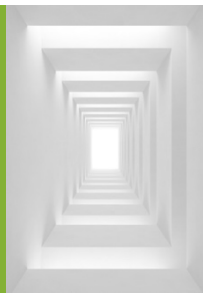
Juniper® Validated Design

JVD Test Report Brief: Collapsed Data Center Fabric with Juniper Apstra



JVD-DCFABRIC-COLLAPSED-01-01

Introduction

This test report brief contains qualification test report data for the Collapsed Data Center Fabric with Juniper Apstra Juniper Validated Design (JVD). This qualification includes validation of the blueprint deployment, incremental configuration push, checking telemetry and analytics, validating data, and traffic flow. If you have questions about this JVD, contact your Juniper Networks representative. The qualification includes validating blueprint deployment, incremental configuration pushes, checking telemetry/analytics, and verifying traffic flow.

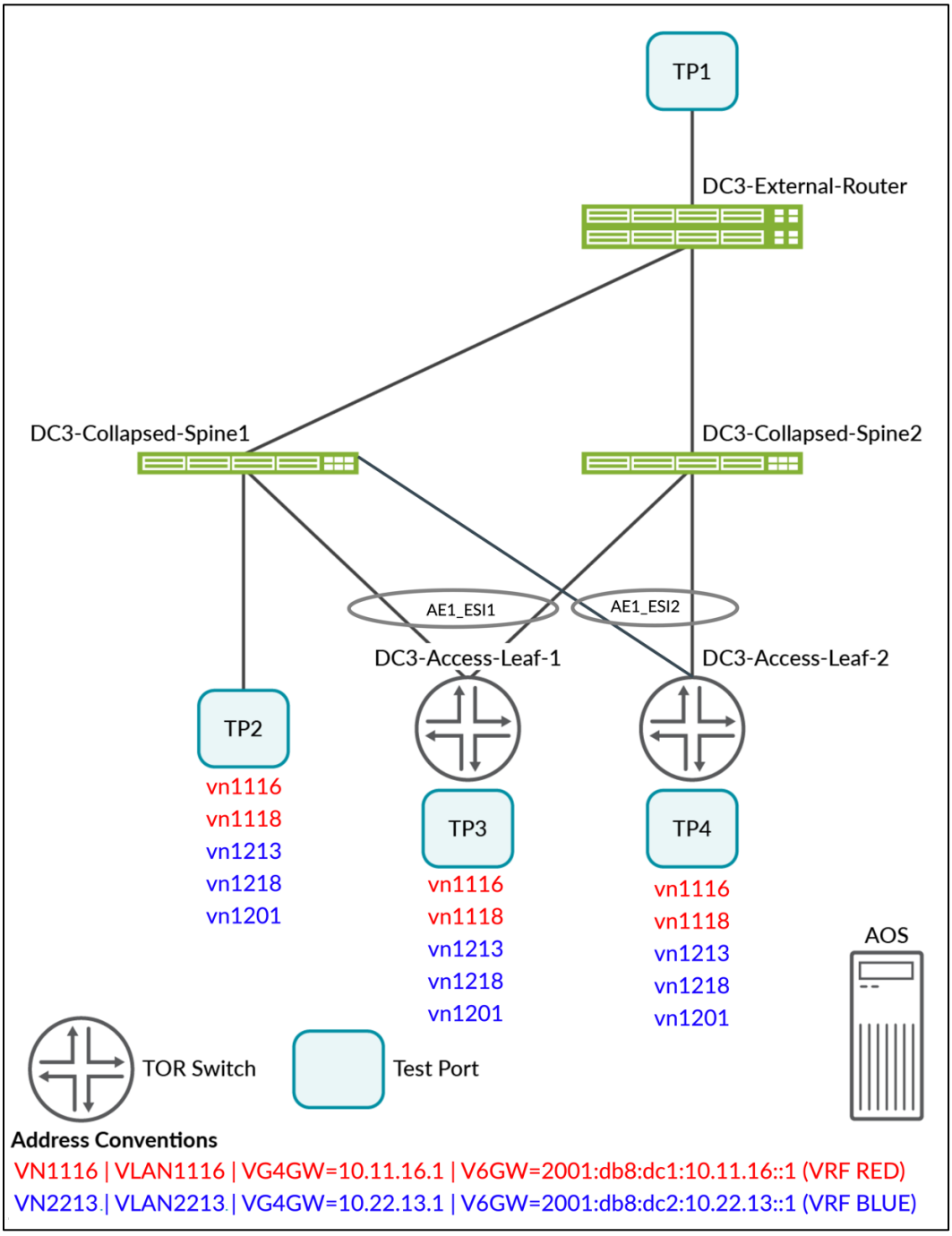
The objective of this test plan is to follow the Collapsed Data Center Fabric with Juniper Apstra JVD and run extended testing to harden the solution for customer deployment.

