

Juniper® Validated Design

JVD Test Report Brief: Datacenter Interconnect Design with Juniper® Apstra



test-report-brief- JVD-DCI-MULTISITE-01-01

Introduction

This document outlines the qualification testing of the Data Center Interconnect (DCI) Reference Design with Juniper Apstra. The design is based on 3 methods of DCI, using the blueprints from previous JVDs for 3-Stage, 5-Stage, and Collapsed Fabric. The goal is to ensure the design is well-documented and will produce a reliable, predictable deployment for the customer.

The prerequisite for this test effort is the deployment (and understanding) of the three prior JVD implementations. We will not be discussing in-depth details of the individual design elements of each JVD. Please refer to the prior design documents:

- 3-Stage EVPN/VXLAN Fabric with Juniper Apstra—Juniper Validated Design (JVD)
- Collapsed Data Center Fabric with Juniper Apstra—Juniper Validated Design (JVD)
- 5-Stage EVPN-VXLAN Data Center —Juniper Validated Design (JVD)

DCI testing will involve the following:

- 3-Stage-DC1 ---> L2OTT Interconnect ---> 3-Stage-DC2
- 3-Stage-DC1 ---> seamless stitching w/translation-VNIs (Type 2 Only) ---> Collapsed Fabric-DC3
- 3-Stage-DC1 ---> seamless stitching w/translation-VNIs (Type 5 and Type 2) ---> 5-Stage-DC4 with 1 Type-5-ONLY POD and 2 T2/T5 PODs

The qualification objectives include validation of blueprint deployment, incremental configuration pushes or provisioning, Telemetry/Analytics checking, performance/convergence 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: DCI with L2 OTT and MACSEC

