



# NVIDIA Spectrum SN3000 Series Switches

Data center performance, scale, and rich telemetry

The NVIDIA® Spectrum SN3000 series switches are based on the 2nd generation of Spectrum switches, purpose-built for leaf/spine/super-spine data center applications. Allowing maximum flexibility, the SN3000 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 SN3000 series is ideal for building cloud-scale layer-2 and layer-3 networks. The SN3000 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.

## Network Disaggregation: Open Ethernet

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 regaining control of the network, and optimizing utilization, efficiency and overall return on investment.

Encouraging an ecosystem of open source, standard network solutions, open Ethernet adopts the same principles as standard open solutions for servers and storage, and applies them to the world of networking infrastructure. 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, SN3000 series allows you to pick and choose the right components for your data center.

## NVIDIA Spectrum SN3000 Series

SN3000 series platforms are based on the high-performance Spectrum-2 ASIC with a bidirectional switching capacity of 6.4Tb/s. SN3000 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 (ToR) leaf and fixed configuration spines.

## Key Features

### Visibility

- > NVIDIA What Just Happened® (WJH) telemetry dramatically reduces mean time to issue resolution by providing answers to: When, What, Who, Where and Why
- > Hardware-accelerated histograms track and summarize queue depths at sub-microsecond granularity
- > Inband network telemetry (INT)-ready hardware
- > Streaming telemetry
- > 512K on-chip flow counters

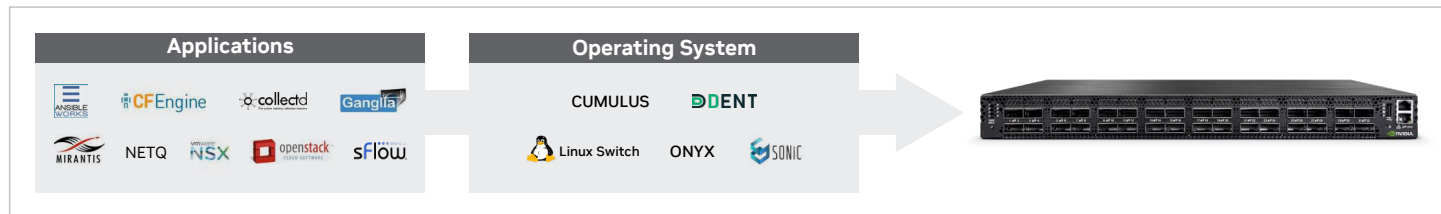
### Performance

- > Fully shared packet buffer provides a fair, predictable and high bandwidth data path
- > Consistent and low cut-through latency
- > Robust RoCE transport to power NVMe over fabric and machine learning applications that leverage GPUDirect®
- > Best-in-class VXLAN scale—10X more tunnels and tunnel endpoints than others
- > 512K shared forwarding entries flexibly shared across ACL, LPM routes, host routes, MAC, ECMP and tunnel applications

### Agility

- > Comprehensive Layer-2, Layer-3 and RoCE
- > Advanced network virtualization with high performance single pass VXLAN routing and IPv6 segment routing
- > Cloud scale NAT – 100K+ sessions
- > Programmable pipeline that can programmatically parse, process and edit packets
- > Deep packet inspection – 512B deep

SN3000 series provides full wire speed, cut through-mode latency, onchip fully-shared 42MB 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 SN3000 series is capable of addressing today's data center's complex networking requirements.



Onie and NVIDIA Spectrum-2

## SN3700

SN3700 spine/super-spine offers 32 ports of 200GbE in a compact 1U form factor. It enables connectivity to endpoints at different speeds and carries a throughput of 6.4Tb/s, with a landmark 8.33Bpps processing capacity. As an ideal spine solution, the SN3700 allows maximum flexibility, with port speeds spanning from 10GbE to 200GbE per port.



