



NVIDIA Spectrum SN3000 Series Switches

Data center performance, scale, and rich telemetry.

Flexibility and Performance for Data Center Networks

NVIDIA® Spectrum™ SN3000 switches, based on the second-generation Spectrum switch application-specific integrated circuit (ASIC), are purpose-built for leaf, spine, and super-spine data center applications. Allowing maximum flexibility, the SN3000 series provides port speeds spanning from 1 to 200 gigabits per second (Gb/s) with 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. Delivering high performance, consistent low latency, and support for advanced software-defined networking (SDN) features, the SN3000 series is the ideal choice for web-scale IT, cloud, hyperconverged storage, and data analytics applications.

Network Disaggregation: Open Ethernet

NVIDIA Open Ethernet™ Spectrum switches break the paradigm of traditional switch systems, eliminating vendor lock-in. Instead of forcing network operators to use the specific software that's 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 be easily deployed into the modern data center across network equipment, easing management and ensuring full interoperability.

With a range of system form factors and a rich software ecosystem, the SN3000 series allows you to pick and choose the right components for your data center.

SN3700

The SN3700 spine/super-spine offers 32 ports of 200GbE (50G PAM4 per lane) in a compact 1U form factor. It enables connectivity to endpoints at different speeds and carries a throughput of 6.4 terabits per second (Tb/s), with a landmark 8.33

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 submicrosecond granularity.
- > Inband network telemetry (INT)-ready hardware
- > Streaming telemetry
- > 512,000 on-chip flow counters

Agility

- > Comprehensive layer-2, layer-3, and RoCE
- > Advanced network virtualization with high-performance single-pass VXLAN routing and IPv6 segment routing
- > Cloud-scale network address translation (NAT)—100,000+ sessions

billion packets per second (Bpps) processing capacity. As an ideal spine solution, the SN3700 allows maximum flexibility, with port speeds spanning from 10 to 200 gigabits per second (Gb/s) per port. It uses 50G PAM4 per lane coding, which is compatible with 25G NRZ.

SN3700C

The 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. The SN3700C ports are fully splittable, allowing for configurations of up to 128 10/25GbE ports, utilizing 25G NRZ per lane.

SN3750-SX

The SN3750-SX is a 1U 32-port 200GbE switch that's purpose-built to accelerate telecommunications 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), the SN3750-SX is ideal for telecom workloads, including NVIDIA's CloudRAN solution. SN3750-SX is also a cyber-resilient switch with secure boot and hardware root of trust functionality to protect switch firmware and critical data from corruption. SN3750-SX supports port speeds spanning 1-200Gb/s per port. It employs 50G PAM4 per lane coding that's compatible with 25G NRZ.

SN3420

As data center switching architectures increasingly adopt 100GbE, the SN3420 switch 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 and utilizing 25G NRZ per lane in a compact 1U form factor, the SN3420 is an ideal top-of-rack (ToR) switch platform, delivering a total throughput of up to 2.4Tb/s with a processing capacity of 3.58Bpps. The SN3420 enables the seamless use of QSFP28 connections for leaf-spine topology and future-proofing the data center.

High Availability

The NVIDIA Spectrum SN3000 series of Ethernet switches is designed for high availability both from a software and hardware perspective. Key features include:

- > 1+1 hot-swappable power supplies and N+1 hot-swappable fans
- > Color-coded power supply units (PSUs) and fans
- > Up to 128x 10/25/50GbE, 64x 100GbE, or 32x 200GbE ports per link aggregation group (LAG)
- > Multi-chassis LAG for active/active L2 multipathing
- > 64-way equal-cost multi-path (ECMP) routing for load balancing and redundancy

- > Programmable pipeline that can programmatically parse, process, and edit packets
- > Deep packet inspection—512 billion deep

Performance

- > Fully shared packet buffer provides a fair, predictable, and high-bandwidth data path.
- > Consistent and low cut-through latency
- > Robust remote direct-memory access (RDMA) over converged Ethernet (RoCE) transport to power non-volatile memory express (NVMe) over Fabrics and machine learning applications that leverage GPUDirect®
- > Best-in-class Virtual Extensible LAN (VXLAN) scale—10X more tunnels and tunnel endpoints than others
- > 512,000 forwarding entries flexibly shared across access control list (ACL), longest prefix match (LPM) routes, host routes, media access control list (MAC), equal-cost multi-path (ECMP), and tunnel applications



SN3700



SN3700C



SN3750-SX



SN3420

SN3000 Series: A Rich Software Ecosystem

NVIDIA Cumulus Linux

NVIDIA Cumulus® Linux is a powerful, open network operating system that enables advanced automation, customization, and scalability using web-scale principles hardened in 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 suit your business needs. Cumulus Linux is the only 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 priorities. NVIDIA fully supports the pure open-source SONiC from the SONiC community site on all of the SN3000 Ethernet switches. With advanced monitoring and diagnostic capabilities, SONiC is a perfect fit for the NVIDIA SN3000 series. Among other innovations, SONiC on the SN3000 series enables fine-grained failure recovery and in-service upgrades (ISSU), with zero downtime.

