



NVIDIA Spectrum SN4700 Switch

For accelerated data centers.



Next-Generation Flexibility and Performance for Data Center Networks

The NVIDIA® Spectrum™ SN4700 switch is the fourth generation of NVIDIA Ethernet switches, purpose-built for leaf, spine, and super-spine data center applications. Allowing maximum flexibility, the SN4700 provides port speeds spanning from 1 to 400 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 SN4700 is ideal for building wire-speed and cloud-scale layer-2 and layer-3 networks. The SN4700 delivers high performance and 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: NVIDIA Open Ethernet

NVIDIA Open Ethernet Spectrum switches break the paradigm of traditional switch systems, eliminating vendor lock-in. Rather than compelling network operators to use vendor-specific software, Open Ethernet allows for the use of a variety of operating systems on top of Ethernet switches. This grants operators greater control over their networks and optimizes 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 variety of system form factors and a rich software ecosystem, the SN4700 allows for the selection of the right components for your data center.

NVIDIA SN4700

The SN4700 is based on the high-performance Spectrum-3 application-specific integrated circuit (ASIC) with a bidirectional switching capacity of 12.8 terabits per second (Tb/s). SN4700 delivers performance and feature-rich layer-2 and layer-3 forwarding, ideally suited for both top-of-rack leaf and fixed-configuration spines. SN4700 provides full-wire speed, cut-through-mode latency, on-chip, fully shared 64 megabyte (MB) packet buffering, and flexible port use in addition to advanced capabilities. Combining a wide range of innovations in the areas of programmability, telemetry, and tunneling with industry-leading performance, SN4700 addresses the complex networking requirements of today's data centers.

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

Performance

- > Fully shared packet buffer provides a fair, predictable, and high-bandwidth data path.
- > Consistent and low cut-through latency
- > Intelligent hardware-accelerated data movement, congestion management, and load balancing for remote direct-memory access (RDMA) over converged Ethernet (RoCE) and machine learning applications that leverage GPUDirect®

SN4700

The SN4700 spine/super-spine offers 32 ports of 400GbE in a compact 1U form factor. It enables connectivity to endpoints at varying speeds and carries a throughput of 12.8 terabits per second (Tb/s), with a landmark 8.4 billion packets per second (Bpps) processing capacity. As an ideal spine solution, the SN4700 allows maximum flexibility, with port speeds spanning from 1 to 400 Gb/s per port.

High Availability

The NVIDIA Spectrum SN4700 is designed with the following features for high availability:

- > 1+1 hot-swappable power supplies and N+1 hot-swappable fans
- > Color-coded power supply units (PSUs) and fans
- > Up to 128x 100/50/25/10/1GbE, 64x 200GbE, or 32x 400GbE ports
- > Multi-chassis link aggregation group (LAG) for active/active L2 multipathing
- > 128-way equal-cost multi-path (ECMP) routing for load balancing and redundancy

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 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 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 priorities. NVIDIA fully supports the pure open-source SONiC from the SONiC community site on SN4700 switch. With advanced monitoring and diagnostic capabilities, SONiC is a perfect fit for the NVIDIA SN4700. Among other innovations, SONiC on the SN4700 enables fine-grained failure recovery and in-service software upgrades (ISSU), with zero downtime.

NVIDIA Air

The NVIDIA Air infrastructure simulation platform creates a digital twin of SN4700 (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% faster through continuous integration and continuous delivery (CI/CD).

- > 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

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



SN4700

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 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 downtime. 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 SN4000 series. ONIE enables a bare-metal network switch ecosystem where end users have a choice of different network operating systems.

Docker Containers

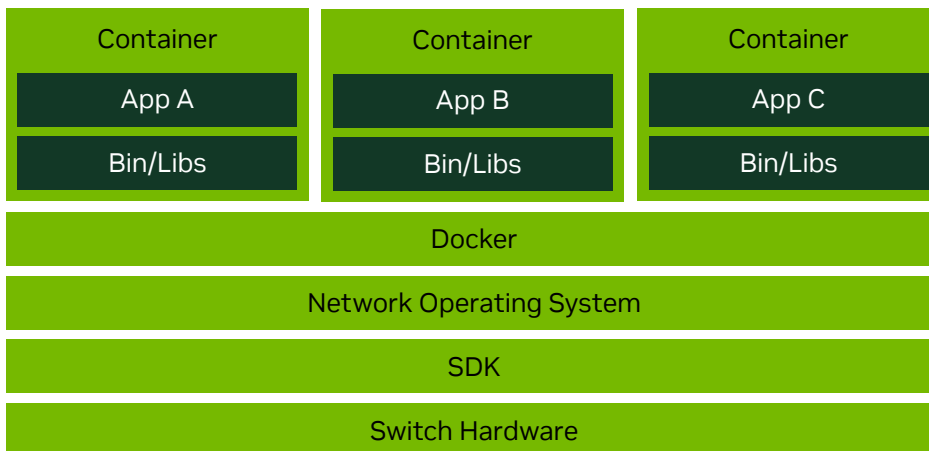
NVIDIA fully supports the running of third-party containerized applications on the switch system itself. The third-party application has complete access to the bare-metal switch via its direct access to the SDK. The switch has tight controls over the amount of memory and CPU cycles each container is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

