Juniper® Validated Design

JVD Solution Overview: 3-Stage Data Center Design with Juniper Apstra

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Executive Summary

Data center operators must deliver and maintain a reliable network infrastructure while managing complexity and meeting scalability needs. Data centers are hosting increasingly varied workloads with a growing diversity of networking requirements. Meeting these needs with bespoke network designs introduces a unique troubleshooting burden on networking teams. *The 3-Stage Data Center Design with Juniper Apstra* is a Juniper Validated Design (JVD) that provides organizations with a data center network that is fast, adaptable to change, scalable, and reliable.

Solution Overview

The *3-Stage Data Center Design with Juniper Apstra* is the most common Juniper data center network architecture and offers comprehensive guidance on deploying a modern 3-stage data center fabric with EVPN-VXLAN. Juniper Apstra automation and network management fully support this design. As with all Juniper data center JVDs, this solution follows best practices as determined by Juniper's subject matter experts, including Juniper support teams. This JVD 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 diagrams the recommended setup.

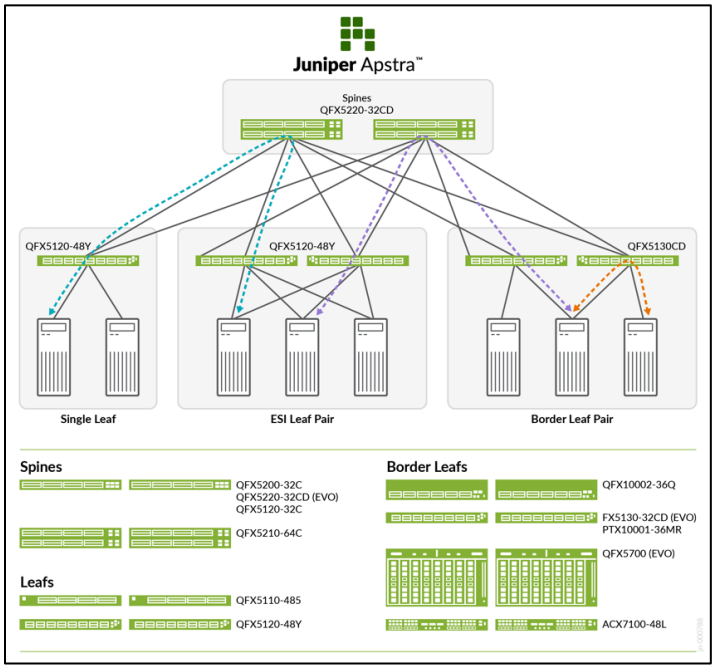

Figure 1: 3-Stage Data Center Design with Juniper Apstra

Juniper has extensively tested the design, with customers deploying it across the globe. Advanced JVD testing combined with widespread adoption simplify troubleshooting and shorten the support cycle, leading to a more stable data center fabric and reduced operational costs.

This JVD 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.

Benefits

- Repeatability – prescriptive designs, where all JVD 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.

Solution Components

Supported Devices and positioning			
Solution	**Server Leaf Switches**	**Border Leaf Switches**	**Spine**
3-stage EVPN/VXLAN	QFX5120-48Y-8C*	QFX5130-32CD*	QFX5220-32CD*
	QFX5110-48S	QFX5700	QFX5120-32C
		ACX7100-48L	QFX5210-64CD
		ACX7100-32C	QFX5200-32C
		PTX10001-36MR	
		QFX10002-36Q	

* baseline devices

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 JVD 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 4.2.1 and Junos OS Release 23.4R2-S3 are the software components.

About Juniper Validated Designs

JVDs represent a cross-functional collaboration between Juniper's top subject matter experts, including product teams, solutions architects, support, development, and testing. The goal of the JVD program is to develop well-characterized, multidimensional solutions that reduce the complexity and support burden of networking teams. Network designs selected for validation are based on industry standards and target the most common use cases with practical, economical designs that are fully tested and supported.

Juniper data center JVDs are customer-driven. Network designs in frequent use by customers are identified and then undergo use case and best practice analysis based on end-to-end validation testing. Juniper fully characterizes and quantifies the design in the Juniper JVD Labs with extensive testing by multiple teams. Once Juniper builds the physical infrastructure required to support the JVD, the design undergoes rigorous validation to prove solution viability, with results provided in JVD test reports. Throughout the validation process, our engineers engage with software developers to quickly address any found issues, and ongoing regression testing confirms functionality, performance, reliability, and security in new software versions.

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