

Juniper® Validated Design

JVD Test Report Brief: 5G CSR xHaul Seamless Segment Routing

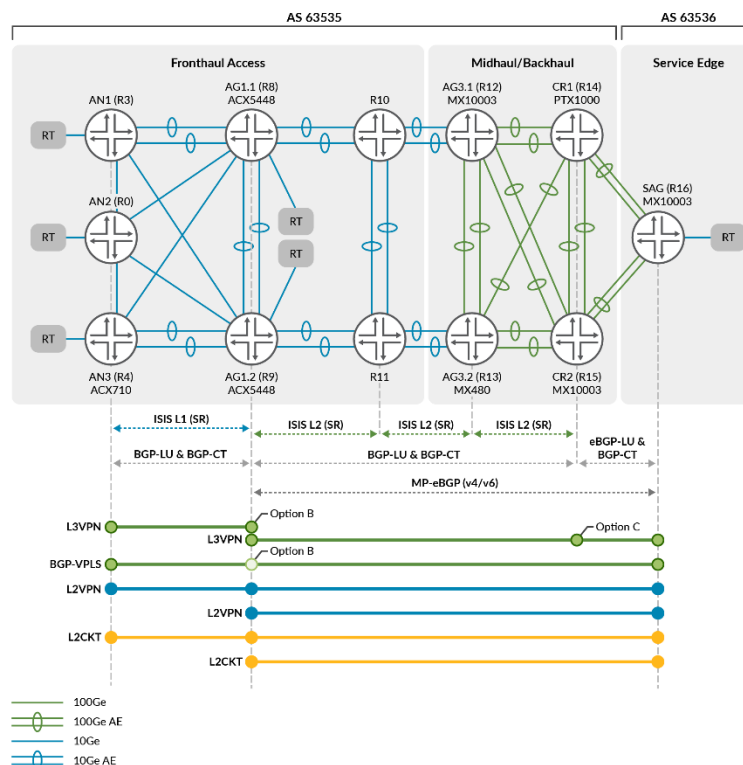
Introduction

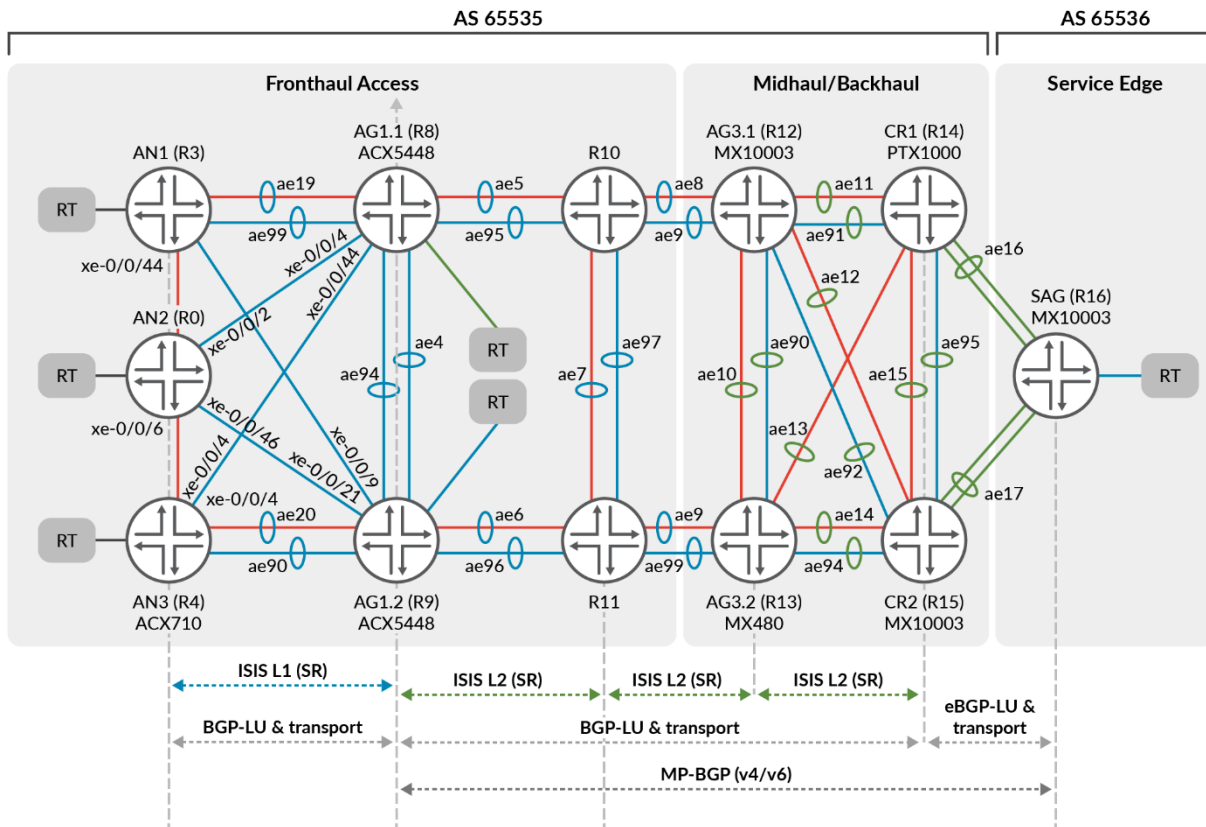
This test report brief outlines the summary of the validation we have conducted for the 5G xHaul network reference design with focus on Seamless Segment Routing (SR), utilizing:

- ACX710 and ACX5448 as cell site Access Node (AN)
- ACX5448 as Pre-Aggregation (AG1)
- MX204 as Aggregation (AG2)
- MX10003 and MX480 as Aggregation (AG3)
- PTX1000 and MX10003 as core routers (CR)
- MX10003 as a Services Aggregation Gateway router (SAG)

The foundation technologies of the xHaul JVD incorporates current and legacy VPN services over SR. Interdomain decoupling of transport and service layers are accomplished by leveraging Seamless SR with BGP-LU and Prefix-SID. Network pre-slicing concepts using flexible algorithm and BGP-Classful Transport (BGP-CT) provide capabilities to support strict end-to-end SLA requirements.

Test Topology





Flex-Algo 128 includes any red
Flex-Algo 129 includes any blue

pn-000717

Platforms Tested

Role	Platform	OS
Access node 2 (AN2)	ACX5448	Junos OS 21.2R3
Access node 1 (AN1)	ACX5448	Junos OS 21.2R3
Access node 3 (AN3 (DUT))	ACX710	Junos OS 21.2R3
Aggregation node 1.1 (AG1.1)	ACX5448	Junos OS 21.2R3
Aggregation node 1.2 (AG1.2 (DUT))	ACX5448	Junos OS 21.2R3
Aggregation node 2.1 (AG2.1)	MX204	Junos OS 21.2R3
Aggregation node 2.2 (AG2.2)	MX204	Junos OS 21.2R3
Aggregation node 3.1 (AG3.1)	MX10003	Junos OS 21.2R3
Aggregation node 3.2 (AG3.2)	MX480	Junos OS 21.2R3
Core router 1 (CR1)	PTX1000	Junos OS 21.2R3

Role	Platform	OS
Core router 2 (CR2)	MX10003	Junos OS 21.2R3
Service aggregation node (SAG)	MX10003	Junos OS 21.2R3

Version Qualification History

This JVD has been qualified in Junos OS Release 21.2R3.

Scale Data

Validated key performance indexes (KPI) 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 1: Access Nodes Validated Scale Parameters

Feature	CSR Scale	Pre-Aggregation	SAG
Platform	CSR3 = ACX710	HSR1.2=ACX5448	MX10003
AE	2	6	2
VLANs	425	3100	4375
ISIS adjacency	14	7	0
IBGP (IPv4) session	2	6	0
EBGP sessions	180	190	390
IGPv4 routes	5100	5100	NA
RIB/FIB	283735/102440	396000/94470	1101500/503800
L2 circuit sessions	100	1000	1800
L2VPN sessions	100	1000	1130
L3VPN instances	100	125	325
VPLS sessions	100	1000	1125
MAC scale (VPLS)	10400	100000	127500
CFM UP MEP	100	1000	1245

Performance Data

Table 2: Aggregated Number of Flows Validated Simultaneously in the Topology

Stream Block (Services)	Aggregate Number of Flows
VPLS	25300
L2VPN	21600
L2 circuit	22200
L3VPN	70000

High Level Features Tested

Summary of the key features and functions under test:

- Network stability and pre-slicing functionalities for Seamless SR xHaul design architecture:
 - End-to-end Seamless SR across ISIS L1 and L2 domains and Inter-AS BGP-LU stitching.
 - Flexible Algorithm with RED (128) and BLUE (129) FADs IGP metric (TE metric verified).
 - BGP-CT creation of transport RIBs for underlay and service mapping functions using Bronze and Gold extended color communities.
 - Color mapping results in deterministic path selection and traffic steering.
- Overlay service mapping (service slicing):
 - BGP-CT service/prefix mapping per supported VPN type (L3VPN, L2VPN, L2CKT).
 - Validate BGP-CT Resolution Scheme fallback operations.
 - BGP-VPLS performs color agnostic path selection.

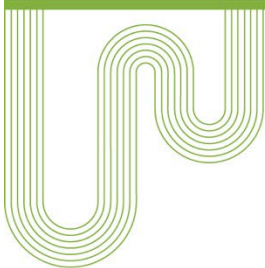
Known Limitations

ACX5448 and ACX710 routers do not support ECMP and Fast reroute (FRR). When both are enabled at the same time, it is recommended to use FRR in place of ECMP.

Event Testing

- Link failures/fail over scenarios across all the nodes within the network for traffic convergence validations.
- Restart daemons.
- Add/delete configuration.
- Node Reboot to evaluate the impact in the network.
- Traffic recovery was validated post all failure scenarios.
- Validation of overlay service mapping - BGP-CT service/prefix mapping per supported VPN type (L3VPN, L2VPN, L2CKT).

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