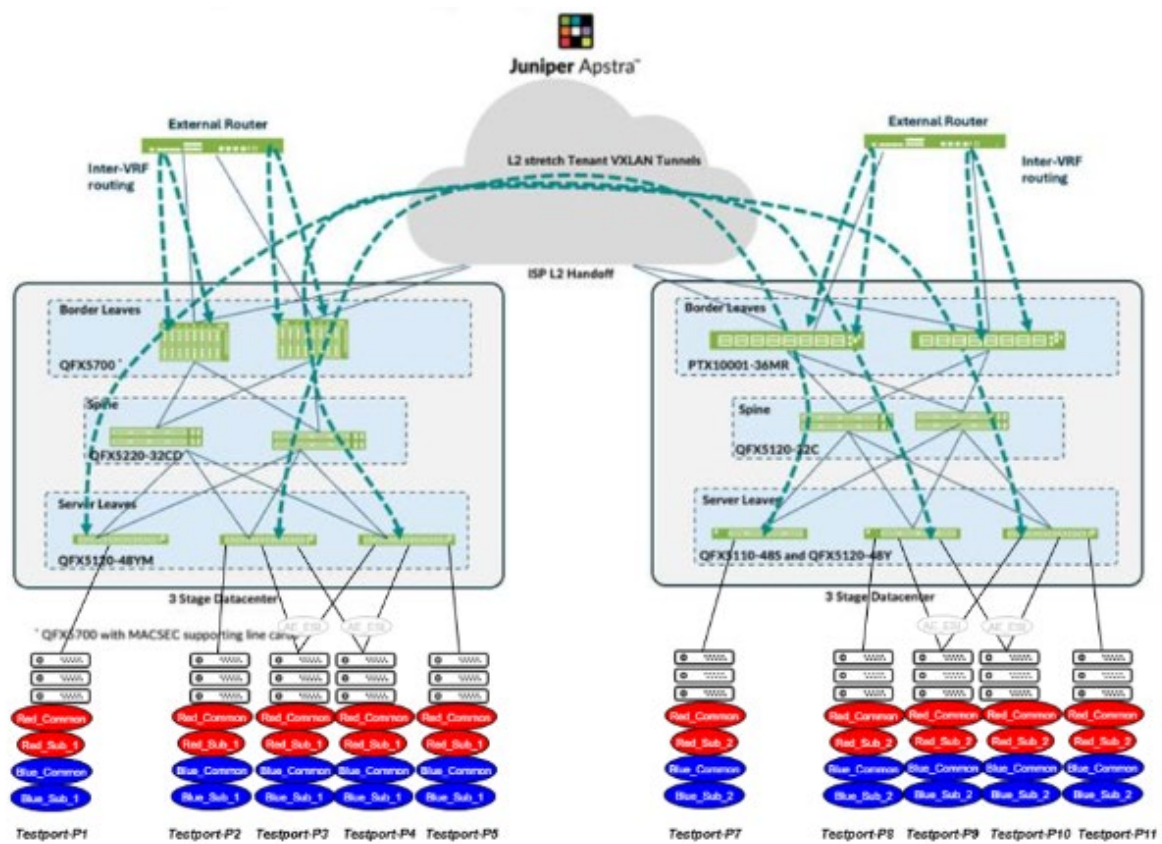


Figure 2: DCI with Type 2 Seamless

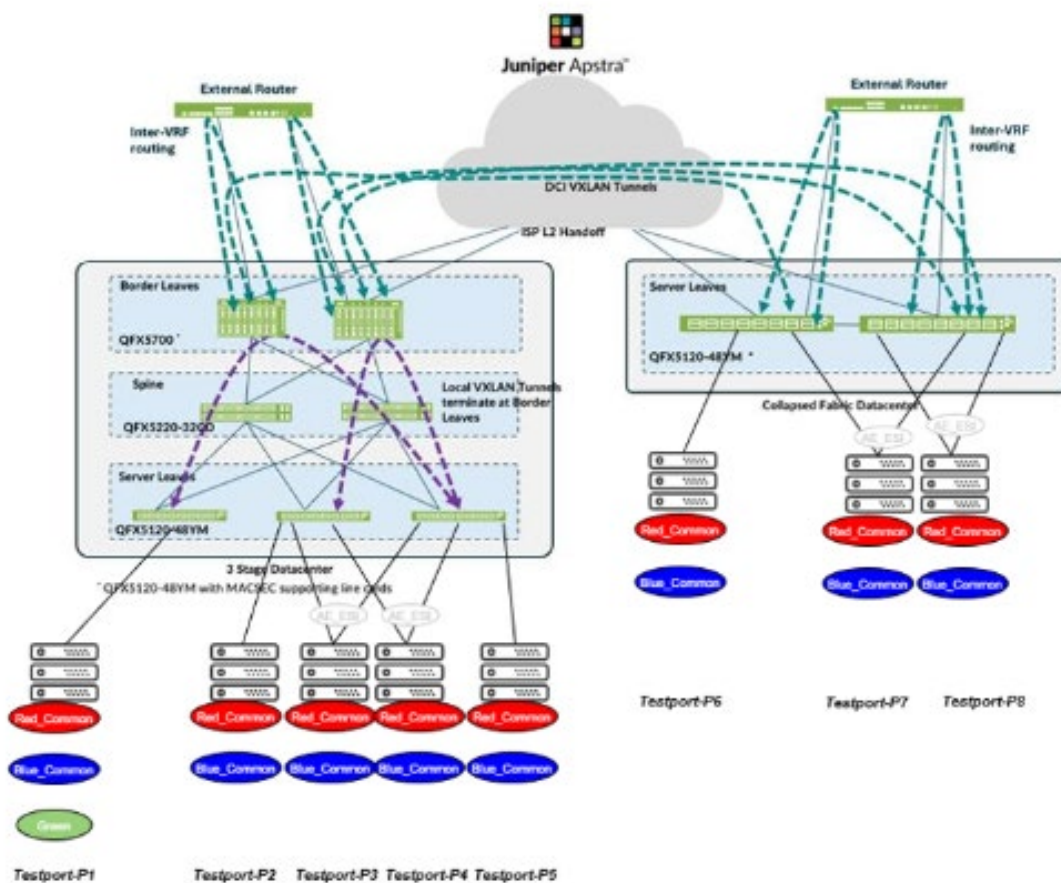


Figure 3 - DCI with Type 2 and Type 5 Seamless

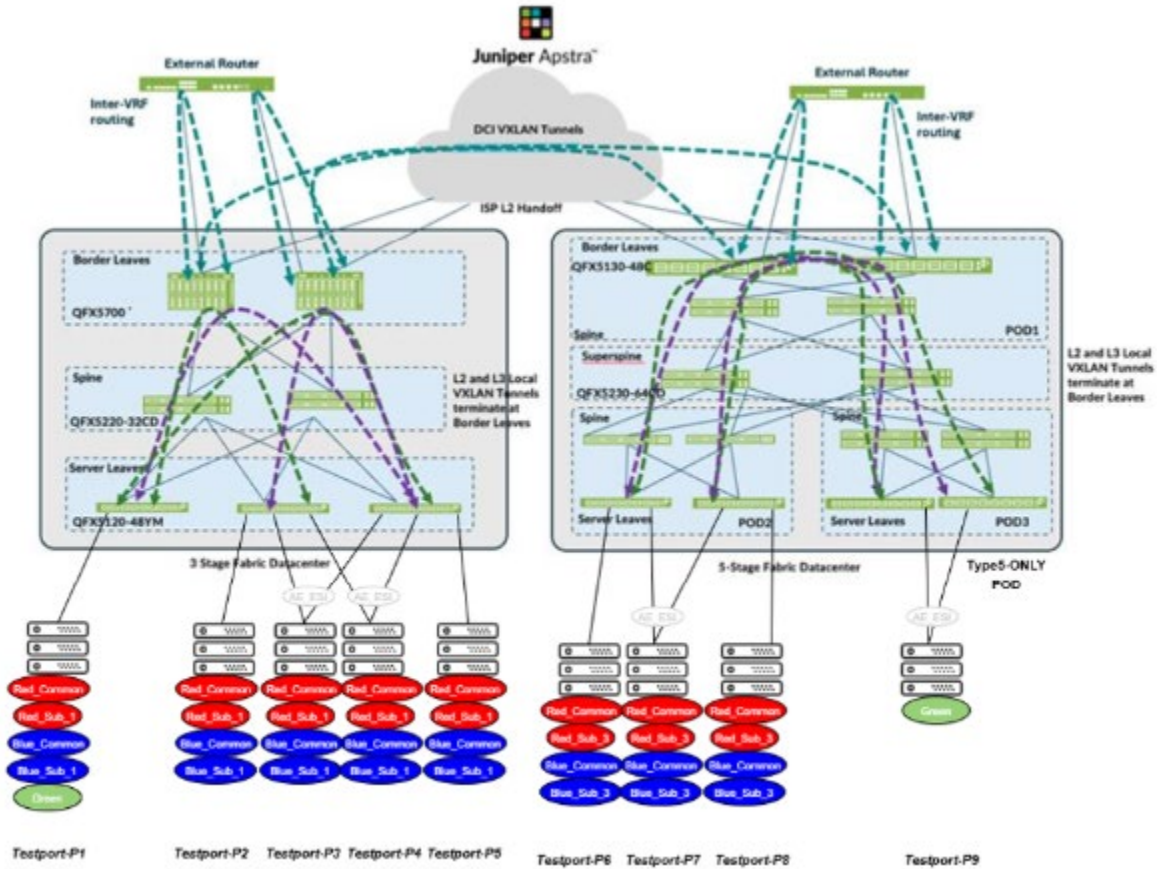


Table 1: VLAN Configurations

VLAN GROUP	VLAN Ranges	Subnet IPv4	Subnet IPv6	Description
RED_COMMON	400-599	10.0.[0-199].0/24	2001:db8:dc1:10:0:[0-c7]::/96	Common range to hosts in both DC sites, linked to RED VRF
RED_SUB_DC1	600-799	10.1.[0-199].0/24	2001:db8:dc1:10:1:[0-c7]::/96	Unique VLAN ranges in DC1, linked to RED VRF
RED_SUB_DC2	800-999	10.2.[0-199].0/24	2001:db8:dc1:10:2:[0-c7]::/96	Unique VLAN ranges in DC2, linked to RED VRF
RED_SUB_DC4	1200-1399	10.4.[0-199].0/24	2001:db8:dc1:10:4:[0-c7]::/96	Unique VLAN ranges in DC4, linked to RED VRF
BLUE_COMMON	1400-1599	10.10.[0-199].0/24	2001:db8:dc1:10:a:[0-c7]::/96	Common range to hosts in both DC sites, linked to BLUE VRF
BLUE_SUB_DC1	1600-1799	10.11.[0-199].0/24	2001:db8:dc1:10:b:[0-c7]::/96	Unique VLAN ranges in DC1, linked to BLUE VRF
BLUE_SUB_DC2	1800-1999	10.12.[0-199].0/24	2001:db8:dc1:10:c:[0-c7]::/96	Unique VLAN ranges in DC2, linked to BLUE VRF
BLUE_SUB_DC4	2200-2399	10.14.[0-199].0/24	2001:db8:dc1:10:e:[0-c7]::/96	Unique VLAN ranges in DC4, linked to BLUE VRF

VLAN GROUP	VLAN Ranges	Subnet IPv4	Subnet IPv6	Description
GREEN_SUB_DC1	2700-2899	10.27.0.0/24	2001:db8:dc1:10:1b:[0-c7]::/96	Unique VLAN ranges per site, linked to GREEN (Type5 ONLY) VRF
GREEN_SUB_DC4	2500-2699	10.25.0.0/24	2001:db8:dc1:10:19:[0-c7]::/96	Unique VLAN ranges per site, linked to GREEN (Type5 ONLY) VRF

