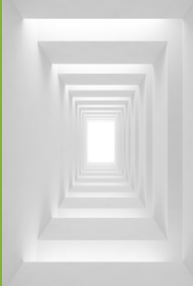


Juniper® Validated Design

JVD Test Report Brief: Metro Fabric and Broadband Edge



test-report-brief-JVD-METRO-BBE-01-01

Introduction

The Juniper Validated Design (JVD) testing is primarily focused on evaluating the design of distributed metro BBE solution involving Segment-Routing (SR) MPLS based EVPN PWHT (Pseudowire Headend Termination) into BNGs and redundancy of BNGs provided through Rapid Re-reconnect (RR) features in a Spine-Leaf environment. In the distributed metro BBE solution architecture, Aggregation Nodes “spines” (AGNs), Access Nodes “leaves” (ANs), and BNG functions are modularized and handled independently by separate platforms thereby providing a cost-effective scalable solution.

The primary focus of this validation is to provide Seamless Broadband Services (SBS) to subscribers during Link/Node failures occurring at different parts (access/aggregation/core) of Metro BBE network and during BNG nodes failure with minimal traffic disruption.

The solution involves subscriber sessions received on ANs getting transported over EVPN-VPWS PWHT (with/without FXC) and terminated into subscriber VRF instance of BNGs distributed across aggregation and core domain. On the access side, EVPN-VPWS without FXC is enabled with All-Active multihoming and single-active multihoming on BNG nodes.

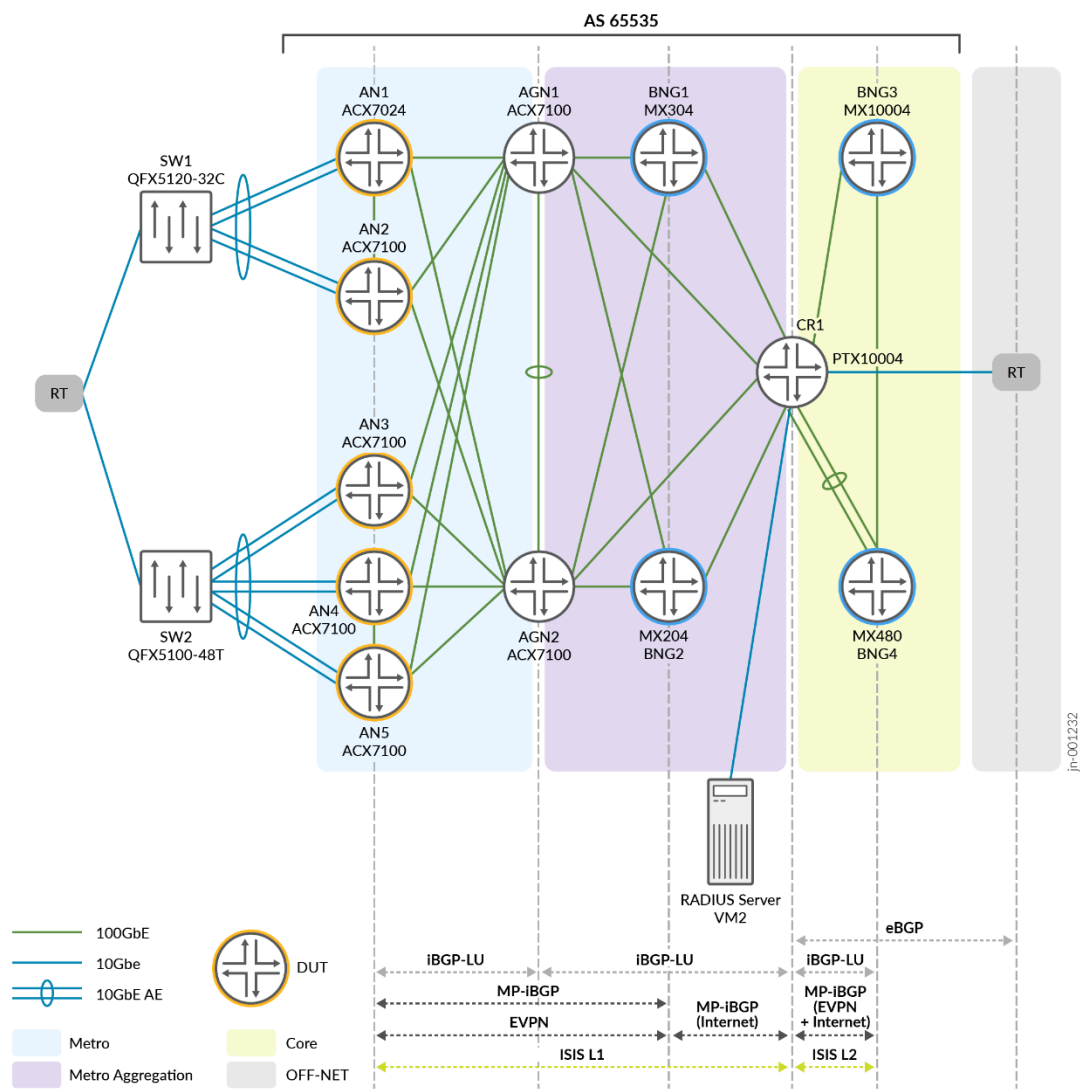
ISIS SR MPLS is used as an underlay transport for the BBE network. BGP-LU is used to propagate loopbacks of BNGs/ANs across domains, while BGP VPNv4/v6 is used to advertise Internet routes to specific subscriber VRF instance. BNGs are enabled with PPPoE(v4/v6) dynamic dual-tagged VLAN profiles and IPoE(v4/v6) dynamic dual-tagged VLAN profiles with stateless RR (i.e., packet triggered based recovery with dynamic IPs for DHCP subscribers). Radius server is used to authenticate all PPPoE and DHCP subscribers.

