Juniper® Validated Design

JVD Test Report Brief: 5-Stage Fabric Datacenter Design with Juniper Apstra

JVD-DCFABRIC-5STAGE-01-01

Introduction

This document outlines the qualification testing of the 5-Stage Data Center Reference Design with Juniper Apstra. The design is based on an ERB (Type 2 and Type 5) EVPN/VXLAN fabric with superspine, spine, server leaf and border leaf devices. The goal is to ensure the design is well-documented and will produce a reliable, predictable deployment for the customer.

The qualification objectives include validation of blueprint deployment, device upgrade, incremental config pushes/provisioning, Telemetry/Analytics checking, scaling/performance characterization, failure mode analysis,and verification of host traffic. Hardware models and software release for each device role will be explicitly listed.

Test Topology

Figure 1:5-stage Data Center

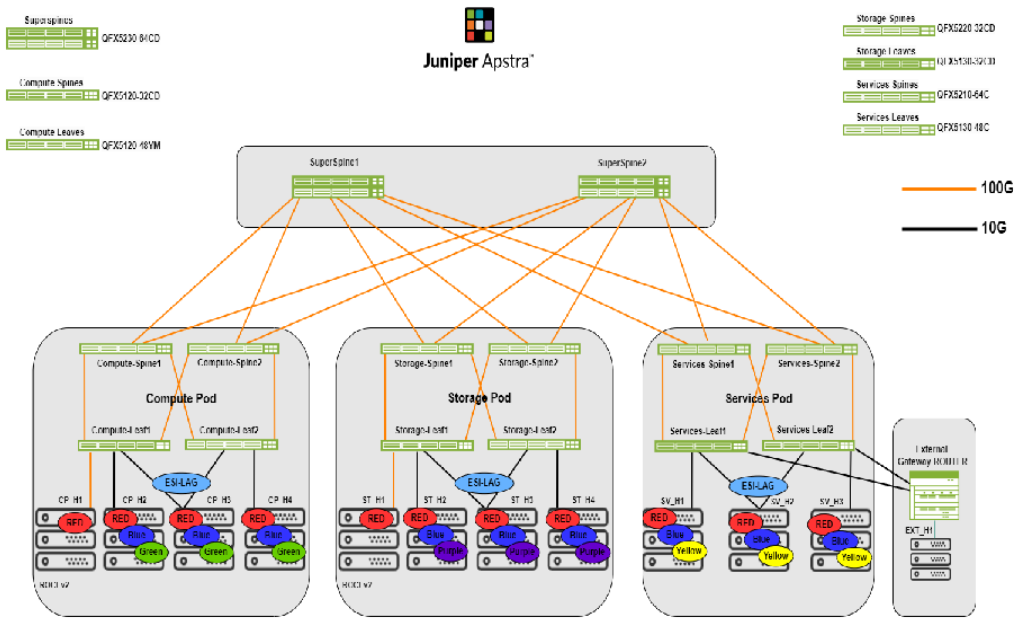

Table 1:Test Topology

Tenant / Routing Zone	External Hosts	Red Hosts / VLANs	Blue Hosts / VLANs	Green Hosts / VLANs	Purple Hosts / VLANs	Yellow Hosts / VLANs
IP Subnet	192.168.37.0/24	10.[0-5].[0-250].0/24	10.[10-15].[0-250].0/24	10.[20-25].[0-250].0/24	10.[30-35].[0-250].0/24	10.[40-45].[0-250].0/24
IPv6_Subnet	2001:db8:192:168:37::/112	2001:db8:dc4:10:[0-5]:[00-ee]::/96	2001:db8:dc4:10:[a-f]:[00-ee]::/96	2001:db8:dc4:10:[14-19]:[00-ee]::/96	2001:db8:dc4:10:[1e-23]:[00-ee]::/96	2001:db8:dc4:10:[28-2d]:[00-ee]::/96
CP_H1_Group		400				
CP_H2_Group		400-599, 600-799	1400-1599, 1600-1799	2500-2699		
CP_H3_Group		400-599, 600-799	1400-1599, 1600-1799	2500-2699		
CP_H4_Group		400-599, 600-799	1400-1599, 1600-1799	2500-2699		
ST_H1_Group		400				
ST_H2_Group		400-599, 800-999	1400-1599, 1800-1999		2800-2999	
ST_H3_Group		400-599, 800-999	1400-1599, 1800-1999		2800-2999	
ST_H4_Group		400-599, 800-999	1400-1599, 1800-1999		2800-2999	
SV_H1_Group		400-599, 1000-1199	1400-1599, 2000-2199			3100-3299
SV_H2_Group		400-599, 1000-1199	1400-1599, 2000-2199			3100-3299
SV_H3_Group		400-599, 1000-1199	1400-1599, 2000-2199			3100-3299
DHCP Server		ON EXTERNAL host for 400	INTER-POD CP_H4 for 1400	INTRA-POD CP_H4 for 2000		
Multicast Source	192.168.37.10 for 235.1.1.1		CP_H2 - 235.2.1.1 on VLAN 1400			
Multicast Receiver	for 235.2.1.1		235.2.1.1 and 235.1.1.1 1400,1401			

