps.
		Off	Possible causes of this state are: - The port has not established a link with another network device. - The LEDs are turned off. To turn on the LEDs, use the eco-friendly button.

Table 6. x530DP-52GHXm Twisted Pair Ports 1 - 48 LED Functions (Continued)

LED	Ports	State	Description
PoE	1 - 48	Solid Green	PD On - The switch is delivering power to a powered device connected to the port.
		Solid Amber	PD Error - The switch has shut down PoE on the port because of a fault condition.
		Flashing Amber	PD Max Current - The switch has detected a powered device on the port but is not delivering power to it because doing so would exceed its available power budget.
		OFF	No PD - This LED state can result from the following conditions: - The port is not connected to a powered device or the device is powered off. - The port is disabled in the management software. - PoE is disabled on the port. - The LEDs are turned off. To turn on the LEDs, use the eco-friendly button.

Power Over Ethernet

The x530DP-28GHXm switch features PoE++ on twisted pair ports 1 - 24. The x530DP-52GHXm switch features PoE+/PoE++ on twisted pair ports 1 - 48. With PoE, the switch supplies DC power to network devices over the same twisted pair cables that carry the network traffic.

PoE can make it easier to install networks. The selection of a location for a network device can be limited by whether there is a power source nearby. This often limits equipment placement or requires the added time and cost of having additional electrical sources installed. With PoE, you can install PoE-compatible devices wherever they are needed without having to worry about whether there are power sources nearby.

A device that provides PoE to network devices is referred to as *power sourcing equipment* (PSE). It functions as a central power source for other network devices.

Devices that receive their power from a PSE are called *powered devices* (PD). Examples include wireless access points, IP telephones, webcams, and even other Ethernet switches.

The x530DP Series switch automatically determines whether devices connected to its ports are powered devices. Ports that are connected to network nodes that are not powered devices (that is, devices that receive their power from another power source) function as regular Ethernet ports, without PoE. The PoE feature remains activated on the ports but no power is delivered to the devices.

PoE Standards

The x530DP Series switch supports these PoE standards:

- PoE (IEEE 802.3af): This standard provides up to 15.4 watts at the switch port for powered devices that require up to 13.0 watts.
- PoE+ (IEEE 802.3at): This standard provides up to 30.0 watts at the switch port for powered devices that require up to 25.5 watts.
- PoE++ (IEEE 802.3bt): This standard provides up to 60 watts at the switch port for powered devices that require up to 50 watts.

Powered Device Classes

Powered devices are grouped into the seven classes listed in Table 7. The classes are based on the amount of power the devices require. The switch supports all seven classes.

Table 7. IEEE Powered Device Classes

Class	Maximum Power at Switch Port	Maximum Power at Powered Device
0	15.4W	12.95W
1	4.0W	3.84W
2	7.0W	6.49W
3	15.4W	12.95W
4	30.0W	25.5W
5	45.0W	40.0W
6	60.0W	51.0W

Power Budget

The power budget is the maximum amount of power the switch can supply to the powered devices on its ports. The higher the budget, the more PoE devices the switch can support at one time.

The power budget of the switch depends on several factors. The first is the power supply model. The power budgets of the power supplies are listed in Table 8.

Table 8. Power Supply Budgets of the Power Supplies

Power Supply	Power Budget for PoE Devices
PWR150 / PWR150R	0 watts
PWR250	0 watts
PWR250-80	0 watts
PWR800	370 watts
PWR1200	740 watts

Note
The switch supports only non-PoE devices when powered with the PWR150, PWR150R, PWR250, or PWR250-80 power supply.

Another factor that determines the power budget of the switch is the number of PoE power supplies in the device. The power budget of a PoE switch that has only one PoE power supply is equal to the budget of the power supply. For example, a switch that has one PWR1200 Power Supply has a power budget of 740W for powered devices.

Table 9 lists the power budgets for the switch with one or two PWR800 Power Supplies.

Table 9. Power Budgets of the PWR800 Power Supply

Number of Power Supplies in the Switch	Power Budget of the Switch
One	370 watts
Two	740 watts

Table 10 lists the power budgets for the switch with one or two PWR1200 Power Supplies.

Table 10. Power Budgets of the PWR1200 Power Supply

Number of Power Supplies in the Switch	Power Budget of the Switch
One	740 watts
Two	1480 watts

The maximum number of PoE devices the switch can support at one time is determined by its power budget and the power requirements of the devices. The switch can supply power to all of the devices as long as the their total power requirements is less than its power budget. If the switch determines that the power requirements of the devices exceed its power budget, it denies power to one or more ports using a mechanism referred to as port prioritization.

To determine whether the power requirements of the PoE devices you plan to connect to the switch exceed its power budget, refer to their documentation for their power requirements and add the requirements together. The switch should be able to power all of the devices simultaneously as long as the total is below its power budget. If the total exceeds the available power budget, you should consider reducing the number of PoE devices so that all of the devices receive power. Otherwise, the switch powers a subset of the devices, based on port prioritization.

The switch can handle different power requirements on different ports. This enables you to connect different classes of PoE equipment to the ports on the switch.

Port Prioritization

If the power requirements of the powered devices exceed the switch power budget, the switch denies power to some ports based on a system called port prioritization. Use this mechanism in the distribution of power if the demands of the devices exceed the available capacity. This ensures that powered devices critical to the operation of your network are given preferential treatment by the switch.

There are three priority levels:

- Critical
- High
- Low

Ports set to the Critical level, the highest priority level, are guaranteed power before any of the ports assigned to the other two priority levels. Ports assigned to the other priority levels receive power only if all the Critical ports are receiving power. Ports that are connected to your most critical powered devices must be assigned to this level. If there is not enough power to support all the ports set to the Critical priority level, power is provided to the ports based on port number, in ascending order.

The High level is the second highest level. Ports set to this level receive power only if all the ports set to the Critical level are already receiving power. It there is not enough power to support all of the ports set to the High priority level, power is provided to the ports based on port number, in ascending order.

The lowest priority level is Low. This is the default setting. Ports set to this level only receive power if all of the ports assigned to the other two levels are already receiving power. As with the other levels, if there is not enough power to support all of the ports set to the Low priority level, power is provided to the ports based on port number, in ascending order.

Power allocation is dynamic. Ports supplying power to powered devices can cease power transmission if the switch power budget is at maximum usage and new powered devices, connected to ports with higher priorities become active.

Wiring Implementation

The IEEE 802.3af standard defines two methods for delivering DC power over twisted pair cable by a switch to powered devices. These methods are known as Modes A and B, and identify the individual wires that carry the DC power within the cable from the switch to powered devices.

Twisted pair cabling typically consists of eight wires. With 100Base-TX devices, the wires connected to pins 1, 2, 3, and 6 on the RJ-45 connectors carry the network traffic while the wires connected to pins 4, 5, 7, and 8 are unused. At higher speeds, all eight wires are used to carry network data.

It takes four wires to deliver DC power to a powered device. With Mode A, power is delivered on pins 1, 2, 3, and 6. These are the same pins in 10Base-T and 100Base-TX devices that carry the network data. With Mode B, power is provided over the spare wires.

The ports on the x530DP Series switch deliver power using Mode A.

Powered devices that comply with the IEEE 802.3af standard are required to support both Modes A and B. Legacy devices that do not comply with the standard will work with the switch if they are powered on pins 1, 2, 3, and 6.

SFP+ Transceiver Ports

The x530DP-28GHXm switch has four ports (ports 25 - 28) and the x530DP-52GHXm switch has four ports (ports 49 - 52) for 1Gbps SFP and 10Gbps SFP+ transceivers.

SFP and SFP+ Transceivers

See “SFP+ Transceiver Ports” on page 21 for a description and guidelines of the SFP+ transceivers.

SFP or SFP+ transceivers must be purchased separately. For a list of supported transceivers, refer to the product data sheet on the Allied Telesis web site.

LEDs

This section applies to the 1Gbps SFP and 10Gbps SFP+ transceiver ports on the x530DP-28GHXm and x530DP-52GHXm switches. Each transceiver port has one LED. The LEDs are located between the ports. Refer to Figure 10.

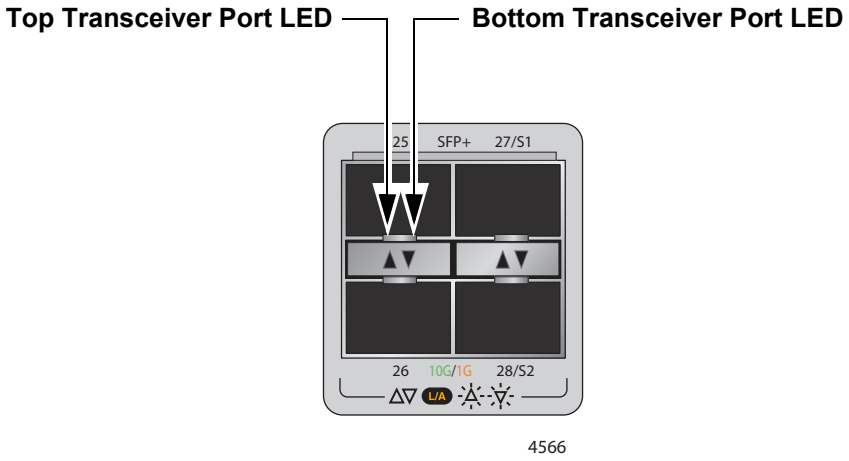


Figure 10. Link and Activity LEDs for the 1Gbps SFP/10Gbps SFP+ Ports

The LEDs display link status and activity. The possible LED states are described in Table 11.

Table 11. Link and Activity Status LEDs for the 1Gbps and 10Gbps Ports

State	Description
Solid Green	The transceiver has established a 10Gbps link to a network device.
Flashing Green	The transceiver is transmitting or receiving data in 10Gbps.
Solid Amber	The transceiver has established a 1Gbps link to a network device.
Flashing Amber	The transceiver is transmitting or receiving data in 1Gbps.
Off	Possible causes of this state are: - The port is empty. - The transceiver has not established a link to a network device. - A non-supported module is installed. - The LEDs are turned off. To turn on the LEDs, use the eco-friendly button.

eco-friendly Button

The eco-friendly button on the front panel of the switch is used to toggle the port LEDs on or off. You can turn off the LEDs to conserve electricity when you are not monitoring the device. You can also toggle the LEDs with the ECOFRIENDLY LED and NO ECOFRIENDLY LED commands in the Global Configuration mode of the command line interface of the AlliedWare Plus management software.

The switch is operating in a low power mode when the LEDs are turned off. Operating the switch in the low power mode does not interfere with the network operations of the device.

The management software on the switch has a command that blinks the LEDs so that you can quickly and easily identify a specific unit among the devices in an equipment rack. It is the FINDME command. The command works on the switch even if you turned off the LEDs with the eco-friendly button or NO ECOFRIENDLY LED command.

Note
Before checking or troubleshooting the network connections to the ports on the switch, you must always check to be sure that the LEDs are on by either pressing the eco-friendly button or issuing the ECOFRIENDLY LED and NO ECOFRIENDLY LED commands in the Global Configuration mode in the command line interface.

VCStack Feature

You can use the switches as standalone units or join up to eight units with the VCStack feature. The switches of a VCStack act as a single virtual unit. They synchronize their actions so that switching operations (such as spanning tree protocols, virtual LANs, and static port trunks) span across all of the units and ports. Two advantages of stacks are:

- You can manage multiple units simultaneously, which can simplify network management.
- You have more flexibility in how you configure some of the features. For instance, a static port trunk on a standalone switch can consist of ports from the same switch. In contrast, a static trunk on a stack can have ports from different switches in the same stack.

Note
This guide explains how to install switches as a stack with Virtual Chassis Stacking (VCStack). For instructions on how to install the devices as standalone switches, refer to the *x530DP Series Installation Guide for Standalone Switches*.

Switch ID LED

The switch ID LED, shown in Figure 11, displays the ID number of the switch. A standalone switch has the ID number 0. Switches in a VCStack have the numbers 1 to 8. Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147 has the procedure for verifying and, if necessary, changing the ID number of the switch.

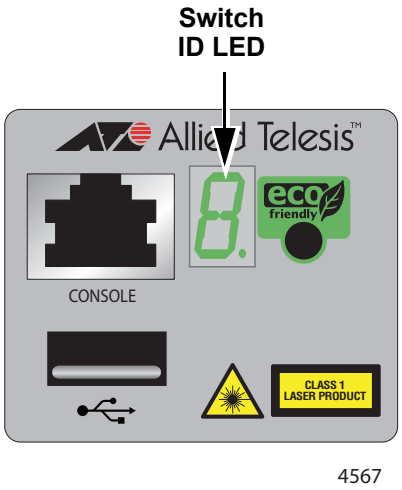


Figure 11. Switch ID LED

The states of the LED when the switch is not operating in the low power mode are shown in Figure 12.

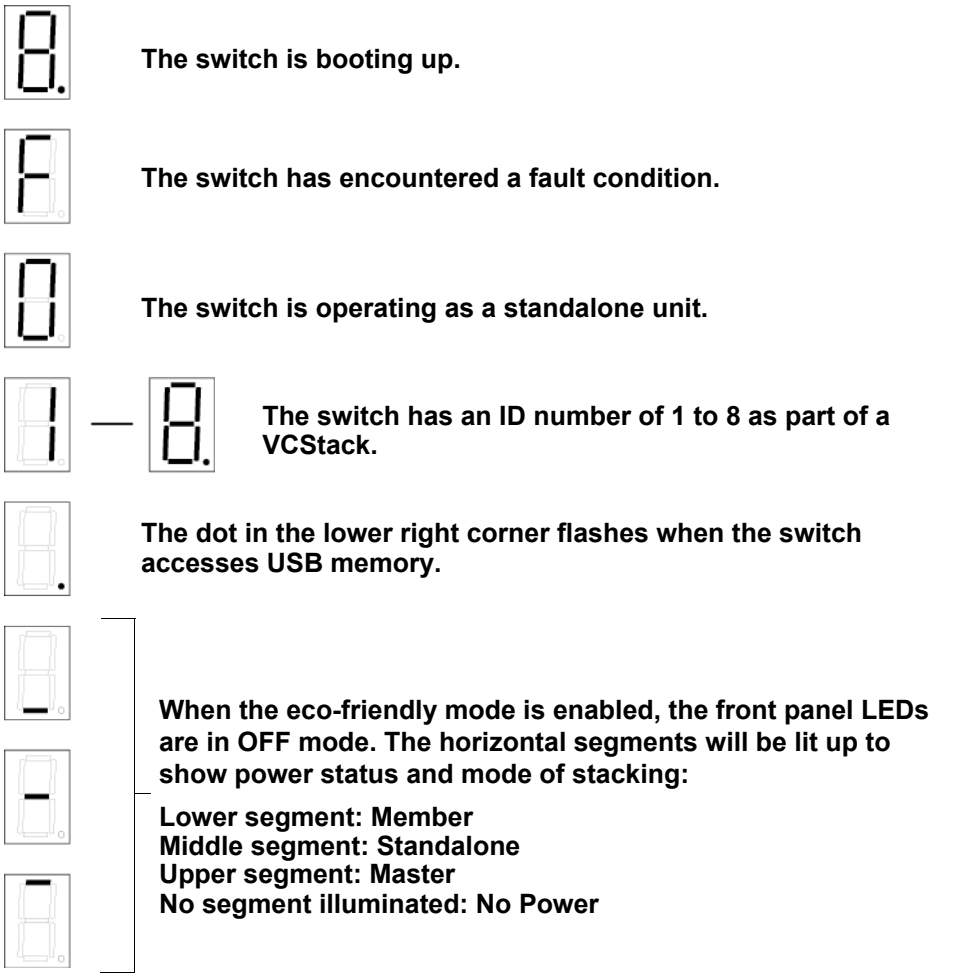


Figure 12. Switch ID LED Description

The switch displays the letter “F” for fault on the ID LED if it detects one of the following problems:

- A cooling fan has failed.
- The internal temperature of the switch has exceeded the normal operating range and the switch may shut down.
- Redundant PSU failure (a second PSU is present, but not supplied with power).

Note
You can use the SNMP or the CLI management interface to determine the type of fault or faults.

USB Port

The USB port on the management panel is used for the following functions:

- Store configuration files on flash drives.
- Restore configuration files to switches that have lost or corrupted settings.
- Configure replacement units by downloading configuration files from a flash drive.
- Update the management firmware.

The port is USB 2.0-compatible.

Console Port

The Console port is an RS232 serial management port. You use the port to access the AlliedWare Plus management software on the switch to configure the feature settings or monitor status or statistics. This type of management is commonly referred to as local management because you have to be at the physical location of the switch and use the management cable included with the unit. The switch does not have to have an IP address for local management.

To establish a local management session with the switch, use the provided management cable to connect a terminal or a computer with a terminal emulation program to the Console port, which has an RJ-45 style (8P8C) connector. The cable has RJ-45 style (8P8C) and DB-9 (D-sub 9-pin) connectors.

The Console port has the following settings:

- Default baud rate: 9,600 bps (range is 9,600 to 115,200 bps)
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Note
These settings are for a DEC VT100 or ANSI terminal, or an equivalent terminal emulation program.

Chapter 2

Virtual Chassis Stacking

The sections in this chapter are listed here:

Note
For more information on VCStack, refer to the *Stacking Introduction and Stacking Commands* chapters in the *Command Reference: x530 Series Switches Running AlliedWare Plus Version 5.5.0* at **www.alliedtelesis.com/library**.

Overview

The VCStack feature is used to connect multiple x530DP Series switches into a single, virtual networking unit. Some of the benefits of the VCStack feature are listed here:

- Simplifies management - You can manage the devices of the stack as a single unit, rather than individually. Your local and remote management sessions give you management access to all the switches in the stack.
- Reduces IP addresses - A stack requires only one IP address for remote management access, thereby reducing the number of IP addresses you have to assign to network devices.
- Adds feature flexibility and resiliency - A stack gives you flexibility in the available configurations of features. For example, you can create port aggregators of ports from different switches in a stack, rather than from only one switch. Distributing the ports of an aggregator across two or more switches in a stack increases its resiliency because it can continue to function, though at a reduced bandwidth, even if one of the switches stops functioning.
- Reduces protocol requirements - Building a stack might eliminate the need to configure some protocols, such as the Virtual Router Redundancy Protocol or Spanning Tree Protocol.

Stacking Guidelines

This section lists the general guidelines to building a VCStack of x530DP Series switches. Stacking guidelines differ depending on the version of the AlliedWare Plus management software on the switches. (Instructions in Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127 and Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147 explain how to display the version numbers of the management software.)

- A stack can have up to eight x530DP Series switches.
- A stack can have x530DP, x530, and/or x530L Series switches. However, this type of stack, referred to as a mixed stack, requires a license and additional configuration commands. Refer to “Mixed Switch Stacks” on page 68.
- Stacking is enabled by default on x530DP Series switches.
- The switches of a stack must be connected with a stack trunk, consisting of a minimum of two ports per switch.
- The default stacking ports are:
  - x530DP-28GHXm: 27 and 28
  - x530DP-52GHXm: 51 and 52
- You can increase the bandwidth and resiliency of the stack trunk by also using these ports as stacking ports:
  - x530DP-28GHXm: 25 and 26
  - x530DP-52GHXm: 49 and 50
- Stack trunks can also be built with the four multi-speed 5Gbps ports.
- Although the default ports support 1Gbps and 10Gbps transceivers, stack trunks require 10Gbps transceivers. Stack trunks are not supported with 1Gbps transceivers.
- A stack of x530DP Series switches cannot contain other stacking switches, such as x600 or x610 Series switches.
- The links of a stack trunk must be direct connections between switches. You cannot install networking devices, such as media converters or Ethernet switches, between two stacking ports.
- SFP+ transceivers and direct attach cables used for a stack trunk must be from Allied Telesis. Switches will not form a stack with transceivers from other network equipment providers. For a list of supported transceivers, refer to the product data sheet on the Allied Telesis web site.
- When using multi-speed ports as a stack port, it supports 1 to 8 links.

- On a 52-port switch with multi-speed ports, it is possible to create one stack link (maximum bandwidth 20Gbps) group with 4 ports (41 to 44) and one stack link (maximum bandwidth 20Gbps) group with 4 ports (45 to 48). The maximum bandwidth of the entire chassis unit is 20Gbps.
- On a 52-port switch, when using the multi-speed ports as stack ports, it is recommended to set up in groups such as ports 41 to 44 or ports 45 to 48 in consideration of redundancy and bandwidth. For even greater redundancy, you can configure 8 ports (such as ports 41 to 48) as stack links.

Stack Trunks

Stack trunks connect the switches of a stack together. A stack trunk consists of a minimum of two ports on each device. For switches with AlliedWare Plus v5.5.0-1 or later, you can choose two ports of the trunk. Your choices are listed in Table 12:

Table 12. Default (10Gbps) and Optional (5Gbps) Trunk Ports

Switch	Optional Trunk Ports (5Gbps twisted pair ports)	Additional Trunk Ports (SFP+ 10Gbps SFP+ transceiver ports)	Default Trunk Ports (SFP+ 10Gbps SFP+ transceiver ports)
x530DP-28GHXm	21-24[1]	25, 26	27/S1, 28/S2
x530DP-52GHXm	41-48[2]	49, 50	51/S1, 52/S2

1. PoE++ twisted pair ports.
2. PoE+ twisted pair ports.

The guidelines are discussed in the following sections:

- “Stack Trunks of SFP+ 10Gbps Ports” on page 54
- “Stack Trunks of 5Gbps Twisted Pair Ports” on page 58

Note
The following discussions apply to AlliedWare Plus v5.5.0-1 or later. Earlier versions of the operating system have different trunk rules and restrictions.

Stack Trunks of SFP+ 10Gbps Ports

You can build stack trunks with the 10Gbps SFP+ transceiver ports on x530DP Series switches. See “Stacking Guidelines” on page 51.

- Stacks can have up to eight switches.
- Trunks have to have a minimum of two ports per switch.
- SFP+ transceivers must be from Allied Telesis and be approved for use in the product. For a list of supported 10Gbps SFP+ transceivers, refer to the product data sheet on the Allied Telesis web site.

Note
Transceivers are purchased separately.

- You can use the default 10Gbps stacking ports as regular networking ports by disabling the stacking feature or by using the multi-speed 5Gbps twisted pair ports as the trunk ports.
- A stack trunk can have fiber optic or SP10TW direct connect cables in the same stack. See Figure 15 on page 57.

Figure 13 shows examples of stack trunks of the default SFP+ stacking ports for two, three, and four x530DP Series switches.

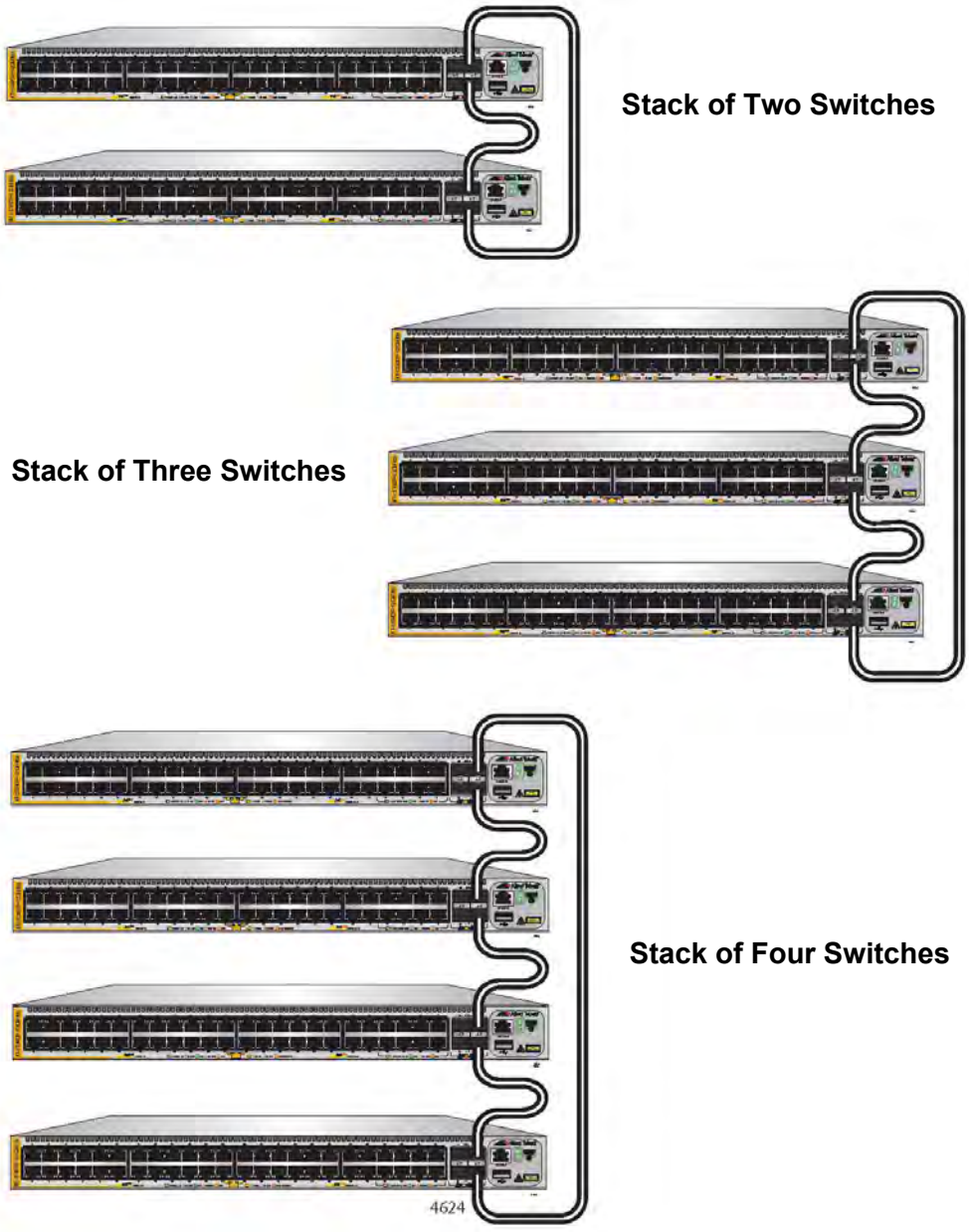
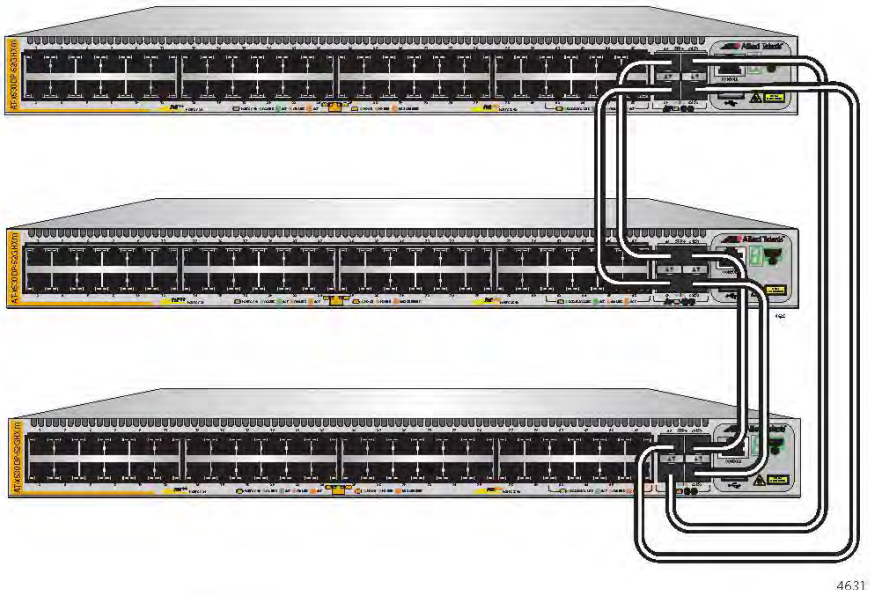


Figure 13. Stack Trunks Using the Default Stacking SFP+ Ports

In stacks of three or four x530DP Series switches the amount of inter-switch network traffic might require a stacking trunk with greater bandwidth than that provided by the default ports. For such situations the additional ports can also be used as trunk ports. Figure 14 shows examples of trunks of all four SFP+ ports for stacks of three and four switches.

Stack of Three Switches



Stack of Four Switches

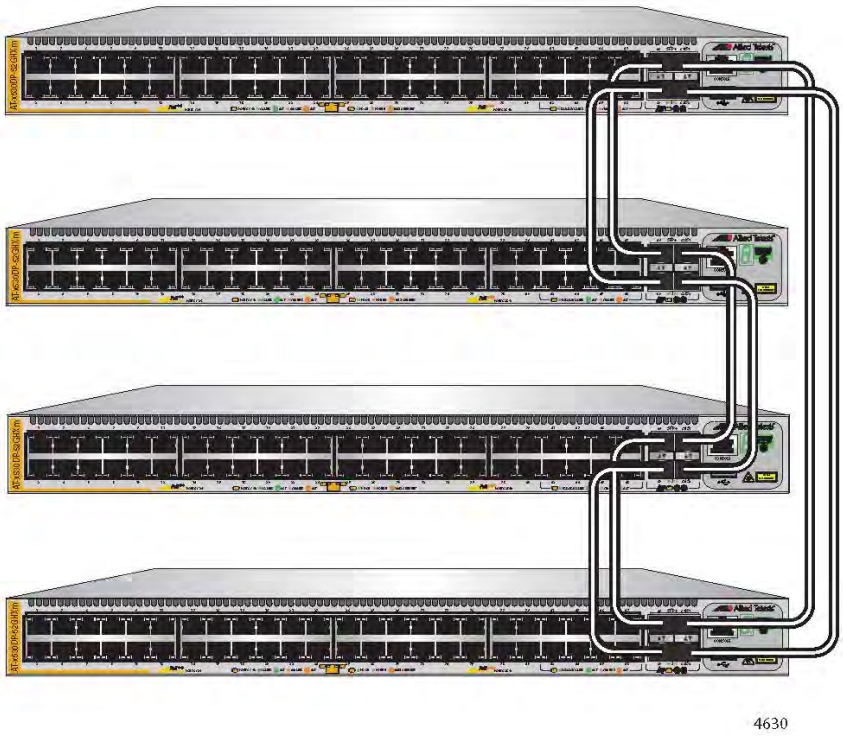


Figure 14. Stack Trunks Using SFP+ Ports

10Gbps stack trunks can have both fiber optic transceivers and SP10TW direct attach cables. The example in Figure 15 illustrates a stack of four switches located in two separate buildings. SP10TW direct attach cables connect switches that are in the same wiring closet while fiber optic transceivers connect the switches across the buildings.

