Datasheet

NVIDIA Spectrum SN2201 Switch

Open Ethernet networking switch.

NVIDIA Spectrum™ SN2201 switch is the second generation of NVIDIA Ethernet switch, purpose-built for leaf, spine, and super-spine data center applications. Allowing maximum flexibility, the SN2201 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 SN2201 is ideal for building wire-speed and cloud-scale layer-2 and layer-3 networks. The SN2201 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.

The SN2201 is powered by the Spectrum Ethernet application-specific integrated circuit (ASIC). The Spectrum ASIC 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. The SN2201 is standards-compliant and fully interoperable with third-party systems.

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.

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

High Availability

The NVIDIA Spectrum SN2201 Ethernet switch 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

SN2201: 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.

SONiC

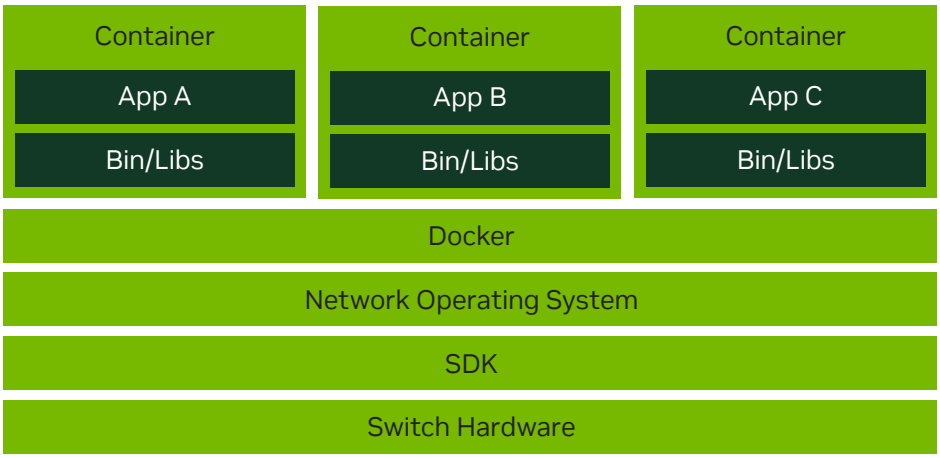
SONiC was designed for cloud networking scenarios, where simplicity and managing at scale are the highest priorities. NVIDIA fully supports the pure open-source SONiC from the SONiC community site on the SN2201 Ethernet switch. With advanced monitoring and diagnostic capabilities, SONiC is a perfect fit for the NVIDIA SN2201. Among other innovations, SONiC on the SN2201 enables fine-grained failure recovery and in-service upgrades (ISSU) with zero downtime.

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

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 SN2201. ONIE enables a bare-metal network switch ecosystem where end users have a choice of different network operating systems.

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 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 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 SN2201 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

Feature	SN2201
Form Factors	**48xRJ45 + 4x QSFP28**
Max 100GbE ports	4
Max 50GbE ports	8
Max 40GbE ports	4
Max 25GbE ports	16
Max 10GbE ports	16
Max 1GbE ports	16
Max 1Gbase-T ports	48
Max 100Mbase-T ports	48
Max 10Mbase-T ports	48
Throughput	448Gb/s
Packet Rate	667Mpps
Packet Buffer	16 MB
CPU	Dual-core x86
System Memory	8 GB
SSD Memory	20 GB
10/100/1000 Ethernet management Port	Single RJ45
Serial Port	Single RJ45
Config and Backup	Single USB port
Power Supplies	2 (1+1 redundant)
Fans	4 (N+1 redundant)
Airflow Options	Forward/Reverse
Power Supplies	Frequency: 50-60Hz Input range: 100-264 AC Input current 4.5-2.9A
Typical Power (ATIS)	100W
Rack Mounting	4-Post 19” rack, Tool-Less Railkit
Size (W x H x D)	1.72” x 16.84” x 17” (43.9mm x 428mm x 432mm)
Weight	7.41kg

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

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