## SN3700C

SN3700C is a 1U 32-port 100GbE spine that can also be used as a high density 10/25GbE leaf when used with splitter cables. SN3700C allows for maximum flexibility, with ports spanning from 1GbE to 100GbE and port density that enables full rack connectivity to any server at any speed, and a variety of blocking ratios. SN3700C ports are fully splittable to up to 128 x 10/25GbE ports.



## SN3750-SX

SN3750-SX is a 1U 32-port 200GbE Ethernet switch that's purpose-built to accelerate telecom infrastructure and NVIDIA telecom solutions. SN3750-SX delivers the software-defined fronthaul capabilities needed for 5G radio area network (RAN). Including advanced timing protocol support such as telco-grade Precision Time Protocol (PTP) and synchronous Ethernet (SyncE) alongside AI-accelerated features such as adaptive routing and advanced congestion control, the SN3750-SX is ideal for telecom and AI workloads, including NVIDIA's CloudRAN solution. SN3750-SX is also a cyber-resilient switch with secure boot, hardware root of trust (HrOT) functionality to verify switch firmware and critical data from corruption. SN3750-SX supports port speeds spanning from 1GbE to 200GbE per port.



## SN3420

As data-center switching architectures increasingly adopt 100GbE, the SN3420 offers a high-performance, cost-effective way to evolve host connectivity from 10G to 25G. Equipped with 48 ports of 10/25GbE and 12 ports of up to 100GbE in a compact 1U form factor. The SN3420 is an ideal ToR switch platform, delivering a total throughput of up to 2.4 Tb/s with a processing capacity of 3.58 Bpps. The SN3420 enables the seamless use of QSFP28 connections for leaf-spine topology and future-proofing the data center.

† For illustration only. Actual products may vary

## Platform Software Options

SN3000 series platforms are available out of the factory in three different flavors:

- > Pre-installed with NVIDIA Cumulus Linux™, a revolutionary operating system, taking the Linux user experience from servers to switches and providing a rich routing functionality for large scale applications.
- > Pre-installed with NVIDIA Onyx®, a home-grown operating system utilizing common networking user experiences and an industry standard CLI.
- > Bare metal including ONIE image, installable with any ONIE-mounted OS. ONIE-based platforms utilize the advantages of open networking and the NVIDIA Spectrum-2 ASIC capabilities.

## High Availability

SN3000 series switches are designed with the following features for high availability both from a software and hardware perspective:

- > 1+1 hot-swappable power supplies and N+1 hot-swappable fans
- > Color coded PSUs and fans
- > Up to 128x 10/25/50GbE, 64x 100GbE, or 32x 200GbE
- > Multi-chassis LAG for active/active L2 multipathing
- > 64-way ECMP routing for load balancing and redundancy.

## SN3000 Series: A Rich Software Ecosystem

### NVIDIA Cumulus-Linux

Cumulus Linux is a powerful open network operating system enabling advanced automation, customization and scalability using web-scale principles like the world's largest data centers. It accelerates networking functions and provides choice from an extensive list of supported switch models including NVIDIA Spectrum based switches. Cumulus Linux was built for automation, scalability and flexibility, allowing you to build data center and campus networks that ideally suits your business needs. Cumulus Linux is the only open network OS that allows you to build affordable and efficient network operations like the world's largest data center operators, unlocking web-scale networking for businesses of all sizes.

### SONiC

SONiC was designed for cloud networking scenarios, where simplicity and managing at scale are the highest priority. NVIDIA fully supports the pure open source SONiC from the SONiC community site on all of the SN2000 series switch platforms. With advanced monitoring and diagnostic capabilities, SONiC is a perfect fit for the NVIDIA SN2000 series. Among other innovations, SONiC on the SN3000 series enables fine-grained failure recovery and in-service upgrades (ISSU), with zero downtime.

### Linux Switch and Dent

Linux Switch enables users to natively install and use any standard Linux distribution as the switch operating system, such as DENT, a Linux-based networking OS stack that is suitable for campus and remote networking. Linux Switch is based on a Linux kernel driver model for Ethernet switches (Switchdev). It breaks the dependency of using vendor-specific, closed-source software development kits. The open-source Linux driver is developed and maintained in the Linux kernel, replacing proprietary

APIs with standard Linux kernel interfaces to control the switch hardware. This allows off-the-shelf Linux-based networking applications to operate on Spectrum-based switches for L2 switching and L3 routing, including open source routing protocol stacks, such as FRR (Quagga), Bird and XORP, OpenFlow applications, or user-specific implementations.