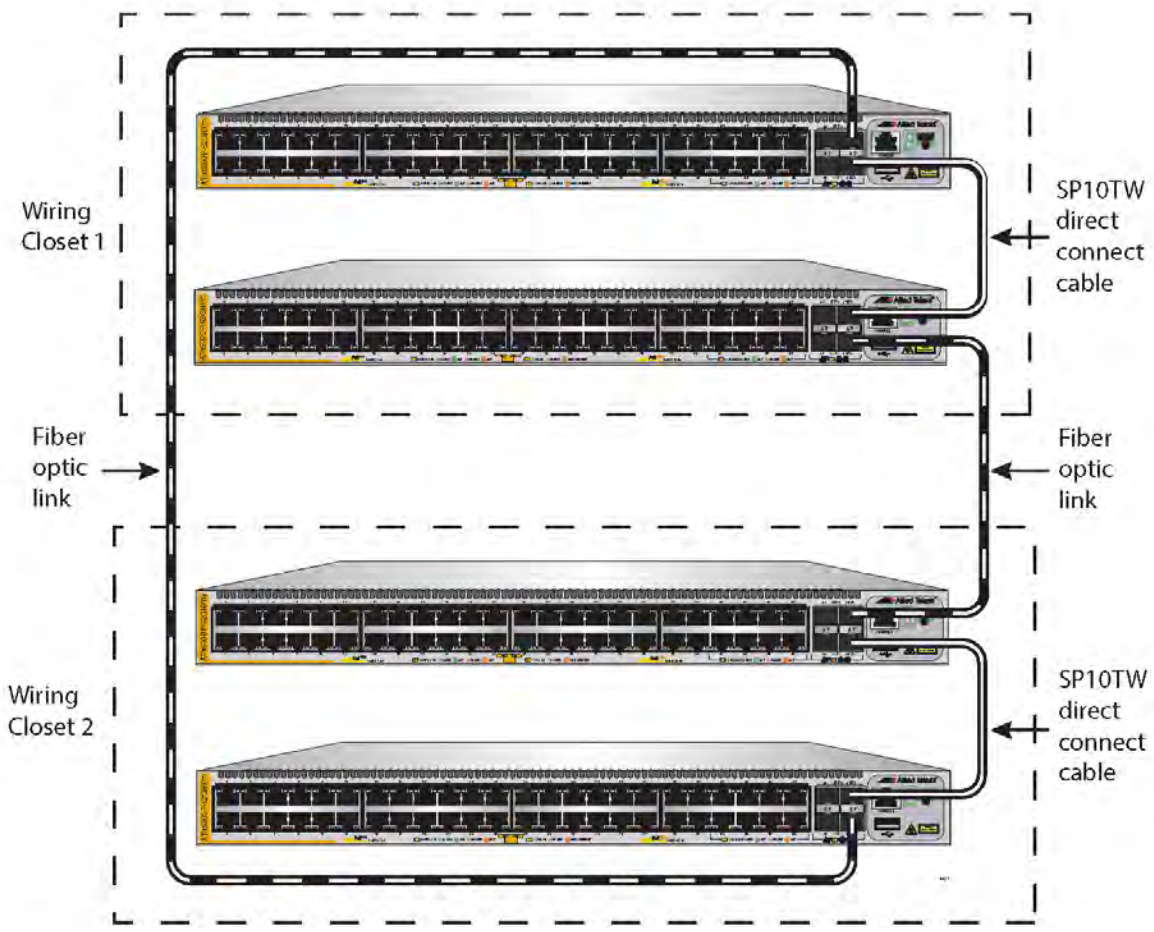


Figure 15. 10Gbps Stack Trunk with Both SFP+ Fiber Optic Transceivers and SP10TW Direct Connect Cables

Stack Trunks of 5Gbps Twisted Pair Ports

The 10Gbps SFP+ ports are not the only ports you can use for a trunk of a stack. If you prefer to use the 10Gbps ports for other functions you can use the 5Gbps twisted pair ports for the trunk instead. You can use two or more 5Gbps ports per switch for the trunk. As with a trunk based on 10Gbps SFP+ ports, the more 5Gbps ports a trunk has, the greater its bandwidth.

The following rules and guidelines for a stack trunk of 5Gbps ports are similar to those for stack trunks of 10Gbps ports:

- Stacks can have up to eight switches.
- Trunks should have a minimum of two ports per switch.
- If you use only two or three of the 5Gbps ports for a trunk, you should use the same ports on all the switches of the stack. This is not a requirement, but it can make managing and troubleshooting the stack easier. For example, you might designate ports 23 and 24 to be the stacking ports on all the switches.
- You designate the stack ports with the STACKPORT command.
- Once ports are designated as trunk ports, you cannot view or change their parameter settings.

A trunk of 5Gbps ports for a stack of two switches can have two or more links per switch. As mentioned previously, the more links in a trunk, the greater its bandwidth and resiliency. Examples are shown in Figure 16.

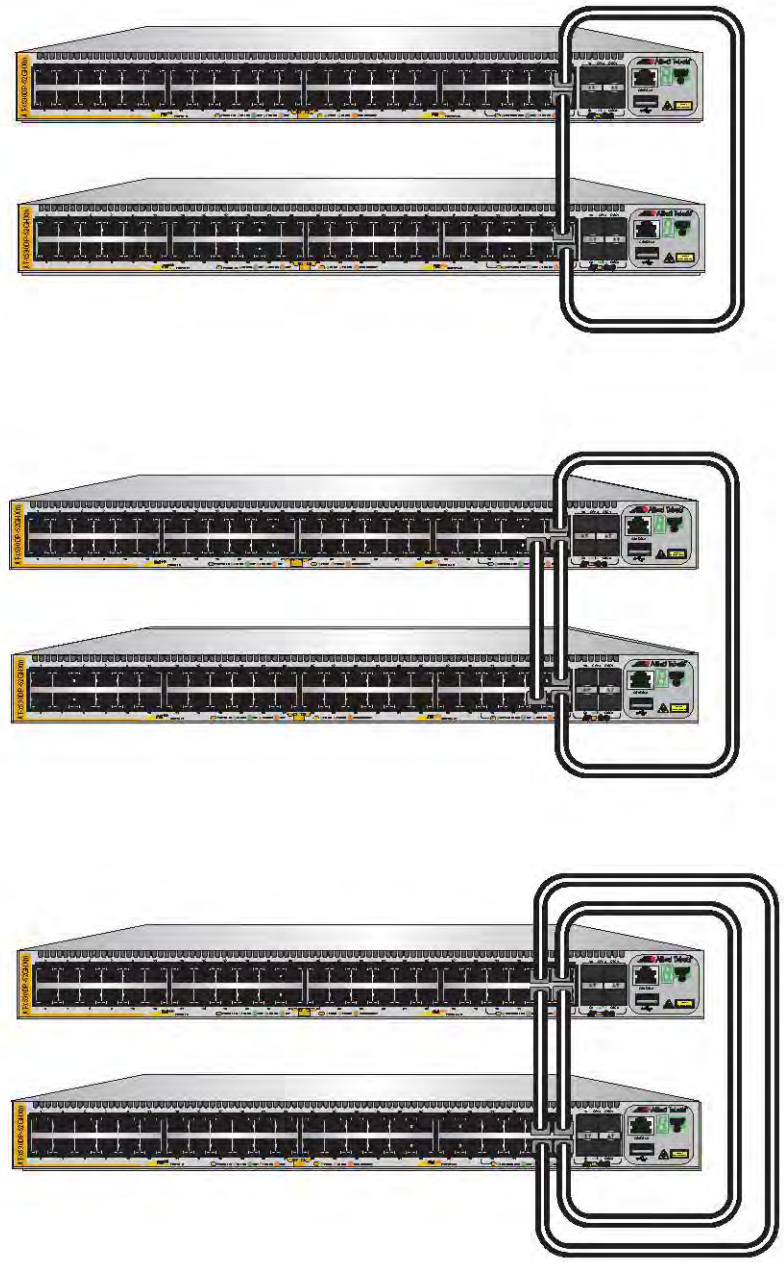


Figure 16. Trunks of 5Gbps Ports for Stacks of Two Switches

A trunk of 5Gbps ports for a stack of three switches can have two or more ports per switch. Refer to Figure 17.

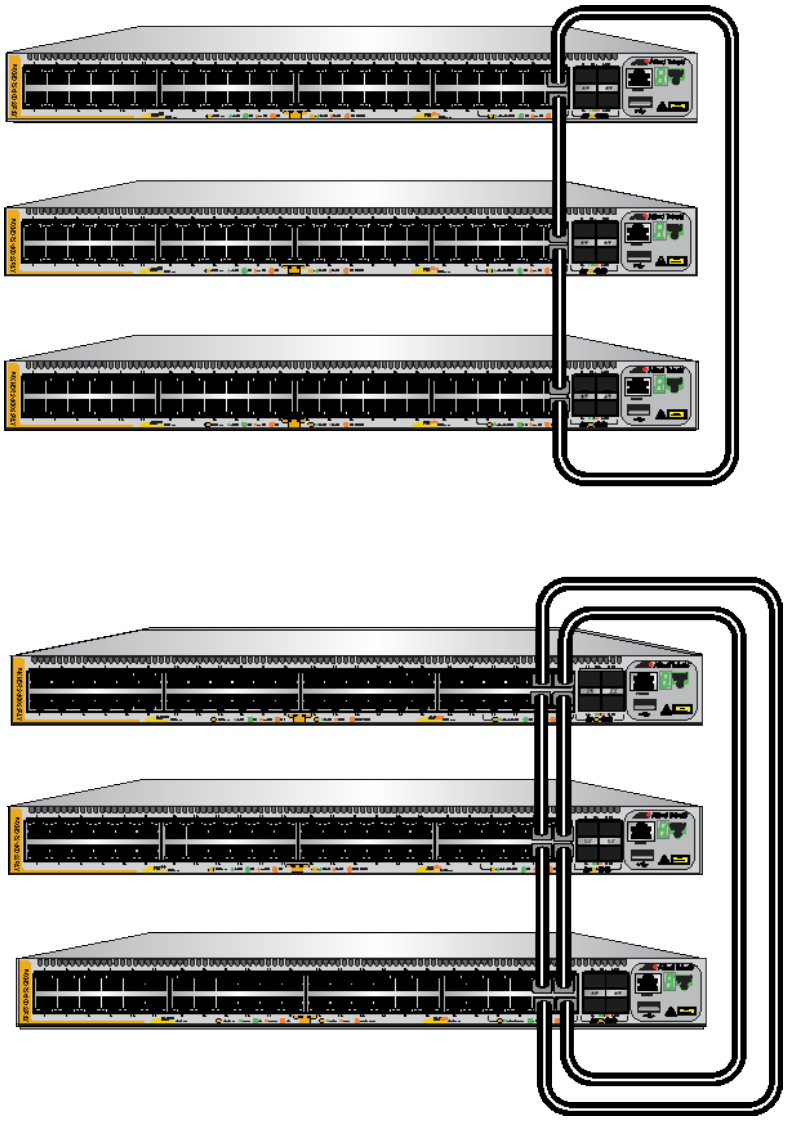


Figure 17. Trunks of 5Gbps Ports for Stacks of Three Switches

A trunk of 5Gbps ports for a stack of four switches can also have two or more ports per switch. Refer to Figure 18.

Figure 18. Trunks of 5Gbps Ports for Stacks of Four Switches

Invalid Stack Trunks

Figure 19 through Figure 22 on page 63 show examples of invalid stack trunks.

Example 1 Stack trunks must be direct links between trunk ports. There cannot be any intermediary networking devices, such as media converters, Ethernet switches, or routers, between trunk ports. Figure 19 is an example of this type of invalid trunk.

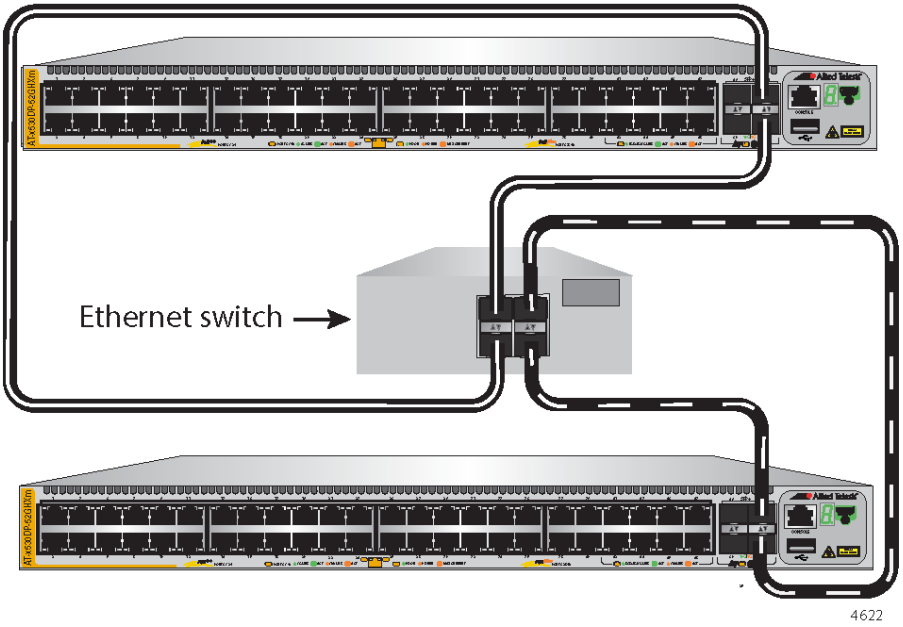


Figure 19. Invalid Stack Trunk with an Intermediary Networking Device

Example 2 Trunks must have a minimum of two ports used per switch. Figure 20 is an example of an invalid stack trunk that has only one port per switch.

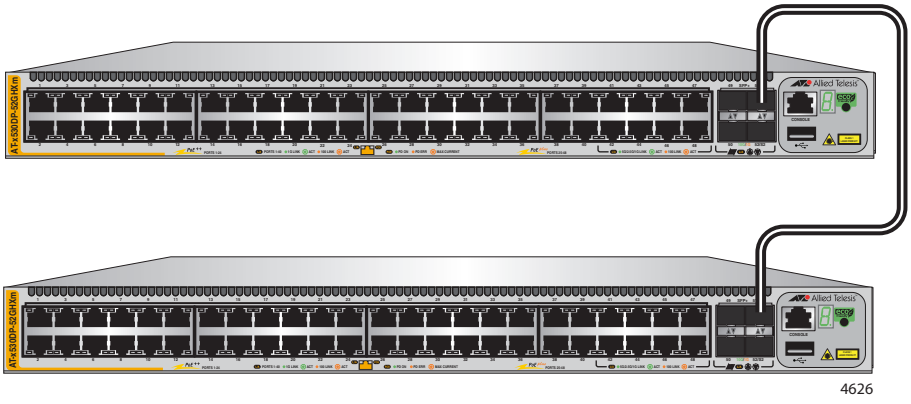


Figure 20. Invalid Stack Trunk with One Port Used Per Switch

Example 3 Trunks must have the same number of physical links between switches. Figure 21 is invalid because the top and middle switches are connected with two links while the top and middle switches are connected to the bottom switch with only one link each.

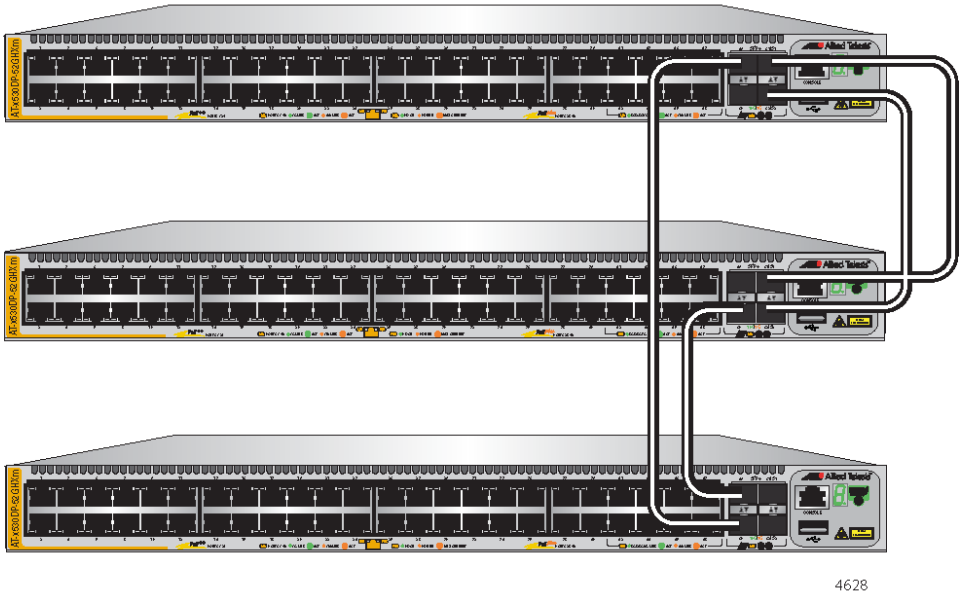


Figure 21. Invalid Stack Trunk with Different Numbers of Links

Example 4 Trunks cannot contain both 1/2.5/5Gbps twisted pair ports and 10Gbps SFP+ ports. Figure 22 shows an example of an invalid stack trunk because it uses both types of ports.

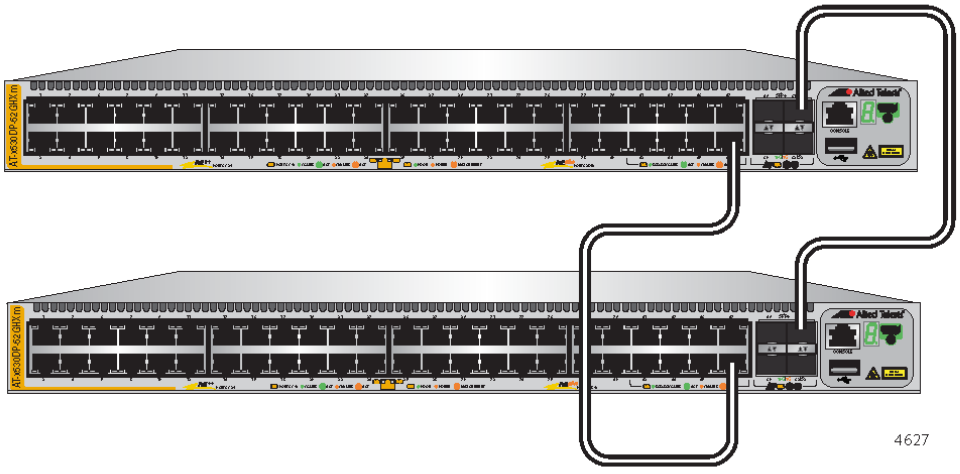


Figure 22. Invalid Stack Trunk with Different Port Types

Master and Member Switches

A stack has one master switch. The other switches are member switches. The main functions of the master switch are listed here:

- Coordinate and monitor stack operations.
- Configure the parameter settings of the switches using its configuration file in flash memory, whenever the stack is reset or powered on.
- Verify that the switches are using the same version of management software. It automatically downloads its management software to the member switch over the stacking cables if the member switch has a different version of the management software.
- Verify that the switches have different ID numbers. It automatically assigns new ID numbers to resolve situations where two or more switches have the same ID number.
- Verify that the stacking transceivers are from Allied Telesis and they are cabled correctly.

The parameter settings of the switches of the stack are stored in configuration files in the flash memories of the master and member switches. Each file contains all the settings for the switches in the stack. The switches update the files with the latest parameter settings whenever you issue the WRITE command to save your changes.

When you reset or power on the stack, the master switch uses the configuration file in its flash memory to restore its own parameter settings as well as the parameter settings of the member switches in the stack. A member switch uses its configuration file to restore parameter settings only if the master switch is removed or fails, and it becomes the new master switch of the stack.

Selection of the Master Switch

The switches of a stack select the master switch during the initialization process, which they perform whenever they are powered on or reset. The master switch is selected using the following parameters:

- Stack priority numbers
- MAC addresses

The stack priority number is an adjustable value of 0 to 255. The lower the number, the higher the priority. The switch with the lowest priority number (highest priority) becomes the master switch of a stack. The default priority value is 128.

When switches have the same priority values, they compare their MAC addresses to select the master switch. As with the priority value, the lower the MAC address, the higher the priority. The switch with the lowest MAC address becomes the master switch.

If you power on the stack for the first time without adjusting the priority values, the master switch is selected based on the MAC addresses if the units are powered on simultaneously. If you power on the switches one at a time, the master switch is the first switch to be powered on.

You can set the priority values of the switches either before or after you build the stack. Changing the values after the stack is operating does not change the parameter settings of the stack or the ID numbers of the devices.

It should be noted that the master switch of a stack does not have to have the ID number 1. It can have any ID number.

Switch ID Numbers

Each switch in a stack must have a unique ID number. The possible ID numbers depend on the version number of the AlliedWare Plus management software. The ID numbers 1 to 8 for the eight switches in a stack with AlliedWare Plus v5.5.1 or later. The default is 1.

The ID numbers are displayed on the ID LEDs on the front panels of the units. You can assign the numbers yourself or let the master switch assign the numbers automatically when you initially power on the stack.

Use the ID numbers to identify the individual switches and ports when configuring the devices with the commands in the management software.

The ID numbers are also used to identify the parameter settings of the switches in the configuration files. When the stack is reset or power cycled, the master switch uses the ID numbers to identify the devices to which the parameter settings belong.

Caution
Do not change the ID numbers of the switches after configuring the parameter settings of the stack. Otherwise, the parameter settings might be applied to the wrong devices when you reset or power cycle the stack. E79

The switches do not use the ID numbers to select the master switch. The selection of the master switch is based on their priority numbers and MAC addresses, as explained in “Selection of the Master Switch” on page 64.

Optional Feature Licenses

The x530DP Series switches come with the AlliedWare Plus operating system and a base set of features that are available as soon as you install the devices. Allied Telesis offers additional features and capabilities for the switches. They come with the AlliedWare Plus operating system, but have to be unlocked before you can use them. Unlocking optional features requires licenses from Allied Telesis. For a list of optional feature licenses for the product, refer to its product sheet on the Allied Telesis web site.

Here are the guidelines to feature licenses for a stack of x530DP Series switches:

- The VCStack feature is part of the base features of the switch. It does not require an additional feature license.
- You can install feature licenses while the switches are operating as standalone units or in a stack.
- When ordering feature licenses for the switches of a stack, you must order one license for each switch.
- The switches will form a stack even if they have different feature licenses. However, the additional features are only available on those switches that have the necessary licenses. The stack generates a warning message if it detects that the switches do not have the same feature licenses. To resolve the issue, you can use the REMOTE-LOGIN command to log onto the individual switches in a stack to install new licenses. For more information, refer to the *Command Reference: x530 Series Switches Running AlliedWare Plus Version 5.5.0* at **www.alliedtelesis.com/library**.

Mixed Switch Stacks

The x530 family consists of the following series of Gigabit Ethernet switches:

- x530L
- x530
- x530DP

If you have previously worked with other Allied Telesis products that support stacking, then you may already know that the feature is typically not supported across switches from different series. This means that all the switches of a stack usually have to be from the same series.

However, the x530 family of switches does permit stacks of switches from different x530 series. For instance, you might build stacks of both x530 and x530DP switches, or models from all three series.

Building mixed stacks that have x530L and one or more of the x530 or x530DP switches require a special license and several additional configuration steps. This is because x530L switches have different base feature sets in their base licenses than the other switches. Stacks, on the other hand, require that all switches have the same feature sets. The following sections explain how to build mixed stacks of x530L and one or more of the other switches.

Note
The following discussions do not apply to mixed stacks of x530 series and x530DP switches. The feature sets in their base licenses are the same. Consequently, building mixed stacks of those switches does not require a special license or additional configurations steps. Additionally, you can build the trunks using either SFP+ ports or multi-speed 1/2.5/5 twisted pair ports.

Stack Mixed-Mode Licenses

One of the first steps to building a mixed stack of x530L switches and one or more x530 or x530DP switches is to obtain stack mixed-mode licenses from Allied Telesis and install the licenses on the switches. Switches of mixed stacks need the licenses to form the stacks.

The different switch series have different stack mixed-mode licenses. To receive the correct type and number of licenses, be sure to specify the number of x530L, x530, and x530DP switches when ordering the licenses.

Stack Mixed-Mode Commands

After installing the stack mixed-mode licenses, you have to enter the STACK MIXED-MODE command in the Global Configuration mode of the AlliedWare Plus operating system. The command designates the switches as part of a mixed stack. When you issue this command on x530 series or x530DP switches, they configure their base feature sets to match the feature set in the base licenses in x530L switches.

Trunk Ports

A key component of a stack is the trunk. These are the ports that link the switches together. With the x530 and x530DP switches, you have the choice of selecting the trunk ports from the SFP+ ports or multi-speed 1/2.5/5Gbps twisted pair ports. The x530L switches, however, do not have multi-speed twisted pair ports. Consequently, to build a stack with x530L switches, regardless of whether it's a mixed stack or not, you have to use the SFP+ ports as the trunk ports. Refer to "Stack Trunks of SFP+ 10Gbps Ports" on page 54.

Optional Licenses

Here are guidelines for optional licenses in mixed stacks of x530L and x530 and/or x530DP switches:

- Mixed stacks do not support premium licenses. Do not install premium licenses on switches in mixed stacks.
- Mixed stacks do support the G8032 ring protection and continuous PoE power licenses.
- All the switches in the stack must have the same optional licenses.

AlliedWare Plus

Mixed stacks require AlliedWare Plus v5.4.9-0.1 and later.

Guidelines

Here are the guidelines to building mixed stacks of x530L and x530 or x530DP switches:

- The trunk ports have to be SFP+ ports.
- The switches should have AlliedWare Plus v5.4.9-0.1 or later.
- You have to install stack mixed-mode licenses on all the switches.
- You have to perform the STACK MIXED-MODE command on all the switches so that they operate with the same base set of features.
- If you break-up a mixed stack or remove the x530L switches, perform the NO STACK MIXED-MODE command on the x530 and x530DP switches to restore their full feature sets.
- If you break-up a mixed stack or remove the x530L switches, you can leave the stack mixed-mode licenses on the switches. They will not interfere with switch operations.
- The STACK MIXED-MODE and NO STACK MIXED-MODE commands require rebooting the switch.
- Mixed stacks do not support premium licenses.

- Mixed stacks do support the G8032 ring protection and continuous PoE power licenses.
- If optional licenses are installed on the switches, all the units must have the same licenses. Switches that have different feature licenses might still be able to form the stack, but the feature inconsistencies are logged and appear in the show license output.
- A mixed stack generates the following log message if the STACK MIXED-MODE command was not performed on all the switches:

  ```
  16:22:21 awplus VCS[1631]: Member 1 cannot join the
  stack because of stack mixed mode incompatibility.
  Enable 'stack mixed-mode'.
  ```

- The trunk for a mixed stack can have a minimum of two ports and a maximum of eight ports per switch.
- Trunk ports are designated with the STACKPORT command in the Port Interface mode.
- If you designate more than eight ports as trunk ports on a switch, only the first eight ports function as trunk ports.
- If you designate less than two ports for the trunk on a switch, the default trunk ports are used instead.
- A trunk should not contain both 5Gbps twisted pair ports and 10Gbps SFP+ ports. Network performance will be unpredictable.
- A trunk should not connect a switch to more than two other stack members. Building a mesh configuration where a member switch is directly connected to more than two other members is not supported and can cause unpredictable behavior.

Planning the Stack

Here are factors to consider when planning a stack:

- How many x530DP switches will be in the stack? The maximum is eight devices.
- If you are using the SFP+ ports for the trunk, have you determined the required number of SFP+ transceivers or SP10TW direct attach cables? Refer to Figure 13 on page 55 and Figure 14 on page 56.
- Have you selected a master switch? This can be any switch. If the switches has different versions of the AlliedWare Plus management software, the master switch should have the most recent version. Refer to “Selection of the Master Switch” on page 64.
- Have you selected ID numbers, in the range of 1 to 8, for the switches? You can control the ID number assignments by the order in which you initially power on the switches, or you can have the switches assign the numbers automatically. Refer to “Switch ID Numbers” on page 66 and “Powering On the Switches Individually” on page 129.
- If you are building a mixed stack of x530L switches and one or more x530 or x530DP switches, have you obtained stack mixed-mode licenses for the units?

Configuring Mixed-Mode VCStacking

To configure mixed-mode VCStacking, on each unit in the stack you must:

1. Install the mixed-mode stacking license. Once you have downloaded your license, you can transfer it onto the device's Flash storage by any preferred method. For example, you can use the copy command to copy the file from a USB device to your Flash storage.
2. Enter the mixed-mode VCStacking command:

   The command is: `awplus(config)#` STACK MIXED-MODE
3. Save the configuration.
4. Re-boot.

Stacking Worksheet

Configuring and maintaining a stack may be easier if you use the worksheet in Table 13.

Table 13. Stacking Worksheet

Switch	Switch Model/ Location	ID	Priority	AW+ Version Number	Trunk Ports
Master		1	1		
Member		2	2		
Member		3	3		
Member		4	4		
Member		5	5		
Member		6	6		
Member		7	7		
Member		8	8		

The worksheet columns are described in Table 14.

Table 14. Stacking Worksheet Columns

Column	Description
Switch Model/ Location	Use this column to write down the model names of the switches and their physical locations, such as the buildings or equipment rooms. The information can be useful in locating the switches if they are in different locations.
ID	Each switch in a stack has to have a unique ID number, in the range of 1 to 8. They display the numbers on the ID LEDs on the front panels and you use the numbers to configure the individual ports. Allied Telesis recommends assigning the ID 1, the default value, to the master switch. You should decide ahead of time, before beginning the configuration procedures, the ID assignments of the switches.
Priority	When the switches of a stack are reset or powered on, they perform an initialization process that involves, in part, choosing the master switch. The selection is based on their priority numbers and MAC addresses. The former is an adjustable parameter with a range of 0 to 255 and a default value of 128. The lower the value, the higher the priority. Thus, the switch with the lowest value becomes the stack master. If switches have the same priority number, the master is selected based on their MAC addresses. Again, as with priority numbers, the lower the MAC address, the higher the priority. Allied Telesis recommends setting each switch's priority value to match its ID value. This is to ensure that the switch you have chosen to be the master unit will indeed function in that role. Additionally, it will make it possible for you to know the order in which the switches assume the master role if the primary master should fail or be powered off.

Table 14. Stacking Worksheet Columns (Continued)

Column	Description
AW+ Version Number	This column is for writing down the version numbers of the AlliedWare Plus management software on the switches. The switches might not be able to form the stack if they have different versions. The configuration instructions explain how to view the version numbers. If they have different versions, you should update them to the most recent release before building the stack.
Trunk Ports	This column is for the ports of the trunk. This will be the default ports or the optional trunk ports. Refer to Table 12 on page 53. If you have not chosen the ports yet, you should do so before beginning the configuration procedures.

Chapter 3

Beginning the Installation

The chapter contains the following sections:

Reviewing Safety Precautions

Important: Safety statements that have the ⁄ symbol are translated into multiple languages in the *Translated Safety Statements* document at **https://www.alliedtelesis.com/en/documents/translated-safety-statements**.

Remarque: Les consignes de sécurité portant le symbole ⁄ sont traduites dans plusieurs langues dans le document *Translated Safety Statements,* disponible à l'adresse **https://www.alliedtelesis.com/en/documents/translated-safety-statements**.

Warning
Class 1 Laser product. ⁄ L1

Warning
Laser Radiation.
Class 1M Laser product.

Warning
Do not stare into the laser beam. ⁄ L2

Warning
Do not look directly at the fiber optic ends or inspect the cable ends with an optical lens. ⁄ L6

Warning
To prevent electric shock, do not remove the cover. No user-serviceable parts inside. This unit contains hazardous voltages and should only be opened by a trained and qualified technician. To avoid the possibility of electric shock, disconnect electric power to the product before connecting or disconnecting the LAN cables. E1

Warning
Do not work on equipment or cables during periods of lightning activity. E2

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. E3

Warning
Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts. E4

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. E5

Caution
Air vents must not be blocked and must have free access to the room ambient air for cooling. E6

Warning
Operating Temperatures. This product is designed for a maximum ambient temperature of 50° C. E52

Note
All Countries: Install product in accordance with local and National Electrical Codes. E8

Warning
Only trained and qualified personnel are allowed to install or replace this equipment. E14

Caution
Circuit Overloading: Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. E21

Caution
Risk of explosion if battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Attention: Le remplacement de la batterie par une batterie de type incorrect peut provoquer un danger d'explosion. La remplacer uniquement par une batterie du même type ou de type équivalent recommandée par le constructeur. Les batteries doivent être éliminées conformément aux instructions du constructeur. E22

Warning
Mounting of the equipment in the rack should be such that a hazardous condition is not created due to uneven mechanical loading. E25

Warning
The chassis may be heavy and awkward to lift. Allied Telesis recommends that you get assistance when mounting the chassis in an equipment rack. E28

Note
Use dedicated power circuits or power conditioners to supply reliable electrical power to the device. E27

Warning
This unit might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing the unit. E30

Note
If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra). E35

Caution
Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. E36

Warning
Reliable earthing of rack-mounted equipment must be maintained. Particular attention must be given to supply connections other than direct connections to the branch circuits (e.g., use of power strips). E37

Warning
To reduce the risk of electric shock, the PoE ports on this product must not connect to cabling that is routed outside the building where this device is located. E40

Warning
This product may have multiple AC power cords installed. To de-energize this equipment, disconnect all power cords from the device. E41

Caution
An Energy Hazard exists inside this equipment. Do not insert hands or tools into open chassis ports or plugs. E44

Warning
This equipment must be installed in a Restricted Access location. E45

Caution
The unit does not contain serviceable components. Please return damaged units for servicing. E42

Warning
The temperature of an operational SFP or SFP+ transceiver may exceed 70° C (58° F). Exercise caution when removing or handling a transceiver with unprotected hands. E43

Choosing a Site for the Switch

Observe these requirements when planning the installation of the switch.

