



# **NVIDIA Spectrum SN2201 1U Switch Hardware User Manual**

NVIDIA SN2201 SWITCH USER MANUAL

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Relevant for Model: SN2201

## **About this Manual**

This manual describes the installation and basic use of NVIDIA Ethernet switches based on the NVIDIA Spectrum IC device.

## **Intended Audience**

This manual is intended for IT managers and system administrators.

# 1 Introduction

NVIDIA Spectrum® based 1U switch is an ideal spine and Top of Rack (ToR) solution, allowing maximum flexibility, with port speeds spanning from 10Gb/s to 100Gb/s per port, and port density that enables full rack connectivity to any server at any speed. The uplink ports allow a variety of blocking ratios that suit any application requirement. Powered by the NVIDIA Spectrum ASIC, the systems carry whopping switching and processing capacities in a compact 1U form factor.

Keeping with the NVIDIA tradition of setting performance record switches, the NVIDIA Spectrum-based system introduces the world's lowest latency for 100GbE switching and routing elements, and do so while having the lowest power consumption in the market. They enable the use of 10, 25, 40, 50 and 100GbE in a large scale without changing power infrastructure facilities.

The SN2201 switch is an end-to-end solution, which provides 10GbE through 100GbE interconnectivity within the data center. Other devices in this solution include ConnectX®-4 based network interface cards, and LinkX® copper or fiber cabling/transceivers. This end-to-end solution is topped with NEO, a management application that relieves some of the major obstacles standing in the way when deploying a network. NEO enables a fully certified and interoperable design, speeds up time to service and ROI. The systems introduce hardware capabilities for multiple tunneling protocols that enable increased reachability and scalability for today's data centers. Implementing MPLS, NVGRE and VXLAN tunneling encapsulations in the network layer of the data center allows more flexibility for terminating a tunnel by the network, in addition to termination on the server endpoint.

While NVIDIA Spectrum provides the thrust and acceleration that powers the switch systems, they get yet another angle of capabilities, running with a powerful x86-based processor, which allows them to not only be the highest performing switch fabric elements, but also grants them the ability to incorporate a Linux running server into the same device. This opens up multiple application aspects of utilizing the high CPU processing power and the best switching fabric, to create a powerful machine with unique appliance capabilities that can improve numerous network implementation paradigms. The NVIDIA Spectrum-based 1U switch systems support the Open Network Install Environment (ONIE) for zero touch installations of network operating systems. Switches arrive preloaded with Cumulus Linux.

## Front View



## Rear View



## 1.1 Speed and Switching Capabilities

The table below describes maximum throughput and interface speed per switch.

System Model	1GbT RJ45 Interfaces	1/10/25GbE SFP28 Interfaces*	40/50/100GbE QSFP28 Interfaces*	Max Throughput
SN2201	48+4*	16 (using QSFP to SFP splitter cables)	4 (or 8 50GbE interfaces when using QSFP to 2xQSFP splitter cables)	448Gb/s

(\*) Requiring a QSA adapter and a 1GBT SFP module

## 1.2 Management Interfaces, PSUs and Fans

The table below lists the various management interfaces, PSUs and fans per switch.

System Model	USB	MGT	Console	PSU	Fan
SN2201	Front	Front (1 port)	Front	Yes, 2	Yes, 4

## 2 Installation

### 2.1 System Installation and Initialization

Installation and initialization of the system require attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

#### Note

The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take precautions to guarantee proper ventilation in order to maintain good airflow at ambient temperature.

#### Note

Unless otherwise specified, this product is designed to work in an environmentally controlled data center with low levels of gaseous and dust (particulate) contamination.

The operation environment should meet severity level G1 as per ISA 71.04 for gaseous contamination and ISO 14644-1 class 8 for cleanliness level.

The installation procedure for the switch involves the following phases:

Step	Procedure	See
1	Follow the safety warnings	<a href="#">Safety Warnings</a>
2	Pay attention to the air flow consideration within the system and rack	<a href="#">Air Flow</a>
3	Make sure that none of the package contents is missing or damaged	<a href="#">Package Contents</a>
4	Mount the system into a rack enclosure	<a href="#">19" System Mounting Options</a>
5	Power on the system	<a href="#">Initial Power On</a>
6	Perform system bring-up	<a href="#">System Bring-Up</a>
7	[Optional] FRU replacements	<a href="#">FRU Replacements</a>

### 2.2 Safety Warnings

Prior to the installation, please review the Safety Warnings.

#### Note

Not all warnings may apply to all switches.

### 2.3 Switch Safety Warnings (English)



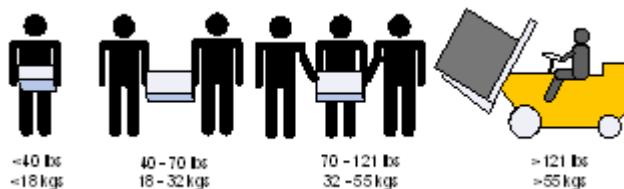
#### Installation Instructions

Read all installation instructions before connecting the equipment to the power source.



### Bodily Injury Due to Weight

Use enough people to safely lift this product.



### Heavy Equipment

This equipment is heavy and should be moved using a mechanical lift to avoid injuries.



### Risk of Electric Shock!

- With the fan module removed power pins are accessible within the module cavity.  
Do not insert tools or body parts into the fan module cavity.
- For AC powered switch systems: Disconnecting one power supply only disconnects one module. To isolate the unit completely, all connected power supplies must be disconnected.



In QM97X0/HGX H100 switch systems: for 200-240Vac use only



### Over-temperature

This equipment should not be operated in an area with an ambient temperature exceeding the maximum value listed in the product specifications. Moreover, to guarantee proper ventilation, allow at least 8 cm (3 inches) of clearance around the ventilation openings.



### Stacking the Chassis

The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.



### Redundant Power Supply Connection (OPTIONAL)—Electrical Hazard

This product includes a redundant power or a blank in its place. In case of a blank power supply, do not operate the product with the blank cover removed or not securely fastened.



### Double Pole/Neutral Fusing

This system has double pole/neutral fusing. Remove all power cords before opening the cover of this product or touching any internal parts.



#### Multiple Power Inlets

Risk of electric shock and energy hazard. The PSUs are all independent. Disconnect all power supplies to ensure a powered down state inside of the switch platform.



#### During Lightning—Electrical Hazard

During periods of lightning activity, do not work on the equipment or connect or disconnect cables.



#### Copper Cable Connecting/Disconnecting

Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings/instructions.



#### Rack Mounting and Servicing

When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general, the rack should be filled with equipment starting from the bottom to the top.



#### Equipment Installation

This equipment should be installed, replaced, and/or serviced only by trained and qualified personnel.



#### Equipment Disposal

Disposal of this equipment should be in accordance to all national laws and regulations.



#### Local and National Electrical Codes

This equipment should be installed in compliance with local and national electrical codes.



#### Installation Codes

This device must be installed according to the latest version of the country national electrical codes. For North America, equipment must be installed in accordance to the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.



#### Battery Replacement

Warning: Replace only with UL Recognized battery, certified for maximum abnormal charging current not less than 4mA. There is a risk of explosion should the battery be replaced with a battery of an incorrect type. Dispose of used batteries according to the instructions. For applicable models: PERCHLORATE MATERIAL - LITHIUM COIN/BUTTON CELL BATTERY. PLEASE DISPOSE OF PROPERLY. SPECIAL HANDLING MAY APPLY.



## UL Listed and CSA Certified Power Supply Cord

For North American power connection, select a power supply cord that is UL Listed and CSA Certified, 3 - conductor, [16 AWG], terminated with a molded plug rated at 125 V, [13 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m. For European connection, select a power supply cord that is internationally harmonized and marked "<HAR>", 3 - conductor, minimum 1.0 mm<sup>2</sup> wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded plug rated at 250 V, 10 A.



## Installation Codes

This device must be installed according to the latest version of the country's national electrical codes. For North America, equipment must be installed in accordance to the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.



## Interconnection of Units

Cables for connecting to the unit RS232 and Ethernet Interfaces must be UL certified type DP-1 or DP-2. (Note: when residing in non LPS circuit.)



## Overcurrent Protection

A readily accessible Listed branch circuit overcurrent protective device rated 20 A must be incorporated in the building wiring.