Testing is done on the following:

- Initial design and blueprint deployment through Apstra
- Validation of fabric operation/monitoring through Apstra Analytics/Telemetry Dashboard
- Validation of end-to-end traffic flow
- System health, ARP, ND, MAC, BGP (route, next hop), interface traffic counters, and so on
- Anomalies and validation

Test Topology

Figure 1: Reference Topology



Platforms Tested

Table 1: Platforms

Role	Platform	OS
DC3-Collapsed-Spine1	QFX5120-48Y | QFX5130-32CD | QFX5700 | ACX7100-48L | PTX10001-36MR	Junos OS Release 23.4R2-S3
DC3-Collapsed-Spine2	QFX5120-48Y | QFX5130-32CD | QFX5700 | ACX7100-48L | PTX10001-36MR	Junos OS Release 23.4R2-S3
DC3-External Router	MX204	Junos OS Release 23.4R2-S3
AOS	AOS	4.2.1

Version Qualification History

This JVD has been qualified in Junos OS Release 23.4R2-S3 and AOS 4.2.1.

Scale and Performance Data

This document may contain key performance indexes (KPIs) used in solution validation. Validated KPIs are multi-dimensional and reflect our observations in customer networks or reasonably represent solution capabilities. These numbers do not indicate the maximum scale and performance of individual tested devices. For uni-dimensional data on individual SKUs, contact your Juniper Networks representative.

The Juniper JVD team continuously strives to enhance solution capabilities. Consequently, solution KPIs may change without prior notice. Always refer to the latest JVD test report for up-to-date solution KPIs. For the latest comprehensive test report, contact your Juniper Networks representative.

Table 2: Scaling Numbers

Feature	Tested Scale
DC3LEAF1_VN_Count	2000
DC3LEAF1_VLAN_Count	2000
DC3LEAF1_IRB Count	2000
DC3LEAF1_local_mac_ip_host_entries	5000
DC3ESILEAF1_VN Count	2000
DC3ESILEAF1_VLAN Count	2000
DC3ESILEAF1_IRB Count	2000
DC3ESI1LEAF1_local_mac_ip_host_entries	5000
DC3 total MAC IP count	10000
VNI per leaf node	2000
VTEP per leaf node	1
ESI per leaf node	2

NOTE: These scale numbers are not device maximums and only reference the scale when these multidimensional test cases are performed.

Table 3: Performance Numbers

Event	Performance
Single homed Access Link Failure - Collapsed spine	Traffic recovery time < 50msec
Multihomed Access Link Failure - Collapsed spine	Traffic recovery time < 50msec
Dual homed collapsed spine node reboot	Traffic recovery time < 500msec
BGP protocol flap collapsed spine	Traffic recovery time < 500msec
Global Mac initialization time for 20k entries	< 10 secs

High Level Features Tested

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

Table 4: Features

Feature	Node	Description
Single Homed Access link	Leaf1	Up to 2,000 VLANs per access interface, distributed between Red and Blue VRF. Access hosts uses up to 10 MAC/IP entries per VLAN.
Multi homed Access link	All Leaf devices	AE bundle with ESI and LACP shared between Access switches and Collapsed spines. Up to 2,000 VLANs per access AE bundle and collapsed spine AE bundle distributed between Blue and Red VRF. Access hosts uses up to 10 MAC/IP entries per VLAN.
Collapsed spine Leaf pair	All Leaf devices	Apstra collapsed spine Rack type with links to Generic system. BGP peering from each VRF to the Generic system to provide connectivity between the VRFs and external hosts.
EBGP underlay and overlay	All Leaf devices	Default routing profile for Apstra blueprint.
IP ECMP with fast re-route	All Leaf devices	Equal traffic distribution at all multipoints.
BFD	All Leaf devices	Underlay and overlay BFD with BGP at timers of both 500ms and 1000ms, validated in steady state and Event testing.
MAC-VRF	All Leaf devices	Apstra default routing instance for Layer 2 (L2). Single instance per leaf with 1 VXLAN VNI per VLAN and VLAN aware service type.
Layer3 IRB interface	All Leaf devices	One L3 IRB address per VLAN/VNI. Same address/MAC used in other leaf pair, 9000 Bytes MTU.
EP-style Access interface	All Leaf devices	Apstra default VLAN configuration style.
Type 2 routing	All Leaf devices	Apstra default L2 route announcement type.
Type 5 routing	All Leaf devices	Default Apstra ip-prefix-routes announcement type.
LLDP	All Leafs and TOR switches	Apstra default link discovery mechanism.
Duplicate Mac Detection	All Leaf devices	Apstra default MAC-VRF settings.
BGP Graceful restart	All Leaf devices	All BGP peers.

