



NVIDIA Spectrum-3 SN4000 1U and 2U Switch Systems Hardware User Manual

Rev. 1.0

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Relevant for Models: SN4410, SN4600/SN4600C and SN4700

About this Manual

This manual describes the installation and basic use of NVIDIA Ethernet switches based on the NVIDIA® Spectrum®-3 ASIC.

Ordering Information

See [Ordering Information](#).

Intended Audience

This manual is intended for IT managers and system administrators.

Related Documentation

Document	Description
<i>NVIDIA Onyx (MLNX-OS) User Manual</i>	This document contains information regarding the configuration and management of the NVIDIA Onyx® (MLNX-OS®) software. See https://www.nvidia.com/en-us/networking/ethernet-switching/onyx/ .
<i>Cumulus Linux User Guide</i>	This document contains information regarding the configuration and management of the Cumulus® Linux® software. See https://docs.cumulusnetworks.com .
<i>Open Network Install Environment (ONIE) Quick Start Guide</i>	See https://github.com/opencomputeproject/onie/wiki/Quick-Start-Guide/ .
Hands-on workshops	Cumulus on-site/remote training: https://academy.nvidia.com/en/cumulus-linux-boot-camp/ NVIDIA Onyx on-site/remote training: https://academy.nvidia.com/en/course/onyx/?cm=242
On-site/remote services	For any tailor-made service, contact nbu-services-sales@nvidia.com .

Revision History

A list of the changes made to this document are provided in [Document Revision History](#).

Ordering Information

The following table lists ordering information for the available systems.

Please pay attention to the airflow direction when ordering your system. For more details, see [Air Flow](#).

SN4410 Ordering Part Numbers

System Model	NVIDIA SKU	Legacy OPN	Description	Lifecycle Phase
SN4410	920-9N312-00F B-0C0	MSN4410-WS2FC	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Cumulus Linux, 24 QSFP-DD28 and 8 QSFP-DD ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	MP (Mass Production)
	920-9N312-00F B-0N0	MSN4410-WS2FO	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with ONIE, 24 QSFP-DD28 and 8 QSFP-DD ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	MP (Mass Production)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N312-00R B-0C0	MSN4410- WS2RC	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Cumulus Linux, 24 QSFP-DD28 and 8 QSFP-DD ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N312-00R B-0N0	MSN4410- WS2RO	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with ONIE, 24 QSFP-DD28 and 8 QSFP-DD ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

SN4600/SN4600C Ordering Part Numbers

System Model	NVIDIA SKU	Legacy OPN	Description	Life Cycle Phase
SN4600	920-9N302-00FA-0C0	MSN4600-VS2FC	NVIDIA Spectrum-3 based 200GbE 2U Open Ethernet Switch with Cumulus Linux, 64 QSFP56 ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	MP (Mass Production)
	920-9N302-00RA-0C0	MSN4600-VS2RC	NVIDIA Spectrum-3 based 200GbE 2U Open Ethernet Switch with Cumulus Linux, 64 QSFP56 ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	MP (Mass Production)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N302-00R A-0N0	MSN4600- VS2RO	NVIDIA Spectrum-3 based 200GbE 2U Open Ethernet Switch with ONIE, 64 QSFP56 ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N302-00FA -0N0	MSN4600- VS2FO	NVIDIA Spectrum-3 based 200GbE 2U Open Ethernet Switch with ONIE, 64 QSFP56 ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
SN4600C	920-9N302-00F7-0X0	MSN4600-CS2F	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with Onyx, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N302-00R7-0X0	MSN4600-CS2R	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with Onyx, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N302-00F7-0C2	MSN4600-CS2FC	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with Cumulus Linux, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N302-00R7-0C0	MSN4600-CS2RC	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with Cumulus Linux, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N302-00F7-0N0	MSN4600-CS2FO	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with ONIE, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N302-00R7-0N0	MSN4600-CS2RO	NVIDIA Spectrum-3 based 100GbE 2U Open Ethernet Switch with ONIE, 64 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

SN4700 Ordering Part Numbers

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
SN4700	920-9N301-00F B-0X0	MSN4700- WS2F	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Onyx, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N301-00R B-0X0	MSN4700- WS2R	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Onyx, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N301-00F B-0C0	MSN4700- WS2FC	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N301-00R B-0C0	MSN4700- WS2RC	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

System Model	NVIDIA SKU	Legacy OPN	Description	L i f e c y c l e P h a s e
	920-9N301-00F B-0N0	MSN4700- WS2FO	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with ONIE, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit	M P (M a s s P r o d u c t i o n)
	920-9N301-00R B-0N0	MSN4700- WS2RO	NVIDIA Spectrum-3 based 400GbE 1U Open Ethernet Switch with ONIE, 32 QSFPDD ports, 2 Power Supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit	M P (M a s s P r o d u c t i o n)

Introduction

The SN4000 series switches are the 4th generation of NVIDIA Spectrum® switches, purpose-built for leaf/spine/super-spine datacenter applications. Allowing maximum flexibility, SN4000 series provides port speeds spanning from 1GbE to 400GbE, and a port density that enables full rack connectivity to any server at any speed. In addition, the uplink ports allow a variety of blocking ratios to suit any application requirement. The SN4000 series is ideal for building wire-speed and cloud-scale layer-2 and layer-3 networks. The SN4000 platforms deliver high performance, consistent low latency along with support for advanced software defined networking features, making it the ideal choice for web scale IT, cloud, hyperconverged storage and data analytics applications.

Open Ethernet breaks the paradigm of traditional switch systems, eliminating vendor lock-in. Instead of forcing network operators to use the specific software that is provided by the switch vendor, Open Ethernet offers the flexibility to use a choice of operating systems on top of Ethernet switches, thereby re-gaining control of the network, and optimizing utilization, efficiency and overall return on investment. Open Ethernet adopts the same principles as standard open solutions for servers and storage, and applies them to the world of networking infrastructure. It encourages an ecosystem of open source, standard network solutions. These solutions can then be easily deployed into the modern data center across network equipment that eases management and ensures full interoperability. With a range of system form factors, and a rich software ecosystem, SN4000 series allows you to pick and choose the right components for your data center.

NVIDIA SN4000 series platforms are based on the high-performance NVIDIA Spectrum-3 ASIC with a switching capacity of 12.8 Tb/s. SN4000 platforms are available in a range of configurations, each delivering high performance combined with feature-rich layer 2 and layer 3 forwarding, ideally suited for both top-of-rack leaf and fixed configuration spines. The NVIDIA SN4000 series provides full wire speed, cut through-mode latency, on-chip fully-shared 64MB packet buffering, and flexible port use in addition to advanced capabilities. Combining a wide range of innovations in the area of programmability, telemetry, and tunneling with industry leading performance, NVIDIA SN4000 series is capable of addressing today's data center's complex networking requirements.

For a full list of all available ordering options, see [Ordering Information](#).

SN4410 Front View



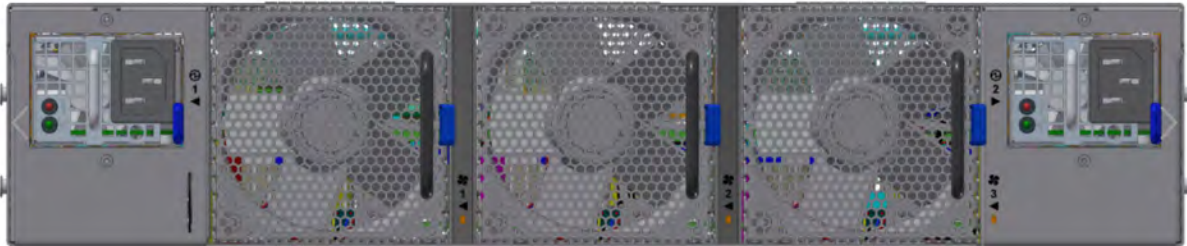
SN4600 Front View



SN4600C Front View



SN4600/SN4600C Rear View



SN4700 Front View



SN4410/SN4700 Rear View



Speed and Switching Capabilities

The table below describes maximum throughput and interface speed per system model.

System Model	Interfaces	Supported Rates	Max Throughput
SN4410	32 x QSFP-DD	8 x 400GbE 16 x 40/100/200GbE 32 x 1/10/25/50GbE	8Tb/s
SN4600	64 x QSFP56	64 x 40/200GbE 128 x 1/10/25/50/100GbE	25.6Tb/s
SN4600C	64 x QSFP28	64 x 40/100GbE 128 x 1/10/25/50/100GbE	12.8Tb/s
SN4700	32 x QSFP-DD	32 x 400GbE 64 x 40/200GbE 128 x 1/10/25/50/100GbE	25.6Tb/s

*The system can support different interfaces and speed rates using QSFP/QSDP-DD to SFP adapters or hybrid cables. For further information, see [Splitter \(Breakout\) Cables and Adapters](#).

Management Interfaces, PSUs and Fans

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

System Model	uUSB	MGT (Management)	Console	PSU	Fan
SN4410	Front	Front	Front	Yes, 2	Yes, 6
SN4600	Front	Front	Front	Yes, 2	Yes, 3
SN4600C	Front	Front	Front	Yes, 2	Yes, 3
SN4700	Front	Front	Front	Yes, 2	Yes, 6

Features

For a full feature list, please refer to the system's product brief. Go to <https://www.nvidia.com/en-us/networking/ethernet-switching/>, and select the desired product family.


Certifications


For a list of certifications (such as EMC, Safety and others) per system for different regions of the world, please contact your NVIDIA representative.

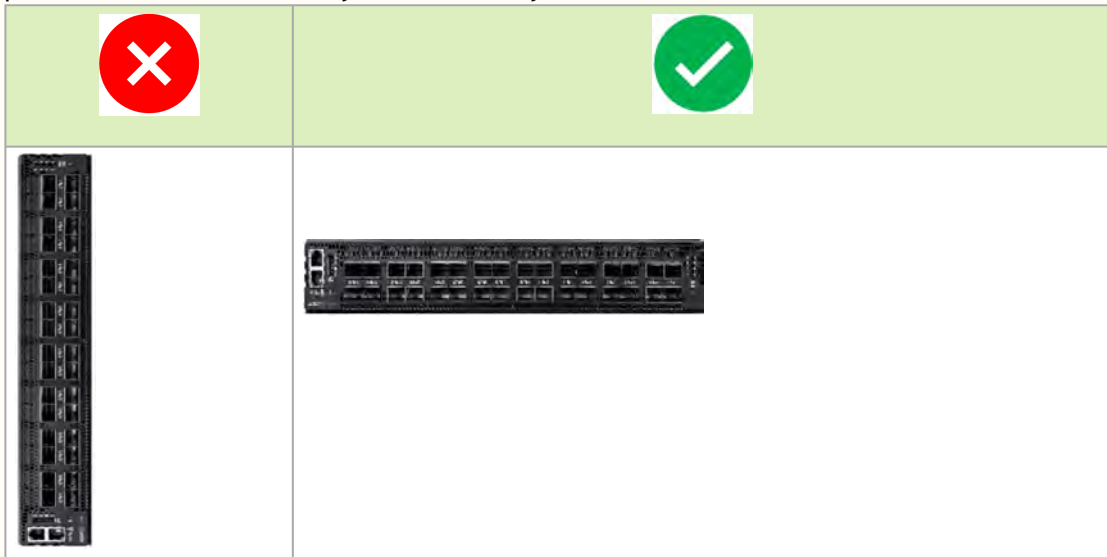
Installation


System Installation and Initialization

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

 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.

 Due to thermal considerations, the switch systems must be installed in a horizontal position. do not install the systems vertically.