Platforms, Controllers and Roles

The following table shows the platforms, Controllers, and the Roles that were tested with this JVD.

Table 2:Platform, Controllers, and Roles

Tag	Role	Model	OS	Linecard	RE	Fabric	VC	Helper/DUT	Additional Info
R0	Super_Spine1	QFX5230-64CD	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R1	Super_Spine2	QFX5230-64CD	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R2	Compute_Spine1	QFX5120-32CD	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R3	Compute_Spine2	QFX5120-32CD	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R4	Compute_Leaf1	QFX5120-48YM	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R5	Compute_Leaf2	QFX5120-48YM	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R6	Storage_Spine1	QFX5220-32CD	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R7	Storage_Spine2	QFX5220-32CD	Junos 23.4R2-S3	NA	NA	NA	NA	DUT	
R8	Storage_Leaf1	QFX5130-32CD	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R9	Storeage_Leaf2	QFX5130-32CD	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R10	Services_Spine1	QFX5120-64C	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R11	Services_Spine2	QFX5120-64C	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R12	Services_Leaf1	QFX5130-48C	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R13	Services_Leaf2	QFX5130-48C	JUNOS EVO 23.4R2-S3	NA	NA	NA	NA	DUT	
R14	External_Gateway	MX304	Junos 23.4R2-S3	NA	NA	NA	NA	Helper	External Gateway
RT0	Tgen	Spirent	SpirentOS	NA	NA	NA	NA	Helper	Access hosts / DHCP Client/server / Multicast SRC/RCVR

Events and Triggers Test

The following table shows the Events and Triggers tests.

Table 3:Events and Triggers

Test	Details
Create Agent profiles for managed devices	Apstra Deployment Step as documented in JVD
Create Pristine Configurations and acknowledge managed devices	Apstra Deployment Step as documented in JVD
Create Logical Device, Interface Map, Device Profile for Super Spines	Apstra Deployment Step as documented in JVD
Create Logical Device, Interface Map, Device Profile for Spines	Apstra Deployment Step as documented in JVD
Create Logical Device, Interface Map, Device Profile for Leaf Devices	Apstra Deployment Step as documented in JVD
Create Rack Types for each POD	Apstra Deployment Step as documented in JVD
Create Templates for each POD	Apstra Deployment Step as documented in JVD
Create a POD-based blueprint	Apstra Deployment Step as documented in JVD
Assign all resource pools and devices for the blueprint	Apstra Deployment Step as documented in JVD
Update Cabling Map	Apstra Deployment Step as documented in JVD
Commit the blueprint	Apstra Deployment Step as documented in JVD
Configure Overlay Network routing zones	Apstra Deployment Step as documented in JVD
Assign EVPN loopbacks	Apstra Deployment Step as documented in JVD
Create Virtual Networks	Apstra Deployment Step as documented in JVD
Commit Overlay Updates	Apstra Deployment Step as documented in JVD
Build OISM Configlets	Multicast deployment for OISM on all leaves for the Blue VRF, using enhanced-OISM with BDNE and Classic L3 Interface Method on Border Leaves, as described in https://www.juniper.net/documentation/us/en/software/junos/evpn/topics/topic-map/oism-evpn-vxlan.html oism-evpn-vxlan-overview
Build Loopback Firewall Filter Configlets	Routing-Engine protection filter to only accept necessary protocol communication to the device
Verify Underlay/Overlay control plane	All BGP sessions are established in the Fabric
Verify DHCP Bindings	DHCP clients have received IP addresses from the appropriate server for their VLAN
Verify Multicast State	All IGMP Groups are joined, and PIM Join state is active.
Verify Overlay Connectivity	Validate forwarding plane establishment with emulated host test traffic.
Apstra Device State Changes	Undeploy / drain / set pristine configuration of leaf, spine, and superspine nodes. Validate redeployment success and re-establishment of control and forwarding planes.