Platforms, Controllers, and Roles

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

Table 2: Platforms, Controllers, and Roles

Tag	Role	Model	OS	Linecard	RE	Fabric	VC	Helper/ DUT
DC1_BL1	3stage_POD1_BorderLeaf1	QFX5700	JUNOS EVO 23.4R2-S4	NA	NA	NA	NA	DUT
DC1_BL2	3stage_POD1_BorderLeaf2	QFX5700	JUNOS EVO 23.4R2-S4	NA	NA	NA	NA	DUT
DC2_BL1	3stage_POD2_BorderLeaf1	PTX10001-36MR	Junos EVO 23.4R2-S4	NA	NA	NA	NA	DUT
DC2_BL2	3stage_POD2_BorderLeaf2	PTX10001-36MR	Junos EVO 23.4R2-S4	NA	NA	NA	NA	DUT
DC3_BL1	Collapsed_Fabric_Leaf1	QFX5120-48YM	Junos 23.4R2-S4	NA	NA	NA	NA	DUT
DC3_BL2	Collapsed_Fabric_Leaf2	QFX5120-48YM	Junos 23.4R2-S4	NA	NA	NA	NA	DUT
DC4_BL1	5Stage_Services_Leaf1	QFX5130-48C	Junos EVO 23.4R2-S4	NA	NA	NA	NA	DUT
DC4_BL2	5Stage_Services_Leaf2	QFX5130-48C	Junos 23.4R2-S4	NA	NA	NA	NA	DUT

Performance

The following tables show the scale and performance data for this JVDE.

Table 3: Scale

Devices	VLANS VNIs with IRB	Hosts per VN per port	DCI VTEPS	Stretched VNIs	Global MAC	Global MAC_IP	Global NDP Hosts	BGP Total Paths	BGP Active Paths
DC1 <--> DC2	800	10	30	NA	60000	98715	8000	904785	430329
DC1 <--> DC3	600	5	NA	500	16000	25409	7000	191354	95680
DC1 <--> DC4	1000	5	NA	800	27090	50953	8000	412073	235558

Table 4: DC1 <-->DC2 Longevity Results

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_all_p1_to_blue_all_p9	9632400	9632400	214.021	155.02	335.72
red_all_p1_to_red_all_p9_v6	9632400	9632400	93.878	79.41	152.68
blue_all_p1_to_blue_all_p9	9632400	9632400	94.154	79.41	154.48

