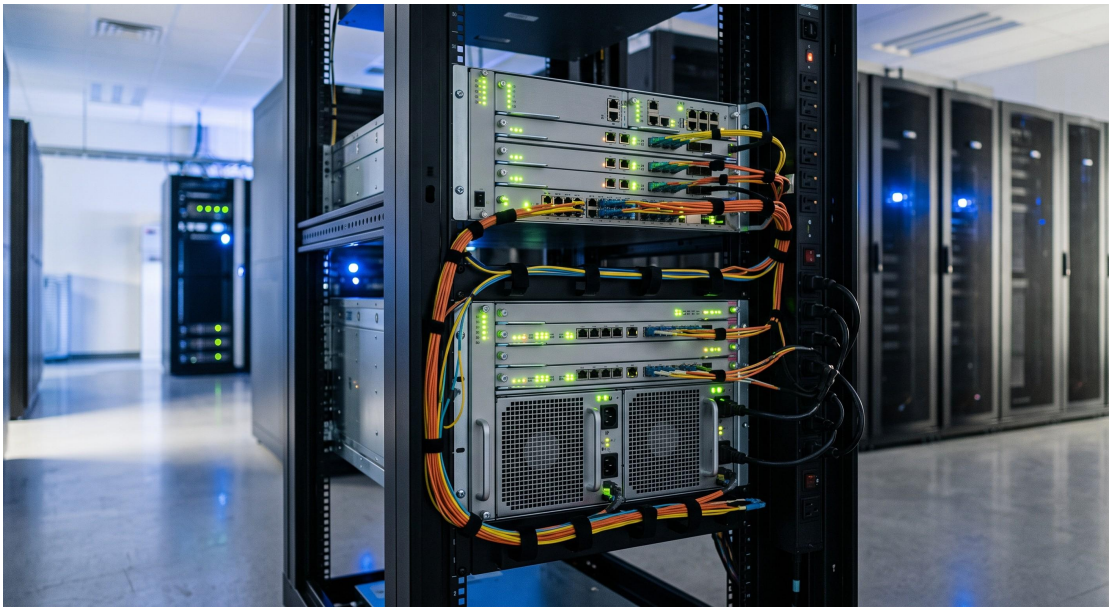
Optical Line Terminal Chassis Redundancy and Power Distribution Blueprint - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The Optical Line Terminal Chassis Redundancy and Power Distribution Blueprint defines the architectural foundation for carrier-grade OLT deployments in next-generation passive optical networks (PON). This document specifies the hardware-level redundancy mechanisms, power distribution topology, and failover logic that ensure uninterrupted service delivery across FTTx, business Ethernet, and mobile backhaul applications. The blueprint addresses the critical intersection of chassis-level redundancy, load-sharing power architectures, and hitless protection switching required for five-nines availability in central office and outside plant environments.



HARDWARE ARCHITECTURE & SILICON

The OLT chassis platform employs a modular, orthogonal midplane architecture that physically separates control plane, data plane, and power distribution into independent domains. This separation eliminates single points of failure and enables field-replaceable unit (FRU) serviceability without service interruption.

CORE INTERNAL TOPOLOGY

At the heart of the system lies a dual-star backplane fabric supporting up to 4.8 Tbps aggregate throughput per chassis. Dual redundant switch fabric cards operate in active-active load-sharing mode, with automatic failover to a single card upon fault detection. The fabric employs cell-based switching with 768-byte cells and a 200 microsecond maximum latency across the backplane.

Each line card slot provides dedicated 400 Gbps full-duplex connectivity to both fabric cards, ensuring no oversubscription at the backplane level. The control plane is managed by dual redundant supervisor modules running in 1+1 hot-standby configuration, with sub-50 millisecond stateful failover.

POWER DISTRIBUTION BLUEPRINT

The power distribution architecture implements a 1+1 redundant A/B feed topology with independent power entry modules (PEMs) per feed. Each PEM supports hot-swappable rectifier modules in N+1 redundancy within its feed group, providing fault tolerance at both the feed and module level.

Dual independent power distribution buses (PDB-A and PDB-B) route -48 VDC or 220 VAC through isolated pathways to every slot in the chassis. Power sequencing and current sharing are managed by intelligent power controllers that continuously monitor load balancing across both feeds. In the event of a complete feed loss, the surviving feed assumes 100% of chassis load without service interruption or performance degradation.

