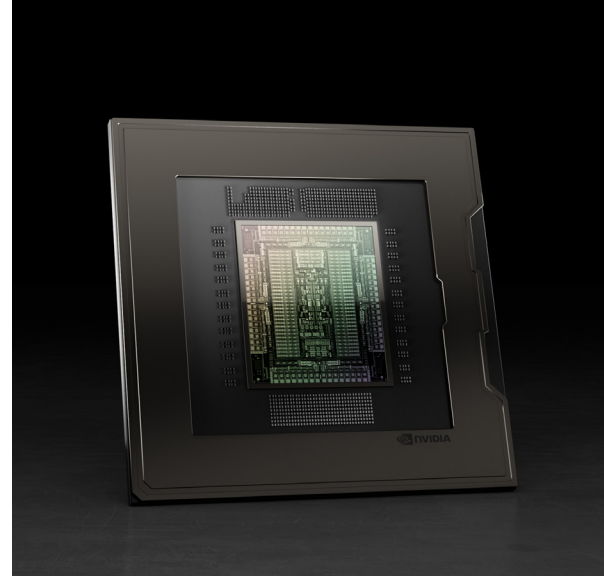




NVIDIA Spectrum ASIC

100G and 50/40/25/10/1G Ethernet switch silicon.



NVIDIA Spectrum™ provides efficient Ethernet interconnect solutions for server and storage systems in enterprise data centers, cloud computing, Web 2.0, data analytics, deep learning, high-performance computing, and embedded environments. The Spectrum switch ASIC delivers leading Ethernet performance, efficiency, throughput, low latency, and scalability by integrating advanced networking functionality for Ethernet fabrics.

From 10 to 100 Gigabit Ethernet

Hyperscale, cloud, data-intensive, virtualized data centers and storage environments are driving the need for increased interconnect performance and throughput. The increasing amount of data that needs to be analyzed quickly and in real time requires interconnect speeds of 100Gb/s and beyond. Spectrum-based Ethernet switches enable users to upgrade their data center Ethernet network from 1G or 10G to 25Gb/s, from 40G to 50Gb/s, and to leverage 100Gb/s for a high data center return on investment. Spectrum flexibility enables building Ethernet switch systems at speeds of 1, 10, 25, 40, 50, and 100 GbE with leading port density, low latency, zero packet loss, and non-blocking traffic.

The integration of 128 PHYs, which are flexible enough to operate at data rates of 1Gb/s to 28Gb/s per lane, makes Spectrum a clear choice for original equipment manufacturers (OEMs) that must address end-user requirements for faster and more robust applications. Spectrum supports network speeds of up to 100 Gb/s per port with extremely low latency, low jitter, and a high message rate. Reduced power, footprint, and fully-integrated PHYs capable of connectivity across printed circuit boards (PCBs), backplanes, as well as passive and active copper/fiber cables allow interconnect fabrics based on Spectrum to be utilized for deploying leading, fabric-flexible computing and storage systems with the lowest total cost of ownership.

Large-Scale Layer 2 or Layer 3

Fabrics drive requirements for increased bandwidth and virtualization, while maintaining non-blocking performance at low latency. Spectrum addresses these requirements by integrating advanced networking features, such as virtualization and tunneling cores, with flexible software-defined network (SDN) control and monitoring engines on top of industry-leading cut-through latencies and a 3.2Tb/s non-blocking switching capacity.

Highlights

- > Zero packet loss
- > Industry-leading, true, cut-through latency
- > Forwarding database sized for hyperscale
- > Optimized for software-defined networking (SDN)
 - > Support for OpenFlow Switch Spec Ver 1.0 to 1.4 and beyond
- > Remote-configurable routing tables
- > 3.2Tb/s switching capacity, delivering wire-speed performance at all packet sizes and traffic patterns
- > Dynamically shared, flexible, packet buffering
- > Comprehensive overlay and tunneling support: VXLAN, NVGRE, Geneve, and MPLS
- > Data Center Bridging (DCB)
- > PFC, DCBX, ETS
- > Advanced load balancing
- > Advanced congestion management, explicit congestion notification (ECN)
- > Low-cost solution
 - > Fully integrated PHYs

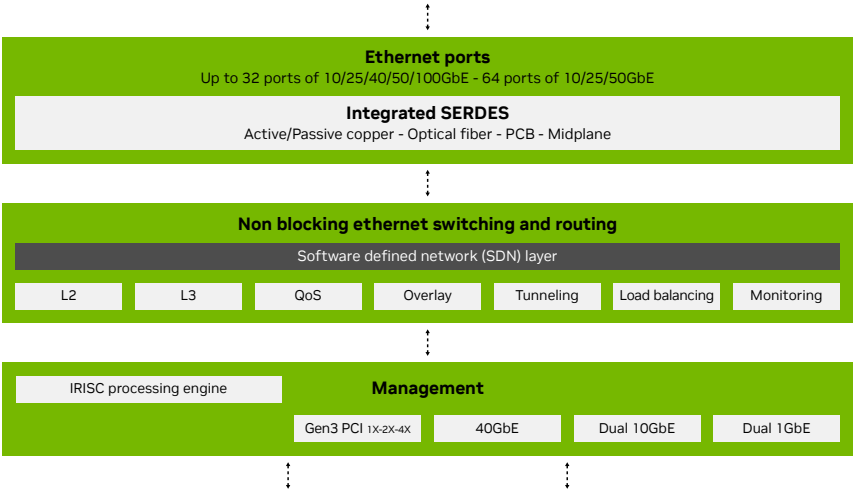
Efficient Switch Network Infrastructure

The demand for data center performance continues to grow as multi-tenant private and public cloud workloads require the network to deliver a high level of reliability and guaranteed service levels. NVIDIA switch solutions deliver zero-loss, wire-speed throughput for all message sizes, and low jitter for predictable latency.