- Before installing the switch in an equipment rack, check that the rack is safely secured so that it will not tip over. Devices in a rack should be installed starting at the bottom, with the heavier devices near the bottom of the rack.
- Before installing the switch on a table, check that the table is level and stable.
- The power outlets should be located near the switch and be easily accessible.
- The site should allow for easy access to the ports on the front of the switch, so that you can easily connect and disconnect cables, and view the port LEDs.
- The site should allow for adequate air flow around the unit and through the cooling vents on the front and rear panels. (The ventilation direction is from front to back.)
- The site must not expose the switch to moisture or water.
- The site must be a dust-free environment.
- The site must have dedicated power circuits or power conditioners to supply reliable electrical power to the network devices.
- Do not install the switch in a wiring or utility box because it might overheat and fail from inadequate air flow.

Warning
Switches should not be stacked on a table or desktop. They could present a physical safety hazard if you need to move or replace switches. E91

Installation Options

Figure 23 illustrates the four installation options.

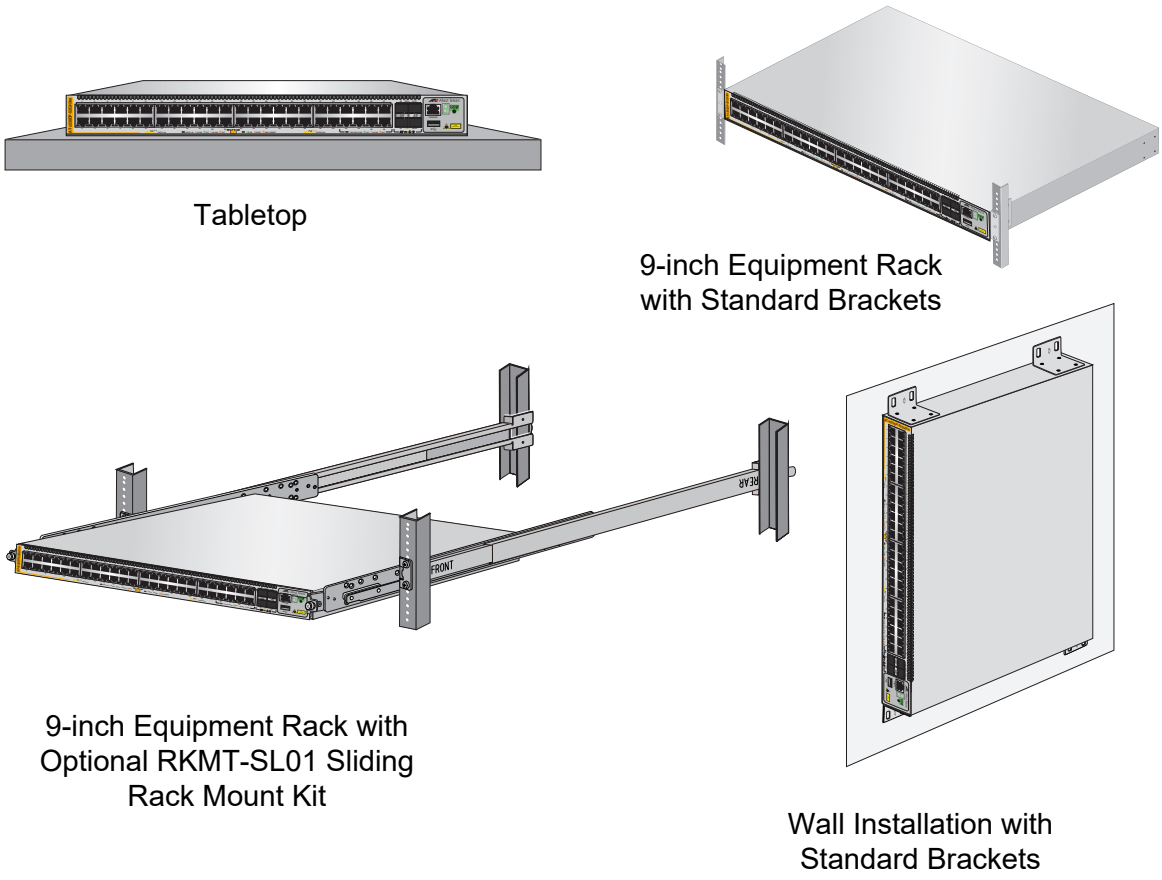


Figure 23. Installation Options

Note
The standard brackets are included with the switch, The optional RKMT-SL01 Sliding Shelf is purchased separately.

Unpacking the Switch

The main items provided in the shipping box for the switch are:

- The switch

Note
The switch comes with the FAN10 fan module, a PNL800/1200 blank panel pre-installed in slot B, and a Styrofoam block in power supply slot A.

- Accessory kit (refer to Figure 25 on page 86)

Note
Retain the original packaging material in case you need to return the unit to Allied Telesis.

Figure 24 shows the items provided in the shipping box for the switch.

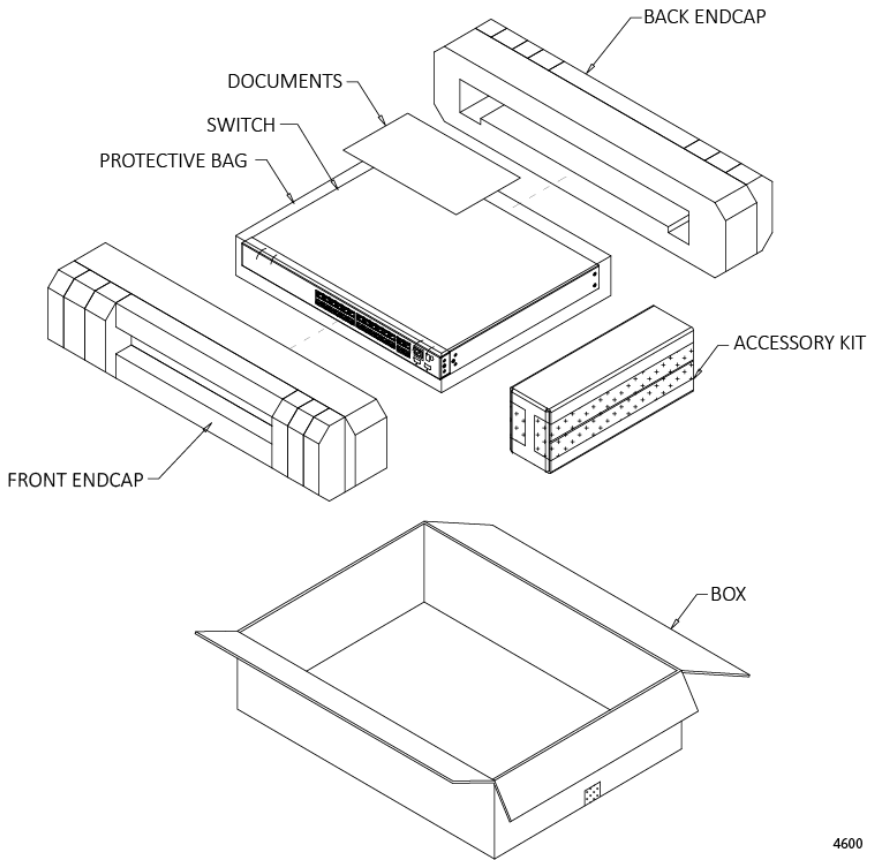
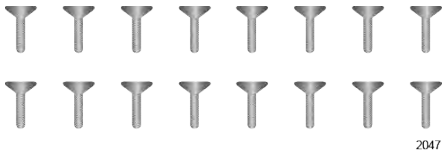


Figure 24. Switch Shipping Box

Verifying the Accessory Kit

Figure 25 lists the accessory items that are included with the switch.

One 2 m (6.6 ft) local management cable with RJ-45 (8P8C) and DB-9 (D-sub 9-pin) connectors.



Sixteen bracket screws

Four standard equipment rack or wall mounting brackets

Four anchors for concrete walls:
Length: 29.6mm (1.2 in.)
Diameter: 4mm (0.2 in.)

Four screws for wood or concrete walls:
Length: 32.6mm (1.3 in.)
Diameter: 4mm (0.2 in.)

Seven rubber feet

One PNL800/1200 blank panel

Figure 25. Accessory Kit

Note
If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.

Unpacking the Power Supply

To unpack the power supply, perform the following procedure:

1. Remove the power cord and any documents from the accessory partition.

Warning
The power supply is heavy. Ask for assistance lifting the device out of the shipping box. You might injure yourself or damage the device if you lift it without assistance.

2. Remove the power supply from the shipping end-caps and protective shipping bag.

Note
Retain the original packaging material in case you need to return the unit to Allied Telesis.

3. Visually inspect the product for damage.

Note
If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.

4. After unpacking the switch and power supplies, go to Chapter 4, “Installing the Power Supplies” on page 89.

Chapter 4

Installing the Power Supplies

The sections in this chapter are listed here:

Installing the Power Supplies

This section contains the procedure for installing a power supply in the switch. If you are planning to install the switch in an equipment rack, you may install the power supplies either before or after installing the device in the rack.

Caution
The device can be damaged by electrostatic discharge (ESD). Be sure to follow standard ESD protections procedures, such as wearing a wrist or foot strap, when installing the device. E106

Caution
The switch is heavy. Always ask for assistance before moving or lifting the device so as to avoid injuring yourself or damaging the equipment.

Note
If you are installing the PWR150R Power Supply, you must replace the pre-installed FAN10 module with the FAN10R module. The FAN10R module is sold separately. For instructions, refer to "Removing and Replacing the FAN10 or FAN10R Module" on page 101.

To install the power supplies, perform the following procedure:

1. Place the switch on a level, secure table or desk.
2. Use a cross-head screwdriver to loosen the two captive screws on the PNL800/1200 blank panel covering power supply slot B on the back panel and remove it from the switch. Refer to Figure 26 on page 91.

Note
You may skip this step and leave the blank panel on the switch if you are installing only one PWR800 or PWR1200 Power Supply. The panel is not compatible with the PWR150, PWR150R, PWR250, PWR250-80 and PWR300 Power Supplies and must be removed even if you are installing only one of those power supplies.

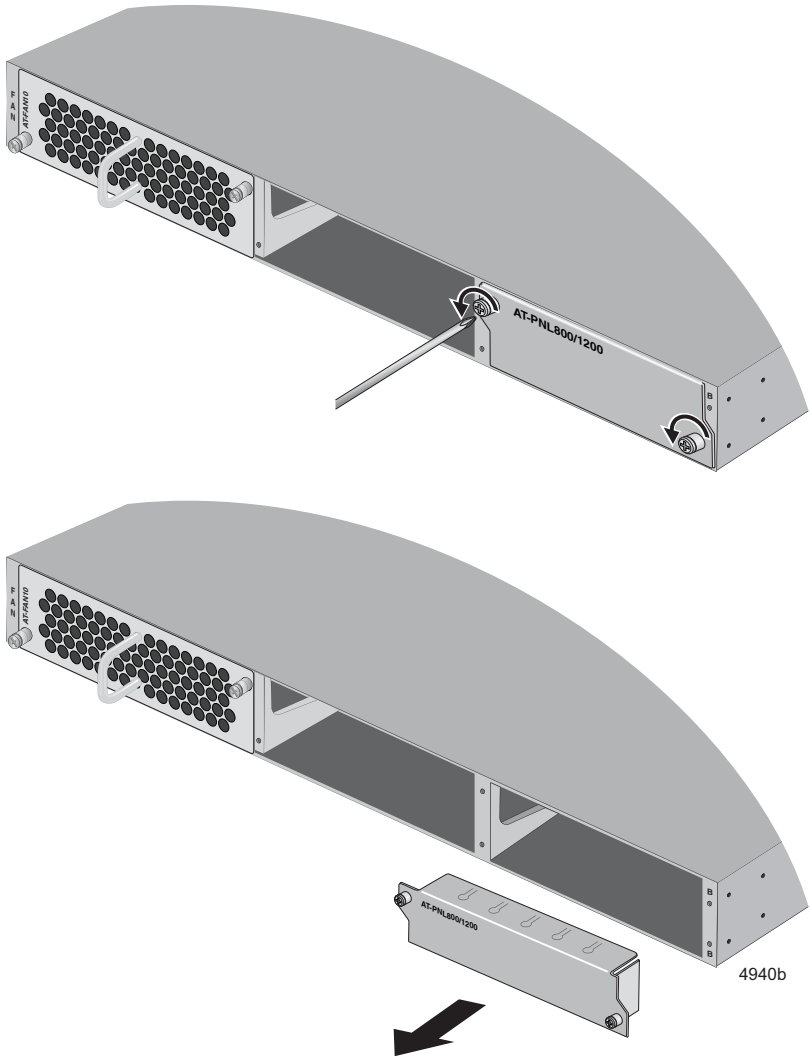


Figure 26. Removing the PNL800/1200 Blank Panel

3. Unpack the power supply from its shipping container.

Caution
The device is heavy. Use both hands to lift it. You might injure yourself or damage the device if you drop it. E94

4. Check the shipping container for the accessory items.

   Refer to Table 15 on page 92 to determine the accessory items that come with your power supply. The items are shown in Figure 27 on page 92.

Table 15. Accessory Items Included with a Power Supply

Power Supply	One Power Cord Retaining Clip	One Power Cord
PWR150 / PWR150R	Yes	Yes
PWR250	Yes	Yes
PWR250-80	No	No
PWR800	Yes	Yes
PWR1200	No	Yes

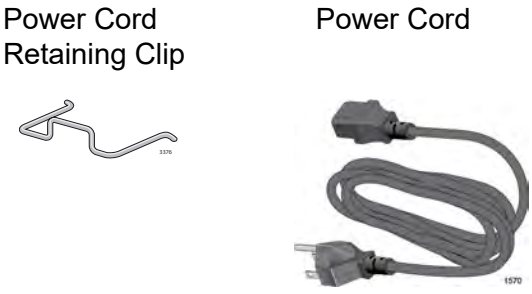


Figure 27. Power Supply Accessory Items

Note
The power cord that comes with the PWR1200 Power Supply for installations in North America has a 20 Amp, 125 V NEMA 5-20P plug that is only compatible with an NEMA 5-20R receptacle.

5. Slide the new power supply into slot A or B in the back panel of the switch. Refer to Figure 28 on page 93.

   Please review the following guidelines before installing the module:

   - ❒ If you are installing only one power supply, you may install it in either slot A or B.
   - ❒ The handle on the power supply should be on the left as you install the module in the switch. Refer to Figure 28 on page 93.
   - ❒ When installed, the PWR1200 Power Supply extends 5.6 cm (2.2 in.) from the back panel of the chassis.
   - ❒ The power supply is fully installed in the slot when the tabs with the captive screws are flush with the back panel of the switch. Light pressure may be required to properly seat the module on the power connector inside the chassis.

- ❒ The power supply unit is field-replaceable and hot-swappable. Refer to Figure 28.

Figure 28. Installing a Power Supply

Caution

Do not use excessive force when seating the module, because this may damage the system or the module. If the module resists seating, remove it from the system, realign it, and try again. E47

Caution

Do not connect the power cord to the power supply until after the power supply is installed in the switch. Installing a power supply while it is powered on might damage the switch. Refer to Figure 29 on page 94.

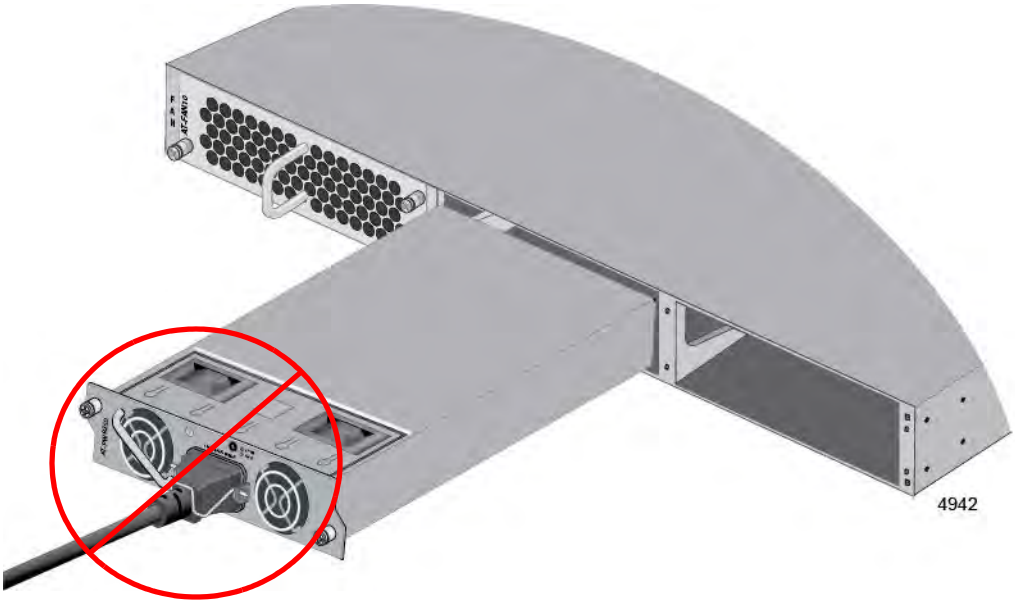


Figure 29. Improper Installation of a Power Supply

6. Secure the power supply to the switch by tightening the two captive screws with a cross-head screwdriver. Refer to Figure 30.

Figure 30. Tightening the Captive Screws on the Power Supply

7. If you installed the PWR150, PWR150R, PWR250, PWR250-80, or PWR800 Power Supply, install the power cord retaining clip on the AC plug. Press the sides of the clip inward and insert the two ends into the holes on the AC socket. Refer to Figure 31 on page 95.

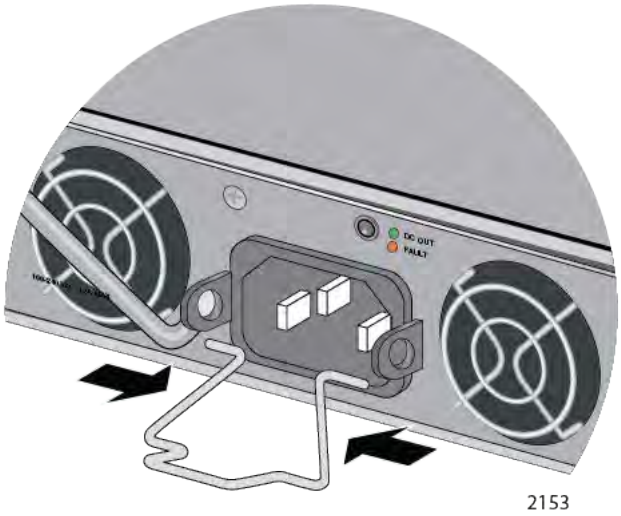


Figure 31. Installing the Power Cord Retaining Clip

Note
The PWR250-80 and PWR1200 Power Supplies do not come with a retaining clip.

8. To install a second power supply, repeat this procedure, starting with step 3.
9. If you installed only one power supply in the switch, perform the procedure in “Installing a Blank Power Supply Slot Cover” on page 96.
10. Do one of the following:
    - ❒ To install the switch on a table, go to Chapter 5, “Installing the Switch on a Table” on page 99.
    - ❒ To install the switch in an equipment rack, refer to Chapter 6, “Installing the Switch in an Equipment Rack” on page 103.
    - ❒ To install the switch on a wall, refer to Chapter 7, “Installing the Switch on a Wall” on page 109.
    - ❒ To install the switch in the RKMT-SL01 sliding rack, go to Appendix B, “Installing the Switch in the RKMT-SL01 Sliding Rack” on page 197.

Installing a Blank Power Supply Slot Cover

If you installed only one power supply in the switch, perform this procedure to install a blank panel over the empty power supply slot:

1. Position the appropriate blank panel over the empty power supply slot. Use the PNL800/1200 Blank Panel included in the accessory kit if the switch has only one PWR800 or PWR1200 Power Supply. Use the PNL250 Blank Panel if the switch has one PWR150, PWR150R, PWR250, or PWR250-80 Power Supply. Refer to Figure 32.

Figure 32. Installing a Blank Panel on a Power Supply Slot

2. Tighten the two captive screws with a cross-head screwdriver to secure the panel to the switch. Refer to Figure 33 on page 97.

Figure 33. Tightening the Captive Screws on the Power Supply Blank Panel

3. Do one of the following:

   - To install the switch on a table, go to Chapter 5, “Installing the Switch on a Table” on page 99.
   - To install the switch in an equipment rack, refer to Chapter 6, “Installing the Switch in an Equipment Rack” on page 103.
   - To install the switch on a wall, refer to Chapter 7, “Installing the Switch on a Wall” on page 109.
   - To install the switch in the RKMT-SL01 sliding rack, go to Appendix B, “Installing the Switch in the RKMT-SL01 Sliding Rack” on page 197.

Chapter 5

Installing the Switch on a Table

This chapter contains the instructions for installing the switch on a table or desktop. The sections in this chapter is listed here:

Warning
Switches should not be stacked on a table or desktop. They could present a physical safety hazard if you need to move or replace switches. E91

Installing the Rubber Feet on the Switch

The switch comes with seven rubber feet in the accessory kit. The feet, which are reusable, are used when installing the switch on a table.

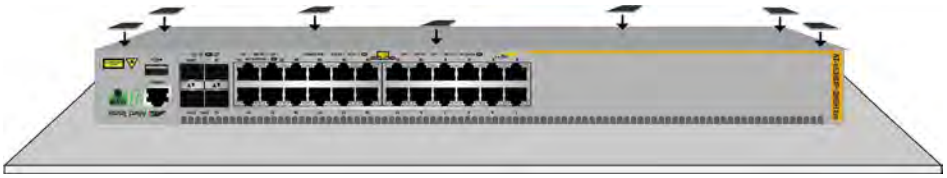
Note
Although you cannot stack the switches on top of each other, they can be placed next to each other.

Note
The following procedure assumes that you have already reviewed the information and performed the procedures in Chapter 3, “Beginning the Installation” on page 77.

Warning
The switch is heavy. Always ask for assistance when moving or lifting the device so as to avoid injuring yourself or damaging the equipment.

To install the bumper feet on the underside of the switch, perform the following procedure:

1. Place the switch upside down on a table.
2. Affix the seven bumper feet to the square indentations on the bottom panel of the switch



3. Turn the switch over.

Placing the Switch on a Desk or Table

To install the switch on a table, perform the following procedure:

1. Turn the switch over and place it on a flat, secure desk or table, leaving ample space around it for ventilation.

Warning
The switch is heavy. Always ask for assistance when moving or lifting the device so as to avoid injuring yourself or damaging the equipment. E122

2. Repeat this procedure on any other switches that are to be installed a a table or desktop.

3. Do one of the following:

   - If any of the switches have the PWR250-80 DC Power Supply, go to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.
   - Otherwise, go to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127.

Chapter 6

Installing the Switch in an Equipment Rack

This chapter provides instructions for installing the switch in an equipment rack. This chapter contains the following section:

Installing the Switch in an Equipment Rack

This section contains the procedure for installing the switch in a standard 19-inch equipment rack using the brackets supplied with the unit.

Note
For sliding rack mount installation instructions see Appendix B, “Installing the Switch in the RKMT-SL01 Sliding Rack” on page 197.

Required Items

The following items are required to install the switch in an equipment rack:

- Two equipment rack brackets (included with the switch)
- Eight M4x6mm bracket screws (included with the switch)
- Cross-head screwdriver (not provided)
- Four standard equipment rack screws (not provided)

Switch Orientations in the Equipment Rack

The switch has two sets of four screw holes on the left and right sides, for attaching the brackets. Refer to Figure 34.

Figure 34. Bracket Holes on the Switch

You can use the different sets of holes on the switch to install the switch in the equipment rack in a variety of orientations. You can install it with the front panel flush with, extending in front of, or recessed behind the front of the equipment rack. The illustration in Figure 35 shows the switch orientation with the front panel even with the front of the equipment rack.

Figure 35. Switch Orientations in an Equipment Rack

Installing the Switch

If you have not chosen an orientation for the switch in the equipment rack, review “Switch Orientations in the Equipment Rack” on page 104.

Please review the installation guidelines in “Choosing a Site for the Switch” on page 83 before installing the switch in an equipment rack.

Caution

The chassis can be heavy and awkward to lift. Allied Telesis recommends that you get assistance when mounting the chassis in an equipment rack. E28

To install the switch in a 19-inch equipment rack, perform the following procedure:

1. Place the switch on a level, secure surface.

2. Attach the two brackets to the sides of the switch in the selected position, using the eight M4x6mm screws supplied with the unit. The illustration in Figure 36 shows the installation of the brackets such that the front panel of the switch is even with the front of the equipment rack.

Figure 36. Example of Attaching the Brackets to the Switch

3. Have another person hold the switch at the desired location in the equipment rack while you secure it using four standard equipment rack screws (not provided). Refer to Figure 37.

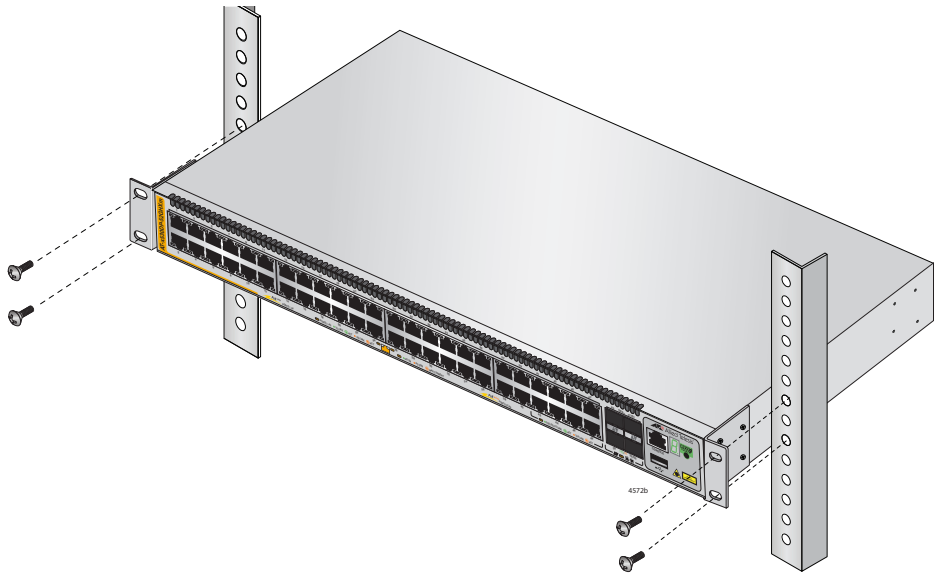


Figure 37. Installing the Switch in an Equipment Rack

4. Repeat this procedure if there are other switches to be installed in an equipment rack.

5. Do one of the following:

   - If you have not installed the power supplies yet, go to Chapter 4, “Installing the Power Supplies” on page 89.
   - If any of the switches contain the PWR250-80 DC Power Supply, go to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121
   - Otherwise, go to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127.

Chapter 7

Installing the Switch on a Wall

The procedures in this chapter are listed here:

Switch Orientations on a Wall

Install the switch on a wall with the front panel facing left or right, as shown in Figure 38. Do not install the switch with the front panel facing up or down.

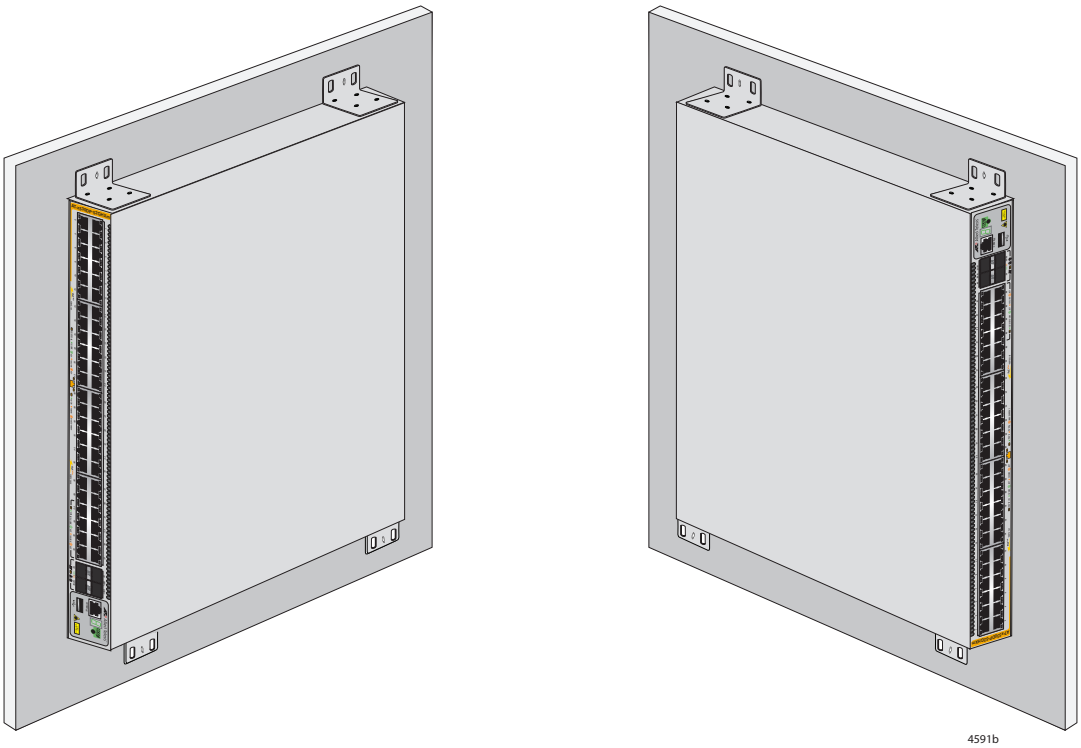


Figure 38. Positioning the Switch on the Wall

Installation Guidelines

Here are the guidelines for installing the switch on a wall:

- Install the switch on a wall that has wooden studs or on a concrete wall.
- If you are installing the switch on a wall with wooden studs, use a plywood base to support the switch. For more information, refer to “Plywood Base for a Wall with Wooden Studs” on page 113. A plywood base is not required for a concrete wall.
- Do not install the switch on a wall that has metal studs. Metal studs may not be strong enough to safely support the device.
- Do not install the switch on sheetrock or similar material. Sheetrock is not strong enough to safely support the device.

Warning
The device is heavy. Always ask for assistance before moving or lifting it to avoid injuring yourself or damaging the equipment.

Warning
The device should be installed on a wall by a qualified building contractor. Serious injury to yourself or others or damage to the equipment can result if it is not properly fastened to the wall. E105

Tools and Material

The following tools and material are required for installing the switch on a wall.

