Datasheet

# NVIDIA Spectrum SN6000 Ethernet Switch Series

Ethernet purpose-built for AI infrastructure at any scale, across any distance.

The NVIDIA Spectrum™ SN6000 series is the sixth generation of NVIDIA Ethernet switches. Built on the Spectrum-6 ASIC, these systems deliver high throughput, low latency, and advanced data center capabilities for fabrics of any size. Dynamic, flexible shared buffers and wire-speed performance ensure consistent, predictable results for both AI and cloud-native workloads.

SN6000 switches power key NVIDIA platforms—including Spectrum-X™ Ethernet, MGX™, DGX™, HGX™, and RTX PRO™ Server—and integrate seamlessly with software suites such as NVIDIA AI Enterprise and NVIDIA Mission Control.

Together, these innovations define the next generation of the NVIDIA Spectrum-X Ethernet platform, engineered with extreme codesign for Vera Rubin to enable the next wave of massive-scale AI factories and pave the way for future million-GPU environments.

## AI-Optimized Switching Architecture

The Spectrum-6 Ethernet switching ASIC delivers best-in-class performance for AI and cloud-native workloads across core, cloud, and edge environments. Enhanced RoCE features like adaptive routing, performance isolation, and auto-path configuration set a new benchmark for high-bandwidth AI workloads running over Ethernet.

## NVIDIA Spectrum-X Ethernet Photonics

NVIDIA Spectrum-X Ethernet Photonics delivers the latest advances in co-packaged optical (CPO) technology, bringing cutting-edge photonics innovation directly into the Ethernet switching platform. Spectrum-6 CPO-based switches boast 5x higher power efficiency, 10x greater reliability, and 5x longer uptimes for AI applications. Spectrum-X Ethernet Photonics switch systems integrate optical engines directly onto the same package as the switch ASIC, eliminating traditional pluggable transceivers. Internal optical routing brings fiber straight to the package, where silicon-photonics engines convert light to electrical signals adjacent to the ASIC. An external laser source (ELS) delivers continuous light to the integrated optical engines, lowering on-package heat and enhancing reliability at scale.

## Key Features

### Performance

- 102.4 Tb/s aggregate bandwidth per ASIC
- Built on 200G SerDes
- 800 Gb/s per port
- Optimized for Spectrum-X Ethernet platform
- Adaptive routing
- Congestion control
- Performance isolation
- Fully shared, monolithic packet buffer

### Telemetry and Visibility

- Hardware-accelerated high-frequency telemetry pipeline
- Packet-granular event-level diagnostics for NetQ histogram visibility
- Support for NVUE, switch SDK, SONiC CLI
- Real-time telemetry via open APIs (OTLP, gNMI, gNOI)

## Achieving Gigascale AI With NVIDIA Spectrum-XGS Ethernet Technology

As AI workloads grow, data centers face hard limits in power and physical footprint, making it increasingly difficult to scale within a single site. Connecting multiple facilities with off-the-shelf Ethernet networking introduces long-tail latency, jitter, and unstable performance. NVIDIA Spectrum-XGS Ethernet technology solves this by enabling high-performance scale-across networking, allowing multiple geographically separated data centers to operate as one unified AI factory.

Built on the NVIDIA SN6000 series of Ethernet switches and Spectrum-X SuperNIC™s, Spectrum-XGS Ethernet adds a distance-aware congestion control algorithm that efficiently balances traffic across sites. With end-to-end telemetry, precise latency management, and deterministic performance, Spectrum-XGS Ethernet technology enables facilities separated by hundreds of kilometers and more to function as a single, coherent AI environment.

## SN6000 Series Switches

The SN6000 series, based on the 102.4 Tb/s Spectrum-6 ASIC, is available in multiple configurations for high-performance L2/L3 forwarding across leaf, spine, and superspine deployments. The platforms deliver full wire-speed throughput, ultra-low latency, and 160 MB per ASIC of fully shared packet buffer for fair and predictable performance.