Test	Details
Remove and Add Tenants	Modify virtual networks and connectivity templates for selected VLANs and check for removal/addition with test traffic. Expected traffic loss when tenant is removed, and restoration of traffic once tenants are re-added.
Reboot Devices	Ensure minimal traffic loss when a redundant node is rebooted, and that control and forwarding plane are restored with ECMP when the node reboot is completed.
Server Link Failure	Interface down/up, laser on/off at access layer for single-homed link. Only traffic to/from the connected hosts will be impacted.
Multihomed link failure	Interface down/up, laser on/off at access layer with minimal traffic loss for links which are redundant. AE member links are flapped. Only traffic to/from the connected hosts will be impacted
Leaf to Spine Link failure	Interface down/up, laser on/off at leaf-spine layer. Minimal traffic loss as all leaves are dual-homed.
Spine to Superspine Link Failure	Interface down/up, laser on/off at SuperSpine-spine layer. Minimal traffic loss as all leaves are dual-homed.
Process Restart	Ensure minimal traffic loss and full recovery when various JUNOS processes are killed/restarted
MAC Move	MAC/IP host move within VLAN to adjacent leaf devices.
Deactivate BGP on leaf	Ensure minimal traffic loss when various leaf and spine BGP sessions are deactivated. Full traffic restoration when sessions are restored.
Reset DHCP Bindings	DHCP release and renew
Verify Loopback Filter	Undesired protocol attempts should be blocked. Overflooding of select protocol frames are policed at specified traffic thresholds.
Verify Storm Control	BUM Traffic is policed at specified traffic thresholds
Multicast Leave / Join	Group Subscription Removed / Restored
ROCev2 traffic subscription	ECN and PCF validation through configured QOS profiles
Fabric Device Upgrade from Apstra	JUNOS Image changes performed via Apstra on all managed devices. Verify control and forward planes are functional after system upgrade
Extended Negative Testing	Continual loop of process restarts, protocol and interface flaps to ensure stability and resilience of control and data plane
Longevity Tests	Extended traffic run for 8 hours

Traffic Profiles

The following tables shows the traffic profiles that were tested with this JVD.

Table 4:Port References

Port Reference	Host
p1	CP_H2
p2	CP_H3
p3	CP_H4

Port Reference	Host
p4	ST_H2
p5	ST_H3
p6	ST_H4
p7	SV_H1
p8	SV_H2
p9	SV_H3
p10	External
RoCEv2_p1	CP_H1
RoCEv2_p2	ST_H1