KEY FEATURES & ROUTING LOGIC

CHASSIS-LEVEL REDUNDANCY

- Dual supervisor modules: 1+1 hot-standby with stateful failover under 50 milliseconds
- Dual switch fabric cards: Active-active load sharing with automatic failover
- Redundant timing and synchronization: Dual BITS/SSU inputs with hitless reference switching
- Hot-swappable FRUs: All line cards, supervisors, fabric cards, and power modules

POWER DISTRIBUTION

- Dual independent power feeds: A/B feed redundancy with isolated distribution paths
- N+1 rectifier redundancy: Per-feed module-level fault tolerance
- Intelligent load balancing: Active current sharing across both feeds
- Wide input range: -40 VDC to -72 VDC or 180 VAC to 264 VAC operation

ROUTING & FORWARDING LOGIC

- Non-blocking fabric: 4.8 Tbps aggregate switching capacity
- Line-rate forwarding: 400 Gbps per slot full-duplex to fabric
- Integrated routing: OSPF, IS-IS, BGP, MPLS L3VPN support
- PON-specific forwarding: GPON, XGS-PON, NG-PON2 line cards supported

COMPLIANCE & STANDARDS

The OLT chassis redundancy and power distribution blueprint adheres to the following carrier-grade standards and certifications:

- ITU-T G.984 (GPON), G.987 (XG-PON), G.989 (NG-PON2)
- IEEE 802.1Q, 802.1ad, 802.3ah, 802.3av
- Telcordia GR-1089-CORE, GR-63-CORE (NEBS Level 3)

- ETSI EN 300 019 (Environmental), EN 300 132-2 (Power)

- IEC 60950-1, IEC 62368-1 (Safety)

- RoHS, WEEE, REACH compliant

- MEF CE 2.0, Carrier Ethernet certification

TECHNICAL SPECIFICATIONS

The following table summarizes the core technical parameters of the OLT chassis redundancy and power distribution blueprint.

Parameter	**Specification**
Form Factor	16-slot modular chassis (16 RU), 8-slot compact (8 RU), 4-slot edge (4 RU)
Switching Capacity	4.8 Tbps aggregate (16-slot), 2.4 Tbps (8-slot), 1.2 Tbps (4-slot)
Power Supply	Dual hot-swappable AC/DC feeds, N+1 rectifier redundancy per feed
Power Input Range	-40 VDC to -72 VDC or 180 VAC to 264 VAC, 50/60 Hz
Redundancy Architecture	1+1 supervisor, active-active fabric, A/B power feeds, N+1 rectifiers
Failover Time	<50 ms supervisor, <10 ms fabric,

	hitless power feed transfer
Max Line Cards	16 (full chassis), 8 (compact), 4 (edge)
Per-Slot Bandwidth	400 Gbps full-duplex to fabric
Cooling	Front-to-back airflow, redundant hot-swappable fan trays
Operating Temperature	-5°C to +55°C (NEBS Level 3), -40°C to +65°C (extended)
Management	Dual redundant management interfaces, CLI, SNMPv3, NETCONF/YANG
Compliance	NEBS Level 3, ITU-T G.984/G.987/G.989, MEF CE 2.0, RoHS

ORDERING SKU INFORMATION

Base Chassis Configurations

- OLT-CH-16: 16-slot modular chassis, dual fabric, dual supervisor, AC power

- OLT-CH-16-DC: 16-slot modular chassis, dual fabric, dual supervisor, DC power

- OLT-CH-8: 8-slot compact chassis, dual fabric, dual supervisor, AC/DC hybrid

- OLT-CH-4: 4-slot edge chassis, single fabric, dual supervisor, AC power

Power Entry Modules

- PEM-AC-2K: 2000W AC power entry module with N+1 rectifier slots

- PEM-DC-2K: 2000W DC power entry module with N+1 rectifier slots

- RECT-1K-AC: 1000W hot-swappable AC rectifier module

- RECT-1K-DC: 1000W hot-swappable DC rectifier module

Supervisor & Fabric Modules

- SUP-2: Dual-core supervisor module with 32 GB RAM

- FAB-4T: 4.8 Tbps switch fabric card with 400 Gbps per slot

