Line-Rate Forwarding Performance Switch - Official Technical Overview & Hardware Datasheet

LINE-RATE FORWARDING PERFORMANCE SWITCH

EXECUTIVE SUMMARY

The Line-Rate Forwarding Performance Switch represents a paradigm shift in high-throughput network infrastructure. Engineered for carriers, cloud providers, and large-scale enterprise data centers, this platform delivers deterministic, non-blocking forwarding at wire-speed across all ports and packet sizes. By eliminating head-of-line blocking and ensuring zero packet loss under full line-rate load, the switch guarantees Service Level Agreements (SLAs) for mission-critical applications including high-frequency trading (HFT), AI training clusters, and 5G mobile backhaul. This datasheet provides the complete technical specification, hardware architecture overview, and ordering information for the platform.

ARCHITECTURE & CHASSIS DESIGN

The switch is built around a distributed, shared-memory switching fabric with a line-rate forwarding engine implemented in hardware. Unlike software-dependent or oversubscribed designs, every physical port possesses dedicated bandwidth to the central fabric, ensuring that aggregate throughput scales linearly with port count.

- Non-Blocking Switching Fabric: Total fabric capacity of up to 12.8 Tbps (for the 32x400GbE model) with cell-based switching and virtual output queuing (VoQ) to prevent HOL blocking.
- Hardware Forwarding Engine: Programmable pipeline ASIC supporting L2/L3 forwarding, ACLs, and QoS at line-rate, independent of packet size (64 to 9216 bytes).

- Modular Chassis Options: Available in fixed 1RU (up to 48x25GbE + 8x100GbE), 2RU (up to 32x400GbE), and 4RU modular chassis with up to 8 line card slots.

- Redundancy Architecture: 1+1 hot-swappable power supplies, N+1 redundant fan trays, and optional ISSU (In-Service Software Upgrade) to maintain forwarding during updates.

HARDWARE FEATURES

- Port Configuration: Full-density 1/10/25/40/50/100/200/400GbE front-panel ports (model dependent). All ports support breakout cables (e.g., 1x400GbE to 4x100GbE).

- Forwarding Rate: 100% line-rate, no packet loss for any frame size. Example: 48x25GbE model = 1.2 Tbps switching capacity, 1.2 Bpps (billion packets per second) for 64-byte frames.

- Latency: Sub-microsecond cut-through latency (typically < 600 ns for 10GbE, < 1 µs for 400GbE).

- Buffering: Configurable shared buffer up to 32 GB (dynamic per port, congestion-aware).

- CPU/Control Plane: Dual-core x86 (1.8 GHz) with out-of-band management port, 16 GB DDR4, 64 GB SSD for logs and telemetry.

COMPLIANCE & STANDARDS

- IEEE 802.3 (Ethernet), 802.1Q (VLAN), 802.1ad (QinQ), 802.3x (Flow Control).

- RFC 2544 (Benchmarking), RFC 2889 (LAN switching device testing).

- RoHS, REACH, WEEE, FCC Class A, CE, VCCI, RCM.

- NEBS Level 3 (Telcordia GR-63-CORE, GR-1089-CORE) for carrier-grade deployments.

TECHNICAL SPECIFICATIONS

Parameter	**Specification**
Form Factor	1RU / 2RU / 4RU Modular Chassis
Switching Capacity	1.2 Tbps (48x25G) up to 12.8 Tbps (32x400G), Non-Blocking
Forwarding Rate (64B)	1.2 Bpps (1RU model), 9.5 Bpps (2RU 400G model)
Latency (min)	< 600 ns (10GbE), < 1 µs (400GbE)
MAC Address Table	256,000 entries
Routing Table (IPv4/IPv6)	128,000 / 64,000 routes
ACL Entries	16,000 (ingress + egress)
Jumbo Frame Support	9216 bytes
Power Supply	1+1 or 2+2 Redundant,

	Hot-swappable AC (100-240V) or DC (-48V)
Typical / Max Power	180W / 250W (1RU model); 450W / 600W (2RU 400G model)
Cooling	N+1 front-to-back airflow fans, 80 CFM max
Operating Environment	0°C to 45°C (32°F to 113°F), 5% to 95% RH non-condensing
MTBF	312,000 hours (Telcordia SR-332)

ORDERING OPTIONS

Base SKU Matrix:

- LRF-4825-8C: 48x25GbE SFP28 + 8x100GbE QSFP28, 1RU, 2xAC PSU, switching capacity 1.2 Tbps.

- LRF-32400-F: 32x400GbE QSFP-DD, 2RU, 4xAC PSU (2+2 redundant), switching capacity 12.8 Tbps.

- LRF-4-CHASSIS: 4RU modular chassis (8 slots). Requires separate line cards: LRF-LC-48x100G (48x100GbE), LRF-LC-24x400G (24x400GbE).

- Accessories: Breakout cables (400G to 4x100G, 100G to 4x25G), dual-rate optical transceivers, rack mount kit 4-post (included).

Warranty & Support: 5-year hardware warranty, 24/7 TAC support with 4-hour on-site replacement (premium contract).