 Unless otherwise specified, NVIDIA products are 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 system involves the following phases:

Step	Procedure	See
1	Follow the safety warnings	Safety Warnings
2	Pay attention to the air flow consideration within the system and rack	Air Flow
3	Make sure that none of the package contents is missing or damaged	Package Contents
4	Mount the system into a rack enclosure	19" System Mounting Options


Step	Procedure	See
5	Power on the system	Initial Power On
6	Perform system bring-up	System Bring-Up
7	[Optional] FRU replacements	FRU Replacements

Safety Warnings

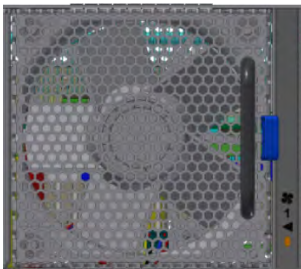
Prior to the installation, please review the [Safety Warnings](#). Note that some warnings may not apply to all models.

Air Flow

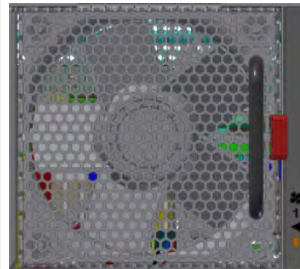
NVIDIA systems are offered with two air flow patterns:


 the images are provided for illustration purposes only. The design may slightly vary in different systems

- Power (rear) side inlet to connector side outlet - marked with blue power supplies/fans FRUs' handles.




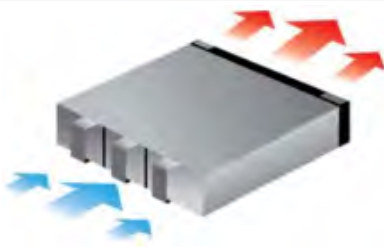
- Connector (front) side inlet to power side outlet - marked with red power supplies/fans FRUs' handles.



 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. Red latches are placed on the power inlet side. OPN designation is “-R”.

Direction	Description and OPN Designation
	Power side inlet to connector side outlet. Blue latches are placed on the power inlet side. OPN designation is “-F”.

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 SN4600/SN4600C package content is as follows:

- 1 x System
- 1 x Rail kit
- 1 x Power cable for each power supply unit - Type C13-C14
- 1 x Harness: HAR000028 - Harness RS232 2M cable - DB9 to RJ-45
- 1 x Cable retainer for each power supply unit

The SN4410/SN4700 package content is as follows:

- 1 x System
- 1 x Rail kit
- 4 x Power cables:
 - 2 x 250V 10A 1830MM C14 TO C15 power cable
 - 2 x 110V 15A 1830MM C14 TO C15 UL power cable
- 1 x Harness: HAR000631 - Harness RS232 2M cable - DB9 to RJ-45
- 2 x Cable retainers for each power supply unit



If anything is damaged or missing, contact your sales representative at Networking-support@nvidia.com.

Mounting Options

By default, the systems are sold with fixed rail-kits. For installation instructions, refer to the relevant links in the following table:

System Model	Fixed Rail-kit (Default)
SN4600/SN4600C	SN4600/SN4600C Fixed Rail Kit
SN4410 SN4700	SN4410/SN4700 Fixed Rail Kit




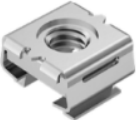

SN4600/SN4600C Fixed Rail Kit

Kit OPN	Legacy OPN	Rack Size and Rack Depth Range
930-9NRKT-00JN-000	MTEF-KIT-J	430-800 mm

The following parts are included in the fixed rail kit (see figure below):

- 2x Rack mount rails (A)
- 2x Rack mount blades (B)
- 2x Rack mount ears (C)
- 8x M6 Standard cage nuts (D)
- 8x M6 Standard pan-head Phillips screws (E)
- 4x Flat Head Phillips 100 DEG 6-32X1/4" ST.ST PATCH 360 (F)

Rack Rail Kit Parts

Ax2	Bx2	Cx2
		
Dx8	Ex8	Fx4
		

Prerequisites:

Before mounting the system to the rack, select the way you wish to place the system. Pay attention to the airflow within the rack cooling, connector and cabling options.

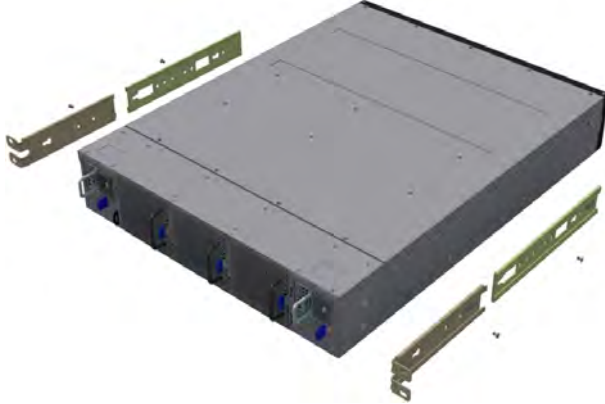
While planning how to place the system, consider the two installation options shown in the figures below, and review the following points:

- Make sure the system air flow is compatible with your installation selection. It is important to keep the airflow within the rack in the same direction.
- Note that the part of the system to which you choose to attach the rails (the front panel direction, as demonstrated in Option 1 or the FRUs direction, as demonstrated in Option 2) 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 (Option 2) will allow you to slide the FRUs, in and out.

Short Racks (430-580 mm) Installation Options

- Rear side (FRUs)

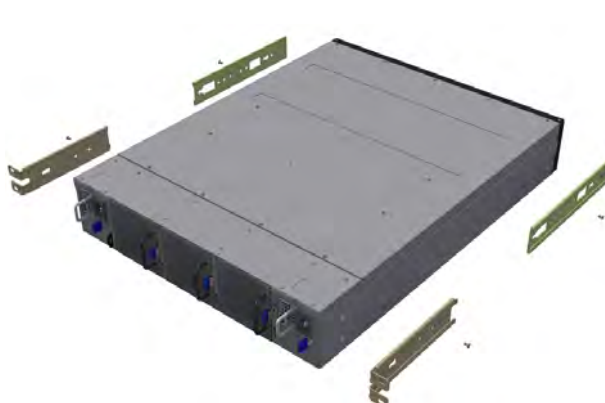


- Front side (ports)

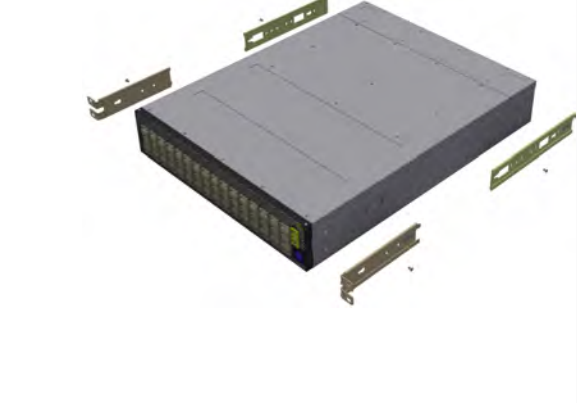


Standard Racks (580-800 mm) Installation Options

- Rear side (FRUs)



- Front side (ports)



Short Racks (430-580 mm) Installation - Side View

Front side (ports):



Rear side (FRUs):



Standard Racks (580-800 mm) Installation - Side View

Front side (ports):



Rear side (FRUs):



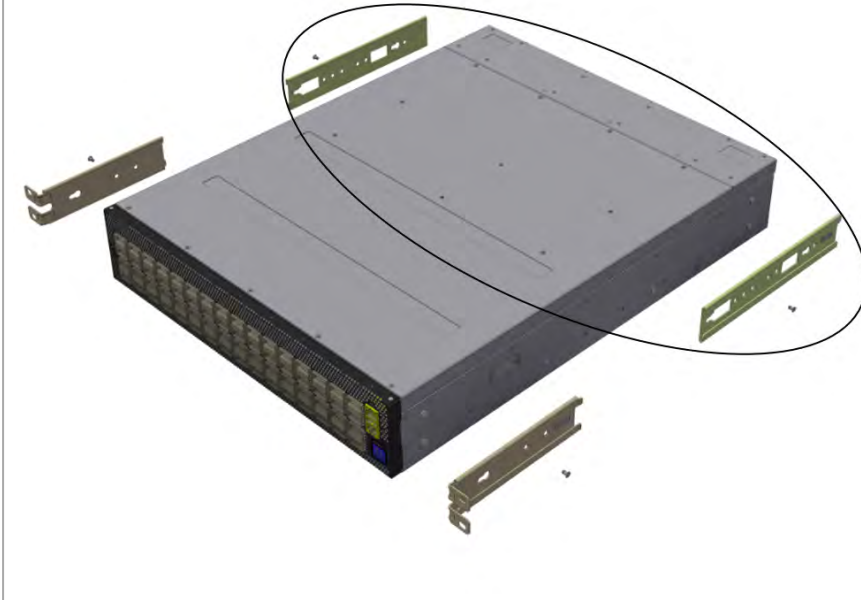
To mount the system into the rack:



The following steps include illustrations that show front side (ports) installation, yet all instructions apply to all installation options.

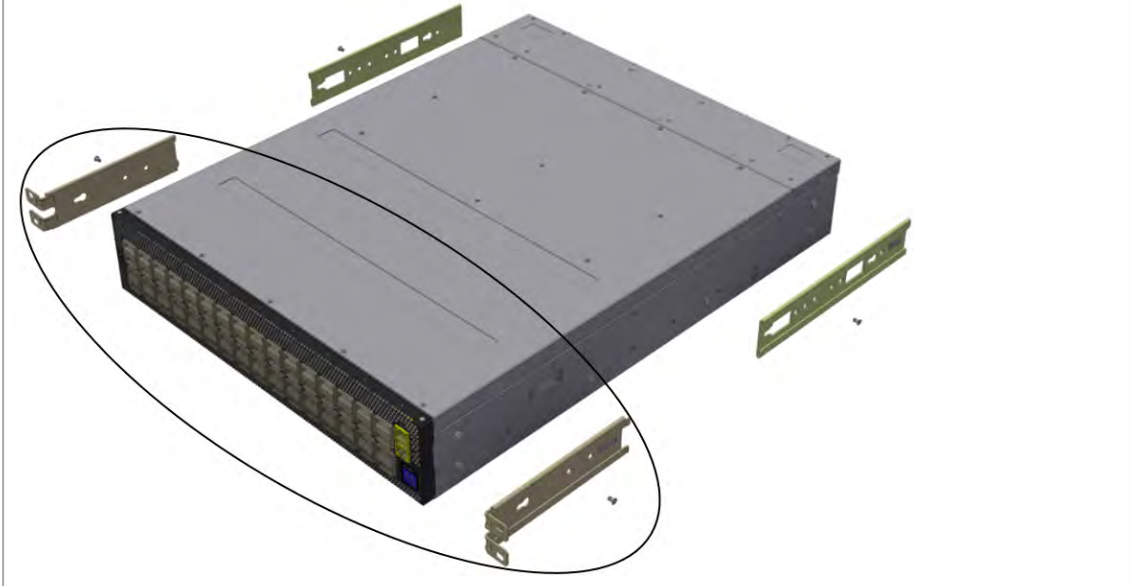
1. Attach the left and right rack mount rails (A) to the switch, by gently pushing the switch chassis' pins through the slider key holes, until locking occurs.
2. Secure the chassis in the rails by screwing 2 flat head Phillips screws (F) in the designated points with a torque of 1.5 ± 0.2 Nm.

