ufiSpace

S9501-28SMT

Disaggregated
Cell Site Gateway

Hardware Installation Guide

R1.0

Table of Contents

1   Overview

The UfiSpace S9501-28SMT is a high-performance, versatile open networking white box router that is designed to address the changing needs of backhaul transport requirements as Telecoms make the transition from legacy technologies towards 5G. It enables telecoms and service providers to deploy disaggregated open network infrastructure to lower costs and rapidly scale existing services for edge computing, mobile backhaul, and broadband access applications. The S9501-28SMT is future-proofed with a powerful quad-core processor, 28 high-speed interfaces, and full timing features supporting IEEE 1588v2 and SyncE. It is suitable for both indoor and outdoor deployments with redundant, hot-swappable components for convenience, increased availability, reliability and lower costs of maintenance

This document describes the hardware installation process for S9501-28SMT.

2 Preparation

2.1 Installation Tools

Screwdriver
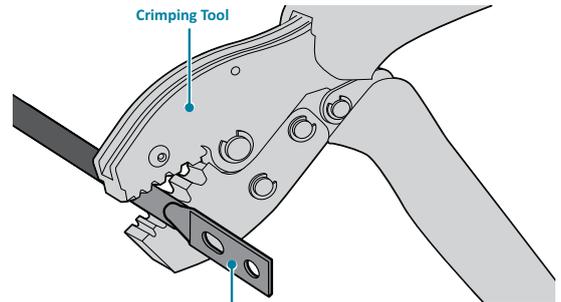
Crimping tool
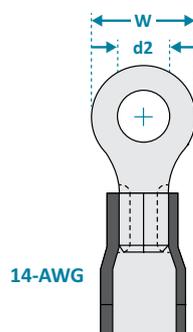
14 AWG wire with ring terminal for DC power supply

6-AWG wire for grounding

Wire-stripping tools for stripping 6-AWG copper wire
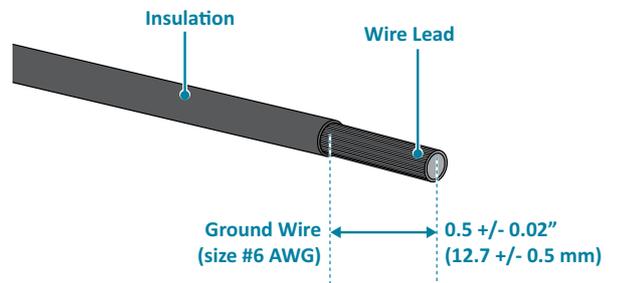
Console cable

- PC with terminal emulation software. Refer to the "Initial System Setup" section for details.
    - Baud rate: 115200 bps
    - Data bits: 8
    - Parity: None
    - Stop bits: 1
    - Flow control: None

2.2   Installation Environment Requirements

- Power Reserve: The S9501-28SMT power supply is available with:
  1. **DC Version:** 1+1 active-active -48 voltage DC power supply field replaceable unit or;
  2. **AC Version:** 1+1 active-active universal 100-240V AC power supply field replaceable unit.

  To ensure the active-active feed power design functions properly, a field with dual power circuit is recommend and a reserve of at least 200 watts on each power circuit.

- Space Clearance: The S9501-28SMT chassis width is 17.32 inches (44cm) and shipped with a rack mount brackets suitable for 19 inch (48.3cm) wide racks. The depth of the S9501-28SMT chassis is 11.89 inches (30.2cm) without the field replaceable units (FRUs) and comes with adjustable mounting rails suitable for rack depths of 22 inches (55.88cm) to 33 inches (83.82cm). The handle for the fan units will extend outwards by 1 inch (2.54cm) and the handle for the power supplies will extend outwards by 1.5 inches (3.81cm). Therefore, to accomodate the fan and power supply handles, a minimum space clearance of 2 inches (5.08cm) is needed at the front and back of the S9501-28SMT. A total minimum reserve depth of 16 inches (40.6cm) is required.
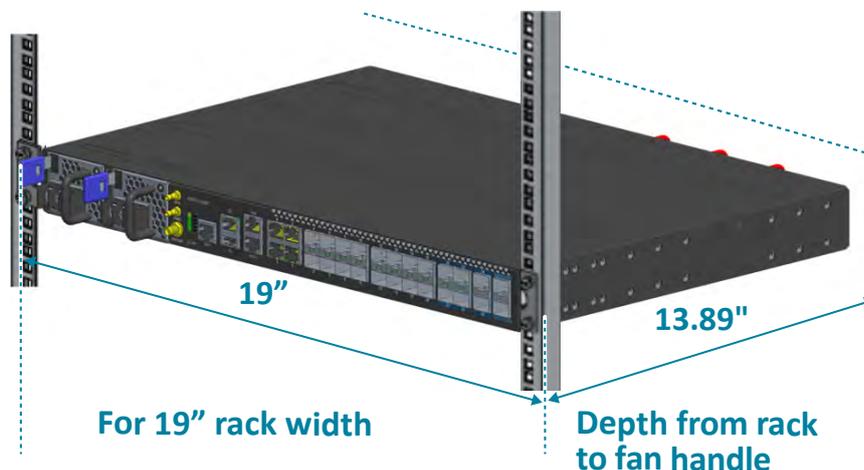

19"

13.89"

For 19" rack width

Depth from rack to fan handle

Figure 1.

4 Post Racks

19"

22"

33"

For 19" rack width

For 22"~33" rack depth

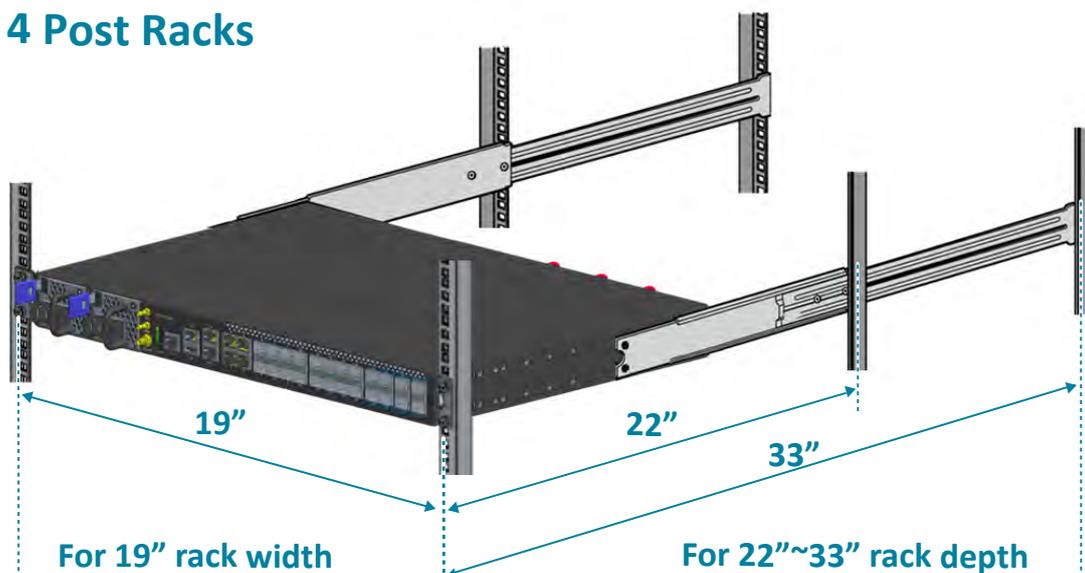**Figure 2.**

- Cooling: The S9501-28SMT airflow direction is front-to-back. Make sure the equipment on the same rack have the same airflow direction.

