



[Home](#) » [JUNIPER NETWORKS](#) » **Juniper NETWORKS Abstract Intent Based Networking User Guide** 

Contents [[hide](#)]

[1 Juniper NETWORKS Abstract Intent Based Networking](#)

[2 Begin](#)

[3 Up and Running](#)

[4 Keep Going](#)

[5 General Information](#)

[6 FAQs](#)

[7 Documents / Resources](#)

[7.1 References](#)



Juniper NETWORKS Abstract Intent Based Networking

Intent Based Networking



Begin

In this guide, we provide a simple, three-step path to quickly get you up and running with Juniper Apstra. We'll show you how to install and configure Apstra software release 5.1.0 onto a VMware ESXi hypervisor. From the Apstra GUI, we'll walk through the elements used to create a new user with administrator privileges. Depending on the complexity of your design, other tasks might be required in addition to the ones included in this workflow.

Meet Juniper Apstra

Juniper Apstra automates and validates your data center network's design, deployment, and operations. After specifying outcomes, Apstra sets up the network, ensures security, alerts you to anomalies, and manages changes. The software supports various vendors and topologies. Apstra offers design templates for repeatable blueprints. It uses advanced IBA to validate the network, eliminating complexity, vulnerabilities, and outages.

Get Ready

Apstra software comes pre-installed on a single virtual machine (VM). For information about supported hypervisors, see [Supported Hypervisors and Versions](#). You'll need a server that meets the following specifications:

Resource	Recommendation
Memory	64 GB RAM + 300 MB per installed device off-box agent
CPU	8 vCPU
Disk Space	80 GB
Network	1 network adapter, initially configured with DHCP
VMware ESXi installed	Version 8.0, 7.0, 6.7, 6.5, 6.0

For more information about Apstra server VM resource requirements, see [Required Server Resources](#).

Install Apstra Server

- These instructions are for installing Apstra software on an ESXi hypervisor. For information about installing Apstra software on other hypervisors, see [Install Apstra on KVM, Install Apstra on Hyper-V, or Install Apstra on Virtual Box](#).
 - You will first download the Apstra VM image file and then deploy it on the VM.
1. As a registered support user, [download the latest OVA Apstra VM image from Juniper Support Downloads](#).

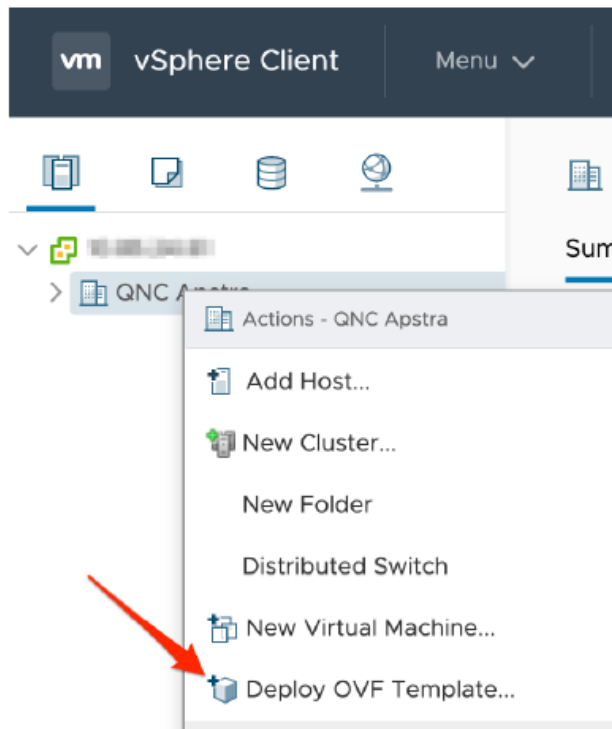
To download the image on your localhost, [CLICK HERE](#)

To download the image directly on your device, use the following URL:

```
https://cdn.juniper.net/software/jafc/5.1.0/aos_server_5.1.0-117.ova?
SM_USER=mknudson&__gda__=1739382445_75f190ed0d4dcd15661eb3ebc929f2e2
```

copy

2. Log in to vCenter, right-click your target deployment environment, then click Deploy OVF Template.



3. Specify the URL or local file location for the downloaded OVA file, then click Next.

Deploy OVF Template

1 Select an OVF template

- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 Select storage
- 6 Ready to complete

Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

☐ URL

http | <https://remoteserver-address/filetoinstall.ovf> | .ova

☒ Local file

aos_server_4.0.2-142.ova

4. Specify a unique name and target location for the VM, then click Next.

Deploy OVF Template

✓ 1 Select an OVF template

2 Select a name and folder

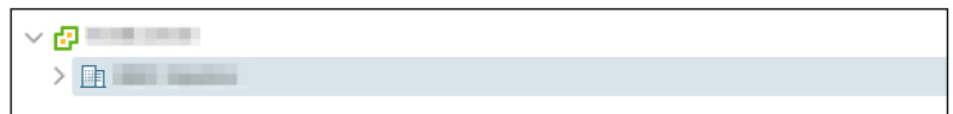
- 3 Select a compute resource
- 4 Review details
- 5 Select storage
- 6 Ready to complete

Select a name and folder

Specify a unique name and target location

Virtual machine name: aos_server4.0.2-142

Select a location for the virtual machine.



5. Select your destination compute resource, then click Next.

Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- 3 Select a compute resource**
- 4 Review details
- 5 Select storage

Select a compute resource

Select the destination compute resource for this operation

▼

Cluster

6. Review template details, then click Next.

7. Select storage for the files, then click Next. We recommend thick provisioning for the Apstra server.

Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- 5 Select storage**
- 6 Select networks
- 7 Ready to complete

Select storage

Select the storage for the configuration and disk files




☐ Encrypt this virtual machine (Requires Key Management Server)

Select virtual disk format:

Thick Provision Lazy Zeroed ▼

VM Storage Policy:

Datastore Default ▼

Name	Capacity	Provisioned	Free	Typ
 datastore1	215 GB	261.57 GB	81.84 GB	VM
 datastore1 (6)	215 GB	493.67 GB	78.11 GB	VM
 NFS-Datastore	2 TB	1.73 TB	1.79 TB	NF

8. Map the Apstra Management network to reach the virtual networks managed by the Apstra server, then click Next.

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- ✓ 4 Review details
- ✓ 5 Select storage
- 6 Select networks**
- 7 Ready to complete

Select networks

Select a destination network for each source network.

Source Network	Destination Network
VM Network	topology1 ▼
1 items	

IP Allocation Settings

IP allocation:

Static - Manual

IP protocol:

IPv4

9. Review your specifications, then click Finish.

Configure Apstra Server

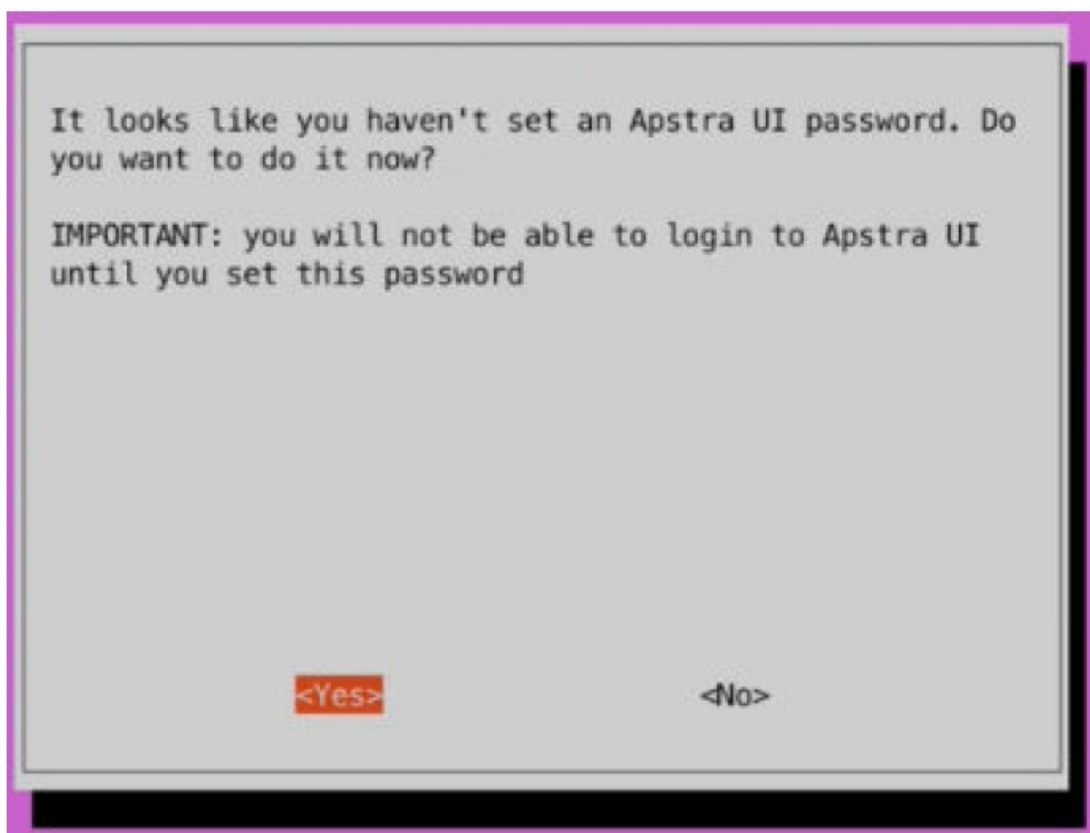
1. Log in to the Apstra server with the default credentials (user: admin, password: admin) either from the web console or via SSH (ssh admin@<apstra-server-ip> where <apstra-server-ip> is the IP address of the Apstra server.) You must change the default password before you can proceed.

```
(admin@) Password:  
(admin@) You are required to change your password immediately (root enforced)  
Changing password for admin.  
(current) UNIX password:  
(admin@) New password:
```