Port Configuration

Spectrum has flexible port configuration that supports a variety of port speeds in 4-lane, 2-lane, or 1-lane operation. Spectrum can provide up to 32 ports of 40/100 GbE, up to 64 ports of 10/25/40/50 GbE, or any combination of these speeds.

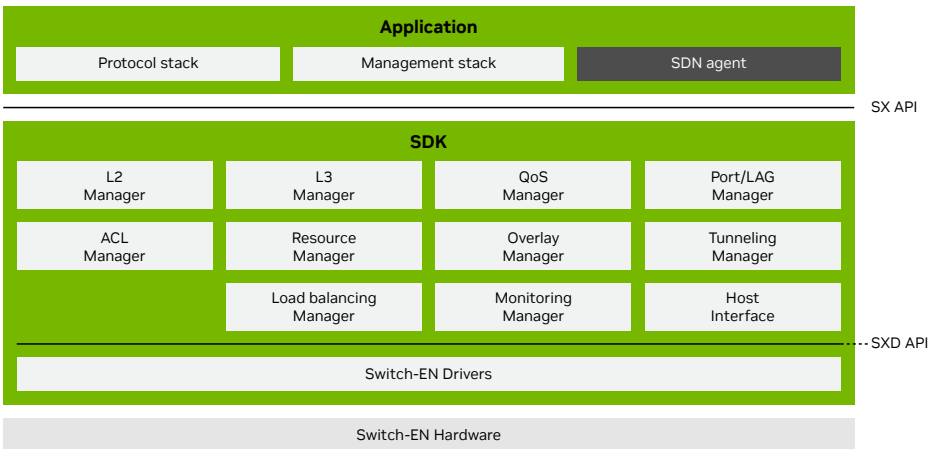
Spectrum Architecture



Optimized SDN Support

Spectrum includes advanced capabilities for remote management as well as configuration and monitoring of data center fabrics, exceeding the requirements of OpenFlow Switch Specification Version 1.4. Such capabilities combine functions like L2 and L3 forwarding tables, overlay network units, and tunneling protocols with advanced statistics and monitoring tables, through an efficient, SDN-optimized control plane and software interfaces. The Spectrum packet-processing pipeline provides unmatched flexibility in managing, monitoring, and distributing data flows at all layers, including tunneling and virtualized flows. Spectrum enables IT managers to program and centralize their server and storage interconnect management and dramatically reduce their operating expenses by completely virtualizing their data center network.

SDN-Optimized Software



- > Backplane and cable support
- > 1, 2, and 4 lane
- > Flexible port configurations
 - > Up to 32 x 40/100 GbE ports
 - > Up to 64 x 10/25/50 GbE ports

Compatibility

Ethernet

- > 1, 10, 25, 40, 50, and 100 Gb/s
- > DCB (PFC, ETS, DCBX)

CPU Interoperability

- > PowerPC, Intel® x86, AMD x86, and MIPS

Host Interface

- > PCIe Gen 3.0; 4 lanes of 8GT/s, 5GT/s, or 2.5GT/s

Interoperability

- > Full interoperability with standard Ethernet NICs and switches

SerDes

- > 128 x 50Gb/s PAM4 (802.3bs, 802.3cd)
- > 10Gb/s (802.3ba, 802.3ae) and 25GbE (802.3bj, 802.3bm) NRZ operational modes

Connectivity

- > Drives active/passive copper cables, fiber optics, PCB, or backplanes

I/O Specifications

- > 32 x 40/56/100 GbE ports, 64 x 10/20/25/40/50 GbE ports
- > SPI flash interface, I²C
- > IEEE 1149.1 boundary-scan JTAG
- > Link status LED indicators
- > General purpose I/O

Package

- > 52.5mm x 52.5mm FCBGA

Switch Development Platforms

The Spectrum Development Kit (DVK) and Software Development Kit (SDK) are available to accelerate OEM evaluation, development, and time to market. These rack-mountable systems are available with full hardware functionality and a mix of QSFP and SFP+ interfaces. OEMs can develop fully functional switching software by integrating a switching management stack on top of the Spectrum SDK.

Ordering Information

OPN / SKU	Description
MT52132A1-FDCG-C	NVIDIA Spectrum, 128x25Gb/s NRZ, 32-Port 100GbE Switch IC
MT52132A1-FDIF-C	NVIDIA Spectrum, 128x25Gb/s NRZ, 32-Port 100GbE Switch IC, Industrial Temperature

Ready to Get Started?

To learn more, contact an NVIDIA sales representative:
[nvidia.com/en-us/contact/sales](https://www.nvidia.com/en-us/contact/sales)

Refer to the driver and firmware release notes for feature availability at <https://docs.nvidia.com/networking/>

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