The following products are used for various roles of the metro BBE solution architecture.

- ACX7024 and ACX7100 as ANs (Access Nodes)
- ACX7100 as AGNs (Aggregation Nodes)
- MX304, MX204, MX10004, MX480 as four BNGs distributed across aggregation and core domain
- PTX10004 as core router
- QFX5120-32c and QFX5210-64C acting as switches connected to ANs and PON (emulated through Ixia RT)

Test Topology

Figure 1: Metro BBE Lab Topology



Platforms and Roles

Table 1: Platforms Used

Tag	Role	Model	Junos OS	Line card	RE	Fabric(cb)	VC	Helper/ DUT	Additional Info
R0	AN1	ACX7024	EVO 24.2R2	NA	ACX7024-CHAS	ACX7024-CB	NA	DUT	
R1	AN2	ACX7100-48L	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	DUT	

Tag	Role	Model	Junos OS	Line card	RE	Fabric(cb)	VC	Helper/ DUT	Additional Info
R2	AN3	ACX7100-48L	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	DUT	
R3	AN4	ACX7100-48L	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	DUT	
R4	AN5	ACX7100-48L	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-48L-CHAS	NA	DUT	
R5	AGN1	ACX7100-32C	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-32C-CHAS	NA	HELPER	
R6	AGN2	ACX7100-32C	EVO 24.2R2	NA	RE-JNP-7100	JNP7100-32C-CHAS	NA	HELPER	
R7	BNG1	MX304	24.2R2	JNP304-LMIC16-BASE	JNP304-RE-S	JNP304-CHAS	NA	DUT	
R8	BNG2	MX204	24.2R2	PROTO-ASSEMBLY	RE-S-1600x8	JNP204-CHAS	NA	DUT	
R9	BNG3	MX10004	24.2R2	LC480 and LC9600	RE X10	JNP10K-RE1	NA	DUT	
R10	BNG4	MX480	24.2R2	MPC7E and MPC10E	RE-S-X6-128G-S-S	SCBE3-MX-S	NA	DUT	
R11	CR1	PTX10004	EVO 24.2R2	LC1202	JNP10K-RE1-E128	JNP10K-RE1-E128	NA	HELPER	
R12	SW1	QFX5120-32c	24.2R2	NA	QFX5120-32C-CHAS	NA	NA	HELPER	
R13	SW2	QFX5210-64C	24.2R2	NA	QFX5210-64C-CHAS	NA	NA	HELPER	
H0	SERVER	LINUX	UBUNTU-5.4.0-190	NA	NA	NA	NA	HELPER	Acting as Radius Server
RT0	TGEN	IXIA	9.30.3001.12	NA	NA	NA	NA	HELPER	Acting as IPoE/PPPoE Clients

Version Qualification History

This JVD has been qualified in Junos OS EVO Release 24.2R2.