2. Enter a password that meets the following complexity requirements, then enter it again:

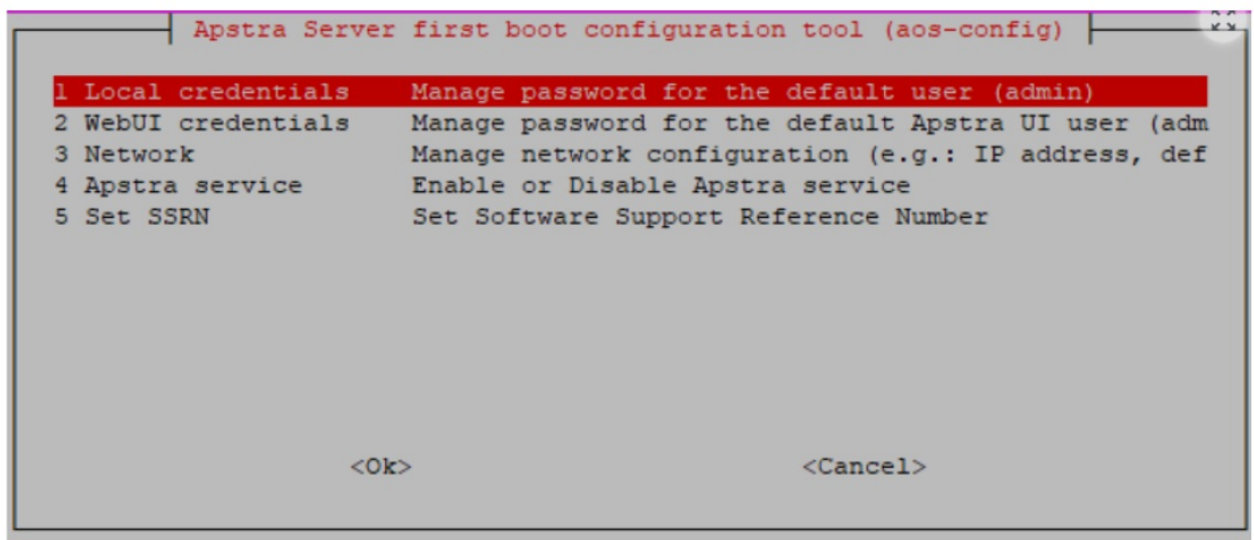
- Must contain at least 14 characters
- Must contain an uppercase letter
- Must contain a lowercase letter
- Must contain a digit
- Must contain a special character
- Must NOT be the same as the username
- Must NOT contain a repeat of the same character
- Must NOT contain consecutive sequential characters
- Must NOT use adjacent keys on the keyboard

3. When you've successfully changed the Apstra server password a dialog opens prompting you to set the Apstra GUI password.