## Acoustic Level Warning

The acoustic level listed in Specifications section represents product noise measured in accordance with ISO 7779 under nominal conditions. The actual noise level can vary depending on the installation conditions, including but not limited to the number of racks in the installation, the overall installation size, rack and other equipment material and noise levels, fan faults, room temperature, room configuration, and employee location in relation to the equipment. The data-center owner should manage effective hearing conservation as per the OSHA standard to protect employees against over and extended exposure to noise.



## Do Not Use the Switch as a Shelf or Work Space

Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space. The rails are not intended for sliding the unit away from the rack. It is for permanent installation at final resting place only, not used for service and maintenance.



## WEEE Directive

According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste. Dispose of this product and all of its parts in a responsible and environmentally-friendly way.



## Country of Norway Power Restrictions

This unit is intended for connection to a TN power system and an IT power system of Norway only.

### 2.3.1 Taiwan RoHS Declaration - Switch Systems

單元 Unit	限用物質及其化學符號					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印刷電路板	—	○	○	○	○	○
金屬外殼	○	○	○	○	○	○
塑膠件	○	○	○	○	○	○
PCB 板電子零件	—	○	○	○	○	○

備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。

備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。

備考3. “—” 係指該項限用物質為排除項目。

### 2.3.2 Taiwan RoHS Declaration - Gateway Systems

單元 Unit	限用物質及其化學符號					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印刷電路板	—	○	○	○	○	○
金屬外殼	○	○	○	○	○	○
塑膠件	○	○	○	○	○	○
PCB 板電子零件	—	○	○	○	○	○

備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。

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備考3. “—” 係指該項限用物質為排除項目。

### 2.3.3 Taiwan BSMI Class A Statement - Warning to the User!

警告使用者：警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境。

### 2.3.4 Air Flow

#### Note

The drawings are provided for illustration purposes only. The panel and modules design may vary depending on the switch.

The switches are offered with two air flow patterns:

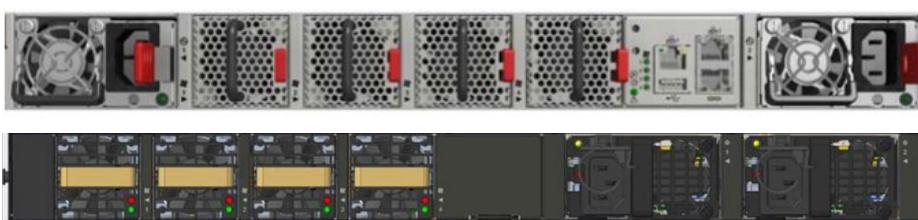
- Power (rear) side inlet to connector side outlet - marked with blue power supplies/fans FRUs' handles or blue dots that are placed on the power inlet side.

#### Air Flow Direction Marking - Power Side Inlet to Connector Side Outlet



- Connector (front) side inlet to power side outlet - marked with red power supplies/fans FRUs' handles or red dots that are placed on the power inlet side.

#### Air Flow Direction Marking - Connector Side Inlet to Power Side Outlet

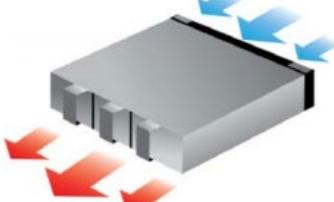


#### Warning

All servers and systems in the same rack should be planned with the same airflow direction.

All FRU components need to have the same air flow direction. A mismatch in the air flow will affect the heat dissipation.

The table below provides an air flow color legend and respective OPN designation.

Direction	Description and OPN Designation
	Connector side inlet to power side outlet. The airflow direction is indicated by red latches or by red dots that are placed on the power inlet side. OPN designation is "-R".
	Power side inlet to connector side outlet. The airflow direction is indicated by blue latches or by blue dots that are placed on the power inlet side. OPN designation is "-F".

#### 2.3.5 Package Contents

Before installing your new system, unpack it and check against the parts list below that all the parts have been sent. Check the parts for visible damage that may have occurred during shipping.

The SN2201 package content is as follows:

- 1 – System
- 1 – Rail kit
- 1 – Power cable for each power supply unit – Type C13-C14
- 1 – DB9 to RJ-45 2m harness
- 1 - RJ-45 to RJ-45 2m harness

**Note**

If anything is damaged or missing, contact your Dell sales representative.

### 2.3.6 System Mounting Options

The systems are shipped with the rail-kits specified in the following table:

System Model	Rail Kit
SN2201	<a href="#">SN2201 Tool-Less Rail Kit</a>

### 2.3.7 Removing the System from the Rack

To remove a unit from the rack:

1. Turn off the system and disconnect it from peripherals and from the electrical outlet.  
While your installation partner is supporting the system's weight:
2. Loosen the screws attaching the brackets to the rack. Do not remove them yet.
3. Loosen the screws attaching the blades to the rack, and pull the blades towards you, while your partner is holding the system.
4. Extract the loosened screws from Step 2 and dismount the system from the rack.
5. Remove the rails and brackets from the chassis by unscrewing 8 screws.

## 2.4 SN2201 Tool-Less Rail Kit

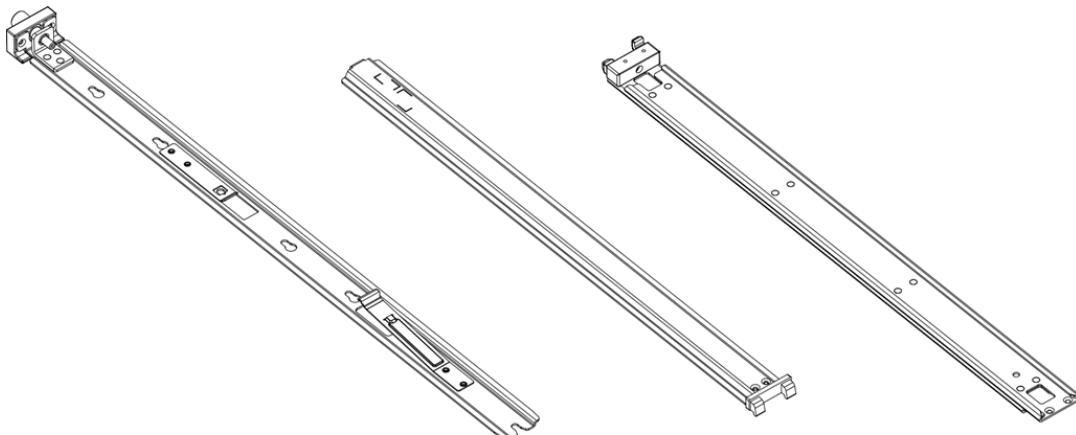
### 2.4.1 Tool-Less 4-Post Mounting Rail-Kit

The following parts are included in the tool-less rail kit (see figure below):

- 2x Rack mount rails (A)
- 2x Rack mount blades (B)
- 2x Inner rails (C)

**Rail-Kit Parts**

2xA	2xB	2xC



## Prerequisites:

- At least two people are required to safely mount the system in the rack.
- All servers and systems in the rack should be planned with the same airflow direction. All FRU components must have the same airflow direction. A mismatch in the airflow will affect the heat dissipation.
- The part of the system to which you choose to attach the rails will determine the system's adjustable side. The system's part to which the brackets are attached will be adjacent to the cabinet.
- The FRU side is extractable. Mounting the rack brackets inverted to the FRU side will allow you to slide the FRUs, in and out.