Linux Switch

With Linux Switch, users can natively install and use any standard Linux distribution as the switch operating system. Linux Switch is based on a Linux kernel driver model for Ethernet switches (switchdev).

NVIDIA Air

The NVIDIA Air infrastructure simulation platform creates digital twins of SN3000 switch systems (as well as the rest of the Spectrum portfolio). The digital twin includes logical instances of every switch and cable, so it can be used to validate security policy compliance, automation processes, monitoring tools, interoperability, and upgrade procedures. The digital twin is key to transforming network operations models, allowing IT architects and infrastructure specialists to deploy and update networks up to 95 percent faster through continuous integration and continuous delivery (CI/CD) integration.

NVIDIA NetQ

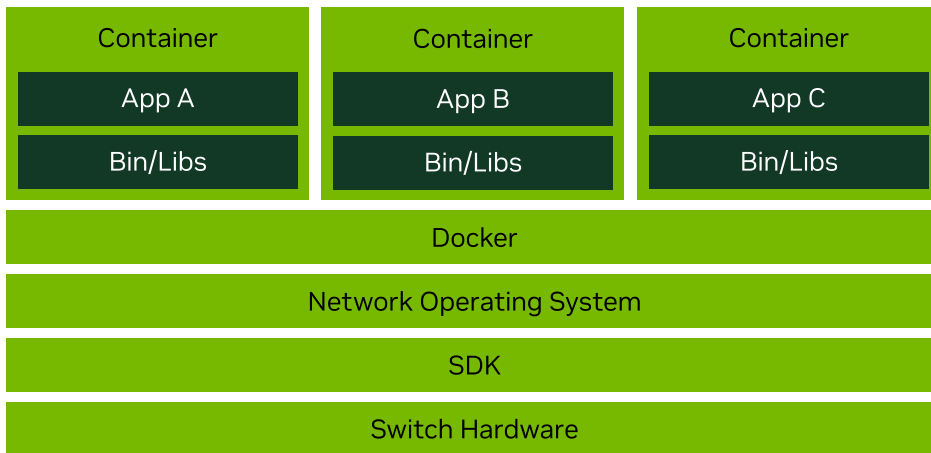
NVIDIA NetQ™ is a highly scalable, modern network operations toolset that provides visibility, troubleshooting, and lifecycle management of your open networks in real time. NVIDIA NetQ delivers actionable insights and operational intelligence about the health of your data center and campus networks—from the container or host all the way to the switch and port—enabling a NetDevOps approach. NVIDIA 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, NVIDIA 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, an 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

The NVIDIA Spectrum Ethernet switch ASIC delivers a solid balance of performance, virtualization, and telemetry capabilities.

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 provides a high-performance, fair, and bottleneck-free data path for mission-critical applications.

Pervasive Visibility

Spectrum offers in-depth and contextual network visibility, enabling network operators to proactively manage issues, thereby reducing mean time to recovery or establishing innocence. WJH harnesses the underlying silicon and software capability to provide granular, event-triggered insights into infrastructure issues. In addition, Spectrum’s rich telemetry information is readily available through open APIs, making it easy to integrate with third-party software tools and workflow engines.

Unprecedented Agility

For a modern data center infrastructure to be software-defined and agile, both its compute and network building blocks must be agile. Spectrum-2 features a distinctive, feature-rich, and efficient packet processing pipeline that delivers advanced data center network virtualization without sacrificing performance or scalability. Not only does it have a programmable pipeline and in-depth packet parser and editor that can process payloads up to the first 512 billion, Spectrum-2 also supports single-pass VXLAN routing and bridging, advanced virtualization features like IPv6 segment routing, and network address translation (NAT).

Massive Scale

The number of endpoints in the data center is experiencing exponential growth. This growth is further amplified by the ongoing shift from virtual machine-based architectures to container-based architectures, necessitating high-scale forwarding tables that modern data centers and mega clouds require—sometimes increasing by an order of magnitude or more. In response to the need for greater scalability and flexibility, Spectrum uses intelligent algorithms and efficient resource sharing and supports unprecedented forwarding tables, counters, and policy scale.

Building on this commitment to adaptability and precision, fine-grained resource allocation is tailored to fit all specific needs, allowing up to 512,000 entries to be dynamically shared across MAC, ARP, IPv4/IPv6 routes, ACLs, ECMP, and tunnels. An innovative algorithmic TCAM is further optimized for data centers and cloud environments, which can scale the number of rules to up to half a million.