- You won't be able to access the Apstra GUI until you set this password. Select Yes and enter a password that meets the following complexity requirements, then enter it again:
- Must contain at least 9 characters

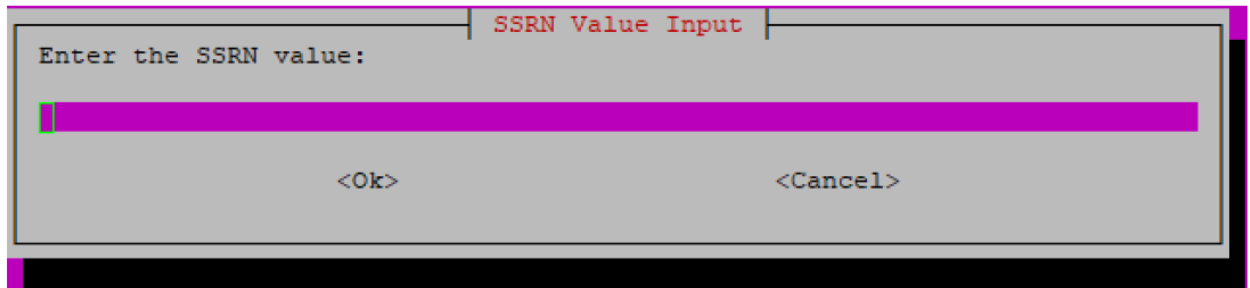
- Must contain an uppercase letter
 - Must contain a lowercase letter
 - Must contain a digit
 - Must contain a special character
 - Must NOT be the same as the username
 - Must NOT contain a repeat of the same character
 - Must NOT contain consecutive sequential characters
 - Must NOT use adjacent keys on the keyboard
4. A dialog appears stating “Success! Apstra UI password is changed.” Select OK.
- The configuration tool menu appears



- You changed the local and Apstra GUI credentials, so no further management is needed. The network is configured to use DHCP by default. To assign static IP addresses instead, select Network, change it to Manual, and provide the following:
 - (Static Management) IP address in CIDR format with netmask (for example, 192.168.0.10/24)
 - Gateway IP address
 - Primary DNS
 - Secondary DNS (optional)
 - Domain
5. Apstra service is stopped by default. To start and stop Apstra service, select AOS service and select Start or Stop, as appropriate. Starting service from this configuration tool invokes /etc/init.d/aos, which is the equivalent of running the command service aos start.
6. You can add a Software Support Reference Number (SSRN) to the Apstra GUI.

Select Set SSRN, enter the SSRN number you received when you purchased your license, and click Ok.

- **NOTE:** This step is optional. Setting an SSRN is not required, but may speed up support times. The SSRN number is saved in Apstra ShowTech, and lets JTAC Support know you have a valid Apstra license.



