Juniper® Validated Design

JVD Test Report Brief: Onboarding 5G xHaul and Cloud Metro Networks with Paragon Automation

test-report-brief- JVD-AUTO-BASE-01-01

Introduction

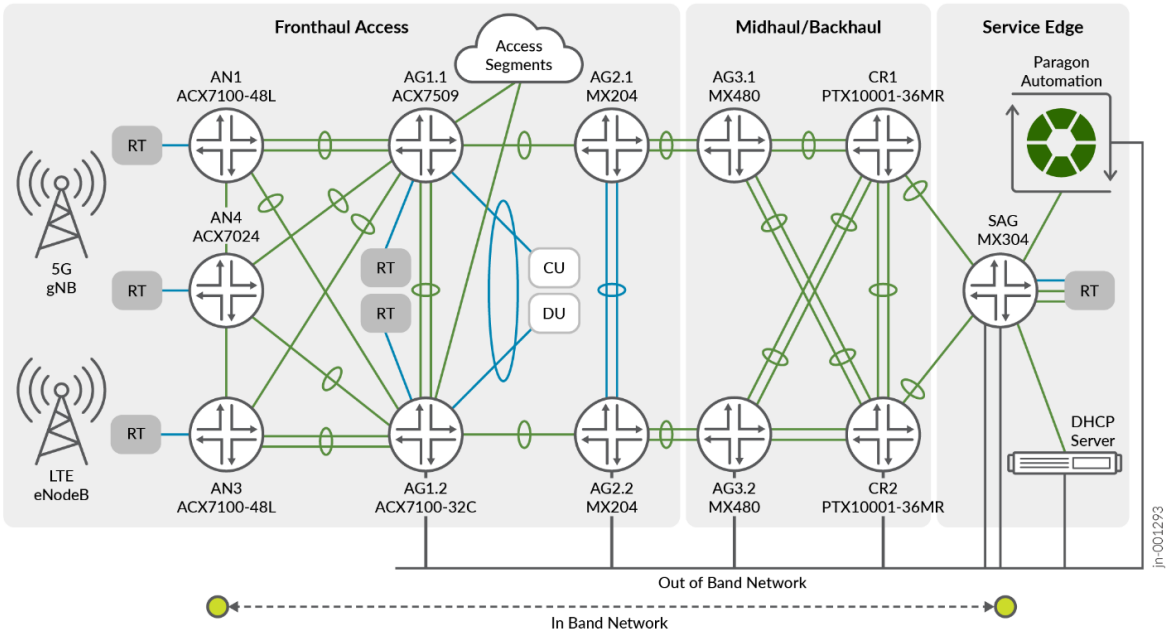
This Juniper Validated Design (JVD) testing focuses on utilizing Paragon Automation and other network automation tools (for example, *python scripts*) to enhance an existing 5G xHaul network and reference architecture. This architecture is defined by O-RAN Alliance Working Group 9 in the O-RAN xHaul Packet Switched Architectures and Solutions technical specification [O-RAN.WG9.XPSAAS-R003-v08.00], which establishes the service aspects and requirements for the xHaul plane.

Paragon Automation and a DHCP/bootstrap server, (for example, open DHCP server), both located at the Service Edge location, can help and provide value to a 5G network by automating the onboarding, configuration, provisioning, and monitoring of the xHaul devices.

Paragon Automation reduces the manual effort and human errors involved in managing a large and complex network, and ensures that the network is optimized for performance, reliability, and security. Paragon Automation also enables faster deployment and troubleshooting of new services and technologies, such as slicing, edge computing, and network function virtualization. By leveraging 5G capabilities, Paragon enables service operators to provide faster data speeds, lower latency, and greater connectivity, resulting in a better customer experience.

Test Topology

Figure 1: 5G Fronthaul COS LLQ Topology with Paragon Automation Suite



Platforms Tested

Table 1: Platforms Used

Role	Device Series	Model	Release
AN1(Access Node)	ACX Series	ACX7100-48L	Junos OS Evolved Release 24.2R2
AN3(Access Node)	ACX Series	ACX7100-48L	Junos OS Evolved Release 24.2R2
AN4(Access Node)	ACX Series	ACX7024	Junos OS Evolved Release 24.2R2
AG1.1(Aggregation Node)	ACX Series	ACX7509	Junos OS Evolved Release 24.2R2
AG1.2(Aggregation Node)	ACX Series	ACX7100-32C	Junos OS Evolved Release 24.2R2
AG2.1(Aggregation Node)	MX Series	MX204	Junos OS Evolved Release 24.2R2
AG2.2(Aggregation Node)	MX Series	MX204	Junos OS Release 24.2R2
AG3.1(Aggregation Node)	MX Series	MX480	Junos OS Release 24.2R2
AG3.2(Aggregation Node)	MX Series	MX480	Junos OS Release 24.2R2
CR1(Core Router)	PTX Series	PTX10001-36MR	Junos OS Evolved Release 24.2R2
CR2(Core Router)	PTX Series	PTX10001-36MR	Junos OS Evolved Release 24.2R2
SAG (Service Aggregation Gateway)	MX Series	MX304	Junos OS Release 24.2R2