Figure 3.
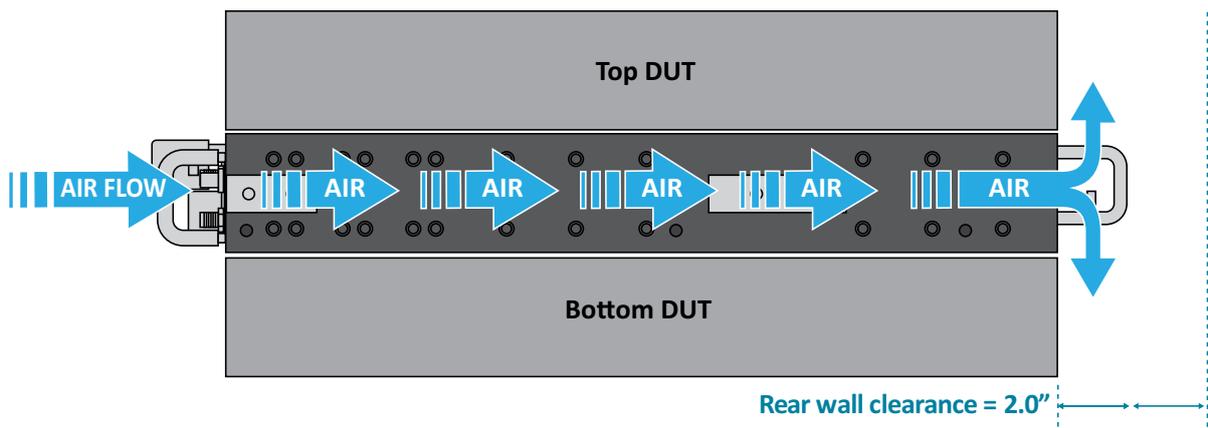
Figure 4.

2.3 Preparation Check List

Task	Check	Date
Power voltage and electric current requirement **DC version**: -48V DC, 8-4 ampere maximum or; **AC version:** 100-240V, 3-1.5 ampere		
Installation spacing and weight load requirement: S9501-28SMT is 1RU (1.75"/4.5cm) in height, 19" (48.3cm) in width, and 16" (40.6cm) in depth without considering cable routing		
Thermal requirement S9501-28SMT working temperature is -40 to 65°C (-40°F to 149°F), airflow direction is front-to-back		
Installation tools required #2 Philips Screwdriver, 6-AWG wire stripper, and crimping tool		
Accessories required PC with terminal emulation software, console cable, 14-AWG wire with ring terminal for power, 6-AWG wire for grounding		

3 Package Contents

3.1 Accessory List

Item	Description	Spec. & Dimensions	Qty.	Weight
1	Grounding Lug	1.97" x 0.44" x 0.3" (# 6 AWG) (50 x 11.1 x 7.5mm)	1 pcs	0.22lbs (10.0g)/pcs
2	Screw Kit (for Grounding Lug)	2 x Screws M4*L8.0mm 4 x M4 Lock Washers	6 sets	0.008lbs (3.8g)/set
3	Rack Mount Bracket	1.98" x 1.69" x 0.79" (19" width rack) (50.4 x 43 x 20mm)	2 pcs	0.15lbs (67.2g)/2 pcs (0.07lbs (33.6g)/pcs)
4	Screw Kit (for Rack Mount Bracket)	8 x Screws M4.0*L6.5mm	8 sets	0.01lbs (6.5g)/set
5	Adjustable Mounting Rail (for 4 post)	16.02" x 1.69" x 0.83" (22" to 33" rack depth) (406.8 x 43 x 21mm)	2 pcs	1.79lbs (810g)/2 pcs (0.89lbs (405g)/pcs)
6	Screw Kit (for Adjustable Mounting Rail)	8 x Screws M4.0*L6.5mm	8 sets	0.01lbs (6.5g)/set
7	Cable USB 2.0 A Type Male to Female 200 mm	7.87" (200mm)	1 pcs	0.021lbs (9.7g)/pcs

3.2   Component Physical Information

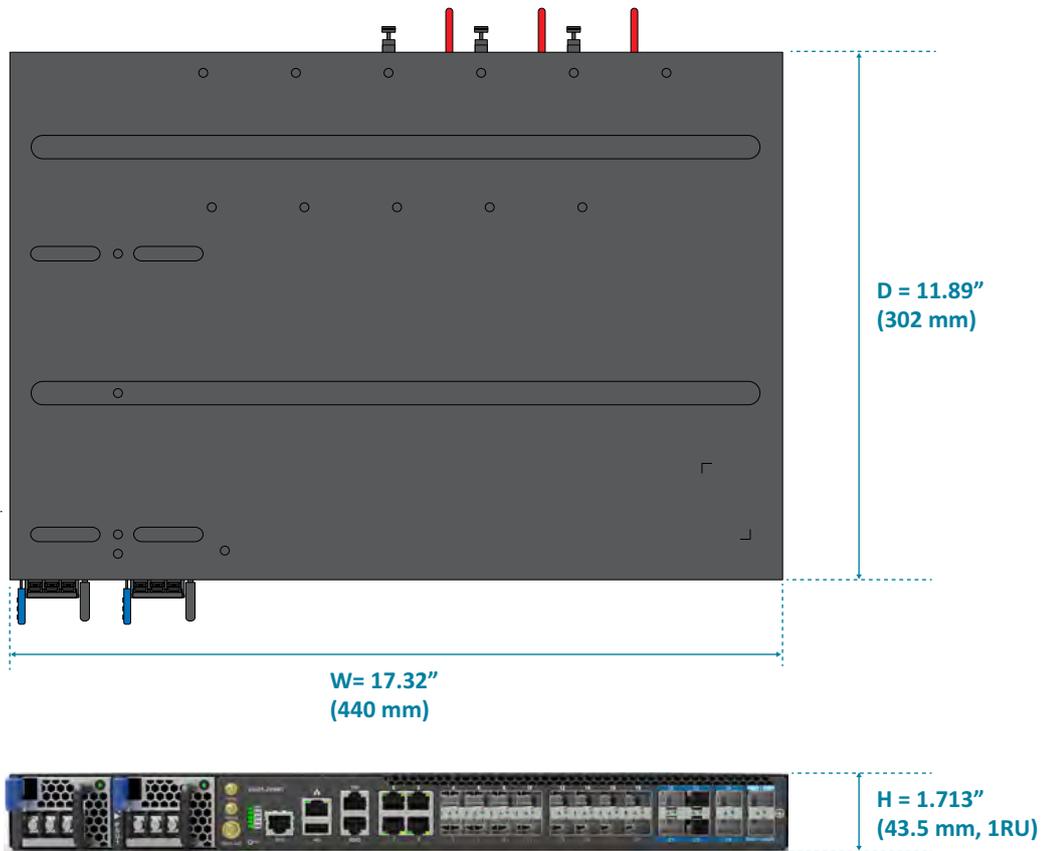| Specification	Item	Description
Weight	Total package contents	22.05lbs (10kg)
	Chassis without FRU	14.44lbs (6.55kg)
	DC/AC PSU	1.5lbs (691g)
	Fan	0.2lbs (90g)
	Ground lug	0.022lbs (10g)
	Rack mount bracket	0.07lbs (33.6g)
	Adjustable mounting rail	0.89lbs (405g)
	USB extension cord	0.021lbs (9.7g)
	Screw kit for ground lug	0.008lbs (3.8g) per set
	Screw kit for rack mount bracket and adjustable mounting rail	0.1lbs (6.5g) per set
Dimension	S9501-28SMT (W x D x H)	17.32" x 11.89" x 1.713" (440 x 302 x 43.5mm)
	PSU (W x D x H)	1.99" x 8.31" x 1.58" (50.5 x 211 x 40.2mm)
	Fan (W x D x H)	1.57" x 1.57" x 1.1" (40 x 40 x 28mm)

