Enterprise Core Systems Engineering Reference Manual: Edge Computing Node Localized Data Routing

PRODUCT IDENTIFICATION

Document ID: TN-EDN-9472-LDR-R2.0

Product Series: EdgeCore 7000 Series

Routing Engine: LDR-S100 Application-Specific Forwarding Subsystem

The EdgeCore 7000 Series is a hardened, carrier-grade edge computing node engineered specifically for localized data routing. Designed to reside at the network extremity—within 5G gNB aggregation points, industrial IoT gateways, or retail branch aggregation closets—this platform executes real-time packet inspection, local breakouts, and closed-loop forwarding without traversing the regional core network. By instantiated Localized Data Routing (LDR) policies directly on the forwarding ASIC, the node reduces egress latency by up to 87% and offloads backhaul capacity by over 60% in typical distributed architectures.



CORE INTERNAL TOPOLOGY

The EdgeCore 7000 implements a disaggregated three-plane architecture: the Control Plane (4-core ARM Cortex-A78 application processor, 8 GB DDR4), the Data Plane (LDR-S100 switching engine with 128 Mbit on-chip packet buffer), and the Management Plane (dedicated 1GbE out-of-band port with secure enclave). The LDR-S100 ASIC maintains a parallel forwarding information base (FIB) for localized prefixes while synchronizing a compressed routing table from the central SDN controller via Netconf/YANG. A hardware-based traffic classifier matches flows against user-defined LDR rules — source/destination subnet, application signature, or 5G QoS flow identifier (QFI) — and either forwards locally or tunnels back to the core. The internal crossbar fabric operates at 240 Gbps full-duplex, non-blocking.

SWITCHING SUBSYSTEM CAPABILITIES

All eight 10GbE SFP+ interfaces and four 25GbE SFP28 uplinks support line-rate wire-speed forwarding. The platform performs localized routing for IPv4, IPv6, MPLS, and VXLAN-encapsulated traffic. Key LDR features include:

- Local Breakout (L-BO): Terminate GTP-U tunnels from gNodeBs, extract user-plane traffic, and route directly to local edge applications (MEC servers, data aggregators) without hair-pinning.
- Closed-Loop Forwarding: Forwarding decisions based on real-time link quality (loss, jitter, latency) via embedded Telemetry Agent.
- Prefix Steering: Match /32 or /128 host routes for critical IoT devices, maintaining session state across node reboots using NVDIMM-N.
- Service Chaining: Redirect selected flows to embedded virtualized network functions (micro-firewall, NAT44) running in the Control Plane container runtime.

OPERATIONAL ADVANTAGES

- Latency Reduction: Forwarding decisions under 1.2 microseconds (P50) for LDR-miss flows; LDR-hit flows resolve in under 380 nanoseconds.
- Bandwidth Optimization: Up to 72% reduction in northbound backhaul

utilization for video surveillance, predictive maintenance, and AR/VR workloads.

- Resilience: Active-Standby state synchronization between paired EdgeCore 7000 nodes; hitless failover occurs within 50 milliseconds per G.8032 ERPS.

- Zero-Touch Provisioning: Bootstrapping via DHCP option 43 with signed configuration from the Orchestrator; automated LDR policy distribution.

SPECIFICATION MATRIX

Parameter	**Specification**
Form Factor	1RU Rack-mountable, 442mm x 330mm x 43.5mm (WxDxH)
Switching Capacity	240 Gbps non-blocking, full-duplex
Power Supply	Dual 150W AC (100-240V, 50/60Hz), optional -48VDC
Forwarding Rate	180 Mpps (64-byte frames)
LDR Rule Capacity	16,000 hardware entries (expandable via TCAM daughter card)
Operating Temperature	-5°C to +55°C (extended: -40°C with fan kit option)
Typical / Max Power	45W typical / 95W maximum loading all ports
MTBF (Telcordia SR-332)	342,000 hours @ 40°C GB

REGULATORY COMPLIANCE

- EMC: FCC Part 15 Class A, EN 55032:2015, EN 55035:2017

- Safety: UL 60950-1, IEC 62368-1:2018, CE Marking

- Environmental: RoHS3, REACH SVHC, WEEE

- Carrier: NEBS Level 3 (GR-63-CORE, GR-1089-CORE), MEF 3.0 CE 2.0

- Telecom: 3GPP TS 23.501 (Local Data Network steering), TR-147 (Broadband Forum)

