Enterprise Core Systems Engineering Reference Manual: Custom Fiber Optic Switch Manufacturer

PRODUCT IDENTIFICATION AND SYSTEM NOMENCLATURE

This document serves as the definitive engineering reference for the [CUSTOM FIBER OPTIC SWITCH MANUFACTURER] series of enterprise and carrier-grade fiber optic switching platforms. Designed for system integrators, network architects, and procurement engineers, this manual details the internal topology, forwarding plane mechanics, and hardware reliability characteristics of a fully customizable optical switching fabric. The platform supports bespoke port configurations, proprietary ASIC integrations, and tailored thermal management profiles for mission-critical deployments.



CORE INTERNAL TOPOLOGY AND FABRIC ARCHITECTURE

The switching backplane utilizes a non-blocking, shared-memory crossbar fabric with a per-slot dedicated bandwidth of 480 Gbps. Customization options include the substitution of the standard SerDes with low-latency PHYs for financial trading networks or high-isolation interfaces for government-dedicated infrastructure. The central control plane operates on a redundant, hot-standby CPU module running a modular carrier-grade operating system. Key internal components are accessible via a tool-less chassis design, allowing OEM partners to replace line cards, fan trays, and power entry modules without power cycling the entire chassis. The fabric element ASIC supports cut-through and store-and-forward switching at programmable thresholds.

SWITCHING AND FORWARDING SUBSYSTEM CAPABILITIES

The forwarding database (FIB) accommodates up to 512,000 IPv4 entries and 256,000 IPv6 entries, fully customizable via request. Dynamic buffer allocation allows for per-port configurable packet buffers ranging from 12 MB to 48 MB, suitable for bursty data center traffic or deterministic industrial networks. The system supports MPLS, VXLAN, and NVGRE tunneling termination at line rate. Programmable pipeline capabilities via P4 language allow custom packet parsing and telemetry insertion. For timing-sensitive environments, the

hardware supports SyncE and IEEE 1588v2 with hardware timestamping accuracy of ±5 ns.

OPERATIONAL ADVANTAGES AND CUSTOMIZATION DEPTH

- Custom Port Mix: OEMs can specify any combination of 10G SFP+, 25G SFP28, 40G/100G QSFP28, or 400G QSFP-DD on a per-module basis.
- Proprietary Firmware Lock: Secure enclave allows manufacturers to embed proprietary hashing or encryption algorithms within the forwarding pipeline.
- Thermal Customization: Extended operating temperature range (-40°C to +85°C) for outdoor or industrial enclosures, with fan speed profiles tunable per OEM.
- Altitude and Coating: Conformal coating available for high-humidity or high-altitude environments up to 5,000 meters.

SPECIFICATION MATRIX

Parameter	**Specification (Base Model - Customizable)**
Form Factor	Modular 1RU, 2RU, 4RU chassis options / Custom dimensions
Switching Capacity	Up to 6.4 Tbps (non-blocking, full

	duplex)
Forwarding Rate	Up to 2.4 Bpps (64-byte packets)
MAC Address Table	288K entries (extendable to 1M)
Power Supply	Dual hot-swappable 1+1 redundant AC (100-240V) or DC (-48V)
Typical / Max Power	150W (no optics) / 500W (fully loaded high-power optics)
Operating Temperature	0°C to 50°C (standard) / -40°C to 85°C (industrial option)
MTBF (Telcordia SR-332)	> 350,000 hours (standard configuration)

REGULATORY AND INDUSTRY COMPLIANCE (CUSTOMIZABLE LABELING)

All hardware variants comply with or can be tailored to meet: CE, FCC Part 15 Class A, ICES-003, VCCI, and RCM. NEBS Level 3 certification available for carrier-grade builds. Safety: IEC 62368-1 and UL 60950-1 (re-certifiable to 62368-1 upon request). Environmental: RoHS3 and REACH SVHC compliant base design; halogen-free and TSCA options on request. The OEM can apply custom regulatory marks and serialization through the factory direct customization program.


SFP+ 10G
Console
1
2
3
4
1
2
3