4 Identifying Your System
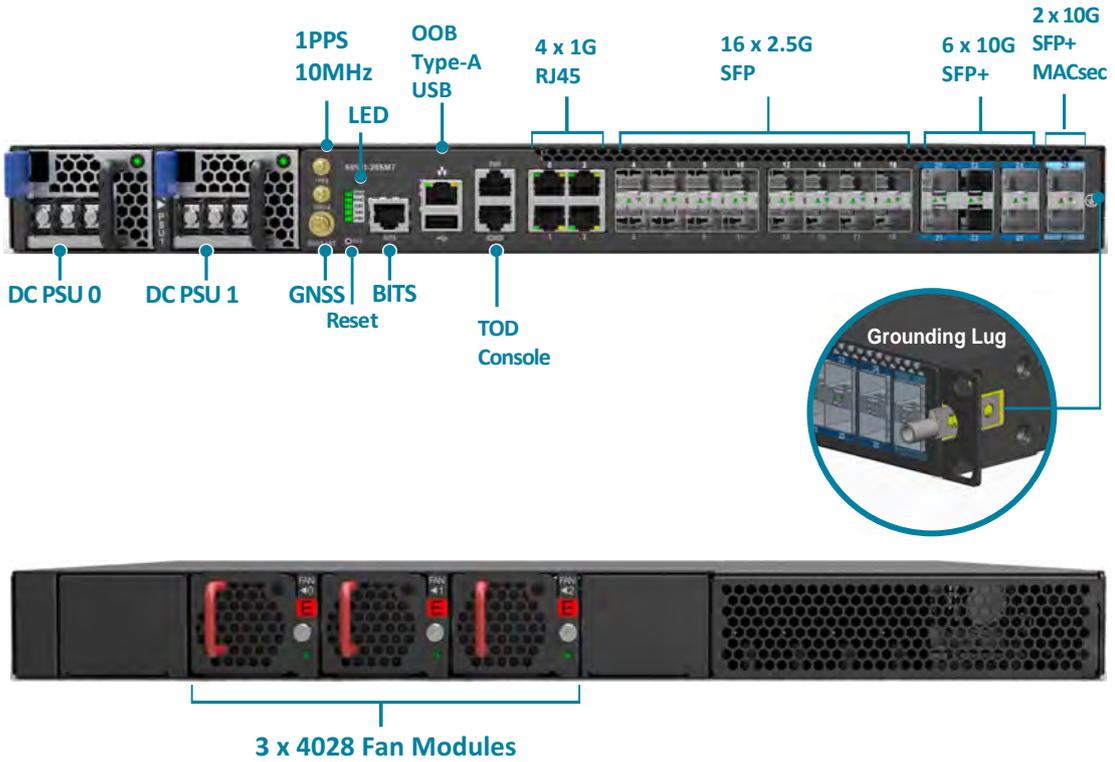
4.1 S9501-28SMT DC Version Overview

D = 11.89"
(302 mm)

W= 17.32"
(440 mm)

H = 1.713"
(43.5 mm, 1RU)

Figure 5.

1PPS
10MHz

OOB
Type-A
USB

LED

4 x 1G
RJ45

16 x 2.5G
SFP

6 x 10G
SFP+

2 x 10G
SFP+
MACsec

DC PSU 0   DC PSU 1   GNSS   BITS
                          Reset

TOD
Console

Grounding Lug

3 x 4028 Fan Modules

Figure 6.

4.2   S9501-28SMT AC Version Overview

D = 11.89"
(302 mm)

W= 17.32"
(440 mm)

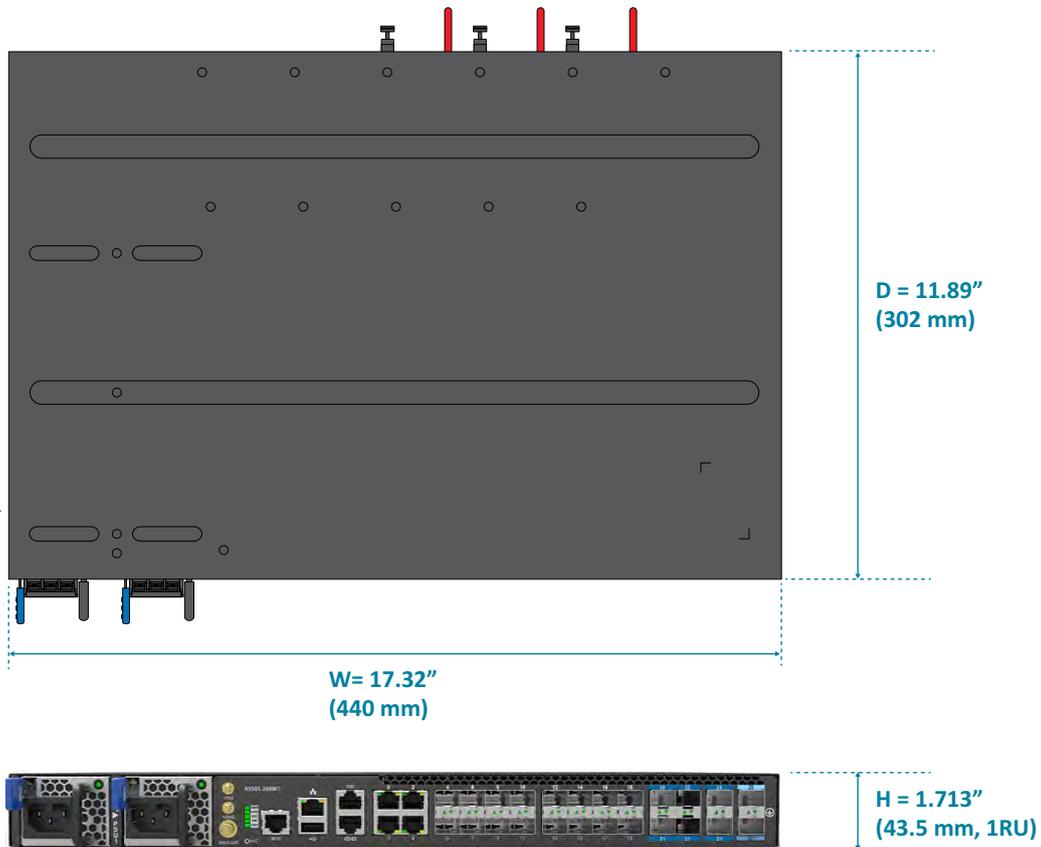H = 1.713"
(43.5 mm, 1RU)

Figure 7.

