EVPN-VXLAN Control Plane Configuration Template for High-Density Switches - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The EVPN-VXLAN Control Plane Configuration Template for High-Density Switches represents a paradigm shift in how enterprise and carrier-grade networks architect their Layer 2 and Layer 3 overlay domains. As data centers evolve toward leaf-spine topologies and campuses demand seamless segmentation across thousands of endpoints, the limitations of legacy flood-and-learn VXLAN implementations become critically apparent. This document serves as the authoritative technical reference for deploying an EVPN-based control plane that replaces inefficient data plane learning with a scalable, BGP-driven signaling mechanism. By leveraging Multiprotocol BGP (MP-BGP) as the single source of truth for MAC and IP address reachability, this template enables organizations to achieve deterministic forwarding, minimized broadcast radiation, and active-active multihoming without the complexity of traditional Spanning Tree Protocol. The solution is purpose-built for high-density switching platforms where line-rate performance, low-latency convergence, and operational simplicity are non-negotiable requirements for mission-critical workloads.



HARDWARE ARCHITECTURE & SILICON

The underlying forwarding silicon for this configuration template is optimized for the unique encapsulation and decapsulation demands of VXLAN traffic. High-density switches supporting this template typically integrate advanced ASICs capable of wire-speed VXLAN Tunnel Endpoint (VTEP) functionality, including hardware-based UDP port 4789 recognition, inner and outer header processing, and per-flow load balancing across Equal-Cost Multi-Path (ECMP) uplinks. The control plane resides on a multi-core x86 or ARM-based CPU complex running a modular network operating system, where the BGP EVPN agent maintains separate Routing Information Bases (RIBs) for each VRF and VLAN-aware bridge domain. This separation ensures that tenant isolation is preserved at the control plane level, even when physical ports and uplinks are shared. The architecture supports distributed anycast gateway implementation,

allowing every leaf switch to serve as the default gateway for its locally attached endpoints while maintaining a consistent IP and MAC address across all leaf nodes. This eliminates the need for First Hop Redundancy Protocols (FHRP) and enables seamless virtual machine mobility across racks and pods.

KEY FEATURES & ROUTING LOGIC

- EVPN Route Type 2 (MAC/IP Advertisement): Distributes endpoint MAC and IP bindings via MP-BGP, enabling remote VTEPs to install precise forwarding entries without data plane flooding.
- EVPN Route Type 3 (Inclusive Multicast Ethernet Tag): Automatically discovers remote VTEPs participating in a given VLAN or VNI, forming the underlay replication tree for broadcast, unknown unicast, and multicast (BUM) traffic.
- EVPN Route Type 5 (IP Prefix Advertisement): Extends Layer 3 reachability across the fabric, supporting symmetric or asymmetric Integrated Routing and Bridging (IRB) models for optimal traffic flow.
- Distributed Anycast Gateway: Every leaf switch advertises the same virtual MAC and IP address for a given subnet, ensuring optimal first-hop routing regardless of workload location.
- All-Active Multihoming: Uses Ethernet Segment Identifiers (ESI) and Type 1/4 routes to enable multichassis link aggregation with per-flow load balancing and fast failover.

- ARP/ND Suppression: The control plane caches and distributes Address Resolution Protocol and Neighbor Discovery information, drastically reducing broadcast and multicast traffic in large Layer 2 domains.

- BGP Route Reflector Hierarchy: Supports scalable iBGP route reflection with next-hop unchanged semantics, eliminating the need for full-mesh BGP sessions across hundreds of leaf switches.

COMPLIANCE & STANDARDS

This template aligns with the following industry specifications and RFCs: RFC 7432 (BGP MPLS-Based Ethernet VPN), RFC 8365 (A Network Virtualization Overlay Solution Using EVPN), RFC 7348 (Virtual eXtensible Local Area Network), RFC 4271 (BGP-4), RFC 4760 (Multiprotocol Extensions for BGP-4), and draft-ietf-bess-evpn-prefix-advertisement. Hardware platforms deployed with this template must comply with IEEE 802.1Q, IEEE 802.1ad, IEEE 802.3ba/802.3cd for high-density 100GbE and 400GbE interfaces, and MEF 3.0 for Carrier Ethernet services. Safety and emissions certifications include UL 60950-1, IEC 60950-1, EN 55032 Class A, EN 55024, and RoHS-6 compliance.

TECHNICAL SPECIFICATIONS

The following table outlines the core parameters supported by the

EVPN-VXLAN Control Plane Configuration Template when deployed on high-density switching hardware.

Parameter	Specification
Form Factor	1RU to 4RU Fixed / Modular Chassis
Switching Capacity	3.2 Tbps to 25.6 Tbps Full Duplex
Forwarding Rate	Up to 9.5 Bpps (Billion Packets Per Second)
VXLAN Tunnel Endpoints	Up to 4,000 VTEPs per Fabric
EVPN Routes Supported	Up to 256,000 MAC/IP and IP Prefix Routes
BGP EVPN Sessions	Up to 256 iBGP/eBGP Peers with Route Reflection
Multihoming	All-Active with ESI, Up to 32 Member Links per ESI
Anycast Gateway	Distributed IRB with IPv4/IPv6 Dual Stack
Power Supply	Dual Hot-Swappable Redundant AC/DC (1+1)
Cooling	Front-to-Back or Back-to-Front Airflow Options
Management	CLI, NETCONF/YANG, RESTCONF,

	SNMPv3, Streaming Telemetry
Operating Temperature	0C to 40C (Commercial) / -5C to 55C (Extended)

ORDERING SKU INFORMATION

Base system SKUs include the high-density fixed-form factor switch chassis with integrated 100GbE or 400GbE QSFP28/QSFP-DD ports. Optional software license tiers activate advanced EVPN-VXLAN features, including distributed anycast gateway, all-active multihoming, and ARP/ND suppression. Redundant power supply and fan tray SKUs are available separately for high-availability deployments. Transceiver SKUs cover short-reach multimode, long-reach single-mode, and active optical cable options at 10GbE, 25GbE, 40GbE, 100GbE, and 400GbE speeds. All SKUs are RoHS-6 compliant and ship with standard three-year hardware warranty, extendable to five or seven years.