## SN6800-LD

SN6800 is the industry's first 4-ASIC co-packaged Ethernet switch for AI scale-out, delivering unmatched radix, optical density, and power efficiency for next-generation AI fabrics. Optimized for Spectrum-X Ethernet, SN6800 is a 5U switch that features 512 ports of 800 Gb/s connectivity via MMC-12 optical fibers, delivering 409.6 Tb/s of switching capacity, supporting up to 2,048 breakout connections for massive GPU-cluster scale-out.

The SN6800-LD features a 5RU liquid-cooled design with UQD8 v2 connectors and a 48–60 VDC busbar power architecture for efficient OCP-style rack integration into high-density AI data centers.

## SN6810-LD

The SN6810-LD is a Spectrum-6 switch designed to deliver high-performance Ethernet connectivity for AI clusters. Driven by a single Spectrum-6 ASIC, it delivers 102.4 Tb/s of switching capacity leveraging silicon-photonics co-packaged optics (CPO) for efficient, low-latency single-mode fiber connectivity.

The SN6810-LD features a 2U liquid-cooled design UQD8 v2 connectors and a 48–60 VDC busbar power architecture for efficient OCP-style rack integration into high-density AI data centers.

**Virtualization, Agility, and Security**

- Programmable packet-processing pipeline
- Deep packet parser/editor supporting up to 512 bytes
- Single-pass VXLAN routing and bridging
- Centralized VXLAN routing
- Hardware acceleration for routing, NAT, and tunnel termination
- Hardware root of trust for secured switching
- Zero-trust security foundation for multi-tenant AI clouds
- Open network operating system (NOS) ecosystem support

**Cloud-Tier Scale**

- Programmable Network Control and Policy support for 750,000 entries (shared across routes, media access control (MAC), access control list (ACL))
- Precision Time Protocol (PTP) time synchronization

## SN6600-LD

The SN6600-LD is a fully liquid-cooled switch, featuring 64 OSFP cages supporting 128 ports of up to 800 Gb/s in a compact 2U form factor. It provides 102.4 Tb/s of total throughput for scalable GPU-cluster connectivity. Leveraging the existing pluggable transceiver ecosystem, it is optimized for NVIDIA Spectrum-X Ethernet and supports AI-optimized leaf/spine architectures in middle-of-row (MoR) and end-of-row (EoR) designs. Its 48–60 VDC busbar power design reduces cabling, improves power efficiency, and simplifies maintenance in high-density data center environments.

## Platform Security

SN6000 series switches offer complete security across all switch layers. Hardware, firmware, and software are authenticated by a built-in root of trust, from the basic input and output system (BIOS) to the network operating system (NOS). Any attempt to run an altered component or image is automatically blocked, ensuring secure operation across data center environments.

## Network Operating Systems

- **NVIDIA Cumulus Linux:** NVIDIA Cumulus® Linux is a powerful network operating system (NOS) that enables advanced automation, customization, and scalability using API-first principles hardened in the world's largest data centers. Cumulus Linux is the only NOS that brings operational efficiency to every AI factory.
- **SONiC:** SONiC is a fully open-source, hardware-agnostic NOS designed for hyperscalers, service providers, and enterprises. NVIDIA's Pure SONiC distribution adds NVIDIA expertise and support. Pure SONiC is fully supported across all SN6000 systems.

## Platform Software Options

- **NVIDIA Air:** NVIDIA Air simplifies deployments by enabling digital twins of the entire network to design, test, and validate network provisioning, automation, and security policies. NVIDIA Air allows day-zero operations before hardware is deployed by simulating and automating changes ahead of production, and accelerates deployment of networking infrastructure, reducing time to first token while ensuring cloud-scale efficiency and reliability.
- **NVIDIA NetQ:** With end-to-end network visibility powered by NVIDIA NetQ™, operators gain flow-level insight across switches, GPUs, SuperNICs, and switch ports, including detailed per-hop behavior on RoCE queues. This integrated telemetry enables precise performance monitoring, rapid troubleshooting, and deterministic optimization of multi-tenant AI workloads running across the fabric.

