Carrier Ethernet Technical Standard Compliance Register: How to Configure VLAN Trunking on Core Router

CARRIER ETHERNET TECHNICAL STANDARD COMPLIANCE REGISTER: VLAN TRUNKING ON CORE ROUTER

EXECUTIVE SUMMARY

This document provides an authoritative technical overview and procedural specification for configuring 802.1Q VLAN Trunking on the CR-Series Carrier-Grade Core Routing Platform. VLAN trunking enables a single physical interface to carry traffic belonging to multiple VLANs, significantly reducing physical port consumption while preserving Layer 2 segmentation across the enterprise backbone. This register outlines hardware prerequisites, the standardized CLI-based configuration workflow, parameter limits, and compliance with IEEE 802.1Q-2022. Intended for network architects and field deployment engineers.



HARDWARE ARCHITECTURE & FORWARDING PLANE SUPPORT

The CR-Series Core Router implements VLAN trunking within the programmable forwarding ASIC (PFA-4th Gen). Each physical interface supports up to 4094 active VLAN trunk instances (VLAN IDs 1–4094) in compliance with IEEE 802.1Q. The hardware performs line-rate tagging, untagging, and tag-preservation without CPU intervention. The internal TCAM (Ternary Content-Addressable Memory) allocates 32,000 entries specifically for VLAN translation and filtering, ensuring zero packet loss during trunk failover events.

KEY FEATURES & ROUTING LOGIC FOR TRUNKING

- 802.1Q Trunk Endpoint (Q-Tag) Support: Native VLAN tagging and stacked VLAN (Q-in-Q) for Metro Ethernet deployments.

- Dynamic Trunk Protocol (DTP) Offload: Hardware-assisted negotiation of trunk mode (desirable/auto/nonegotiate).

- Allowed VLAN List Filtering: Granular per-trunk permit/deny lists (up to 4094 VLAN ranges) with hardware TCAM offload.

- Native VLAN Isolation: Dedicated native VLAN ID assignment with untagged frame handling (default VLAN 1 reassignable).

- Trunk Failover Mechanism: Bidirectional Forwarding Detection (BFD) coupled with trunk link redundancy (sub-50 ms).

CONFIGURATION WORKFLOW (CLI-BASED)

Step 1 – Access Global Configuration Context

configure terminal

Step 2 – Select Physical Interface (e.g., HundredGigE 0/0/0)

(config)# interface hundredGigE 0/0/0

Step 3 – Set Interface as Trunk

(config-if)# switchport mode trunk

Step 4 – Define Native VLAN (Optional, default = VLAN 1)

(config-if)# switchport trunk native vlan 10

Step 5 – Specify Allowed VLANs (Default = all VLANs 1–4094)

(config-if)# switchport trunk allowed vlan add 100,200-300,1000

Step 6 – Verify Configuration

show interfaces hundredGigE 0/0/0 trunk

OPERATIONAL ADVANTAGES

Implementing VLAN trunking on the CR-Series reduces infrastructure complexity by 70% in typical core-to-distribution links, lowers power consumption per Gbps transported, and enables seamless VM mobility across data center racks without re-cabling. Hardware-native tag manipulation guarantees wire-speed forwarding at 800 Gbps per slot.

COMPLIANCE & STANDARDS

- IEEE 802.1Q-2022 (VLAN Tagging & Trunking)
- IEEE 802.1ad (Provider Bridging – Q-in-Q)
- MEF 6.2 (Ethernet Private Line Services)
- ITU-T G.8011/Y.1307 (Ethernet over Transport)

TECHNICAL SPECIFICATIONS

Parameter	Specification
Maximum VLAN Trunks per Physical Port	4094 (VLAN IDs 1–4094)
Hardware TCAM for VLAN Filtering	32,000 entries
Trunk Native VLAN Range	1–4094 (default 1, user-configurable)
Maximum Allowed VLAN List Entries per Trunk	1024 ranges or individual IDs
Q-in-Q (Stacked VLAN) Depth	2 tags (outer/inner) line-rate
Trunk Link Failover Time	< 50 ms (with BFD) / 0 loss with G.8032
Forwarding Rate per Trunk Interface	800 Gbps (full duplex) per slot
Encapsulation Standards	IEEE 802.1Q, IEEE 802.1ad
Supported Media	SFP28 (25G), QSFP56 (100G/200G), SFP56 (10G)
Operating Temperature	0°C to 45°C (long-term trunk stability)
Power Draw (additional trunk logic)	+2.5W per active trunk port

ORDERING SKU INFORMATION

CR-SERIES TRUNK ENABLEMENT: Standard with base software license (no

additional SKU).

Optional advanced trunk features (VLAN translation, selective Q-in-Q): SKU – CR-VLAN-ADV.

Recommended optics for trunk uplinks: CR-SFP28-25G-LR, CR-QSFP56-100G-ER4.



DEPLOYMENT TOPOLOGY NOTE: For core-to-aggregation trunking, ensure native VLAN matches on both sides. For multi-vendor interoperability, set switchport trunk encapsulation dot1q explicitly (legacy ISL not supported).

REVISION HISTORY

Version 1.0 – Engineering Release – Validated on CR-8808 with CR-OS 6.2.1.