Table 5:Stream Blocks

Stream Block	Type	Rate	FrameSize
external_to_red_sub_p1	External	1000pps	256-1500
external_to_blue_sub_p2	External	1000pps	256-1500
external_to_green_all_p3	External	1000pps	256-1500
external_to_red_sub_p4	External	1000pps	256-1500
external_to_blue_sub_p5	External	1000pps	256-1500
external_to_purple_all_p6	External	1000pps	256-1500
external_to_red_sub_p7	External	1000pps	256-1500
external_to_blue_sub_p8	External	1000pps	256-1500
external_to_yellow_all_p9	External	1000pps	256-1500
external_p10_mcast	External	1000pps	256-1500
red_all_p1_to_red_all_p9	IntraVLAN	1000pps	256-1500
red_all_p1_to_red_all_p9_v6	IntraVLAN	1000pps	256-1500
red_sub_p1_to_red_sub_p8	InterVLAN	1000pps	256-1500
blue_all_p1_to_blue_all_p7	IntraVLAN	1000pps	256-1500
blue_all_p1_to_blue_all_p7_v6	IntraVLAN	1000pps	256-1500
blue_sub_p1_to_blue_sub_p6	InterVLAN	1000pps	256-1500
green_all_p1_to_green_all_p3	IntraVLAN	1000pps	256-1500
red_all_p1_to_blue_all_p5	InterVRF	1000pps	256-1500
red_all_p1_to_blue_all_p5_v6	InterVRF	1000pps	256-1500
blue_all_p1_to_red_all_p4	InterVRF	1000pps	256-1500
blue_all_p1_to_red_all_p4_v6	InterVRF	1000pps	256-1500
green_all_p1_to_yellow_all_p9	InterVRF	1000pps	256-1500

Stream Block	Type	Rate	FrameSize
red_all_p1_to_external_p10	External	1000pps	256-1500
blue_all_p1_to_external_p10	External	1000pps	256-1500
green_all_p1_to_external_p10	External	1000pps	256-1500
blue_dhcp_p1_to_external	External	1000pps	256-1500
red_all_p2_to_red_all_p8	IntraVLAN	1000pps	256-1500
red_all_p2_to_red_all_p8_v6	IntraVLAN	1000pps	256-1500
red_sub_p2_to_red_sub_p7	InterVLAN	1000pps	256-1500
blue_all_p2_to_blue_all_p6	IntraVLAN	1000pps	256-1500
blue_all_p2_to_blue_all_p6_v6	IntraVLAN	1000pps	256-1500
blue_sub_p2_to_blue_sub_p5	InterVLAN	1000pps	256-1500
green_all_p2_to_green_all_p1	IntraVLAN	1000pps	256-1500
red_all_p2_to_blue_all_p4	InterVRF	1000pps	256-1500
red_all_p2_to_blue_all_p4_v6	InterVRF	1000pps	256-1500
blue_all_p2_to_red_all_p3	InterVRF	1000pps	256-1500
blue_all_p2_to_red_all_p3_v6	InterVRF	1000pps	256-1500
green_all_p2_to_yellow_all_p8	InterVRF	1000pps	256-1500
red_all_p2_to_external_p10	External	1000pps	256-1500
blue_all_p2_to_external_p10	External	1000pps	256-1500
green_all_p2_to_external_p10	External	1000pps	256-1500
green_dhcp_p2_to_external	External	1000pps	256-1500
red_all_p3_to_red_all_p7	IntraVLAN	1000pps	256-1500
red_all_p3_to_red_all_p7_v6	IntraVLAN	1000pps	256-1500
red_sub_p3_to_red_sub_p6	InterVLAN	1000pps	256-1500
blue_all_p3_to_blue_all_p5	IntraVLAN	1000pps	256-1500
blue_all_p3_to_blue_all_p5_v6	IntraVLAN	1000pps	256-1500
blue_sub_p3_to_blue_sub_p4	InterVLAN	1000pps	256-1500
green_all_p3_to_green_all_p2	IntraVLAN	1000pps	256-1500
red_all_p3_to_blue_all_p9	InterVRF	1000pps	256-1500
red_all_p3_to_blue_all_p9_v6	InterVRF	1000pps	256-1500
blue_all_p3_to_red_all_p8	InterVRF	1000pps	256-1500
blue_all_p3_to_red_all_p8_v6	InterVRF	1000pps	256-1500
green_all_p3_to_yellow_all_p7	InterVRF	1000pps	256-1500
red_all_p3_to_external_p10	External	1000pps	256-1500
blue_all_p3_to_external_p10	External	1000pps	256-1500
green_all_p3_to_external_p10	External	1000pps	256-1500