**Technical Specifications***

| Switch Model | SN6800-LD | SN6810-LD | SN6600-LD |
|---|---|---|---|
| **Optical form factor** | 512 MMC-12<br>co-packaged optics | 128 MMC-12<br>co-packaged optics | 64 OSFP 800 GbE<br>liquid-DC |
| **Max. 800 Gb/s ports** | 512 | 128 | 128 |
| **Max. 400 Gb/s ports** | 1,024 | 256 | 256 |
| **Max. 200 Gb/s ports** | 2,048 | 256 | 256 |
| **Max. 100 Gb/s ports** | 2,048+8 | 256 | 256 |
| **External laser source (ELS)** | 64 | 16 | - |
| **Switching capacity (Tb/s)** | 409.6 Tb/s<br>[4x 102.4 Tb/s] | 102.4 Tb/s | 102.4 Tb/s |
| **Lanes per port x max. speed per lane** | 8x 200G PAM4 | 8x 200G PAM4 | 8x 200G PAM4 |
| **CPU** | 16-core x86, AMD | 8-core x86, AMD | 8-core x86, AMD |
| **System memory** | 64 GB | | 64 GB |
| **SSD memory** | 160 GB NVMe | 160 GB NVMe | 160 GB NVMe |
| **Packet buffer** | 4x 160 MB | 4x 160 MB | 160 MB |
| **100/1000 Mb/s management ports** | 2 | 1 | 1 |
| **Serial ports** | 1 RJ45 | 1 RJ45 | 1 RJ45 |
| **USB ports** | | USB-C v3 | USB-A v2 |
| **BMC ports** | 1 RJ45 | 1 RJ45 | 1 RJ45 |
| **Cooling specifications** | Liquid<br>connector: 10x UQD8 v2<br>LFR: 12.27 LPM<br>Coolant temp: 17–45ºC | Liquid<br>connector: 4x UQD8 v2<br>LFR: 3.27 LPM<br>Coolant temp: 17–45ºC | Liquid<br>connector: 2x UQD8 v2<br>LFR 5.7: LPM<br>Coolant temp: 17–45ºC |
| **System power** | 48 VDC/54 VDC [Busbar]<br>Permissible range:<br>40–60 VDC | 48 VDC/54 VDC [Busbar]<br>Permissible range:<br>40–60 VDC | 48 VDC/54 VDC [Busbar]<br>Permissible range:<br>40–60 VDC |
| **Operating conditions** | 0–40ºC | 0–40ºC | 0–40ºC |
| **Size (H x W x D)** | H: 8.75” (220 mm), 5RU<br>W: 17.24” (438 mm)<br>D: 30.55” (780 mm) | H: 3.43” (87 mm), 2RU<br>W: 17.24” (438 mm)<br>D: 30.55” (776 mm) | H: 3.43” (88 mm), 2RU<br>W: 16.8” (438 mm)<br>D: 28.3” (780 mm) |

*This document describes hardware features and capabilities. For information on feature availability, refer to the switch software release notes.

## Compliance

| Standards Compliance | |
|---|---|
| **Safety** | CB, CE, cTUVus, CU |
| **EMC** | CE, ICES, FCC, RCM, VCCI |
| **Non-operating conditions** | -40–70ºC |
| **Relative humidity** | 5%–85% |
| **Operating altitude** | 0–3,050 m |
| **RoHS** | RoHS compliant |

## Enterprise Support and Services

A minimum of one year of Enterprise Business-Standard Support is required when purchasing NVIDIA Spectrum SN6000 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, visit the NVIDIA Enterprise Support and Services User Guide

## Product Specifications

Details of the NVIDIA Spectrum Ethernet SN6000 series switches are available in the SN6000 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 SN6000 Switch Systems User Manual for detailed information on switch ports' power specifications.

## Ready to Get Started?

To learn more about NVIDIA Spectrum Ethernet SN6000 switches, including product specifications and ordering information, refer to the SN6000 Switch Systems User Manual.



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