## Installation

1. Extract the inner rails (A) from the other rails by pressing the spring latch and pulling it out, as shown in the following illustration:

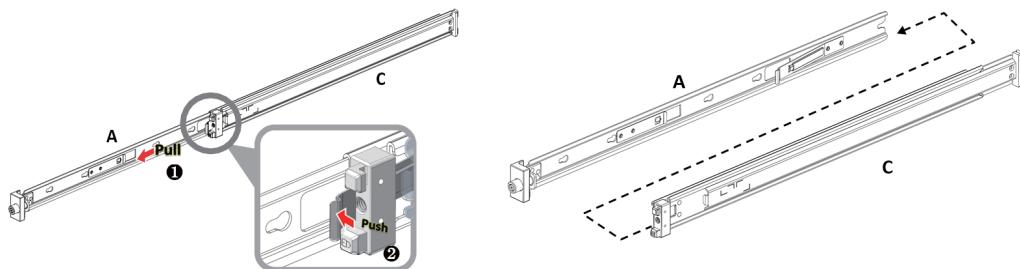


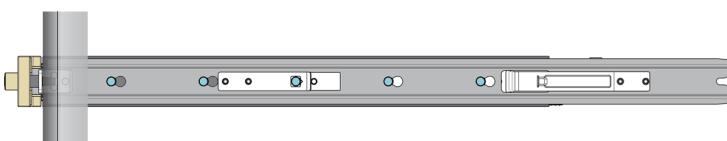
illustration:

2. Mount the inner rails (A) onto the chassis:

- a. Attach the switch to the left and right inner rails according to your installation selection -

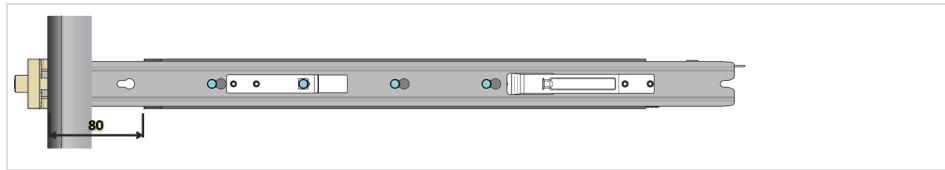
- Standard Installation:

The inner rails should be assembled to the switch using the first five holes (from its front side).



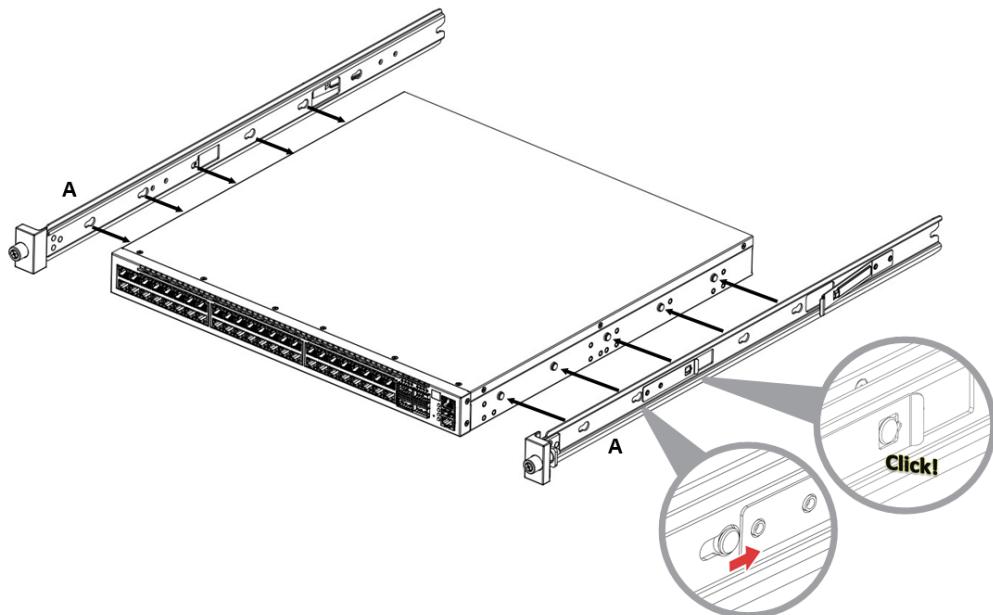
- Recessed Installation:

The inner rails should be assembled to the switch skipping the first hole (from its front side).

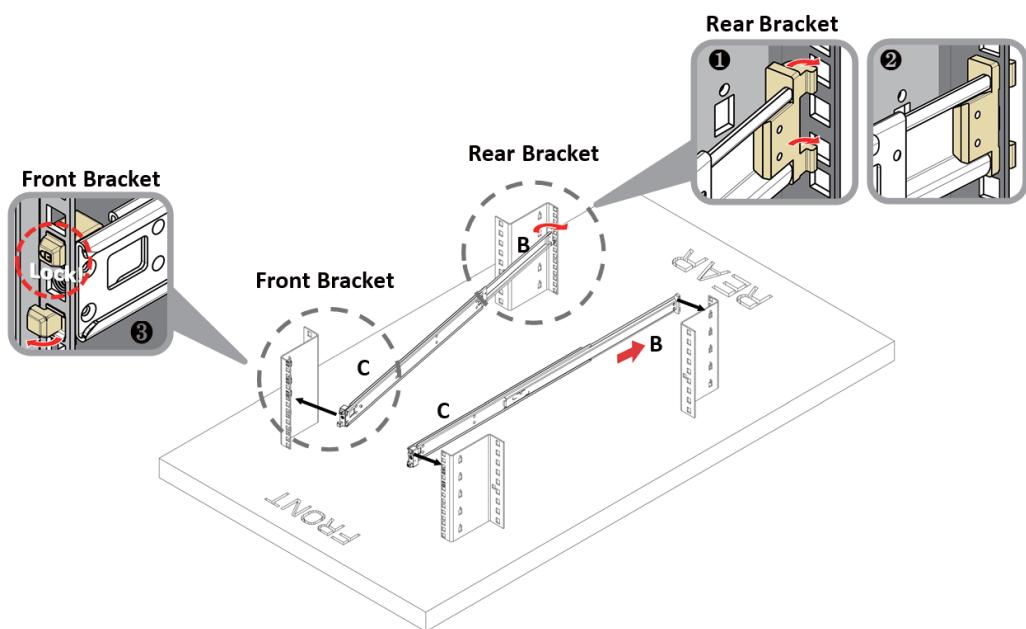


- b. Secure the assembly by pushing the chassis' pins through the slider key holes, until a click is heard and locking occurs.

3.