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_sub_p1_to_red_sub_p9	9632229	9632229	94.068	79.39	153.6
blue_sub_p1_to_blue_sub_p9	9632003	9632003	93.985	79.36	152.67
red_all_p2_to_red_all_p11	9634800	9634800	94.429	79.93	153
red_all_p2_to_red_all_p11_v6	9634736	9634736	94.352	80.06	152.1
blue_all_p2_to_red_all_p11	9634528	9634528	214.095	156.12	337.37
red_sub_p2_to_red_sub_p11	9634400	9634400	94.393	80.04	154.16
blue_sub_p2_to_blue_sub_p11	9634400	9634400	94.323	80.05	152.15
red_all_p3_to_red_all_p7	9636800	9636800	94.606	80.09	154.61
red_all_p3_to_red_all_p7_v6	9636800	9636800	94.562	80.07	154.6
blue_all_p3_to_blue_all_p7	9636800	9636800	94.939	80.03	154.61
blue_sub_p3_to_blue_sub_p7	9636649	9636649	94.679	80.12	152.37
red_sub_p3_to_blue_sub_p7	9636400	9636400	215.142	156.56	336.18
red_all_p4_to_red_all_p8	9639666	9639666	94.548	80.07	154.11
red_all_p4_to_red_all_p8_v6	9639600	9639600	94.475	80.02	153.37
blue_all_p4_to_blue_all_p8	9639418	9639418	94.419	80.06	154.99
red_sub_p4_to_red_sub_p8	9639400	9639400	94.644	80.1	153.01
blue_sub_p4_to_red_sub_p8	9639400	9639400	214.294	155.78	336.17
red_all_p5_to_blue_all_p9	9647197	9647197	215.491	156.19	336.27
red_all_p5_to_red_all_p9_v6	9647000	9647000	95.019	80.02	152.06
blue_all_p5_to_blue_all_p9	9647000	9647000	94.82	80.01	155.33
blue_sub_p5_to_blue_sub_p9	9647000	9647000	94.89	79.99	155.19
red_sub_p5_to_red_sub_p9	9647000	9647000	95.001	79.95	156.68
red_all_p7_to_blue_all_p1	9641000	9641000	128.379	91.6	218.9
red_all_p7_to_red_all_p1_v6	9641000	9641000	97.406	78.25	164.48
blue_all_p7_to_blue_all_p1	9641000	9641000	97.34	78.21	164.51
red_sub_p7_to_red_sub_p1	9640851	9640851	97.594	78.23	165.1
blue_sub_p7_to_blue_sub_p1	9640600	9640600	97.44	78.25	165.93
red_all_p8_to_red_all_p2	9642600	9642600	98.157	79.31	165.78
red_all_p8_to_red_all_p2_v6	9642600	9642600	98.318	79.3	166
blue_all_p8_to_red_all_p2	9642563	9642563	129.758	92.54	218.62
red_sub_p8_to_red_sub_p2	9642261	9642261	97.963	79.36	165.86
blue_sub_p8_to_blue_sub_p2	9642200	9642200	97.996	79.36	165.5
red_all_p9_to_red_all_p3	9644908	9644908	98.018	79.45	166.41
red_all_p9_to_red_all_p3_v6	9644800	9644800	97.984	79.39	165.63
blue_all_p9_to_blue_all_p3	9644800	9644800	97.998	79.26	165.92

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_sub_p9_to_red_sub_p3	9644775	9644775	97.957	79.4	166.06
blue_sub_p9_to_red_sub_p3	9644600	9644600	129.882	92.64	218.75
red_all_p10_to_red_all_p4	9647110	9647110	98.15	79.38	166.55
red_all_p10_to_red_all_p4_v6	9647000	9647000	98.095	79.42	165.94
blue_all_p10_to_blue_all_p4	9647000	9647000	98.02	79.42	165.87
blue_sub_p10_to_blue_sub_p4	9647000	9647000	98.349	79.42	165.36
red_sub_p10_to_blue_sub_p4	9646843	9646843	129.786	92.58	219.83
red_all_p11_to_red_all_p5	9647200	9647200	98.689	79.27	166.64
red_all_p11_to_red_all_p5_v6	9647200	9647200	98.518	79.36	165.72
blue_all_p11_to_blue_all_p5	9647040	9647040	98.518	79.26	165.65
red_sub_p11_to_red_sub_p5	9647000	9647000	98.073	79.27	166.1
blue_sub_p11_to_red_sub_p5	9646874	9646874	130.463	92.53	219.05

