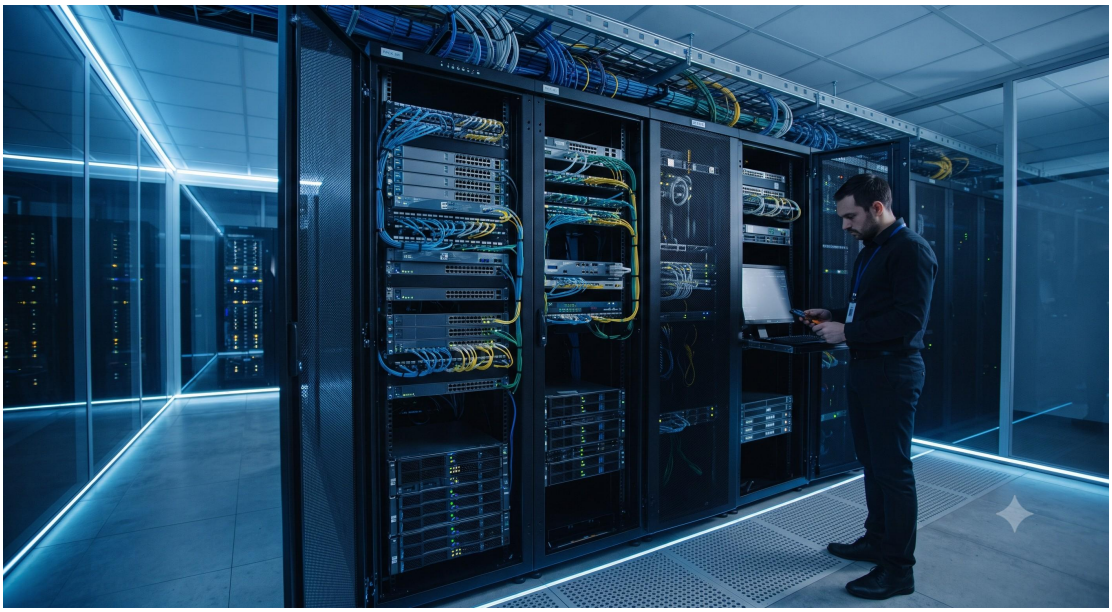
Enterprise Campus Network Design Blueprint - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the official Technical Overview and Hardware Datasheet for the Enterprise Campus Network Design Blueprint solution. This blueprint defines a next-generation, intent-based networking architecture engineered to address the burgeoning demands of the modern digital enterprise, encompassing high-density IoT, pervasive mobility, and cloud-native applications. The solution is architected around a core principle of a flexible, scalable, and secure foundation, integrating advanced hardware and software innovations to deliver a future-proof infrastructure that simplifies operations and accelerates service innovation.

The blueprint is structured around a hierarchical model comprising the Core, Distribution, and Access layers, each populated with purpose-built hardware to ensure deterministic performance and high availability. This document provides a comprehensive technical overview of the hardware components, architectural design principles, and performance specifications that underpin this robust campus networking solution.



ARCHITECTURE & CHASSIS DESIGN

The Enterprise Campus Network Design Blueprint is built upon a modular, three-tier architecture, ensuring optimal traffic flow, resilience, and scalability. The foundation of this architecture is a portfolio of high-performance switching platforms designed for specific functional roles.

Core Layer: The core layer is the high-speed backbone of the campus network, responsible for fast and reliable switching of traffic between distribution switches and the data center or WAN edge. This layer is built on the platform using the high-density chassis switch. Its design emphasizes high availability with redundant supervisor engines, fabric modules, and power supplies, delivering non-blocking performance and sub-millisecond convergence.

Distribution Layer: The distribution layer acts as the boundary between the access and core layers, enforcing policy, aggregating access switches, and providing routing services. This layer is realized through the modular distribution switch, which supports high-density 10/25/40 Gigabit Ethernet uplinks to the core and Gigabit/Multi-Gigabit downlinks to access switches. It is designed for high availability and features advanced services such as VXLAN, MPLS, and segment routing for enhanced policy and traffic engineering.

Access Layer: The access layer provides direct network connectivity to end-user devices, including workstations, IP phones, wireless access points, and IoT sensors. This layer is composed of stackable access switches and compact access switches. The stackable access switch offers high port density and flexible stacking capabilities for simplified management and scaling, while the compact switch is designed for space-constrained environments like outdoor cabinets and small wiring closets.

Chassis Design: The modular chassis systems feature a passive midplane design, supporting high-speed fabric modules and a wide variety of line cards. The hot-swappable architecture allows for serviceability and expansion without network disruption, facilitating graceful upgrades and maintenance. Power and cooling are fully redundant, with N+1 power supplies and dual, hot-swappable fan trays to maximize system uptime.

HARDWARE FEATURES

The Enterprise Campus Network Design Blueprint leverages a suite of advanced hardware features to deliver superior performance, reliability, and intelligence.

- High-Performance ASIC: The switching platforms are powered by a custom, programmable network processor ASIC. This provides line-rate forwarding on all ports, with hardware-based support for advanced features such as QoS, ACLs, and network telemetry.
- Unified Ports: Multiple platform variants offer unified ports that can be configured as Ethernet, Fibre Channel over Ethernet (FCoE), or front-end networking, providing investment protection and flexibility for mixed environments.
- Stacking Technology: The access layer leverages a high-bandwidth stacking technology for the stackable switches, creating a single logical device with simplified management and high-availability features, such as cross-stack link aggregation and graceful failover.
- PoE Capabilities: The access switches offer up to 90W of Power over Ethernet (PoE) per port, capable of powering the latest high-power IoT devices, including PTZ cameras, virtual desktop thin clients, and advanced Wi-Fi 6/6E access points.

