



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.

SN3000 series provides full wire speed, cut through-mode latency, on-chip 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.

VISIBILITY

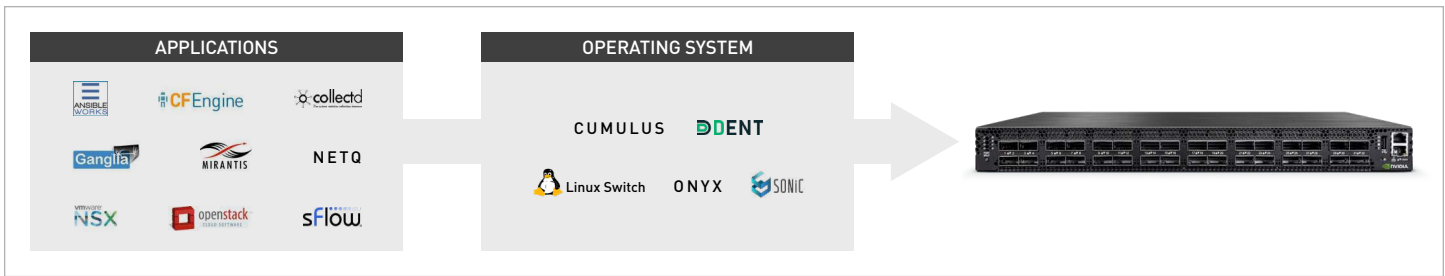
- > NVIDIA What Just Happened® (WJH) telemetry dramatically reduces mean time to issue resolution by providing answers to: When, What, Who, Where and Why
- > Hardware-accelerated histograms track and summarize queue depths at sub-microsecond granularity
- > Inband network telemetry (INT)-ready hardware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



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.



The SN3700C-S version is a cyber-resilient data center switch with secured boot functionality. It leverages a Hardware Root-of-Trust (HrOT) to enable advanced authentication mechanisms to verify the switch's BIOS, ONIE and NOS images so that only NVIDIA-authorized images will operate the switch. This protects the switch firmware and critical data from corruption while ensuring the authenticity and integrity of any firmware updates. It can cryptographically detect corrupted firmware and critical data, when the system is first powered on, while the system is running, and following any system updates.

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.



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, 32x 200GbE, or 6x 400GbE
- > 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 & 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

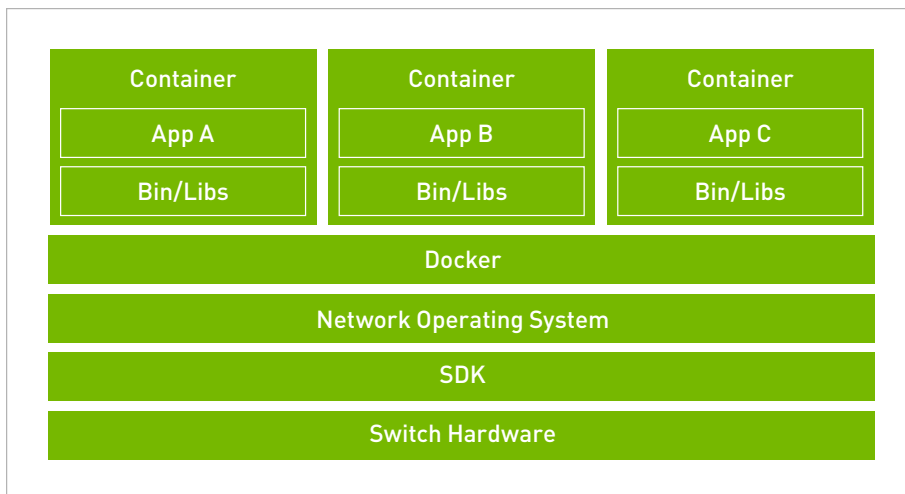
NVIDIA Cumulus NetQ™ is a highly-scalable, modern, network operations tool set that provides visibility, troubleshooting and lifecycle management of your open networks in real time. NetQ delivers actionable insights and operational intelligence about the health of your data center and campus networks — 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.

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.



Docker Containers Support

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 cut-through 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.

