Datasheet

NVIDIA Spectrum SN2000 Series Switches

Open Ethernet networking switches.

NVIDIA Spectrum™ SN2000 switches are the second generation of NVIDIA Ethernet switches, purpose-built for leaf, spine, and super-spine data center applications. Allowing maximum flexibility, the SN2000 series provides port speeds spanning from 1 to 100 gigabits per second (Gb/s), with a port density that enables full-rack connectivity to any server at 1, 20, 25, 40, 50, and 100Gb/s speeds. In addition, the uplink ports allow a variety of blocking ratios to suit any application requirement.

The SN2000 series is ideal for building wire-speed and cloud-scale layer-2 and layer-3 networks. The SN2000 series 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: Open Ethernet

Open Ethernet breaks the paradigm of traditional switch systems, eliminating vendor lock-in. Open Ethernet offers customers the flexibility and freedom 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 allows IT managers and data center planners the option to make independent selections with regard to their switching equipment. They can "mix and match" offerings from different equipment vendors to achieve optimal configuration and have better control of capital and operational expenditures.

With a range of system form factors and a rich software ecosystem, the SN2000 series allows you to pick and choose the right components for your data center.

SN2000 Platforms

The SN2000 series is powered by the Spectrum Ethernet application-specific integrated circuit (ASIC) and is available in four configurations. Each delivers high performance combined with feature-rich layer-2 and layer-3 forwarding—ideal for both top-of-rack (ToR) leaf and fixed-configuration spines. Superior hardware capabilities include dynamic, flexible shared buffers and predictable wire-speed performance with no packet loss for any packet size. While the SN2000 Ethernet

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
- Up to 256,000 shared forwarding entries

Agility

- Comprehensive layer-2, layer-3, and RoCE
- Advanced network virtualization with high-performance single-pass VXLAN routing and IPv6 segment routing
- Programmable pipeline
- Deep packet inspection—512 billion deep

switch series is aimed for the 25/50/100GbE market, SN2000B switches are priced comfortably for the 10/40 GbE market and provide the superior feature set of Spectrum. The SN2000 series switches are standards-compliant and fully interoperable with third-party systems.

SN2201

The SN2201 is ideal as an out-of-band (OOB) management switch or as a ToR switch connecting up to 48 1G Base-T host ports with non-blocking 100GbE spine uplinks. Featuring highly advanced hardware and software along with ASIC-level telemetry and a 16 megabyte (MB) fully shared buffer, the SN2201 delivers unique and innovative features to 1G switching.

SN2100

The SN2100 carries a unique design to accommodate the highest rack performance. Its design allows side-by-side placement of two switches in a single 1RU slot of a 19" rack, delivering high availability to the hosts. The SN2100 accommodates 16 ports running at 100Gb/s, with a throughput of 1.6 terabits per second (Tb/s) and a 2.38 billion packets per second (Bpps) processing capacity.

SN2010

The SN2010 switch is the ideal ToR solution for small hyperconverged and storage deployments. Packed with 18 ports of 10/25GbE and four ports of 40/100GbE, the SN2010 can deliver up to 850Gb/s aggregate bandwidth with 1.26Bpps processing capacity in a compact half-width 1RU form factor.

High Availability

The NVIDIA Spectrum SN2000 series of Ethernet switches is designed for high availability from both a software and hardware perspective. Key high-availability features include:

- 1+1 hot-swappable power supplies
- Four N+1 hot-swap fans
- Color-coded power supply units (PSUs) and fans
- Up to 64 1/10/25/40/50/100G/bs 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

SN2000 Series: A Rich Software Ecosystem

NVIDIA Cumulus Linux

NVIDIA Cumulus® Linux is an advanced, open network operating system designed for robust automation, flexibility, and scalability. Cumulus Linux stands out as the only open network OS, enabling businesses of all sizes to build affordable and efficient network operations akin to the world's largest data center operators. Furthermore, it provides the tools to tailor data center and campus networks to specific business requirements.

Performance

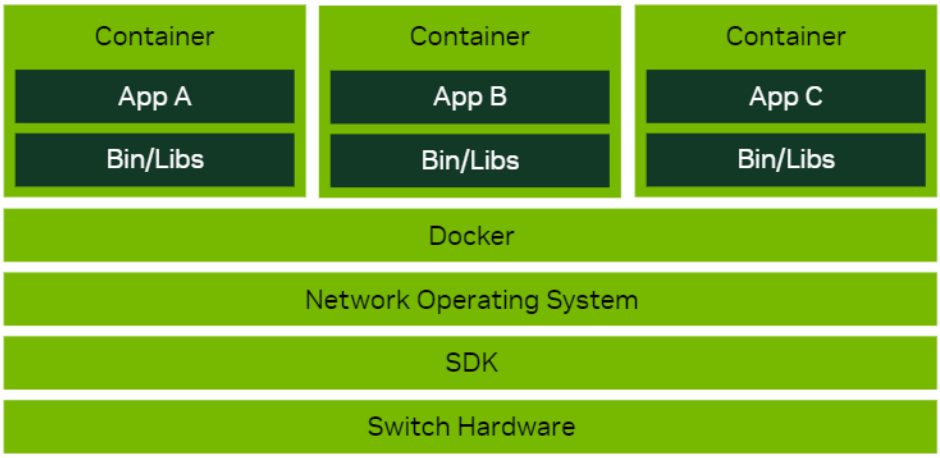
- Fully shared packet buffer provides a fair, predictable, and high-bandwidth data path.
- Consistent and low cut-through latency, intelligent hardware-accelerated data movement, congestion management, and load balancing for remote direct-memory access (RDMA) over converged Ethernet (RoCE) and machine learning applications that leverage GPUDirect®
- Best-in-class Virtual Extensible LAN (VXLAN) scale—6X more tunnels and tunnel endpoints