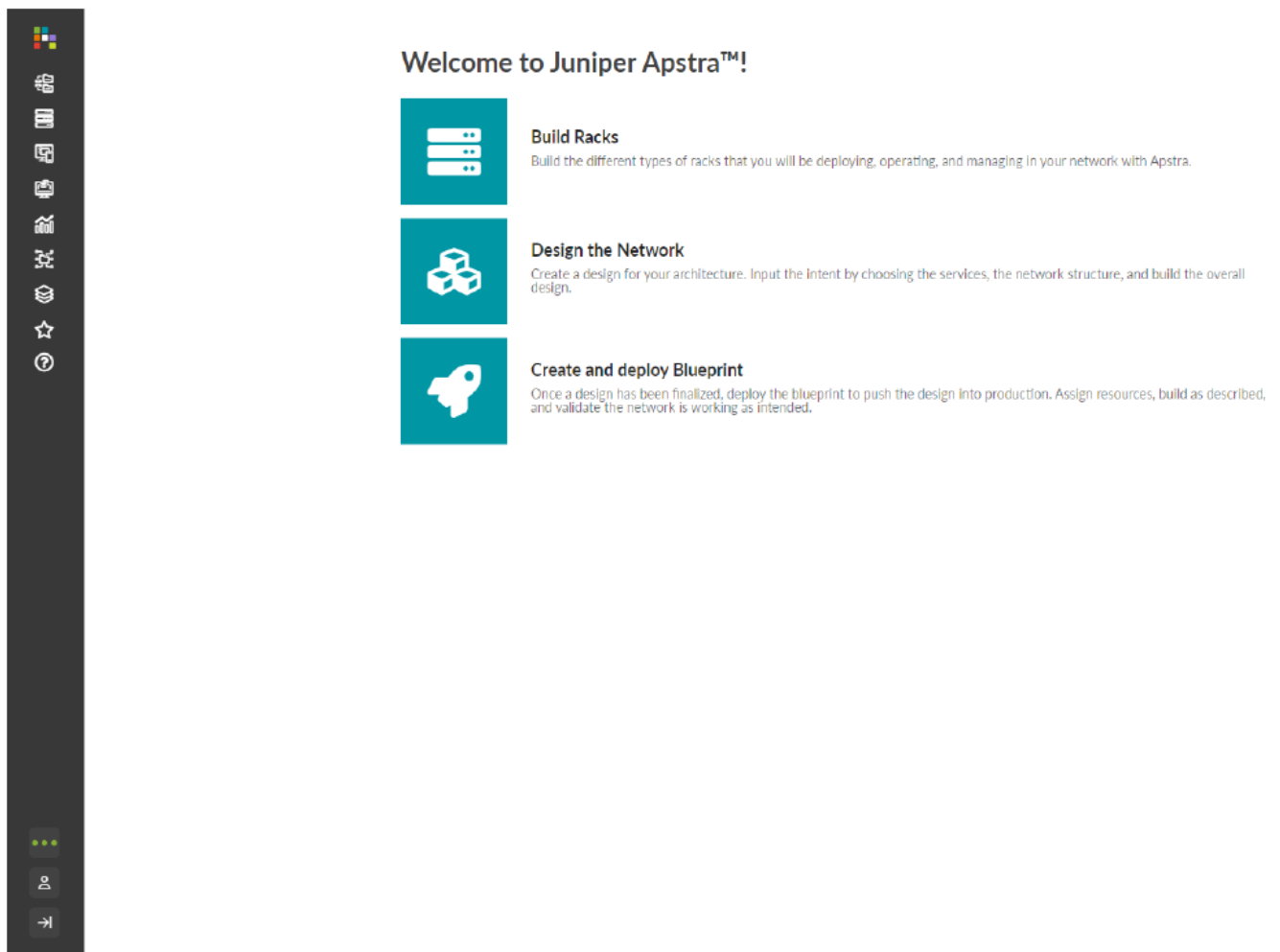
7. To exit the configuration tool and return to the CLI, select Cancel from the main menu. (To open this tool again in the future, run the command `aos_config`.)
 - You're ready to [Replace the SSL Certificate on Apstra server with a signed one](#).

CAUTION: We recommend that you back up the Apstra server on a regular basis (since HA is not available). For backup details, see the [Apstra Server Management](#) section of the Juniper Apstra User Guide.

Up and Running

Access the Apstra GUI

1. From the latest web browser version of Google Chrome or Mozilla FireFox, enter the URL `https://<apstra_server_ip>` where `<apstra_server_ip>` is the IP address of the Apstra server (or a DNS name that resolves to the IP address of the Apstra server).
2. If a security warning appears, click Advanced and Proceed to the site. The warning occurs because the SSL certificate that was generated during installation is self-signed. We recommend that you replace the SSL certificate with a signed one.
3. From the log in page, enter the username and password. The username is admin. The password is the secure password that you created when configuring the Apstra server. The main Apstra GUI screen appears.



Design Your Network

The Apstra design process is highly intuitive because you base your design on physical building blocks such as ports, devices, and racks. When you create these building blocks and specify what ports are used, Apstra has all the information it needs to come up with a reference design for your fabric. Once your design elements, devices and resources are ready, you can start staging your network in a blueprint.

Apstra Design Elements

At first, you design your fabric using generic building blocks that don't have site-specific details or site-specific hardware. The output becomes a template that you later use in the build stage to create blueprints for all your data center locations. You'll use different design elements to build your network in a blueprint. Keep reading to learn about these elements.

Logical Devices

Logical devices are abstractions of physical devices. Logical devices allow you to create a mapping of the ports you want to use, their speed, and their roles. Vendor-specific information is not included; this lets you plan your network based on device capabilities alone before selecting hardware vendors and models. Logical devices are used in interface maps, rack types and rack-based templates. Apstra ships with many predefined logical devices. You can view them through the logical devices design (global) catalog. From the left navigation menu, navigate to Design > Logical Devices. Go through the table to find ones that meet your specifications.

The screenshot shows the 'Design > Logical Devices' page. A left navigation menu is open, with 'Logical Devices' selected (indicated by red arrow 1). A tooltip (indicated by red arrow 2) explains the relationship between Logical Devices, Interface Maps, Rack Types, Templates, and Device Profiles. The main table lists logical devices with columns: Capabilities, Panels Count, Ports Count, Ports Summary, and Actions. Two devices are visible: AOS-1x1-1 (1x1 Gbps Leaf Access Switch) and AOS-1x10-1 (1x10 Gbps Leaf Access Switch). A 'Create Logical Device' button is in the top right.