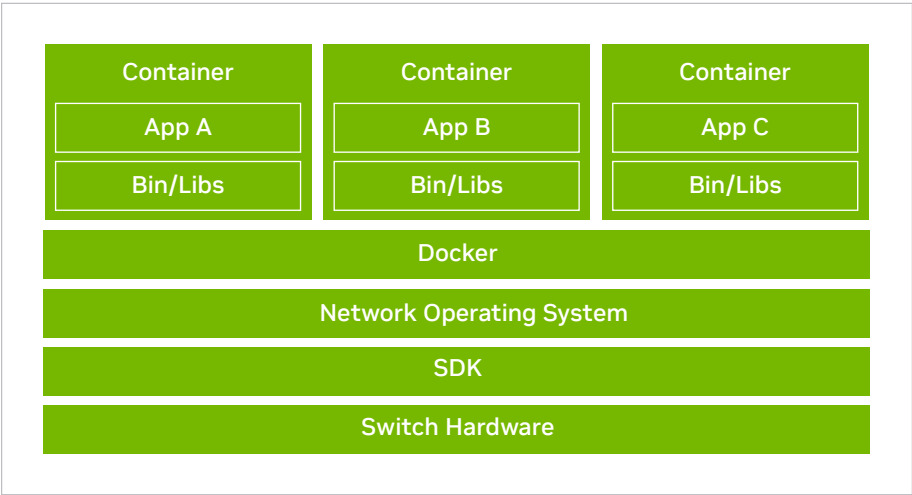
**NVIDIA Onyx**

NVIDIA is a high performance switch operating system, with a classic CLI interface. Whether building a robust storage fabric, cloud, financial or Media and Entertainment fabric, customers can leverage the flexibility of = Onyx to tailor their network platform to their environment. With built-in workflow automation, monitoring and visibility tools, enhanced high availability mechanisms, and more, Onyx simplifies network processes and workflows, increasing efficiencies, reducing operating expenses and time-to-service.

Onyx leverages the capabilities of the SN3000 series to provide greater scale, state-of-the-art telemetry, enhanced quality of service (QoS), and exceptional programmability that enables a flexible pipeline supporting both new and legacy protocols, a larger fully-shared buffer, and more.

**NVIDIA Cumulus NetQ**

NVIDIA Cumulus NetQ™ is a highly-scalable, modern, network operations tool set that provides visibility, troubleshooting and lifecycle management of your open networks in real time. NetQ delivers actionable insights and operational intelligence about the health of your data center and campus networks—from the container or host, all the way to the switch and port, enabling a NetDevOps approach. NetQ is the leading network operations tool that utilizes telemetry for deep troubleshooting, visibility and automated workflows from a single GUI interface, reducing maintenance and network downtimes. With the addition of full lifecycle management functionality, NetQ now combines the ability to easily upgrade, configure and deploy network elements with a full suite of operations capabilities, such as visibility, troubleshooting, validation, trace and comparative look-back functionality.



Docker Containers Support

## **ONIE**

The open network install environment (ONIE) is an open compute project open source initiative driven by a community to define an open “install environment” for bare metal network switches, such as the NVIDIA SN3000 series. ONIE enables a bare metal network switch ecosystem where end users have a choice of different network operating systems.

## **Docker Containers**

NVIDIA fully supports the running of third party containerized applications on the switch system itself. The third party application has complete access to the bare-metal switch via its direct access to the SDK. The switch has tight controls over the amount of memory and CPU cycles each container is allowed to use, along with fine grained monitoring of those resources.