Scale and Performance Data

Table 2: Scale and Service Details

Feature	Each ANx Access	BNG1 (Non-Failure)	BNG2 (Non-Failure)	BNG (During Failure)
IPv4 RIB	N/A	8100	8100	16200
IPv4 FIB	N/A	8100	8100	16200
IPv6 RIB	N/A	8100	8100	16200
IPv6 FIB	N/A	8100	8100	16200
Total RIB	N/A	16200	16200	32400
Total FIB	N/A	16200	16200	32400
PPPoE v4(E-LINE-PWHT)	N/A	4000	4000	8000
PPPoE v6(E-LINE-PWHT)	N/A	4000	4000	8000
PPPoE v4(E-LINE-FXC-PWHT)	N/A	50	50	100
PPPoE v6(E-LINE-FXC-PWHT)	N/A	50	50	100
IPoE v4(E-LINE-PWHT)	N/A	4000	4000	8000
IPoE v6(E-LINE-PWHT)	N/A	4000	4000	8000
IPoE v4(E-LINE-FXC-PWHT)	N/A	50	50	100
IPoE v6(E-LINE-FXC-PWHT)	N/A	50	50	100
VLANs	S-VLANs=15, C-VLANs-8100	16200	16200	32400
ELINE-PWHT (Routing-instance)	10	20	20	20
ELINE-FXC-PWHT(Routing-Instance)	2	4	4	4

Table 3: Traffic Profiles

Feature	BNG1 (Non-Failure)	BNG2 (Non-Failure)
PPPoEv4_VPWS_SW1_L_R	10.24	128
PPPoEV6_VPWS_SW1_L_R	10.24	128
DHCPv4_VPWS_SW1_L_R	10.24	128
PPPoEV4_VPWS_SW1_R_L	10.24	128
PPPoEV6_VPWS_SW1_R_L	10.24	128
DHCPv4_VPWS_SW1_R_L	10.24	128
DHCPv6_VPWS_SW1_R_L	10.24	128

Feature	BNG1 (Non-Failure)	BNG2 (Non-Failure)
DHCPv6_VPWS_SW1_L_R	10.24	128
DHCPv4_VPWS_SW2_L_R	10.24	128
DHCPv4_VPWS_SW2_R_L	10.24	128
DHCPv6_VPWS_SW2_L_R	10.24	128
DHCPv6_VPWS_SW2_R_L	10.24	128
PPPoEv4_VPWS_SW2_L_R	10.24	128
PPPoEv4_VPWS_SW2_R_L	10.24	128
PPPoEv6_VPWS_SW2_L_R	10.24	128
PPPoEv6_VPWS_SW2_R_L	10.24	128
PPPoEv4_FXC_SW1_L_R	10.24	128
PPPoEv4_FXC_SW2_L_R	10.24	128
DHCPv4_FXC_SW1_L_R	10.24	128
PPPoEV6_FXC_SW1_L_R	10.24	128
PPPoEv6_FXC_SW2_L_R	10.24	128
DHCPv6_FXC_SW1_L_R	10.24	128
DHCPv6_FXC_SW2_L_R	10.24	128
DHCPv4_FXC_SW2_L_R	10.24	128
PPPoEv4_FXC_SW1_R_L	10.24	128
PPPoEV6_FXC_SW1_R_L	10.24	128
DHCPv4_FXC_SW1_R_L	10.24	128
DHCPv6_FXC_SW1_R_L	10.24	128

Convergence Data

Table 4: Single BNG Failure/Restoration

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
BNG1 failover	PPPoEv4_VPWS_SW1_L_R	28233
	PPPoEV6_VPWS_SW1_L_R	26543
	PPPoEV4_VPWS_SW1_R_L	28259
	PPPoEV6_VPWS_SW1_R_L	26606
	PPPoEv4_FXC_SW1_L_R	19652
	PPPoEV6_FXC_SW1_L_R	19752
	PPPoEv4_FXC_SW1_R_L	18347
	PPPoEV6_FXC_SW1_R_L	17299
	DHCPv4_VPWS_SW1_L_R	19733