Attaching the Rails to the Chassis

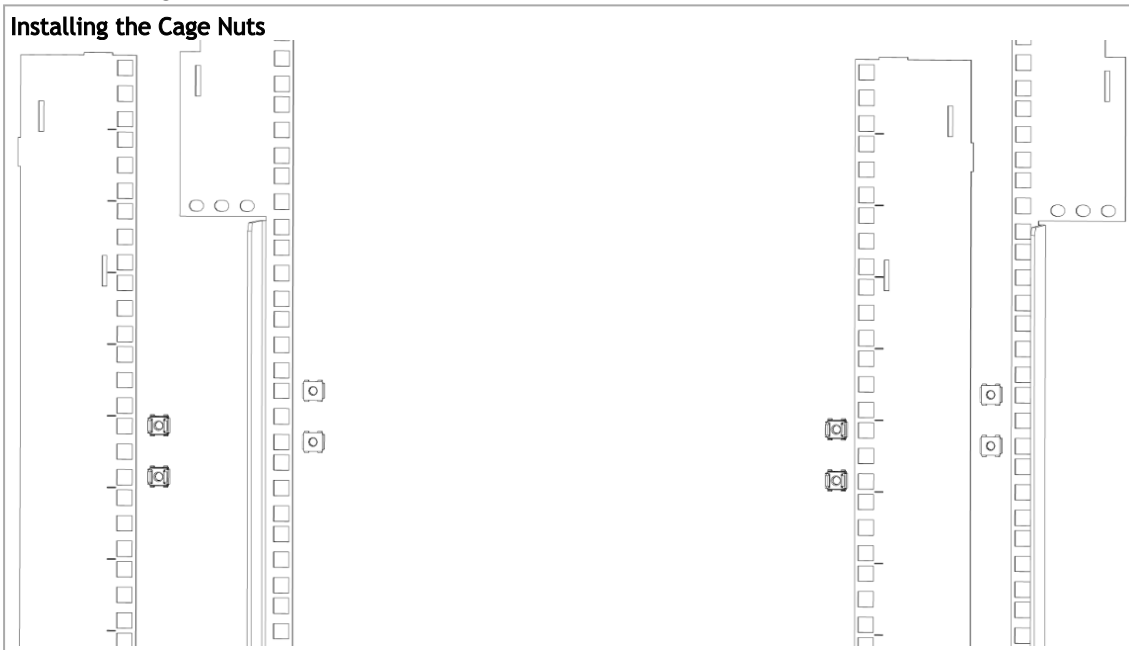


3. Attach the left and right rack mount ears (C) to the switch, by gently pushing the switch chassis' pins through the slider key holes, until locking occurs. Secure the system in the brackets by screwing the remaining 2 flat head Phillips screws (F) in the designated points with a torque of 1.5 ± 0.2 Nm.

Attaching the Brackets to the Chassis



4. Install 8 cage nuts (D) in the desired 1U slots of the rack: 4 cage nuts in the non-extractable side and 4 cage nuts in the extractable side.

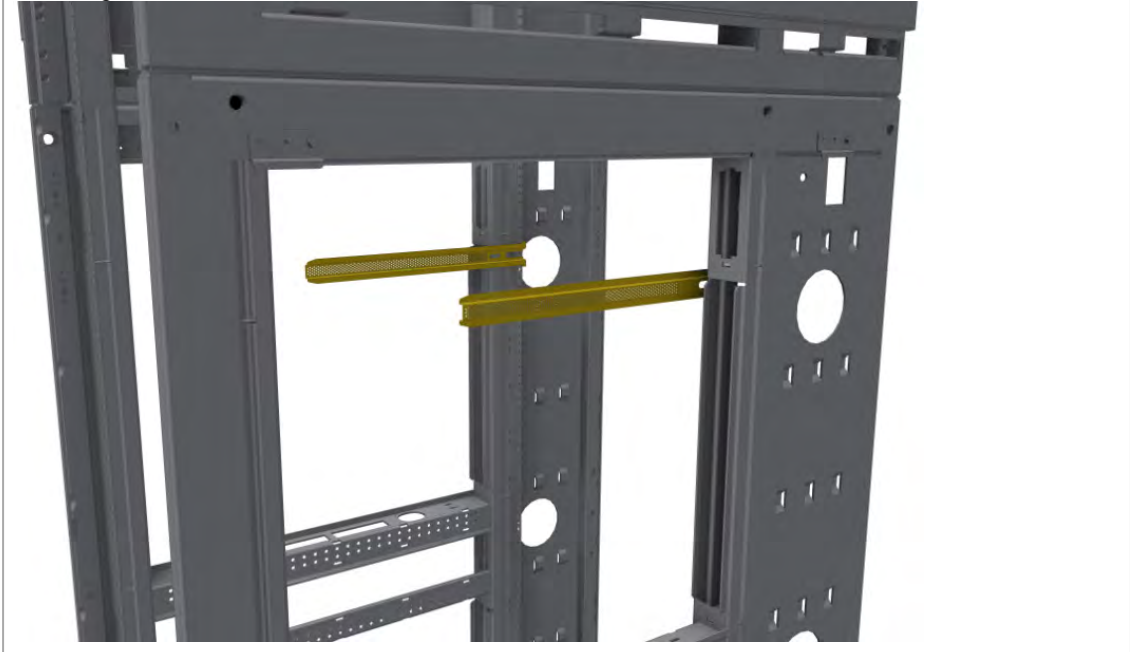


⚠ While each rack U (unit) consists of three holes, the cage nut should be installed vertically with its ears engaging the top and bottom holes only.

While your installation partner is supporting the system's weight, perform the following steps:

5. Attach the two rack mount blades (B) to the back side (FRU side) of the rack by inserting four M6 screws (E) in the designated cage nuts. Do not tighten the screws yet.

Attaching the Brackets to the Rack



6. Slide the switch with the rails (A) and ears (C) installed on it into the left and right rails (B) on the rack. Use four M6 screws (E) to fix the rack mount ears (C) to the rack. Do not tighten the screws yet.

Sliding the Blades in the Rails



⚠ At least two people are required to safely mount the system in the rack.

- When fully inserted, fix the switch by tightening the 8 screws (E) inserted in Step 5 and Step 6 with a torque of 4.5 ± 0.5 .

Removing the System from the Rack

To remove a unit from the rack:

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







SN4410/SN4700 Fixed Rail Kit

Kit OPN	Legacy OPN	Rack Size and Rack Depth Range
930-9NRKT-00JN-000	MTEF-KIT-J	430-800 mm

The following parts are included in the fixed rail kit (see figure below):

- 2x Rack mount rails (A)
- 2x Rack mount blades (B)
- 2x Rack mount ears (C)
- 8x M6 Standard cage nuts (D)
- 8x M6 Standard pan-head Phillips screws (E)
- 4x Flat Head Phillips 100 DEG 6-32X1/4" ST.ST PATCH 360 (F)

Rack Rail Kit Parts

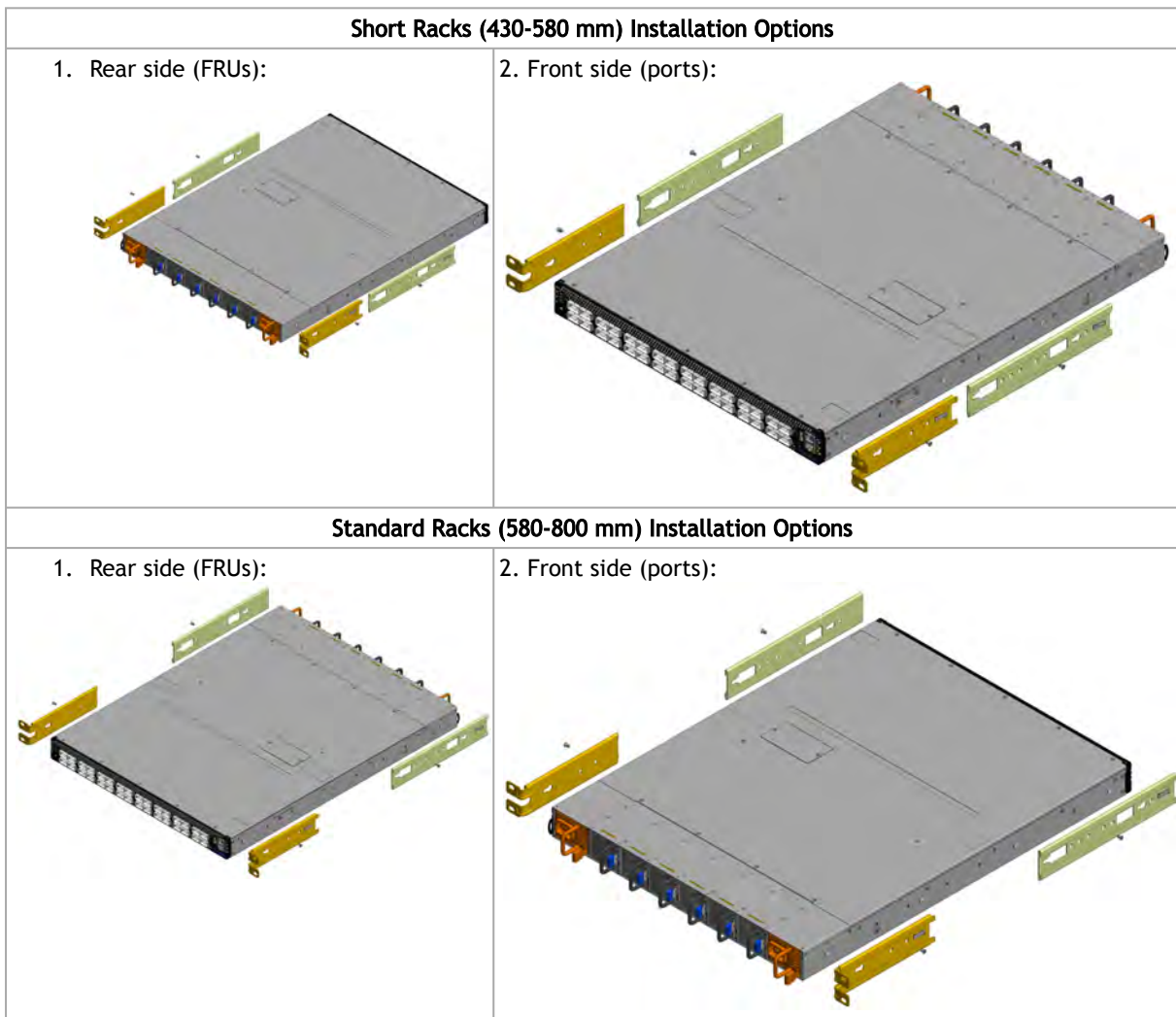
Ax2	Bx2	Cx2
		
Dx8	Ex8	Fx4
		

Prerequisites:

Before mounting the system to the rack, select the way you wish to place the system. Pay attention to the airflow within the rack cooling, connector and cabling options.

While planning how to place the system, consider the two installation options shown in the figures below, and review the following points:

- Make sure the system air flow is compatible with your installation selection. It is important to keep the airflow within the rack in the same direction.
- Note that the part of the system to which you choose to attach the rails (the front panel direction, as demonstrated in Option 1 or the FRUs direction, as demonstrated in Option 2) 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 (Option 2) will allow you to slide the FRUs, in and out.



⚠ In short racks, the system's ventilation openings should be framed by the designated windows in the rails, as shown below.