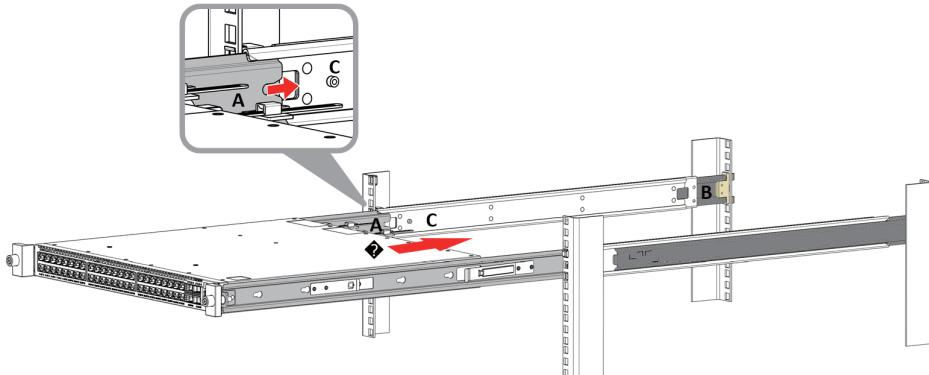


4. Install the outer rails (B+C) in the rack, as shown in the following illustration:

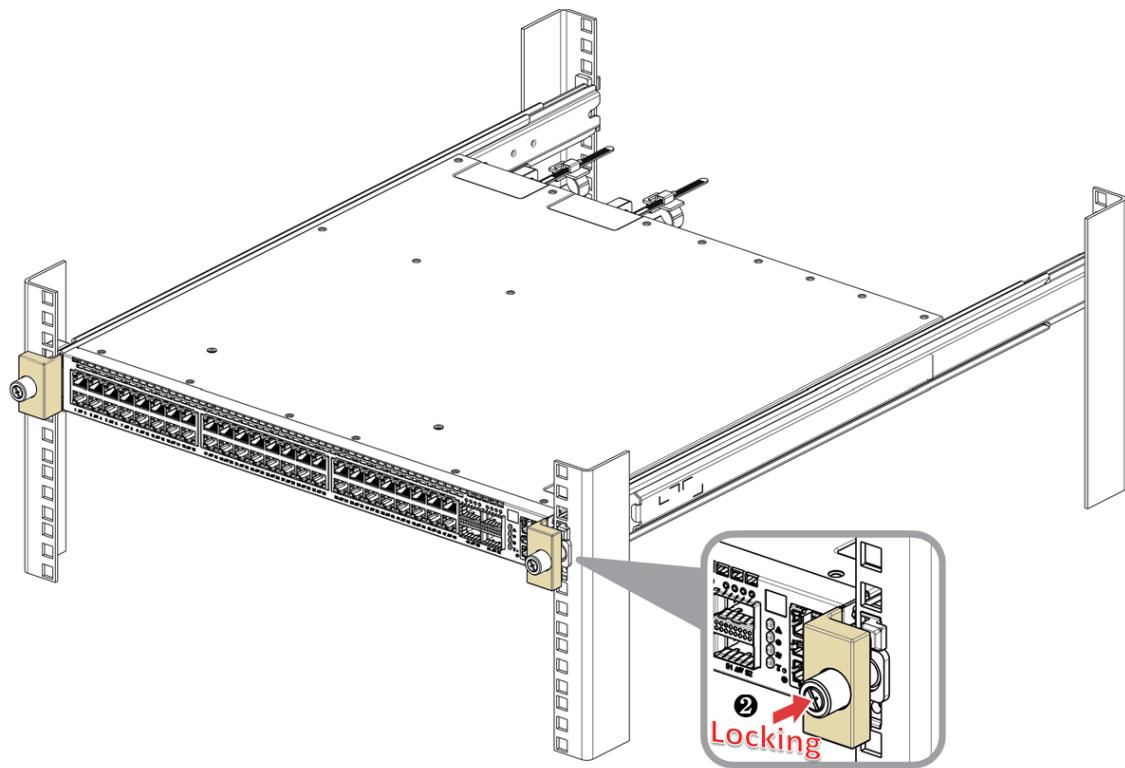


5. Mount the chassis onto the rack:

- a. Insert the chassis into the middle-outer rails installed in the rack (C).



- b. Secure the chassis in place by tightening the thumb-screws.



## 2.4.2 Tool-Less 2-Post Mounting Rail-Kit

### Note

This mounting kit is optional and should be ordered separately.

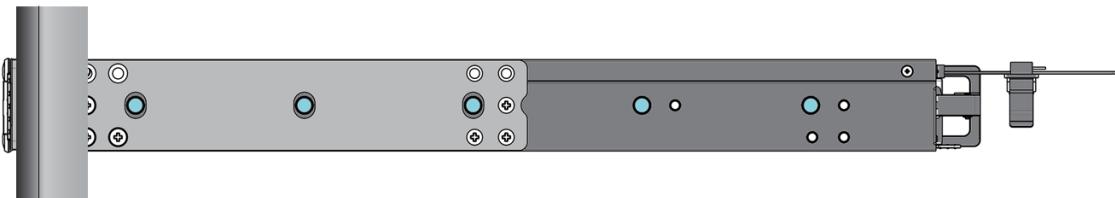
The following parts are included in the 2-post mounting rail kit (see figure below):

- 2x Rack mount brackets (A)
- 12x M4 screws (B)
- 2x cage nuts (C)
- 4x 10-32 screws (D)

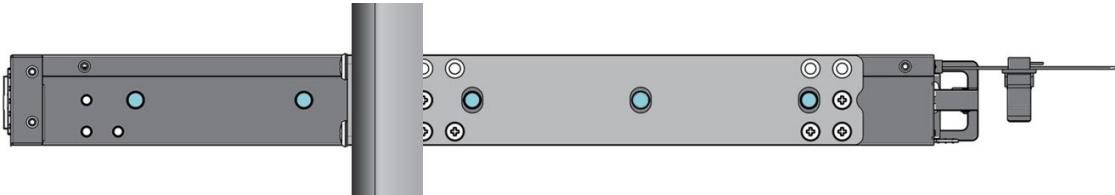
## Rail-Kit Parts



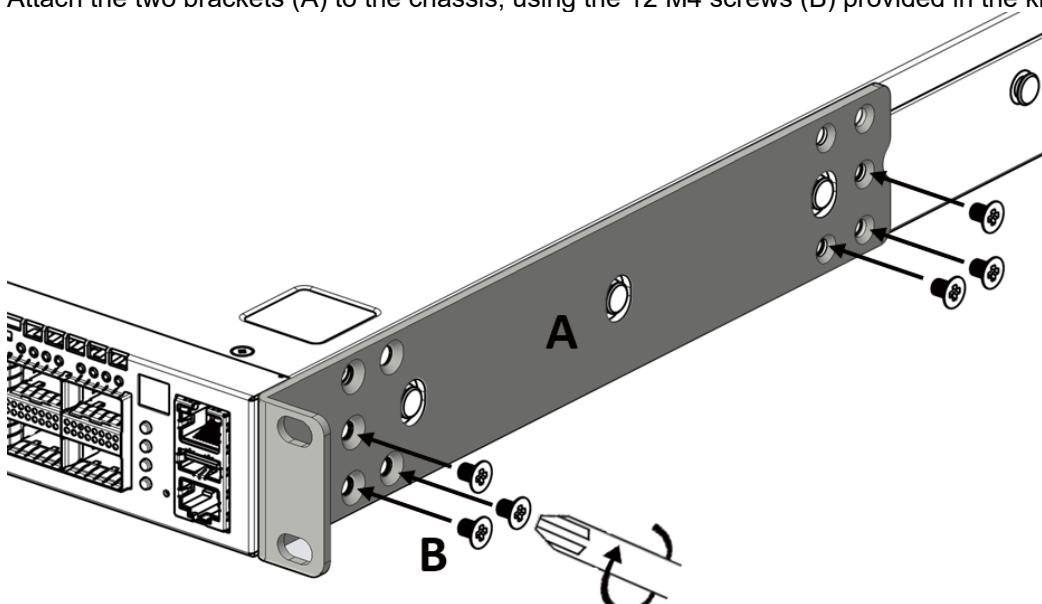
- Standard installation:



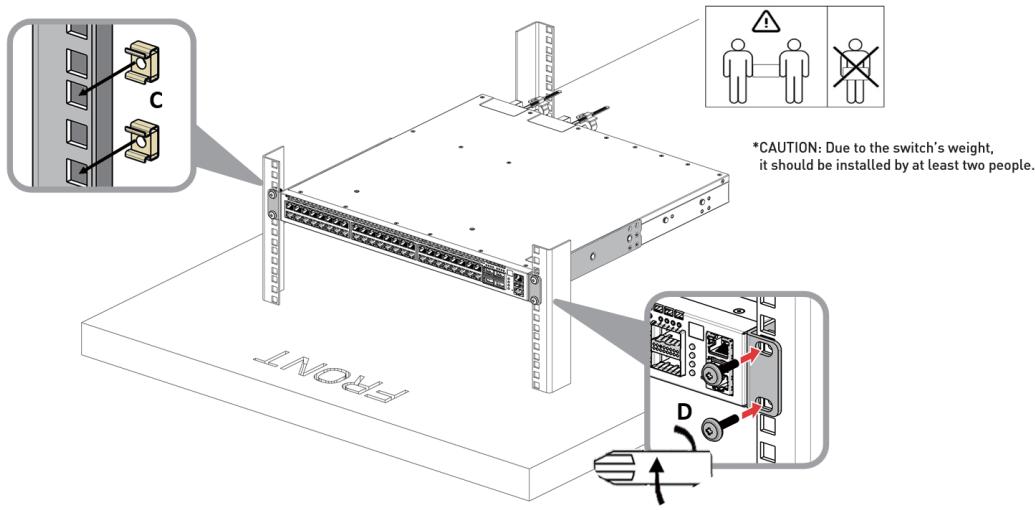
- Middle rack installation:



1. Attach the two brackets (A) to the chassis, using the 12 M4 screws (B) provided in the kit.



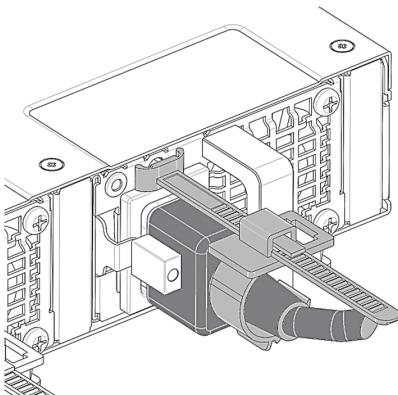
2. Install 4 cage nuts (C) in the desired 1U slots of the rack, and mount the device in the rack, using 10-32 rack mounting screws.



#### Note

The 2-post mounting installation may cause sinking of the switch. The rear end sag is 6-8mm.

3. The cable retainer should be used to secure the cable when installing the system. To secure the power cord inside the retainer, press the small tab on the retainer strip to loosen the loop.