Stream Block	Type	Rate	FrameSize
red_all_p4_to_red_all_p6	IntraVLAN	1000pps	256-1500
red_all_p4_to_red_all_p6_v6	IntraVLAN	1000pps	256-1500
red_sub_p4_to_red_sub_p5	InterVLAN	1000pps	256-1500
blue_all_p4_to_blue_all_p3	IntraVLAN	1000pps	256-1500
blue_all_p4_to_blue_all_p3_v6	IntraVLAN	1000pps	256-1500
blue_sub_p4_to_blue_sub_p2	InterVLAN	1000pps	256-1500
purple_all_p4_to_purple_all_p6	IntraVLAN	1000pps	256-1500
red_all_p4_to_blue_all_p3	InterVRF	1000pps	256-1500
red_all_p4_to_blue_all_p3_v6	InterVRF	1000pps	256-1500
blue_all_p4_to_red_all_p2	InterVRF	1000pps	256-1500
blue_all_p4_to_red_all_p2_v6	InterVRF	1000pps	256-1500
purple_all_p4_to_green_all_p1	InterVRF	1000pps	256-1500
red_all_p4_to_external_p10	External	1000pps	256-1500
blue_all_p4_to_external_p10	External	1000pps	256-1500
purple_all_p4_to_external_p10	External	1000pps	256-1500
red_all_p5_to_red_all_p4	IntraVLAN	1000pps	256-1500
red_all_p5_to_red_all_p6_v4	IntraVLAN	1000pps	256-1500
red_sub_p5_to_red_sub_p3	InterVLAN	1000pps	256-1500
blue_all_p5_to_blue_all_p2	IntraVLAN	1000pps	256-1500
blue_all_p5_to_blue_all_p2_v6	IntraVLAN	1000pps	256-1500
blue_sub_p5_to_blue_sub_p1	InterVLAN	1000pps	256-1500
purple_all_p5_to_purple_all_p4	IntraVLAN	1000pps	256-1500
red_all_p5_to_blue_all_p9	InterVRF	1000pps	256-1500
red_all_p5_to_blue_all_p9_v6	InterVRF	1000pps	256-1500
blue_all_p5_to_red_all_p8	InterVRF	1000pps	256-1500
blue_all_p5_to_red_all_p8_v6	InterVRF	1000pps	256-1500
purple_all_p5_to_green_all_p3	InterVRF	1000pps	256-1500
red_all_p5_to_external_p10	External	1000pps	256-1500
blue_all_p5_to_external_p10	External	1000pps	256-1500
purple_all_p5_to_external_p10	External	1000pps	256-1500
red_all_p6_to_red_all_p3	IntraVLAN	1000pps	256-1500
red_all_p6_to_red_all_p6_v3	IntraVLAN	1000pps	256-1500
red_sub_p6_to_red_sub_p2	InterVLAN	1000pps	256-1500
blue_all_p6_to_blue_all_p1	IntraVLAN	1000pps	256-1500
blue_all_p6_to_blue_all_p1_v6	IntraVLAN	1000pps	256-1500