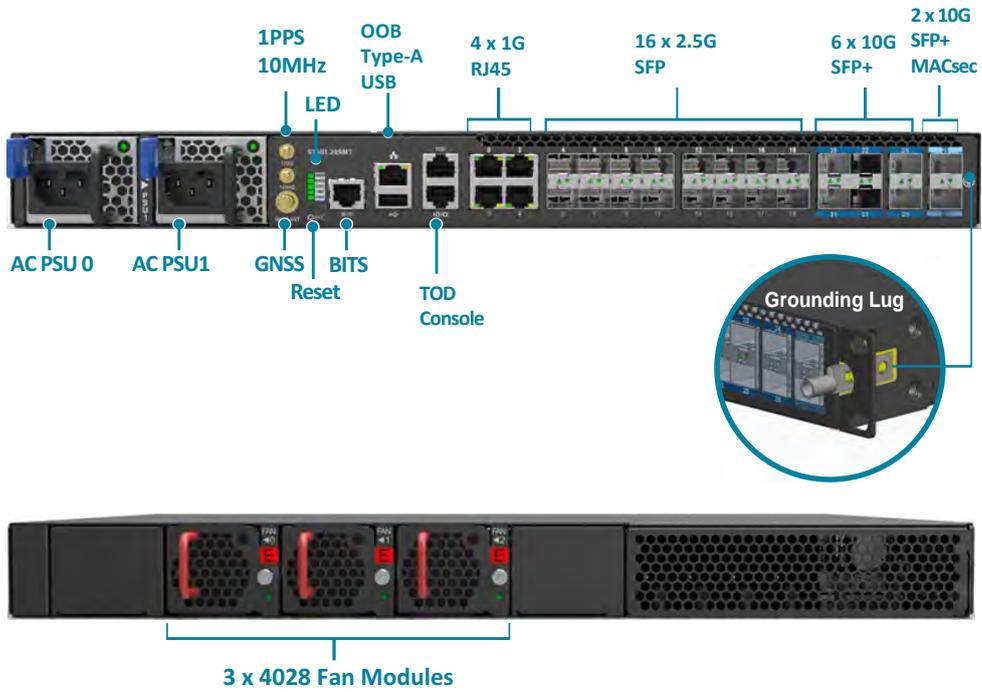**Figure 8.**

4.3   DC Version PSU Overview

1+1, hot swappable power supply unit (PSU) field replaceable unit (FRU).
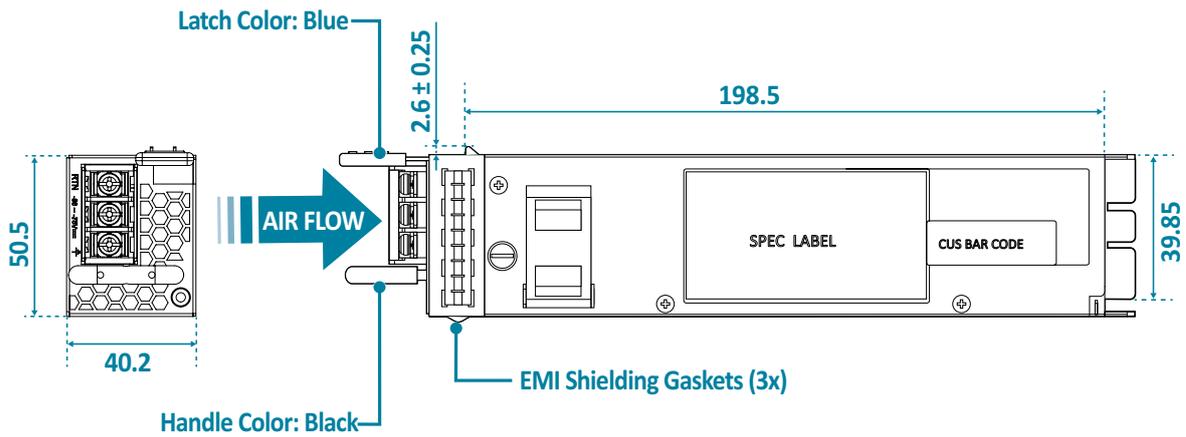

Figure 9.

Figure 10.

4.4   AC Version PSU Overview

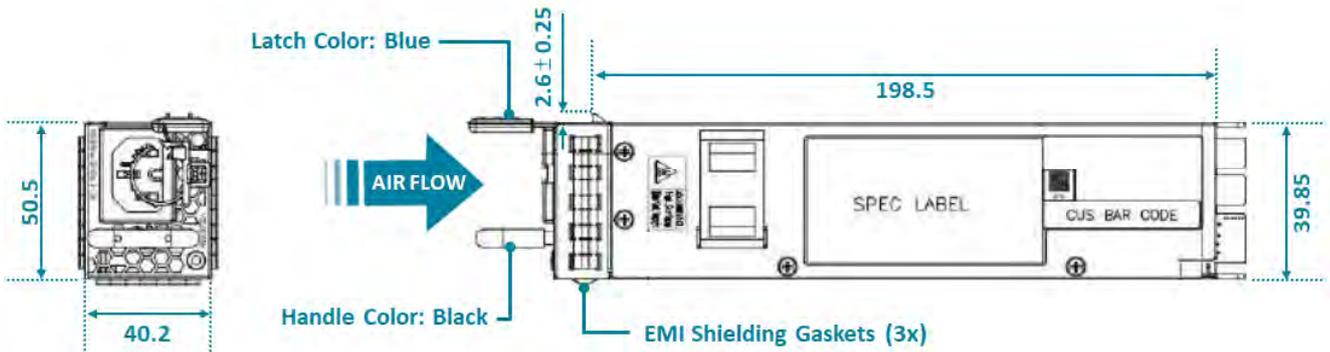1+1, hot swappable power supply unit (PSU) field replaceable unit (FRU).

Figure 11.

Figure 12.

4.5   Fan Overview

2+1, hot swappable fan field replaceable unit (FRU).
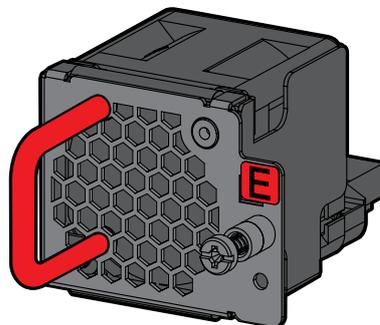
Figure 13.

4.6　Port Overview

Port ID	Form Factor	Maximum Support Distance	Support Speed
0 ~ 3	RJ45	238.01ft (100m)	1GE/100M
4 ~ 19	SFP	24.85mi (40km)	2.5GE/1GE/100M
20 ~ 25	SFP+	24.85mi (40km)	10GE/2.5GE/1GE
26 ~ 27	SFP+	24.85mi (40km)	10GE/2.5GE/1GE (MACsec)

DC Version:

Figure 14.

AC Version:
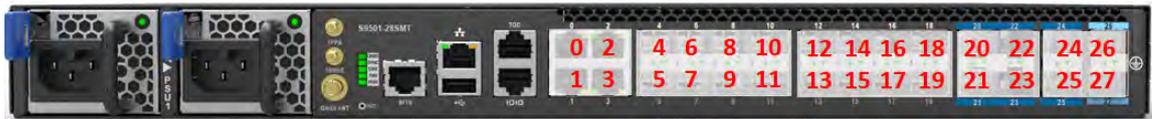
Figure 15.

5 Rack Mounting

> ✋ **Caution** It is recommended that installation be done by two trained professionals. One individual should hold the equipment in position on the rack while the other secures it in place.
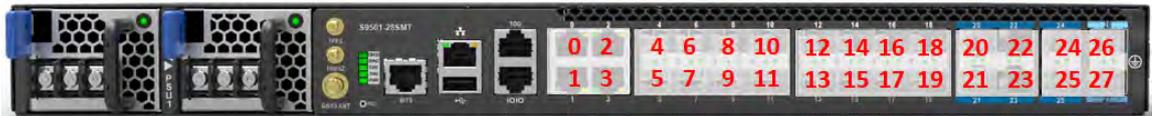
1. Secure the rack mount brackets onto the router.
   Align the rack mount brackets with the holes provided on the both sides of the case and secure the brackets using the 8 M4.0*L6.5mm screws provided with the package.

Figure 16.

2. Secure the router onto the rack posts.
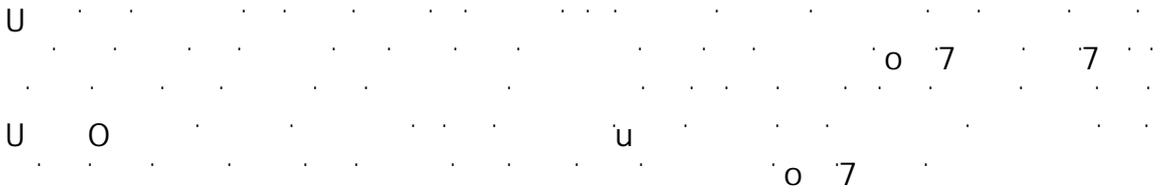
> 📌 *Note* Illustrations are for reference purposes only. Actual cabinet posts may differ.
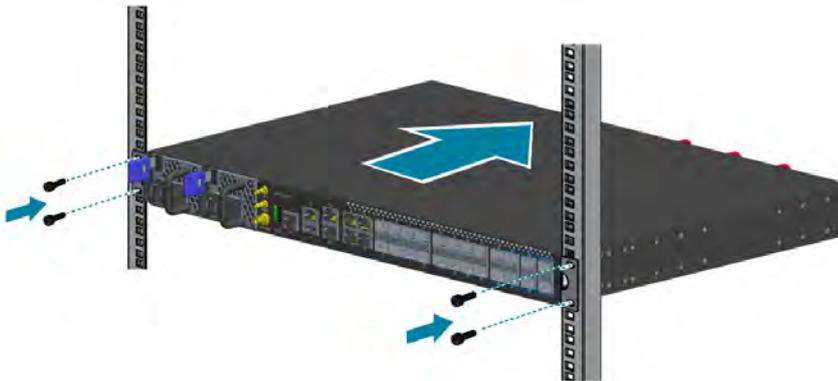
Figure 17.
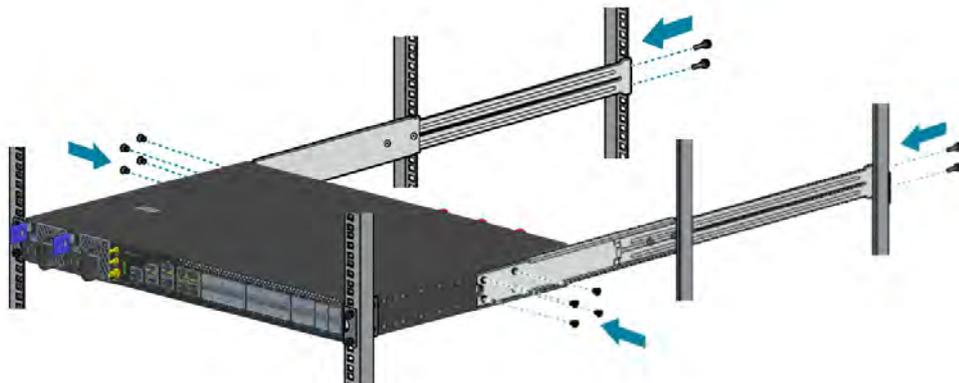
Figure 18.