## 2.5 Cable Installation

### 2.5.1 Power Cable and Cable Retainer

In some switch models, the product's package includes cable retainers. It is highly recommended to use them in order to secure the power cables in place. Please adhere to the following instructions:

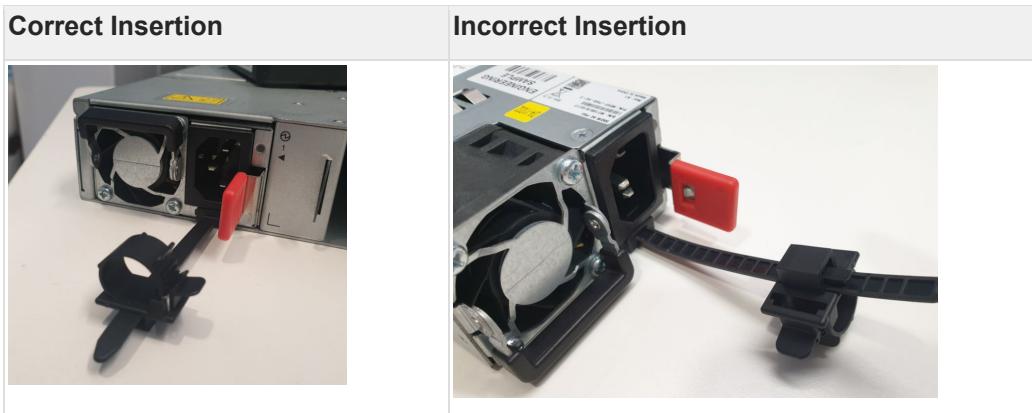
1. Verify the integrity of the retainer assembly, as demonstrated in the below table:- The snaps' push-pins must have visible edges with no broken or torn parts.  
- The shoulders' pins should be in-tact and must not be bent inwards.



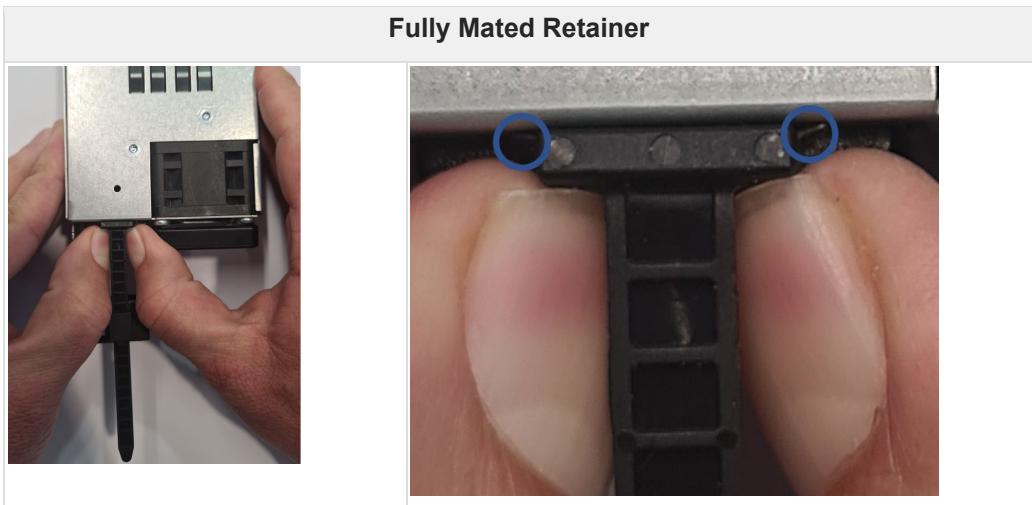
2. It is advised to place the PSU on a flat, stable surface. While you secure the PSU in place, use two thumbs to insert the retainer's two snaps into the designated holes located near the AC inlet. Make sure that the retainer's plastic loop is facing upwards, as demonstrated in the below table.

**Note**

For demonstration purposes, the images in this document show C2P (Connector-to-Power) airflow PSUs with red latches, yet the instructions apply to P2C (Power-to-Connector) PSUs with blue latches as well.



3. Push the retainer until the shoulders' pins (in blue circles below) are open and aligned with the PSU front panel, as shown in the following table:



4. Make sure that the retainer is fully locked in place by gently attempting to pull it outwards.
5. Open the plastic loop and route the AC cord through it. Locate the loop over the AC cord, as shown in the following table, and fasten it tightly.

Proper Loop Placement	Improper Loop Placement
	

#### Note

Each cable retainer can be used once only. Once the retainer has been fully inserted and the shoulders' pins have been adjusted, the retainer cannot be used again, and should be discarded if pulled out.

## 2.5.2 Port Cables

All cables can be inserted or removed with the unit powered on.

To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The LED indicator, corresponding to each data port, will light when the physical connection is established. When a logical connection is made, the relevant port LED will turn on.

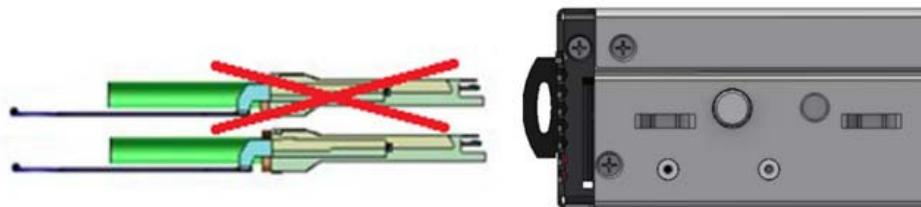
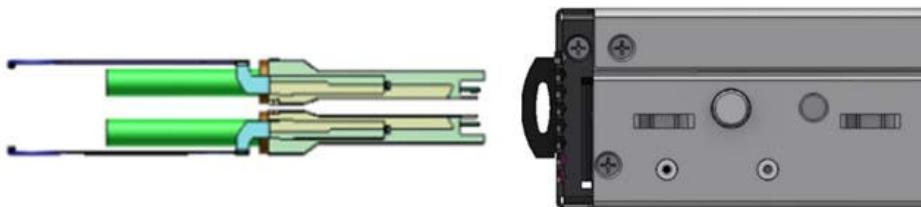
To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator for that port will turn off when the cable is unseated.

For more information about port LEDs, refer to [Port LEDs](#).

#### Warning

Do not force the cable into the cage with more than 40 newtons/9.0 pounds/4kg force. Greater insertion force may cause damage to the cable or to the cage.

## QSFP Cable Orientation



### 2.5.2.1 Splitter (Breakout) Cables and Adapters

A 100GbE port can be split to two 50GbE ports, or to four (or less) 25GbE ports, using an NVIDIA splitter cable.

Splitting a 100GbE QSFP28 port to 4 separate 25GbE ports (using a splitter cable) may disable (unmap) the 100GbE port below it. See specific splitting options per system detailed below.

#### 2.5.2.1.1 Using Splitter (Breakout) Cables with NVIDIA NOS

When using this feature, you should log into the NVIDIA NOS CLI and configure the individual ports to be 'split-2' or 'split-4'.

#### 2.5.2.1.2 Using Splitter (Breakout) Cables with Cumulus Linux

If you are using 4x10G direct attach copper cables or active optical cables, edit the /etc/cumulus/ports.conf to enable support for these cables, then restart the switchd service using the sudo systemctl restart switchd command.

#### Examples of Splitter (Breakout or Fanout) Cables



#### 2.5.2.1.3 SN2201 Splitting Options

All QSFP28 ports are splittable. Each port can be split into 4xSFP28 (10/25G) or 2xQSFP28 (50G) ports. There are no blocking requirements.



## 2.6 Initial Power On

Each system's input voltage is specified in the [Specifications](#) chapter.

The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

### Warning

The system platform will automatically power on when AC power is applied. There is no power system. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

1. Plug in the first power cable.
2. Plug in the second power cable.
3. Wait for the System Status LED to turn green.

### Warning

It may take up to five minutes to turn on the system. If the System Status LED shows amber after five minutes, unplug the system and call your Dell representative for assistance.

4. Check the System Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation (initially flashing, and then moving to a steady color) as shown in the figures below. For more information, refer to [LED Notifications](#).

System Status LEDs\* 5 Minutes After Power On



\*The icons order and style may vary depending on the system.

### Warning

After inserting a power cable and confirming the green System Status LED light is on, make sure that the Fan Status LED shows green. If the Fan Status LED is not green, unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles. If no obstacles were found and the problem persists, call your Dell representative for assistance.

