Juniper® Validated Design

JVD Test Report Brief: Campus Fabric EVPN Multihoming Using Juniper Mist™ Wired Assurance

test-report-brief-JVD-ENTWIRED-EVPNMH-01-01

Introduction

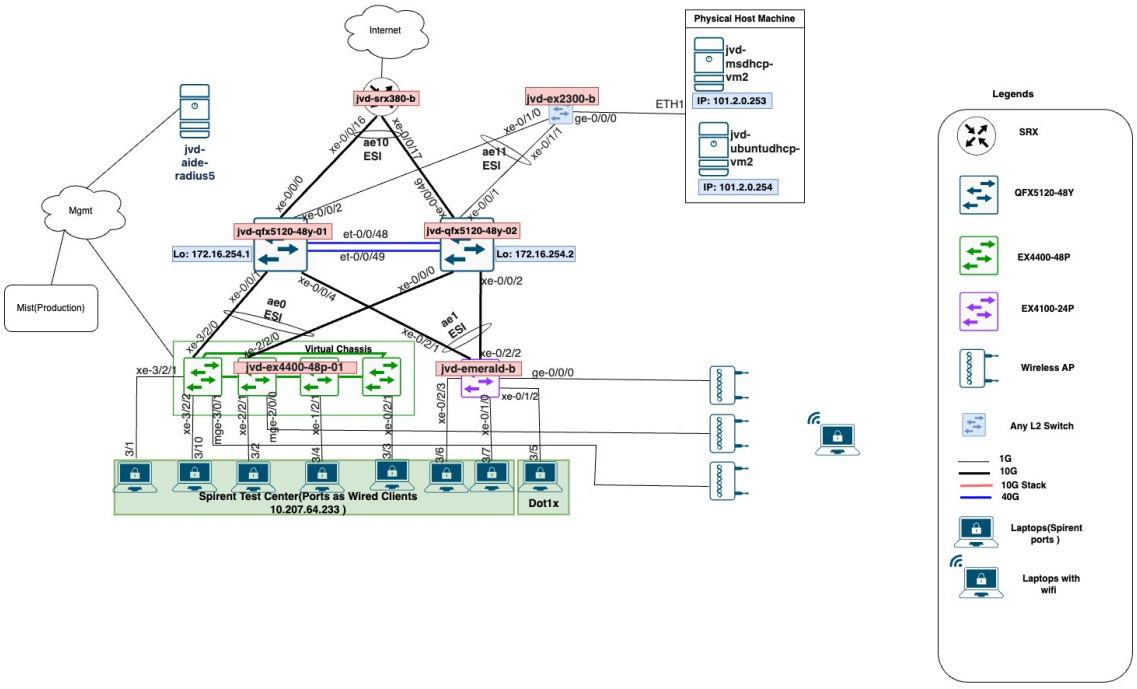
The scope of this JVD is to test EVPN Multihoming with two collapsed core (core and distribution devices collapsed into one) in enterprise campus networks. The EVPN multihoming network encompasses the collapsed core and access layers of your topology. Campus architectures are too rigid to support the scalability and changing needs of modern large enterprises. Multichassis link aggregation group (MC-LAG) is a good example of a single vendor technology that addresses the collapsed core deployment model. MC-LAG does not interoperate between vendors, creating lock-in, and is limited to two devices.

EVPN multihoming uses a Layer 3 IP-based underlay network and an EVPN-VXLAN overlay network between the collapsed core Juniper switches. Broadcast, unknown unicast, and multicast (BUM) traffic, is handled natively by EVPN and eliminates the need for Spanning Tree Protocols (for example, STP and RSTP). A flexible overlay network based on VXLAN tunnels combined with an EVPN control plane, efficiently provides Layer 3 or Layer 2 connectivity. This standard is vendor agnostic, so you can use the existing access layer infrastructure such as LACP without the need to retrofit this layer of your network.

This JVD will concentrate on the below network topologies provisioned through Juniper Mist.