Table 5: DC1 <-->DC3 Longevity Results

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_all_p1_to_blue_all_p6	56724050	56724050	190.26	125.03	286.41
blue_all_p1_to_blue_all_p6	56724050	56724050	59.76	47.05	96.72
blue_all_p1_to_blue_all_p6_v6	56724048	56724048	59.82	47.14	97.18
red_all_p2_to_red_all_p7	56725180	56725180	74.85	53.02	104.35
blue_all_p2_to_red_all_p7	56725180	56725180	214.52	133.5	287.48
blue_all_p2_to_blue_all_p7_v6	56725170	56725170	74.19	53.06	104.28
red_all_p3_to_red_all_p8	56726166	56726166	20.93	17.95	23.23
blue_all_p3_to_blue_all_p8	56726160	56726160	20.89	17.94	23.26
blue_all_p3_to_blue_all_p8_v6	56726160	56726160	20.82	17.95	23.23
red_all_p4_to_red_all_p6	56727130	56727130	60.18	47.78	97.57
blue_all_p4_to_blue_all_p6	56727122	56727122	59.81	47.74	97.48
blue_all_p4_to_blue_all_p6_v6	56727120	56727120	60.13	47.91	97.6
red_all_p5_to_blue_all_p7	56724239	56724239	203.73	131.58	274.2
blue_all_p5_to_blue_all_p7	56724230	56724230	73.69	52.83	104.82
blue_all_p5_to_blue_all_p7_v6	56724230	56724230	73.7	52.99	104.36
red_all_p7_to_blue_all_p2	56724240	56724240	106.58	63.94	155.6
blue_all_p7_to_blue_all_p2	56724235	56724235	77.23	53.88	101.91
blue_all_p7_to_blue_all_p2_v6	56724230	56724230	76.49	54.21	101.62

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_all_p6_to_blue_all_p1	56725230	56725230	102.57	57.71	149.32
blue_all_p6_to_blue_all_p1	56725230	56725230	72.35	46.94	94.91
blue_all_p6_to_blue_all_p1_v6	56725229	56725229	72.25	47.11	95.37
blue_all_p6_to_green_sub_p1_deny	56725220	0	0	0	0
red_all_p8_to_red_all_p3	56726230	56726230	20.96	18.07	23.3
blue_all_p8_to_red_all_p3	56726230	56726230	50.68	27.88	77.73
blue_all_p8_to_blue_all_p3_v6	56726230	56726230	21.08	18.06	23.41

Table 6: DC1 <-->DC4 Longevity Results

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_all_p1_to_blue_all_p6	69808390	69808390	155.258	97.18	226.05
red_all_p1_to_blue_sub_p6_v6	69808381	69808381	155.601	97.74	225.92
blue_all_p1_to_blue_all_p6	69808380	69808380	23.834	23.17	26.98
red_sub_p1_to_red_sub_p6	69808380	69808380	23.372	23.15	25.51
blue_sub_p1_to_blue_sub_p6	69808380	69808380	23.372	23.17	25.57
blue_sub_p1_to_blue_sub_p6_v6	69808380	69808380	23.377	23.16	25.31
green_sub_p1_to_green_sub_p9	69808380	69808380	22.27	22.05	24.43
green_sub_p1_to_green_sub_p9_v6	69808380	69808380	22.27	22.06	24.33
red_all_p2_to_red_all_p7	70038310	70038310	24.648	23.82	27.87
red_all_p2_to_red_all_p7_v6	70038310	70038310	24.632	23.83	27.74
blue_all_p2_to_red_all_p7	70038310	70038310	151.385	97.57	226.68
red_sub_p2_to_red_sub_p7	70038303	70038303	24.036	23.81	26.46
blue_sub_p2_to_blue_sub_p7	70038300	70038300	24.038	23.81	26.41
blue_sub_p2_to_blue_sub_p7_v6	70038300	70038300	24.033	23.81	26.47
red_all_p3_to_red_all_p8	70041950	70041950	24.449	23.89	28.03
red_all_p3_to_red_all_p8_v6	70041950	70041950	24.637	23.89	27.92
blue_all_p3_to_blue_all_p8	70041944	70041944	24.543	23.89	27.94
blue_sub_p3_to_blue_sub_p8	70041940	70041940	24.102	23.9	26.07
blue_sub_p3_to_blue_sub_p8_v6	70041940	70041940	24.099	23.89	26.21
red_sub_p3_to_blue_sub_p8	70041940	70041940	152.239	97.68	226.78
red_all_p4_to_red_all_p6	70039570	70039570	24.537	23.86	28.27
red_all_p4_to_red_all_p6_v6	70039570	70039570	24.556	23.86	28.27
blue_all_p4_to_blue_all_p6	70039570	70039570	24.481	23.86	27.97
red_sub_p4_to_red_sub_p6	70039570	70039570	24.079	23.87	26.15
blue_sub_p4_to_red_sub_p6	70039565	70039565	150.73	97.82	226.98
blue_sub_p4_to_blue_sub_p6_v6	70039560	70039560	24.075	23.86	26.33
red_all_p5_to_blue_all_p7	70144300	70144300	153.279	97.8	226.99
red_all_p5_to_red_all_p7_v6	70144300	70144300	24.455	23.79	27.88
blue_all_p5_to_blue_all_p7	70144300	70144300	24.437	23.79	27.81
blue_sub_p5_to_blue_sub_p7	70144300	70144300	24.013	23.79	25.85
blue_sub_p5_to_blue_sub_p7_v6	70144300	70144300	24.011	23.8	25.84
red_sub_p5_to_red_sub_p7	70144293	70144293	24.015	23.8	25.82
red_all_p6_to_blue_all_p4	69882980	69882980	52.548	32.64	78.76

