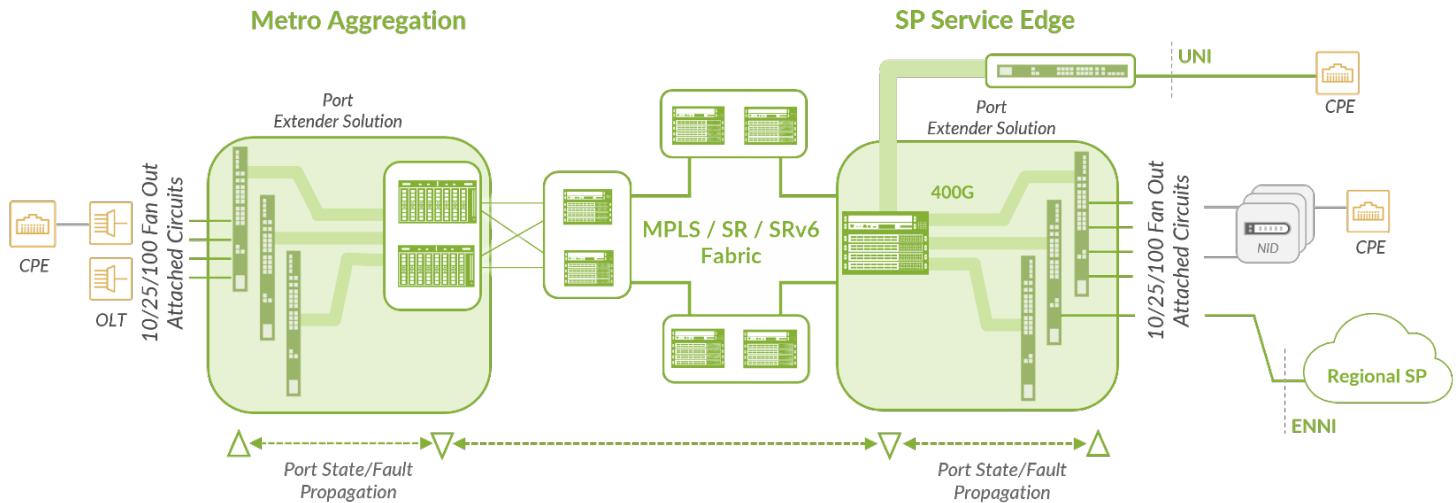


Juniper® Validated Design

# JVD Solution Overview: Port Fan-Out

## Executive Summary

In modern WAN networks, 100G/400G port speeds are a common requirement, even for enterprise networks. Nonetheless, lower speed ports continue to be extensively utilized. While achieving the necessary port diversity within a single chassis system is feasible, it often falls short of being optimal in terms of total cost of ownership (TCO), performance, and power consumption. Introducing distribution or preaggregation network segments or layers emerges as the natural solution to consolidate traffic from lower speed attached circuits and route it towards centrally located aggregation nodes equipped with 100G/400G ports. However, this approach leads to the challenge of increasing the number of nodes in the network, thereby escalating complexity and operational costs. In certain designs, efforts can be made to mitigate the management and configuration workload required when operators connect new attached circuits by configuring the preaggregation node as a mere "port-extender" of the high-speed 100G/400G ports of the aggregation router or switch. With this Juniper Validated Design (JVD), we introduce a solution for a simple port-extender, addressing the need for efficient management and configuration of high-speed aggregation networks.



## Solution Overview

This JVD presents a network design encompassing both data and control planes for a port fan-out solution, utilizing the MX Series as an aggregation PE and the ACX Series router as the port fan-out device. This configuration allows for a cost-effective fan-out of 100G or 400G into 1G/10G/25G port speeds with maximum transparency, consistently minimizing operational efforts for the integrated system. This solution proves particularly beneficial for enabling the fan-out approach within metro aggregation or multi-service edge network segments of a service provider (SP) network, where the MX Series router's Nx100G ports are fanned-out into lower port speeds with the ACX7024 Series router serving as the fan-out device.

The key characteristics of this solution include:

- A full extender's physical port and optics laser status propagation to the aggregation node
- Full transparency for the Layer 2 control traffic
- Streamlined operations and provisioning

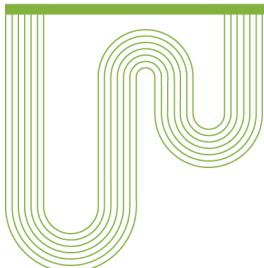
This proposed solution necessitates a one-time provision of the fan-out device at day 0 only, with its configuration remaining unchanged as new attached circuits are connected to the ports of the fan-out device. Furthermore, the solution is entirely based on open standard protocols and can be readily extended for use with other variations of the Juniper Networks platforms if needed.

## About Juniper Validated Designs

A JVD represents 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.

A reference architecture is chosen for validation after collaboration with Juniper global regions and thorough examination of customer scenarios. 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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