Included with switch:

- Four wall/equipment rack brackets for the switch.
- Sixteen screws for attaching the wall/equipment rack brackets to the switch: Length: 6.0mm (0.2 in.) Diameter: 4.0mm (0.2 in.).
- Four anchors for concrete walls for the switch: Length: 29.6mm (1.2 in.) Diameter: 6.0mm (0.2 in.).
- Four screws for wood or concrete walls for the switch: Length: 32mm (1.3 in.) Diameter: 4mm (0.2 in.).
- Two power cord retaining clips.

Not included with switch:

- Cross-head screwdriver.
- Stud finder for a wooden wall, capable of identifying the middle of wall studs and hot electrical wiring.
- Drill and 1/4-inch carbide drill bit (for a concrete wall).
  Refer to “Installing the Switch on a Concrete Wall” on page 117.
- Plywood base (if you are installing the switch on a wall with wooden studs). Refer to “Plywood Base for a Wall with Wooden Studs” on page 113 for illustrations.
- Four screws for attaching the plywood base to the wall.

Caution

The supplied screws and anchors might not be appropriate for all walls. A qualified building contractor can determine the hardware requirements for your wall prior to installing the switch. E88

Plywood Base for a Wall with Wooden Studs

If you are installing the switch on a wall that has wooden studs, use plywood base for the device. (A plywood base is not required for a concrete wall.) Refer to Figure 39.

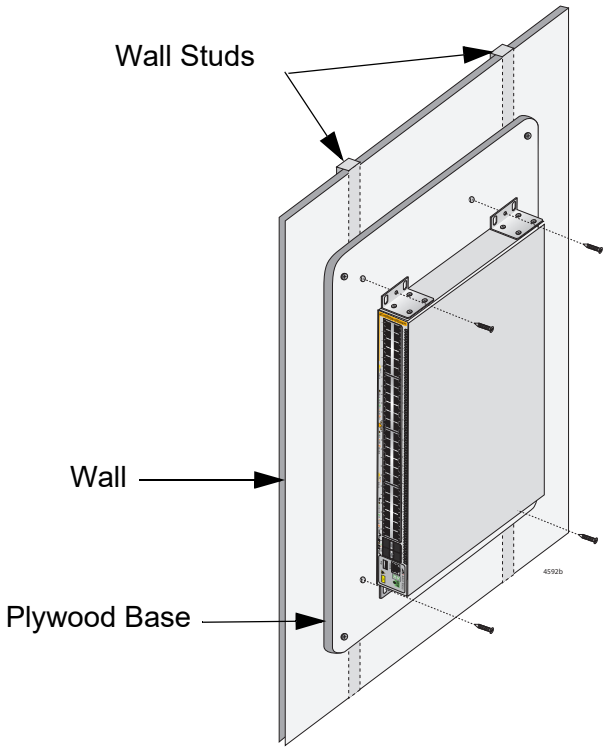


Figure 39. Switch on the Wall with Plywood Base

Mount the plywood base to two studs in the wall. The recommended minimum dimensions of the plywood base for the switch are:

- Width: 55.9 centimeters (22 inches)
- Height: 61.0 centimeters (24 inches)
- Thickness: 2.5 centimeters (1 inch)

The dimensions assume the wall studs are 41 centimeters (16 inches) apart. You might need to adjust the width of the base if the distance between the studs in your wall is different than the industry standard.

Installing a Plywood Base to the Wall

A plywood base is recommended when installing the switch on a wall that has wooden studs. Refer to “Plywood Base for a Wall with Wooden Studs” on page 113. Consult a qualified building contractor for installation instructions for the plywood base. Refer to Figure 40. The installation guidelines are listed here:

- Use a stud finder to identify the middle of studs and hot electrical wiring in the wall.
- Attach the base to two wall studs with a minimum of four screws.
- The selected wall location for the base must provide sufficient space from other devices or walls so that you can access the front and back panels, and for adequate air flow for ventilation.

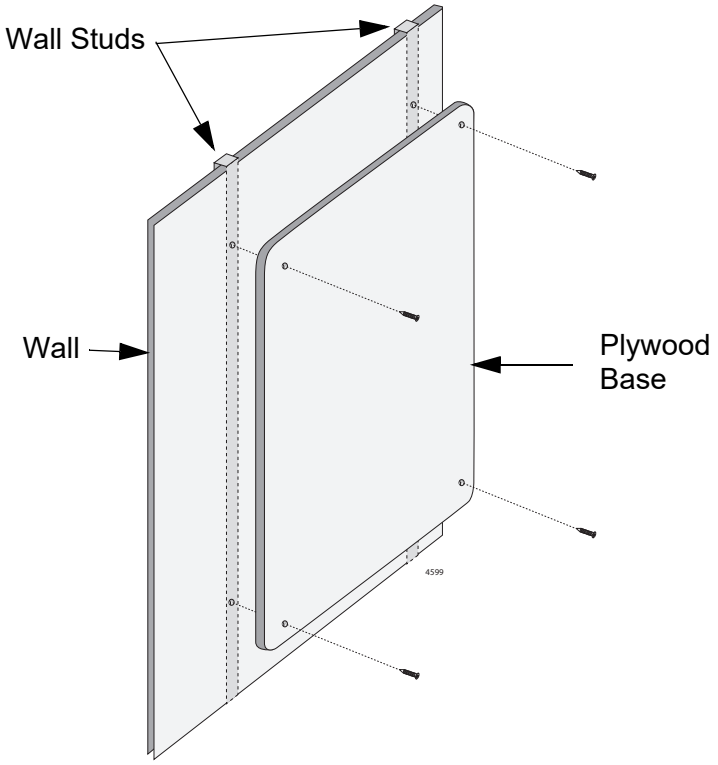


Figure 40. Installing the Plywood Base to the Wall

Installing the Switch on a Plywood Base

After the plywood base for the switch has been installed on the wall, install the switch. See “Reviewing Safety Precautions” on page 78 and “Choosing a Site for the Switch” on page 83 before performing this procedure. Allied Telesis recommends a minimum of two people for this procedure.

Warning
The device is heavy. Always ask for assistance before moving or lifting it to avoid injuring yourself or damaging the equipment.

Warning
The device should be installed on the wall by a qualified building contractor. Serious injury to yourself or others or damage to the equipment can result if it is not properly fastened to the wall. E105

To install the switch on the plywood base, perform the following procedure:

1. Place the switch on a table.
2. Install four wall/equipment rack brackets to the sides of the unit with the sixteen M4x6mm screws included with the switch. Refer to Figure 41.

Figure 41. Installing Brackets on the Switch

3. After attaching the brackets, have another person hold the switch on the plywood base on the wall while you secure it with the M4x32.3mm screws included with the switch. Refer to Figure 42 on page 116 for the switch.

4. Follow these guidelines as you position the switch on the wall:

   - ❒ Position it so that the front panel is left or right. Refer to Figure 42. Do not install it with the front panel facing up or down.
   - ❒ Provide sufficient space from other devices or walls so that you can access the front and back panels, and for adequate air flow for ventilation.

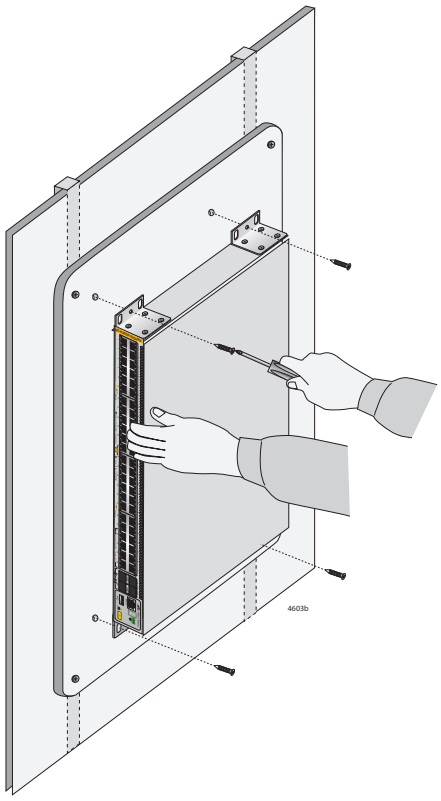


Figure 42. Securing the Switch to the Plywood Base

5. Repeat this procedure to install other switches on a wall.

6. Do one of the following:

   - ❒ If any of the switches contain the AT-PWR250-80 DC Power Supply, go to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.
   - ❒ Otherwise, go to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127 or Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147.

Installing the Switch on a Concrete Wall

This section contains the instructions for installing the switch on a concrete wall. Please review the information in the following sections before performing the procedure:

- “Switch Orientations on a Wall” on page 110
- “Installation Guidelines” on page 111

Warning
The device is heavy. Always ask for assistance before moving or lifting it to avoid injuring yourself or damaging the equipment.

Warning
The device should be installed on the wall by a qualified building contractor. Serious injury to yourself or others or damage to the equipment can result if it is not properly fastened to the wall. E105

To install the switch on a concrete wall, perform the following procedure:

1. Place the switch on a table.
2. Install four wall/equipment rack brackets to the sides of the unit with the sixteen M4x6mm screws included with the switch. Refer to Figure 41 on page 115.
3. After attaching the brackets, have another person hold the switch on the concrete wall at the selected location for the device while you use a pencil or pen to mark the wall with the locations of the four screw holes in the four brackets (one screw per bracket). Refer to Figure 43 on page 118.

   Please follow these guidelines as you position the switch on the wall:

   - Position it so that the front panel is facing left or right. Refer to Figure 38 on page 110. Do not install the switch with the front panel facing up or down.
   - Provide sufficient space from other devices or walls so that you can access the front and back panels, and for adequate air flow and ventilation.

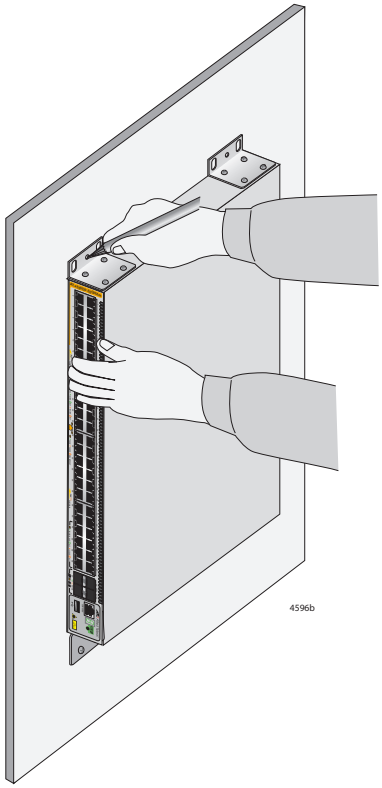


Figure 43. Marking the Locations of the Bracket Holes on a Concrete Wall

4. Place the switch on a table.
5. Use a drill and a 1/4-inch carbide drill bit to pre-drill the holes you marked in step 3. Please review the following guidelines:
   - ❒ Prior to drilling, set the drill to hammer and rotation mode. The mode breaks up the concrete and cleans out the hole.
   - ❒ Clean out the holes with a brush or compressed air.
6. Insert the anchors into the holes.

7. Have another person hold the switch at the selected wall location while you secure it to the wall with the M4x32mm screws provided. Refer to Figure 44.

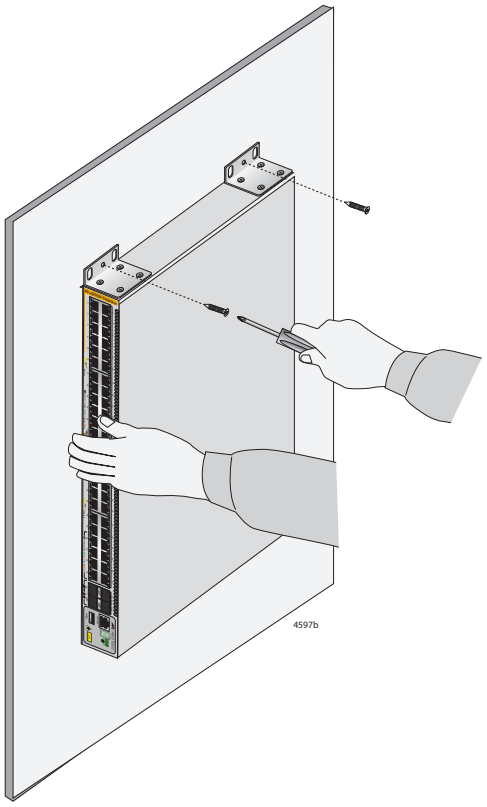


Figure 44. Installing the Switch on a Concrete Wall

8. Repeat this procedure to install other switches on a wall.

9. Do one of the following:

   - If any of the switches contain the AT-PWR250-80 DC Power Supply, go to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.
   - Otherwise, go to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127 or Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147.

Chapter 8

Wiring the DC Connector on the PWR250-80 Power Supply

This chapter contains instructions on how to wire the DC connector on the PWR250-80 DC power supply.

Warning
As a safety precaution, install a circuit breaker with a minimum value of 15 Amps between the equipment and the DC power source. E9

Warning
Always connect the wires to the LAN equipment first before connecting them to the circuit breaker. Do not work with HOT feeds to avoid the danger of physical injury from electrical shock. Always verify that the circuit breaker is in the OFF position before connecting the wires to the circuit breaker. E9

Warning
For centralized DC power connection, install only in a restricted access area. E23

Warning
This equipment must be installed in a Restricted Access location. E45

Note
A tray cable is required to connect the power source if the unit is powered by centralized DC power. The tray cable must be a UL listed Type TC tray cable and rated at 600 V and 90 degrees C, with three conductors, minimum 14 AWG. E24

To wire the DC connector on the PWR250-80 DC Power Supply, perform the following procedure:

1. Power off the DC circuit to which the switch will be connected.
2. Verify that the On/Off switch on the power supply is in the Off position. Refer to Figure 45 on page 122.

Figure 45. On/Off Switch on PWR250-80 Power Supply

3. Use the legend above the terminal block to identify the terminals. The terminals are **positive**, **power supply ground** and **negative**, from left to right, as shown in Figure 46.

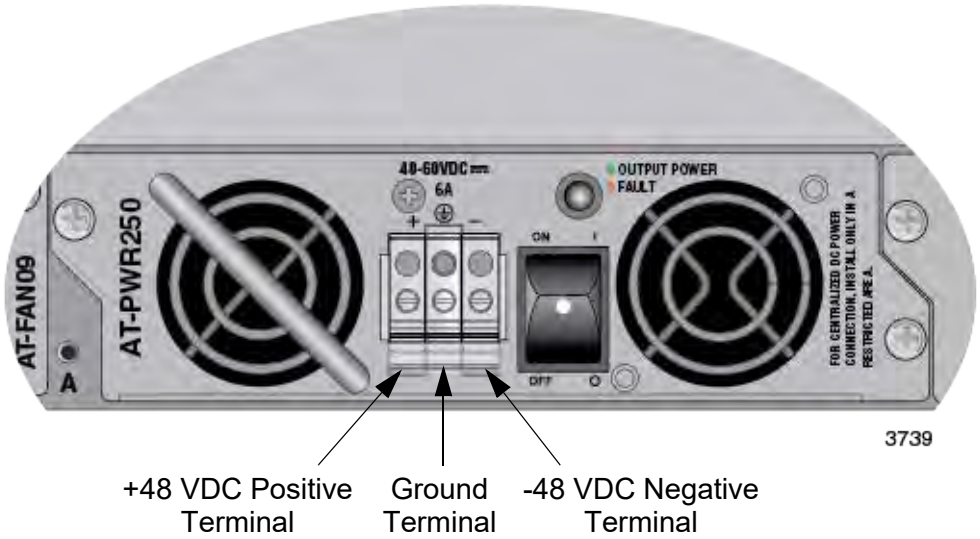


Figure 46. DC Terminal Block

4. With a 14-gauge wire-stripping tool, strip the three wires in the tray cable coming from the DC input power source to 8mm ± 1mm (0.31 in., ± 0.039 in.), as shown in Figure 47 on page 123.

Warning
Do not strip more than the recommended amount of wire. Stripping more than the recommended amount can create a safety hazard by leaving exposed wire on the terminal block after installation. E10

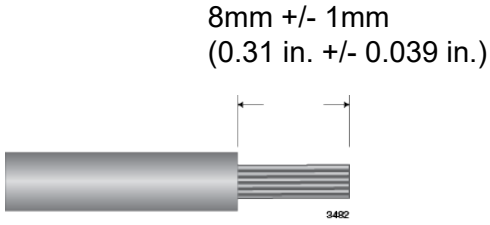


Figure 47. Stripped Wire

5. Insert the power supply ground wire into the middle connector of the DC terminal and tighten the connection with a flathead screwdriver. Refer to Figure 48.

Warning
When installing this equipment, always ensure that the power supply ground connection is installed first and disconnected last. E11

Figure 48. Connecting the Ground Wire to the DC Terminal Block

6. Connect the +48 VDC (RTN) feed wire to the terminal block marked + (plus).

7. Connect the -48 VDC feed wire to the terminal block marked - (minus).

Warning
Check to see if there are any exposed copper strands coming from the installed wires. When this installation is done correctly there should be no exposed copper wire strands extending from the terminal block. Any exposed wiring can conduct harmful levels of electricity to persons touching the wires. E12

8. Secure the tray cable near the rack framework using multiple cable ties to minimize the chance of the connections being disturbed by casual contact with the wiring. Use at least four cable ties, separated four inches apart. Locate the first one within six inches of the terminal block.

Note
This system will work with a positive grounded or negative grounded DC system. E13

9. Verify that the circuit breaker is in the OFF position.

10. Connect the supply-cable wires to the circuit breaker.

Note
Do not power on the switch at this time.

11. If the switch has two PWR250-80 Power Supplies, repeat this procedure to wire the second DC connector.

12. Repeat this procedure to wire the DC connectors on the PWR250-80 Power Supplies in the other switches of the stack.

13. After wiring all of the PWR250-80 Power Supplies, go to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127 or Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147.

Warning
This unit might have more than one power source. To reduce the risk of electric shock, disconnect all power cords before servicing the unit. E30

Chapter 9

Building the Trunk with Default 10 Gbps Stacking Ports

This chapter contains the following procedures:

Introduction

This chapter contains instructions for building the stack using the default 10Gbps stacking ports. The procedure does not require any configuration steps because the stacking feature is enabled by default. The default stacking ports are:

- Ports 27 and 28 on the x530DP-28GHXm switch
- Ports 51 and 52 on the x530DP-52GHXm switch

To build the stack, you cable the stacking ports and power on the switches.

There are two procedures:

- To control the assignment of the switch ID numbers yourself, perform “Powering On the Switches Individually” on page 129. The numbers are assigned in the order in which you power on the units.
- To have the switches assign the ID numbers automatically, perform “Powering On the Switches Simultaneously” on page 132.

Caution

Do not change the ID numbers of the switches after beginning to configure the parameter settings. Otherwise, the stack might assign configuration settings to the wrong units.

Note

To use the 5Gbps multi-speed ports for the stack trunk instead of the default ports, refer to Chapter 10, “Building the Stack Trunk with 5Gbps Multi-Speed Ports” on page 147. For background information, refer to “Stack Trunks of 5Gbps Twisted Pair Ports” on page 58.

Powering On the Switches Individually

This procedure explains how you can control the assignment of the ID numbers of the switches by powering on the units one at a time during the initial power-on sequence. The first switch is assigned ID number 1, the next unit is assigned ID number 2, and so on. This procedure is useful when the switches are installed in the same equipment rack and you want to number them in sequence, such as from top to bottom, to make them easier to identify. After the ID numbers are assigned, the switches retain their assignments even if you power off or reset the stack.

During the first power on sequence, the first switch powered on becomes the master switch of the stack. If you do not change the priority values of the units, the next time you reset or power cycle the stack the units use their MAC addresses to select the master switch. This might result in a different switch being assigned that role. However, this does not affect their ID number assignments, the configuration of the switches, or the manner in which you manage the stack.

This procedure assumes the following:

- ❒ This is the initial power-on sequence of the stack.
- ❒ You cabled the default ports on the switches to form the stack trunk.
  - – Ports 27 and 28 on the x530DP-28GHXm switch
  - – Ports 51 and 52 on the x530DP-52GHXm switch

Note
For example, when cabling x530DP-52GHXm ports 51/S1 and 52/S2 for the stack trunk, you can either connect the same ports together, for example, (51/S1 to 51/S1 and 52/S2 to 52/S2) or you can cross them over (51/S1 to 52/S2). The latter is recommended but not mandatory.

- ❒ The ID numbers are set to the default 1.
- ❒ All the switches are powered off.
- ❒ If the stack contains one or more switches with PWR250-80 DC power supplies, you should have already connected the grounding and power wires to the DC connectors on the power supplies. For instructions, refer to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.

To monitor the power on sequence, you can connect a terminal or computer with a terminal emulator program to the Console port on the switch you intend to power on first. The messages are found in “Monitoring the Initialization Processes” on page 144.

Before powering on the switch, refer to “Power Specifications” on page 190 for the power specifications.

If you want to monitor the power on sequence, you may connect a terminal or computer with a terminal emulator program to the Console port on the switch you intend to power on first. The messages are found in “Monitoring the Initialization Processes” on page 144.

To power on the switches, perform the following procedure:

1. Power on the switch you want to have ID number 1.

   - ❒ If the switch has an AC power supply, connect the AC power cord to the connector on the back panel and to an appropriate power source. If the switch has two power supplies, power on both supplies. Connecting the two power cords to power sources that are on different circuits will provide power redundancy to the switch in the event a circuit fails.
   - ❒ If you have not already cabled the default ports, do so now. For background information, refer to “Stack Trunks of SFP+ 10Gbps Ports” on page 54. For cabling instructions, refer to Chapter 11, “Cabling the Networking Ports” on page 173.
   - ❒ If the switch has the PWR250-80 DC Power Supply, power on the DC circuit and the On/Off switch on the power supply. If you have not wired the DC connector yet, perform the procedure in Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ⁄ E3

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. ⁄ E5

Note
Refer to “Power Specifications” on page 190 for the power specifications of the switches.

2. Wait one minute for the switch to initialize its management software.

   The switch should be displaying the number 1 on its ID LED.

3. Power on the switch to be assigned ID number 2.

4. Wait two minutes for the new switch to join the stack as a member.

   As the new switch boots up, the first switch, which has the ID number 1 and at this point is the master switch of the stack, notifies the new switch that its current ID number is already being used and that it should change its number to the next available number, which is 2. The new switch responds by automatically changing its ID number to 2 and reboots. So the new switch is actually booting up twice, once with the ID number 1 and again with its new ID number 2, which is why it takes two minutes before the device becomes a full member of the stack.

5. If there is a third switch, power it on and wait another two minutes for it to join the stack as a member with the ID number 3.

6. If there are additional switches, power each one on at a time and wait two minutes for the switch to join the stack as a member with the ID number 4, 5, 6, 7, and 8.

   The stack is operational. The ID numbers are automatically stored in special files in the flash memories of the switches and are retained by the devices even if you reset or power cycle the stack.

7. To continue with the installation, go to “Starting a Local Management Session” on page 134 and “Verifying the Stack” on page 136.

Powering On the Switches Simultaneously

If you want the switches of the stack to use their MAC addresses to automatically assign the ID numbers during the initial power on sequence, all you have to do is power them on simultaneously, rather than one at a time as in the previous procedure. Here are the steps the switches perform:

- ❒ They initialize their management software and compare their MAC addresses.
- ❒ The switch with the lowest address is designated as the master switch of the stack.
- ❒ The master switch assigns itself the ID number 1.
- ❒ The master switch assigns ID numbers to the other switches.
- ❒ The other switches reset and initialize their management software again, with their new ID numbers.

This procedure assumes the following:

- ❒ This is the first power on sequence of the stack.
- ❒ You cabled the default ports on the switches to form the stack trunk.
  - – Ports 27 and 28 on the x530DP-28GHXm switch
  - – Ports 51 and 52 on the x530DP-52GHXm switch

Note
For example, when cabling x530DP-52GHXm ports 51/S1 and 52/S2 for the stack trunk, you can either connect the same ports together, for example, (51/S1 to 51/S1 and 52/S2 to 52/S2) or you can cross them over (51/S1 to 52/S2). The latter is recommended but not mandatory.

- ❒ The ID numbers are set to the default 1.
- ❒ All the switches are powered off.
- ❒ If the stack contains one or more switches with PWR250-80 DC power supplies, you should have already connected the grounding and power wires to the DC connectors on the power supplies. For instructions, refer to Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.

To monitor the power-on sequence, you can connect a terminal or computer with a terminal emulator program to the Console port on any of the switches. The messages are found in “Monitoring the Initialization Processes” on page 144.

Before powering on a switch, refer to “Power Specifications” on page 190 for the power specifications of the switches.

To have the switches automatically assign the ID numbers, perform the following procedure:

1. Power on all of the switches in the stack at the same time.

   - ❒ If the switch has an AC power supply, connect the AC power cord to the connector on the back panel and to an appropriate power source. If the switch has two power supplies, power on both supplies. Connecting the two power cords to power sources that are on different circuits will provide power redundancy to the switch in the event a circuit fails.
   - ❒ If you have not already cabled the default ports, do so now. For background information, refer to “Stack Trunks of SFP+ 10Gbps Ports” on page 54. For cabling instructions, refer to Chapter 11, “Cabling the Networking Ports” on page 173.
   - ❒ If the switch has the PWR250-80 DC Power Supply, power on the DC circuit and the On/Off switch on the power supply. If you have not wired the DC connector yet, perform the procedure in Chapter 8, “Wiring the DC Connector on the PWR250-80 Power Supply” on page 121.

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ∽ E3

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. ∽ E5

Note
Refer to “Power Specifications” on page 190 for the power specifications of the switches.

2. Wait two or three minutes for the switches to select a master switch and to assign the ID numbers.

   The stack is operational. The ID numbers are automatically stored in special files in the flash memories of the switches and are retained by the devices even if you reset or power cycle the stack.

3. To continue with the installation, go to “Starting a Local Management Session” on page 134.

Starting a Local Management Session

This section contains the procedure for starting a local management session on a stack. You can perform the procedure on any switch in a stack.

To start a local management session on the stack, perform the following procedure:

1. Connect the RJ-45 connector of the management cable to the console port on the front panel of any switch in the stack. Refer to Figure 49.

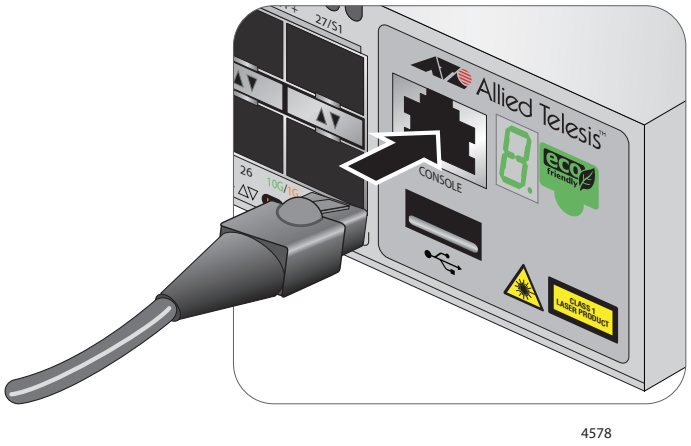


Figure 49. Connecting the Management Cable to the Console Port

Note
To manage switches from a laptop computer that does not have an RS-232 port, you can use the optional VT-Kit3 USB to Serial Console Management Cable.

2. Connect the other end of the cable to an RS-232 port on a terminal or computer with a terminal emulator program.
3. Configure the terminal or terminal emulator program as follows:
   - ❒ Default baud rate: 9,600 bps (range is 9,600 to 115,200 bps)
   - ❒ Data bits: 8
   - ❒ Parity: None
   - ❒ Stop bits: 1
   - ❒ Flow control: None

Note
The port settings are for a DEC VT100 or ANSI terminal, or an equivalent terminal emulator program.

4. Press Enter.

   You are prompted for a user name and password.

5. When prompted, type a user name and password to log on to the switch. If this is the initial management session, enter “manager” as the user name and “friend” as the password. The user name and password are case sensitive.

   The local management session starts when the User Exec mode prompts:

```
awplus>
```

   Note
   The User Exec mode is the first level in the command mode interface. For complete information on the modes and commands, refer to the *Command Reference: x530 Series Switches Running AlliedWare Plus Version 5.5.0* at **www.alliedtelesis.com/library.**

6. Go to “Verifying the Stack” on page 136.

Verifying the Stack

To verify the stack, perform the following procedure:

1. Start a local management session on any switch in the stack. Refer to “Starting a Local Management Session” on page 134.
2. From the User Exec mode, type the SHOW STACK command:

```
awplus> show stack
```

The following example is from a stack of three switches:

```
awplus> show stack
Virtual Chassis Stacking summary information
ID    Pending ID     MAC address       Priority   Status   Role
1     -              e01a:ea20:8011    1          Ready    Active Master
2     -              e01a:ea20:8012    2          Ready    Member
3     -              e01a:ea20:8902    3          Ready    Member
Operational Status                     Normal operations
```

Consider the following:

- The command should list all switches in the stack. If the list is incomplete, refer to Chapter 12, “Troubleshooting” on page 181.
- The Operational Status field displays “Normal operations” when the switches are connected in the ring topology and “Not all stack ports are up” when the switches are connected in the linear topology.
- The priority values will be 128, the default value, if you did not change them.
- There is no relationship between the ID numbers and the selection of the master switch. Consequently, the active master in the SHOW STACK command might not have the ID number 1.

3. Do one of the following:
   - To add ports to the stack trunk, go to “Adding Optional Ports to the Stack Trunk” on page 137.
   - If you want to change the priority values of the switches, go to “STACK PRIORITY” on page 151. The procedure is optional.
   - Otherwise, go to Chapter 11, “Cabling the Networking Ports” on page 173 to complete with the installation.

Adding Optional Ports to the Stack Trunk

This procedure explains how to add ports to the stack trunk.

- Ports 25 to 26 on the x530DP-28GHXm. Refer to Table 16.
- Ports 49 to 50 on the x530DP-52GHXm. Refer to Table 17 on page 138.

x530DP-28GHXm

The procedure assumes the following:

- You performed the procedures earlier in this chapter to power on and verify the stack with ports 27 and 28 as the stack trunk.
- Ports 25 to 26 are not cabled. If there are cables connected to the ports, remove them before performing the procedure.

To add ports 25 and 26 to the stack trunk, perform the following procedure:

Table 16. Adding Ports 25 and 26 to the Stack Trunk

Step	Description and Command
1	Start a local management session on any switch in the stack. Refer to “Starting a Local Management Session” on page 134.
2	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`

3	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

4	Enter the port Interface mode for ports 25 and 26 on all the switches in the stack. This example assumes the stack has four switches: `awplus(config)# interface port1.0.25-1.0.26,port2.0.25-2.0.26,port3.0.25-3.0.26,port4.0.25-4.0.26`

5	Designate the ports as stacking ports with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

6	Return to the Global Configuration mode. `awplus(config-if)# exit`

Table 16. Adding Ports 25 and 26 to the Stack Trunk (Continued)

Step	Description and Command
7	Return to the Privileged Exec mode. `awplus(config)# exit`

8	Enter the WRITE command to save your change. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory, for storing your configuration changes. If you do not save your changes, they will be discarded and you will have to reenter them when you reboot the switch in the next step.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

9	Power off the switches of the stack.
10	Cable ports 25 and 26.
11	Power on the switches.
12	Wait three minutes for the switches to initialize their management software and form the stack.
13	Repeat “Verifying the Stack” on page 136.

x530DP-52GHXm

The procedure assumes the following:

- You performed the procedures earlier in this chapter to power on and verify the stack with ports 51 and 52 as the stack trunk.
- Ports 49 to 50 are not cabled. If there are cables connected to the ports, remove them before performing the procedure.

