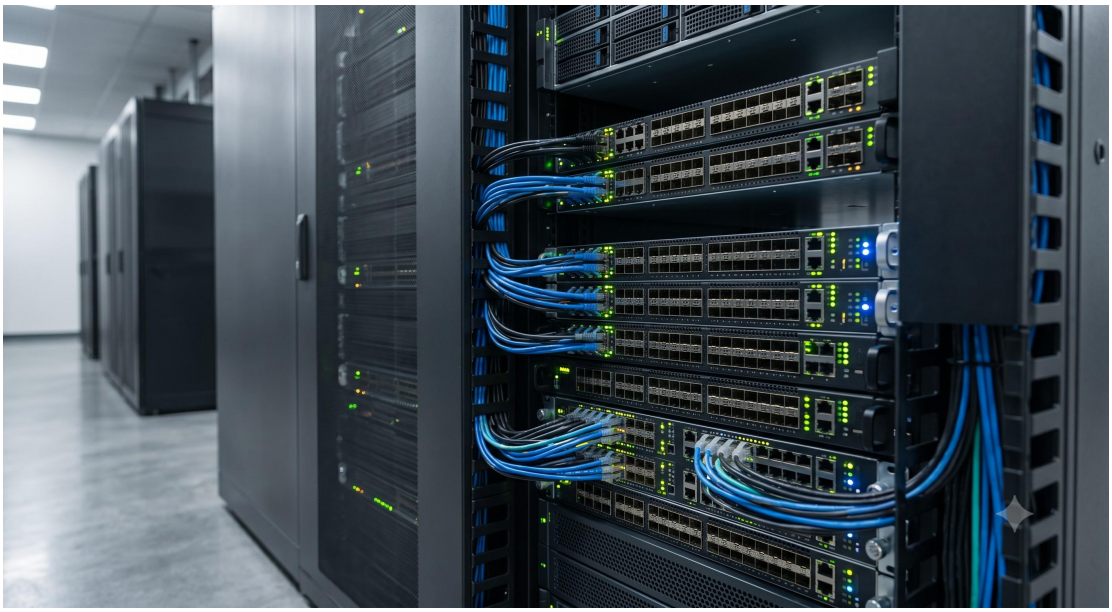
Server Virtualization High Density Network Interface - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The explosive growth of virtualized server environments and east-west data center traffic demands a fundamental rethinking of network access architecture. Traditional top-of-rack switching, with its limited port densities and rigid forwarding models, has become a primary bottleneck in modern hyper-converged and cloud-native infrastructures. The Server Virtualization High Density Network Interface (SV-HDNI) family represents a paradigm shift, delivering an unprecedented combination of port density, energy efficiency, and programmable data-plane performance. This document provides a comprehensive technical overview of the platform, detailing its hardware architecture, forwarding engine capabilities, and operational advantages for the most demanding virtualized data centers. Engineered for the hyper-scale era, the SV-HDNI maximizes server ROI by enabling more virtual machines per physical host, accelerating storage access, and ensuring consistent, predictable application performance.



HARDWARE ARCHITECTURE & SILICON

At the heart of the SV-HDNI lies a purpose-built, fifth-generation network processor ASIC, fabricated on a 7nm process node. This system-on-chip integrates a high-performance, fully shared packet buffer, a ternary content-addressable memory (TCAM) engine for advanced ACL and QoS, and a sophisticated traffic manager. The architecture is built around a non-blocking, cell-based switching fabric that guarantees line-rate performance across all ports and packet sizes. The hardware is designed for maximum operational efficiency, utilizing a high-efficiency, variable-speed fan design and a meticulous airflow path that can be configured for either port-to-power or power-to-port cooling, enabling seamless integration into existing data center hot-aisle/cold-aisle containment strategies. The chassis incorporates advanced telemetry sensors that monitor thermal and power consumption in real-time,

feeding data to a central management plane for predictive capacity planning and proactive fault mitigation.