- Front-to-Back Cooling: All platforms employ a front-to-back cooling airflow design, supporting optimized hot/cold aisle configurations for energy-efficient data center and wiring closet deployments. The direction of airflow is clearly marked on the chassis.
- Management Ports: Each switch includes a dedicated out-of-band management port (10/100/1000BASE-T) and a USB console port for initial configuration and disaster recovery.
- Field-Replaceable Units (FRUs): Key components, including power supplies, fan trays, and optical transceivers, are all hot-swappable FRUs, minimizing downtime for hardware maintenance and upgrades.

COMPLIANCE & STANDARDS

The hardware and software components of the Enterprise Campus Network Design Blueprint adhere to a comprehensive set of industry standards and regulatory certifications, ensuring interoperability, safety, and global compliance.

- IEEE Standards: 802.3 (Ethernet), 802.1Q (VLAN), 802.1p (CoS), 802.3at/bt (PoE), 802.1AX (Link Aggregation), 802.3z/ab/ae/ba/cc/cd (Various Ethernet rates), 802.1s (MSTP), 802.1w (RSTP), 802.3x (Flow Control).
- RFC Compliance: Full compliance with a wide range of Internet Engineering

Task Force (IETF) RFCs, covering TCP/IP, OSPFv2/v3, BGP-4, IS-IS, MPLS, VXLAN, DHCP, SNMPv1/v2c/v3, and more.

- Security Certifications: IEEE 802.1X (Port-Based Network Access Control), MAC Authentication Bypass (MAB), and various RADIUS/TACACS+ implementations.

- Regulatory and Safety: The hardware is certified to meet the safety and emission standards including:

    - Safety: UL 60950-1, CSA C22.2 No. 60950-1, EN 60950-1, IEC 60950-1, GB 4943.1.

    - EMC: FCC Part 15 (Class A), ICES-003 (Class A), VCCI (Class A), EN 55022 (Class A), EN 55024, EN 61000-3-2, EN 61000-3-3.

    - Environmental: The product is compliant with RoHS (Restriction of Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) directives, supporting sustainability goals.

- NEBS Compliance: The ruggedized platforms are designed to meet Network Equipment-Building System (NEBS) Level 3 standards, ensuring they can operate reliably in telecommunications central office environments.

TECHNICAL SPECIFICATIONS

The following table provides a comprehensive summary of the key technical specifications for the primary chassis and switching platforms within the Enterprise Campus Network Design Blueprint. For detailed information on

specific line cards, power supplies, and transceivers, please refer to the respective ordering guides and product documentation.

Parameter	Specification
Form Factor	Modular: 5U to 13U Chassis (Core), 4U Chassis (Distribution), 1U/2U Fixed (Access)
Switching Capacity	Up to 25.6 Tbps (Core), Up to 2.56 Tbps (Distribution), Up to 480 Gbps (Access)
Forwarding Rate	Up to 8.4 Bpps (Core), Up to 1.9 Bpps (Distribution), Up to 360 Mpps (Access)
Port Density	Up to 96 x 100GE + 48 x 40GE (Core), Up to 48 x 10GE + 8 x 40GE (Distribution), Up to 48 x 1GE + 4 x 10GE (Access)
Power Supply	N+N or N+1 Redundant AC/DC: 1100W, 2200W, 3000W, 6000W (per PSU)
PoE Budget	Up to 3,000W per Access Switch (for PoE/PoE+) for high-power IoT devices

CPU / Memory	Dual-core 1.2 GHz to Quad-core 2.4 GHz, 4GB to 32GB DDR4 DRAM
Management	10/100/1000BASE-T Out-of-Band, USB Console, RS-232 Serial
Operating Temperature	0°C to 40°C (Standard), -40°C to +65°C (Extended/Ruggedized variant)
MTBF	> 300,000 Hours (for Core Chassis), > 500,000 Hours (for Fixed Switches)

ORDERING OPTIONS

To facilitate the deployment of a customized campus network, the Enterprise Campus Network Design Blueprint offers a comprehensive set of ordering options. These options allow for precise scaling and capability selection to meet diverse enterprise requirements.

- Chassis Systems: Available as empty chassis bundles requiring separate selection of supervisor engines, fabric modules, line cards, power supplies, and fan trays.

- Core Chassis Bundle: Includes the chassis, midplane, backplane, and one fan tray. (Rack-mount kit sold separately).

- Distribution Chassis Bundle: Includes the chassis, midplane, one fan tray, and one power supply. (Second power supply sold separately).

- Supervisor Engines: Available in Standard and High-Performance variants, with varying CPU, memory, and feature capabilities.

- Line Cards & Modules: A broad portfolio of line cards is available, offering different port speeds (Gigabit, 10 Gigabit, 25 Gigabit, 40/100 Gigabit) and PoE capabilities.

- Power Supplies: AC and DC power supply options are available with different wattage ratings (e.g., 1100W, 2200W, 3000W). Redundant configurations (1+1, N+N) are supported.

- Software Licenses: The hardware is delivered with a base software image. Advanced features such as network virtualization, automation, and analytics require additional license packs.

- Accessories: A full range of accessories is available, including:

    - Rack-mount kits for EIA and ETSI racks.

    - Pluggable optical transceivers (SFP, SFP+, QSFP, QSFP-DD) supporting various fiber types, wavelengths, and distances.

    - Cable management kits and blanking panels.

    - Console cables and stacking cables.