



# JUNIPER APSTRA

## Product Overview

*Juniper Apstra is a turn-key automation solution that dramatically simplifies the process of designing, deploying, and operating data center networks. Apstra provides a singular view into the relationships and interdependencies between millions of data center elements. With real-time continuous validation, Apstra enables you to instantly pinpoint and quickly resolve issues across all infrastructure silos, regardless of vendor or hardware.*

## Product Description

Juniper Networks® Apstra is a software-only intent-based networking solution that leverages closed-loop automation and assurance along with multivendor support to provide a complete fabric management solution.

Apstra can be installed on any virtual machine (VM) or server to connect and manage devices via agents that can be installed on or off the devices. Once Apstra is ready to manage your devices, you can define multiple logical devices and racks during the network design phase and assemble them all into a template. Details such as rack types, routing policies, Ethernet VPN/virtual extensible LAN (EVPN/VXLAN), IPv4/v6, and other resources can be allocated to templates and associated with compatible physical device profiles (such as Juniper, Cisco, Arista, and Cumulus). Multiple templates can be created and instantiated in a virtual data center to create blueprints for the entire network.

Apstra manages the entire network, giving you the ability to easily grow or shrink your network, extract meaningful device telemetry, and understand the status of network elements.

Apstra keeps your intent in check with the actual status of the network, providing you with actionable insights into your network to ensure your goals are met.

## Features and Benefits

Juniper Apstra offers the following features:

### Intent-Based Network Design and Operations

Intent-based data center automation increases application availability and reliability, simplifies deployment and operations, and dramatically reduces costs for enterprise, cloud service provider, and telco data centers. As the only intent-based networking technology to be hardware- and device OS-vendor agnostic, Apstra delivers on the vision of complete end-to-end data center automation, integrating capabilities such as group-based policies, enterprise scale, and significant intent-based analytics enhancements.

### Lifecycle Management for Data Center Networks

Typically, architects design the network and operators manage it, resulting in a breakdown in information sharing and the absence of a single source of truth (SSOT). Architects are not aware of changes made to the network, and operators are not fully informed of the capabilities and known limits of the system. Apstra eliminates these issues by creating an SSOT in the intent datastore and tracking all network moves, additions, and changes. Not only does Apstra track changes made to the network by other systems, but it also provides simple workflows for implementing changes across the entire network.

## Advanced Telemetry – Intent-Based Analytics

Operators frequently find themselves drowning in telemetry data collected by their managed systems. Apstra's intent-based analytics lets you define expert-level rules and embed them into the network management system, ensuring that system checks are continuously running and updated immediately with any network changes.

## Scalability to the Largest Data Centers

Apstra was designed to handle the largest data centers in the world, supporting hundreds of thousands of connected servers. This is achieved through support for 3- or 5-Stage Clos IP fabrics with EVPN-VXLAN deployed as the overlay. Racks and pods can be added with a few clicks as part of a unified workflow. More importantly, Apstra is focused on intent and on translating that intent to configuration. Operators can easily make changes to these roles, driving large-scale changes to configurations across multiple vendors and network designs.

To satisfy these demands, Apstra is built with a high-throughput, highly scalable graph datastore that tracks all changes in real time, relieving the organization from having to manage individual IP addresses or configurations. This allows operators to focus on business-specific needs rather than low-level troubleshooting or reconfiguring of the network management system following every network change.

## Intent Time Voyager

A key operational feature for any network operator is the ability to rapidly recover from human error. This is typically a complex, vendor-specific process that requires a complete understanding of the full state of all boxes, as well as their relationships to each other at certain points in time. Apstra's Intent Time Voyager feature speeds time to resolution by enabling the operator to move the entire state of the network (intent, configuration, and continuous validations) backwards or forwards with a few simple clicks, returning it to a specific point in time. This unique ability is enabled by Apstra's foundational intent-based approach, including its SSOT and assurance validations.

## Data Center Interconnect

As networks expand and applications require greater geographic diversity, a number of vendor-specific proprietary features have been introduced to address stretched Layer 2 domains and active-active topologies. Apstra now supports an industry-standard EVPN/VXLAN overlay that extends Layer 2 application segments outside of the Apstra-managed topology, allowing architects to integrate multiple disparate computing centers for effective load balancing, legacy migration, disaster recovery, or resource sharing.

## Support for all Modern Network Platforms

Apstra offers the industry's first and only vendor-agnostic intent-based networking platform, allowing enterprises to design a network without consideration for the hardware platforms that will eventually be deployed. The tools used to design and manage the network are exactly the same, regardless of which vendor hardware or network operating system is ultimately selected. This translates to a massive reduction in OpEx by eliminating the need to maintain staff expertise in multiple platforms and vendor nuances. There is also an opportunity to reduce CapEx by allowing all modern vendors to be considered for inclusion in an Apstra-managed environment.

## VMware NSX-T Integration

Juniper Apstra tightly integrates with VMware NSX-T virtual networking to guarantee compliance between the virtual and physical networks. Integration to the latest VMware NSX-T 3.0 release supports its new capabilities for multiple sites and multicloud architecture. Built-in validation ensures that peering points have matching VLAN, LLDP, and LACP, allowing Apstra to locate virtual machines within the fabric and provide detailed telemetry on application performance.