## **NVIDIA Spectrum-2: Build Your Cloud Without Compromise**

### **Groundbreaking Performance**

Packet buffer architecture has a major impact on overall switch performance. The Spectrum-2 packet buffer is fully shared across all ports, supporting cutthrough line rate traffic from all ports, without compromising scale or features. With its fast packet buffer, Spectrum-2 is able to provide a high-performance fair and bottleneck-free data path for mission-critical applications.

### **Pervasive Visibility**

Spectrum-2 provides deep and contextual network visibility, which enables network operators to proactively manage issues and reduce mean time to recovery/innocence. The What Just Happened (WJH) Spectrum feature leverages the underlying silicon and software capability to provide granular and event-triggered information about infrastructure issues. In addition, the rich telemetry information from Spectrum-2 is readily available via open APIs that are integratable with third party software tools and workflow engines.

### **Unprecedented Agility**

For modern data center infrastructure to be software defined and agile, both its compute and network building blocks need to be agile. Spectrum-2 features a unique feature rich and efficient packet processing pipeline that offers data center network virtualization features without compromising on performance or scale. Spectrum-2 is a programmable pipeline and a deep packet parser/editor (can process payload up to the first 512B). Spectrum-2 supports single pass VXLAN routing as well as bridging. Additionally, Spectrum-2 supports advanced virtualization features such as IPv6 segment routing, and network address translation (NAT).

### **Massive scale**

The number of endpoints in the data center is increasing exponentially. With the current shift from virtual machine-based architectures to container-based architectures, the high-scale forwarding tables required by modern data centers and mega-clouds increase by up to an order of magnitude or more. To answer these needs for scalability and flexibility, Spectrum-2 uses intelligent algorithms and efficient resource sharing, and supports unprecedented forwarding table, counters and policy scale.

Fine-grained resource allocation to fit all specific needs, allowing up to 512K entries to be dynamically shared across MAC, ARP, IPv4/IPv6 routes, ACLs, ECMP, and Tunnels.

An innovative algorithmic TCAM optimized for data centers and cloud environments, which can scale the number of rules to up to half a million rules.

## End-To-End Solution

The SN3000 series is part of the NVIDIA complete end-to-end solution which provides 1GbE through 400GbE interconnectivity within the data center. Other devices in this solution include ConnectX-based network interface cards and LinkX copper or fiber cabling.

## Technical Specifications

Switch Model	SN3700	SN3700C	SN3420
Connectors	32 QSFP56 200GbE	32 QSFP28 100GbE	48 SFP28 25GbE + 12 QSFP28 100GbE
Max. 400GbE Ports	-	-	-
Max. 200GbE Ports	32	-	-
Max. 100GbE Ports	64	32	12
Max. 50GbE Ports	128*	64	24
Max. 40GbE Ports	32	32	12
Max. 25GbE Ports	128	128	48+48
Max. 10GbE Ports	128	128	48+48
Max. 1GbE Ports	128	128	48+48
Throughput	6.4Tb/s	3.2Tb/s	2.4Tb/s
Packet Per Second	8.33Bpps	4.76Bpps	3.58Bpps
Latency	425ns	425ns	425ns
CPU	Quad-core x86	Dual-core x86	Dual-core x86
System Memory	8GB	8GB	8GB
SSD Memory	32GB	32GB	32GB
Packet Buffer	42MB	42MB	42MB
100/1000Mb/s Mgmt Ports	1	1	1
Serial Ports	1 RJ45	1 RJ45	1 RJ45
USB Ports	1	1	1
Hot-Swap Power Supplies	2 (1+1 redundant)	2 (1+1 redundant)	2 (1+1 redundant)
Hot-Swappable Fans	6 (N+1 redundant)	4 (N+1 redundant)	5 (N+1 redundant)
Reversible Airflow Option	Yes	Yes	Yes
Power Supplies	Frequency: 50-60Hz Input range: 100-264 AC Input current 2.9-4.5A	Frequency: 50-60Hz Input range: 100-264 AC Input current 2.9-4.5A, DC**	Frequency: 50-60Hz Input range: 100-264 AC Input current 2.9-4.5A
Size (H x W x D)	1.72" x 16.84" x 22" (44mm x 428mm x 559mm)	1.72" x 16.84" x 22" (44mm x 428mm x 559mm)	1.72" x 16.84" x 17" (44mm x 428mm x 432mm)
Weight	11.1kg (24.5lb)	11.1kg (24.5lb)	8.5kg (18.73lb)