Short Racks (430-580 mm) Installation - Side View

Front side (ports):

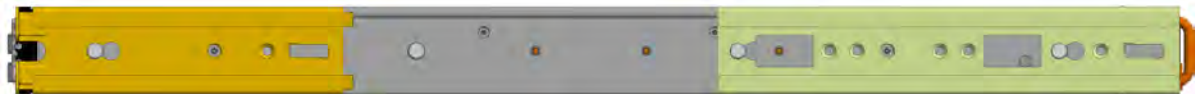


Rear side (FRUs):



Standard Racks (580-800 mm) Installation - Side View

Front side (ports):



Rear side (FRUs):



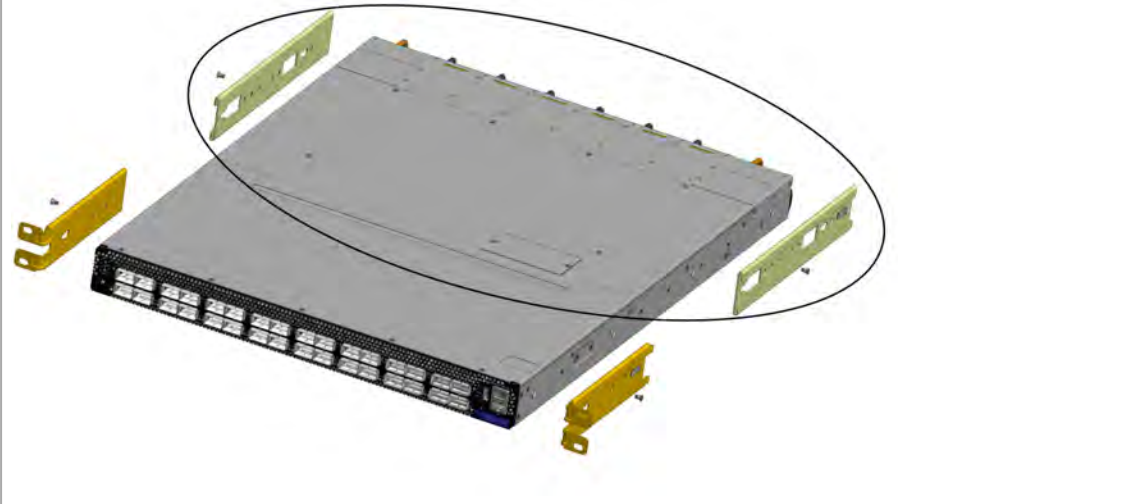
To mount the system into the rack:

⚠ At least two people are required to safely mount the system in the rack.

⚠ The following steps include illustrations that show front side (ports) installation, yet all instructions apply to all installation options.

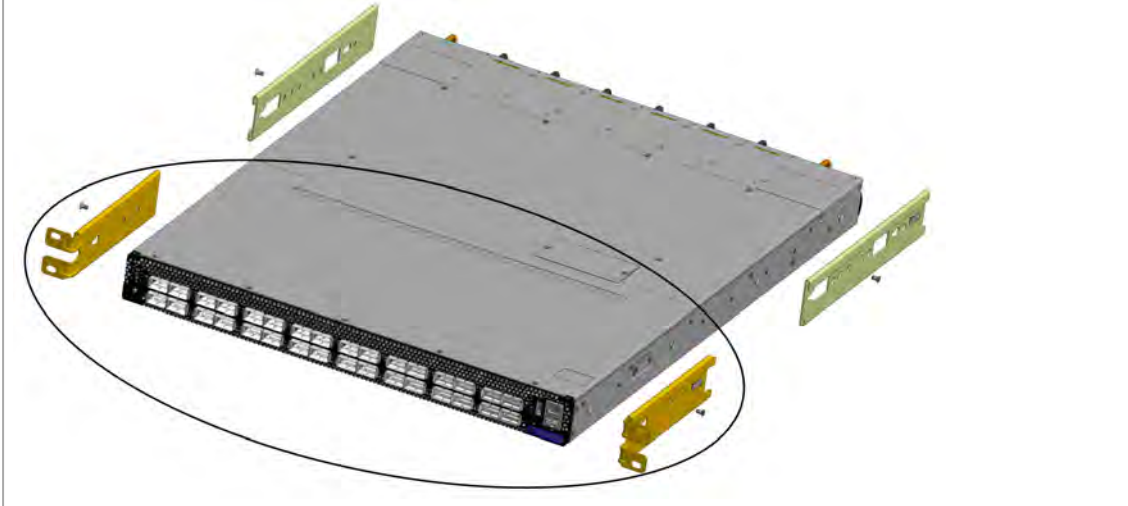
1. Attach the left and right rack mount rails (A) to the switch, by gently pushing the switch chassis' pins through the slider key holes, until locking occurs.
2. Secure the chassis in the rails by screwing 2 flat head Phillips screws (F) in the designated points with a torque of 1.5 ± 0.2 Nm.

Attaching the Rails to the Chassis



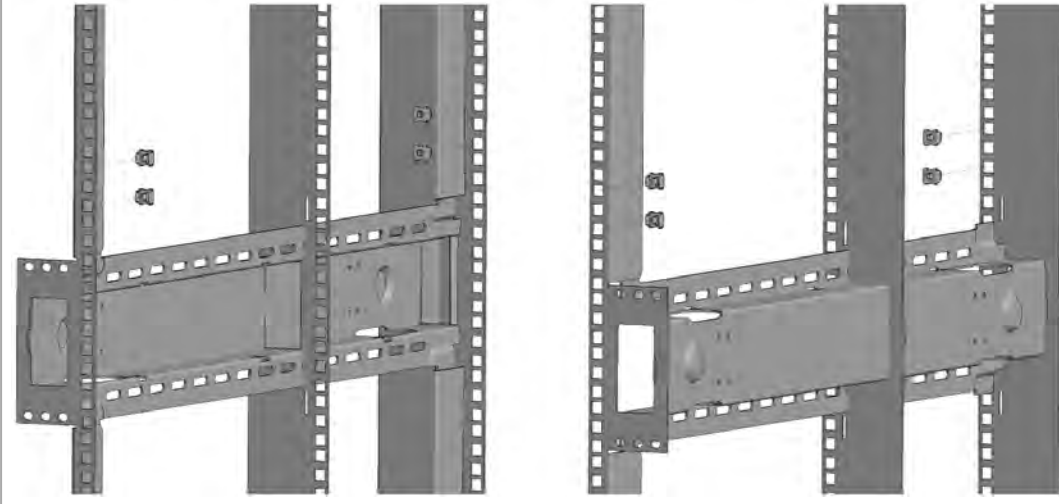
3. Attach the left and right rack mount ears (C) to the switch, by gently pushing the switch chassis' pins through the slider key holes, until locking occurs. Secure the system in the brackets by screwing the remaining 2 flat head Phillips screws (F) in the designated points with a torque of 1.5 ± 0.2 Nm.

Attaching the Brackets to the Chassis



4. Install 8 cage nuts (D) in the desired 1U slots of the rack: 4 cage nuts in the non-extractable side and 4 cage nuts in the extractable side.

Installing the Cage Nuts



- ⚠** While each rack U (unit) consists of three holes, the cage nut should be installed vertically with its ears engaging the top and bottom holes only.

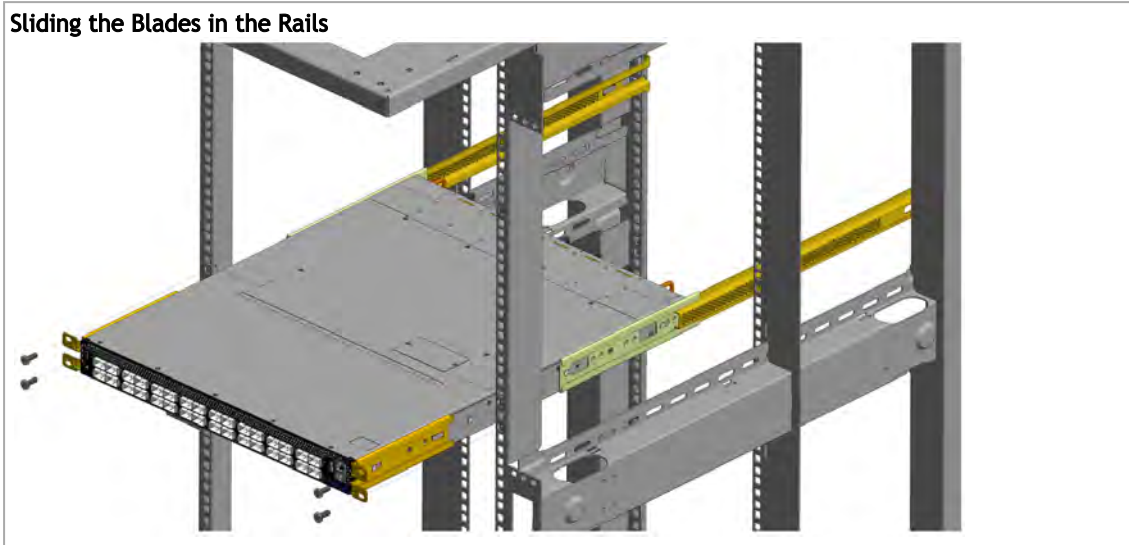
While your installation partner is supporting the system's weight, perform the following steps:

5. Attach the two rack mount blades (B) to the back side (FRU side) of the rack by inserting four M6 screws (E) in the designated cage nuts. Do not tighten the screws yet.

Attaching the Brackets to the Rack



- Slide the switch with the rails (A) and ears (C) installed on it into the left and right rails (B) on the rack. Use four M6 screws (E) to fix the rack mount ears (C) to the rack. Do not tighten the screws yet.



- When fully inserted, fix the switch by tightening the 8 screws (E) inserted in Step 5 and Step 6 with a torque of 4.5 ± 0.5 .

Removing the System from the Rack

To remove a unit from the rack:

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

Cable Installation

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.

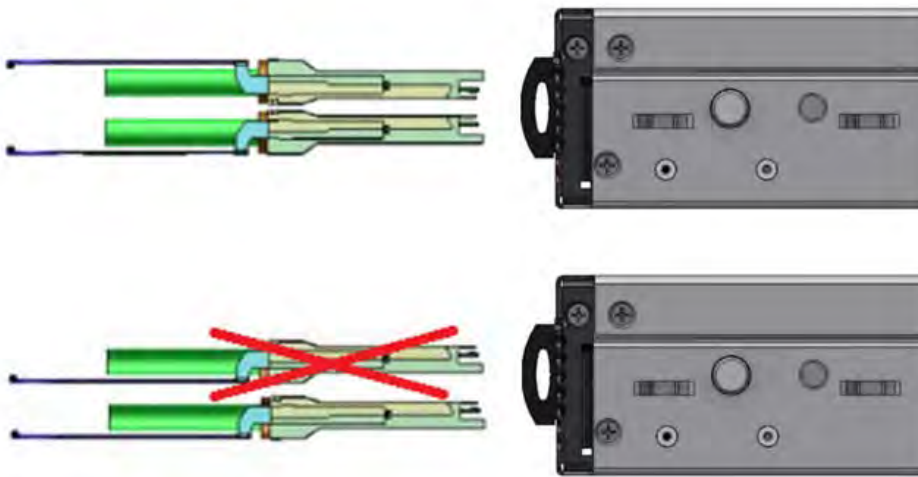
For a list of Supported Cables and Transceivers, please refer to the [SN4000 Systems Datasheet](#).

For full cabling guidelines, ask your NVIDIA representative for a copy of *NVIDIA Cable Management Guidelines and FAQs Application Note*.