Capabilities	Panels Count	Ports Count	Ports Summary	Actions
1 x 1	1	1	AOS-1x1-1 1 x 1 Gbps Leaf • Access Switch	[Edit] [Copy] [Delete]
1 x 10	1	1	AOS-1x10-1 1 x 10 Gbps Leaf • Access Switch	[Edit] [Copy] [Delete]

Interface Maps

Interface maps link logical devices to device profiles. Device profiles specify hardware model characteristics. By the time you check the design (global) catalog for interface maps, you'll need to know which models you'll be using. You assign interface maps when you build your network in the blueprint. Apstra ships with many predefined interface maps. You can view them through the interface maps design (global) catalog. From the left navigation menu, navigate to Design > Interface Maps. Go through the table to find ones that match your devices.

The screenshot shows the 'Design > Interface Maps' page. A left navigation menu is open, with 'Interface Maps' selected (indicated by red arrow 1). A tooltip (indicated by red arrow 2) explains the relationship between Logical Devices, Interface Maps, Rack Types, Templates, and Device Profiles. The main table lists interface maps with columns: Device Profile, Logical Device, and Actions. Three interface maps are visible: SONIC_BRCM_BUZZNIK_PLUS_AOS-24x10-2, SONIC_BRCM_BUZZNIK_PLUS_AOS-48x10-6x40-1, and FOS AOS-32x10-3. A 'Create Interface Map' button is in the top right.

Device Profile	Logical Device	Actions
Accton-AS5712-54X_SONIC_BRCM_BUZZNIK_PLUS	AOS-24x10-2	[Edit] [Copy] [Delete]
Accton-AS5712-54X_SONIC_BRCM_BUZZNIK_PLUS	AOS-48x10+6x40-1	[Edit] [Copy] [Delete]
Arista DCS-7050QX-32	AOS-32x10-3	[Edit] [Copy] [Delete]

Rack Types

Rack types are logical representations of physical racks. They define the type and number of leafs, access switches and/or generic systems (unmanaged systems) in racks. Rack types don't specify vendors, so you can design your racks before selecting hardware. Apstra ships with many predefined rack types. You can view them in the rack type design (global) catalog: From the left navigation menu, navigate to Design > Rack Types. Go through the table to find ones that match your design.

1. 2.

Description	Fabric Connectivity Design	Leaf Count	Access Switch Count	Generic System Count	Actions
	L3 Collapsed	1 single leaf	1 single switch	2	
	L3 Collapsed	1 ESI group	None	2	
	L3 Clos	1 ESI group	None	3	

Templates

Templates specify a network's policy and structure. Policies can include ASN allocation schemes for spines, overlay control protocol, spine-to-leaf link underlay type and other details. The structure includes rack types, spine details and more. Apstra ships with many predefined templates. You can view them in the template design (global) catalog. From the left navigation menu, navigate to Design > Templates. Go through the table to find ones that match your design.

1. 2.

Type	Overlay Control Protocol	Actions
COLLAPSED	MP-EBGP EVPN	
COLLAPSED	MP-EBGP EVPN	
RACK BASED	MP-EBGP EVPN	