## Compliance

Standards Compliance	
Safety	CB, CE, cTUVus, CU
EMC	CE, ICES, FCC, RCM, VCCI
Operating Conditions	Operating: 0°C to 40°C; Non-Operating: -40°C to 70°C
Relative Humidity	5% to 85%
Operating Altitude	0-3050m
RoHS	RoHS compliant

## Supported Transceivers and Cables

Supported Transceivers and Cables	Interface Type	Description	SKU
100GbE QSFP28	100BASE-CR4 copper	0.5m-5m LSZH DAC	980-9I6xx
	100BASE-AOC	3m-100m	980-9I13xx
	100BASE-SR4	850nm, MPO, up to 100m	980-9I149-00CS00
	100BASE-PSM4	1310nm, MPO, up to 500m	980-9I16X-00C000
	100BASE-LR4	1310nm, LC-LC, up to 10km	980-9I17P-00CR00
	100BASE-CWDM4	1310nm, LC-LC, up to 2km	980-9I17Q-00CM00
	100BASE-SWDM4	850nm, LC-LC, up to 100m	980-9I90Z-00C000
	100BASE-ER	1310nm, LC-LC, up to 40km	980-9I53X-00C000
	100BASE-DR1	1310nm, LC-LC, up to 500m	980-9I042-00C000
	100GbE to 4 x 25GbE SFP28	1m-5m DAC	980-9I48xx
	100GbE to 4 x 25GbE SFP28	3m-30m AOC	980-9I4xx
	100GbE to 2 x 50GbE QSFP28	1m-5m DAC	980-9Ixx
	100GbE to 25GbE	QSA28 pluggable adapter	980-9I78I-00A000
40GbE QSFP	40BASE-CR4	1m-5m DAC	980-9I66xx
	40BASE-SR4	850nm, MPO, up to 100m	980-9I426-00BM00
		850nm, MPO, up to 300m	980-9I170-00BM00
	40BASE-LR4	1310nm, LC-LC, up to 10km	980-9I210-00TR00
	40GbE to 4 x 10GbE	1m-5m DAC	980-9I6xx
25GbE SFP28	40GbE to 10GbE	QSA pluggable adapter	980-9I71G-00J000
	25BASE-CR	0.5m-5m DAC	980-9I63xx
	25BASE-AOC	3m-100m	980-9I53xx
	25BASE-SR	850nm, LC-LC, up to 100m	980-9I595-00AM00
10GbE	25BASE-LR	1310nm, LC-LC, up to 10km	980-9I094-00AR00
	10BASE-CR	1m-7m DAC	980-9I68xx
	10BASE-SR	850nm, LC-LC, up to 300m	980-9O000-0000-409
	10BASE-LR	1310nm, LC-LC, up to 10km	980-9O000-0000-343



## Ordering Information

### SKUs

#### MSN3700 Series: 32 Ports of up to 200GbE

920-9N201-00FA-0X0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with NVIDIA Onyx, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00RA-0X0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with NVIDIA Onyx, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit
920-9N201-00FA-0C0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00RA-0C0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit
920-9N201-00FA-0N0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with ONIE, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00RA-0N0	NVIDIA Spectrum-2 based 200GbE 1U Open Ethernet Switch with ONIE, 32 QSFP56 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit

#### MSN3700C Series: 32 Ports of up to 100GbE

920-9N201-00F7-0X0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with NVIDIA Onyx, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00R7-0X0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with NVIDIA Onyx, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit
920-9N201-00F7-0C0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch Open Switch with Cumulus Linux, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00R7-0C0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit
920-9N201-00F7-0N0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with ONIE, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, P2C airflow, Rail Kit
920-9N201-00R7-0N0	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with ONIE, 32 QSFP28 ports, 2 Power Supplies (AC), Standard depth, x86 CPU, C2P airflow, Rail Kit