Two Power Inlets - Electric Caution Notifications:

### Warning

Risk of electric shock and energy hazard. The two power supply units are independent. Disconnect all power supplies to ensure a powered down state inside of the switch platform.

## 2.7 System Bring-Up

For bring-up of a switch system with Cumulus Linux operating system installed, see [Configuring Network Attributes Using Cumulus Linux](#).

### 2.7.1 Configuring Network Attributes Using Cumulus Linux

For Cumulus Linux initial configuration instructions, see Configuring Cumulus Linux in the [Cumulus Linux Quick Start Guide](#).

#### 2.7.1.1 Remote Connection with Cumulus Linux

Cumulus Linux uses the OpenSSH package to provide SSH functionality. To securely access a Cumulus Linux switch remotely, please follow the instructions on the "SSH for Remote Access" page in the [Cumulus Linux User Guide](#).

## 2.8 FRU Replacements

### 2.8.1 Power Supply

These switches equipped with two replaceable power supply units work in a redundant configuration. Either unit may be extracted without bringing down the system.

### Warning

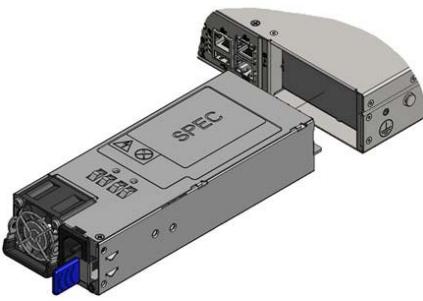
Make sure that the power supply unit that you are NOT replacing is showing green for the power supply unit LED.

### Warning

Power supply units have directional air flows similar to the fan module. The fan module airflow must coincide with the airflow of all of the power supply units. If the power supply unit airflow direction is different from the fan module airflow direction, the system's internal temperature will be affected. For power supply unit air flow direction, refer to [Air Flow](#).

#### To extract a power supply unit:

1. Remove the power cord from the power supply unit.
2. Grasping the handle with your hand, push the latch release with your thumb while pulling the handle outward. As the power supply unit unseats, the power supply unit status LEDs will turn off.
3. Remove the power supply unit.



**PS Unit Pulled Out**

\*The drawing is for illustration purposes. The design may slightly vary depending on the system.

**To insert a power supply unit:**

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.

**Warning**

Do not attempt to insert a power supply unit with a power cord connected to it.

2. Insert the power supply unit by sliding it into the opening, until a slight resistance is felt.
3. Continue pressing the power supply unit until it seats completely. The latch will snap into place, confirming the proper installation.
4. Insert the power cord into the supply connector.
5. Insert the other end of the power cord into an outlet of the correct voltage.

**Warning**

The green power supply unit indicator should light. If it does not, repeat the whole procedure to extract the power supply unit and re-insert it.

## 2.8.2 Fans

The system can fully operate if one fan FRU is dysfunctional. Failure of more than one fan is not supported.

**Warning**

Make sure that the fans have the air flow that matches the model number. An air flow opposite to the system design will cause the system to operate at a higher (less than optimal) temperature. For power supply unit air flow direction, refer to [Air Flow](#).

**To remove a fan unit:**

**Note**

When replacing a faulty fan unit in an operational switch system, do not leave the slot unpopulated for more than 60 seconds.

1. Grasping the handle with your right hand, push the latch release (if exists) with your thumb, while pulling the handle outward. As the fan unit unseats, the fan unit status LEDs will turn off.
2. Remove the fan unit.

**To insert a fan unit:**

1. Make sure the mating connector of the new unit is free of any dirt and/or obstacles.
2. Insert the fan unit by sliding it into the opening until slight resistance is felt. Continue pressing the fan unit until it seats completely.

**Warning**

The green Fan Status LED should light. If not, extract the fan unit and reinsert it. After two unsuccessful attempts to install the fan unit, power off the system before attempting any system debug.

**Fan Module Latches Example**



## 3 Interfaces

The systems support the following interfaces:

- Data interfaces - Ethernet: 1/10/25/40/50/56/100GbE
- USB port
- RS232 Console port
- Management interface(s) (Eth. RJ45) – 100MbE/1GbE
- Reset button
- Status and Port LEDs

In order to review the full configuration options matrix, refer to [Management Interfaces, PSUs and Fans](#).

### 3.1 Speed

Ethernet speed must be set manually. The system's ports can be manually configured to run at speeds ranging from 10GbE to 100GbE (for more details, see [Specifications](#)). To change the port speed configuration, use the command “speed” under interface configuration mode.

### 3.2 I2C/RS232 (Console)

The port labeled “Console” is an RS232 serial port on the front side. It is used for initial configuration and debugging. Upon first installation of the system, you need to connect a PC to this interface and configure network parameters for remote connections.

#### Note

- This interface is not found in externally managed systems.
- Apart from the initial configuration, the I<sup>2</sup>C interface is made exclusively for debugging and troubleshooting. Only FAEs are authorized to connect through it.

#### Warning

Only original NVIDIA cables supplied with the switch package can be used to connect a switch system to the server.

Connecting any cable other than the NVIDIA supplied console cable may cause an I<sup>2</sup>C hang. Using uncertified cables may damage the I<sup>2</sup>C interface.

### 3.3 Management

#### Note

The RJ45 Ethernet “MGT” port is labeled .

The RJ45 Ethernet ports provide access for remote management. The management ports are configured with auto-negotiation capabilities by default (100MbE to 1GbE). The management ports' network attributes (such as IP address) need to be pre-configured via the RS232 serial console port or by DHCP before use.

### **Warning**

Make sure you use only FCC compliant Ethernet cables.

## **3.4 USB**

The USB interface is USB 2.0 compliant (USB 1.0 is not supported) and can be used by NVIDIA NOS software to connect to an external disk for software upgrade or file management. The connector comes in a standard USB shape.

To view the full matrix of the USB configuration options, refer to [Management Interfaces, PSUs and Fans](#).

### **Note**

Do not use excessive force when inserting or extracting the USB disk to and from the connector.

## **3.5 Reset Button**

The reset button is located on the front side in the SN2201. This reset button requires a tool to be pressed.

### **Warning**

Do not use a sharp pointed object such as a needle or a push pin for pressing the reset button. Use a flat object to push the reset button.

To reset the system and the CPU of its management board, push the reset button and keep it pressed for up to 15 seconds.

To reset the system, the CPU of its management board, and the “admin” password, push the reset button and keep it pressed for at least 15 seconds. When using a NVIDIA NOS based system, this should allow you to enter without a password and set a new password for the user “admin”.

For Cumulus Linux password reset instructions, please refer to the Single User Mode - Boot Recovery section in the [Cumulus Linux User Guide](#).

## **3.6 Status and Port LEDs**

See [LED Notifications](#).

## **3.7 Data Interfaces and High Power Transceivers Support**

### **3.7.1 Data Interfaces**

The data interfaces use QSFP28 connectors. The full list of interfaces per system is provided in [Speed and Switching Capabilities](#).

Each QSFP28 port can be connected with a QSFP28 cable or connector for 25/40/50/56/100GbE, or 1/10/25GbE when connecting through NVIDIA QSFP28 to SFP28 (Dynamix QSA™) adapters, hybrid or split cables. The systems offer support of up to 3.5W transceivers in all QSFP28 ports, and support of up to 1.5W in all SFP28 ports.

The systems offer several high-power ports for optical transceivers that require such support. The following table specifies each system's ports max power capabilities:

### 3.7.1.1 High Power Transceivers Support

Model Family	Ports	Maximum High Power Support
SN2201	52,53	3.5W
	49, 51	5W

Notes:

5.0W high power modules are supported on NVIDIA NOS from version 3.x.1xxx onwards for 100GbE Fiber Optics up to 80km.

## 3.8 LED Notifications

The system's LEDs are an important tool for hardware event notification and troubleshooting.

### LEDs Symbols

Symbol	Name	Description	Normal Conditions
	<a href="#">System Status LED</a>	Shows the health of the system.	Green/Flashing green when booting
	<a href="#">Fan Status LED</a>	Shows the health of the fans.	Green
	<a href="#">Power Supply Units LEDs</a>	Shows the health of the power supply units.	Green

### 3.8.1 System Status LEDs

Both of the System Status LEDs (front and back, if exist) supply identical information.

System Status LEDs - Front and Rear Sides

LED Type	System	Front	Rear
System Status LEDs 	SN2201	Yes	No

**Warning**

It may take up to five minutes to turn on the system. If the System Status LED shows red after five minutes, unplug the system and call your NVIDIA representative for assistance.