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
	DHCPv4_VPWS_SW1_R_L	21064
	DHCPv4_FXC_SW1_L_R	4731
	DHCPv6_VPWS_SW1_R_L	22935
	DHCPv6_VPWS_SW1_L_R	21338
	DHCPv6_FXC_SW1_L_R	7677
	DHCPv4_FXC_SW1_R_L	3957
	DHCPv6_FXC_SW1_R_L	6789
BNG1 Restoration	PPPoEv4_VPWS_SW1_L_R	28200
	PPPoEV6_VPWS_SW1_L_R	27541
	PPPoEV4_VPWS_SW1_R_L	28246
	PPPoEV6_VPWS_SW1_R_L	27615
	PPPoEv4_FXC_SW1_L_R	25111
	PPPoEV6_FXC_SW1_L_R	25153
	PPPoEv4_FXC_SW1_R_L	22457
	PPPoEV6_FXC_SW1_R_L	23457
	DHCPv4_VPWS_SW1_L_R	13627
	DHCPv4_VPWS_SW1_R_L	15057
	DHCPv4_FXC_SW1_L_R	42
	DHCPv6_VPWS_SW1_R_L	15671
	DHCPv6_VPWS_SW1_L_R	14228
	DHCPv6_FXC_SW1_L_R	84
	DHCPv4_FXC_SW1_R_L	50
	DHCPv6_FXC_SW1_R_L	80

Table 5: Dual BNGs Failure/Restoration

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in Milliseconds)
BNG1 and BNG2 failover	PPPoEv4_VPWS_SW1_L_R	73634
	PPPoEV6_VPWS_SW1_L_R	73835
	PPPoEV4_VPWS_SW1_R_L	73759
	PPPoEV6_VPWS_SW1_R_L	73962
	PPPoEv4_VPWS_SW2_L_R	80061
	PPPoEv4_VPWS_SW2_R_L	80364
	PPPoEv6_VPWS_SW2_L_R	81714

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in Milliseconds)
	PPPoEv6_VPWS_SW2_R_L	81943
	PPPoEv4_FXC_SW1_L_R	75157
	PPPoEv4_FXC_SW2_L_R	75452
	PPPoEV6_FXC_SW1_L_R	75346
	PPPoEv6_FXC_SW2_L_R	75934
	PPPoEv4_FXC_SW1_R_L	74200
	PPPoEV6_FXC_SW1_R_L	73200
	DHCPv4_VPWS_SW1_L_R	44052
	DHCPv4_VPWS_SW1_R_L	45386
	DHCPv4_VPWS_SW2_L_R	38592
	DHCPv4_VPWS_SW2_R_L	40206
	DHCPv4_FXC_SW1_L_R	26421
	DHCPv4_FXC_SW2_L_R	27912
	DHCPv4_VPWS_SW1_L_R	44052
	DHCPv4_VPWS_SW1_R_L	45386
	DHCPv4_VPWS_SW2_L_R	38592
	DHCPv4_VPWS_SW2_R_L	40206
	DHCPv4_FXC_SW1_L_R	26421
	DHCPv4_FXC_SW2_L_R	27912
	DHCPv4_FXC_SW1_R_L	24300
	DHCPv6_FXC_SW1_R_L	25400
BNG2 Restoration	PPPoEv4_VPWS_SW1_L_R	61457
	PPPoEV6_VPWS_SW1_L_R	63551
	PPPoEV4_VPWS_SW1_R_L	61563
	PPPoEV6_VPWS_SW1_R_L	63661
	PPPoEv4_VPWS_SW2_L_R	60142
	PPPoEv4_VPWS_SW2_R_L	60356
	PPPoEv6_VPWS_SW2_L_R	62058
	PPPoEv6_VPWS_SW2_R_L	62300
	PPPoEv4_FXC_SW1_L_R	55979
	PPPoEv4_FXC_SW2_L_R	59446
	PPPoEV6_FXC_SW1_L_R	58219
	PPPoEv6_FXC_SW2_L_R	61268
	PPPoEv4_FXC_SW1_R_L	54200