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

⚠ 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



Splitter (Breakout) Cables and Adapters

When using an NVIDIA splitter cable, the following splitting options are available:

- SN4410 (see "[SN4410 Splitting Options](#)"):
 - Each 100GbE port (ports #1-24) provides up to 24 100GbE NRZ; or up to 48 100GbE NRZ, using a QSFP-DD to QSFP28 splitter cable (1/10/25/40/50GbE speeds are supported as well).
 - Each 400GbE port (ports #25-32) can be split to 8 ports of 50GbE, while blocking the adjacent ports.
 - Each 400GbE port (ports #25-32) can be split to 2 ports of 200GbE or 4 ports of 100GbE, without any limitations.
- SN4600 (see "[SN4600/SN4600C Splitting Options](#)"):
 - Each 200GbE port can be split to 2 ports of 100GbE without any limitation.
 - Each 200GbE odd number port can be split to 4 ports of 50GbE while disabling (unmapping) the 100GbE port above or below it.
 - Each 100GbE port can be split to 2 ports of 50GbE without any limitation. Each 100GbE odd number port can be split to 4 ports of 25GbE, while disabling (unmapping) the 100GbE port above or below it. See "[SN4600/SN4600C Splitting Options](#)" below.
- SN4600C (see "[SN4600/SN4600C Splitting Options](#)"):
 - Each 100GbE port can be split to 2 ports of 50GbE without any limitation.
 - Each 100GbE odd number port can be split to 4 ports of 25GbE ports, while disabling (unmapping) the 100GbE port above or below it. See "[SN4600/SN4600C Splitting Options](#)" below.
- SN4700 (see "[SN4700 Splitting Options](#)"):

- Each 400GbE port (ports #1-32) can be split to 8 ports of 50GbE, while blocking the adjacent ports.
- Each 400GbE port (ports #1-32) can be split to 2 ports of 200GbE or 4 ports of 100GbE, without any limitations.

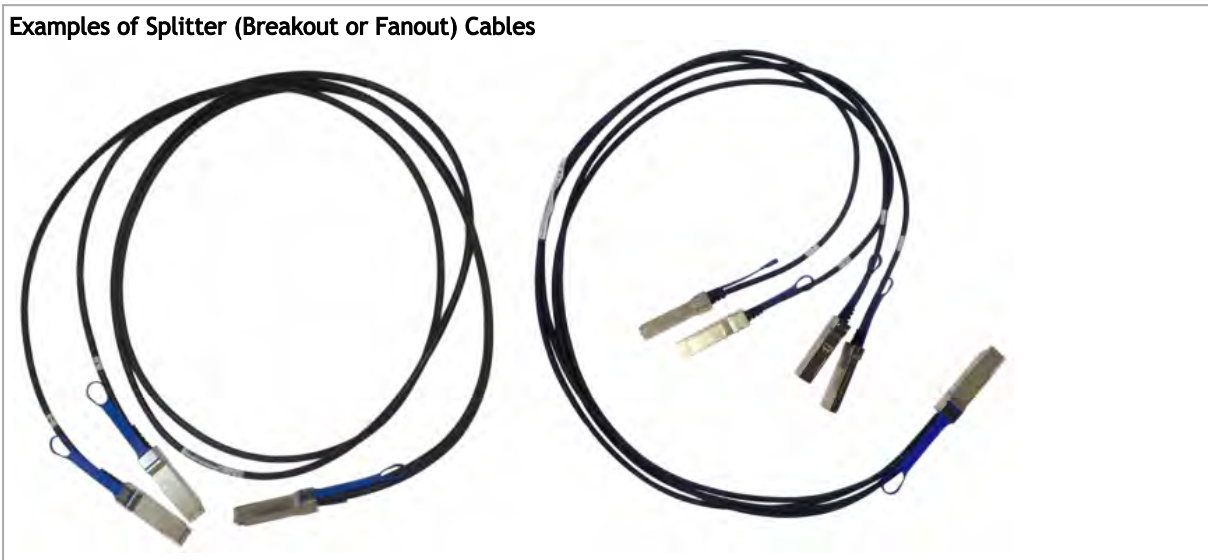
Using Splitter (Breakout) Cables with NVIDIA Onyx (MLNX-OS)

When using this feature, you should log into the NVIDIA Onyx (MLNX-OS) CLI and configure the individual ports to be 'split-2' or 'split-4'. For further information on NVIDIA's cable, visit <https://www.nvidia.com/en-us/networking/interconnect/>.

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. For more details, see [Switch Port Attributes](#) in the [Cumulus Linux User Guide](#).

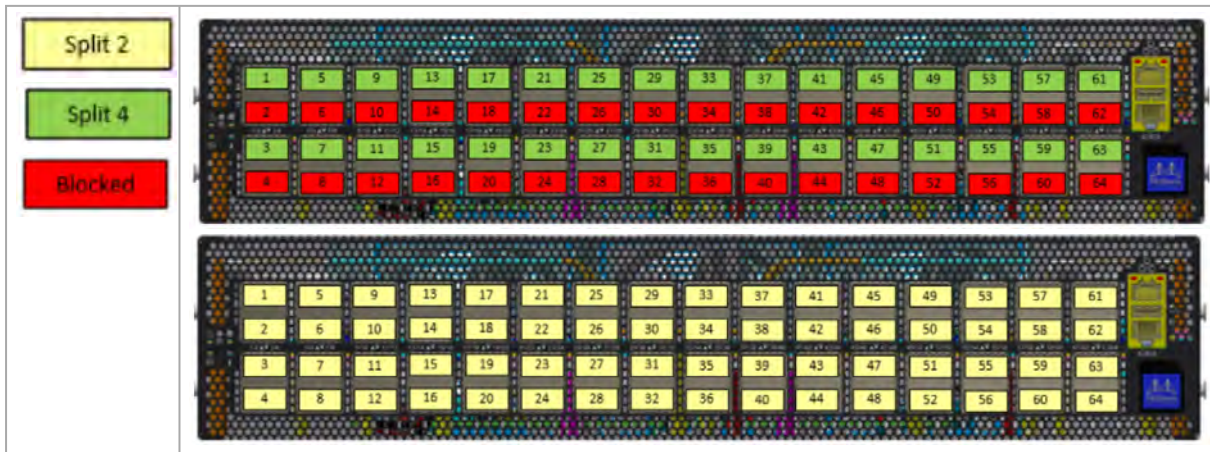
Examples of Splitter (Breakout or Fanout) Cables



SN4410 Splitting Options



SN4600/SN4600C Splitting Options



SN4700 Splitting Options



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.

⚠ In the SN4700 systems, two power cords are provided for each power supply unit. In order to meet the electrical requirements of various regions, please make sure to use the cord that meets the power requirements of your country or region.

⚠ 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.

⚠ 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 NVIDIA representative for assistance.

4. Check the System Status LEDs and confirm that all of the LEDs show status lights consistent with normal operation as shown in the figure below. For more information, refer to [“LEDs”](#).



*The figure is for illustration purposes only. The LEDs location and shape may slightly vary in different systems.

⚠ 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 NVIDIA representative for assistance.

Two Power Inlets - Electric Caution Notifications:



- 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.
- ACHTUNG Gefahr des elektrischen Schocks. Entfernen des Netzsteckers eines Netzteils spannungsfrei. Um alle Einheiten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen.
- ATTENTION Risque de choc et de danger électrique. Le débranchement d'une seule alimentation stabilisée ne débranch uniquement qu'un module "Alimentation Stabilisée". Pour isoler complètement le module en cause, il faut débrancher toutes les alimentations stabilisées.

System Bring-Up

For bring-up of a switch system with NVIDIA Onyx (MLNX-OS) operating system installed, see [Configuring Network Attributes Using NVIDIA Onyx \(MLNX-OS\)](#).

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

Configuring Network Attributes Using NVIDIA Onyx (MLNX-OS)

The procedures described in this chapter assume that you have already installed and powered on the system according to the instructions in this document. The system comes with a pre-configured DHCP. If you wish to disable it, refer to [Disable Dynamic Host Configuration Protocol \(DHCP\)](#). In case a manual configuration is required, please refer to the instructions in [Manual Host Configuration](#).

Manual Host Configuration

To perform initial configuration of the system:

Step 1. Connect a host PC to the Console RJ45 port of the system, using the supplied harness cable (DB9 to RJ45).



Make sure to connect to the Console RJ45 port, and not to the (Ethernet) MGT port. Pay attention to the icons:

Console RJ45	IOIOI
Ethernet MGT	

Step 2. Configure a serial terminal program (for example, HyperTerminal, minicom, or Tera Term) on your host PC with the settings described in the table below. Once you perform that, you should get the CLI prompt of the system.

Serial Terminal Program Configuration

Parameter	Setting
Baud Rate	115200
Data bits	8
Stop bits	1
Parity	None
Flow Control	None

Step 3. Login as admin and use admin as password. On the first login, the NVIDIA Onyx (MLNX-OS) configuration wizard will start.

Step 4. To configure network attributes and other initial parameters to the system, follow the configuration wizard as shown in the Configuration Wizard Session table below.

Configuration Wizard Session

Wizard Session Display	Comments
NVIDIA configuration wizard Do you want to use the wizard for initial configuration? yes	You must perform this configuration the first time you operate the system or after resetting the system. Type 'y' and then press <Enter>.
Step 1: Hostname? [switch-1]	If you wish to accept the default hostname, press <Enter>. Otherwise, type a different hostname and press <Enter>.
Step 2: Use DHCP on mgmt0 interface? [no] yes	Perform this step to obtain an IP address for the system. (mgmt0 is the management port of the system). If you wish the DHCP server to assign the IP address, type 'yes' and press <Enter>. If you type 'no' (no DHCP), then you will be asked whether you wish to use the 'zeroconf' configuration or not. If you enter 'no' (no Zeroconf), you must enter a static IP, and the session will continue.
Step 3: Enable IPv6? [yes]	The management interface will be able to use IPv6 addresses. If you enter "no" (no IPv6), you will automatically be referred to Step 6.
Step 4: Enable IPv6 auto-config (SLAAC) on mgmt0 interface? [no]	This turns on auto-configuration of the IPv6 addresses. This is unsuitable for DHCPv6.
Step 5: Enable DHCPv6 on mgmt0 interface? [no]	To enable DHCPv6 on the MGMT0 interface.
Step 6: Admin password (Press <Enter> to leave unchanged)? <new_password> Step 6: Confirm admin password? <new_password>	To avoid illegal access to the machine, please type a password and then press <Enter>. Then confirm the password by re-entering it. Note that password characters are not printed.
You have entered the following information: <A summary of the configuration is now displayed.> To change an answer, enter the step number to return to or hit <enter> to save changes and exit. Choice: <Enter> Configuration changes saved.	The wizard displays a summary of your choices and then asks you to confirm the choices or to re-edit them. Either press <Enter> to save changes and exit, or enter the configuration step number that you wish to return to. <i>Note: To re-run the configuration wizard, run the command "configuration jump-start" in Config mode.</i>

The table below shows an example of static IP configuration for mgmt0 interface.

Configuration Wizard Session - Static IP Configuration

```
NVIDIA configuration wizard
Do you want to use the wizard for initial configuration? yes

Step 1: Hostname? []
Step 2: Use DHCP on mgmt0 interface? [yes] no
Step 3: Use zeroconf on mgmt0 interface? [no]
Step 4: Primary IP address? [for example 192.168.10.4] 10.10.10.10
Mask length may not be zero if address is not zero (interface eth0)
Step 5: Netmask? [0.0.0.0] 255.255.255.0
Step 6: Default gateway? [for example 192.168.10.1] 10.10.10.255
Step 7: Primary DNS server?
Step 8: Domain name?
Step 9: Enable IPv6? [yes]
Step 10: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no]
Step 11: Admin password (Enter to leave unchanged)?

To change an answer, enter the step number to return to.
Otherwise hit <enter> to save changes and exit.
Choice:
Configuration changes saved.

To return to the wizard from the CLI, enter the "configuration jump-start"
command from configure mode. Launching CLI...
```

Step 5. Before attempting a remote (for example, SSH) connection to the system, check the mgmt0 interface configuration. Specifically, verify the existence of an IP address. To check the current mgmt0 configuration, enter the following command:

```
switch01 (config) # show interfaces mgmt0
Interface mgmt0 status:
Comment:
Admin up:          yes
Link up:           yes
DHCP running:     yes
IP address:       192.168.1.100
Netmask:          255.255.255.0
IPv6 enabled:     yes
Autoconf enabled: no
Autoconf route:   yes
Autoconf privacy: no
DHCPv6 running:   no
IPv6 addresses:   1
IPv6 address:     fe80::202:c9ff:fe63:b55a/64
Speed:            1000Mb/s (auto)
Duplex:           full (auto)
Interface type:   ethernet
Interface source: physical
MTU:              1500
HW address:       00:02:C9:63:B5:5A

RX bytes:         968810197      TX bytes:         1172590194
RX packets:       10982099      TX packets:       10921755
RX mcast packets: 0          TX discards:      0
RX discards:      0          TX errors:         0
RX errors:        0          TX overruns:       0
RX overruns:      0          TX carrier:        0
RX frame:         0          TX collisions:     0
                                   TX queue len:     1000

switch01 (config) #
```

Step 6. Check the software version embedded in your system, using the command 'show version'. Compare this version to the latest version that can be retrieved from NVIDIA support site. To upgrade software, please refer to the *NVIDIA Onyx (MLNX-OS) User Manual*.