Table 2: Paragon Software and Hardware Requirements

Paragon Software and Hardware Requirements	
Paragon Automation Version	2.3.0
Paragon Cluster Node OS	Ubuntu 22.04 LTS (Jammy Jellyfish)
VCPU per Node	16
RAM per Nod	32GB
Hard Disk per Node	750GB + 250GB(CEPH)
Minimum No. Of. Nodes	4 Nodes (3 x Master/Worker + 1 Worker)
Server	VMWare ESXi 8.0

Version Qualification History

This JVD has been qualified using Junos OS Release 24.2R2, Junos OS Evolved Release 24.2R2, and Paragon Automation Release 2.3.0.

Test Summary

Table 3: Test Results Summary

Tests	Results	Details
Create Organization	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create Sites	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create Configuration templates	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create Device Profiles and map configuration template	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create a device with physical port, chassis details, link details for Access nodes under Network Implementation Plan	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create a device with physical port, chassis details, link details for Aggregate nodes under Network Implementation Plan	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create a device with physical port, chassis details, link details for Core nodes under Network Implementation Plan	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Create a device with physical port, chassis details, link details for SAG nodes under Network Implementation Plan	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Onboard Core devices manually	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Onboard SAG devices manually	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Configurate underlay and overlay for Aggregate, core and SAG devices using python script	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Initiate ZTP from the access node (Acquire IP address and copy a	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.

Tests	Results	Details
python script from VM to access nodes)		
Continue ZTP from access node (Python script (see above test) copies the necessary configurations from VM to access nodes)	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Continue ZTP from access node (Configure onboarding commands on access nodes as a part of python script execution)	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Access node Onboarding process load sets the service configuration file by executing configuration template.	Pass	Paragon Deployment Step as documented in Automation JVD Solution Document.
Telemetry traffic classification	Pass	Ensure gNMI and outbound SSH traffic from AN is properly routed through the network control queue. Refer Automation JVD Solution Document for more details.
Device Identity and Location Details	Pass	Validate vendor name, hostname, serial number of the device and name and location of the site are correctly displayed for the device. Refer Automation JVD Solution Document for more details.
Remote Connectivity	Pass	Display the last outbound SSH and gNMI sessions established between the device and the paragon. Refer Automation JVD Solution Document for more details.
Hardware Health	Pass	Check the number of available and unhealthy chassis components, details of the temperature sensors and latest events related to the hardware. Refer Automation JVD Solution Document for more details.
Software Life Cycle Management	Pass	Validate software version, software end-of-life information, number of OS related SIRT advisories and verify software upgrade of the device.
Configuration Management	Pass	Validate device's active and backup version of the configurations, compare the difference between the configurations and restore the backup configuration. Refer Automation JVD Solution Document for more details.
Routing and MPLS Information	Pass	Verify total number of routes in the RIB and FIB table of the devices. Refer Automation JVD Solution Document for more details.
Device Inventory	Pass	Verify the hardware components present on the chassis and the details of the interfaces present on the chassis, line cards, FPCs, and PICs. Refer Automation JVD Solution Document for more details.
Device integrity	Pass	Validate the hardware components reached end-of-service date and the software reached end-of-life. Refer Automation JVD Solution Document for more details.
Latency validation	Pass	Refer LLQ JVD document for more details

Traffic Profiles

Table 4: Custom iMIX Definition

Custom iMIX-1	
Size	**Weight**
64	1
128	1
256	1
512	1
1024	1
1500	1
2000	1
-	-

Custom iMIX-1	
Size	**Weight**
64	1
128	1
256	1
512	1
1024	1
1500	1
2000	1
9000	1