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	MCP1600-C0xxxxxx
	100BASE-AOC	3m-100m	MFA1A00-CXXX
	100BASE-SR4	850nm, MPO, up to 100m	MMA1B00-C100D
	100BASE-PSM4	1310nm, MPO, up to 500m	MMS1C10-CM
	100BASE-LR4	1310nm, LC-LC, up to 10km	MMA1L10-CR
	100BASE-CWDM4	1310nm, LC-LC, up to 2km	MMA1L30-CM
	100BASE-SWDM4	850nm, LC-LC, up to 100m	FTLC9152RGPL
	100BASE-ER	1310nm, LC-LC, up to 40km	SPQ-CE-ER-CDFL-M
	100BASE-DR1	1310nm, LC-LC, up to 500m	MMS1V70-CM
	100GbE to 4 x 25GbE SFP28	1m-5m DAC	MCP7F00-A0xxxxxx
	100GbE to 4 x 25GbE SFP28	3m-30m AOC	MFA7A50-Cxxx
	100GbE to 2 x 50GbE QSFP28	1m-5m DAC	MCP7H00-G0xxxxxx
	100GbE to 2 x 50GbE QSFP28	3m-20m AOC	MFA7A20-Cxxx
	100GbE to 25GbE	QSA28 pluggable adapter	MAM1Q00A-QSA28
50GbE PAM4 SFP56	50GBASE-SR	850nm, LC, up to 100m	Contact NVIDIA
	50GBASE-AOC	850nm, LC, up to 100m	Contact NVIDIA
	50GBASE-CR (DAC)	Up to 2.5m, DAC	MCP2M50-G0xxxxxx
40GbE QSFP	40BASE-CR4	1m-5m DAC	MC2210130-00X
	40BASE-AOC	3m-100m	MC2210310-XXX
	40BASE-SR4	850nm, MPO, up to 100m	MMA1B00-B150D
		850nm, MPO, up to 300m	MC2210411-SR4E
	40BASE-LR4	1310nm, LC-LC, up to 10km	MC2210511-LR4
	40GbE to 4 x 10GbE	1m-5m DAC	MC26091XX-00X
	40GbE to 10GbE	QSA pluggable adapter	MAM1Q00A-QSA
25GbE SFP28	25BASE-CR	0.5m-5m DAC	MCP2M00-A0xxxxxx
	25BASE-AOC	3m-100m	MFA2P10-AXXX
	25BASE-SR	850nm, LC-LC, up to 100m	MMA2P00-AS
	25BASE-LR	1310nm, LC-LC, up to 10km	MMA2L20-AR
10GbE	10BASE-CR	1m-7m DAC	MC3309xxx-00X
	10BASE-SR	850nm, LC-LC, up to 300m	MFM1T02A-SR
	10BASE-LR	1310nm, LC-LC, up to 10km	MFM1T02A-LR

Ordering Information

SKUs	
MSN3700 Series: 32 Ports of up to 200GbE	
MSN3700-VS2F	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
MSN3700-VS2R	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
MSN3700-VS2FC	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
MSN3700-VS2RC	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
MSN3700-VS2FO	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
MSN3700-VS2RO	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

Ordering Information (Continue)

SKUs

MSN3700C Series: 32 Ports of up to 100GbE

MSN3700-CS2F	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
MSN3700-CS2R	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
MSN3700-CS2FC	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
MSN3700-CS2RC	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
MSN3700-CS2FO	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
MSN3700-CS2RO	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
MSN3700-CS2FSC	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with Cumulus Linux, 32 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, Secured-boot, standard depth, P2C airflow, Rail Kit
MSN3700-CS2FSO	NVIDIA Spectrum-2 based 100GbE 1U Open Ethernet Switch with ONIE, 32 QSFP28 ports, 2 Power Supplies (AC), x86 CPU, Secured-boot, standard depth, P2C airflow, Rail Kit

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

MSN3420-CB2F	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
MSN3420-CB2R	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
MSN3420-CB2FC	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
MSN3420-CB2RC	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
MSN3420-CB2FO	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
MSN3420-CB2RO	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

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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