6 Installing Fan Modules

The fan modules are hot swappable field replaceable units (FRUs), which can be replaced while the router is operating as long as all the remaining modules are installed and in operation. The fans come pre-installed and the following steps are instructions on how to install a new fan module.

1. Loosen the captive screw located on the fan module.

Figure 19.

2. Grip the fan's handle and firmly pull it out of the fan bay.
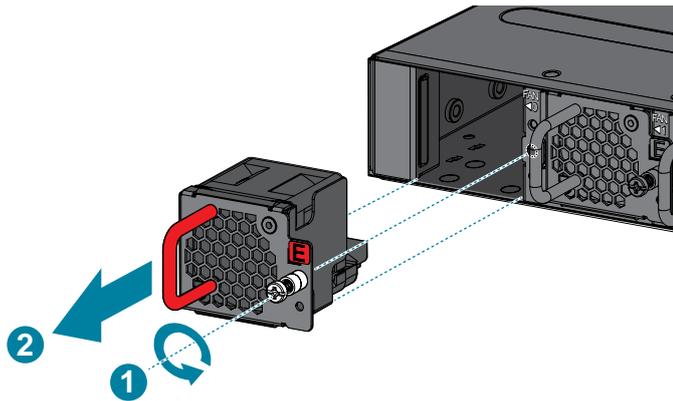
Figure 20.

3. Align the new fan module with the fan bay.
4. Carefully slide the new fan module into the fan bay and gently push until it is flush with the case.
5. Secure the captive screw on the fan module to lock the fan in place.
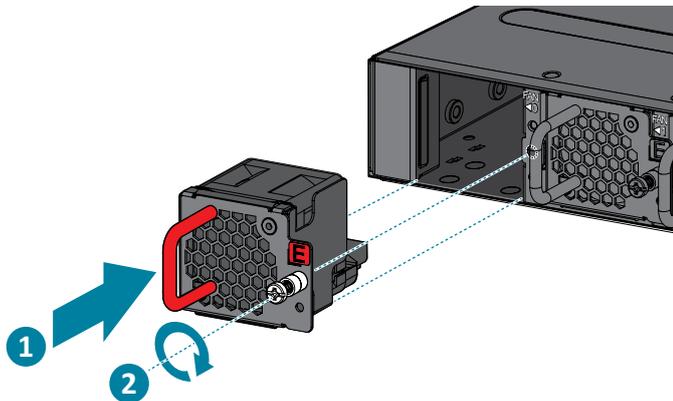
Figure 21.

7 Installing Power Supply Units

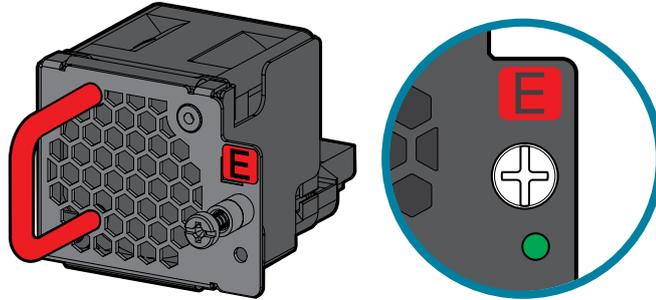The power supply unit (PSU) is a hot swappable field replaceable unit (FRU) and can be replaced while the router is operating as long as the remaining (second) PSU is installed and in operation. The PSUs comes pre-installed and the following are instructions on how to install a new PSU.

DC   AC:
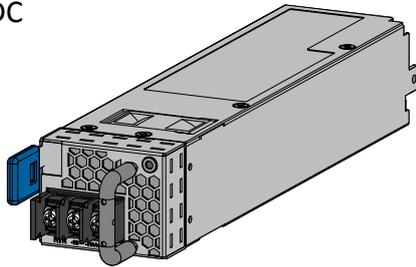
Figure 22.

✋	Shock hazard!
Caution	For safety, please disconnect all power inputs from the power supply unit before servicing the router.

1. Locate the release tab on the PSU. Then press and hold down the release tab to unlock the PSU from the power bay.

2. While holding down the release tab, grip the PSU's handle and firmly pull it out of the power bay.
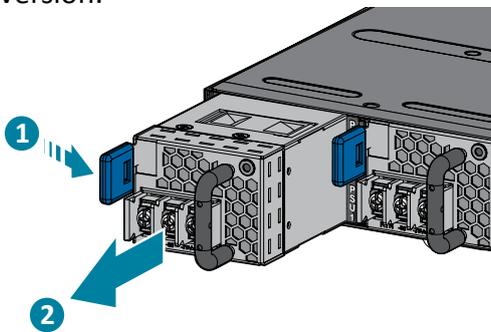
DC Version: AC Version:

Figure 23.

3. Align the new PSU with the power bay, ensuring the PSU's power connector is in the correct position.

4. Carefully slide the new PSU into the power bay and gently push until it is flush with the case.

5. An audible click will be heard when the PSU is installed correctly. The PSU will not go in all the way if it is in the wrong direction.

> *Note* The PSUs must have the same airflow direction as the installed fans (front to back).

DC Version:
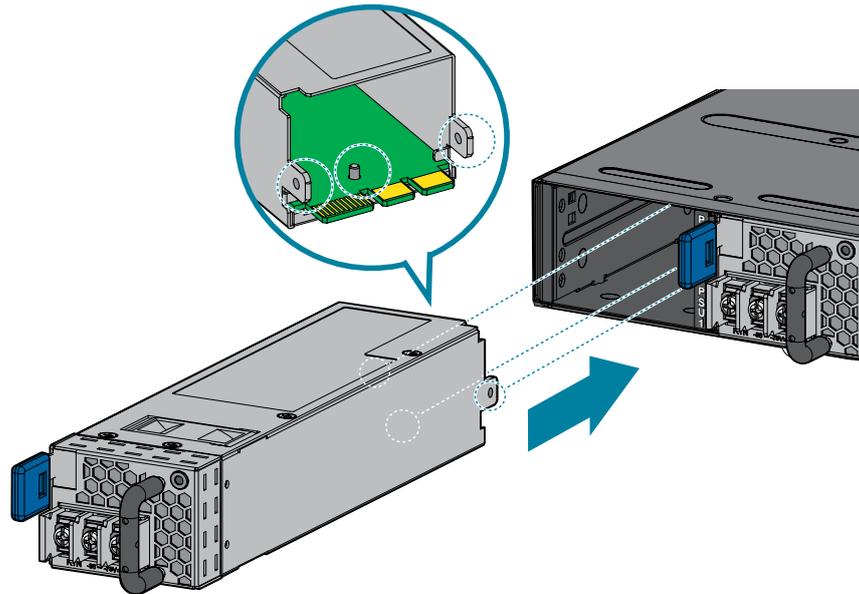
AC Version:

8 Grounding the Router

It is recommended that equipment changes be done on a grounded rack system. This will reduce or prevent the risk of shock hazards, equipment damage, and potential of data corruption.