Stream Block	Tx Count (Frames)	Rx Count (Frames)	Avg Latency (us)	Min Latency (us)	Max Latency (us)
red_all_p6_to_red_all_p4_v6	69882980	69882980	24.61	23.83	27.55
blue_all_p6_to_blue_all_p4	69882980	69882980	24.609	23.85	27.44
red_sub_p6_to_red_sub_p4	69882980	69882980	24.069	23.86	25.82
blue_sub_p6_to_blue_sub_p4	69882972	69882972	24.07	23.87	25.77
blue_sub_p6_to_blue_sub_p4_v6	69882970	69882970	24.066	23.85	25.78
red_all_p7_to_blue_all_p1	69882710	69882710	51.486	31.61	77.62
red_all_p7_to_red_all_p1_v6	69882710	69882710	23.48	22.81	26.55
blue_all_p7_to_blue_all_p1	69882701	69882701	23.427	22.8	26.53
red_sub_p7_to_red_sub_p1	69882700	69882700	23.012	22.81	24.73
blue_sub_p7_to_blue_sub_p1	69882700	69882700	23.011	22.8	24.72
blue_sub_p7_to_blue_sub_p1_v6	69882700	69882700	23.011	22.81	24.69
red_all_p8_to_red_all_p2	69886120	69886120	24.423	23.86	27.54
red_all_p8_to_red_all_p2_v6	69886120	69886120	24.553	23.86	27.6
blue_all_p8_to_red_all_p2	69886120	69886120	52.586	32.64	78.84
red_sub_p8_to_red_sub_p2	69886120	69886120	24.066	23.87	25.7
blue_sub_p8_to_blue_sub_p2	69886110	69886110	24.067	23.86	25.75
blue_sub_p8_to_blue_sub_p2_v6	69886110	69886110	24.065	23.85	25.84
green_sub_p9_to_green_sub_p1	70144379	70144379	22.084	21.86	23.77
green_sub_p9_to_green_sub_p1_v6	70144370	70144370	22.067	21.86	23.83

High Level Features

The following table shows the high level features that were tested with this JVDE.

Table 7: High Level Features

Feature	Node	Description
L2OTT Interconnect	QFX5700 and PTX10001	Interconnect Method between 3-Stage DC1 and DC2
VXLAN-to-VXLAN Seamless Stitching	QFX5700 and QFX5120	Interconnect Method between 3-Stage DC1 and Collapsed Fabric DC3
T2 and T5 VXLAN-to-VXLAN Stitching	QFX5700 and QFX5130	Interconnect Method between 3-Stage DC1 and 5Stage DC4
ECMP	All Leaves and Border Gateways	Via Multihomed Interconnect Gateways
MAC-VRF EVI	All Leaves	Supported Apstra EVI Method
VLAN-AWARE service type	All Leaves	Supported Apstra Service Type
IPv4 and IPv6	All Leaves	Overlay Host Connectivity
Asymmetric IRB	All Leaves	Default Apstra IRB Method
Type2/Type5 Coexistence	All Leaves	Apstra Option to Include Type5 Host Routes

Feature	Node	Description
System Monitoring via AOS (Telemetry)	All Devices	Probes to Report Anomalies
Selective Tenant Interconnectivity	All Border Gateways	Real-world Scenarios to Demonstrate only Subset of VNs to be Extended
MACSec at Borders (encryption on DCI links)	QFX5700, QFX5120, and QFX5130	Encryption on DCI Links for 3-Stage and Collapsed Fabric
translation VNI	All Border Gateways	When Same VLAN in Site A and Site B use different VNIs
MAC Mobility	All Leaves	Support MAC Host moves across DC
BFD	All Leaves and Border Gateways	Border Gateway BFD on Underlay and Overlay

Events and Triggers Test

The following table shows the Events and Triggers tests that were performed in this JVDE.

Table 8: Events and Triggers Test

Test	Details
L2OTT Provisioning DC1<-->DC2	Apstra Deployment Step as Documented in JVD
Type2 Seamless Stitching Provisioning DC1<-->DC3	Apstra Deployment Step as Documented in JVD
Type2 / Type5 Seamless Stitching Provisioning DC1<-->DC4	Apstra Deployment Step as Documented in JVD
Intra-VLAN, Inter-VLAN, Inter-VRF Connectivity across DC	Host Emulation Via Test Traffic
Enable MACSEC on DC1<-->DC2 Links	Apstra Deployment via Configlet
Enable MACSEC on DC1<-->DC3 Links	Apstra Deployment via Configlet
Bandwidth Optimization with ECMP	Traffic Optimization via Dual Border Gateways
VNI Translation	Subset of VNIs which share the same VLAN, but use different IDs in each DC
VLAN Remove and Re-add at single L2 endpoint in each DC	Successful Configuration Changes via Apstra
VLAN Remove and Re-add at all L2 endpoints in each DC	Successful Configuration Changes via Apstra
VLAN Remove and Re-add at single L3 endpoint in DC1<-->DC4 for Type5 Stitched Hosts	Successful Configuration Changes via Apstra
VLAN Remove and Re-add at all L3 endpoint in DC1<-->DC4 for Type5 Stitched Hosts	Successful Configuration Changes via Apstra
VNI-Interconnect Remove / Re-add for Select VNIs in each DC	Successful Configuration Changes via Apstra
DCI Link Failure and Reconvergence	Reconvergence time and restoration of ECMP
Border Gateway Reboot and Reconvergence	Reconvergence time and restoration of ECMP
DCI BGP Underlay Failure and Reconvergence	Reconvergence time and restoration of ECMP
DCI BGP Overlay Failure and Reconvergence	Reconvergence time and restoration of ECMP
Border Gateway Node Undeploy / Redeploy	Successful Configuration Changes via Apstra, reconvergence time and restoration of ECMP
Border Gateway Process Restart	Reconvergence time and restoration of processes (routing / I2-learning / chassis-control)
MAC Move across DCI	Reconvergence time for bulk move of many hosts in a VLAN across DCI

Test	Details
Longevity with Continual Link and Process Failures	Sustained traffic runs while performing continual event triggers

Traffic Profiles

The following tables show the traffic profiles that were tested with this JVDE.