Event Testing

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

Table 5: Tested Events

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 a Logical Device, interface Map, and device profile for collapsed spines	Apstra Deployment Step as documented in JVD.
Create a Logical Device, Interface Map, Device profile for external router and emulated servers	Apstra Deployment Step as documented in JVD.
Create a rack type for Collapsed spines	Apstra Deployment Step as documented in JVD.
Create rack templates for collapsed spines	Apstra Deployment Step as documented in JVD.
Create a blueprint with the template	Apstra Deployment Step as documented in JVD.
Assign all resource pools for the blueprint	Apstra Deployment Step as documented in JVD.
Assign Interface Maps to managed devices	Apstra Deployment Step as documented in JVD.
Check 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. Verify successful establishment of the control plane and verify no anomalies reported.
Verify Overlay Connectivity	Validate forwarding plane establishment with emulated host test traffic.
Apstra Device State Changes	Undeploy / drain / set pristine configuration of leaf and spine nodes. Validate redeployment success and re-establishment of control and forwarding planes.
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. Only traffic to/from the connected hosts will be impacted.
Multihomed link failure	Interface down/up, laser on/off with minimal traffic loss for links which are redundant. AE member links and complete AE bundles are flapped. Only traffic to/from the connected hosts will be impacted.
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 TOR/servers.

Test	Details
Deactivate BGP on DUTs	Ensure minimal traffic loss when various BGP sessions are deactivated. Full traffic restoration when sessions are restored.
Longevity Tests	Extended traffic run for 8 hours.
Extended Negative Testing	Continual loop of process restarts, protocol, and interface flaps to ensure stability and resilience of control and data plane.
Collapsed spine devices Upgrade from Apstra	Junos OS Image changes performed through Apstra on all managed devices. Verify control and forward planes are functional after system upgrade.

Traffic Profiles

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

Table 6: Tested Traffic Profiles

Traffic Path	Type	Load	Packet Size
Traffic Path	Type	Load	Frame Size Distribution
Intra VRF	Overlay	UDP and TCP	1kpps per streamblock
Inter VRF	Overlay with and without route leaking	UDP and TCP	1kpps per streamblock
External Routes	Overlay through Collapsed Spine	UDP and TCP	1kpps per streamblock

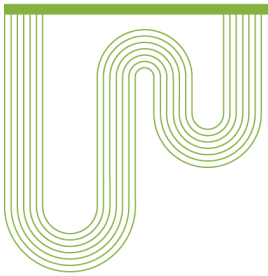
Known Limitations

AOS configlets are suggested in order to adjust the maximum number of allowed EVPN overlay next-hops and physical interfaces on the leaf devices to an appropriate number for a data center fabric. The same should also be used to set a balanced memory allocation for L2 and Layer 3 (L3). For more information on these features, see:

- https://www.juniper.net/documentation/us/en/software/junos/multicast-l2/topics/topic-map/layer-2-forwarding-tables.html
- https://www.juniper.net/documentation/us/en/software/junos/evpn-vxlan/Other/interface-num-edit-forwarding-options.html
- https://www.juniper.net/documentation/us/en/software/junos/cli-reference/topics/ref/statement/next-hop-edit-forwarding-options-vxlan-routing.html

When setting a MAC-VRF instance on QFX5120 and QFX5110 leaf devices, the following CLI command is required: **set forwarding-options evpn-vxlan shared-tunnels**.

Once Apstra applies this command, the device will require a reboot. Apstra reports this as an anomaly until the device is manually rebooted.



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