The router can be grounded from the router's case and/or the power supply units (PSUs). When grounding the PSUs, ensure that both PSUs are grounded at the same time in case one of them is removed. A grounding lug and M4 screws and washers are provided with th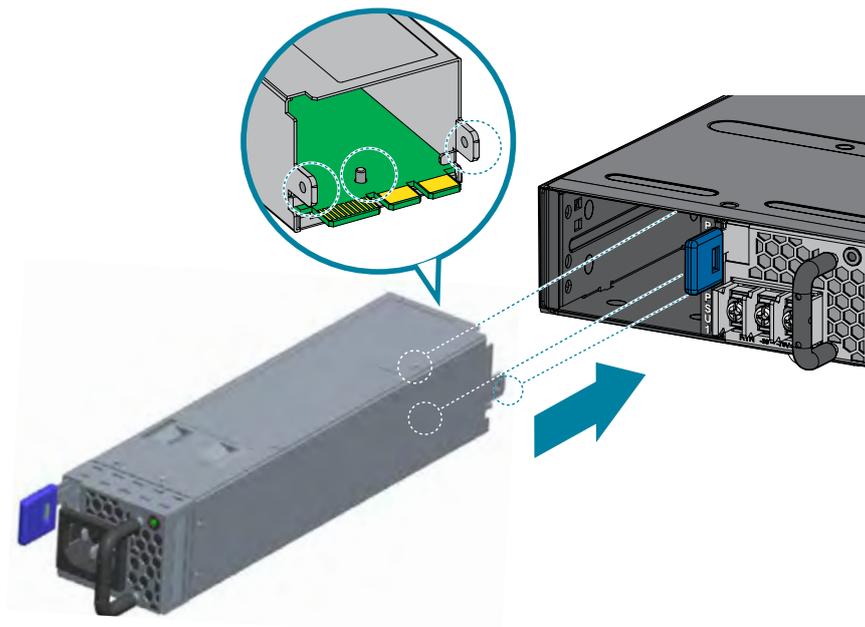e package contents, however, the grounding wire is not included. For convenience, there are two locations on the case in which the grounding lug may be fixed.

The following instructions are for grounding the router.

> ⚠️ **Warning** This equipment must be grounded. Do not defeat the ground conductor or operate the equipment without correctly grounding the equipment. If there is any uncertainty about the integrity of the equipment's grounding, please contact the electrical inspection authority or a certified electrician.

1. Before grounding the router, ensure that the rack is properly grounded and in compliance with local regulatory guidelines. Ensure that there is nothing that can obstuct the connection for grounding and remove any paint or materials that may prevent good grounding contact.
2. Strip the insulation from a size #6 AWG grounding wire (not provided within the package contents), leaving 0.5" +/-0.02" (12.7mm +/-0.5mm) of exposed grounding wire.
3. Insert the exposed grounding wire all the way into the hole of the grounding lug (provided with package contents).
4. Using a crimping tool, firmly secure the grounding wire to the grounding lug.
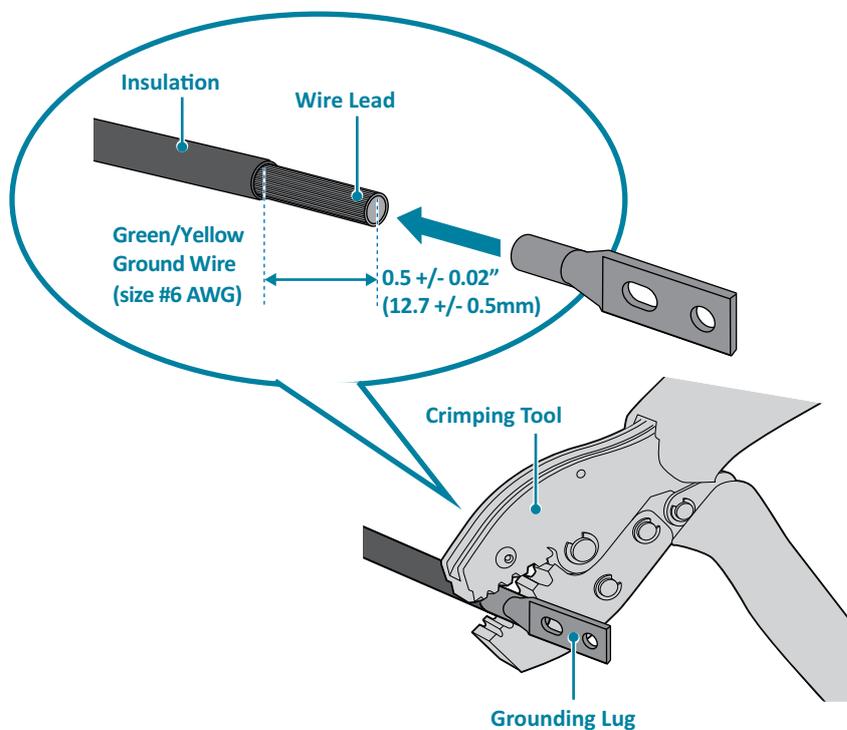

Figure 24.

5. Locate the designated location for securing the grounding lug, which is located on the side of the router.
6. Using 2 M4 screws and 4 washers (provided with the package contents), firmly lock the grounding lug to either of the designated grounding locations on the router.
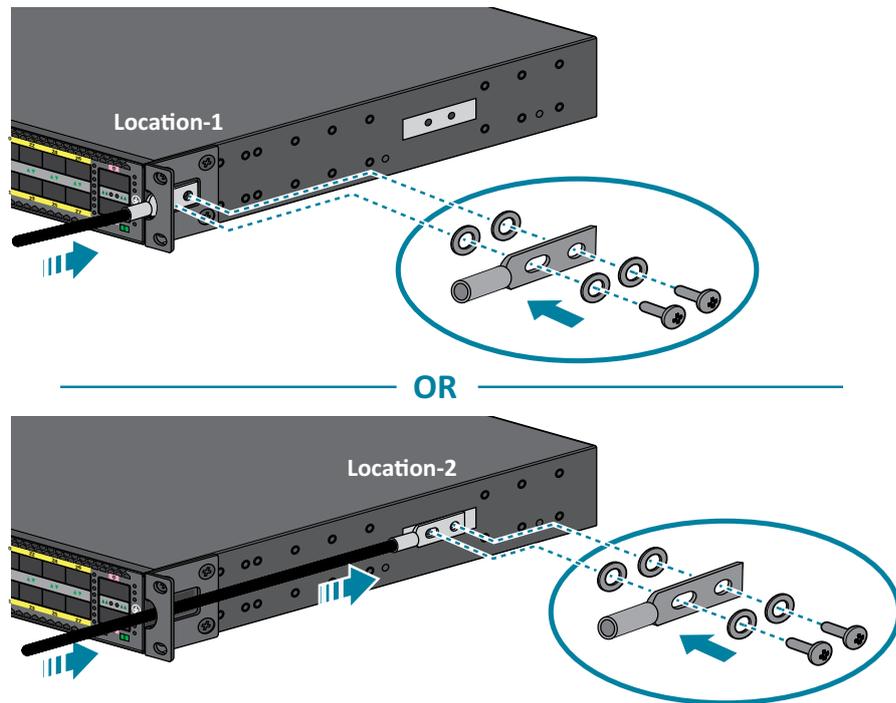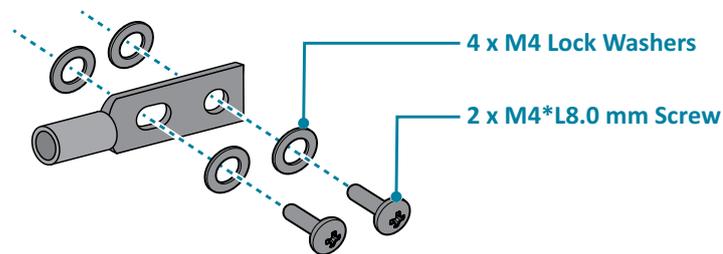
Figure 25.

Figure 26.

Figure 27.

9 Connecting Power

9.1 DC Version

1. Ensure there is enough power to supply the system.
   The maximum system power consumption is 200 watt. The minimum power distribution unit fuse requirement is 15 ampere based on the lowest voltage of 42.6 volts

2. Attach the power cable.
   Locate the DC power screw-type terminal block on the DC PSU. Attach the UL 1015, 14 AWG DC power cable (not provided within the package contents) to the DC inlet connector on the PSU.

