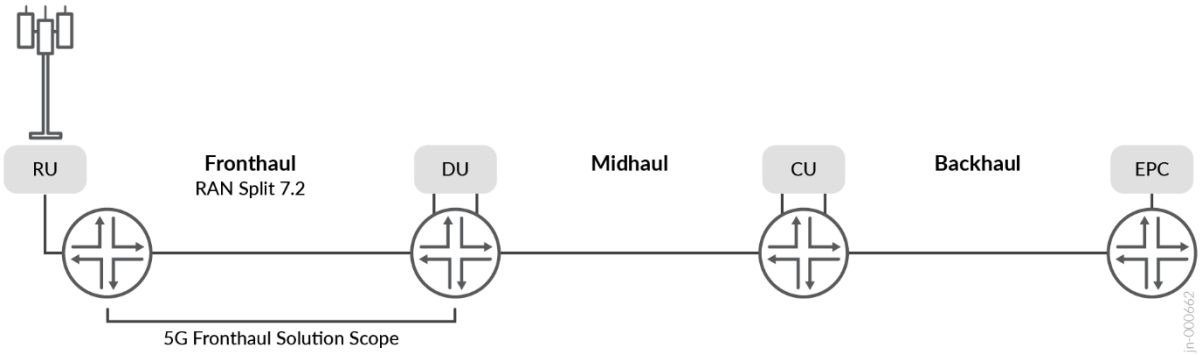
Juniper® Validated Design

JVD Solution Overview: 5G Fronthaul Network Using Seamless MPLS Segment Routing

Executive Summary

The introduction of 5G radio access networks (RAN) dictates new requirements for the mobile backhaul (MBH) network infrastructure in terms of number nodes that constitutes the network, performance and feature richness and leads to growing network complexity. Juniper provides a solution for the end-to-end 5G xHaul network infrastructure, which is carefully designed to support both the traditional 4G mobile backhaul and the evolution into the 5G network infrastructure over the same physical network. This approach allows MSOs to make a smooth transition from 4G to 5G without disrupting their existing services. They can gradually introduce the necessary changes and upgrades to accommodate the new requirements of 5G networks.



Solution Overview

5G Fronthaul is an integral part of the modern 5G xHaul and undoubtedly the most demanding in the part of lowering latency and increasing resiliency for the RAN traffic flows. This solution provides design and implementation details for the 5G Fronthaul network using Seamless Segment Routing Multiprotocol Label Switching (SR-MPLS) with Juniper Network's next-generation ACX7000 series. The Fronthaul solution is considered in the context of the end-to-end 5G xHaul network architecture.

Through careful testing, we found that the ACX7100-32C/48L and ACX7509 are excellent choices for access and aggregation purposes. They offer enhanced performance and a wide range of advanced features, outperforming previous ACX platforms in most scenarios. Both the ACX7100 and ACX7509 are particularly well-suited for the Hub Site Router (HSR) or Lean Edge segments, as they provide the necessary scale, bandwidth, feature velocity, and performance capabilities. While the ACX7100 surpasses the requirements for access nodes, it's also an ideal option for 400G Fronthaul or Metro Access deployments.

About JVD

Juniper Validated Design (JVD) is a cross-functional collaboration between Juniper Solution Architects and Test teams to develop coherent multidimensional solutions for domain-specific use cases. The JVD team is comprised of technical leaders in the industry with a wealth of experience supporting complex customer use cases. The scenarios selected for validation are based on industry standards to solve critical business needs with practical designs that are fully supported at publication.

Solution Architecture

A reference architecture is selected for validation after ongoing cadence with Juniper global theaters and deep analysis of customer use cases. The design concepts deployed are formulated around best practices, leveraging relevant technologies to deliver the solution scope. Key Performance Indicators (KPI) are identified as part of an extensive test plan that focuses on functionality, performance integrity, and service delivery.

Once the physical infrastructure required to support the validation is built, the design is sanity-checked and optimized. Our test teams conduct a series of rigorous validation to prove solution viability, capturing and recording results. Throughout the validation process, our engineers engage with software developers to quickly address any issues found. Unsupported features are excluded from the validation.

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