Table 9: DC1 <-->DC2 Traffic Flows

Traffic Flow	Type	Path
red_all_p1_to_blue_all_p9	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p1_to_red_all_p9_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p1_to_blue_all_p9	Intra-VLAN	OTT with Type2 Tunnel
red_sub_p1_to_red_sub_p9	Inter-VLAN	OTT with Type2 Tunnel
blue_sub_p1_to_blue_sub_p9	Inter-VLAN	OTT with Type2 Tunnel
red_all_p2_to_red_all_p11	Intra-VLAN	OTT with Type2 Tunnel
red_all_p2_to_red_all_p11_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p2_to_red_all_p11	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_sub_p2_to_red_sub_p11	Inter-VLAN	OTT with Type2 Tunnel
blue_sub_p2_to_blue_sub_p11	Inter-VLAN	OTT with Type2 Tunnel
red_all_p3_to_red_all_p7	Intra-VLAN	OTT with Type2 Tunnel
red_all_p3_to_red_all_p7_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p3_to_blue_all_p7	Intra-VLAN	OTT with Type2 Tunnel
blue_sub_p3_to_blue_sub_p7	Inter-VLAN	OTT with Type2 Tunnel
red_sub_p3_to_blue_sub_p7	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p4_to_red_all_p8	Intra-VLAN	OTT with Type2 Tunnel
red_all_p4_to_red_all_p8_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p4_to_blue_all_p8	Intra-VLAN	OTT with Type2 Tunnel
red_sub_p4_to_red_sub_p8	Inter-VLAN	OTT with Type2 Tunnel
blue_sub_p4_to_red_sub_p8	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p5_to_blue_all_p9	Inter-VRF	

Traffic Flow	Type	Path
red_all_p5_to_red_all_p9_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p5_to_blue_all_p9	Intra-VLAN	OTT with Type2 Tunnel
blue_sub_p5_to_blue_sub_p9	Inter-VLAN	OTT with Type2 Tunnel
red_sub_p5_to_red_sub_p9	Inter-VLAN	OTT with Type2 Tunnel
red_all_p7_to_blue_all_p1	Inter-VRF	
red_all_p7_to_red_all_p1_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p7_to_blue_all_p1	Intra-VLAN	OTT with Type2 Tunnel
red_sub_p7_to_red_sub_p1	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
blue_sub_p7_to_blue_sub_p1	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p8_to_red_all_p2	Intra-VLAN	OTT with Type2 Tunnel
red_all_p8_to_red_all_p2_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p8_to_red_all_p2	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_sub_p8_to_red_sub_p2	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
blue_sub_p8_to_blue_sub_p2	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p9_to_red_all_p3	Intra-VLAN	OTT with Type2 Tunnel
red_all_p9_to_red_all_p3_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p9_to_blue_all_p3	Intra-VLAN	OTT with Type2 Tunnel
red_sub_p9_to_red_sub_p3	Inter-VLAN	OTT with Type2 Tunnel
blue_sub_p9_to_red_sub_p3	Inter-VRF	TYPE5 Routes, via EXT Gateway
red_all_p10_to_red_all_p4	Intra-VLAN	OTT with Type2 Tunnel
red_all_p10_to_red_all_p4_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel
blue_all_p10_to_blue_all_p4	Intra-VLAN	OTT with Type2 Tunnel
blue_sub_p10_to_blue_sub_p4	Inter-VLAN	OTT with Type2 Tunnel
red_sub_p10_to_blue_sub_p4	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p11_to_red_all_p5	Intra-VLAN	OTT with Type2 Tunnel
red_all_p11_to_red_all_p5_v6	Intra-VLAN (IPv6)	OTT with Type2 Tunnel

Traffic Flow	Type	Path
blue_all_p11_to_blue_all_p5	Intra-VLAN	OTT with Type2 Tunnel
red_sub_p11_to_red_sub_p5	Inter-VLAN	OTT with Type2 Tunnel
blue_sub_p11_to_red_sub_p5	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway

Table 10: DC1 <-->DC3 Traffic Flows

Traffic Flow	Type	Path
red_all_p1_to_blue_all_p6	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p1_to_blue_all_p6	Intra-VLAN	T2 Seamless Stitching
blue_all_p1_to_blue_all_p6_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p2_to_red_all_p7	Intra-VLAN	T2 Seamless Stitching
blue_all_p2_to_red_all_p7	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p2_to_blue_all_p7_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p3_to_red_all_p8	Intra-VLAN	T2 Seamless Stitching
blue_all_p3_to_blue_all_p8	Intra-VLAN	T2 Seamless Stitching
blue_all_p3_to_blue_all_p8_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p4_to_red_all_p6	Intra-VLAN	T2 Seamless Stitching
blue_all_p4_to_blue_all_p6	Intra-VLAN	T2 Seamless Stitching
blue_all_p4_to_blue_all_p6_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p5_to_blue_all_p7	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p5_to_blue_all_p7	Intra-VLAN	T2 Seamless Stitching
blue_all_p5_to_blue_all_p7_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p6_to_blue_all_p1	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p6_to_blue_all_p1	Intra-VLAN	T2 Seamless Stitching
blue_all_p6_to_blue_all_p1_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
blue_all_p6_to_green_sub_p1_deny	Inter-VRF	Blocked, Green VRF is not stitched