#### MSN3420 Series: 48 Ports of up to 25GbE and 12 Ports of up to 100GbE

920-9N213-00F7-0X0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with NVIDIA Onyx, 48 SFP28 ports and 6 QSFP28 ports, 2 power supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit
920-9N213-00R7-0X0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with NVIDIA Onyx, 48 SFP28 ports and 12 QSFP28 ports, 2 power supplies (AC), x86 CPU, C2P airflow, Short-depth, Rail Kit
920-9N213-00F7-0C0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with Cumulus Linux, 48 SFP28 ports and 12 QSFP28 ports, 2 power supplies (AC), x86 CPU, standard depth, P2C airflow, Rail Kit
920-9N213-00R7-0C0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with Cumulus Linux, 48 SFP28 ports and 12 QSFP28 ports, 2 power supplies (AC), x86 CPU, standard depth, C2P airflow, Rail Kit
920-9N213-00F7-0N0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with ONIE, 48 SFP28 ports and 12 QSFP28 ports, 2 power supplies (AC), x86 CPU, P2C airflow, Short-depth, Rail Kit
920-9N213-00R7-0N0	NVIDIA Spectrum-2 based 25GbE/100GbE 1U Open Ethernet switch with ONIE, 48 SFP28 ports and 12 QSFP28 ports, 2 power supplies (AC), x86 CPU, C2P airflow, Short-depth, Rail Kit



## Ordering Information

### Spare Power Supplies & Fan Modules

930-9NPSU-00J1-000	Power-Supply Unit, 550W AC, P2C Airflow, for SN3420, Power cord included
930-9NPSU-00J1-000	Power-Supply Unit, 550W AC, C2P Airflow, for SN3420, Power cord included
930-9BPSU-00JZ-000	Power-Supply Unit, 1100W AC, P2C Airflow, for SN3700/SN3700C, Power cord included
930-9BPSU-00JG-000	Power-Supply Unit, 1100W AC, C2P Airflow, for SN3700/SN3700C, Power cord included
930-9NPSU-00J1-000	Power-Supply Unit, 550W AC, P2C Airflow, Power cord included
930-9BFAN-00IN-000	Fan Module, P2C Airflow for SN3420/SN3700/SN3700C
930-9BFAN-00J0-000	Fan Module, C2P Airflow for SN3420/SN3700/SN3700C

### Rack (and Spare Rack) Installation Kits

930-9NRKT-00JN-000	NVIDIA 19" rack fixed mounting-kit, Standard depth, for SN3700/SN3700C rack size 600-800mm
930-9NRKT-00JJ-000	Rack installation kit for SN3700/SN3700C, short/standard depth racks
930-9NRKT-00JE-000	NVIDIA 19" rack fixed mounting-kit, Standard depth, for SN3420, short depth, rack size 500-600mm
930-9NRKT-00JV-000	NVIDIA 19" rack fixed mounting-kit, Standard depth, for SN3420, short depth, rack size 600-800mm

### Accessories

HAR000631	RS232 Cable - DB9 to RJ45, Serial Console Cable
ACC001310	Power Cord Black 250V 10A 1830mm C14 to C13 for AC PSUs

#### Warranty Information

NVIDIA SN3000 series switches come with a one-year limited hardware return-and-repair warranty, with a 14 business day turnaround after the unit is received. For more information, please visit the [NVIDIA Technical Support User Guide](#).

#### Additional Information

Support services including next business day and 4-hour technician dispatch are available. For more information, please visit the [NVIDIA Technical Support User Guide](#). NVIDIA offers installation, configuration, troubleshooting and monitoring services, available on-site or remotely delivered. For more information, please visit the [NVIDIA Global Services website](#).

[Learn More](#)

Find out more about the **NVIDIA Spectrum SN3000 Series Switches**

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