To add ports 49 and 50 to the stack trunk, perform the following procedure:

Table 17. Adding Ports 49 and 50 to the Stack Trunk

Step	Description and Command
1	Start a local management session on any switch in the stack. Refer to “Starting a Local Management Session” on page 134.
2	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`

Table 17. Adding Ports 49 and 50 to the Stack Trunk (Continued)

Step	Description and Command

3	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

4	Enter the port Interface mode for ports 49 and 50 on all the switches in the stack. This example assumes the stack has four switches: `awplus(config)# interface port1.0.49-1.0.50,port2.0.49-2.0.50,port3.0.49-3.0.50,port4.0.49-4.0.50`

5	Designate the ports as stacking ports with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

6	Return to the Global Configuration mode. `awplus(config-if)# exit`
7	Return to the Privileged Exec mode. `awplus(config)# exit`

8	Enter the WRITE command to save your change. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory, for storing your configuration changes. If you do not save your changes, they will be discarded and you will have to reenter them when you reboot the switch in the next step.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

9	Power off the switches of the stack.
10	Cable ports 49 and 50.
11	Power on the switches.
12	Wait three minutes for the switches to initialize their management software and form the stack.
13	Repeat “Verifying the Stack” on page 136.

Powering on a Stack

Before powering on a switch, review the information in “Power Specifications” on page 190 for the power specifications of the switches. See power on instructions for the power supply unit you are using:

- “PWR150, PWR150R, PWR250, or PWR800 Power Supply” on page 140
- “PWR1200 Power Supply” on page 142
- “What to Do Next” on page 143

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ℒ E3

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. ℒ E5

PWR150, PWR150R, PWR250, or PWR800 Power Supply

To power on a switch, perform the following procedure for PWR150, PWR250R, PWR250, or PWR800:

Note
PWR1200 power supply does not use a power cord retaining clip. To view the procedure for PWR1200, see “PWR1200 Power Supply” on page 142.

1. Install the power cord retaining clip on the AC power connector of the power supply on the rear panel of the switch. Refer to Figure 50.

Figure 50. Installing the Power Cord Retaining Clip

2. Connect the AC power cord to the AC power connector on the rear panel of the switch. Refer to Figure 51.

Figure 51. Connecting the AC Power Cord to the Switch

3. Lower the power cord retaining clips to secure the cord to the switch. Refer to Figure 52.

Figure 52. Plugging in the AC Power Cord to the Switch

4. Connect the power cord to an appropriate AC power source. Refer to Figure 53 on page 142.

5. Repeat this procedure to connect the second power cord to the switch.

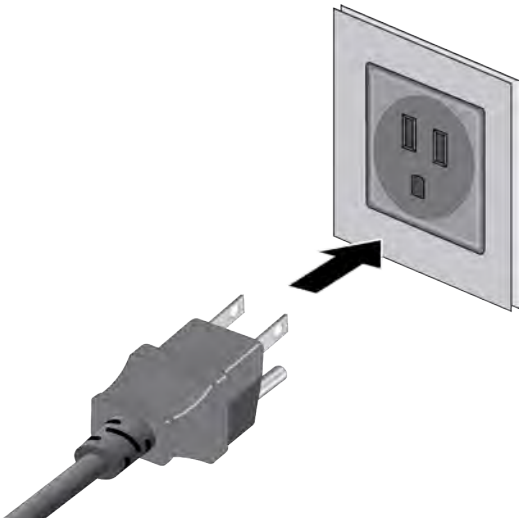


Figure 53. Plugging in the AC Power Cord to an AC Source

PWR1200 Power Supply

To power on a switch, perform the following procedure for PWR1200 power supply:

1. Connect the AC power cord to the AC power connector on the rear panel of the switch. Refer to Figure 51.

Figure 54. Connecting the AC Power Cord to the Switch

Note
When installed, the PWR1200 Power Supply extends 5.6 cm (2.2 in.) from the back panel of the chassis as shown in Figure 54.

2. Connect the power cord to an appropriate AC power source. Refer to Figure 55.

3. Repeat this procedure to connect the second power cord to the switch.

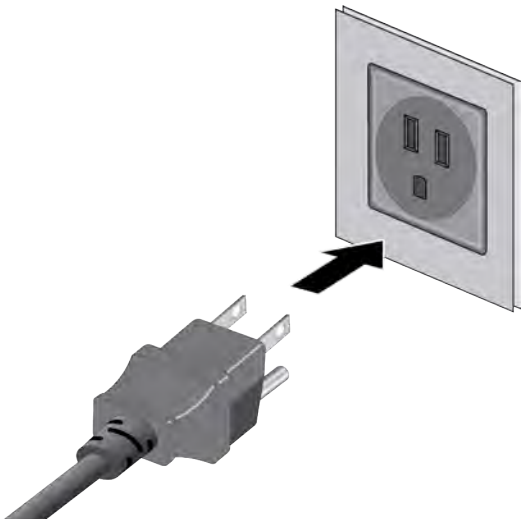


Figure 55. Plugging in the AC Power Cord to an AC Source

What to Do Next

Do one of the following:

- ❒ To monitor the switch as it initializes the management software, go to “Monitoring the Initialization Processes” on page 144.
- ❒ Wait two minutes for the switch to initialize its management software and then go to Chapter 11, “Cabling the Networking Ports” on page 173.

Monitoring the Initialization Processes

It takes about two minutes for the switch to initialize its management software programs and features, and load the default configuration. You can monitor the bootup sequence by connecting a terminal or computer with a terminal emulator program to the Console port. (The Console port settings are provided in “Starting a Local Management Session” on page 134.) The switch displays the messages in Figure 56 through Figure 58 on the Console port as it initializes the management software.

```
Bootloader 6.2.12 loaded
Press <Ctrl+B> for the Boot Menu
Reading flash:x530DP-5.5.1-rcl.rel...

Verifying release... OK
Booting...
Starting base/first...                                  [  OK  ]
Mounting virtual filesystems...                         [  OK  ]
          _______________   ____
        /\ \            / /______\
      /   \ \_      __/ /| _______ |
    /      \ |     |  /  | _______ |
  /         \ \   / /     \ ____ /
/_______/\____\ \/ /_____________/

Allied Telesis Inc.
AlliedWare Plus (TM) v5.5.1
Current release filename: x530DP-5.5.1-rcl.rel...
Built: Mon Mar 29 01:57:50 UTC 2021
Mounting static filesystems...                          [  OK  ]
Attaching to /dev/mtd0...                               [  OK  ]
Mounting file system...                                 [  OK  ]
Checking for last gasp debug output...                  [  OK  ]
Checking NVS filesystem...                              [  OK  ]
Mounting NVS filesystem...                              [  OK  ]
Initializing random number generator...                 [  OK  ]
Starting base/hwrandom...                               [  OK  ]
Starting base/jitterentropy-rngd...                     [  OK  ]
Starting base/dbus...                                   [  OK  ]
Starting base/linux...                                  [  OK  ]
```

Figure 56. Switch Initialization Messages

```
Starting base/loopback...                                [  OK  ]
Starting base/poe_done...                                [  OK  ]
Starting base/portmapper...                              [  OK  ]
Received event syslog.done
Starting base/modules...                                 [  OK  ]
Received event modules.done
Starting base/reboot-stability...                        [  OK  ]
Checking system reboot stability...                      [  OK  ]
Starting base/apteryx...                                 [  OK  ]
Starting base/crond...                                   [  OK  ]
Starting base/appmond...                                 [  OK  ]
Starting base/clockcheck...                              [  OK  ]
Starting network/execd...                                [  OK  ]
Starting base/inet...                                    [  OK  ]
Received event apteryx.done
Starting hardware/early_host_info...                     [  OK  ]
Starting base/alfred...                                  [  OK  ]
Starting base/kernond...                                 [  OK  ]
Starting base/apteryx-sync...                            [  OK  ]
Starting base/logconf...                                 [  OK  ]
Received event apteryx-sync.done
Starting hardware/platformd...                           [  OK  ]
Starting hardware/plugman...                             [  OK  ]
Starting hardware/timeout...                             [  OK  ]
Starting hardware/hardware-done...                       [  OK  ]
Received event board.inserted
Received event hardware.done
Starting base/external-media...                          [  OK  ]
Starting network/startup...                              [  OK  ]
Starting network/hostcfg...                              [  OK  ]
Received event hostcfg.done
Starting network/cmplplatformd...                        [  OK  ]
Starting base/eventwatch...                              [  OK  ]
Starting network/startup...                              [  OK  ]
Starting hardware platform_eventd...                     [  OK  ]
Starting network/licd...                                 [  OK  ]
Starting network/stackd...                               [  OK  ]
Starting network/election.timeout...                     [  OK  ]
Starting network/corosync...                             [  OK  ]
Received event network.enabled
```

Figure 57. Switch Initialization Messages (Continued)

```
Initializing HA processes:
atmf_agentd, execd, exfx, hostd, atmfd, auth, epsr
hsl, imi, imiproxyd, lldpd, loopprot, mstp, nsm
pim6d, ripngd, rmon, sflowd, vrrpd, bgpd, irdpd
lacp, ospf6d, ospfd, pdmd, pimd, ripd, udldd

Received event network.initialized

Assigning Active Workload to HA processes:
hsl, irdpd, lacpd, loopprotd, mstpd, nsm, ospfd
ripd, rmond, sflowd, vrrpd, authd, epsrd, imi
imiproxyd, lldpd

Received event network.activated

Loading default configuration
..

done!
Received event network.configured
```

Figure 58. Switch Initialization Messages (Continued)

Chapter 10

Building the Stack Trunk with 5Gbps Multi-Speed Ports

This chapter contains the following sections:

Introduction

As explained in “Stack Trunks of 5Gbps Twisted Pair Ports” on page 58, you can choose the ports of the stack trunk. The default trunk ports are 10Gbps ports:

- Ports 27 and 28 on the x530DP-28GHXm switch
- Ports 51 and 52 on the x530DP-52GHXm switch

Directions on how to use those ports as the stack trunk are provided in Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127.

This chapter contains the procedures for configuring switches to use 5Gbps ports for the stack trunk. Refer to “Stack Trunks of 5Gbps Twisted Pair Ports” on page 58.

- Ports 21 to 24 on the x530DP-28GHXm switch
- Ports 41 to 48 on the x530DP-52GHXm switch

Here are the general steps:

1. Fill in “Stacking Worksheet” on page 73.
2. Review the configuration commands in “Command Summary” on page 150.
3. Perform “Configuring the Master Switch” on page 153.
4. Perform “Configuring Member Switches” on page 162.
5. Perform “Powering on the Stack” on page 170
6. Perform “Verifying the Stack” on page 171

Review the following information before performing the instructions:

- Perform the procedures in the order presented here.
- Choose the master switch before beginning the procedure. It can be any of the switches. Refer to “Master and Member Switches” on page 64.
- If you have not selected the trunk ports yet, you should do so before continuing. Refer to “Stack Trunks” on page 53.
- If you have already connected network cables to the ports of the stack trunk, disconnect them before continuing. You should cable the ports after configuring the switches for stacking.

Note
Cabling the ports of the stack trunk before configuring the switches can result in loops in your network topology, which can cause poor network performance.

Command Summary

The following sections briefly describe the commands for configuring the master and member switches for stacking with the 5Gbps ports. For further instructions, refer to the *Command Reference: x530 Series Switches Running AlliedWare Plus Version 5.5.0* at **www.alliedtelesis.com/library**. After reviewing the commands, go to "Configuring the Master Switch" on page 153 to start the configuration procedures.

Note
The following instructions in this chapter are for the x530DP-52GHXm.

STACKPORT

This command designates the ports of the stack trunk. After you enter the command, the designated ports stop functioning as regular Ethernet ports and function instead as the stack trunk. If you are using the default SFP+ ports as the stack trunk, you do not have to perform this command because those ports are the default trunk ports. However, if you want to use the optional 5Gbps ports as trunk ports, you have to designate them with this command. Refer to Table 12 on page 53 for a list of the default and optional trunk ports.

The command is performed in the Interface mode of the selected ports. In this example, the optional stacking ports 47 to 48 on the AT-x530DP-52GHXm switch is designated as the stack trunk:

```
awplus(config)# interface port.0.47-.0.48
awplus(config-if)# stackport
```

To remove the stacking function from ports and return them to regular Ethernet networking ports, use the NO STACKPORT command. You might perform this command if you are not using SFP+ ports 51 and 52 as the stack trunk and want to use them instead as regular Ethernet ports, or if you inadvertently assign the stacking function to the wrong ports. This example removes the stacking function from the default stacking ports 51 and 52:

```
awplus(config)# interface port.0.51-.0.52
awplus(config-if)# no stackport
```

STACK ENABLE

This command enables the VCStack feature on the switch. You will probably not have to perform this command because the default setting for the feature is enabled. However, if for any reason the feature was disabled, you can enable it by entering the STACK ENABLE command in the Global Configuration mode. Here is the command:

```
awplus(config)# stack enable
```

If you ever want to disable stacking, such as to use the switch as a standalone unit, enter the NO STACK ENABLE command, shown here:

```
awplus(config)# no stack ID enable
```

STACK PRIORITY

This command assigns priority numbers to the switches of the stack. The switches use the numbers to select the master switch. The lower the number the higher the priority. The unit with the lowest number becomes the master. If both have the same priority value, the MAC addresses determines the master. As with priority numbers, the lower the MAC address, the higher the priority. A switch can have only one priority number.

Allied Telesis recommends changing a switch's priority number to match its ID number. For example, the switch with ID should be assigned priority 1, switch with ID 2 should be assigned priority 2, and so on. This is not required, but it can make managing and troubleshooting the stack easier.

The STACK PRIORITY command is found in the Global Configuration mode and has the following format:

```
stack <switch_ID> priority <priority_number>
```

The variables are defined here:

- switch_ID – This is the ID number of the switch. The range is 1 to 8. You can specify only one ID number.
- priority_number – This is the new priority number for the switch. You can specify only one number. The range is 0 to 255. The default is 128.

This example assigns the priority 1 to the switch with ID 1:

```
awplus(config)# stack 1 priority
```

STACK RENUMBER

Every switch in a stack must have a unique ID number. The range is 1 to 8. The default is 1. The master switch should use the default value. The number is set on the member switches with the STACK RENUMBER command. Here is the format:

```
stack <current_switch_ID> renumber <new_switch_ID>
```

The variables are defined here:

- current_switch_ID - This is the current ID number of the switch. You can specify only one ID number.
- new_switch_ID - This is the new ID number for the switch. You can specify only one number. The range is 1 to 8. The default is 1.

Changing the ID number requires resetting the switch.

This example changes a switch ID from 1, the default, to 2:

```
awplus(config)# stack 1 renumber 2
```

SWITCH PROVISION

To ensure that the first power-on of the stack is successful, configure the master switch such that it is aware of the member switches, prior to forming the stack. This involves using the SWITCH PROVISION command to add the member switches as provisioned units on the master switch. Here is the format of the command:

```
switch <switch_ID> provision x530DP-52
```

This example adds a provisioned member switch with the ID 2 to the master switch:

```
awplus(config)# switch 2 provision x530DP-52
```

Configuring the Master Switch

This section contains the following procedures for configuring the master switch of the stack:

Note
The procedures require reseting the switch. Some network traffic will be lost if the unit is already connected to an active network.

You need to know the following to perform these procedures:

- ❒ How many member switches will be in the stack?
- ❒ Which 5Gbps ports will be used as the stack trunk on the master and member switches? Refer to “Stack Trunks” on page 53.

The procedures should be performed in the order presented here.

General Steps for the Master Switch

The procedure for configuring the master switch to use the 5Gbps ports as the stacking ports is divided into two parts. Here are the general steps to Part I:

1. Start a local management session on the switch.
2. Display the hardware status and management software version number with the SHOW SYSTEM ENVIRONMENT and SHOW VERSION INSTALLED commands, respectively, in the Privilege Exec mode.
3. Enable the VCStack feature with the STACK ENABLE command in the Global Configuration mode. You will probably not have to perform this step because the default setting for the feature is enabled.
4. Assign the master switch the priority 1 with the STACK PRIORITY command in the Global Configuration mode. This is to ensure that it is selected as the master switch during the first power-on of the stack.
5. Remove the stacking function from the default stacking ports 51 and 52 on the master switch with the NO STACKPORT command.

6. Designate the 5Gbps ports as the stack trunk on the master switch, with the STACKPORT command.

7. Save the changes with the WRITE command in the Privileged Exec mode.

Here are the general steps to Part II:

1. Add the member switches as provisioned units to the master switch, with the SWITCH PROVISION command. This step is to ensure that the master switch knows about the member switches during the first power-on of the stack.

2. Remove the stacking function from the default stacking ports 51 and 52 on the provisioned member switches with the NO STACKPORT command.

3. Designate the 5Gbps ports as the stack trunk on the provisioned member switches, with the STACKPORT command.

4. Save your changes with the WRITE command in the Privilege Exec mode.

5. Reboot the switch with the REBOOT command.

6. Start a new local management session.

7. Verify the changes with the SHOW STACK and SHOW RUNNING-CONFIG command.

Configuring the Master Switch - Part I

To configure the master switch to use 5Gbps ports for the stack trunk, perform the procedure in Table 18.

Table 18. Configuring the Master Switch for 5Gbps Stacking Ports - Part I

Step	Description and Command
1	Power on the master switch and wait two minutes for it to initialize the management software. Refer to Chapter 9, “Building the Trunk with Default 10 Gbps Stacking Ports” on page 127.
2	Start a local management session. Refer to “Starting a Local Management Session” on page 134.
3	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`
Steps 4 to 6 display the status of the switch hardware and the version number of the AlliedWare Plus management software.	

Table 18. Configuring the Master Switch for 5Gbps Stacking Ports - Part I (Continued)

Step	Description and Command

4	Verify that the switch hardware is operating correctly by entering the SHOW SYSTEM ENVIRONMENT command. All components should have the status Ok.
	
	`awplus# show system environment`
	`Environment Monitoring Status`
	`Overall Status: Normal`
	`Resource ID: 1 Name: x530DP-52GHXm`
	`ID Sensor (Units) Reading Low Limit High Limit Status`
	`1 Fan: Fan 1 (RPM) 5980 4800 - Ok`
	`2 Voltage: 1.0V (Volts) 1.040 0.891 1.090 Ok`
	`.`

5	Display the version number of the AlliedWare Plus operating software on the switch by entering the SHOW VERSION INSTALLED command. Write down the version number in the worksheet in Table 13 on page 73. After viewing the version numbers on all the switches, you will compare them to confirm they all have the same version. Switches with different versions will have to be updated.
	
	`awplus# show version installed`
	`Current software`
	`----------`
	`Software version : value`
	`Build date : value`
	
	`Installed software`
	`----------`
	`Build name : value`
	`Build version : value`
	`Build date : value`

6	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

Step 7 enables the VCStack feature on the switch. You probably do not need to perform this step because the feature is enabled by default. If the Switch ID LED is displaying “0”, perform the step. Otherwise, go to step 8.	

7	Activate VCStack on the switch with the STACK ENABLE command.
	
	`awplus(config)# stack enable`
	`% Automatically enabling ‘stack virtual-mac’ to minimize disruption from failovers.`
	`% Please check that the new MAC 0000.cd37.0431 is unique within the network.`
	`% Save the config and restart the system for this change to take effect.`

Table 18. Configuring the Master Switch for 5Gbps Stacking Ports - Part I (Continued)

Step	Description and Command
Step 8 assigns priority 1 to the switch with the STACK PRIORITY command, so that it functions as the master unit of the stack.	
8	Assign priority 1 to the switch with the STACK PRIORITY. `awplus(config)# stack 1 priority 1`
Steps 9 to 10 remove stacking from the default stacking ports 51 and 52 so that they function as regular networking ports.	

9	Enter the Interface modes for the default stacking ports 51 and 52 on the master switch:
	
	`awplus(config)# interface port.0.51-1.0.52`
	`% port1.0.51 is currently configured as a stack-port. Use caution when altering its config.`
	`% port1.0.52 is currently configured as a stack-port. Use caution when altering its config.`

10	Remove the stacking function from the ports with the NO STACKPORT command, so that they function as regular networking ports:
	
	`awplus(config-if)# no stackport`
	`% Save the config and restart the system for this change to take effect.`

Steps 11 and 12 designate 5Gbps ports as the active stacking ports.	
11	Enter the Interface mode of the 5Gbps ports to be used as the stack trunk. Refer to Table 19 on page 157. If you filled out the worksheet in Table 13 on page 73, refer there for the ports. This example assumes you want to use 5Gbps ports 47 and 48 as the stack trunk. `awplus(config-if)# interface port1.0.47-1.0.48`

12	Designate the ports as the stack trunk with the STACKPORT command:
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

The remaining steps save your changes.	
13	Return to the Global Configuration mode with the EXIT command: `awplus(config-if)# exit`
14	Return to the Privileged Exec mode. `awplus(config)# exit`

Table 18. Configuring the Master Switch for 5Gbps Stacking Ports - Part I (Continued)

Step	Description and Command

15	Enter the WRITE command to save your change. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory, for storing your configuration changes. If you do not save your changes, they will be discarded and you will have to reenter them when you reboot the switch later in these procedures.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

16	Go to “Configuring the Master Switch - Part II,” next.

Configuring the Master Switch - Part II

In Part II, you add the member switches as provisioned units to the master switch and designate their 5Gbps stacking ports. Adding member switches as provisioned devices ensures that the master switch is aware of them during the first stack power-on. The procedure assumes you are continuing directly from the previous procedure.

Table 19. Configuring the Master Switch for 5Gbps Stacking Ports - Part II

Step	Description and Command
Steps 1 to 2 add the member switches as provisioned switches on the master switch. This is so the master switch is aware of the switches when the stack is powered on for the first time.	

1	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

2	Add the member switches to the master switch as provisioned switches with the SWITCH PROVISION command. Assign a unique ID number, in the range of 2 to 8, to each unit. The following example adds three provisioned member switches to the master switch, with the IDs 2 to 4:
	
	`awplus(config)# switch 2 provision x530DP-52`
	`awplus(config)# switch 3 provision x530DP-52`
	`awplus(config)# switch 4 provision x530DP-52`

Steps 3 and 4 remove the stacking function from the default stacking ports 51 and 52 on the provisioned member switches.	
3	Enter the port Interface modes of the default stacking ports 51 and 52 on the provisioned member switches. The example here assumes there are three provisioned member switches, with the IDs 2 to 4: `awplus(config)# interface port2.0.51-2.0.52,port3.0.51-3.0.52,port4.0.51-4.0.52`

Table 19. Configuring the Master Switch for 5Gbps Stacking Ports - Part II (Continued)

Step	Description and Command

4	Remove the stacking function from the ports to convert them into regular Ethernet ports, with the NO STACKPORT command:
	
	`awplus(config-if)# no stackport`
	`% Save the config and restart the system for this change to take effect.`

Steps 5 and 6 add the stacking function to the selected 5Gbps stacking ports on the provisioned member switches.	
5	Enter the Interface modes of the 5Gbps ports to be used as the stack trunk on the provisioned member switches. If you filled out the worksheet on Table 13 on page 73, refer there for the stacking ports. This example assumes that there are three member switches that are to use ports 47 and 48 as the stack trunk. `awplus(config)# interface port2.0.47-2.0.48,port3.0.47-3.0.48,port4.0.47-4.0.48`

6	Designate the ports as stacking ports with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

Steps 7 to 13 save your changes on the master switch and reboot it.	
7	Return to the Global Configuration mode. `awplus(config-if)# exit`
8	Return to the Privileged Exec mode. `awplus(config)# exit`

9	Enter the WRITE command to save your changes.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

10	Restart the switch with the REBOOT command.
	
	`awplus# reboot`
	`reboot system? (y/n):`
	`awplus#`

11	Type “Y” for yes.
12	Wait two minutes for the switch to initialize the management software.

Table 19. Configuring the Master Switch for 5Gbps Stacking Ports - Part II (Continued)

Step	Description and Command
13	Go to “Verifying the Master Switch” on page 159.

Verifying the Master Switch

Perform the steps in Table 20 to confirm the configuration of the master switch.

Table 20. Verifying the Master Switch

Step	Description and Command
1	Start a new local management session on the master switch.
2	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`

3	Enter the SHOW STACK command. Here is an example of the display:
	`awplus# show stack`
	`Virtual Chassis Stacking summary information`
	`ID Pending ID MAC address Priority Status Role`
	`1 - e0a.ba56.c208 1 Ready Active Master`
	`2 - - - - Provisioned`
	`3 - - - - Provisioned`
	`4 - - - - Provisioned`
	`Operational Status Standalone unit`
	`Stack MAC address e01a.ba56.c208`
	
	Check the display for the following:
	- Switch ID 1 is the master switch.
	- The master switch should have the priority 1. If it does not, repeat “Configuring the Master Switch - Part I” on page 154. Be sure to perform the STACK PRIORITY command and to save your changes with the WRITE command.
	- The other ID entries are for the provisioned member switches. There should be one entry for each member switch that will be in the stack. Their fields are empty because the master switch is not yet part of a stack. If the table does not include these fields, repeat “Configuring the Master Switch - Part II” on page 157. Be sure to perform the SWITCH PROVISION command and to save your changes with the WRITE command.
	- The Operational Status should be Standalone Unit, indicating that stacking is enabled, but that the unit is operating as a stack of one switch. If the status is Stacking Hardware Disabled, the stacking feature is disabled. Repeat “Configuring the Master Switch - Part I” on page 154. Be sure to perform the STACK ENABLE command and to save your changes with the WRITE command.

Table 20. Verifying the Master Switch (Continued)

Step	Description and Command

4	Enter the SHOW RUNNING-CONFIG command to display the running configuration of the master switch. You should use the display to confirm that you designated the correct 5Gbps trunk ports for the master and member switches. The display should contain INTERFACE PORT commands that identify the ports and are followed by STACKPORT commands. In the following example, ports 47 and 48 on the master and member switches are to be the stack trunk:
	`interface port1.0.47-1.0.48`
	`stackport`
	.
	`interface port2.0.47-2.0.48`
	`stackport`
	.
	`interface port3.0.47-3.0.48`
	`stackport`
	.
	`interface port4.0.47-4.0.48`
	`stackport`

5	Go to “What to Do Next” on page 160.

What to Do Next

After configuring the master switch, do the following:

1. Power off the switch by disconnecting its AC power cords from the AC power sources. Refer to Figure 59.

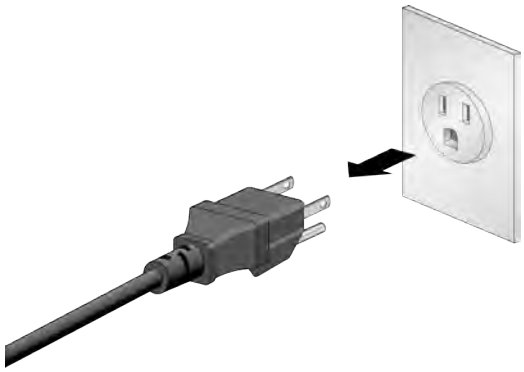


Figure 59. Powering Off the Switch

2. Configure the member switches. Refer to “Configuring Member Switches” on page 162.
3. After configuring the master and member switches, cable the ports of the stack trunk on all the switches. Refer to “Cabling Twisted Pair Ports” on page 174.

4. Power on the master and member switches of the stack. Refer to “Powering on the Stack” on page 170.
5. Verify that the switches formed the stack by referring to “Verifying the Stack” on page 171.
6. Cable the networking ports. Refer to Chapter 11, “Cabling the Networking Ports” on page 173.

Configuring Member Switches

Here are the procedures for configuring member switches of the stack.

Note
The procedures require resetting the member switch twice. Some network traffic will be lost if the switch is already connected to an active network.

The procedures should be performed in the order presented here.

General Steps for the Member Switch

The procedure for configuring member switches for stacking is divided into two parts. The general steps to Part I are listed here:

1. Start a local management session on the switch.
2. View the hardware status and management software version number with the SHOW SYSTEM ENVIRONMENT and SHOW VERSION INSTALLLED commands in the Privilege Exec mode.
3. Enable the VCStack feature with the STACK ENABLE command in the Global Configuration mode. You will probably not have to perform this step because the default setting for the feature is enabled.
4. Assign an ID number in the range of 2 to 8 to the member switch with the SWITCH RENUMBER command in the Global Configuration mode.

Note
Changing a member switch’s ID does not delete the default ID 1 from its configuration. Instead, the member switch retains it and uses default ID 1 as the provisioned master switch.

5. Save your changes with the WRITE command in the Privilege Exec mode.
6. Restart the switch with the REBOOT command.

The general steps in Part II are listed here:

1. Start a new local management session with the switch.
2. Assign the member switch a priority number equal to its ID number, with the STACK PRIORITY command in the Global Configuration mode.
3. Remove the stacking function from the default stacking ports 51 and 52, with the NO STACKPORT command.
4. Designate the ports of the stack trunk on both the provisioned master switch and member switch, with the STACKPORT command in the port Interface mode.
5. Save your changes with the WRITE command in the Privilege Exec mode.
6. Restart the switch with the REBOOT command.
7. Start a new local management session.
8. Verify the changes with the SHOW STACK and SHOW RUNNING-CONFIG command.

Configuring Member Switches - Part I

The instructions for configuring member switches are divided into two parts. You do the following in Part I:

- ❒ Display the hardware status and management software version number.
- ❒ Enable VCStack.
- ❒ Set the switch ID number.

To configure a member switch, perform the procedure in Table 21.

Table 21. Configuring Member Switches - Part I

Step	Description and Command
1	Power on a member switch and wait two minutes as it initializes the management software. Refer to “Powering on a Stack” on page 140.
2	Start a local management session. Refer to “Starting a Local Management Session” on page 134.
3	Enter the ENABLE command to move from the User Exec mode to the Privileged Exec mode. `awplus> enable`

Table 21. Configuring Member Switches - Part I (Continued)

Step	Description and Command

4	Verify that the switch hardware is operating correctly, with the SHOW SYSTEM ENVIRONMENT command. All components should have the status Ok.
	
	`awplus# show system environment`
	`Environment Monitoring Status`
	`Overall Status: Normal`
	`Resource ID: 1 Name: x530DP-28GHXm`
	`ID Sensor (Units) Reading Low Limit High Limit Status`
	`1 Fan: Fan 1 (RPM) 5980 4800 - Ok`
	`2 Voltage: 1.0V (Volts) 1.040 0.891 1.090 Ok`
	`.`

5	Display the version number of the AlliedWare Plus operating software on the member switch by entering the SHOW VERSION INSTALLED command. Write down the version number in the worksheet in Table 13 on page 73. After viewing the version numbers on all the switches, you will compare them to confirm they all have the same version. Switches with different versions will have to be updated.

6	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

Step 7 enables the VCStack feature on the switch. You will probably not need to perform the step because the feature is enabled by default. If the Switch ID LED is displaying “0”, perform the step. Otherwise, go to step 7.	

7	Activate VCStack on the switch with the STACK ENABLE command.
	
	`awplus(config)# stack enable`
	`% Automatically enabling ‘stack virtual-mac’ to minimize disruption form failovers.`
	`% Please check that the new MAC 0000.cd37.043 is unique within the network.`
	`% Save the config and restart the system for this change to take effect.`

Steps 8 to 14 set the member switch’s ID number, save your changes, and reboot the unit.	

8	Set the ID number of the member switch with the STACK RENUMBER command. If you are using the worksheet on Table 13 on page 73, refer there for the ID numbers. This example assigns the ID number 2 to the member switch.
	