### System Status LED Assignments

LED Behavior	Description	Action Required
Solid Green	The system is up and running normally.	N/A
Flashing Green	The system is booting up.	Wait up to five minutes for the end of the booting process.
Solid Red	Major error has occurred. For example, corrupted firmware, system is overheated etc.	If the System Status LED shows red five minutes after starting the system, unplug the system and call your NVIDIA representative for assistance.

### 3.8.2 Fan Status LEDs

LED Type	System	Front	Rear
Fan Status LEDs 	SN2201	Yes	Yes*, 4

\*The fans status is reflected by the LEDs only once the Network Operating System boot is complete.

### Fan Status Front LED Assignments

LED Behavior	Description	Action Required
Solid Green	All fans are up and running.	N/A
Solid Red	Error, one or more fans are not operating properly.	The faulty FRUs should be replaced.
Off	System boot	N/A

### Fan Status Rear LED Assignments (One LED per Fan)

LED Behavior	Description	Action Required
Solid Green	A specific fan unit is operating.	N/A
Solid Red	A specific fan unit is missing or not operating properly.	The fan unit should be replaced.
Off	System boot	N/A

#### Warning

**Risk of Electric Shock!** With the fan module removed, power pins are accessible within the module cavity. Do not insert tools or body parts into the fan module cavity.

### 3.8.3 Power Supply Status LEDs

#### Power Supply Status LEDs

LED Type	System	Front	Rear
Power Supply Unit Status LED	SN2201	Yes	Yes

#### Power Supply Unit Status Rear LED Assignments

LED Behavior	Description	Action Required
Solid Green	The PSU is running normally.	N/A
Flashing Green 1Hz	AC present / Only 12VSB on (PSU off) or PSU in Smart-on state.	Call your NVIDIA representative for assistance.
Amber	AC cord unplugged or AC power lost while the second power supply still has AC input power.	Plug in the AC cord of the faulty PSU.
	PS failure (including voltage out of range and power cord disconnected).	Check voltage. If OK, call your NVIDIA representative for assistance.
Flashing Amber	Power supply warning events where the power supply continues to operate; high temp, high power, high current, slow fan.	Call your NVIDIA representative for assistance.
Off	No AC power to all power supplies.	Call your NVIDIA representative for assistance.

### 3.8.4 Port LEDs

System	Port LEDs
SN2201	<p>RJ45:</p>  <p>1 ▲▼ 2</p> <p>QSFP28:</p>  <p>49 ▲▼ 50    51 ▲▼ 52</p>

## SFP and QSFP Port LEDs in Ethernet System Mode

LED Behavior	Description	Action Required
Off	Link is down	Check the cable.
Solid Green	Link is up with no traffic	N/A
Flashing Green	Link is up with traffic	N/A
Flashing Amber	A problem with the link	Check the cable, and replace it if needed.

## 1GBase-T LEDs in Ethernet System Mode

LED Behavior	Description	Action Required
Off	Link is down	Check that the near-end and far-end connectors are properly plugged, check cable integrity.
Solid Yellow	Link is up	N/A
Solid Green	Link is up with no traffic	N/A
Flashing Green	Link is up with traffic	N/A

## 3.9 Inventory Information

The system's inventory parameters (such as Serial Number, Part Number, GUID and MAC address) can be extracted from the inventory pull-out tab on the lower right side of the front panel.

### SN2201 Pull-out Tab



## 4 Software Management

The system includes an embedded management CPU card that runs NVIDIA Cumulus management software. This NOS includes a CLI, WebUI, SNMP, system management software and Ethernet protocols stack.

- For Cumulus® Linux® software management instructions, refer to the [\*Cumulus Linux User Guide\*](#).

### Warning

The Ethernet ports for remote management connect to Ethernet systems. These systems must be configured to 100Mb/1Gb auto-negotiation.

### Note

No more than two subnet managers are recommended for any single fabric.

## 4.1 Upgrading Software

### 4.1.1 Switch Firmware Update

The systems do not require firmware updating. Firmware updating is done through the Cumulus management software.

### 4.1.2 Cumulus Linux Software Upgrade

For Cumulus Linux software upgrade instructions, see Upgrading Cumulus Linux in the [\*Cumulus Linux User Guide\*](#).

## 5 Troubleshooting

Problem Indicator	Symptoms	Cause and Solution
LEDs	System Status LED is blinking for more than 5 minutes	<p>Cause: NVIDIA NOS software did not boot properly and only firmware is running.</p> <p>Solution: Connect to the system via the console port, and check the software status. You might need to contact an FAE if the NVIDIA NOS software did not load properly.</p>
	System Status LED is red	<p>Cause:</p> <ul style="list-style-type: none"> <li>• Critical system fault (CPU error, bad firmware)</li> <li>• Over temperature</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>• Check environmental conditions (room temperature)</li> </ul>
	Fan Status LED is red	<p>Cause: Possible fan issue</p> <p>Solution:</p> <ul style="list-style-type: none"> <li>• Check that the fan is fully inserted and nothing blocks the airflow</li> </ul>
	PSU Status LED is red	<p>Cause: Possible PSU issue</p> <p>Solution:</p> <ul style="list-style-type: none"> <li>• Check/replace the power cable</li> </ul>
System boot failure while using NVIDIA NOS	Software upgrade failed on x86 based systems	<p>Solution:</p> <ul style="list-style-type: none"> <li>• Connect the RS232 connector (CONSOLE) to a laptop.</li> <li>• Push the system's reset button.</li> <li>• Press the ArrowUp or ArrowDown key during the system boot. GRUB menu will appear. For example:</li> </ul> <div style="border: 1px dashed black; padding: 10px; margin-top: 10px;"> <pre> Default image: 'SX_X86_64 SX_3.4.0008 2014-11-10 20:07:51 x86_64' Press enter to boot this image, or any other key for boot menu Booting default image in 3 seconds. Boot Menu ----- ----- 0: SX_X86_64 SX_3.4.0008 2014-11-10 20:07:51 x86_64 1: SX_X86_64 SX_3.4.0007 2014-10-23 17:27:34 x86_64 ----- ----- Use the ArrowUp and Arrowdown keys to select which entry is highlighted. Press enter to boot the selected image or 'p' to enter a password to unlock the next set of features. Highlighted entry is 0: "</pre> <ul style="list-style-type: none"> <li>• Select previous image to boot by pressing an arrow key and choosing the appropriate image.</li> </ul> </div>
System boot failure while using Cumulus Linux	Software upgrade failed on x86 based systems	See Monitoring and Troubleshooting in <a href="#">Cumulus Linux User Guide</a> .

Problem Indicator	Symptoms	Cause and Solution
System date and time reset	<p>The date and time settings were reset to the default configuration following an AC power loss</p>	<p>Cause: Date and time are reconfigured by the operating system.</p> <p>Solution:</p> <ul style="list-style-type: none"> <li>• To set the system's date and time manually, run:</li> </ul> <pre># clock set &lt;hh:mm:ss&gt; [&lt;yyyy/mm/dd&gt;]</pre> <ul style="list-style-type: none"> <li>• To verify the configured clock settings, run:</li> </ul> <pre># show clock</pre> <ul style="list-style-type: none"> <li>• It is recommended to enable server time synchronization with a Network Time Protocol (NTP) server. To do that, run:</li> </ul> <pre>&gt; enable # config terminal (config)# ntp server &lt;ntp server ip address&gt;</pre> <ul style="list-style-type: none"> <li>• To verify NTP time synchronization is enabled, run:</li> </ul> <pre># show ntp</pre> <p>For full configuration instructions, please refer to Network Time Protocol - NTP &gt; Configure NTP servers a under <a href="#">Cumulus Linux User Guide</a>.</p>