Stream Block	Type	Rate	FrameSize
blue_sub_p6_to_blue_sub_p9	InterVLAN	1000pps	256-1500
purple_all_p6_to_purple_all_p5	IntraVLAN	1000pps	256-1500
red_all_p6_to_blue_all_p8	InterVRF	1000pps	256-1500
red_all_p6_to_blue_all_p8_v6	InterVRF	1000pps	256-1500
blue_all_p6_to_red_all_p7	InterVRF	1000pps	256-1500
blue_all_p6_to_red_all_p7_v6	InterVRF	1000pps	256-1500
purple_all_p6_to_green_all_p2	InterVRF	1000pps	256-1500
red_all_p6_to_external_p10	External	1000pps	256-1500
blue_all_p6_to_external_p10	External	1000pps	256-1500
purple_all_p6_to_external_p10	External	1000pps	256-1500
red_all_p7_to_red_all_p2	IntraVLAN	1000pps	256-1500
red_all_p7_to_red_all_p2_v3	IntraVLAN	1000pps	256-1500
red_sub_p7_to_red_sub_p1	InterVLAN	1000pps	256-1500
blue_all_p7_to_blue_all_p9	IntraVLAN	1000pps	256-1500
blue_all_p7_to_blue_all_p9_v6	IntraVLAN	1000pps	256-1500
blue_sub_p7_to_blue_sub_p8	InterVLAN	1000pps	256-1500
yellow_all_p7_to_yellow_all_p9	IntraVLAN	1000pps	256-1500
red_all_p7_to_blue_all_p6	InterVRF	1000pps	256-1500
red_all_p7_to_blue_all_p6_v6	InterVRF	1000pps	256-1500
blue_all_p7_to_red_all_p5	InterVRF	1000pps	256-1500
blue_all_p7_to_red_all_p5_v6	InterVRF	1000pps	256-1500
yellow_all_p7_to_purple_all_p6	InterVRF	1000pps	256-1500
red_all_p7_to_external_p10	External	1000pps	256-1500
blue_all_p7_to_external_p10	External	1000pps	256-1500
yellow_all_p7_to_external_p10	External	1000pps	256-1500
red_all_p8_to_red_all_p1	IntraVLAN	1000pps	256-1500
red_all_p8_to_red_all_p1_v3	IntraVLAN	1000pps	256-1500
red_sub_p8_to_red_sub_p9	InterVLAN	1000pps	256-1500
blue_all_p8_to_blue_all_p7	IntraVLAN	1000pps	256-1500
blue_all_p8_to_blue_all_p7_v6	IntraVLAN	1000pps	256-1500
blue_sub_p8_to_blue_sub_p6	InterVLAN	1000pps	256-1500
yellow_all_p8_to_yellow_all_p7	IntraVLAN	1000pps	256-1500
red_all_p8_to_blue_all_p5	InterVRF	1000pps	256-1500
red_all_p8_to_blue_all_p5_v6	InterVRF	1000pps	256-1500
blue_all_p8_to_red_all_p4	InterVRF	1000pps	256-1500

Stream Block	Type	Rate	FrameSize
blue_all_p8_to_red_all_p4_v6	InterVRF	1000pps	256-1500
yellow_all_p8_to_purple_all_p5	InterVRF	1000pps	256-1500
red_all_p8_to_external_p10	External	1000pps	256-1500
blue_all_p8_to_external_p10	External	1000pps	256-1500
yellow_all_p8_to_external_p10	External	1000pps	256-1500
red_all_p9_to_red_all_p8	IntraVLAN	1000pps	256-1500
red_all_p9_to_red_all_p8_v3	IntraVLAN	1000pps	256-1500
red_sub_p9_to_red_sub_p7	InterVLAN	1000pps	256-1500
blue_all_p9_to_blue_all_p6	IntraVLAN	1000pps	256-1500
blue_all_p9_to_blue_all_p6_v6	IntraVLAN	1000pps	256-1500
blue_sub_p9_to_blue_sub_p5	InterVLAN	1000pps	256-1500
yellow_all_p9_to_yellow_all_p8	IntraVLAN	1000pps	256-1500
red_all_p9_to_blue_all_p4	InterVRF	1000pps	256-1500
red_all_p9_to_blue_all_p4_v6	InterVRF	1000pps	256-1500
blue_all_p9_to_red_all_p3	InterVRF	1000pps	256-1500
blue_all_p9_to_red_all_p3_v6	InterVRF	1000pps	256-1500
yellow_all_p9_to_purple_all_p4	InterVRF	1000pps	256-1500
red_all_p9_to_external_p10	External	1000pps	256-1500
blue_all_p9_to_external_p10	External	1000pps	256-1500
yellow_all_p9_to_external_p10	External	1000pps	256-1500
RoCEv2_p1__RoCEv2_p2	Storage	1546247pps	4022
RoCEv2_p2__RoCEv2_p1	PCF	3500pps	NA
blue_p1_mcast	Multicast	1000pps	256-1500

Scale and Performance Data

The following table shows the scaling data for this JVD.