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in Milliseconds)
	PPPoEV6_FXC_SW1_R_L	54300
	DHCPv4_VPWS_SW1_L_R	64214
	DHCPv4_VPWS_SW1_R_L	72004
	DHCPv4_VPWS_SW2_L_R	64999
	DHCPv4_VPWS_SW2_R_L	74329
	DHCPv4_FXC_SW1_L_R	49419
	DHCPv4_FXC_SW2_L_R	49419
	DHCPv6_VPWS_SW1_R_L	34675
	DHCPv6_VPWS_SW1_L_R	32425
	DHCPv6_VPWS_SW2_L_R	31676
	DHCPv6_VPWS_SW2_R_L	33962
	DHCPv6_FXC_SW1_L_R	15
	DHCPv6_FXC_SW2_L_R	77
	DHCPv4_FXC_SW1_R_L	48100
	DHCPv6_FXC_SW1_R_L	20
BNG1 Restoration	PPPoEv4_VPWS_SW1_L_R	62201
	PPPoEV6_VPWS_SW1_L_R	64899
	PPPoEV4_VPWS_SW1_R_L	61444
	PPPoEV6_VPWS_SW1_R_L	65103
	PPPoEv4_FXC_SW1_L_R	67695
	PPPoEV6_FXC_SW1_L_R	70784
	PPPoEv4_FXC_SW1_R_L	65200
	PPPoEV6_FXC_SW1_R_L	70200
	DHCPv4_VPWS_SW1_L_R	19229
	DHCPv4_VPWS_SW1_R_L	20909
	DHCPv4_FXC_SW1_L_R	60
	DHCPv6_VPWS_SW1_R_L	21261
	DHCPv6_VPWS_SW1_L_R	19503
	DHCPv6_FXC_SW1_L_R	80
	DHCPv4_FXC_SW1_R_L	50
	DHCPv6_FXC_SW1_R_L	70

Table 6: A Link Failure Towards Switch

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
SW1-AN1 link down	PPPoEv4_VPWS_SW1_L_R	7.7
	PPPoEV6_VPWS_SW1_L_R	7.7
	DHCPv4_VPWS_SW1_L_R	6.6
	PPPoEV4_VPWS_SW1_R_L	1.1
	PPPoEV6_VPWS_SW1_R_L	1.2
	DHCPv4_VPWS_SW1_R_L	0.7
	DHCPv6_VPWS_SW1_R_L	0.7
	DHCPv6_VPWS_SW1_L_R	6.9
	PPPoEv4_FXC_SW1_L_R	0
	DHCPv4_FXC_SW1_L_R	0
	PPPoEV6_FXC_SW1_L_R	0
	DHCPv6_FXC_SW1_L_R	0
SW1-AN1 link Up	PPPoEv4_VPWS_SW1_L_R	103
	PPPoEV6_VPWS_SW1_L_R	103
	DHCPv4_VPWS_SW1_L_R	90
	PPPoEV4_VPWS_SW1_R_L	0
	PPPoEV6_VPWS_SW1_R_L	0
	DHCPv4_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_L_R	80
	PPPoEv4_FXC_SW1_L_R	0
	DHCPv4_FXC_SW1_L_R	0
	PPPoEV6_FXC_SW1_L_R	0
	DHCPv6_FXC_SW1_L_R	0
SW2-AN3 link down	DHCPv4_VPWS_SW2_L_R	0
	DHCPv4_VPWS_SW2_R_L	0
	DHCPv6_VPWS_SW2_L_R	0
	DHCPv6_VPWS_SW2_R_L	0
	PPPoEv4_VPWS_SW2_L_R	0
	PPPoEv4_VPWS_SW2_R_L	0
	PPPoEv6_VPWS_SW2_L_R	0
	PPPoEv6_VPWS_SW2_R_L	0

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
	PPPoEv4_FXC_SW2_L_R	833
	PPPoEv6_FXC_SW2_L_R	833
	DHCPv6_FXC_SW2_L_R	833
	DHCPv4_FXC_SW2_L_R	833
SW2-AN3 link Up	DHCPv4_VPWS_SW2_L_R	59.4
	DHCPv4_VPWS_SW2_R_L	0
	DHCPv6_VPWS_SW2_L_R	57.4
	DHCPv6_VPWS_SW2_R_L	0
	PPPoEv4_VPWS_SW2_L_R	61.9
	PPPoEv4_VPWS_SW2_R_L	0
	PPPoEv6_VPWS_SW2_L_R	61.9
	PPPoEv6_VPWS_SW2_R_L	0
	PPPoEv4_FXC_SW2_L_R	18.9
	PPPoEv6_FXC_SW2_L_R	18.9
	DHCPv6_FXC_SW2_L_R	29.1
	DHCPv4_FXC_SW2_L_R	28.9