Screw Size: M3.5

8.2 mm

W

d2

Dangerous voltage!
- Must be powered off before removing!
- Verify that all electrical connections are grounded before powering on

Warning!

d2 > 3.5 mm, W < 8.2 mm
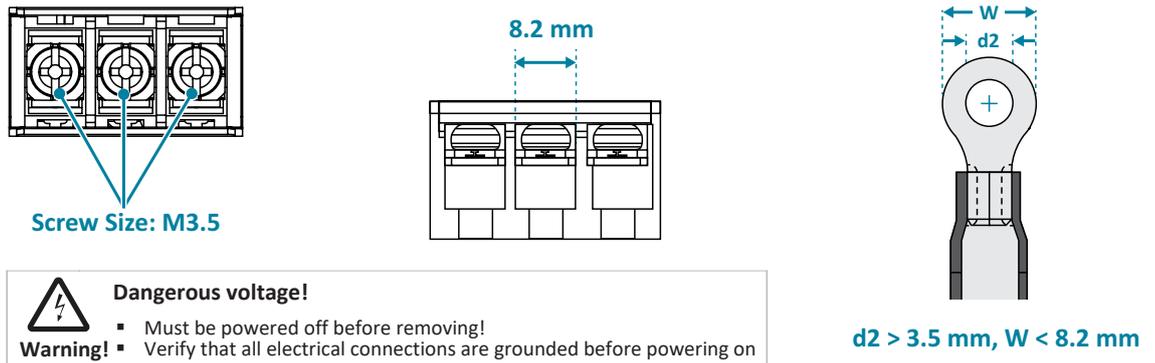
Figure 28.

3. Tighten the screws to the specified torque.

   Tighten the screws to a torque value of 6.94lbf.in (+/-10%). If the torque is not enough, the lug will not be secure and may cause malfunctions. If the torque is too much, the terminal block or lug may be damaged.

RTN   -36   -75V⎓   ⏚

Green/ Yellow Ground Wire

(min. size 16 AWG)
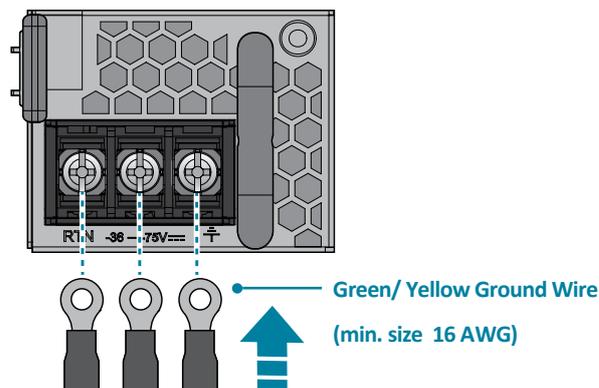
Figure 29.

4. Feed DC power into the system.
   The PSU will immediately output 12V and 5VSB to the system when a -48V DC power source is applied. The PSU has a built in 20 amperes, fast acting fuse based on the PSU maximum capacity, which will act as a second tier system protection in case the power distribution unit's fuse is not functioning.

5. Verify that the power supply is operating.
   If connected correctly, when turned on, the LED on the PSU will light up with a Green color designating normal operation.
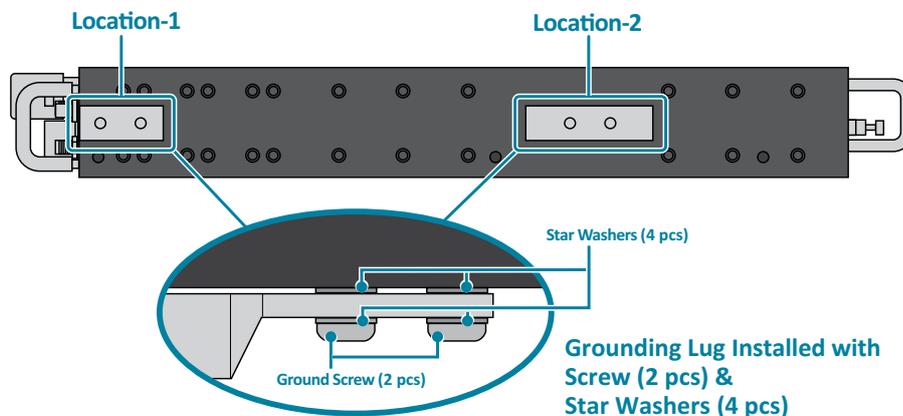
9.2   AC Version

1. Ensure there is enough power to supply the system.
   The maximum system power consumption is 200 watts with an input voltage of 100~240V and 3 amperes.
2. Attach the power cable.
   Plug the power cord into the AC PSU and secure it tightly.
3. Verify that the power supply is operating.
   If connected correctly, when turned on, the LED on the PSU will light up with a Green color designating normal operation.

Figure 30.

10 Verifying System Operation

10.1 Front Panel LED

Verify basic operations by checking the system LEDs located on the front panel. When operating normally, the PWR, FAN, and STAT LEDs should all display green.

Figure 31.

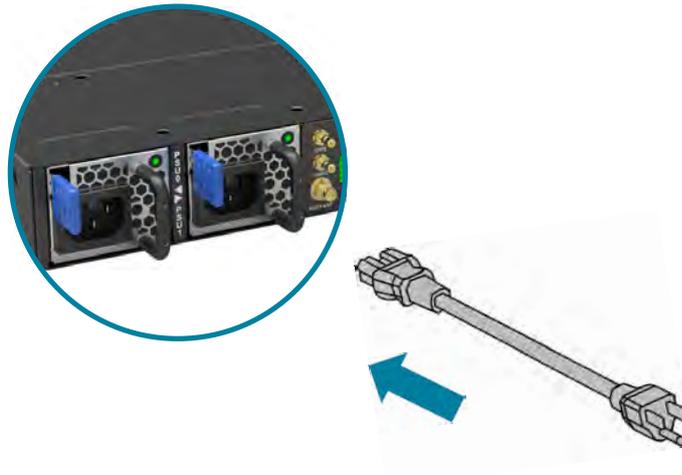| LED Condition	Equipment Status
PWR	
OFF	No power or in shutdown mode.
Solid Green	System power good & BMC is present & BMC power good.
Blinking Green	System power good & BMC is present but BMC power fail.
Solid Amber	System power good & BMC is absent.
Blinking Amber	System power fail.
FAN	
OFF	No fan modules present.
Solid Green	All fan modules work well.
Blinking Green	Reserved.
Solid Amber	Reserved.
Blinking Amber	One or more FAN module(s) fail.
STAT	
OFF	System (x86 & BMC) no boot.
Solid Green	System boot complete. **NOTE:** Need NOS to activate this feature.
Blinking Green	System is booting.
Solid Amber	Reserved.
Blinking Amber	Reserved.
SYNC	
OFF	System timing synchronization is disabled or in free-run mode. **NOTE:** Need NOS to activate this feature.
Solid Green	System timing core(1588 and SyncE) is synchronized to external timing source (ex: GNSS, 1PPS, PTP, BITS, etc). **NOTE:** Need NOS to activate this feature.
Blinking Green	System is synchronized in SyncE mode. **NOTE:** Need NOS to activate this feature.

LED Condition	Equipment Status
Solid Amber	System timing core is in acquiring state or holdover mode. **NOTE:** Need NOS to activate this feature.
Blinking Amber	System timing synchronization fail. **NOTE:** Need NOS to activate this feature.
GNSS	
OFF	GNSS is not configured. **NOTE:** Need NOS to activate this feature.
Solid Green	GNSS is in normal state. Self-survey is complete. **NOTE:** Need NOS to activate this feature.
Blinking Green	GNSS is in learning state. Self-survey is not completed. **NOTE:** Need NOS to activate this feature.
Solid Amber	GNSS is in learning state. Self-survey is not completed. **NOTE:** Need NOS to activate this feature.
Blinking Amber	GNSS antenna is short to ground. **NOTE:** Need NOS to activate this feature.