Disable Dynamic Host Configuration Protocol (DHCP)

DHCP is used for automatic retrieval of management IP addresses.

If a user connects through SSH, runs the wizard and turns off DHCP, the connection is immediately terminated, as the management interface loses its IP address. In such a case, the serial connection should be used.



```
<localhost># ssh admin@<ip-address>

Mellanox Onyx (MLNX-OS) Switch Management
Password:
Mellanox Switch
Mellanox configuration wizard
Do you want to use the wizard for initial configuration? yes
Step 1: Hostname? [my-switch]
Step 2: Use DHCP on mgmt0 interface? [yes] no
<localhost>#
```

Remote Connection with NVIDIA Onyx (MLNX-OS)

Once the network attributes are set, you can access the CLI via SSH or the WebUI via HTTP/ HTTPS.

To access the CLI, perform the following steps:

1. Set up an Ethernet connection between the system and a local network machine using a standard RJ45 connector.
2. Start a remote secured shell (SSH) using the command: `ssh -l <username> <IP_address>`

```
# ssh -l <username> <ip_address>
Mellanox Onyx (MLNX-OS) Switch Management
Password:
```

3. Login as admin (default username is *admin*, password is *admin*).
4. Once you get the CLI prompt, you are ready to use the system.

For additional information about NVIDIA Onyx (MLNX-OS), refer to the *NVIDIA Onyx (MLNX-OS) User Manual* located on the [NVIDIA Networking Documentation Website](#).

Configuring Network Attributes Using Cumulus Linux

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

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](#).

FRU Replacements



For a list of the FRU replacements, see [“Accessory and Replacement Parts”](#).

Power Supplies

NVIDIA systems that are equipped with two replaceable power supply units work in a redundant configuration. Either unit may be extracted without bringing down the system.

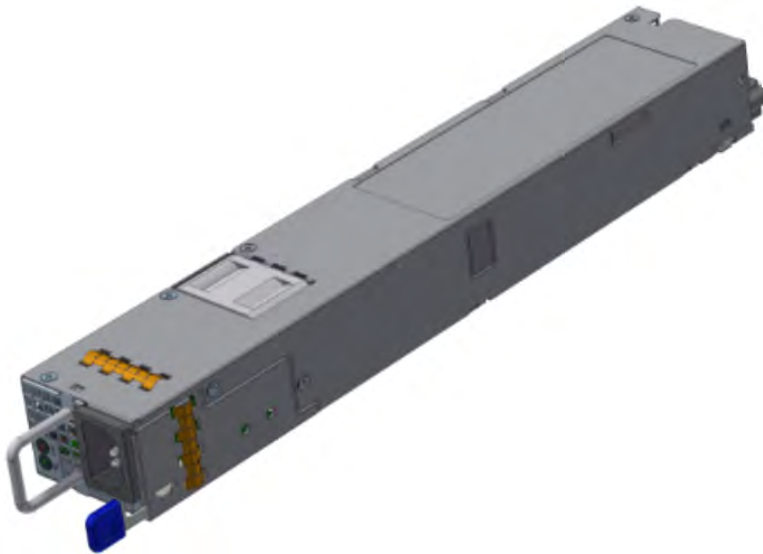
❗ Make sure that the power supply unit that you are NOT replacing is showing green for the power supply unit LED.

❗ 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



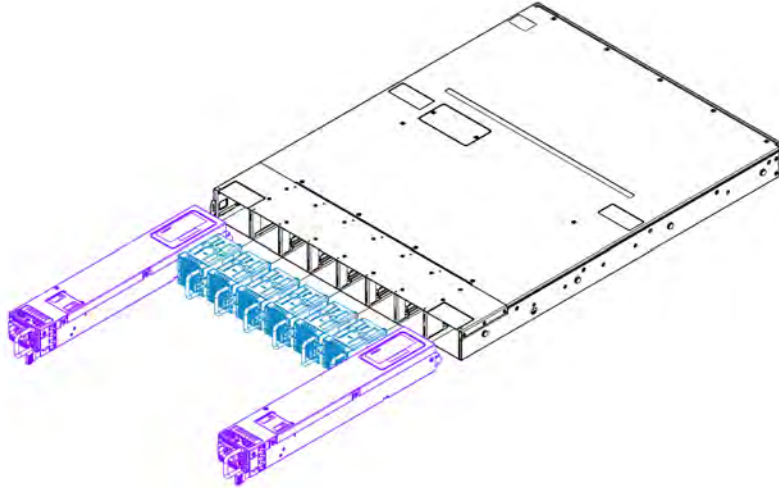
*Illustration only. The design may vary in different systems.

To insert a power supply unit:

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

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

2. Make sure that the board connector is on the lower side of the FRU module, and insert the 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.



*Illustration only. The design may vary in different systems.

- ❗ 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.

Fans

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

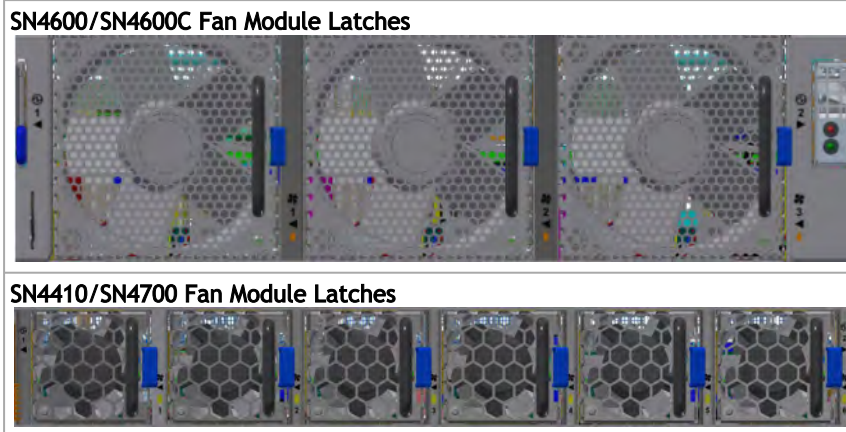
- ❗ Make sure that the fans have the air flow that matches the model number. An air flow opposite to the system design will cause the system to operate at a higher (less than optimal) temperature. For power supply unit air flow direction, refer to [Air Flow](#).

- ⚠ If operating the systems at full capacity with all ports occupied, and at 40°C ambient temperature, and one of the system fans becomes faulty, it is recommended to replace the fan within 24 hours of failure.

To remove a fan unit:

- ⚠ 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 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.

❗ 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.

Interfaces

The systems support the following interfaces:

- 10/100/1000Mb Ethernet management interface (RJ45)
- USB port (Type A or uUSB connector)
- RS232 Console port (RJ45)
- Reset button
- Status and Port LEDs

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

Data Interfaces

The data interfaces use QSFP28/56/DD connectors. The full list of interfaces per system is provided in [Speed and Switching Capabilities](#).

As detailed in the following table, for additional data interfaces, each QSFP28/56/DD port can be connected with a QSFP28/56/DD cable or connector through NVIDIA QSFP28/56/DD to SFP (Dynamix QSA™) adapters, hybrid or split cables*.

Model Family	Ports	Maximum Speed	
SN4410	8	400GbE	
	16	200GbE	
	32 +	100GbE PAM4	
		100GbE NRZ	
	48		
	64	40GbE	
	128	50GbE	
		25GbE	
		10GbE	
		1GbE	
SN4600	64	200GbE PAM4	
		100GbE NRZ	
		40GbE	
	128	100GbE PAM4	
		50GbE	
		25GbE	
		10GbE	
		1GbE	
	SN4600C	64	100GbE
			40GbE
128		50GbE	
		25GbE	
		10GbE	

Model Family	Ports	Maximum Speed	
SN4700	32	1GbE	
		64	400GbE
			200GbE PAM4
	100GbE NRZ		
	128	40GbE	
		100GbE PAM4	
		50GbE	
		25GbE	
			10GbE
			1GbE

*In the SN4600, SN4700 and SN4410 systems, when interconnecting Switch to Switch and Switch to NIC in 50GbE, 100GbE 200GbE and 400GbE based PAM4 speeds, the supported length of PAM4 passive copper and breakout cables is up to 2.5m.

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:

High Power Transceivers Support

Model Family	Ports	Maximum High Power Support
SN4410	1-24	10W
	25-32	12W
SN4600	All ports	5W
	49-50, 53-54, 57-58, 61-62	6.5W
SN4600C	1-48	3.5W
	49-64	5W
SN4700	All ports	12W

Speed

Ethernet speed must be set manually. The system's ports can be manually configured to run at speeds ranging from 1GbE to 200GbE/400GbE (for more details, see [Specifications](#)). To change the port speed configuration, use the command "speed" under interface configuration mode. Refer to the *NVIDIA Onyx (MLNX-OS) User Manual* for instructions on port speed re-configuration.

RS232 (Console)



The RS232 serial "Console" port is labeled **IOIOI**.

The "Console" port is an RS232 serial port on the front side of the chassis that 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. Refer to [Configuring Network Attributes Using NVIDIA Onyx \(MLNX-OS\)](#) to view the full procedure.

Management



The RJ45 Ethernet “MGT” port is labeled .

The RJ45 Ethernet “MGT” port provides access for remote management. The management ports are configured with auto-negotiation capabilities by default (10MbE to 1000GbE). 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. Refer to [Configuring Network Attributes Using NVIDIA Onyx \(MLNX-OS\)](#) to view the full procedure.



Make sure you use only FCC compliant Ethernet cables.

USB

The USB interface is USB 2.0 compliant and can be used by NVIDIA Onyx software to connect to an external disk for software upgrade or file management. The connector complies with the USB 3.0 type A standard.

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



USB 1.0 is not supported.



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

Reset Button

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



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.

When using an NVIDIA Onyx (MLNX-OS) based system, keeping the reset button pressed for more than 15 seconds will reset the system and the “admin” password, this should allow you to login without a password and set a new password for the “admin” user.

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





Status and Port LEDs

See [LED Notifications](#).

LED Notifications

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

LED Symbols

Symbol	Name	Description	Normal Conditions
	System Status LED	Shows the health of the system.	Green/Flashing green when booting
	Fan Status LED	Shows the health of the fans.	Green
	Power Supply Units LEDs	Shows the health of the power supply units.	Green
	Unit Identifier LED	Lights up on command through the CLI.	Off or blue when activated by the user

System Status LED

The LED in the red oval shows the system's status.

Front (Ports Side):



*The figure is provided for illustration purposes only. The design may slightly vary in different systems.



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 NVIDIA representative for assistance.