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 SN2000 Ethernet switches. With advanced monitoring and diagnostic capabilities, SONiC is a perfect fit for the NVIDIA SN2000 series. Among other innovations, SONiC on the SN2000 series enables fine-grained failure recovery and in-service upgrades (ISSU) with zero downtime.

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

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 Spectrum SN2000 series. ONIE enables a bare-metal network switch ecosystem where end users have a choice of different network operating systems.

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 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.

NVIDIA Spectrum: 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 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 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.

End-to-End 100GbE Solution

The SN2000 series is part of NVIDIA complete end-to-end solutions providing 10–100Gb/s of interconnectivity within the data center. Other devices in this solution include NVIDIA BlueField data processing units (DPUs), ConnectX network interface cards (NICs), and LinkX® copper or fiber cabling.

Technical Specifications

Switch Model	SN2201	SN2100	SN2010
Connectors	**48 RJ45 + 4 QSFP28 100GbE**	**16 QSFP28 100GbE**	**8 SFP28 25GbE + 4 QSFP28 100GbE**
Max 100GbE ports	4	16	4
Max 50GbE ports	8	32	8
Max 40GbE ports	4	16	4
Max 25GbE ports	16	64	34
Max 10GbE ports	1,664	64	34
Switching capacity (Tb/s)	448Gb/s	1.6Tb/s	850GbE
Wire-speed switching (Bpps)	667Mpps	2.38Bpps	1.26Bpps
Lanes per port x max speed per lane	4x 25G NRZ	4x 25G NRZ	4x 25G NRZ
Latency	300ns	300ns	300ns
CPU	Dual-core x86	ATOM x86	ATOM x86
System memory	8GB	8GB	8GB
SSD memory	20GB	16GB	16GB
Packet buffer	16MB	16MB	16MB
100/100 management ports	1	1	1
Serial ports	1 RJ45	1 RJ45	1 RJ45
USB ports	1	1 Mini USB	1 Mini USB
Hot-swap power supplies	2 (1+1 redundant)	No	No
Hot-swappable fans	4 (N+1 redundant)	No	No
Reversible airflow option	Yes	Yes	Yes
Power supplies	Frequency: 50–60Hz Input range: 100–264 Vac AC Input current: 4.5–2.9A	Frequency: 50–60Hz Input range: 100–264 Vac AC Input current: 4.5–2.9A	Frequency: 50–60Hz Input range: 100–264 Vac AC Input current: 4.5–2.9A
Typical power (ATIS)	100W (estimated)	94W	57W
Size (W x H x D)	1.72” (H) x 16.84”(W) x 17”(D) 43.9mm (H) x 428mm (W) x 432mm (D)	1.72” (H) x 16.84”(W) x 17”(D) 43.9mm (H) x 428mm (W) x 432mm (D)	1.72” (H) x 16.84”(W) x 17”(D) 43.9mm (H) x 428mm (W) x 432mm (D)
Weight	7.41kg (16.34lb)	4.54kg (10lb)	4.54kg (10lb)

Compliance

Standards Compliance	
Safety	CB, CE, cTUVus, CU
EMC	CE, ICES, FCC, RCM, VCCI
Operating temperature	Operating: 0–40ºC; Non-operating: -40–70ºC
Relative humidity	Operating: 10–85% non-condensing Non-operating: 10–90% non-condensing
Operating altitude	0-3,050m
RoHS	RoHS compliant

Enterprise Support and Services

A minimum of one-year of **Enterprise Business-Standard Support** is required when purchasing NVIDIA Spectrum SN2000 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 details, review the **NVIDIA Enterprise Support and Services User Guide**.

Product Specifications

Details of the NVIDIA Spectrum SN2000 series of Ethernet switches are available in the **SN2000 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 **SN2000 Switch Systems User Manual** for detailed information on switch ports' power specifications.

Ready to Get Started?

To learn more about the NVIDIA Spectrum SN2000 series of Ethernet switches, including product specifications and ordering information, refer to the **SN2000 Switch Systems User Manual**.

NVIDIA.