Test Topology

Figure 1: Two Collapsed Cores with ToRs Multihomed to both Cores



The testing in this JVD focuses on the following items:

- Build a production-grade lab design where all fabric links are minimum 10Gbit/s.
- Test with at least one WAN router attached. Test designs with two collapsed cores.
- Test again with the latest recommended Junos OS release.
- Test Virtual Chassis with two and four members.
- Three-stage EVPN multihoming fabric with:
  - Two redundant collapsed core switches acting as spine and leaf.
  - One 4-member Virtual Chassis access switch acting as ToR.
  - One 2-member Virtual Chassis access switch acting as ToR.
  - Two standalone access switches acting as ToR.
- Service block function through:
  - Integrated to existing collapsed core switches.
  - Attached WAN routers using Layer 2 exit.
  - Attached servers using ESI-LAG redundant links.
- WAN router integration
  - Layer 2 fabric exit.
- ESI-LAG-based trunks.

Platforms Tested

Table 1: Devices Under Test (DUT) for Campus Fabric EVPN Multihoming

Devices Under Test						
Tag	**Role**	**Model**	**OS Release**	**VC**	**Helper/DUT**	**Additional Info**
R0	Access Switch-1	EX4400-48P	Junos 23.4R2	YES	DUT	
R1	Access Switch-2	EX4100-48P	Junos 23.4R2	YES	DUT	
R2	Collapsed Core Switch	QFX5120-48Y-8C	Junos 23.4R2	NO	DUT	
R3	Collapsed Core Switch	QFX5120-48Y-8C	Junos 23.4R2	NO	DUT	
R4	WAN router	SRX380	Junos 23.4R2	NO	Helper	External Gateway/DHCP Server
R5	DHCP server	Linux	UBUNTO22-DHCP-VM	NO	Helper	DHCP Server
R6	RADIUS server	Linux	Ubuntu 16.04.3 LTS	NO	Helper	Dot1X Server
AP	Juniper AP	AP	Mist OS	NO	Helper/DUT	WiFi Access Point
RT0	Traffic Generator	Spirent	SpirentOS	NO	Helper	Access hosts / DHCP Client

Version Qualification History

This JVD has been qualified in Junos OS Release 23.4R2.

Scale and Performance Data

The request is to test the lab design with:

- Up to 10 VRFs (most customers do not have more than 5 VRFs).
- Up to 500 VLANs (across all VRFs).
- Test with 45K IP/MAC addresses wired clients.

High Level Features Tested

- IPv4
- Test features like:
  - Protect RE-filter
- DHCP Snooping
  - DHCP relay
- Storm Control
- MAC address limit with aging
- Voice VLAN
- QoS profile
- Test features like:
  - Desktop switch attached to access switch (STP issue)
  - Do extended PoE testing
- RADIUS server
  - Server location
- Local server attached to underlay network
- Remote Juniper Mist Access Assurance via public cloud
- Authentication for the following clients:
  - Wired clients attached to access switches
  - Wi-Fi clients using the access points
- Authentication based on clients':
  - MAC address
  - 802.1X EAP authentication
    - Dynamic authorization profiles
- Single VLAN assigned
- Multiple VLANs assigned
- Wi-Fi access points
  - Local attached to the access switches with PoE
- Various Wi-Fi clients
- Basic Wi-Fi roaming

Traffic Profile

Device emulations:

- Mac + IPv4 Hosts
- Dot1x Clients
- DHCP Clients

Traffic rate: 5k FPS per stream block Bi-directional.

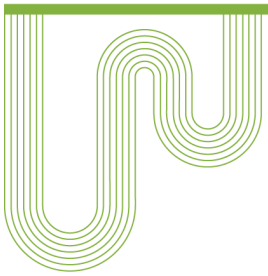
Traffic details:

- Intra VNI Traffic between Users across the Access Switches.
- Intra VNI Traffic between Users within the Access Switch.
- Inter VNI (same VRF) Traffic between Users across the Access Switches.
- Inter VNI (same VRF) Traffic between Users within the Access Switch.
- Inter VRF (Inter VNI) Traffic between Users across the Access Switches.
- Inter VRF (Inter VNI) Traffic between Users within the Access Switch.

Known Limitations

- With the tested QFX5120 and EX4650 platforms as collapsed core switches, the next-hop forwarding limit is 45K as configured by the Juniper Mist cloud.
- On EVPN multihoming fabric, the “no-dhcp-flood” knob should be configured using the additional CLI on the Juniper Mist portal to prevent DHCP flooding. Campus fabrics created starting March 2025 should no longer need this.
- On EVPN multihoming fabric, DHCP relay-option-82 configuration should be configured using the additional CLI on the Juniper Mist portal.

Intellectual Property Rights



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