	`awplus(config)# stack 1 renumber 2`
	`% Warning: the new ID will not become effective until the stack-member reboots.`
	`% Warning: the boot configuration may now be invalid.`

Table 21. Configuring Member Switches - Part I (Continued)

Step	Description and Command
9	Return to the Privileged Exec mode. `awplus(config)# exit`

10	Enter the WRITE command to save your change. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory, for storing your configuration changes.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

11	Restart the switch with the REBOOT command.
	
	`awplus# reboot`
	`reboot system? (y/n):`
	`awplus#`

12	Type “Y” for yes.
13	Wait two minutes for the switch to initialize its management software.
14	Check the ID LED on the front panel and do one of the following: - If the ID LED is displaying the switch’s new ID number, go to “Configuring Member Switches - Part II,” next. - If the ID LED is displaying a different number, repeat this procedure. Be sure to correctly enter the STACK RENUMBER command and to save your changes with the WRITE command.

Configuring Member Switches - Part II

This section contains instructions to the second part to configuring member switches. The instructions explain how configure the following parameters:

- ❒ Set the priority number. For background information, refer to “Selection of the Master Switch” on page 64.
- ❒ Designate the optional stacking ports for the stack trunk. Refer to “Stack Trunks” on page 53.

To configure a member switch, perform the procedure in Table 22.

Table 22. Configuring Member Switches - Part II

Step	Description and Command
1	Start a new local management session on the member switch. Refer to “Starting a Local Management Session” on page 134.

Table 22. Configuring Member Switches - Part II (Continued)

Step	Description and Command
2	Enter the ENABLE command to move from the User Exec mode to the Privileged Exec mode. `awplus> enable`
Steps 3 and 4 set the switch's priority value to be the same as its ID number.	

3	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

4	Assign a priority value to the switch equal to its ID number, with the STACK PRIORITY. This example assigns priority 2 to a member switch with the ID 2: `awplus(config)# stack 2 priority 2`
Steps 5 and 6 remove the stacking function from the default stacking ports 51 and 52 on the member switch.	

5	Enter the port Interface modes of the default stacking ports 51 and 52 on the member switch. The example here assumes the member switch has the ID 2:
	
	`awplus(config)# interface port2.0.51-2.0.52`
	`% port2.0.51 is currently configured as a stack-port. Use caution when altering its config.`
	`% port2.0.52 is currently configured as a stack-port. Use caution when altering its config.`

6	Remove the stacking function from the ports to convert them into regular Ethernet ports, with the NO STACKPORT command:
	
	`awplus(config-if)# no stackport`
	`% Save the config and restart the system for this change to take effect.`

Steps 7 and 8 add the stacking function to the optional stacking ports on the member switch.	
7	Enter the Interface modes of the optional stack ports on the member switch. If you filled out the worksheet in Table 13 on page 73, refer there for the ports. The example command here assumes the switch has the ID 2 and will be using ports 47 and 48 for the stack trunk. Be sure to modify the command with the ports you selected for the stack trunk. `awplus(config-if)# interface port2.0.47-2.0.48`

Table 22. Configuring Member Switches - Part II (Continued)

Step	Description and Command

8	Designate the ports as the stack trunk with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

The remaining steps save your changes and reboot the switch.	
9	Return to the Global Configuration mode. `awplus(config-if)# exit`
10	Return to the Privileged Exec mode. `awplus(config)# exit`

11	Save your changes with the WRITE command.
	
	`awplus# write`
	`Building configuration ...`
	`[OK]`

12	Restart the switch.
	
	`awplus# reboot`
	`reboot system? (y/n):`

13	Type “Y” for yes.
14	Wait two minutes for the switch to initialize its management software.
15	Go to “Verifying Member Switches,” next.

Verifying Member Switches

Perform the steps in Table 23 to confirm the configuration of a member switch.

Table 23. Verifying Member Switches

Step	Description and Command
1	Start a local management session. Refer to “Starting a Local Management Session” on page 134.
2	Move to the Privileged Exec mode. `awplus> enable`

Table 23. Verifying Member Switches (Continued)

Step	Description and Command

3	Enter the SHOW STACK DETAIL command and examine the display for the entry that has the same ID number of the member switch. Here is an example for the member switch with the ID 2:
	`awplus# show stack detail`
	`.`
	`.`
	`Stack member 2:`
	`----------`
	`ID 2`
	`MAC address e0a:ea20:8011`
	`Last role change Thur Mar 23 21:15:20 2020`
	`Product type x530DP-28GHXm`
	`Role Active Master`
	`Status Ready`
	`Priority 2`
	`Host name awplus`
	`S/W version auto synchronization On`
	`Resiliency link status Not configured`
	`Stack port2.0.23 status Down`
	`Stack port2.0.24 status Down`
	`.`
	`.`
	Examine the entry for the following:
	- The “Priority” value should be the same as the switch’s ID number. If they are not the same, repeat “Configuring Member Switches - Part II” on page 165. Be sure to perform the STACK PRIORITY command and save your changes with the write command.
	- The “Stack port status” fields, the last two lines, should identify the selected optional stack ports. If they identify the wrong ports, such as the default ports 51 and 52, repeat “Configuring Member Switches - Part II” on page 165. (The status of the ports is Down because the stack ports are not cabled yet.

4	Go to “What to Do Next,” next.

What to Do Next

After configuring a member switch, do the following:

1. Power off the switch by disconnecting its AC power cords from the AC power sources. Refer to Figure 59 on page 160.
2. Repeat this procedure to configure any additional member switches.
3. If you have not already configured the master switch, perform “Configuring the Master Switch” on page 153.

4. Cable the 5Gbps ports of the stack trunk, on the master and member switches. Refer to “Cabling Twisted Pair Ports” on page 174.

5. Power on the master and member switches of the stack, as explained in “Powering on the Stack” on page 170.

6. Verify that the switches successfully formed the stack by performing “Verifying the Stack” on page 171.

7. Cable the networking ports, as explained in Chapter 11, “Cabling the Networking Ports” on page 173.

Powering on the Stack

After configuring the master and member switches, you are ready to cable the 5Gbps ports of the stack trunk and power on the stack for the first time. (If you want to monitor the power-on sequence, connect a terminal or computer with a terminal emulator program to the Console port on either switch.)

To power on the stack for the first time, perform the following procedure:

1. Verify that the master and member switches are powered off.
2. Cable the 5Gbps ports of the stack trunk on the switches. Refer to “Cabling Twisted Pair Ports” on page 174.
3. Power on all the switches at the same time or within thirty seconds of each other. Refer to “Powering on a Stack” on page 140.

   Refer to “Power Specifications” on page 190 for the power specifications of the switches.

Warning
Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ∽ E3

Note
Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. ∽ E5

4. Wait two minutes for the switches to form the stack.
5. Go to “Verifying the Stack” on page 171.

Verifying the Stack

To verify the stack, perform the following procedure:

1. Start a local management session on any switch in the stack. Refer to “Starting a Local Management Session” on page 134.

2. From the User Exec mode, enter the SHOW STACK command:

```
awplus> show stack
```

   An example of the command for a stack of four switches is shown in Figure 60.

```
awplus> show stack
Virtual Chassis Stacking summary information
ID    Pending ID     MAC address       Priority   Status   Role
1     -              e01a:ea20:8011    1        Ready    Active Master
2     -              e01a:ea20:8023    2          Ready    Backup Member
3     -              e01a:ea20:9a45    3          Ready    Backup Member
4     -              e01a:ea20:1b8a    4          Ready    Backup Member
Operational Status                    Normal operations
Stack MAC address                     e01a:ea20:8011
```

Figure 60. SHOW STACK Command

   Review the following items:

   - The command should list all the switches. If the list is incomplete, refer to Chapter 12, “Troubleshooting” on page 181.
   - The Operational Status field should be “Normal operations” to Indicate that all the stacking ports are operating normally.
   - If the Operational Status field is displaying “Not all stack ports are up,” one or more stacking ports are not being used or cannot establish links with their counterparts. For more information, refer to Chapter 12, “Troubleshooting” on page 181.

3. Go to Chapter 11, “Cabling the Networking Ports” on page 173, to complete the installation.

Chapter 11

Cabling the Networking Ports

This chapter contains the following procedures:

Cabling Twisted Pair Ports

Here are the guidelines to cabling the twisted pair ports on the switch:

- The category of twisted pair cable requirements are as follows:
  - 10/100Mbps ports: Standard TIA/EIA 568-B-compliant Category 3 unshielded cabling.
  - 1000Mbps ports: Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) unshielded cabling.
  - 1/2.5/5Gbps ports: Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) unshielded cabling.
- PoE is enabled by default on the x530DP-28GHXm and x530DP-52GHXm switch ports.
- The connectors on the cables must fit snugly into the ports, and the tabs must lock the connectors into place.
- The default speed setting for the ports is Auto-Negotiation. This setting is appropriate for ports connected to network devices that also support Auto-Negotiation.
- The ports must be set to the default setting of Auto-Negotiation to operate at 1Gbps and higher.
- The ports support full-duplex only when operating at 1Gbps and higher. The ports support half- and full-duplex when operating at 10/100Mbps.
- Do not attach cables to ports of static or Link Aggregation Control Protocol (LACP) port trunks until after you configure the trunks on the switch. Otherwise, the ports will form network loops that can adversely affect network performance.

Caution

Do not connect or disconnect copper cables from PoE++ devices (Class 5, 40W or higher) when the switch is powered on. It might damage the switch. Before cabling PoE++ devices, do one of the following:
- Power off the switch, or:
- Disable PoE on the ports with the NO POWER-INLINE ENABLE command. After cabling the ports, activate it again with the POWER-INLINE ENABLE command.

Guidelines to Handling SFP and SFP+ Transceivers

Review the following guidelines before installing SFP or SFP+ transceivers in the switches:

- The transceivers are hot-swappable. You can install them while the switch is powered on.
- For a list of supported transceivers, refer to the product data sheet on the Allied Telesis web site.
- The operational specifications and fiber optic cable requirements of the transceivers are provided in the documents included with the devices.
- Install a transceiver before connecting the fiber optic cable.
- Unnecessary removal and insertion of a transceiver can lead to premature failure.

Caution

Transceivers can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the devices. E92

Installing SFP or SFP+ Transceivers

This section contains instructions for installing transceivers in the SFP or SFP+ ports of the switch.

- Ports 25 to 28 on the x530DP-28GHXm switch
- Ports 49 to 52 on the x530DP-52GHXm switch

The following illustrations show a transceiver with a duplex LC connector. The connectors on your transceivers may be different.

To install transceivers, perform the following procedure:

1. Select a port for the transceiver.
2. Remove the transceiver from its shipping container and store the packaging material in a safe location.
3. If you are installing the transceiver in a top port, position the transceiver with the Allied Telesis label facing up. If you are installing the transceiver in a bottom port, position the transceiver with the label facing down. Refer to Figure 61.

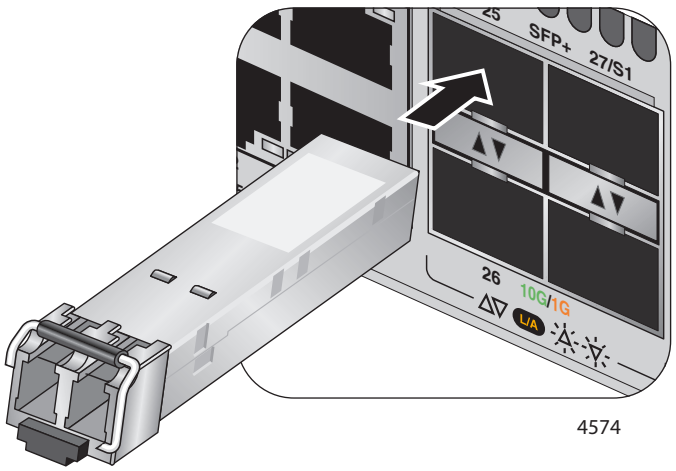


Figure 61. Installing an SFP Transceiver

4. Slide the transceiver into the port until it clicks into place.

Note
If you are ready to attach the fiber optic cable to the transceiver, continue with the next step. Otherwise, repeat steps 1 through 4 to install the remaining transceivers in the switch.

5. Verify the position of the handle on the transceiver. If the transceiver is in a top port, the handle must be in the up position, as shown in Figure 62. If the transceiver is in a bottom port, the handle must be in the down position.

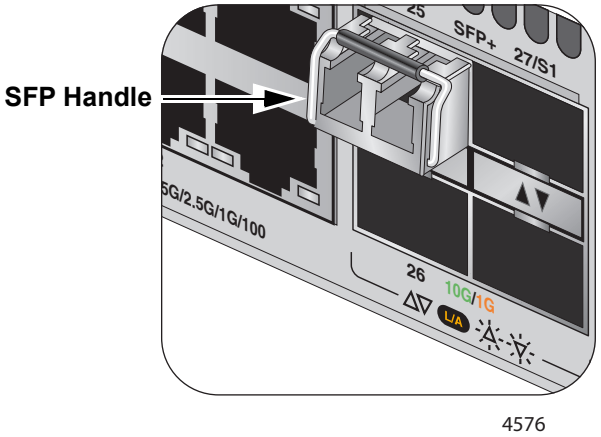


Figure 62. Positioning the SFP or SFP+ Handle in the Up Position

6. Connect the fiber optic cable to the transceiver, as shown in Figure 63. The connector on the cable must fit snugly into the port, and the tab must lock the connector into place.

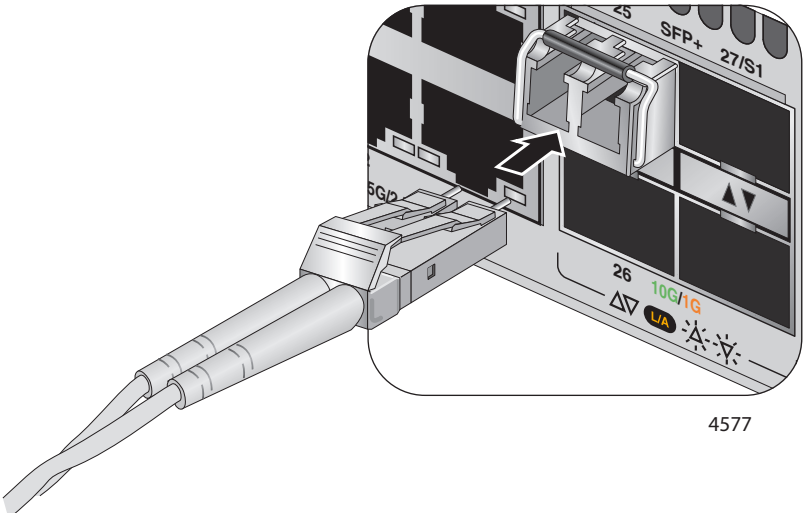


Figure 63. Connecting a Fiber Optic Cable to an SFP or SFP+ Transceiver

7. Repeat this procedure to install additional transceivers.

Installing SP10TW Direct Connect Twinax Cables

The SFP and SFP+ transceiver ports on the switch support SP10TW direct connect twinax cables. The cables are an economical way to add 10 Gbps connections over short distances. They have SFP+ transceivers on both ends and come in lengths of 1, 3, and 7 meters.

To install SP10TW cables, perform the following procedure:

1. Select a port for the transceiver.
   - ❒ Ports 25 to 28 on the x530DP-28GHXm switch
   - ❒ Ports 49 to 52 on the x530DP-52GHXm switch
2. Remove the transceiver from its shipping container and store the packaging material in a safe location.
3. To install the transceiver in a port in the top row, position the transceiver with the Allied Telesis label facing up. To install the transceiver in a port in the bottom row, position the transceiver with the label facing down. Refer to Figure 64 on page 179.

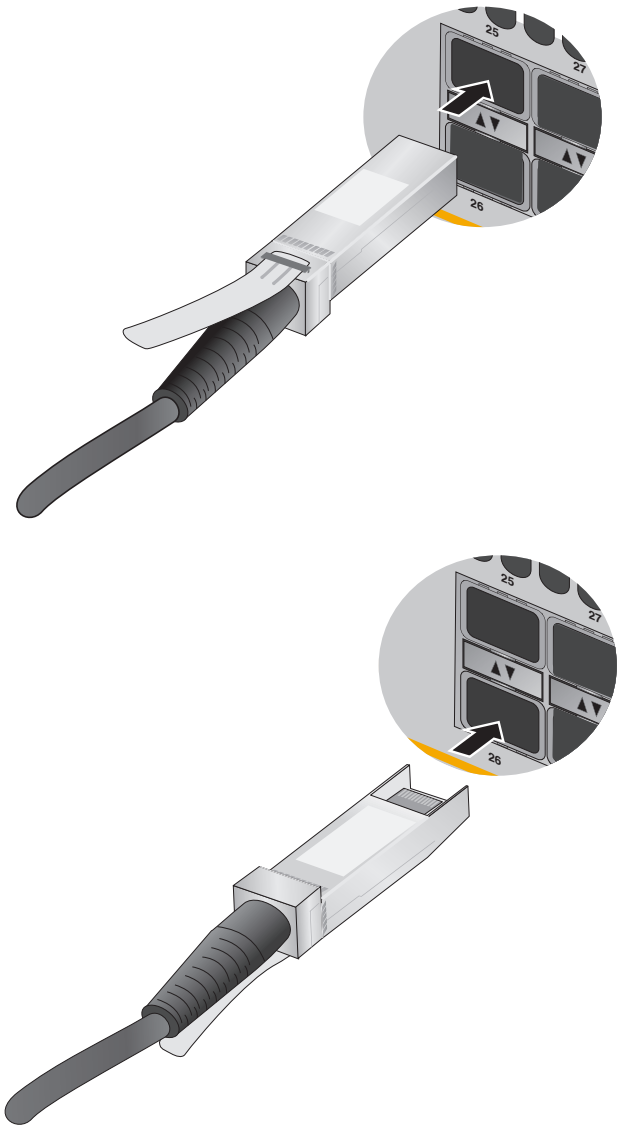


Figure 64. Installing SP10TW Cables

4. Slide the transceiver into the port until it clicks into place.
5. Connect the other end of the cable into an SFP+ port on another network device.
6. Repeat this procedure to install additional transceivers.

Note
To remove the connector and cable from the port, gently push on the connector, pull on the release tab, and slide the connector from the port.

Chapter 12
Troubleshooting

This chapter contains suggestions on how to troubleshoot problems with the switch.

> **Note**
> For further assistance, please contact Allied Telesis Technical Support at **www.alliedtelesis.com/support**.

Problem 1: All the port LEDs and Switch ID LED are off, and the fans are not operating.

Solutions: The unit is not receiving power. Try the following:

- Verify that the power cord is securely connected to the power source and the AC connector on the back panel of the switch.
- Verify that the power outlet has power by connecting another device to it.
- Try connecting the unit to another power source.
- Try a different power cord.
- Verify that the voltage from the power source is within the required levels for your region. The power requirements for the switch are listed in “Power Specifications” on page 190.

Problem 2: All of the port LEDs are off even though the ports are connected to active network devices.

Solution: The switch might be operating in the low power mode. To toggle on the LEDs, press the eco-friendly button on the front panel of the switch. You can also toggle the LEDs off and on with the ECOFRIENDLY LED and NO ECOFRIENDLY LED commands in the command line interface.

Problem 3: A twisted pair port on the switch is connected to an active network device but the port's LINK/ACT LED is off.

Solutions: The port is unable to establish a link to a network device. Try the following:

- ❒ Verify that the network device connected to the twisted pair port is powered on and is operating properly.
- ❒ Try connecting another network device to the twisted pair port with a different cable. If the twisted pair port is able to establish a link, then the problem is with the cable or the other network device.
- ❒ Verify that the twisted pair cable does not exceed 100 meters (328 feet).
- ❒ Verify that you are using the appropriate category of twisted pair cable. Refer to "Cable Requirements" on page 32.
- ❒ Verify that the port is connected to the correct twisted pair cable.

Note
Twisted pair ports may require five to ten seconds to establish a link.

Problem 4: The LINK/ACT LED for an SFP or SFP+ transceiver is off.

Solutions: The fiber optic port on the transceiver is unable to establish a link to a network device. Try the following:

- ❒ Verify that the remote network device connected to the fiber optic port is operating properly.
- ❒ Verify that the fiber optic cable is securely connected to the port on the transceiver and to the port on the remote network device.
- ❒ Check that the transceiver is fully inserted in the port.
- ❒ Verify that the operating specifications of the fiber optic ports on the transceiver and remote network device are compatible.
- ❒ Verify that the correct type of fiber optic cabling is being used.
- ❒ Verify that the port is connected to the correct fiber optic cable.
- ❒ Try connecting another network device to the fiber optic port using a different cable. If the port is able to establish a link, then the problem is with the cable or with the other network device.

- ❒ Use the switch's management software to verify that the port is enabled.
- ❒ If the remote network device is a managed device, use its management firmware to determine whether its port is enabled.
- ❒ Test the attenuation of both directions on the fiber optic cable with a fiber optic tester to determine whether the optical signal is too weak (sensitivity) or too strong (maximum input power).

Problem 5: The SHOW STACK command is not displaying all the switches in the stack.

Solutions: If you are using 10Gbps ports for the stack trunk, try the following:

- ❒ Verify that the stacking ports are properly cabled.
- ❒ If you are using SFP+ transceivers for the stack trunk, verify that they are fully inserted into the transceiver ports.
- ❒ If you are using SPI0TW direct connect twinax cables, verify that they are from Allied Telesis. The trunk will not work with cables from other network equipment manufacturers.
- ❒ Verify that VCStack is activated on the switches. For instructions, refer to "Verifying the Stack" on page 136.

Problem 6: The switch is not providing power to a PoE or PoE device.

Solutions: Try the following:

- ❒ Review the powered device documentation to confirm that the device supports Mode A of the IEEE 802.3at standard. Mode A is one of two modes that define the connector pins that deliver the power from the port in the switch to the powered device. In Mode A, the power is carried on pins 1, 2, 3, and 6 on the RJ-45 port, the same pins that carry the network traffic. The second mode, Mode B, defines pins 4, 5, 7, and 8 as the power carriers. The and x530DP-28GHXm switch does not support Mode B. Most powered devices are designed to accept power by either mode, but some legacy devices may only support one mode. This can be verified by reviewing the device's documentation or data sheet. Legacy devices that only support Mode B will not work with the switch.
- ❒ Use the SHOW SYSTEM ENVIRONMENT command to confirm that both power supplies are operating normally. The switch might not be able to support all powered devices if one of the power supplies is powered off or has failed. For more information, refer to "Power Over Ethernet" on page 36.

- Check that the device power requirements do not exceed 30W. This can be verified by reviewing the device documentation or data sheet.
- Verify that you are using the appropriate category of twisted-pair cable. Refer to “Cable Requirements” on page 32.
- Use the management software on the switch to determine whether PoE is enabled on the port. The default setting for PoE is enabled.
- Use the management software on the switch to determine whether the PoE power setting for the port has been reduced to a value below the power requirements of the device.
- Try connecting the device to a different port on the switch.

Problem 7: The switch functions intermittently.

Solutions: Check the system hardware status through the management software:

- Use the SHOW SYSTEM ENVIRONMENT command in the Privileged Exec mode to verify that the input voltage from the power source to the switch is stable and within the approved operating range. The unit will shut down if the input voltage fluctuates above or below the approved operating range.
- Use the SHOW SYSTEM ENVIRONMENT command in the Privileged Exec mode to verify that the fan is operating correctly.
- Verify that the location of the switch allows for adequate airflow. The unit will shut down if it is overheating.

Problem 8: The Switch ID LED on the front of the switch is flashing the letter “F.”

Solutions: One or more of the following problems has occurred:

- A cooling fan has failed.
- The switch might be overheating and may have to shut down.

Contact your Allied Telesis sales representative for assistance.

Appendix A
Technical Specifications

This appendix contains the following sections:

Physical Specifications

Dimensions

Table 24 lists the dimensions of the switches.

Table 24. Product Dimensions

Model	Dimension (W x D x H)
x530DP-28GHXm	44.05 cm x 41.91 cm x 4.37 cm (17.34 in. x 16.50 in. x 1.72 in.)
x530DP-52GHXm	44.05 cm x 41.91 cm x 4.37 cm (17.34 in. x 16.50 in. x 1.72 in.)
FAN10 / FAN10R	40 mm x 40 mm x 28 mm (1.575 in. x 1.575 in. x 1.1 in.)
PWR150 / PWR150R	14.8 cm x 25.2 cm x 4.2 cm (5.8 in. x 9.8 in. x 1.7 in.)
PWR250	14.8 cm x 25.2 cm x 4.2 cm (5.8 in. x 9.8 in. x 1.7 in.)
PWR250-80	14.8 cm x 25.2 cm x 4.2 cm (5.8 in. x 9.8 in. x 1.7 in.)
PWR800	14.8 cm x 25.2 cm x 4.2 cm (5.8 in. x 9.8 in. x 1.7 in.)
PWR1200	14.8 cm x 30.7 cm x 4.2 cm (5.8 in. x 12.1 in. x 1.7 in.)

Figure 65 illustrates the dimensions of the x530DP-28GHXm and x530DP-52GHXm switch.

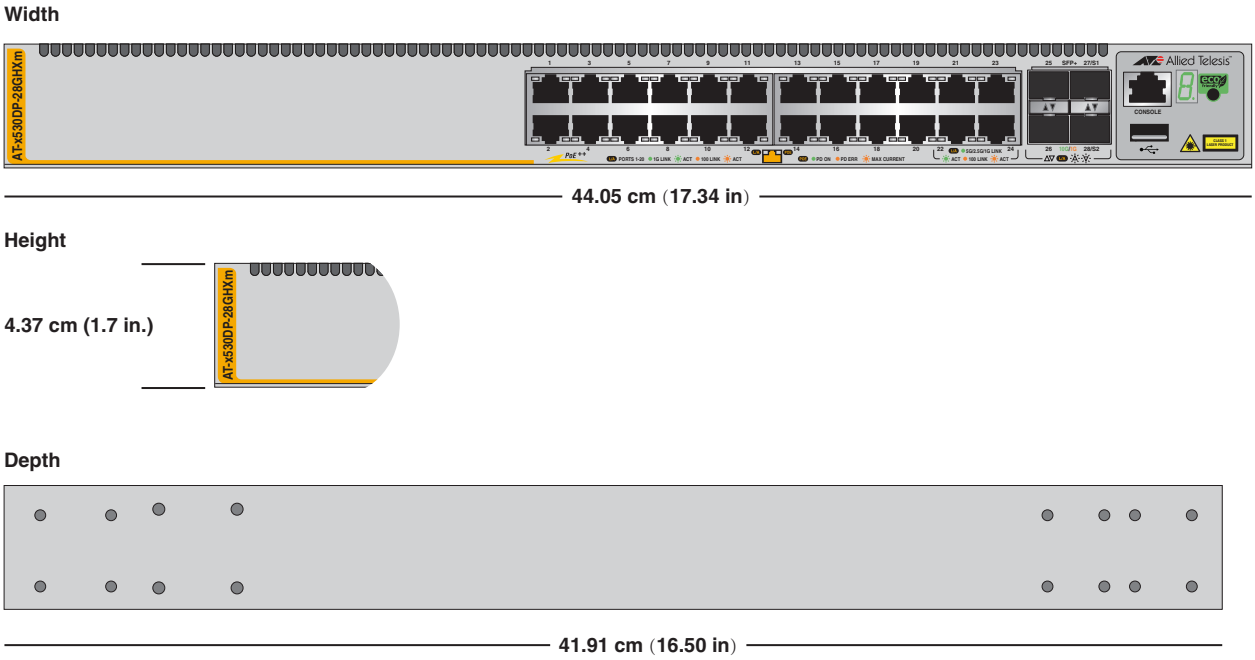


Figure 65. x530DP-28GHXm and x530DP-52GHXm Switch Dimensions

Figure 66 illustrates the dimensions of the FAN10 module.

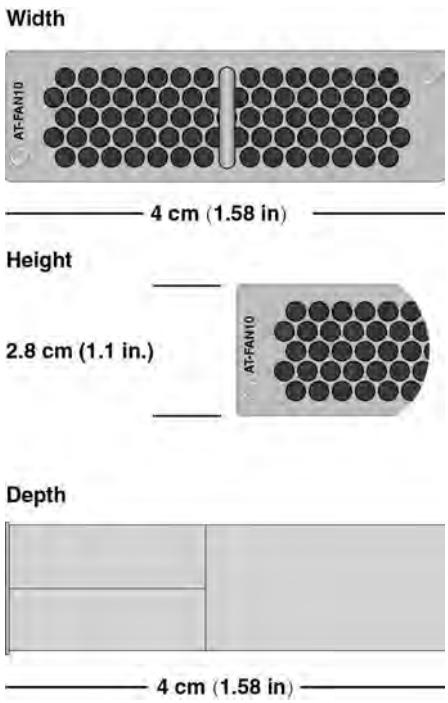


Figure 66. FAN10 Dimensions

Weights

Table 25 lists the weights of the switches.

Table 25. Product Weights

x530DP-28GHXm	5.36 kg (11.82 lb.)
x530DP-52GHXm	5.56 kg (12.26 lb.)
PWR150 / PWR150R	1.28 kg (2.80 lb)
PWR250	1.50 kg (3.30 lb.)
PWR250-80	1.50 kg (3.30 lb.)
PWR800	1.77 kg (3.90 lb.)
PWR1200	2.23 kg (4.90 lb.)

Ventilation

Table 26 lists the ventilation requirements.

Table 26. Ventilation Requirements

Recommended Minimum Ventilation on All Sides	10 cm (4.0 in)

Environmental Specifications

Table 27 lists the environmental specifications of the switches.

Table 27. Environmental Specifications

Storage Temperature	-25° C to 85° C (-13° F to 185° F)
Operating Humidity	5% to 90% noncondensing
Storage Humidity	5% to 95% noncondensing
Maximum Operating Altitude	3,048 m (10,000 ft)
Maximum Nonoperating Altitude	4,000 m (3,00 ft)
Product Noise Level	More than 42 dB @ 30C or less
Installation Requirement	Tabletop, wall or rack mount

Table 28 lists the maximum operating temperature of the power supply units.

Table 28. Maximum Operating Temperature

PWR150 / PWR150R PWR250 PWR250-80	0° C to 65° C (32° F to 149° F)
PWR800 (1 or 2 units)	0° C to 55° C (32° F to 131° F)
PWR1200 (1 unit) and 670W PWR1200 (2 units) and 1,340W	45° C to 50° C (113° F to 122° F)
PWR1200 (1 unit) and 740W PWR1200 (2 units) and 1,480W	0° C to 45° C (32° F to 113° F)

Power Specifications

This section contains the maximum power consumption values, input voltages, and heat dissipation values.

Maximum Power Consumption

Table 29 and Table 30 list the maximum power consumptions of the switches with the different power supplies.

Table 29. Maximum Power Consumptions with the PWR150, PWR250, or PWR250-80 Power Supply

x530DP-28GHXm	110 watts
x530DP-52GHXm	150 watts

Table 30. Maximum Power Consumptions with the PWR800 or PWR1200 Power Supply

x530DP-28GHXm	1840 watts
x530DP-52GHXm	1930 watts

Input Voltages

Table 31 lists the input voltages for the switches.

Table 31. Input Voltages

PWR150 / PWR150R	100-240 VAC, 2.0A maximum, 50/60 Hz
PWR250	100-240 VAC, 5.0A maximum, 50/60 Hz
PWR250-80	40-60 VDC, 6.0A maximum
PWR800	100-240 VAC, 10.0A maximum, 50/60 Hz
PWR1200	100-240 VAC, 15.0-7A maximum, 50/60 Hz

Heat Dissipation

Table 32 and Table 33 list the heat dissipation for the switches.

Table 32. Maximum Heat Dissipation with the PWR150, PWR250, or PWR250-80 Power Supply

x530DP-28GHXm	375 BTU/h
x530DP-52GHXm	512 BTU/h

Table 33. Maximum Heat Dissipation with the PWR800 or PWR1200 Power Supply

x530DP-28GHXm	6279 BTU/h
x530DP-52GHXm	6586 BTU/h

Certifications

Table 34 lists the product certificates.