Traffic Flow	Type	Path
red_all_p7_to_blue_all_p2	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p7_to_blue_all_p2	Intra-VLAN	T2 Seamless Stitching
blue_all_p7_to_blue_all_p2_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching
red_all_p8_to_red_all_p3	Intra-VLAN	T2 Seamless Stitching
blue_all_p8_to_red_all_p3	Inter-VRF	Default route to External Gateway, T2 stitched from Border Gateway
blue_all_p8_to_blue_all_p3_v6	Intra-VLAN (IPv6)	T2 Seamless Stitching

Table 11: DC1 <-->DC4 Traffic Flows

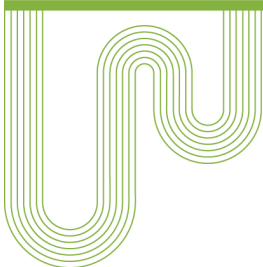
Traffic Flow	Type	Path
red_all_p1_to_blue_all_p6	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p1_to_blue_sub_p6_v6	Inter-VRF (IPv6)	Default route to External Gateway, T5 stitched from Border Gateway
blue_all_p1_to_blue_all_p6	Intra-VLAN	Type2 Stitched
red_sub_p1_to_red_sub_p6	Inter-VLAN	Type5 Stitched
blue_sub_p1_to_blue_sub_p6	Inter-VLAN	Type5 Stitched
blue_sub_p1_to_blue_sub_p6_v6	Inter-VLAN (IPv6)	Type5 Stitched
green_sub_p1_to_green_sub_p9	Inter-VLAN	Type5 Stitched
green_sub_p1_to_green_sub_p9_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_all_p2_to_red_all_p7	Intra-VLAN	Type2 Stitched
red_all_p2_to_red_all_p7_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p2_to_red_all_p7	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_sub_p2_to_red_sub_p7	Inter-VLAN	Type5 Stitched
blue_sub_p2_to_blue_sub_p7	Inter-VLAN	Type5 Stitched
blue_sub_p2_to_blue_sub_p7_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_all_p3_to_red_all_p8	Intra-VLAN	Type2 Stitched
red_all_p3_to_red_all_p8_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p3_to_blue_all_p8	Intra-VLAN	Type2 Stitched
blue_sub_p3_to_blue_sub_p8	Inter-VLAN	Type5 Stitched
blue_sub_p3_to_blue_sub_p8_v6	Inter-VLAN (IPv6)	Type5 Stitched

Traffic Flow	Type	Path
red_sub_p3_to_blue_sub_p8	Inter-VRF	Type5 Stitched
red_all_p4_to_red_all_p6	Intra-VLAN	Type2 Stitched
red_all_p4_to_red_all_p6_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p4_to_blue_all_p6	Intra-VLAN	Type2 Stitched
red_sub_p4_to_red_sub_p6	Inter-VLAN	Type5 Stitched
blue_sub_p4_to_red_sub_p6	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
blue_sub_p4_to_blue_sub_p6_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_all_p5_to_blue_all_p7	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p5_to_red_all_p7_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p5_to_blue_all_p7	Intra-VLAN	Type2 Stitched
blue_sub_p5_to_blue_sub_p7	Inter-VLAN	Type5 Stitched
blue_sub_p5_to_blue_sub_p7_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_sub_p5_to_red_sub_p7	Inter-VLAN	Type5 Stitched
red_all_p6_to_blue_all_p4	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p6_to_red_all_p4_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p6_to_blue_all_p4	Intra-VLAN	Type2 Stitched
red_sub_p6_to_red_sub_p4	Inter-VLAN	Type5 Stitched
blue_sub_p6_to_blue_sub_p4	Inter-VLAN	Type5 Stitched
blue_sub_p6_to_blue_sub_p4_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_all_p7_to_blue_all_p1	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_all_p7_to_red_all_p1_v6	Intra-VLAN (IPv6)	Type2 Stitched
blue_all_p7_to_blue_all_p1	Intra-VLAN	Type2 Stitched
red_sub_p7_to_red_sub_p1	Inter-VLAN	Type5 Stitched
blue_sub_p7_to_blue_sub_p1	Inter-VLAN	Type5 Stitched
blue_sub_p7_to_blue_sub_p1_v6	Inter-VLAN (IPv6)	Type5 Stitched
red_all_p8_to_red_all_p2	Intra-VLAN	Type2 Stitched
red_all_p8_to_red_all_p2_v6	Intra-VLAN (IPv6)	Type2 Stitched

Traffic Flow	Type	Path
blue_all_p8_to_red_all_p2	Inter-VRF	Default route to External Gateway, T5 stitched from Border Gateway
red_sub_p8_to_red_sub_p2	Inter-VLAN	Type5 Stitched
blue_sub_p8_to_blue_sub_p2	Inter-VLAN	Type5 Stitched
blue_sub_p8_to_blue_sub_p2_v6	Inter-VLAN (IPv6)	Type5 Stitched
green_sub_p9_to_green_sub_p1	Inter-VLAN	Type5 Stitched
green_sub_p9_to_green_sub_p1_v6	Inter-VLAN (IPv6)	Type5 Stitched

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