Table 7: A Node Failure

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
AN1---Node Failure	PPPoEv4_VPWS_SW1_L_R	100
	PPPoEv6_VPWS_SW1_L_R	100
	DHCPv4_VPWS_SW1_L_R	98.4
	PPPoEv4_VPWS_SW1_R_L	119.7
	PPPoEv6_VPWS_SW1_R_L	114.6
	DHCPv4_VPWS_SW1_R_L	119.5
	DHCPv6_VPWS_SW1_R_L	125.7
	DHCPv6_VPWS_SW1_L_R	96.9
	PPPoEv4_FXC_SW1_L_R	0
	DHCPv4_FXC_SW1_L_R	0
	PPPoEv6_FXC_SW1_L_R	0
	DHCPv6_FXC_SW1_L_R	0
AN1---Node restore	PPPoEv4_VPWS_SW1_L_R	84

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
	PPPoEV6_VPWS_SW1_L_R	84
	DHCPv4_VPWS_SW1_L_R	84
	PPPoEV4_VPWS_SW1_R_L	0
	PPPoEV6_VPWS_SW1_R_L	0
	DHCPv4_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_L_R	76
	PPPoEv4_FXC_SW1_L_R	0
	DHCPv4_FXC_SW1_L_R	0
	PPPoEV6_FXC_SW1_L_R	0
	DHCPv6_FXC_SW1_L_R	0
AN2---Node Failure	PPPoEv4_VPWS_SW1_L_R	10.4
	PPPoEV6_VPWS_SW1_L_R	10.4
	DHCPv4_VPWS_SW1_L_R	10.8
	PPPoEV4_VPWS_SW1_R_L	142.5
	PPPoEV6_VPWS_SW1_R_L	145.3
	DHCPv4_VPWS_SW1_R_L	147.6
	DHCPv6_VPWS_SW1_R_L	152.6
	DHCPv6_VPWS_SW1_L_R	11.9
	PPPoEv4_FXC_SW1_L_R	372.8
	DHCPv4_FXC_SW1_L_R	372.8
	PPPoEV6_FXC_SW1_L_R	372.8
	DHCPv6_FXC_SW1_L_R	372.8
AN2---Node restore	PPPoEv4_VPWS_SW1_L_R	30
	PPPoEV6_VPWS_SW1_L_R	30
	DHCPv4_VPWS_SW1_L_R	33
	PPPoEV4_VPWS_SW1_R_L	0
	PPPoEV6_VPWS_SW1_R_L	0
	DHCPv4_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_R_L	0
	DHCPv6_VPWS_SW1_L_R	32
	PPPoEv4_FXC_SW1_L_R	29
	DHCPv4_FXC_SW1_L_R	28

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
AN3---Node Failure	PPPoEv6_FXC_SW1_L_R	28
	DHCPv6_FXC_SW1_L_R	28
	DHCPv4_VPWS_SW2_L_R	10.6
	DHCPv4_VPWS_SW2_R_L	152.1
	DHCPv6_VPWS_SW2_L_R	9.2
	DHCPv6_VPWS_SW2_R_L	152.3
	PPPoEv4_VPWS_SW2_L_R	9
	PPPoEv4_VPWS_SW2_R_L	152.6
	PPPoEv6_VPWS_SW2_L_R	9
	PPPoEv6_VPWS_SW2_R_L	152.3
	PPPoEv4_FXC_SW2_L_R	327.4
	PPPoEv6_FXC_SW2_L_R	327.4
	DHCPv6_FXC_SW2_L_R	327.4
	DHCPv4_FXC_SW2_L_R	327.3
AN3---Node restore	DHCPv4_VPWS_SW2_L_R	29.7
	DHCPv4_VPWS_SW2_R_L	0
	DHCPv6_VPWS_SW2_L_R	23.6
	DHCPv6_VPWS_SW2_R_L	0
	PPPoEv4_VPWS_SW2_L_R	29
	PPPoEv4_VPWS_SW2_R_L	0
	PPPoEv6_VPWS_SW2_L_R	29
	PPPoEv6_VPWS_SW2_R_L	0
	PPPoEv4_FXC_SW2_L_R	17.6
	PPPoEv6_FXC_SW2_L_R	17.6
	DHCPv6_FXC_SW2_L_R	27
	DHCPv4_FXC_SW2_L_R	28.2

Table 8: A Link Failure Towards Core

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
AN1---AGN1 down	PPPoEv4_VPWS_SW1_L_R	0.5
	PPPoEv6_VPWS_SW1_L_R	0.5
	DHCPv4_VPWS_SW1_L_R	0.5
	PPPoEv4_VPWS_SW1_R_L	0.5
	PPPoEv6_VPWS_SW1_R_L	0.5