Table 34. Product Certifications

EMI (RFI Emissions)	FCC Class A, EN55032 Class A, EN61000-3-2, EN61000-3-3, EN55024, EN62368-1, VCCI Class A, RCM
EMC (Immunity)	EN55024
Electrical and Laser Safety	EN60950-1 (TUV), UL 60950-1 ($_{C}UL_{US}$), CSA-C22-2 No. 60950-1 ($_{C}UL_{US}$), EN60825-1 (TUV)
Compliance Marks	CE, $_{C}UL_{US}$, TUV
RoHS and WEEE	Complies with RoHS 6 Complies with China RoHS
Common Criteria	ISO/IEC 15408

RJ-45 Twisted Pair Port Pinouts

Figure 67 illustrates the pin layout of the RJ-45 connectors on the front panel of the switch.

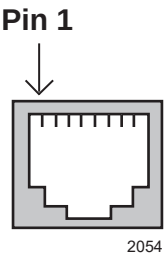


Figure 67. RJ-45 Socket Pin Layout (Front View)

Table 35 lists the pin signals.

Table 35. Pin Signals for 10/100M and 2.5G/5G Base-T Connectors

Pin	10/100Mbps MDI Signal	10/100Mbps MDI-X Signal	G/2.5G/5G Signal
1	TX+	RX+	Bi-directional pair A+
2	TX-	RX-	Bi-directional pair A-
3	RX+	TX+	Bi-directional pair B+
4	Not used	Not used	Bi-directional pair C+
5	Not used	Not used	Bi-directional pair C-
6	RX-	TX-	Bi-directional pair B-
7	Not used	Not used	Bi-directional pair D+
8	Not used	Not used	Bi-directional pair D-

RJ-45 Style Serial Console Port Pinouts

Table 36 lists the pin signals of the RJ-45 style serial console port.

Table 36. RJ-45 Style Serial Console Port Pin Signals

Pin	Signal
1	RTS#
2	Not used
3	Transmit Data
4	Ground
5	Ground
6	Receive Data
7	Not used
8	CTS

USB Port

Table 37 lists the pin signals of the USB port.

Table 37. USB Port Pin Signals

Pin	Signal
1	+5V
2	DATA-
3	DATA+
4	NC
5	GND

Appendix B

Installing the Switch in the RKMT-SL01 Sliding Rack

This appendix contains the following sections:

Introduction

The RKMT-SL01 Rack Mount Kit is a slide-rail type rack-mount kit for Allied Telesis switches in EIA standard 19-inch equipment racks. The kit makes installation and maintenance of network equipment easier by letting you slide switches into or out of equipment racks, including server racks with deep dimensions.

Note
The RKMT-SL01 Kit should only be used with approved Allied Telesis products.

Rack Mount Kit Components

Note
The illustrations in this chapter show a generic switch, but the installation procedures are the same for similar switches.

The kit has three main components.

Adjustable Outer Rails

Two adjustable outer rails attach to the equipment rack. They are suitable for racks with depths of 600 mm (23.6 in) to 900 mm (35.4 in). Refer to Figure 68.

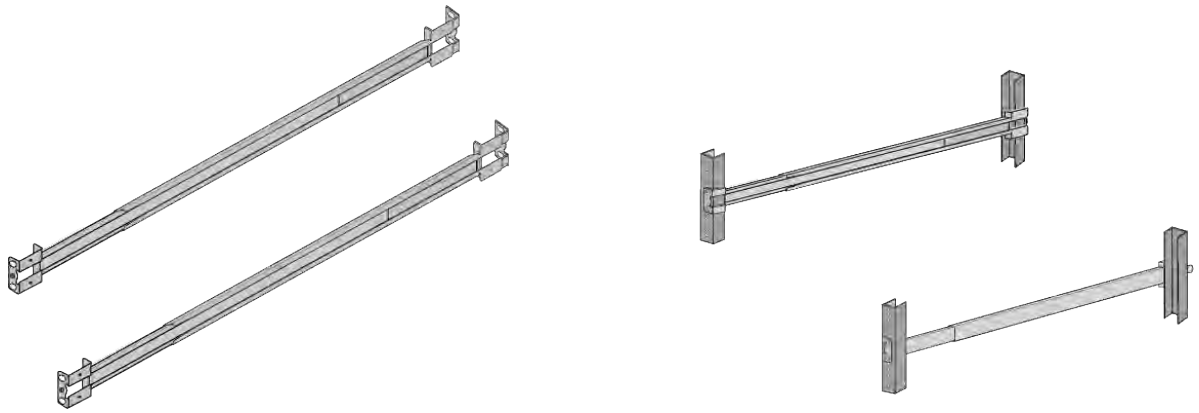


Figure 68. Outer Rails

Inner Rails

Two Inner rails attach to the sides of the switch. Refer to Figure 69.

Figure 69. Inner Rails

Extension Brackets

Two extension brackets attach to the front of the inner rails and control the amount the switch is recessed in the equipment rack. The brackets also have a captive screw for securing the switch in the equipment rack. Refer to Figure 70 on page 200.

Figure 70. Extension Brackets

Equipment Rack Requirements

The Rack Mount Kit is designed for equipment racks that meet the following requirements:

- The depth can be from 600 mm (23.6 in) to 900 mm (35.4 in).
- The width should be a minimum of 452 mm (17.8 in).
- There should be 35 mm (1.4 in) depth within the rack post for the outer rail mounting.
- The distance between the left and right wall (for the outer rail mounting) should be a minimum of 10 mm (0.4 in) from the screw hole in the center of the rack posts.

Reviewing Safety Precautions

Review these safety precautions before installing the RKMT-SL01 Kit.

Note
The ✍ indicates that a translation of the safety statement is available in a PDF document titled ***Translated Safety Statements*** posted on the Allied Telesis website at **www.alliedtelesis.com/en/documents/translated-safety-statements**.

Warning
Mounting of the equipment in the rack should be such that a hazardous condition is not created due to uneven mechanical loading. ✍ E25

Warning
Do not pull the rear of the switch out past the front rack posts. If you need to position the rear of the switch out past the front of the rack, you should remove it completely from the rack. ✍ E58

Warning
Pull the switch out slowly if you must remove it from the rack for maintenance. If you pull the switch out past the front of the rack posts, or if you pull it out too quickly, there is a risk that the weight of the switch will cause the sliding rail assemblies to fail and cause the switch to fall out. ✍ E59

Caution
Avoid applying excessive force to the cables. ✍ E60

Caution
If using long extension bracket(s), secure between the fixed bracket and short extension bracket - the long extension bracket(s) cannot be attached directly to the inner rail. ✍ E61

Caution
Use the adjustment bracket screws supplied with the inner rail. Using screws other than those supplied may result in equipment damage. E62

Warning
When installing the outer and inner rails, and adjustment bracket, ensure the components are securely attached with the appropriate screws. If not securely attached, a serious accident may occur due to falling equipment. E63

Warning
When installing and removing the switch from the rack, disconnect the media and power cables. E64

Warning
A built-in stopper prevents the outer rail from extending beyond its maximum length of 960 mm (37.8 in). Do not extend the rail by force beyond this point, otherwise, the outer bracket will be weakened, and the switch may fall from the rack; equipment could be damaged. E65

Warning
Ensure the front and rear of both outer rails are attached at the same distance from the floor, otherwise the switch may fall from the rack. E66

Warning
Be careful to not drop the switch when lifting and not to pinch your fingers when inserting the switch into the rack. E67

Warning
Other than maintenance work, secure the switch to the outer rail (via the adjustment bracket): If the switch is not secured properly, there is a risk of the switch falling out during movement caused by an earthquake. E68

Warning
Do not pull the switch out past the front rack posts. E69

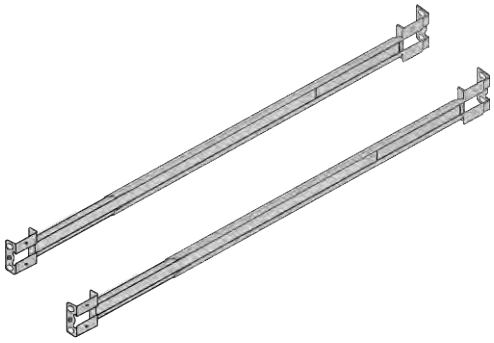
Installation Overview

The following steps summarize the installation procedure for the RKMT-SL01 Rack Mount Kit:

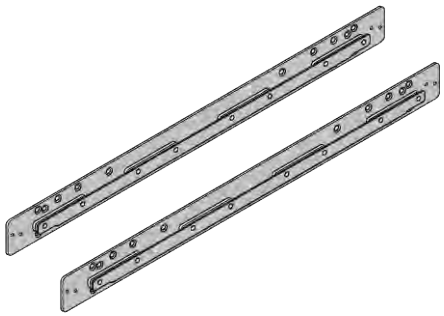
1. Verify the contents of the shipping box. Refer to “Unpacking the Shipping Container” on page 206.
2. Attach the outer rails to the equipment rack. Refer to “Installing the Outer Rails on the Equipment Rack” on page 208.
3. Determine the lengths of the extension brackets and install the brackets on the inner rails. Refer to “Installing the Extension Brackets on the Inner Rails” on page 210.
4. Attach the inner rails to the switch. Refer to “Installing the Inner Rails on the Switch” on page 216.
5. Slide the switch into the outer rails. Refer to “Installing the Switch in the Equipment Rack” on page 217.

Unpacking the Shipping Container

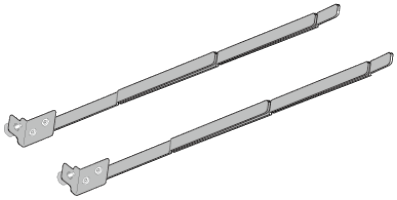
The contents of the shipping container are shown in Figure 71.



Two outer rails - They attach to the equipment rack. Their lengths are adjustable from 600 to 960 mm (23.6 - 37.8 in).

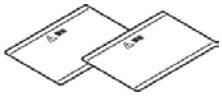


Two inner rails - They attach to the sides of the switch.



Two extension brackets - They set the distance the switch is recessed in the equipment rack and secure the switch to the rack.

- 16 inner rail screws (M4 x 8 countersunk) - They attach the inner rails to the switch. Screw holes and number of screws vary depending on the switch.
- Four extension bracket screws (M3 x 4 countersunk) - They attach the extension brackets to the inner rails.



Two warning labels - They are affixed to the top and bottom of the switch and warn against pulling the switch out past the equipment rack posts.

Figure 71. Shipping Container Contents

Note
Store the packaging material in a safe location. You should use the original shipping material if you need to return the kit to Allied Telesis.

Warning
When installing the outer and inner rails, and extension brackets, ensure the components are securely attached with the appropriate screws. If not securely attached, a serious accident may occur due to falling equipment. E63

Installing the Outer Rails on the Equipment Rack

To install the outer rails to the equipment rack, perform the following procedure.

1. Locate the FRONT and REAR labels on the sides of the rails. You have to install the rails with the FRONT labels at the front of the equipment rack and the REAR Labels at the back. Refer to Figure 72.

Figure 72. FRONT and REAR Labels on the Outer Rails

2. Attach the outer rails to the equipment rack using the supplied screws. Use four screws per rail. Refer to Figure 73 on page 209. Installing the switch can be easier if you leave the screws slightly loosened now and fully tightened them after the switch is installed.

Warning
Built-in stoppers prevent the outer rails from extending beyond their maximum length of 960 mm (37.8 in). Do not force the rails beyond the maximum length. Otherwise, the brackets will be weakened, and the switch may fall from the rack and be damaged. E65

Warning
Verify that the front and rear of both outer rails are attached at the same distance from the floor, otherwise the switch may fall from the rack. E66

3. Go to “Installing the Extension Brackets on the Inner Rails” on page 210.

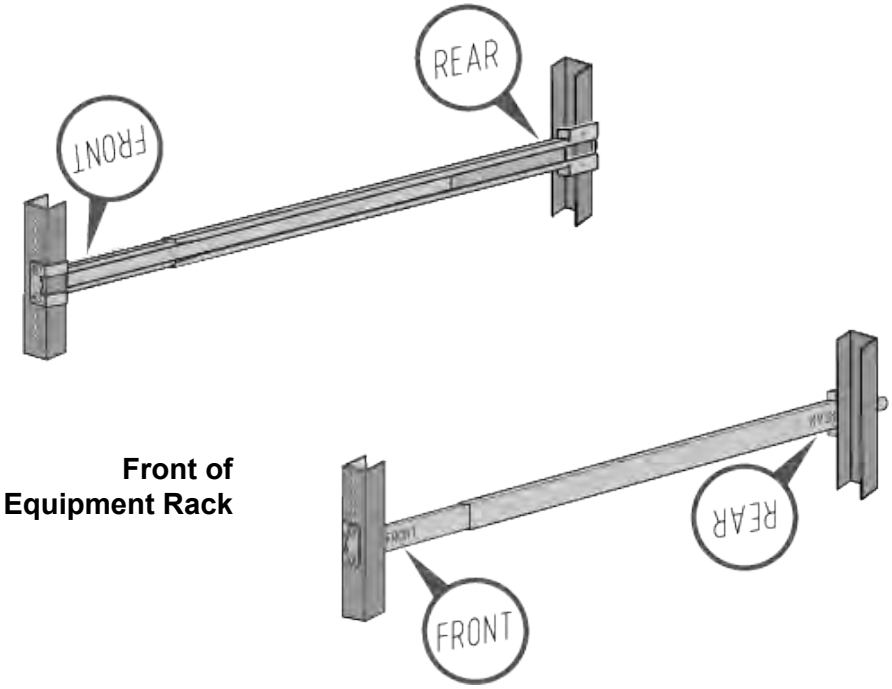


Figure 73. Installing the Outer Rails on the Equipment Rack

Installing the Extension Brackets on the Inner Rails

The kit comes with two extension brackets. Refer to Figure 74.

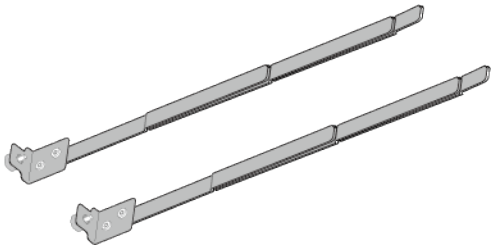


Figure 74. Extension Brackets

You use the brackets to recess the switch in the equipment rack. The maximum distance will depend on the depth of the equipment rack. The deeper the equipment rack, the more the switch can be recessed. The range is approximately 40mm (1.6 in.) to 453mm (17.8 in.). Figure 75 is an example.

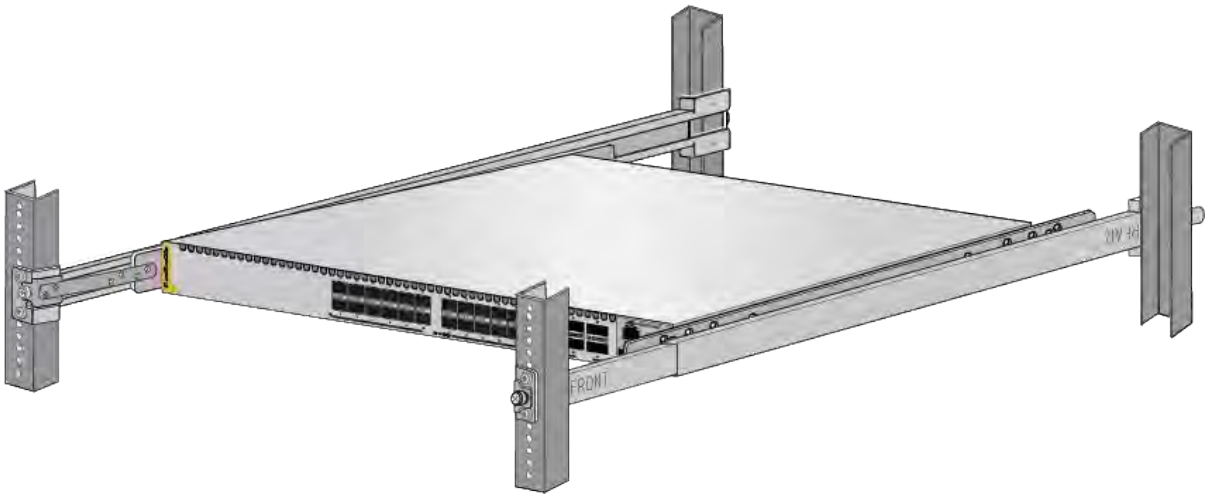


Figure 75. Example of a Switch Recessed in an Equipment Rack

Measuring the Extension Bracket Lengths

The first step is to decide how much you want to recess the front panel of the switch in the rack and then measure the distance. That will tell you the approximate lengths of the extension brackets. Perform the following procedure:

1. Slide one of the inner rails into an outer rail. Be sure that the UP arrow on the inner rail is pointing up. Refer to Figure 76 on page 211.

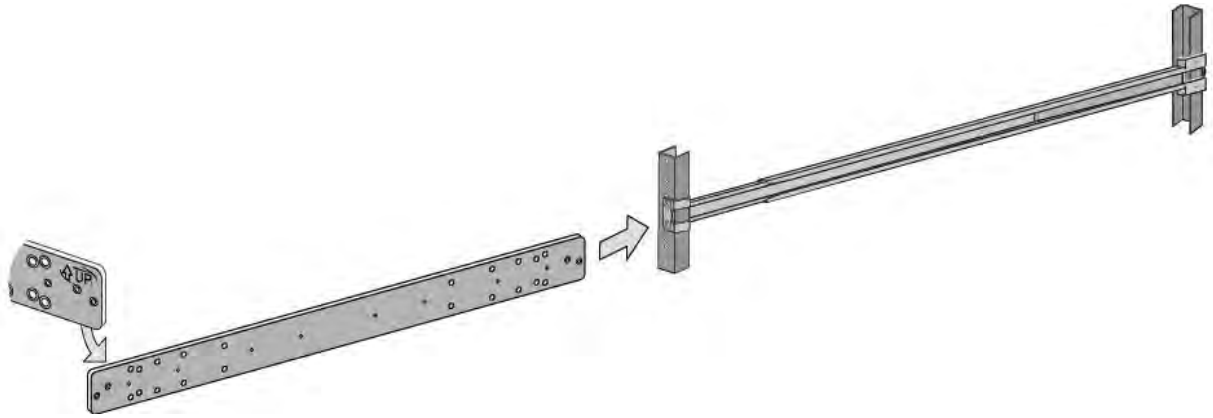


Figure 76. Inserting an Inner Rail into an Outer Rail

2. Position the inner rail at the planned location for the front panel of switch in the sliding rack. Refer to Figure 77.

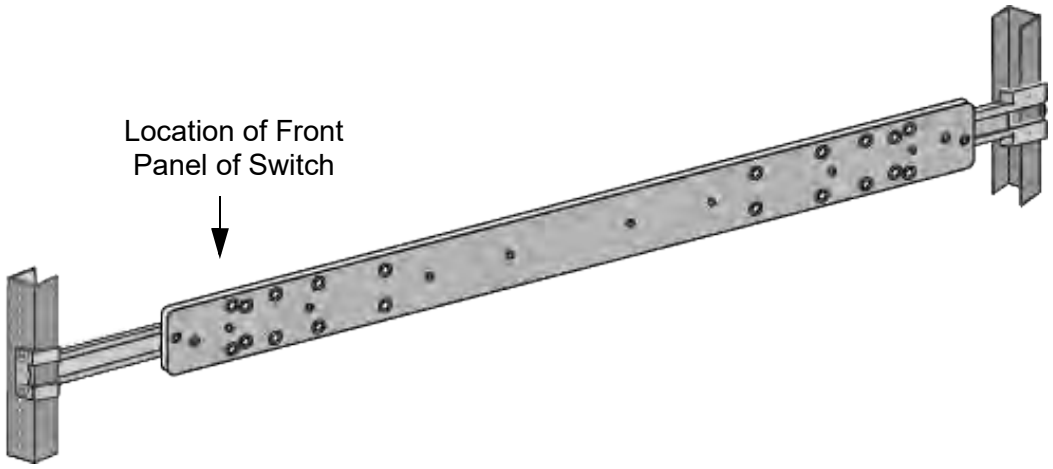


Figure 77. Example of Positioning the Inner Rail

3. Measure the distance from the front of the equipment rack to the front of the inner rail. This will be the approximate length of the extension brackets. Refer to Figure 78.

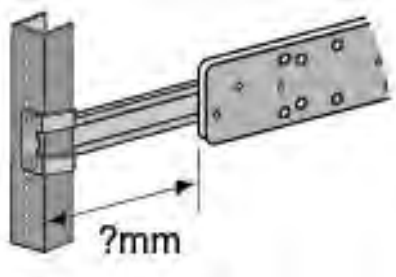


Figure 78. Measuring for the Extension Brackets

4. Remove the inner rail from the outer rail. Refer to Figure 79.

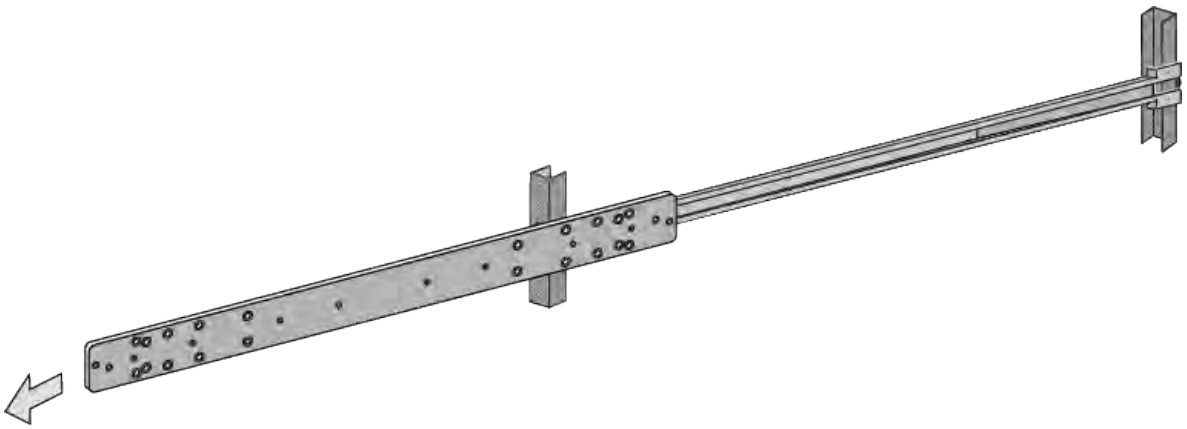


Figure 79. Removing the Inner Rail

5. Go to “Assembling the Extension Brackets,” next.

Assembling the Extension Brackets

Now that you know the approximate length for the extension brackets, you are ready to assemble them. The brackets consist of four parts. Refer to Table 38 and Figure 80.

Table 38. Extension Bracket Parts

A	Fixed Bracket	1 ea
B	Long Extension Brackets	2 ea
C	Short Extension Bracket	1 ea

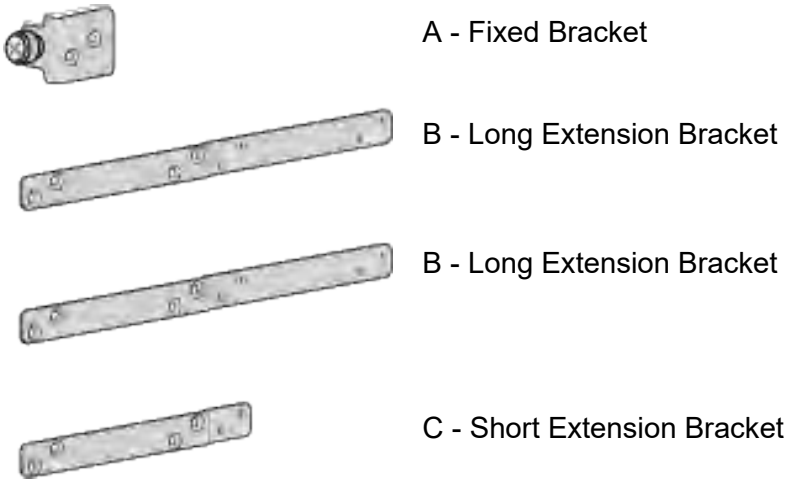


Figure 80. Extension Bracket Parts

You adjust the lengths of the brackets by connecting them in different combinations. There are seven possible configurations. Refer to Figure 81. The default configuration is number 5. To adjust the extension brackets, perform the following procedure:

1. Review Figure 81 to find the bracket length that most closely matches the measurement taken in step 3 in the previous procedure.

#1

#2
Length:101mm (3.8 in.)

#3
Length:202mm (8.0 in.)

#4
Length:277mm (10.9 in.)

#5
Length:303mm (11.9 in.)
(Factory default)

#6
Length:378mm (14.9 in.)

#7
Length:453mm (17.8 in.)

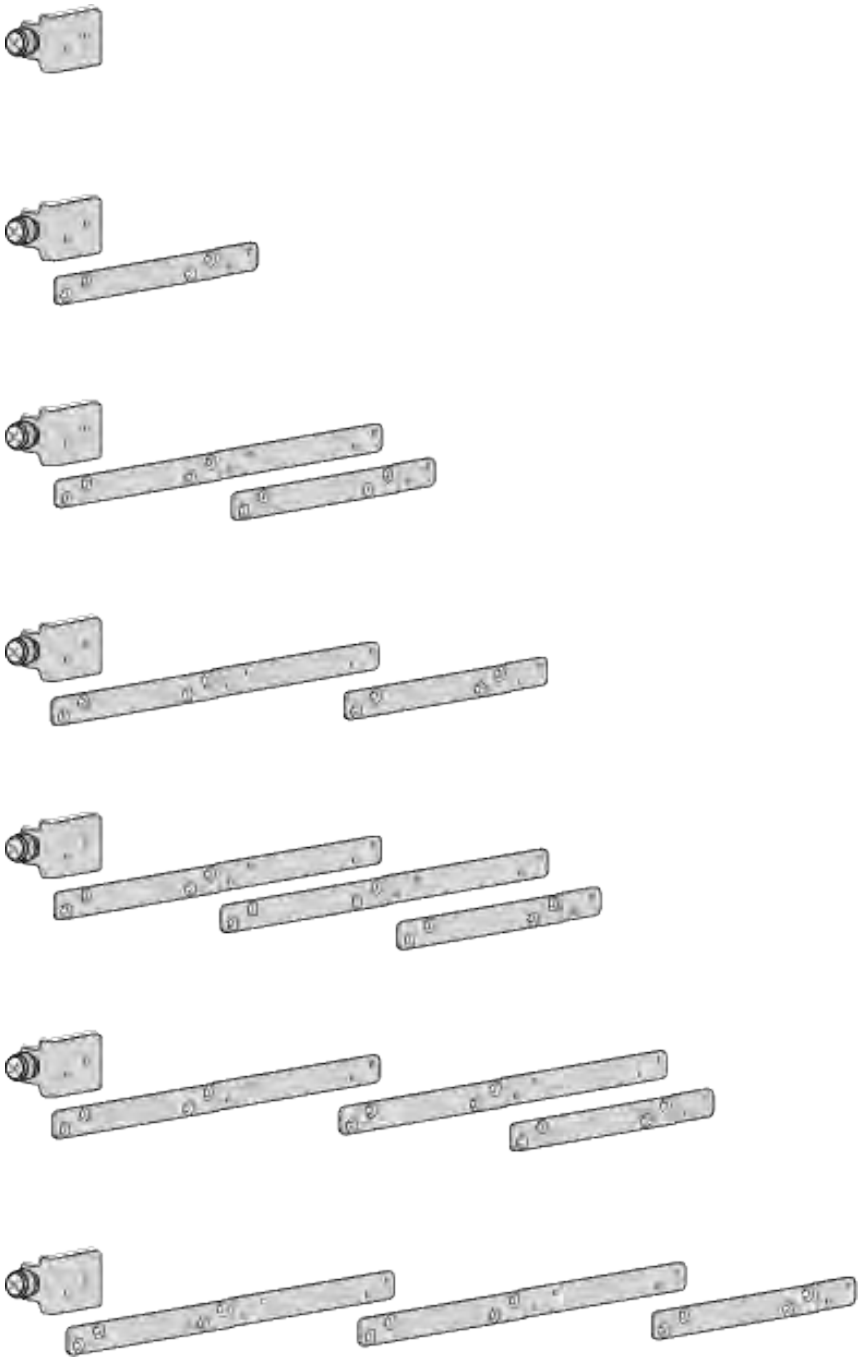


Figure 81. Extension Bracket Configurations

Note
The long brackets have to be used between the fixed and short brackets. You cannot connect them directly to the inner rails.

2. Assemble the extension brackets to match the selected length in the table.

3. Attach the extension brackets to the inner rails. Observe the following:

   - ❒ Attach the brackets to the sides of the inner rails with the UP arrows.
   - ❒ Attach the screws through the holes on the sides opposite the sides with the UP arrows.

Caution
Use the extension bracket screws supplied with the inner rail. Using screws other than those supplied may result in equipment damage. E62

Figure 82 on page 214 shows an example.

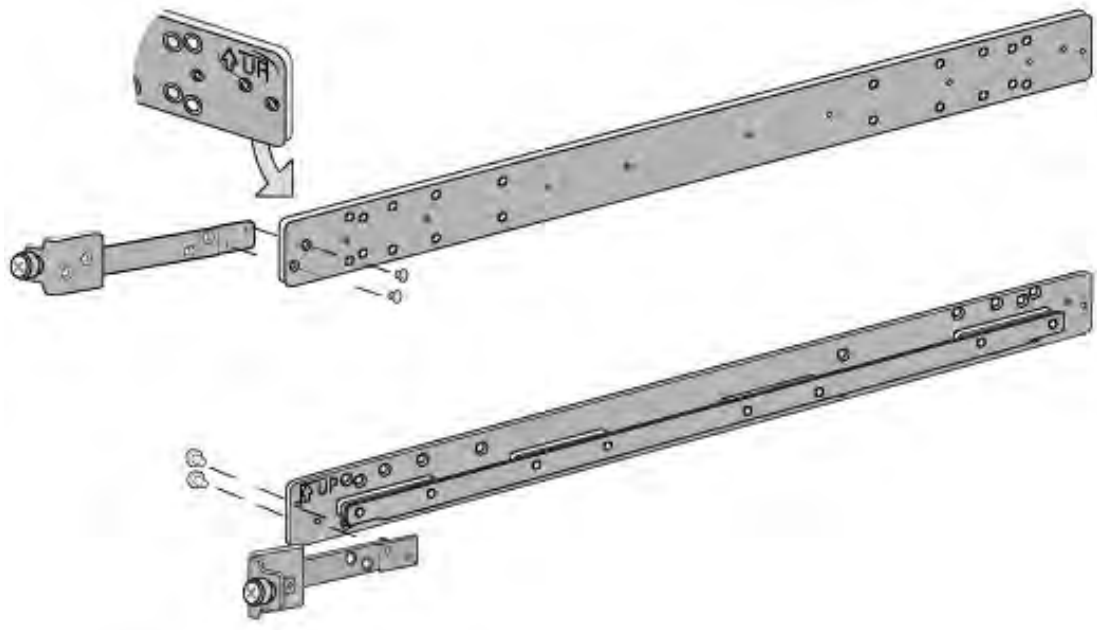


Figure 82. Example of Attaching the Extension Brackets to the Inner Rails

4. To test the lengths of the extension brackets, slide the inner rails into the outer rails in the equipment rack. Refer to Figure 83.