10.2 PSU FRU LED

LED Condition	Equipment Status
OFF	No power to all PSUs.
Blinking Red (1/sec)	No power to this PSU.
Blinking Green (1/sec)	Power present, only standby output on. Poor contact.
Green	PSU DC output ON and OK.
Red	PSU failure.
Blinking between Green and Red	Warning. Working condition not satisfied. Please check the voltage, electric current, and temperature.

10.3 Fan FRU LED

LED Condition	Equipment Status
OFF	Main board 3.3V power fail or Fan is not present.
Solid Green	Fan is present and interrupt de-assert.
Blinking Green	N/A.
Solid Amber	N/A.
Blinking Amber	Fan is present but interrupt assert.

11 Initial System Setup

Establishing a first-time serial connection.

To assign an IP address, you must have access to the command line interface (CLI). The CLI is a text-based interface that can be accessed through a direct serial connection to the device.

Access the CLI by connecting to the console port. After you assign an IP address, you can access the system through Telnet or SSH by Putty, TeraTerm or HyperTerminal.

Perform the following steps to access the device through a serial connection:

1. Connect the console cable.

   - The console can be connected using the RJ45 port labelled IOIO.
   - To connect to console, plug a RJ45 serial cable into the console port and connect the other end to the computer. Cable types may vary depending on the model.
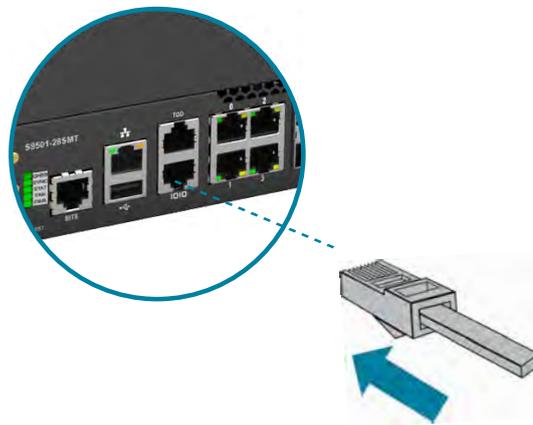
2. Check for serial control availability.
   Disable any serial communication programs running on the computer such as synchronization programs to prevent interference.

3. Launch a terminal emulator.
   Open a terminal emulator application such as HyperTerminal (Windows PC), Putty or TeraTerm and configure the application. The following settings are for a Windows environment (other operating systems will vary):

   - Baud rate: 115200 bps

   - Data bits: 8

   - Parity: None

   - Stop bits: 1

   - Flow control: None

4. Login to the device.
   After the connection is established, a prompt for the username and password displays. Enter the username and password to access the CLI. The username and password should be provided by the Network Operating System (NOS) vendor.

12 Cable Connections

12.1 Connecting the USB Extender Cable

Connect the USB 2.0 A Type plug (male connector) into the USB port (female connector) located on the front panel of the router.
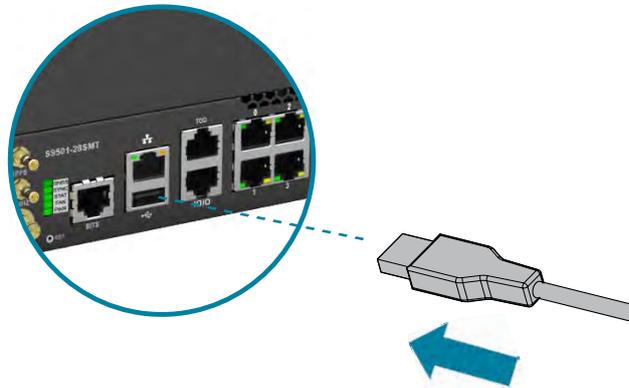

Figure 32.

12.2 Connecting a Cable to the ToD Interface

1. Connect one end of a straight-through Ethernet cable to the GNSS unit;
2. Connect the other end of the straight-through Ethernet cable to the port marked "TOD" located on the front panel of the router.

12.3 Connecting a Cable to the BITS Interface

1. Connect one end of a shielded RJ48 cable to the port labelled "BITS" located on the front panel of the router.
2. Connect the other end of the cable to the BITS patch or demarcation panel.
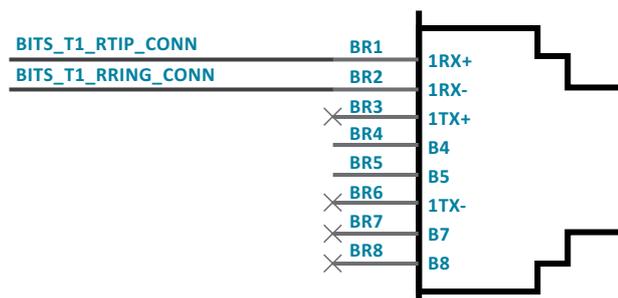3. Below is the pinout for the BITS port.

Figure 33.

12.4 Connecting the GNSS Interface

Connect an external GNSS antenna with an impedance of 50 ohms to the port marked "GNSS ANT" located on the front panel of the router.

12.5   Connecting the 1PPS Interface

Connect an external 1PPS cable with an impedance of 50 ohms to the port labelled "1PPS".

12.6   Connecting the 10MHz Interface

Connect an external 10MHz cable with an impedance of 50 ohms to the port labelled " 10MHz".

12.7   Connecting the Transceiver

🔌 *Note*	To prevent over tightening and damaging the optic fibers, it is not recommended to use tie wraps with optical cables.

Read the following guidelines before connecting the transceiver:

- Before installing the router, take into consideration rack space requirements for cable management and plan accordingly.
- It is recommended to use hook-and-loop style straps to secure and organize the cables.
- For easier management, label each fiber-optic cable and record its respective connection.
- Maintain a clear line of sight to the port LEDs by routing the cables away from the LEDs.

✋ *Caution*	Before connecting anything (cables, transceivers, etc.) to the router, please ensure to dischage any static electricity that may have built up during handling. It is also recommended the cabling be done by a professional who is grounded, such as by wearing an ESD wrist strap.

Please follow the steps below for connecting a transceiver.

1. Remove the new transceiver from its protective packaging.

2. Remove the protective plug from the transceiver port.

3. Place the bail (wire handle) in the unlocked position and align the transceiver with the port.

4. Slide the transceiver into the port and use gentle pressure to secure it in place. An audible click can be heard when the transceiver is secured in the port.

13 Cautions

Safety Notices
Caution! Shock hazard!

TO DISCONNECT POWER, REMOVE ALL POWER CORDS FROM UNIT.

Electrical Hazard: Only qualified personnel should perform installation procedures.

Risques d'électrocution: Seul un personnel qualifié doit effectuer les procédures d'installation.

Warning: Network Switch power supplies do not have switches for turning the unit on and off. Before servicing, disconnect all power cords to remove power from the device. Make sure that these connections are easily accessible.

Avertissement: Network Switch alimentations ne sont pas des interrupteurs pour allumer l'appareil et en dehors. Avant l'entretien, débranchez tous les cordons d'alimentation pour couper l'alimentation de l'appareil. Assurez-vous que ces connexions sont facilement accessibles.

Caution: Before mounting the device, ensure that the rack can support it without compromising stability. Otherwise, personal injury and/or equipment damage may result.

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Caution: Only Laser Class 1 optical transceivers shall be used.

Warning: Do not use optical instruments to view the laser output. The use of optical instruments to view laser output increases eye hazard. Use only UL/CSA, IEC/EN60825-1/-2 recognized pluggable modules.

Avertissement: Ne pas utiliser d'instruments optiques pour voir la sortie du laser. L'utilisation de instruments optiques pour afficher la sortie laser augmente les risques oculaires. Utilisez uniquement UL/CSA, IEC/EN60825-1 /-2 reconnu modules enfichables.

Warning:
The equipment should only be used within a restricted access area.
The equipment should only be operated by skilled or instructed persons.
The equipment and its modules should only be repaired, maintained or replaced by skilled personnel.
Instructed person is a term applied to persons who have been instructed and trained by a skilled person, or who is supervised by a skilled person.

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