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
	DHCPv4_VPWS_SW1_R_L	0.5
	DHCPv6_VPWS_SW1_R_L	0.5
	DHCPv6_VPWS_SW1_L_R	0.5
	PPPoEv4_FXC_SW1_L_R	0.5
	DHCPv4_FXC_SW1_L_R	0.5
	PPPoEV6_FXC_SW1_L_R	0.5
	DHCPv6_FXC_SW1_L_R	0.5
AN1---AGN1 UP	PPPoEv4_VPWS_SW1_L_R	0.5
	PPPoEV6_VPWS_SW1_L_R	0.5
	DHCPv4_VPWS_SW1_L_R	0.5
	PPPoEV4_VPWS_SW1_R_L	0.5
	PPPoEV6_VPWS_SW1_R_L	0.5
	DHCPv4_VPWS_SW1_R_L	0.5
	DHCPv6_VPWS_SW1_R_L	0.5
	DHCPv6_VPWS_SW1_L_R	0.5
	PPPoEv4_FXC_SW1_L_R	0.5
	DHCPv4_FXC_SW1_L_R	0.5
	PPPoEV6_FXC_SW1_L_R	0.5
	DHCPv6_FXC_SW1_L_R	0.5
AN3---AGN1 down	DHCPv4_VPWS_SW2_L_R	0.5
	DHCPv4_VPWS_SW2_R_L	0.5
	DHCPv6_VPWS_SW2_L_R	0.5
	DHCPv6_VPWS_SW2_R_L	0.5
	PPPoEv4_VPWS_SW2_L_R	0.5
	PPPoEv4_VPWS_SW2_R_L	0.5
	PPPoEv6_VPWS_SW2_L_R	0.5
	PPPoEv6_VPWS_SW2_R_L	0.5
	PPPoEv4_FXC_SW2_L_R	0.5
	PPPoEv6_FXC_SW2_L_R	0.5
	DHCPv6_FXC_SW2_L_R	0.5
	DHCPv4_FXC_SW2_L_R	0.5
AN3---AGN1 UP	DHCPv4_VPWS_SW2_L_R	0.5

Event	Services-Stream-Name (L-Left, R-Right)	Convergence (in milliseconds)
	DHCPv4_VPWS_SW2_R_L	0.5
	DHCPv6_VPWS_SW2_L_R	0.5
	DHCPv6_VPWS_SW2_R_L	0.5
	PPPoEv4_VPWS_SW2_L_R	0.5
	PPPoEv4_VPWS_SW2_R_L	0.5
	PPPoEv6_VPWS_SW2_L_R	0.5
	PPPoEv6_VPWS_SW2_R_L	0.5
	PPPoEv4_FXC_SW2_L_R	0.5
	PPPoEv6_FXC_SW2_L_R	0.5
	DHCPv6_FXC_SW2_L_R	0.5
	DHCPv4_FXC_SW2_L_R	0.5

High Level Features Tested

The following high-level features are tested.

- EVPN E-LINE (EVPN-VPWS) with and without FxC
- EVPN Headend Termination (PWHT) into BNG
- ISIS SR MPLS, MP-BGP, iBGP-LU, eBGP, BFD, Route Reflection, IPv4, IPv6
- ESI LAG, VLAN (802.1q)
- VLAN QinQ (802.1ad)
- PPPoE(v4/v6), IPoE(v4/V6)
- Stateless RR (Packet triggered based recovery with Dynamic IPs for DHCPv4/V6 subscribers).

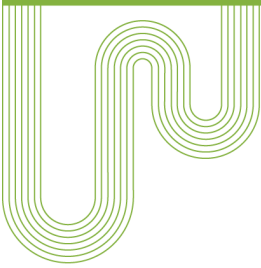
Event Testing

The following events are tested.

- Restart of critical Junos OS or Junos Evo OS processes and assess its impact
- Device reboot to evaluate impact on the network
- Interface up/down to evaluate impact on the traffic
- Deletion or configuration of various configuration stanzas to evaluate impact of node and network stability
- Clearing protocol sessions to simulate protocol session flap and assess its impact on service and traffic

Known Limitations

When IPv4, and IPv6 subscribers with same MAC on same VLAN, on BNG1 failure to BNG2, traffic recovers for either IPv4 or IPv6 only. The other one recovers only after DHCP lease expiry.

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