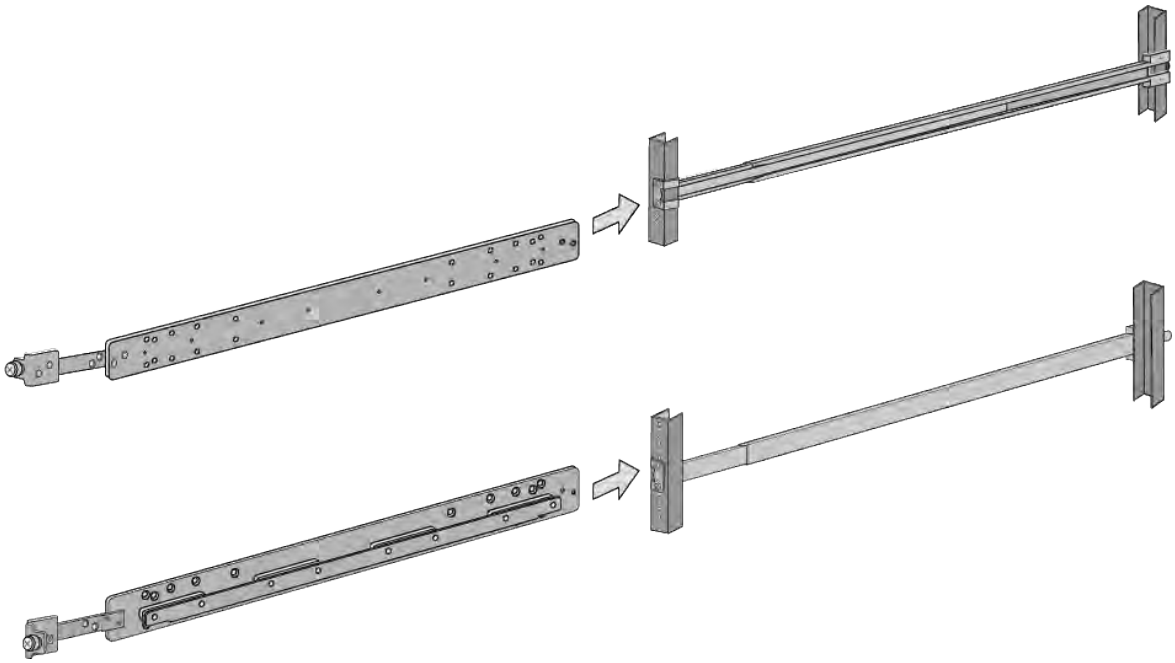


Figure 83. Testing the Inner Rails with the Extension Brackets

5. Measure the distance from the front of the equipment rack to the front of the inner rail. Refer to Figure 84. This should approximately match the value you measured in “Measuring the Extension Bracket Lengths” on page 210.

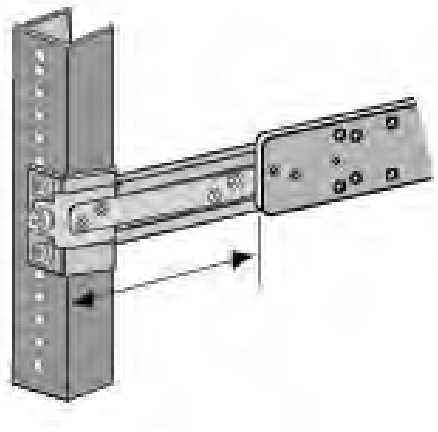


Figure 84. Verifying the Length of the Extension Bracket

6. If the extension brackets are the correct length, remove the inner brackets from the outer brackets and go to “Installing the Inner Rails on the Switch” on page 216.

7. If the brackets are not the correct length, repeat this procedure.

Installing the Inner Rails on the Switch

The sides of the x530DP-28GHXm and x530DP-52GHXm switch have two sets of bracket screw holes. The smaller M3 holes are for the standard brackets that come with the switch and the larger M4 screw holes are for the inner rails of the RKMT-SL01 sliding rack.

The inner rails are attached to the switch with four M4 screws on each side. Figure 85 identifies the respective screw holes on the inner rails and sides of the switch.

Figure 85. Inner Rail Screw Holes for the x530DP-28GHXm Switch

Attach the inner rails to the switch using eight M4 screws included with the sliding rack. Be sure that the UP arrows on the rails are pointing up and that the extension brackets extend in front of the switch. Refer to Figure 86.

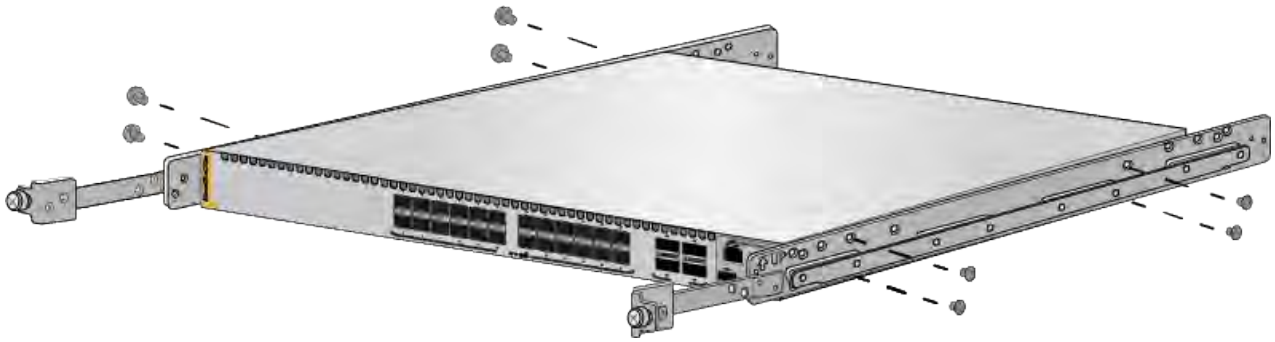


Figure 86. Attaching the Inner Rails to the x530DP-28GHXm Switch

Go to “Installing the Switch in the Equipment Rack” on page 217.

Installing the Switch in the Equipment Rack

After attaching the inner rails and extension brackets to the switch, perform the following procedure to install the switch in the sliding rack:

Warning
When installing or removing the switch from the rack, disconnect the media and power cables. E64

1. Install the switch in the sliding rack by sliding the inner rails into the outer rail grooves. Refer to Figure 87.

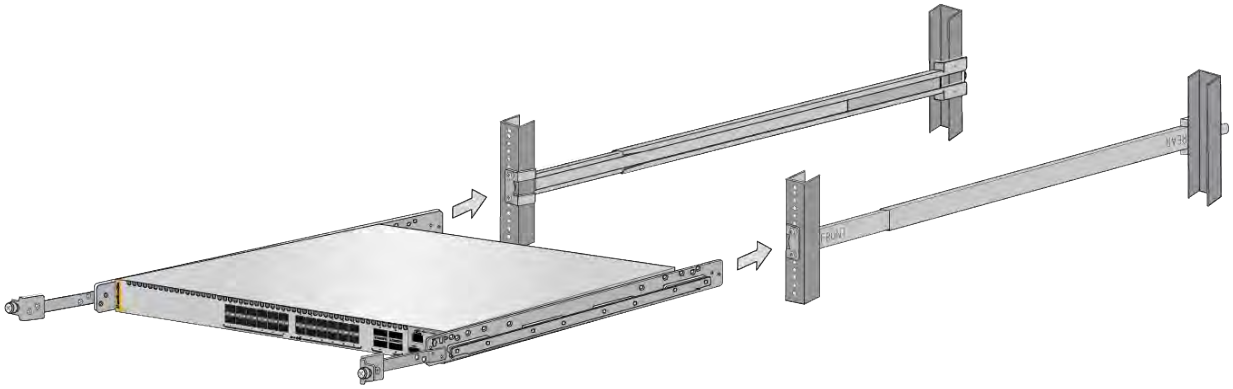


Figure 87. Sliding the Inner Rails on the Switch into the Outer Rails

Warning
Be careful to not drop the switch or pinch your fingers when inserting it into the sliding rack. E67

2. Affix the provided warning labels to the top and bottom of the switch, in locations immediately visible when removing the device from the rack. Refer to Figure 88 on page 218.

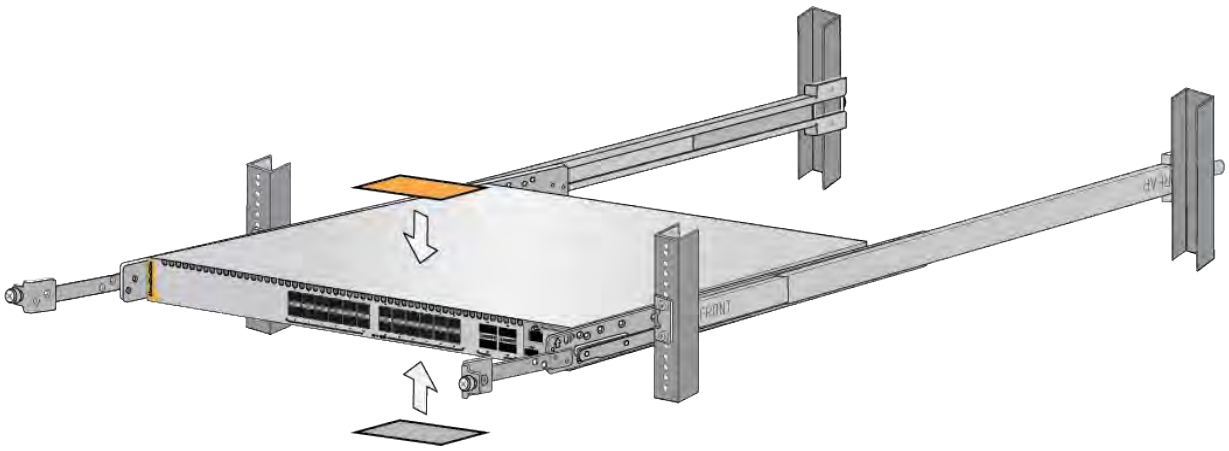


Figure 88. Affixing the Warning Labels

3. Slide the switch fully into the rack.

4. Tighten the two screws on the fixed brackets to secure the switch to the equipment rack. Refer to Figure 89.

Figure 89. Tightening the Two Screws on the Fixed Brackets

Warning
Always be sure to secure the switch to the outer rail (via the adjustment bracket). If the switch is not secured properly, there is a risk of it falling out during an earthquake. E68

Warning
Do not pull the switch out past the front rack posts. E69

Warning
Pull the switch out slowly if you must remove it from the rack for maintenance. If you pull the switch out past the front of the rack posts, or if you pull it out too quickly, there is a risk that the weight of the switch will cause the sliding rail assemblies to fail and cause the switch to fall out. E59

5. Finish tightening the eight screws on the outer rails to secure the rails to the equipment rack. See Figure 90.

Figure 90. Tightening the Screws on the Outer Rails

This completes the installation procedure.

Appendix C

Removing Modules

This chapter contains the following procedures:

Removing AC Power Supplies

This section contains the procedure for removing the following power supplies:

- PWR150 / PWR150R
- PWR250
- PWR800
- PWR1200

The illustrations show the removal of a power supply from slot PSU A. The procedure is the same for removing a power supply in slot PSU B.

Note
Allied Telesis recommends saving a backup copy of the configuration file in the switch before removing or replacing power supplies. For instructions, refer to the *Command Reference for x530 Series Switches Running AlliedWare Plus* at **www.alliedtelesis.com**.

To remove a power supply from the switch, perform the following procedure:

1. Lift the power cord retaining clip on the power supply. Refer to Figure 91. The PWR1200 power supply does not have a retaining clip.

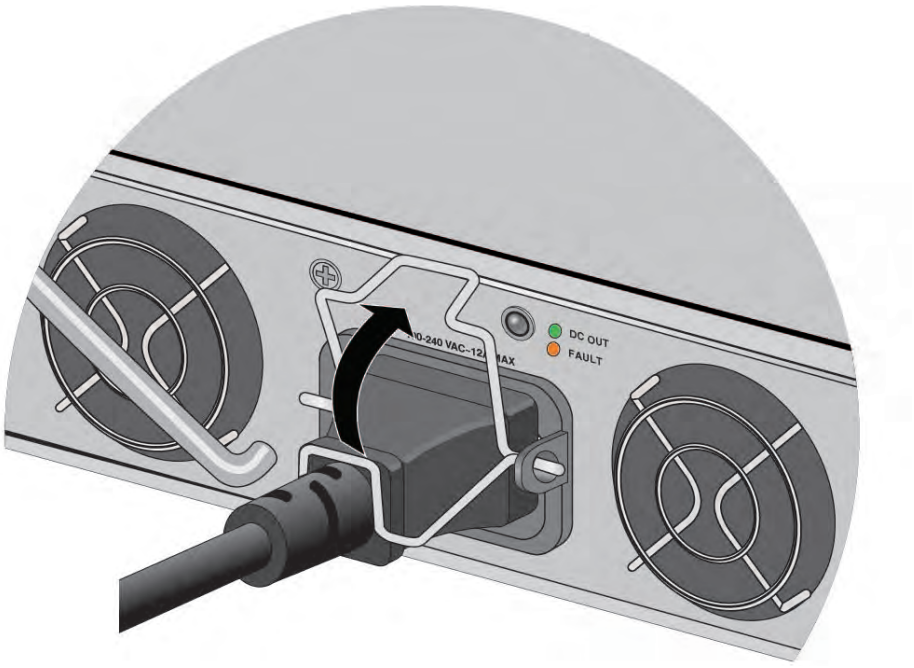


Figure 91. Lifting the Power Cord Restraining Clip

2. Disconnect the AC power cord from the AC power supply. Refer to Figure 92.

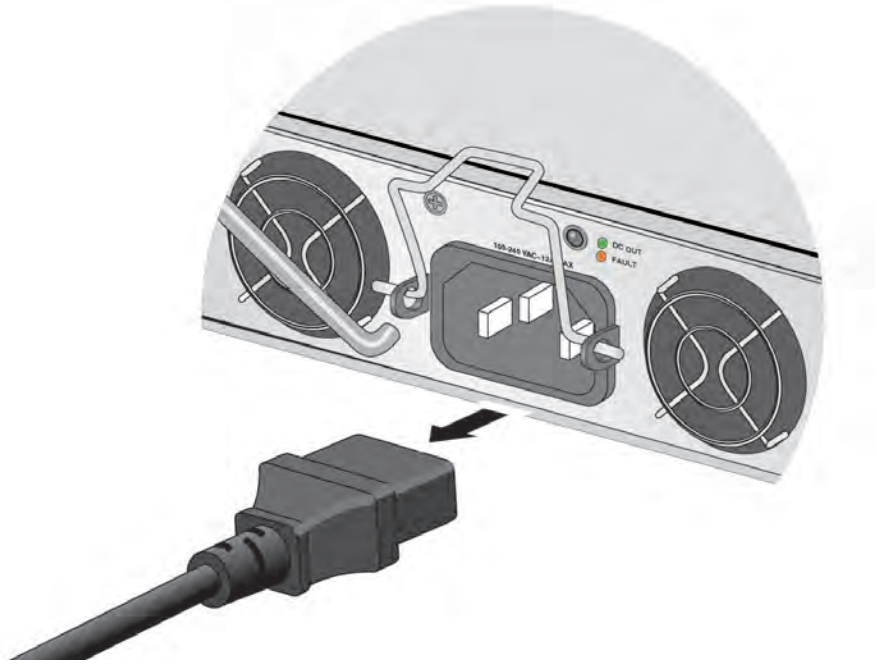


Figure 92. Disconnecting the Power Cord from the Power Supply

3. Loosen the two retaining screws on the power supply with a cross-head screwdriver. Refer to Figure 93.

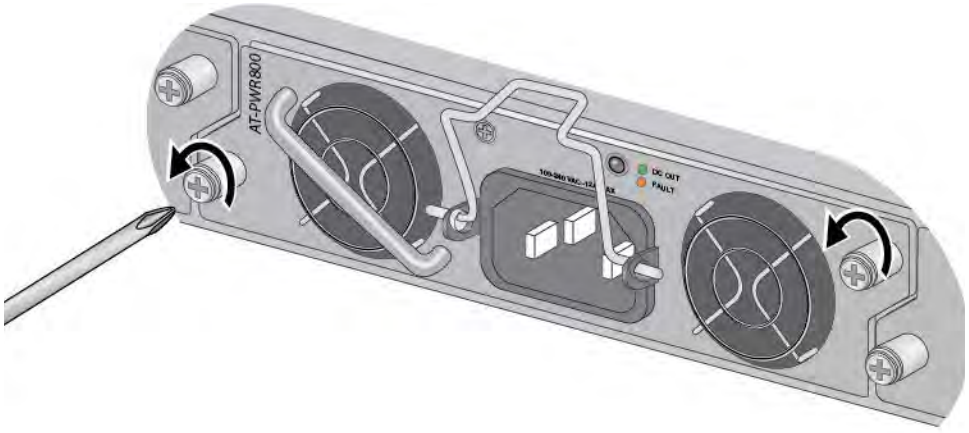


Figure 93. Loosening the Two Captive Screws

4. Carefully slide the power supply from the switch. Refer to Figure 94 on page 224.

Warning
The power supply is heavy. Use both hands to hold it when removing it from the switch.

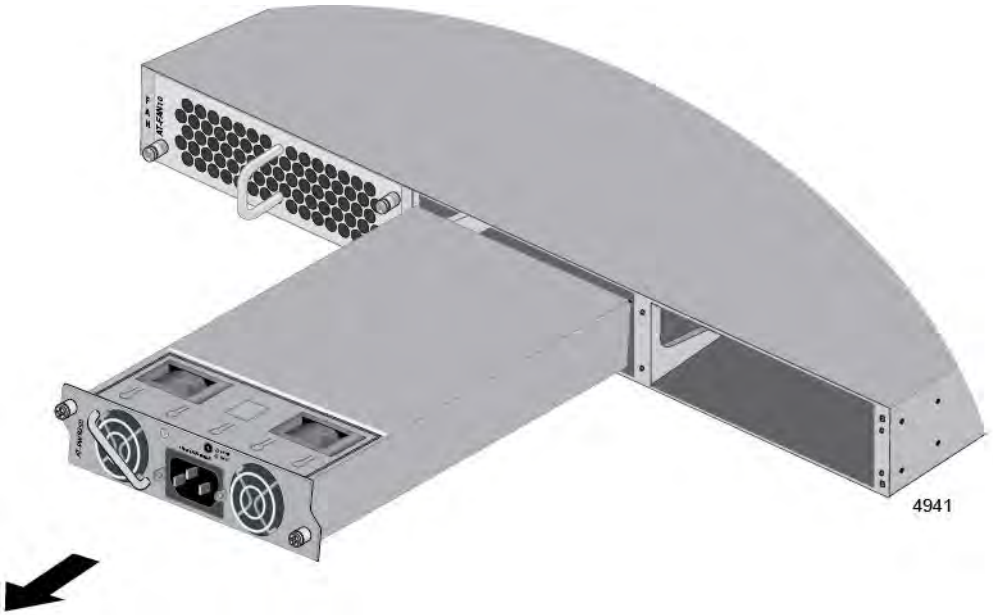


Figure 94. Removing a Power Supply

5. Do one of the following:

   - To install a new power supply, refer to Chapter 4, “Installing the Power Supplies” on page 90 for instructions.
   - If you are not installing a new power supply, install a blank panel. See “Installing a Blank Power Supply Slot Cover” on page 229 to install a blank panel.

Removing the PWR250-80 DC Power Supply

This section contains the procedure for removing the PWR250-80 DC power supply.

Warning
As a safety precaution, install a circuit breaker with a minimum value of 15 Amps between the equipment and the DC power source. E9

Warning
Always connect the wires to the LAN equipment first before connecting them to the circuit breaker. Do not work with HOT feeds to avoid the danger of physical injury from electrical shock. Always verify that the circuit breaker is in the OFF position before connecting the wires to the circuit breaker. E9

Warning
For centralized DC power connection, install only in a restricted access area. E23

Warning
This equipment must be installed in a Restricted Access location. E45

Note
A tray cable is required to connect the power source if the unit is powered by centralized DC power. The tray cable must be a UL listed Type TC tray cable and rated at 600 V and 90 degrees C, with three conductors, minimum 14 AWG. E24

Perform the following procedure to the PWR250-80 DC Power Supply.

1. Power off the DC circuit to which the switch is connected.
2. Verify that the On/Off switch on the power supply is in the Off position. Refer to Figure 95.

Figure 95. On/Off Switch on PWR250-80 Power Supply

3. Use the legend above the terminal block to identify the terminals. The terminals are **positive**, **power supply ground** and **negative**, from left to right, as shown in Figure 96.

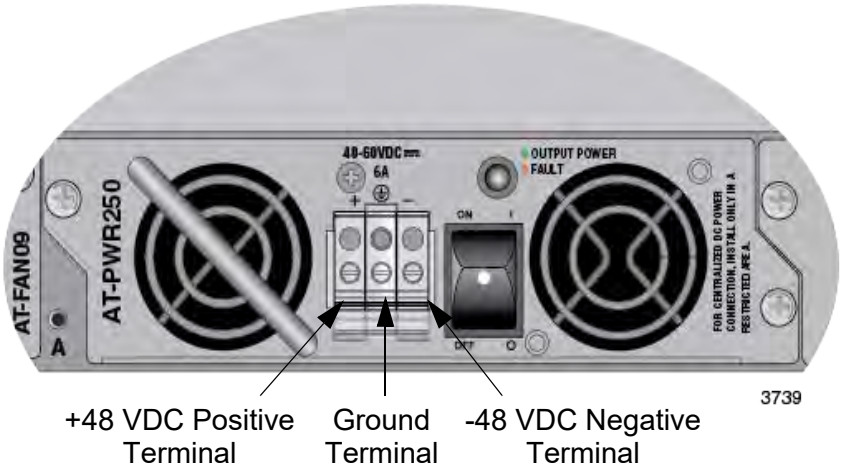


Figure 96. DC Terminal Block

4. Disconnect the supply-cable wires to the circuit breaker.
5. Disconnect the -48 VDC feed wire to the terminal block marked - (minus).
6. Disconnect the +48 VDC (RTN) feed wire to the terminal block marked + (plus).
7. Disconnect the ground wire. Refer to Figure 97.

Warning
When installing/removing this equipment, always ensure that the power supply ground connection is installed first and disconnected last. E11

Figure 97. Disconnecting the Ground Wire to the DC Terminal Block

8. Loosen the two retaining screws on the power supply with a cross-head screwdriver. Refer to Figure 93.

Figure 98. Loosening the Two Captive Screws

9. Carefully slide the power supply from the switch. Refer to Figure 99 on page 228.

Warning
The power supply is heavy. Use both hands to hold it when removing it from the switch.

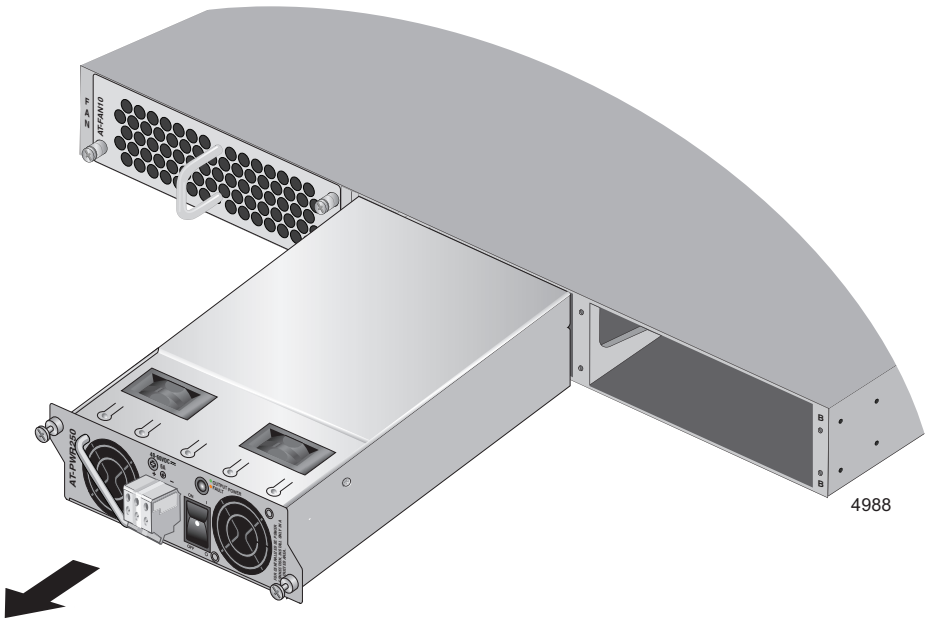


Figure 99. Removing a Power Supply

10. Do one of the following:

    - To install a new power supply, refer to Chapter 4, “Installing the Power Supplies” on page 90 for instructions.
    - If you are not installing a new power supply, go to “Installing a Blank Power Supply Slot Cover” on page 229 to install the blank panel.

Installing a Blank Power Supply Slot Cover

If you installed only one power supply in the switch, perform this procedure to install a blank panel over the empty power supply slot:

1. Position the appropriate blank panel over the empty power supply slot. Use the PNL800/1200 Blank Panel included in the accessory kit if the switch has only one PWR800 or PWR1200 Power Supply. Use the PNL250 Blank Panel if the switch has one PWR150, PWR150R, PWR250, or PWR250-80 Power Supply. Refer to Figure 100.

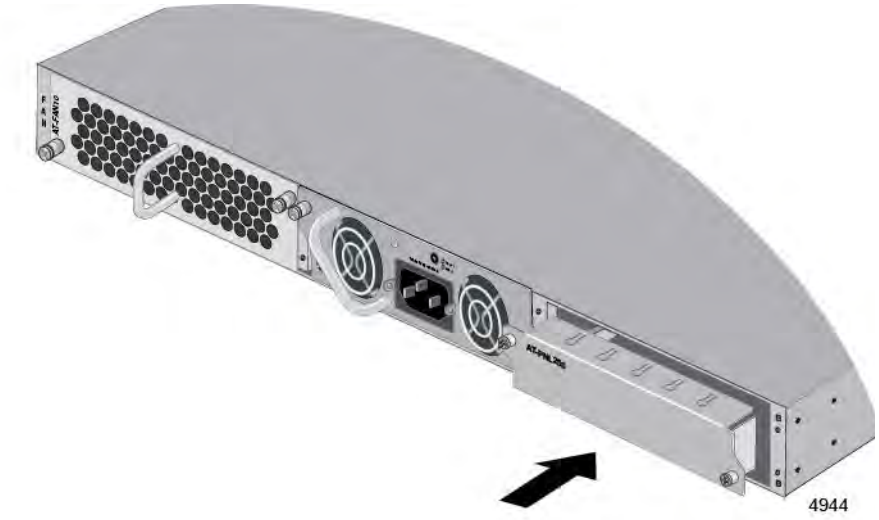


Figure 100. Installing a Blank Panel on a Power Supply Slot

2. Tighten the two captive screws with a cross-head screwdriver to secure the panel to the switch. Refer to Figure 101 on page 230.

Figure 101. Tightening the Captive Screws on the Power Supply Blank Panel

3. Do one of the following:

   - To install the switch on a table, go to Chapter 5, “Installing the Switch on a Table” on page 99.
   - To install the switch in an equipment rack, refer to Chapter 6, “Installing the Switch in an Equipment Rack” on page 103.
   - To install the switch on a wall, refer to Chapter 7, “Installing the Switch on a Wall” on page 109.
   - To install the switch on a slide-rail type rack-mount, refer to Appendix B, “Installing the Switch in the RKMT-SL01 Sliding Rack” on page 197

Removing and Replacing the FAN10 or FAN10R Module

This section contains the procedure for replacing the FAN10 module. The FAN10 / FAN10R is hot swappable. You can replace it without having to power off the switch.

Note
Allied Telesis recommends saving a backup copy of the configuration file in the switch before replacing the fan module. For instructions, refer to the *Command Reference for x530 Series Switches Running AlliedWare Plus* at **www.alliedtelesis.com**.

Removing the Fan Module

This procedure requires the following tool:

- #2 Phillips-head screwdriver (not provided)

To remove a fan module from the switch, perform the following procedure:

1. Use a #2 Phillips-head screwdriver to loosen the two screws on the faceplate of the fan module. Refer to Figure 102.

Figure 102. Loosening the Screws on the FAN10 / FAN10R Module

2. Carefully pull on the handle to disconnect the module from the internal connector in the switch, and slide it from the switch. Refer to Figure 103 on page 232.

Figure 103. Removing the FAN10 / FAN10R Module from the Switch

3. Continue with the next procedure to install a new FAN10 / FAN10R module.

Installing the Fan Module

This procedure requires the following tool:

- ❒ #2 Phillips-head screwdriver (not provided)

To install a fan module, perform the following procedure:

1. Remove the new fan module form its shipping box. Align the fan module in the slot, with the module name on the left. Refer to Figure 104.

Figure 104. Aligning the FAN10 / FAN10R Module in the Switch Slot

2. When you feel the module make contact with the internal connector, gently press on both sides to seat the module on the connector. Refer to Figure 105.

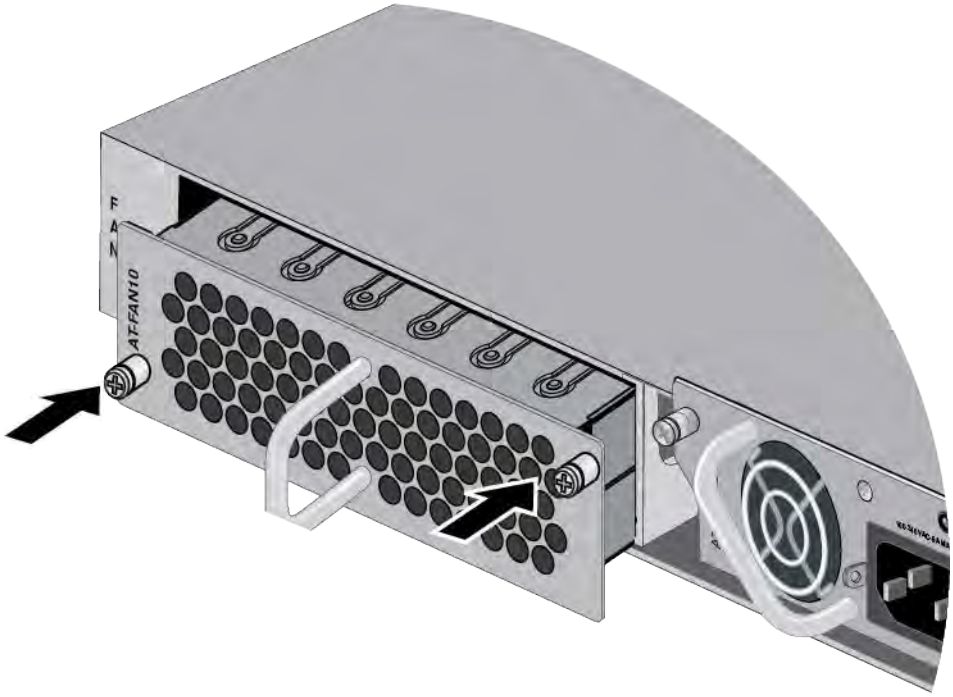


Figure 105. Seating the FAN10 / FAN10R Module on the Internal Connector

3. Tighten the two screws on the module to secure it to the switch. Refer to Figure 106.

Figure 106. Tightening the Two Captive Screws on the FAN10 / FAN10R Module

To confirm the operations of the new fan module, start a local or remote management session and enter the SHOW SYSTEM ENVIRONMENT command in the User Exec or Privileged Exec mode. For directions, refer to *Command Reference for x530 Series Switches Running AlliedWare Plus* at www.alliedtelesis.com.Reverse Airflow Combinations

Guidelines

The following combinations supported for reverse airflow are:

- FAN10R / PWR250R-80
- FAN10R / PWR250R-80 / PWR250R-80

The following combinations are not supported by the x530DP Series switches:

- Mixed AC and DC power supply units
- Mixed normal and reverse airflow modules