## 6 Specifications

### 6.1 SN2201

Feature		Value
Mechanical	Size:	43.9mm (H) x 428mm (W) x 432mm (D) 1.72" (H) x 16.84" (W) x 17" (D)
	Mounting:	19" Rack mount
	Weight:	7.410kg
	Speed:	1/10/25/40/50/56/100GbE per QSFP28 port 10/100/1000Mbase-T per RJ45 port
	Connector cage:	48 RJ45 ports of 1GbE and 4 QSFP28 ports of 100GbE
Environmental	Temperature:	Operational: 0° to 40°C Non-Operational: -40° to 70°C
	Humidity:	Operational: 10% - 85% non-condensing Non-Operational: 10% - 90% non-condensing
	Altitude:	5000m
	Noise level:	60 dB(A)
Regulatory	Safety/ EMC:	CB, cTUVus, CE, CU, S_Mark, CE, FCC, VCCI, ICES, RCM, BSMI, KCC, CCC
	RoHS:	RoHS complaint
Power	Input Voltage:	100-127Vac, 50/60Hz 4A (x2), 200-240Vac, 50/60Hz 2A (x2)
	Global Power Consumption:	Typical power with passive cables (ATIS): 98W
Main Devices	CPU:	Intel x86 Dual Core
	PCIe:	4x Gen2.0
	Switch:	NVIDIA Spectrum
	Memory:	SDRAM: 8GB ECC DDR4 SO-DIMM Storage: 20GB SSD M.2 PCIe Gen 3
Throughput		448GB/s

# 7 Appendixes

The document contains the following appendixes:

- [Thermal Threshold Definitions](#)
- [Interface Specifications](#)
- [Disassembly and Disposal](#)

## 7.1 Thermal Threshold Definitions

Three thermal threshold definitions are measured by the Spectrum ASICs, and impact the overall switch system operation state as follows:

- **Warning** – 105°C: On managed systems only: When the ASIC device crosses the 100°C threshold, a Warning Threshold message will be issued by the management software, indicating to system administration that the ASIC has crossed the Warning threshold. Note that this temperature threshold does not require nor lead to any action by hardware (such as switch shutdown).
- **Critical** – 120°C: When the ASIC device crosses this temperature, the switch firmware will automatically shut down the device.
- **Emergency** – 130°C: In case the firmware fails to shut down the ASIC device upon crossing its Critical threshold, the device will auto-shutdown upon crossing the Emergency (130°C) threshold.

For thermal threshold definitions in Cumulus Linux, see [Configuring SNMP Traps](#) in the Cumulus User Guide.

## 7.2 Interface Specifications

### 7.2.1 QSFP28 Pin Description

J3 and J6	
20	GND
21	Rx2n
22	Rx2p
23	GND
24	Rx4n
25	Rx4p
26	GND
27	ModPrsL
28	IntL
29	VccTx
30	Vcc1
31	LPMode
32	GND
33	Tx3p
34	Tx3n
35	GND
36	Tx1p
37	Tx1n
38	GND
	GND
	Rx1n
	Rx1p
	GND
	Rx3n
	Rx3p
	GND
	SDA
	SCL
	Vcc Rx
	ResetL
	ModSelL
	GND
	Tx4p
	Tx4n
	GND
	Tx2p
	Tx2n
	GND

## QSFP Pin Description

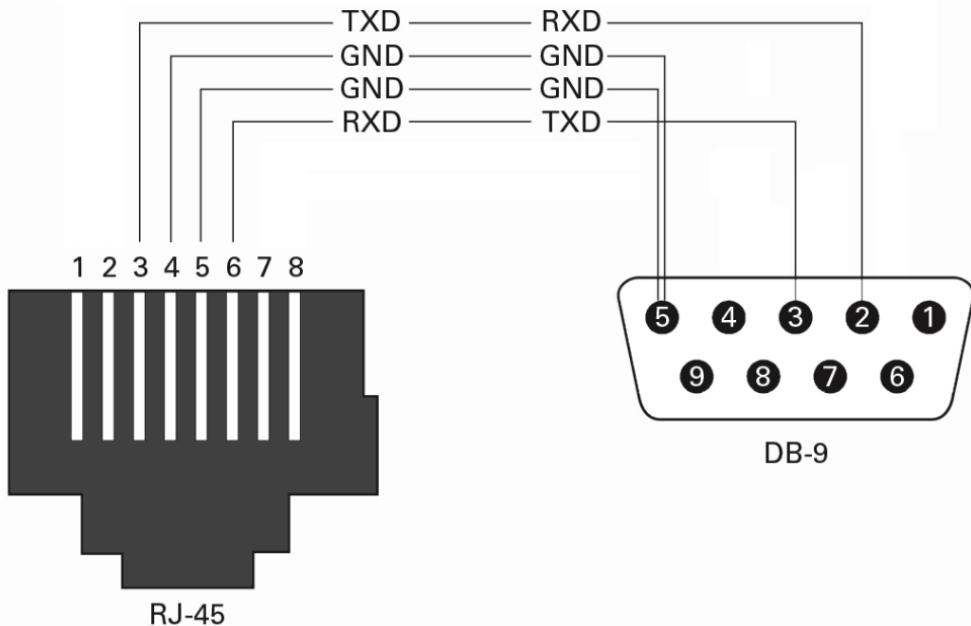
Connector Pin Number	Symbol	Signal Description
1	GND	Ground
2	Tx2n	Connected to Port 2 lane Rx Inverted Data
3	Tx2p	Connected to Port 2 lane Rx Non-Inverted Data
4	GND	Ground
5	Tx4n	Connected to Port 4 lane Rx Inverted Data
6	Tx4p	Connected to Port 4 lane Rx Non-Inverted Data
7	GND	Ground
8	Mod-SelL	Cable/Module Select
9	ResetL	Cable/Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Connected to Port 3 lane Tx Non-Inverted Data
15	Rx3n	Connected to Port 3 lane Tx Inverted Data
16	GND	Ground
17	Rx1p	Connected to Port 1 lane Tx Non-Inverted Data
18	Rx1n	Connected to Port 1 lane Tx Inverted Data
19	GND	Ground
20	GND	Ground
21	Rx2n	Connected to Port 2 lane Tx Inverted Data
22	Rx2p	Connected to Port 2 lane Tx Non-Inverted Data
23	GND	Ground
24	Rx4n	Connected to Port 4 lane Tx Inverted Data
25	Rx4p	Connected to Port 4 lane Tx Non-Inverted Data
26	GND	Ground

Connector Pin Number	Symbol	Signal Description
27	ModPrsL	Module/cable Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMode	Low Power Mode
32	GND	Ground
33	Tx3p	Connected to Port 3 lane Rx Non-Inverted Data
34	Tx3n	Connected to Port 3 lane Rx Inverted Data
35	GND	Ground
36	Tx1p	Connected to Port 1 lane Rx Non-Inverted Data
37	Tx1n	Connected to Port 1 lane Rx Inverted Data
38	GND	Ground

## 7.2.2 RJ45 to DB9 Harness Pinout

The RS232 harness cable (DB9 to RJ45) is provided within the package to connect a host PC to the system's Console RJ45 port.

### RJ45 to DB9 Harness Pinout



## 7.3 Disassembly and Disposal

### 7.3.1 Disassembly Procedure

To disassemble the system from the rack:

1. Unplug and remove all connectors.
2. Unplug all power cords.
3. Remove the ground wire.
4. Unscrew the center bolts from the side of the system with the bracket.

#### Warning

Support the weight of the system when you remove the screws so that the system does not fall.

5. Slide the system from the rack.
6. Remove the rail slides from the rack.
7. Remove the caged nuts.

### 7.3.2 Disposal

According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste. Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Follow the instructions found [here](#) for proper disassembly and disposal of the switch, according to the WEEE directive.



#### 7.3.2.1 Lithium Battery

The SN2201 system's Real-time Clock includes a Lithium coin battery (CR2032) that contains perchlorate. When replacing the battery, use only a replacement battery that is recommended by the equipment manufacturer.

#### Warning

The battery can explode if not properly used, replaced, or disposed of.  
Dispose of the battery according to your local regulations. Do not attempt to recharge the battery, disassemble, puncture, or otherwise damage it.

## 8 Dell Support

The Dell support site provides documents and tools to help you use Dell equipment and mitigate network outages. Through the support site you can obtain technical information, access software upgrades and patches, download available management software, and manage your open cases. The Dell support site provides integrated, secure access to these services. To access the Dell support site, go to [Dell Support](#). To display information in your language, scroll down to the bottom of the web page and select your country or region from the drop-down menu.

- To receive more technical support, click Contact Us. On the Contact Information web page, click Technical Support.
- To access switch documentation, go to [Dell support](#) and enter your switch type.
- To search for drivers and downloads, go to **Drivers & Downloads** tab for your switch.
- To participate in Dell community blogs and forums, go to [Dell Community](#).

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