

ULTRA-LOW LATENCY FORWARDING ENGINE FACTSHEET: NEXT-GENERATION CORE ROUTER

PRODUCT IDENTIFICATION

The Next-Generation Core Router (NGCR-9K) represents a paradigm shift in carrier-grade routing, integrating a purpose-built, Ultra-Low Latency Forwarding Engine (ULFE) with a high-density 400G/800G port architecture. This system is engineered for the convergence of 5G transport, cloud-native core networks, and hyperscale data center interconnect (DCI), delivering deterministic sub-microsecond latency and unprecedented energy efficiency per gigabit. The NGCR-9K platform redefines the economic and performance thresholds for modern IP backbone infrastructure.



SYSTEM HARDWARE TOPOLOGY

The NGCR-9K architecture is founded on a fully distributed, non-blocking fabric utilizing a Clos-based switch fabric with a 3+1 redundant matrix. The chassis design is partitioned into three primary functional planes: the Data Plane, comprising the ULFE ASICs and high-speed SerDes; the Control Plane, featuring dual redundant route processors with 2.4 GHz multi-core CPUs; and the Management Plane, with out-of-band 1G/10G Ethernet access. A 17-slot modular chassis supports up to twelve line card slots, four fabric card slots, and one dedicated system controller slot, facilitating a flexible, pay-as-you-grow investment model for network operators.

DATA & CONTROL PLANE CAPABILITIES

The Ultra-Low Latency Forwarding Engine (ULFE) employs a parallel pipeline architecture that processes IPv4, IPv6, MPLS, and Segment Routing (SR-MPLS/SRv6) headers in a single clock cycle. Key capabilities include: line-rate 800GbE per port, Jumbo Frame support up to 16KB, and a cut-through switching mode that ensures port-to-port latency is consistently below 4 microseconds under full load. The control plane leverages a modular network operating system, supporting BGP-LS, PCEP, and gRPC for telemetry, enabling seamless integration with Software-Defined Networking (SDN) controllers and network automation frameworks for closed-loop optimization.

Parameter	Specification
Form Factor	19" Rack-Mountable 17-Slot Modular Chassis (13U)
Switching Capacity	36 Tbps (Non-Blocking, Full-Duplex)
Power Supply	4x 3,000W Hot-Swappable AC/DC (N+1 Redundant)
Forwarding Latency	< 4 microseconds (64B Packet, Cut-Through)
Supported Optics	400G QSFP-DD, 800G OSFP, 100G QSFP28 (Coherent/NRZ)
Power Efficiency	2.8 Watts per Gbps

COMPONENT BREAKDOWN

Line Card Types: 36x400G QSFP-DD, 24x800G OSFP, and 48x100G QSFP28 modules, all supporting coherent and non-coherent optics. Fabric Modules: High-bandwidth switch fabric chips with 4.5 Tbps per chip, arranged in a 1:1 oversubscription ratio. Route Processor: Dual 2.4 GHz 16-Core Intel Xeon processors with 64GB DDR4 ECC memory and 128GB SSD for system logs. The system is optimized for 5G core slicing, offering hardware-based QoS queueing

with up to 8 queues per port and advanced congestion management via PFC and ECN.

OPERATIONAL SPECS MATRIX

System Capacity: Maximum throughput of 36 Tbps in a single chassis. Port Density: Support for up to 36 x 400G interfaces, allowing for a total throughput of 14.4 Tbps of line-rate traffic. Latency: < 4 microseconds (64-byte frame) in cut-through mode. Jitter: < 1 microsecond. Power Efficiency: 2.8 Watts per Gbps, featuring intelligent power scaling with per-port laser shutdown and dynamic clock throttling.



REGULATORY COMPLIANCE

The NGCR-9K platform is designed to exceed the stringent requirements of modern telecom and enterprise data centers. Compliance certifications include: Safety (UL, IEC 60950-1/62368-1), EMC (FCC Part 15, EN 55022 Class A), Environmental (RoHS, WEEE), and NEBS Level 3 (GR-63-CORE, GR-1089-CORE). The system also meets the Time Sensitive Networking (TSN) and IEEE 802.1BR standards, ensuring deterministic communication for industrial IoT and ultra-reliable low-latency communication (URLLC) applications.