Table 5: Traffic Load Distribution

Traffic Item Name	Feature Name	FPS	Frame Size
L3-MBH-L3VPN-IPV6-BA-BEST-EFFORT	L3VPN-IPv6	1000pps	1500
L2-MBH-VPLS-L2-BA-HIGH	VPLS	1000pps	1500
L2-MBH-VPLS-L2-BA-MEDIUM	VPLS	1000pps	1500
L2-MBH-VPLS-L2-BA-LOW	VPLS	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-SIGNALLING	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-CONTROL	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-REALTIME	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-HIGH	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-MEDIUM	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-LOW	EVPN-VPWS-L2	1000pps	1500
L2-MBH-EVPN-VPWS-L2-BA-BEST-EFFORT	EVPN-VPWS-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-SIGNALLING	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-CONTROL	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-REALTIME	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-HIGH	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-MEDIUM	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-LOW	EVPN-FXC-SH	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-BEST-EFFORT	EVPN-FXC-SH	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-FIX-REALTIME	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-FIX-REALTIME	L3VPN-IRB-EVPN-IPv6	1000pps	1500

Traffic Item Name	Feature Name	FPS	Frame Size
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-FIX-REALTIME	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-FIX-REALTIME	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-LLQ	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-SIGNALLING	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-CONTROL	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-REALTIME	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-HIGH	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-MEDIUM	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-LOW	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-BA-BEST-EFFORT	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-LLQ	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-SIGNALLING	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-CONTROL	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-REALTIME	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-HIGH	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-MEDIUM	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-LOW	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-BA-BEST-EFFORT	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-LLQ	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-SIGNALLING	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-CONTROL	L3VPN-IRB-BD-IPV4	1000pps	1500

Traffic Item Name	Feature Name	FPS	Frame Size
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-REALTIME	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-HIGH	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-MEDIUM	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-LOW	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-BA-BEST-EFFORT	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-LLQ	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-SIGNALLING	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-CONTROL	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-REALTIME	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-HIGH	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-MEDIUM	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-LOW	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-BA-BEST-EFFORT	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-SIGNALLING	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-CONTROL	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-REALTIME	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-HIGH	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-MEDIUM	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-LOW	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-BEST-EFFORT	EVPN-ELAN-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-SIGNALLING	EVPN-FXC-MH-L2	1000pps	1500

Traffic Item Name	Feature Name	FPS	Frame Size
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-CONTROL	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-REALTIME	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-HIGH	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-MEDIUM	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-LOW	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-BEST-EFFORT	EVPN-FXC-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-LLQ	EVPN-VPWS-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-SIGNALLING	EVPN-VPWS-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-CONTROL	EVPN-VPWS-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-REALTIME	EVPN-VPWS-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-HIGH	EVPN-VPWS-MH-L2	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-BEST-EFFORT	EVPN-VPWS-MH-L2	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-MFC-REALTIME	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-MFC-HIGH	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-MFC-MEDIUM	L3VPN-IRB-EVPN-IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV4-MFC-LOW	L3VPN-IRB-EVPN-IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-LLQ	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-SIGNALLING	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-CONTROL	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-REALTIME	IPv4	1000pps	1500

Traffic Item Name	Feature Name	FPS	Frame Size
TOPO1A-AN4-TO-AN4-IPV4-BA-HIGH	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-MEDIUM	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-LOW	IPv4	1000pps	1500
TOPO1A-AN4-TO-AN4-IPV4-BA-BEST-EFFORT	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LLQ	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-SIGNALLING	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-CONTROL	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-REALTIME	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-HIGH	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-MEDIUM	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LOW	IPv4	1000pps	1500
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-BEST-EFFORT	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LLQ	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-SIGNALLING	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-CONTROL	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-REALTIME	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-HIGH	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-MEDIUM	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LOW	IPv4	1000pps	1500
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-BEST-EFFORT	IPv4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-MFC-REALTIME	L3VPN-IRB-EVPN-IPv6	1000pps	1500

Traffic Item Name	Feature Name	FPS	Frame Size
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-MFC-HIGH	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-MFC-MEDIUM	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-EVPN-IPV6-MFC-LOW	L3VPN-IRB-EVPN-IPv6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-MFC-REALTIME	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-MFC-HIGH	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-MFC-MEDIUM	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV4-MFC-LOW	L3VPN-IRB-BD-IPV4	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-MFC-REALTIME	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-MFC-HIGH	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-MFC-MEDIUM	L3VPN-IRB-BD-IPV6	1000pps	1500
5G-MIDHAUL-L3VPN-IRB-BD-IPV6-MFC-LOW	L3VPN-IRB-BD-IPV6	1000pps	1500
L2-MBH-L2CKT-L2-FIX-HIGH	L2Circuit	1000pps	1500
L2-MBH-L2CKT-L2-FIX-MEDIUM	L2Circuit	1000pps	1500
L2-MBH-L2CKT-L2-FIX-LOW	L2Circuit	1000pps	1500
5G-FRONTHAUL-EVPN-VPWS-SH-TO-AG1.1-L2-FIX-LLQ	EVPN-VPWS-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-SH-TO-AG1.2-L2-FIX--LLQ	EVPN-VPWS-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-SIGNALLING	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-CONTROL	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-REALTIME	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-HIGH	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-MEDIUM	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV4-BA-LOW	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2