End-to-End Solution

The SN3000 series is an integral component of NVIDIA's comprehensive end-to-end solutions, providing 10–100Gb/s of interconnectivity within the data center. In addition to the SN3000 series, NVIDIA's solutions also include NVIDIA ConnectX® smart network interface cards (SmartNICs), BlueField® data processing units (DPUs), and LinkX® copper and fiber cabling.

Technical Specifications

Switch Model	SN3700	SN3700C	SN3750-SX	SN3420
Connectors	32 QSFP56 200GbE	32 QSFP28 100GbE	32 QSFP56 200GbE	48 SFP28 25GbE + 12 QSFP28 100GbE
Max. 200GbE ports	32	-	32	-
Max. 100GbE ports	64	32	64	12
Max. 50GbE ports	128	64	128	24
Max. 40GbE ports	32	32	32	12
Max. 25 ports	128	128	128	48+48
Max. 10GbE ports	128	128	128	48+48
Max. 1GbE ports	128	128	128	48+48
Switching capacity (Tb/s)	6.4Tb/s	3.2Tb/s	6.4Tb/s	2.4Tb/s

Switch Model	SN3700	SN3700C	SN3750-SX	SN3420
Wire-speed switching (Bpps)	8.33Bpps	4.76Bpps	8.33Bpps	3.58Bpps
Lanes per port x max speed per lane	4x 50G PAM4	4x 25G NRZ	4x 50G PAM4	4x 25G NRZ
Latency	425ns	425ns	425ns	425ns
CPU	Quad-core x86	Dual-core x86	Quad-core x86	Dual-core x86
System memory	8GB	8GB	16GB	8GB
SSD memory	32GB	32GB	32GB	32GB
Packet buffer	42MB	42MB	42MB	42MB
100/1,000Mb Management ports	1	1	1	1
Serial ports	1 RJ45	1 RJ45	1 RJ45	1 RJ45
USB ports	1	1	1	1
Hot-swap power supplies	2 (1+1 redundant)	2 (1+1 redundant)	2 (1+1 redundant)	2 (1+1 redundant)
Hot-swappable fans	6 (N+1 redundant)	4 (N+1 redundant)	6 (N+1 redundant)	5 (N+1 redundant)
Airflow options	Forward or reverse	Forward or reverse	Forward or reverse	Forward or reverse
Power supplies	Frequency: 50–60Hz Input range: 100–264Vac AC input current: 2.9–4.5A	Frequency: 50–60Hz Input range: 100–264Vac AC input current: 2.9–4.5A	Frequency: 50–60Hz Input range: 100–264Vac AC input current: 2.9–4.5A	Frequency: 50–60Hz Input range: 100–264Vac AC input current: 2.9–4.5A
Size	1.72" (H) x 16.84" (W) x 22" (D) 44mm (H) x 428mm (W) x 559mm (D)	1.72" (H) x 16.84" (W) x 22" (D) 44mm (H) x 428mm (W) x 559mm (D)	1.72" (H) x 16.84" (W) x 22" (D) 44mm (H) x 428mm (W) x 559mm (D)	1.72" (H) x 17.24" (W) x 18.29" (D) 44mm (H) x 438mm (W) x 464.6mm (D)
Weight	14kg (30.8lb)	14kg (30.8lb)	14kg (30.8lb)	8.5kg (18.73lb)

Compliance

Standards Compliance	
Safety	CB, CE, cTUVus, CU
EMC	CE, ICES, FCC, RCM, VCCI
Operating conditions	Operating: 0–40°C; Non-operating: -40–70°C
Relative humidity	5–85%
Operating altitude	0–3050m
RoHS	RoHS compliant

Enterprise Support and Services

A minimum of one-year of **Enterprise Business Standard Support** is required when purchasing NVIDIA Spectrum SN3000 Ethernet switches.

- > NVIDIA Enterprise Support provides access to NVIDIA experts, the NVIDIA Enterprise Support Portal, advanced return material authorization (RMA), and more.
- > Add-on services—including installation, configuration, technical account manager, four-hour on-site engineer, expedited RMA, media retention, and more—are available.

For more details, refer to the **NVIDIA Enterprise Support and Services User Guide**.

Product Specifications

Details of the NVIDIA Spectrum SN3000 series of Ethernet switches are available in the **SN3000 Switch Systems User Manual**.

Transceivers and Cables

- > For details on NVIDIA cables and transceivers, visit the **Interconnect documentation hub**.
- > Some transceivers may require higher than typical power delivery. Please refer to the **SN3000 Switch Systems User Manual** for detailed information on switch ports' power specifications.

Ready to Get Started?

To learn more about the NVIDIA Spectrum SN3000 series of Ethernet switches, including product specifications and ordering information, refer to the **SN3000 Switch Systems User Manual**.