NVIDIA Spectrum-3: Build your cloud without compromise

NVIDIA's Spectrum-3 is the fourth-generation Ethernet switch ASIC, delivering a solid balance of performance, virtualization, and telemetry capabilities.

Groundbreaking Performance

Packet buffer architecture has a major impact on overall switch performance. The Spectrum-3 packet buffer is monolithic and 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-3 provides a high-performance, fair, and bottleneck-free data path for mission-critical applications.



Docker Containers Support

Pervasive Visibility

Spectrum-3 provides deep and contextual network visibility, which enables network operators to proactively manage issues and reduce mean time to recovery or innocence. What Just Happened leverages the underlying silicon and software capability to provide granular and event-triggered information about infrastructure issues. In addition, Spectrum-3's rich telemetry information is readily available via open APIs that can be integrated 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-3 features a unique, feature-rich, and efficient packet processing pipeline that offers advanced data center network virtualization without compromising on performance or scale. Spectrum-3 has a programmable pipeline and a deep packet parser and editor that can process payloads up to the first 512 billion. Spectrum-3 supports single-pass VXLAN routing and bridging. Additionally, Spectrum-3 supports advanced virtualization features such as IPv6 segment routing and 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-3 uses intelligent algorithms and efficient resource sharing and supports forwarding tables, counters, and policy engines at cloud scale.

Building on this commitment to adaptability and precision, fine-grained resource allocation supports up to 512,000 entries 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 to support up to 500,000 rules.

End-to-End Solution

The SN4700 is part of NVIDIA's complete end-to-end Ethernet networking solution, which provides 1 to 400 Gb/s of interconnectivity within the data center. Other devices in this solution include NVIDIA BlueField® data processing units (DPUs), ConnectX®-based network interface cards, and LinkX® copper or fiber cabling.

Technical Specifications

Switch Model	SN4700
Connectors	32 QSFP-DD 400GbE
Max. 400GbE ports	32
Max. 200GbE ports	64
Max. 100GbE ports	128
Max. 50GbE ports	128
Max. 40GbE ports	64
Max. 25GbE ports	128
Max. 10GbE ports	128
Max. 1GbE ports	128
Switching capacity (Tb/s)	12.8Tb/s
Wire speed switching (Bpps)	8.4Bpps
Lanes per port x max speed per lane	8x 50G PAM4
Latency	620ns
CPU	Quad-core x86
System memory	16GB
SSD memory	64GB
Packet buffer	64MB
100/1000Mb/s management ports	1
Serial ports	1 RJ45
USB ports	1
Hot-swap power supplies	2 (1+1 redundant)
Hot-swappable fans	6 (N+1 redundant)
Reversible airflow option	Yes
Power supplies	Frequency: 50–60Hz Input range: 100–264Vac
Size (H x W x D)	1.72" (H) x 16.85" (W) x 22.3" (D) 44mm (H) x 428mm (W) x 568.5mm (D)
Weight	11.7kg (25.8lb)

Compliance

Standards Compliance	
Safety	CB, CE, cTUVus, CU
EMC	CE, ICES, FCC, RCM, VCCI
Operating conditions	Operating: 0–35°C; Non-operating: -40–70°C
Relative humidity	5–85%
Operating altitude	0-3050m
RoHS	RoHS compliant

IT Lifecycle Services for Networking

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Our highly trained experts, with innovative tools and proven processes, help you transform your IT investments into strategic advantages.



Plan & Design

Let us analyze your multivendor environment and deliver a comprehensive report and action plan to build upon the existing network and improve performance.



Deploy & Integrate

Get new wired or wireless network technology installed and configured with ProDeploy. Reduce costs, save time, and get up and running fast.



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Manage & Support

Gain access to technical experts and quickly resolve multivendor networking challenges with ProSupport. Spend less time resolving network issues and more time innovating.



Optimize

Maximize performance for dynamic IT environments with Dell Optimize. Benefit from in-depth predictive analysis, remote monitoring and a dedicated systems analyst for your network.



Retire

We can help you resell or retire excess hardware while meeting local regulatory guidelines and acting in an environmentally responsible way.

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