System Status LED Assignments

LED Behavior	Description	Action Required
Solid Green	The system is up and running normally.	N/A

LED Behavior	Description	Action Required
Flashing Green	The system is booting up.	Wait up to five minutes for the end of the booting process.
Solid Amber	An error has occurred. For example, corrupted firmware, system is overheated etc..	In case the System Status LED shows amber five minutes after starting the system, refer to Troubleshooting for further instructions.

Fan Status LED

Fan Status LED - Front and Rear Sides


<p>Front (Ports Side):</p> 	<p>Both of these LEDs in the red ovals show the fans' status.</p> <p>*The figures are provided for illustration purposes only. The design may slightly vary in different systems.</p>	<p>Rear (FRUs Side):</p> 
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Fan Status Front LED Assignments

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

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 Amber	A specific fan unit is missing or not operating properly.	The fan unit should be replaced.

 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.

Power Supply Status LEDs

The LED in the red oval shows the power supply status.

Front (Ports Side):



*The figure is provided for Illustration purposes only. The design may slightly vary in different systems.

There are two power supply inlets in the system (for redundancy). The system can operate with only one power supply connected. Each power supply unit has two single color LEDs on the right side of the unit, that indicate the status of the unit.

When looking from the FRUs side, the primary power supply (PS) unit is located on the left side of the system, and the secondary unit is located on the right side.

Rear Side Panel



*The figure is provided for Illustration purposes only. The design may slightly vary in different systems.

Power Supply Unit Status Front LED Assignments

LED Behavior	Description	Action Required
Solid Green	All power supply units are connected and running normally.	N/A
Solid Amber	One or both of the power supplies are not operational or not powered up/ the power cord is disconnected.	Make sure the power cord is plugged in and active. If the problem resumes, refer to Troubleshooting for further instructions.

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, Standby - On, Main Output - Off	Refer to Troubleshooting . For further assistance, call your NVIDIA representative.
Flashing Amber 1Hz	PSU warning - events where the PSU continues to operate	
Solid Amber	PSU failure (voltage, current, temperature or fan related issue)	
Off	No AC power to all power supplies.	Plug in the AC cor

Unit Identification LED

The UID LED is a debug feature, that the user can use to find a particular system within a cluster by turning on the UID blue LED.

To activate the UID LED on a switch system, run:

```
switch (config) # led MGMT uid on
```

To verify the LED status, run:

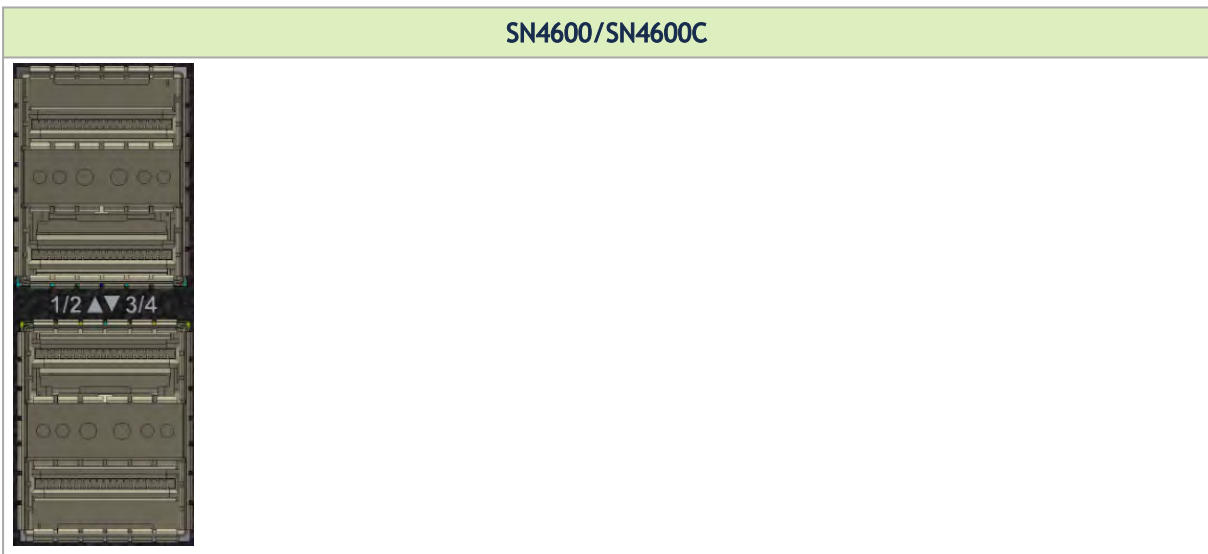
```
switch (config) # show leds
Module LED Status
-----
MGMT UID Blues
```

To deactivate the UID LED on a switch system, run:

```
switch (config) # led MGMT uid off
```

Port LEDs

SN4600/SN4600C Port LEDs



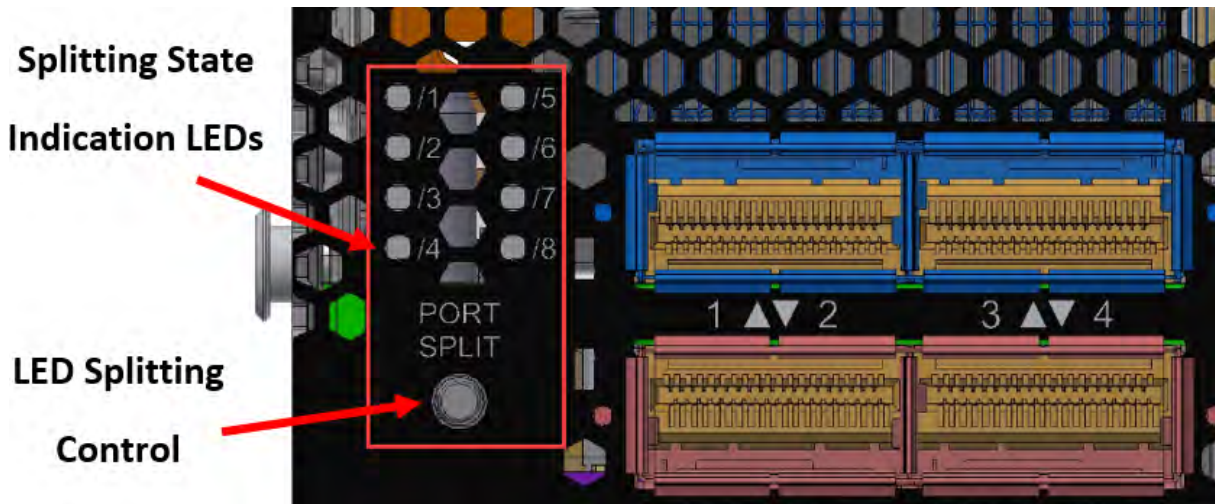
SN4600/SN4600C Port LEDs Indications

LED Behavior	Description	Action Required
Off	Link is down	Refer to Troubleshooting .
Solid Green	Link is up with no traffic	N/A
Flashing Green	Link is up with traffic	N/A

LED Behavior	Description	Action Required
Flashing Amber	A problem with the link	Refer to Troubleshooting .




SN4410/SN4700 Port LEDs

Each QSFP module can be used as two 4X ports/four 2X ports/eight 1X ports. Each QSFP-DD has one dedicated bi-color LED. In order to provide link information for more than one port by using one LED, LED splitting control button is available. You may use the button to select between 8 indication states. By pressing the button, the next indication state will be selected in a cyclic manner. The current state can be identified by the LED splitting state indication LEDs. The states and their indications are detailed in the below table.



SN4410/SN4700 LED Splitting Options

State	State Indication LEDs [/1 /2 /3 /4]	QSFP Module LED Indication	Comments
0		Any link is up	See details in Port LEDs Indications (State 0)
1		8x/4xA/2xA/1xA	<ul style="list-style-type: none"> • See details in Port LEDs Indications (States 1-8). • Only one of the link types can be up at a given time.
2		8x/4xB/2xB/1xB	
3		8x/2xC/1xC	
4		8x/2xD/1xD	
5		8x/1xE	

State	State Indication LEDs [/1 /2 /3 /4]	QSFP Module LED Indication	Comments
6		8x/1xF	
7		8x/1xG	
8		8x/1xH	

The port LED behavior indicates the port state, as follows:

SN4410/SN4700 Port LEDs Indications

State	LED Behavior	Description	Action Required
0	Off	No 8x/4x/2x/1x link was established on this QSFP module	N/A
	Solid Green	At list one link was established: 8x/4x/2xA/2xB/1xA/1xB/1xC/1xD/1xE/1xF/1xG/1xH	
	Flashing Green	Traffic is running in linked ports	
	Flashing Amber	N/A	
1-8	Off	Link is down	N/A
	Solid Green	Link is up with no traffic	
	Flashing Green	Link is up with traffic	
	Flashing Amber	A problem with the link	Refer to Troubleshooting .

Inventory Information

The system's inventory parameters (such as serial number, part number and GUID address) can be extracted from the inventory pull-out tab on the lower left side of the rear panel.

Pull-out Tab

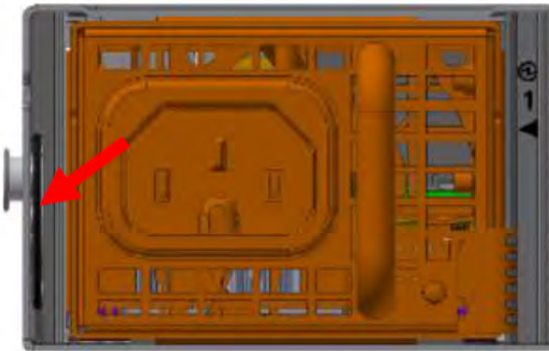
SN4600/SN4600C:



Switch-Eth SN4600 64 ports 100GbE
S/N: MTTYWWSZZZZZ YYYY-MM-DD

P/N: MSN4600-CS2F
Rev: XX
Made in Israel 以色列制造 


SN4410/SN4700:



Switch-Eth SN4700 32 ports 400GbE
S/N: MTTYWWSZZZZZ YYYY-MM-DD


P/N: MSN4700-WS2F
Rev: A5
Made in Israel 以色列制造 


Software Management

 This document is preliminary and subject to change.

The system includes an embedded management CPU card that runs NVIDIA Onyx® (MLNX-OS®) management software. This system includes a CLI, WebUI, SNMP, system management software, Ethernet protocols and IB management software (OpenSM).

- For NVIDIA Onyx (MLNX-OS) systems management package and related documentation, visit the product page at <https://docs.nvidia.com/networking/category/onyx>.
- For Cumulus® Linux® software management instructions, refer to the [Cumulus Linux User Guide](#).

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

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

Software Upgrade

NVIDIA Onyx (MLNX-OS) Software Upgrade

Software and firmware updates are available from the NVIDIA Support website. Check that your current revision is the latest one available on the NVIDIA Support website. If you do not have the latest revision, upgrade your software using the CLI or the GUI. Copy the updated software to a known location on a remote server within the user's LAN.

For further information please refer to the *NVIDIA Onyx (MLNX-OS) Software User Manual* in the "Upgrading Onyx (MLNX-OS) Software" section.

Prior to updating, read and follow all of the instructions regarding the updating of the software on your system.


Switch Firmware Update

The systems do not require firmware updating. Firmware updating is done through the NVIDIA Onyx (MLNX-OS) management software.

Cumulus Linux Software Upgrade

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

Troubleshooting

 This document is preliminary and subject to change.

