



NVIDIA SPECTRUM-3

400G Ethernet Switch Silicon



NVIDIA® Spectrum®-3 is our 4th generation of Ethernet switch ASIC and provides an unmatched combination of performance, virtualization, and telemetry capabilities in a 12.8 Tbps Ethernet switch silicon with 256 x 50 Gb/s PAM4 SerDes. The SerDes can act independently, in pairs, quads or groups of 8, to operate at speeds between 1 GbE and 400vGbE for maximum flexibility. The switch ASIC is optimized for cloud, storage and Machine Learning solutions. The Spectrum® family of products enjoy a strong software ecosystem that can be leveraged by partners to develop and deploy solutions with a rapid time-to-market.

Consistent Performance

Consistent performance and fair bandwidth sharing are critical for multi-tenant cloud, distributed storage workloads, as well as hardware-accelerated data transfers using technologies such as GPUDirect® or NVMe-oF. Spectrum-3 features a 64 MB fully-shared and monolithic packet buffer that is dynamically shared across all ports. This provides excellent burst absorption with true, port-to-port, cut-through latency.

The on-chip packet buffer supports high-bandwidth packet reads/writes, enabling consistent and predictable cut-through performance. The monolithic packet buffer architecture simplifies buffer management and traffic scheduling, while also enabling fair resource sharing. Additionally, Spectrum-3 supports intelligent congestion management mechanisms, including Explicit Congestion Notification (ECN), that enable robust RoCEbased, hardware-accelerated, data transport and load balancing, such as adaptive routing and Priority-based Flow Control (PFC).

Advanced Network Visualization

Spectrum-3 is designed with a highly-flexible programmable packet pipeline that enables advanced network virtualization. The hybrid packet-forwarding pipeline comprises optimized blocks, which are streamlined in hardware to deliver the highest performing traditional functionality. The pipeline also is made up of programmable blocks for supporting new functionality. Leveraging this capability, Spectrum-3 can deliver industry-leading packet-processing rates at scale, concurrently with programmability and Advanced Network Virtualization.

Spectrum-3 supports single-pass VXLAN routing and provides 10X better VXLAN VTEP and tunnel scale. In addition to VXLAN, Spectrum-3 supports a myriad of virtualization technologies including SRV6, Network Address Translation (NAT), and more.

HIGHLIGHTS

- > 12.8 Tb/s of Ethernet switching and IP routing
- > Integrated 256 x 50 Gb/s PAM4 SerDes
- > Flexible port configurations:
 - > Up to 32 x 400 GbE ports
 - > Up to 64 x 200 GbE ports
 - > Up to 128

CONSISTENT PERFORMANCE

- > Industry leading, true, cut-through latency
- > Low power consumption per port
- > 64 MB dynamically-shared, flexible, packet buffering
- > Robust RoCE data path for NVMe-oF and GPUDirect®
- > Adaptive Routing congestion avoidance

ADVANCED NETWORK VIRTUALIZATION

- > Single-pass VXLAN bridging and routing
- > Centralized VXLAN routing
- > Comprehensive overlay and tunneling support: VXLAN-GPE, NVGRE, Geneve, NSH and MPLS/IPv6 based Segment Routing
- > Network Address Translation (NAT)

EVENT-BASED TELEMETRY

- > Reduced Mean Time to Recovery/Innocence
- > Actionable telemetry with What Just Happened (WJH)
- > Hardware-based buffer histograms
- > Streaming telemetry
- > In-band network telemetry