## Flexible Connectivity

Juniper Apstra software offers unlimited connectivity configuration options for servers, firewalls, and external routers. These connectivity options can be quickly attached to any port in the fabric, with deterministic configuration to ensure that all protocols are properly functioning. They leverage the Apstra graph model, providing integrated operational statistics and workflows tailored to the selected design.

## Specifications

### Software

#### Services

- BGP L3 Clos Fabric with multitenancy EVPN (RFC 7432)
- 3- and 5-Stage Clos IP Fabric
- Intra-rack (VLAN), or Inter-rack (VXLAN)
- L3 VXLAN routing
- L3 server routing with dual attachment
- MLAG/vPC/CLAG/ESI
- BGP/OSPF Egress
- IPv6 fabric and applications
- Dynamic BGP neighbors
- Static routes
- Group Based Policy – Access Control Lists (ACLs)
- Extensible services (intent, resources, expectations)
- DHCP relay
- VRFs

**Telemetry**

- LLDP, BGP, EVPN, Config Deviation
- Interface counters
- Routing table verification
- Host, transceiver, interface, LAG / MLAG
- MAC & ARP
- Server and devices health
- Network-wide external routes
- Intent-Based anomaly detection
- Telemetry streaming via protocol buffers
- Extensible telemetry collection
- Interactive Network Visualization

**Root-Cause Identification**

- Connectivity Fault Model
- Cabling Fault Model
- Anomaly Summarization

**Intent-Based Analytics (IBA)**

- IBA Dashboards and Widgets
- IBA Property Sets
- IBA Visualization Improvements
- Complex Data Filtering\*
- Global Tag Management

**Device OS**

- Juniper Junos OS
- Juniper Junos on vQFX virtual devices
- Cisco NX-OS and NX-OSv
- Arista EOS and vEOS
- Cumulus Linux and CVX
- Microsoft SONiC
- Ubuntu Servers
- CentOS Servers

**Platform**

- Apstra Backup / Restore
- Apstra Server Health Reporting\*
- RESTful APIs
- Graph model and GraphQL/QE API
- Apstra CLI
- Apstra Developer SDK (Python)
- Extensible on-box or off-box device agents
- Apstra Server Clustering

**Security**

- Multi-User Administration
- Role Based Access Control
- LDAP Authentication

- TACACS+ Authentication
- RADIUS Authentication
- Active Directory Authentication
- 802.1x Network Admission Control
- HTTPS UI
- Apstra Server Security Hardening
- Headless Operation

**Blueprint Customization**

- Flexible Connectivity Templates
- External Routing Policy
- Advanced Configlets
- Property Sets
- Resource Management

**Cloud Platform Integration**

- VMware vSphere
- VMware NSX-T

**Apstra Solution Extensibility**

- Zero Touch Provisioning (ZTP) Server
- Template Catalog
- External Streaming Telemetry (protobuf)
- Legacy Devices Integration
- Github
- IBA Probe Repository
- Configlets

**Maintenance Workflows**

- Staged/Commit Workflows
- Scale-Out Maintenance
- Add Rack/Add Pod
- Intent Time-Voyager
- NOS Upgrade/Downgrade
- Change/Add Interface
- Device Maintenance Mode
- Replacement Maintenance
- Decommission Maintenance

**Workload Change Operations**

- Group Based Policy
- Virtual Network Management

**Device Management**

- Zero Touch Provisioning
- Device Agent Installer
- Lifecycle Management
- Device Quarantine

- NOS Management
- Device Import/Export
- Device Profiles
- Logical Devices

### Intent-Based Analytics Probes

- East-West traffic
- MLAG imbalance
- Headroom
- ECMP imbalance
- Hot / Cold fabric ports
- Interface flapping
- BGP (VRF aware)
- Default gateway count
- MLAG domain
- TCAM usage
- OS version
- Interface bandwidth
- Interface errors (overloaded int bandwidth)
- Sustained Interface discards
- SFP
- Interface buffers
- BUM traffic
- Display External Routes
- PIM state on a Leaf, Spine,
- Border Leaf
- PIM RP on Leaf, Spine
- PIM Anycast RP on Border Leaf
- PIM MRoute Anomalies on Border Leaf
- VTEP
- STP state
- Flag STP state changes
- Power Supply Anomalies Probe

- Hypervisor and Fabric VLAN config mismatch
- VMs without Fabric configured VLANs
- Hypervisor and Fabric LAG config mismatch
- Hypervisor missing LLDP config
- Hypervisor MTU Mismatch
- Hypervisor MTU Check
- Hypervisor Redundancy Check

An open-source catalog of Intent-Based Analytics probe configurations is available, to enable an ecosystem with customers, partners, and other third parties.

### Installation Requirements

#### Hypervisors

- VMware ESXi
  - Supported versions - 7.0, 6.7, 6.5
- QEMU / KVM for Ubuntu
  - Supported versions - 18.04 LTS
- Microsoft Hyper-V
- VirtualBox

### Ordering Information

Please contact your Juniper sales representative for information on how to order Juniper Apstra.

### About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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