Problem Indicator	Symptoms	Cause and Solution
LEDs	System Status LED is blinking for more than 5 minutes	Cause: NVIDIA Onyx (MLNX-OS) software did not boot properly and only firmware is running. Solution: Connect to the system via the console port, and check the software status. You might need to contact an FAE if the NVIDIA Onyx (MLNX-OS) software did not load properly.
	System Status LED is Amber	Cause: <ul style="list-style-type: none"> • Critical system fault (CPU error, bad firmware) • Over temperature Solution: <ul style="list-style-type: none"> • Check environmental conditions (room temperature)
	Fan Status LED is Amber	Cause: Possible fan issue Solution: <ul style="list-style-type: none"> • Check that the fan is fully inserted and nothing blocks the airflow • Replace the fan FRU if needed
	PSU Status LED is Amber	Cause: Possible PSU issue Solution: <ul style="list-style-type: none"> • Check/replace the power cable • Replace the PSU if needed
System boot failure while using NVIDIA Onyx (MLNX-OS)	Software upgrade failed on x86 based systems	Solution: <ul style="list-style-type: none"> • Connect the RS232 connector (CONSOLE) to a laptop. • Push the system's reset button. • Press the ArrowUp or ArrowDown key during the system boot. GRUB menu will appear. For example: <div data-bbox="667 1312 1394 1592" style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <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> </div> <ul style="list-style-type: none"> • Select previous image to boot by pressing an arrow key and choosing the appropriate image.
System boot failure while using Cumulus Linux	Software upgrade failed on x86 based systems	See Monitoring and Troubleshooting in Cumulus Linux User Guide .

Specifications

SN4410 Specifications

Feature		Value
Mechanical	Size:	1.72" x 16.85" x 22.3" 44mm (H) x 428mm (W) x 568.5mm (D)
	Mounting:	19" rack mount
	Weight:	11.6kg
	Speed:	Ports #1-24 - 1/10/25/40/50/100GbE per port Ports #25-32 - 1/10/25/40/50/100/200/400GbE per port
	Connector cage:	32 QSFP-DD
Environmental	Temperature:	Operational: 0° to 35° C Non-Operational: -40° to 70° C
	Humidity:	Operational: 10% - 85% non-condensing Non-Operational: 10% - 90% non-condensing
	Altitude:	3050m
Regulatory	Safety/ EMC:	CB, cTUVus, CE, CU, S_Mark, FCC, VCCI, ICES, RCM, BSMI, KCC, CCC
	RoHS:	RoHS compliant
Power	Input Voltage:	1x/2x, 100Vac 15A, 110Vac 15A, 120Vac 12A, 200-240Vac 10A, 50/60Hz Note: Two power cords are provided for each power supply unit in order to meet the electrical requirements of various regions. Please make sure to use the cord that meets the power requirements of your country or region.
	Global Power Consumption:	Typical power with passive cables (ATIS): 460W
Main Devices	CPU:	Intel x86 2.20GHz Quad Core
	PCIe:	4x Gen 3.0
	Switch:	NVIDIA Spectrum®-3
	Memory:	16GB RAM , 60GB SSD
Throughput		8Tb/s

SN4600/SN4600C Specifications

Feature		Value
Mechanical	Size:	3.46" x 16.85" x 22.3" 88mm (H) x 428mm (W) x 566.4mm (D)
	Mounting:	19" rack mount
	Weight:	14.64kg
	Speed:	SN4600 - 1/10/25/50/100/200GbE per port SN4600C - 1/10/25/40/50/100GbE per port
	Connector cage:	64 QSFP28


Feature		Value
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:	3050m
	Noise level:	67.6dBA
Regulatory	Safety/ EMC:	CB, cTUVus, CE, CU, S_Mark, FCC, VCCI, ICES, RCM, BSMI, KCC, CCC
	RoHS:	RoHS compliant
Power	Input Voltage:	SN4600: 1x/2x, 15A/100 Vac, 15A/110Vac, 12A/120Vac, 10A/200-240Vac, 50/60Hz SN4600C: 1x/2x, 10A/100-127Vac, 50/60Hz, 6A/200-240Vac, 50/60Hz
	Global Power Consumption:	<u>SN4600:</u> Typical power with passive cables (ATIS): 600W <u>SN4600C:</u> Typical power with passive cables (ATIS): 466W
Main Devices	CPU:	Intel x86 2.20GHz Quad Core
	PCIe:	4x Gen 3.0
	Switch:	NVIDIA Spectrum®-3
	Memory:	SN4600 - 16GB RAM, 60GB SSD SN4600C - 8GB RAM, 30GB SSD
Throughput		SN4600 - 25.6Tb/s SN4600C - 12.8Tb/s

SN4700 Specifications

Feature		Value
Mechanical	Size:	1.72" x 16.85" x 22.3" 44mm (H) x 428mm (W) x 568.5mm (D)
	Mounting:	19" rack mount
	Weight:	11.6kg
	Speed:	1/10/25/40/50/100/200/400GbE per port
	Connector cage:	32 QSFP-DD
Environmental	Temperature:	Operational: 0° to 35° C Non-Operational: -40° to 70° C
	Humidity:	Operational: 10% - 85% non-condensing Non-Operational: 10% - 90% non-condensing
	Altitude:	3050m
Regulatory	Safety/ EMC:	CB, cTUVus, CE, CU, S_Mark, FCC, VCCI, ICES, RCM, BSMI, KCC, CCC
	RoHS:	RoHS compliant

Feature	Value	
Power	Input Voltage:	1x/2x, 100Vac 15A, 110Vac 15A, 120Vac 12A, 200-240Vac 10A, 50/60Hz Note: Two power cords are provided for each power supply unit in order to meet the electrical requirements of various regions. Please make sure to use the cord that meets the power requirements of your country or region.
	Global Power Consumption:	Typical power with passive cables (ATIS): 630W
Main Devices	CPU:	Intel x86 2.20GHz Quad Core
	PCIe:	4x Gen 3.0
	Switch:	NVIDIA Spectrum®-3
	Memory:	16GB RAM , 60GB SSD
Throughput	25.6Tb/s	

Appendixes

 This document is preliminary and subject to change.

The document contains the following appendixes:

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

Accessory and Replacement Parts

Ordering Part Numbers for Replacement Parts

Part Type	Part Number	Legacy Part Number	Description	Supported Systems
Rack Installation Kits	930-9NRKT-00J N-000	MTEF-KIT-J	Static rack installation kit for 1U\2U systems into 4-poles, 430-800mm depth racks	SN4600/SN4600C, SN4410, SN4700
Fan Modules	930-9NFAN-00I T-000	MTEF-FANF-I	NVIDIA fan module, 80 x 80 [mm], P2C Airflow, For SN4600 switch	SN4600
	930-9NFAN-00J 7-000	MTEF-FANR-I	NVIDIA fan module, 80 x 80 [mm], C2P Airflow, For SN4600 switch	SN4600
	930-9BFAN-00I X-000	MTEF-FANF-M	NVIDIA fan module, 40 x 40 [mm], P2C Airflow For SN4700 switches	SN4700/SN4410
	930-9BFAN-00J B-000	MTEF-FANR-M	NVIDIA fan module, 40 x 40 [mm], C2P Airflow For SN4700 switches	SN4700/SN4410
	930-9NFAN-00I S-000	MTEF-FANF-G	2U Systems Fan Module P2C Air flow with Shutters	SN4600C
	930-9NFAN-00J 6-000	MTEF-FANR-G	2U Systems Fan Module C2P Air flow with Shutters	SN4600C
Power Supplies	930-9BPSU-00J Z-000	MTEF-PSF-AC- C	200G 1U systems 1100W AC Power Supply w/ P2C airflow	SN4600C
	930-9BPSU-00J G-000	MTEF-PSR-AC- C	200G 1U systems 1100W AC Power Supply w/ C2P airflow	SN4600C
	930-9NPSU-00J 2-000	MTEF-PSF-AC-F	1500W AC Power Supply, P2C Air flow	SN4600, SN4410, SN4700
	930-9NPSU-00J J-000	MTEF-PSR-AC-F	1500W AC Power Supply, C2P Air flow	SN4600, SN4410, SN4700
Cables and Harnesses	HAR000631	N/A	RS232 Cable - DB9 to RJ45 2M harness 2M for SX67X0 and SB78X0	SN4410, SN4600/SN4600C, SN4700
	ACC001449	N/A	Power Cord Gray 250V 10A 1830MM C14 TO C15 EUR + CCC	SN4410, SN4600/SN4600C, SN4700
	ACC001550	N/A	Power Cord Black 110V 15A 1830MM C14 TO C15 UL	SN4410, SN4600/SN4600C, SN4700

Thermal Threshold Definitions

Three thermal threshold definitions are measured by the Spectrum®-3 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 Net-SNMP Event Notification Traps](#) in the [Cumulus Networks Help Center](#).

Interface Specifications

Small Form Factors Specifications

NVIDIA switch systems come in a flexible range of form factors - SFP/QSFP, SFP28/QSFP28, SFP56/QSFP56 and SFP-DD/QSFP-DD.

All form factors specification documents are available on the [Storage Networking Industry Association \(SNIA\) Website](#).

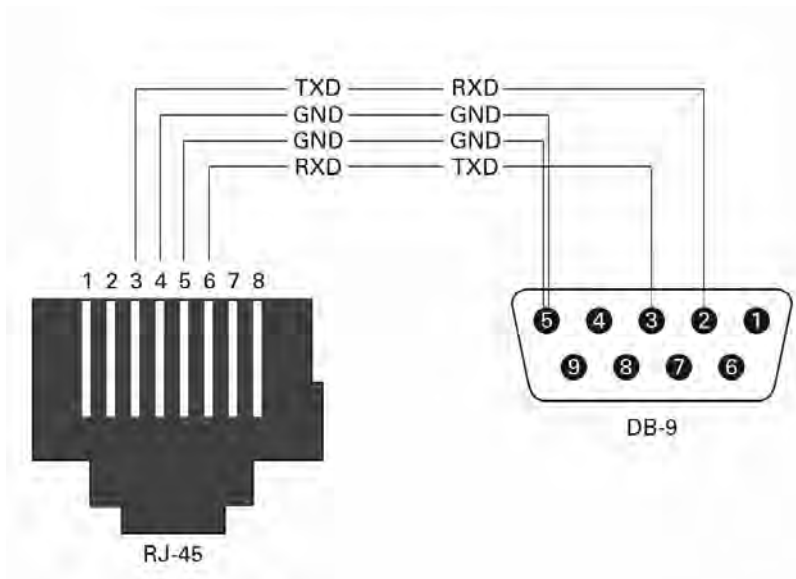
USB Standard Specifications

For the specification documents of all available USB types, please refer to the document library in the [USB Organization Website](#).

RJ45 to DB9 Harness Pinout

In order to connect a host PC to the Console RJ45 port of the system, a RS232 harness cable (DB9 to RJ45) is supplied.

RJ45 to DB9 Harness Pinout



Disassembly and Disposal

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.

⚠ 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.

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.



Lithium Battery

The product'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.



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.

Document Revision History

Date	Revision	Description
July 24, 2022	1.9	Updated OPNs in: <ul style="list-style-type: none">• Ordering Information• Installation• Accessory and Replacement Parts Updated Interface Specifications
February 3, 2022	1.8	Updated Interfaces
December 16, 2021	1.7	Updated LED Notifications
November 1, 2021	1.6	Added SN4410 to the User Manual.
August 10, 2021	1.5	Updated: <ul style="list-style-type: none">• SN4700 temperature in Specifications
February 15, 2021	1.4	Updated: <ul style="list-style-type: none">• High Power/LR4 Transceivers Support in Interfaces• Speeds in Specifications
January 11, 2021	1.3	Added: <ul style="list-style-type: none">• A note in Specifications regarding the operational temperature of the SN4700 systems
October 25, 2020	1.2	Updated: <ul style="list-style-type: none">• High Power/LR4 Transceivers Support in Interfaces• Global Power Consumption in Specifications
October 8, 2020	1.1	Updated Accessory and Replacement Parts
June 24, 2020	1.0	First release

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