KEY FEATURES & ROUTING LOGIC

- Feature 1: Wire-Speed L2/L3 Forwarding - Delivers deterministic, line-rate performance for all packet sizes (64 to 9216 bytes) with zero packet loss across all active ports.
- Feature 2: Advanced Virtualization Support - Features hardware-based VXLAN, NVGRE, and Geneve tunnel termination and initiation, enabling agile overlay networks for multi-tenant and micro-segmentation architectures.
- Feature 3: Intelligent Hash & ECMP - Employs a dynamic, adaptive hashing algorithm to ensure efficient load balancing across multiple links, maximizing link utilization and minimizing flow collisions.
- Feature 4: Microsecond Latency - Optimized pipeline design results in sub-microsecond, cut-through switching latency, critical for high-frequency trading, AI/ML training, and NVMe-oF storage traffic.
- Feature 5: Programmable Pipeline - The on-board ASIC allows for field-upgradable packet processing pipelines, enabling the introduction of new protocols and features (e.g., in-band network telemetry) without hardware replacement.
- Feature 6: Energy Efficient Ethernet (EEE) - Compliant with IEEE 802.3az,

dynamically reducing power consumption during periods of low link utilization, lowering overall TCO.

COMPLIANCE & STANDARDS

The SV-HDNI platform is designed and certified to meet the most stringent global regulatory and industry standards, ensuring interoperability and reliability in diverse environments. Full compliance is maintained with IEEE 802.3 (Ethernet), IEEE 802.1Q (VLAN), IEEE 802.1ad (Q-in-Q), IEEE 802.3ae (10 Gb/s), IEEE 802.3ba (40 Gb/s & 100 Gb/s), and IEEE 802.3by (25 Gb/s). The platform adheres to the rigorous environmental, health, and safety requirements of RoHS, REACH, and WEEE directives. It has successfully passed the electromagnetic compatibility (EMC) testing for FCC Part 15, ICES-003, and EN 55032 class A and is certified to CB, UL, and CE safety standards. Furthermore, the hardware is designed in accordance with the Network Equipment Building Standards (NEBS) GR-63-CORE and GR-1089-CORE Level 3, guaranteeing its robustness for carrier-grade deployments.

TECHNICAL SPECIFICATIONS

- Physical Ports: 48 x 10/25 GbE SFP28 ports + 8 x 40/100 GbE QSFP28 ports or 64 x 10/25 GbE SFP28 ports, all supporting hot-swappable transceivers.

- Maximum Switching Capacity: 3.2 Tbps (full-duplex, non-blocking).

- Forwarding Rate: Up to 2.4 Bpps (billion packets per second).

- MAC Address Table Size: 288,000 entries.

- Routing Table Size (IPv4): 256,000 prefixes.

- Routing Table Size (IPv6): 128,000 prefixes.

- Packet Buffer Memory: 36 MB shared, dynamically allocated.

- CPU: Dual-core x86 2.2 GHz processor with 16 GB onboard memory for control plane.

- Dimensions (HxWxD): 1.73'' (1RU) x 17.4'' x 18.0'' (for 48-port variant) / 1.73'' (1RU) x 17.4'' x 20.5'' (for 64-port variant).

- Power Supply: Dual, hot-swappable, load-sharing, 80 PLUS Platinum-rated AC/DC power supplies (550W).

- Cooling: (5+1) hot-swappable fan trays, front-to-back or back-to-front airflow options.

- Operating Temperature: 0°C to 45°C (32°F to 113°F).

- Operating Humidity: 10% to 90% (non-condensing).

- Mean Time Between Failures (MTBF): > 450,000 hours (calculated per Telcordia SR-332).

- Management Interfaces: 1 x RJ45 out-of-band management port, 1 x USB 2.0 storage port, 1 x RJ45 console port.

Parameter	**Specification**

Form Factor	1RU Standard (48/64-port variants)
Switching Capacity	Up to 3.2 Tbps (full-duplex, non-blocking)
Port Configuration	48x 10/25GbE SFP28 + 8x 40/100GbE QSFP28 or 64x 10/25GbE SFP28
Power Supply	Dual Hot-Swappable Redundant AC/DC, 80 PLUS Platinum (550W)
Latency (Cut-through)	< 1 microsecond (typical)
Packet Buffer	36 MB shared, dynamically allocated
Forwarding Rate	Up to 2.4 Bpps