Traffic Item Name	Feature Name	FPS	Frame Size
L3-MBH-L3VPN-IPV4-BA-BEST-EFFORT	L3VPN-IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-SIGNALLING	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-CONTROL	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-REALTIME	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-HIGH	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-MEDIUM	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-LOW	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
L3-MBH-L3VPN-IPV6-BA-BEST-EFFORT	L3VPN-IPv6	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-SIGNALLING	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-CONTROL	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-REALTIME	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-HIGH	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-MEDIUM	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-LOW	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-SH-TO-AG1.1-L2-BA-BEST-EFFORT	EVPN-FXC-SH	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-SIGNALLING	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-CONTROL	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-REALTIME	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-HIGH	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-MEDIUM	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-LOW	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2

Traffic Item Name	Feature Name	FPS	Frame Size
5G-FRONTHAUL-EVPN-ELAN-MH-L2-BA-BEST-EFFORT	EVPN-ELAN-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-SIGNALLING	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-CONTROL	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-REALTIME	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-HIGH	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-MEDIUM	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-LOW	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-FXC-MH-L2-BA-BEST-EFFORT	EVPN-FXC-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-LLQ	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-SIGNALLING	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-CONTROL	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-REALTIME	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-HIGH	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
5G-FRONTHAUL-EVPN-VPWS-MH-L2-MFC-BEST-EFFORT	EVPN-VPWS-MH-L2	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-LLQ	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-SIGNALLING	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-CONTROL	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2

Traffic Item Name	Feature Name	FPS	Frame Size
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LLQ	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-SIGNALLING	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-CONTROL	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LLQ	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-SIGNALLING	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-CONTROL	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1A-AN4-TO-AN4-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LLQ	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-SIGNALLING	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-CONTROL	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2

Traffic Item Name	Feature Name	FPS	Frame Size
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1B-AG1.2-TO-AG1.2-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LLQ	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-SIGNALLING	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-CONTROL	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-REALTIME	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-HIGH	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-MEDIUM	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2
TOPO1C-AG1.1-TO-AG1.1-IPV4-BA-LOW	IPv4	1000pps	Customer iMIX-1 and Customer iMIX-2

High Level Features Tested

Following high level features are tested:

- Device Onboarding
- Life Cycle Management
- Device Health Status
- AE, LACP
- ISIS, ISIS-SR
- L2Circuit, VPLS
- IBGP, EBGP
- BFD
- CFM
- L3VPN-OSPF, L3VPN-BGP
- TI-LFA
- MP-BGP
- BGP-LU

- EVPN-VPWS SH, EVPN-VPWS Active-Active MH
- EVPN-FXC SH, EVPN-FXC Active-Active MH
- EVPN-ELAN Active-Active MH
- FAT-PW
- L3VPN Anycast with VLANS & static ARP
- L3VPN Anycast with EVPN-ELAN
- Classifiers (DSCP, DSCPv6, Fixed, MF, 802.1P, EXP)
- Rewrite-rules (DSCP, DSCPv6, 802.1P, EXP)
- Scheduling
- Shaping
- Rate-limiting

Known Limitations

This JVD proposes solutions and services that one can consider complete and support with the following distinctions.

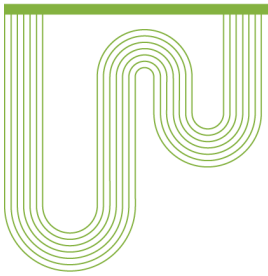
Any target that Junos OS/Junos OS Evolved feature delivery references are not guaranteed and are subject to delay or cancellation without notice. Please consult your Juniper account representative for status.

- **Limitation**: Configuration templates can accommodate configurations only up to 100KB in size.
  Workaround: Use configuration templates for any configuration not supported in the Network Implementation Plan or Service Instance. Please note configuration template has a size limit of 100KB. User can either split the configurations into multiple configuration templates or can use a python script to push the bulk configuration.
- **Limitation**: Software image upgrade for ACX7100 model is not allowed from EOP UI.
  Workaround: Due to the differences in device model identification for ACX7100-32C and ACX7100-48L SKUs in the UI, software upgrade can be performed via Python script until the differences are rectified in the subsequent releases.

Event Testing

The following events have been tested:

- Device offboarding and onboarding
- Resume onboarding
- Device reboot
- Software upgrade/downgrade
- Configuration backup/Restore



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