Table 6:Scaling Data

Device	Platform	VLANs_VNIs_with_IRB	MAC_IPs/VN/port	VTEP	ESI	Global_MAC	Global_MAC_IP	Global_NDP_hosts	BGP Total Paths	BGP Active Paths
CP_Leaf1	qfx5120-48YM-8C	50	10	5	1	2717	5710	1800	49412	24760
ST_Leaf1	qfx5130-32cd	50	10	5	1	2716	5709	1800	48898	24503

Device	Platform	VLANs_VNIs_with_IRB	MAC_IPs/VN/port	VTEP	ESI	Global_MAC	Global_MAC_IP	Global_NDP_hosts	BGP Total Paths	BGP Active Paths
SV_Leaf1	qfx5130-48c	50	10	5	1	2716	5709	1800	48858	24483
CP_Leaf1	qfx5120-48YM-8C	500	5	5	1	13527	27649	9000	243650	121879
ST_Leaf1	qfx5130-32cd	500	5	5	1	13516	27647	9000	243200	121654
SV_Leaf1	qfx5130-48c	500	5	5	1	13516	27647	9000	241002	120555
CP_Leaf1	qfx5120-48YM-8C	1000	2	5	1	10827	22907	3600	239058	119583
ST_Leaf1	qfx5130-32cd	1000	2	5	1	10816	22901	3600	237764	118936
SV_Leaf1	qfx5130-48c	1000	2	5	1	10816	22901	3600	236060	118084

High Level Features

The following table shows the features that were tested with this JVD.

Table 7:Feature Tested

Feature	Node	Description
EBGP	All Devices	Default protocol for Apstra configured overlay and underlay sessions
BFD	All Devices	Sub-second timers for underlay and overlay (performance measurements for varying timers)
Graceful Restart	All Devices	Enabled for all BGP sessions
Border Leaf Gateway	Service-Leaves	Serves as link to external gateway
IP ECMP with fast-reroute	All Devices	Balanced traffic distribution at all multipath points in fabric, tested in steady-state and with link/protocol/device/process flapping
BFD	All Devices	Underlay (default timers) and overlay (with sub-second timers) validated in steady state and with link/protocol/device/process flapping
IPv4 IPv6 fabric addressing	All Devices	
LLDP	All Leaf Devices	Apstra default link discovery mechanism

Feature	Node	Description
Single-homed Access Links	All Leaf Devices	EP-style with up to 2,000 VLANs distributed among VRF Tenants; Access hosts use up to MAC/IP and 5 NDP/IPV6 entries per VLAN; DHCP client and server emulation on selected VLANs
Dual-homed Access Links	All Leaf Devices	AE bundles with ESI and LACP shared between leaf pairs; EP-style with up to 2,000 VLANs distributed among VRF Tenants; Access hosts use up to MAC/IP and 5 NDP/IPV6 entries per VLAN; DHCP client and server emulation on selected VLANs
MAC-VRF	All Leaf Devices	Apstra default EVPN instance type; vlan-aware service-type with 1:1 VLAN:VNI mapping
Layer 3 IRB interface	All Devices	Anycast gateway with 1 L3 IRB per VLAN/VNI; 9000 Byte MTU (Unique Unicast IP, Unique Unicast MAC, Duplicate VGA IP, Duplicate VGA MAC)
Type 2 Routing	All Leaf Devices	Symmetric routing for improved scalability for MAC/IP inter and intra-VRF tenant routing. Scaling comparison also to be performaed with asymmetric routing.
Type 5 Routing	All Leaf Devices	ip-prefix-routes announcement route-type for inter-VRF routing
VRF	All Leaf Devices	L3 Connectivity per Tenants with inter-vrf route-leaking for selected prefixes
Duplicate MAC Detection	All Leaf Devices	Apstra default MAC-VRF setting
DHCP	All Devices	Per-VRF DHCP forwarding and relay-source override profile; Servers and clients distributed internally and externally
Optimized Inter-Subnet Multicast (OISM)	All Devices	Border leaf devices with BDNE and Classic L3 interfaces to exchange multicast data with external sources and receivers
Firewall filters	All Devices	Profiles for loopback interface to protect the device from unwanted control plane traffic
QoS	set All Devices	ECN and PCF profiles to support RoCEv2

Known Limitations

The IRB IFD MTU is not being on QFX5120 by AOS. This affects the SBD IRB when using OISM.
Since the SBD IRB does not have a physical interface mapped to the same VLAN, this IFL will inherit the default IRB IFD MTU.

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