High-Density Core Routing Capabilities Blueprint: ZTE ZXR10 T8000 Core Router Multi-Chassis Cluster Scalability

PLATFORM ROLE IN ISP

The ZXR10 T8000 is ZTE's flagship core routing platform, purpose-built for the extreme capacity demands of Internet core nodes, backbone super-nodes, and large metropolitan area network egress points. As service providers confront relentless growth in broadband traffic, 5G backhaul, and cloud service interconnect requirements, the T8000 delivers a strategic architecture that transcends single-chassis limitations. Its defining characteristic is the ability to cluster multiple physical chassis into a single logical router, enabling linear capacity expansion without disrupting existing service delivery. This clustering paradigm allows operators to commence with a standalone system and seamlessly evolve toward a multi-chassis configuration as bandwidth demands escalate, protecting capital investment and ensuring long-term infrastructure viability.



NON-BLOCKING SWITCHING ARCHITECTURE

The T8000 employs a distributed forwarding architecture with a non-blocking crossbar switching fabric, logically separating the forwarding, control, and management planes. This three-plane separation is a fundamental prerequisite for next-generation service delivery, ensuring that control-plane processing and management operations remain isolated from line-rate data forwarding. At the heart of the system lies ZTE's self-developed ZXRIC chipset family. The ZXRIC SF600 switching fabric chip provides 600 Gbps Crossbar capacity and supports three-stage CLOS cascading, significantly exceeding the capabilities of contemporary commercial switch fabric silicon. Complementing this, the ZXRIC PFE packet forwarding engine delivers wire-speed forwarding at 40G and 100G per slot, while the ZXRIC TME traffic management chip implements five-level hierarchical QoS for precise, granular control over subscriber and service traffic.

The multi-chassis cluster architecture interconnects Central Fabric Chassis and Line Card Chassis through high-speed fabric links. Supported cluster modes include back-to-back, 1+2, 1+4, 2+2, 2+4, 2+8, 4+16, and ultimately 16+64 configurations. In the maximum 16+64 mode, the system can achieve switching capacities approaching 200 Tbps, with support for up to 2,048 40G interfaces or 1,024 100G interfaces. This clustering approach transforms the T8000 from a single-point routing element into a scalable fabric that grows in direct proportion to the number of interconnected chassis, allowing capacity expansion without the operational disruption of a full system replacement.

TRAFFIC MANAGEMENT

Effective core routing demands more than raw throughput; it requires intelligent, policy-driven treatment of diverse traffic classes. The T8000 addresses this through a comprehensive traffic management framework anchored by the ZXRIC TME chip and the ROSng operating system. The system supports five levels of hierarchical QoS, enabling differentiated treatment across physical ports, logical interfaces, service classes, and individual subscriber flows. Queue resources and buffer allocation are managed with sufficient granularity to absorb bursts and maintain latency bounds for delay-sensitive applications such as voice and real-time video.

On the control plane, the T8000 supports a rich suite of routing and service protocols. IPv4 and IPv6 unicast and multicast routing are complemented by MPLS, MPLS-TE, and MPLS L2/L3 VPN capabilities. The platform embraces SDN readiness through support for EVPN, BGP-LS, BGP Flowspec, and NETCONF/YANG, enabling centralized path computation and automated service provisioning. Segment Routing over IPv6 allows the T8000 to select optimal paths based on service intent, network bandwidth, and latency constraints, with real-time adjustment to meet differentiated SLA requirements. Traffic measurement and visibility are addressed through TWAMP/SQA, Telemetry, and Netflow/IPFIX, providing operators with the data needed for proactive network optimization.

PERFORMANCE PARAMETERS

The T8000's performance profile reflects its positioning as a carrier-grade core platform. Single-chassis switching capacity is specified at 3.84 Tbps full-duplex with the 40G generation, scalable to 7.68 Tbps with 100G line cards. Packet forwarding performance reaches 1,600 million packets per second in the 40G configuration. The routing information base supports between 4 and 10 million IPv4 routes depending on configuration, a scale sufficient for projected Internet growth over the platform's service life.

High availability is engineered into every subsystem. The switch fabric supports 1+1, 2+1, and 3+1 redundancy configurations to match specific resiliency requirements. All major modules—power supplies, fan trays, control processors, and line cards—are hot-swappable, and the system supports non-stop routing and non-stop forwarding to eliminate service interruption during maintenance or upgrade events. Graceful Restart and pseudowire redundancy provide additional layers of protection for always-on service delivery. The T8000 has received recognition from industry analysts, including a Leader rating from GlobalData in the Infrastructure Services and Network and Service Management categories, underscoring its operational maturity.

Parameter	**Specification**
Cluster Configuration (Maximum)	16+64 mode (Central Fabric Chassis + Line Card Chassis)
Maximum Switching Capacity	Up to 200 Tbps (cluster)
Single-Chassis Switching Capacity	3.84 Tbps (40G generation) / 7.68 Tbps (100G generation)
Maximum Interface Density	2,048 x 40G or 1,024 x 100G
Packet Forwarding Performance	1,600 Mpps (40G system)
Switch Fabric Redundancy	1+1, 2+1, 3+1
Routing Scale (RIB)	4–10 million IPv4 routes

Architecture	Distributed forwarding, non-blocking CLOS, three-plane separation
Core Silicon	ZXRIC PFE, SF600, TME (self-developed)
QoS	Five-level hierarchical QoS
High Availability	NSR, NSF, TE-FRR, LDP-FRR, GR, hot-swappable modules
Management	Netnumen U31 (FCAPS), SNMP, CORBA, TL1, XML

CARRIER COMPLIANCE

The T8000 is designed to meet the stringent environmental and operational standards expected of carrier core infrastructure. The platform incorporates intelligent and dynamic power management across power supplies, line cards, and system components, aligning with global green telecom initiatives. ZTE's self-developed chips contribute to a lower per-gigabit power consumption profile compared to merchant silicon alternatives, reducing operational expenditure over the platform's lifecycle.

The system supports synchronization requirements for latency-sensitive traffic

through IEEE 1588 with synchronous Ethernet interfaces, an out-of-band 1PPS+TOD interface, and adaptive SSM or BMC protocols for automatic protection switching of time links. From an interoperability standpoint, the T8000 is designed for multi-vendor networking, supporting standard protocols including TL1, Syslog, CORBA, SNMP, and XML for northbound management integration. The Netnumen U31 management system provides full FCAPS functionality, centralized element and network management, and service-layer orchestration capabilities that span access, bearer, control, and application layers.

ARCHITECTURE DIAGRAM

The T8000 cluster architecture represents a deliberate engineering response to the fundamental constraint of single-chassis routing: physical slot count and backplane bandwidth. By externalizing the switching fabric into dedicated Central Fabric Chassis and distributing line-card processing across multiple Line Card Chassis, the cluster achieves a scale-out model that preserves the operational simplicity of a single logical router. Control plane functions are distributed across the cluster with balanced load sharing, while the forwarding plane maintains non-blocking connectivity through the CLOS fabric.

This architecture has been validated through extensive commercial deployment.

The T8000 platform has been deployed by China Telecom, China Unicom, China Mobile, and international operators including Vietnam VNPT and Saudi Atheeb. Its evolution from 40G to 100G and beyond has followed ZTE's platform strategy, with self-developed silicon progressing from the original ZXRIC generation to 1T NP and 8.8T SF chips in commercial service. For operators planning backbone infrastructure that must accommodate a decade of bandwidth growth, the T8000 multi-chassis cluster offers a proven, scalable foundation.

