

Validated Design Solution Overview:

Executive Summary

Modern data centers are rapidly adopting IPv6 to meet the scaling demands of cloud platforms, microservices, containerized workloads, and IoT back-end systems. IPv4 exhaustion, combined with increased service density and automation needs, makes IPv6 a foundational requirement for contemporary and future data center architectures. Deploying EVPN-VXLAN data center with an IPv6 underlay using Juniper switches and Apstra significantly reduces the operational complexity, configuration errors, and troubleshooting time associated with modern, highly scalable network fabrics. The **3-stage Data center IPV6 design with Juniper Apstra** is a Validated Design that provides organizations with a data center network that is fast, adaptable to change, scalable, and reliable.

Solution Overview

The *3-Stage Data Center IPV6 Design with Juniper Apstra* offers comprehensive guidance on deploying a IPv6 only 3-stage data center fabric with EVPN-VXLAN. Juniper Apstra automation and network management fully supports this design. As with all HPE Juniper Networking data center validated designs, this solution follows best practices as determined by Juniper's subject matter experts, including Juniper support teams. This validated design is the result of extensive consultation and testing to find the balance between capability, performance, and cost efficiency to meet the needs of scalable data center deployments. [Figure 1: 3-Stage Data Center Design ERB design](#) diagrams the recommended setup.

The diagram illustrates a Juniper Apstra network architecture. At the top, the Juniper Apstra logo is shown. Below it, a central 'Spines' block contains two green spine icons. To the left, a 'Single Leaf' block contains one green leaf icon. In the center, an 'ESI Leaf Pair' block contains two green leaf icons. To the right, a 'Border Leaf Pair' block contains two green leaf icons. Above the Spines block, an 'External Gateway Router' block contains one green router icon. A 'sFlow Flow collector' (represented by a funnel icon) is positioned between the Single Leaf and the Spines. An arrow labeled 'Juniper Apstra Flow' points from the sFlow Flow collector to a laptop icon labeled 'Juniper Apstra Flow'. Solid black lines represent network connections between the Spines and the various leaf types. Dashed lines in different colors (blue, purple, red) highlight specific paths or flows between the components.

This validated design consists of an ERB-based network architecture with spine, leaf, and border leaf switches in a high-availability configuration. All hardware components and software versions are tested extensively with simulated and real-world traffic.

- Repeatability – prescriptive designs, where all validated design customers benefit from lessons from worldwide deployments.
- Reliability – integrated, best practice designs tested with real-world traffic and described with measured results.
- Velocity – streamlined deployment with step-by-step guidance, automation, and prebuilt integrations.

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Solution Components

Server Leaf Switches	Border Leaf Switches	Spine	Access Switch
QFX5120-48Y/ QFX5120-48YM/ QFX5120-32C	QFX5120-48Y/ QFX5120-48YM/ QFX5120-32C	QFX5120-48Y/ QFX5120-48YM/ QFX5120-32C	EX4400-48MP
QFX5130-48C/ QFX5130-48CM	QFX5130-48C/ QFX5130-48CM	QFX5130-48C/ QFX5130-48CM	EX4100-48MP
QFX5140-24CD	QFX5140-24CD	QFX5140-24CD	
QFX5700/ QFX5700E	QFX5130-32CD/ QFX5130E-32CD	QFX5220-32CD/ QFX5220-128C	
		QFX5200-32C	
		QFX5230-64CD	
		QFX5241-640D	

The minimum configuration for the *3-Stage Data Center Design with Juniper Apstra* is two spine switches, two leaf switches, and two border leaf switches. This validated design can scale up to eight lean spines and 128 leaf switches while maintaining low or no oversubscription. Fully scaled, the 3-stage fabric can provide up to 6144 single ports, or 3072 high-availability ports, while retaining expected functionality. Juniper Apstra version 6.2 and Junos EVO Release – 25.2X100-D30 and Junos OS Release 25.2R2 are the software components.

About Validated Designs

Validated designs are the product of cross-functional collaboration among HPE Networking's top experts—product teams, solution architects, support, development, and testing. The program's goal: deliver well-characterized, multidimensional solutions that reduce complexity and support burden for networking teams. We select designs based on industry standards and real-world customer usage, targeting the most common use cases with practical, economical, fully tested solutions. Each design undergoes end-to-end validation testing to confirm best practices, with extensive lab testing quantifying performance across multiple teams. Once the required physical infrastructure is built, the design undergoes rigorous validation to prove solution viability, with results documented in test reports. Throughout validation, our engineers work directly with software developers to resolve issues quickly. Ongoing regression testing then confirms functionality, performance, reliability, and security across new software versions.

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