Install Device System Agents

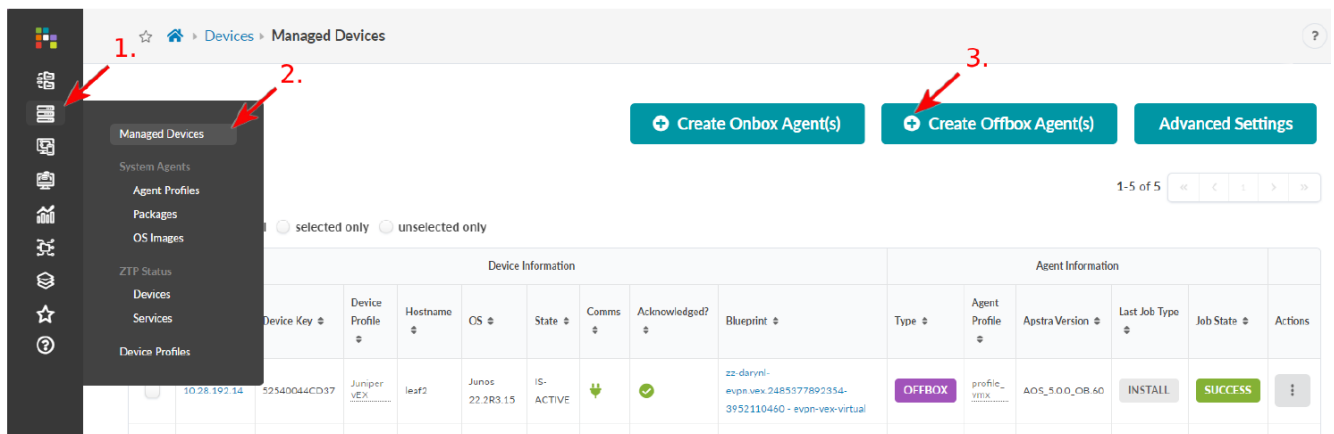
Device system agents manage devices in the Apstra environment. They manage configuration, device-to-server communication, and telemetry collection. We'll use Juniper Junos devices with off-box agents for our example.

1. Before creating the agent, install the following minimum required configuration on the Juniper Junos devices:

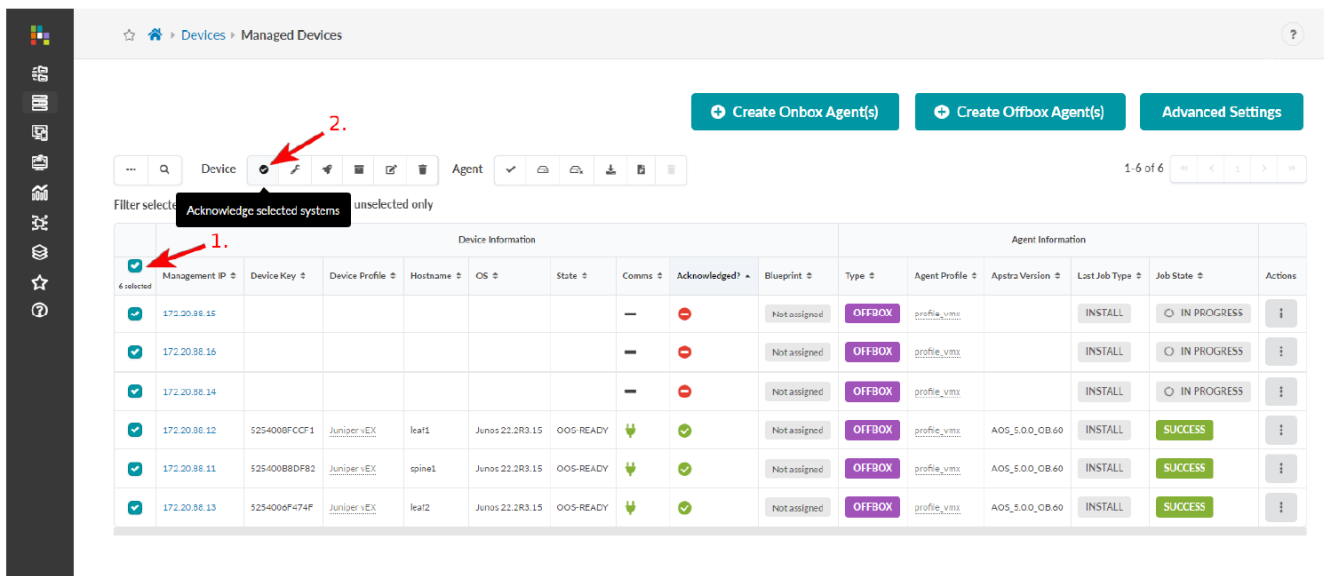
```
system {
  login {
    user aosadmin {
      uid 2000;
      class super-user;
      authentication {
        encrypted-password "xxxxx";
      }
    }
  }
  services {
    ssh;
    netconf {
      ssh;
    }
  }
  management-instance;
}
interfaces {
  em0 {
    unit 0 {
      family inet {
        address <address>/<cidr>;
      }
    }
  }
}
```

```
routing-instances {
  mgmt_junos {
    routing-options {
      static {
        route 0.0.0.0/0 next-hop <management-default-gateway>;
      }
    }
  }
}
```

2. From the left navigation menu in the Apstra GUI, navigate to Devices > Managed Devices and click Create Offbox Agent(s).



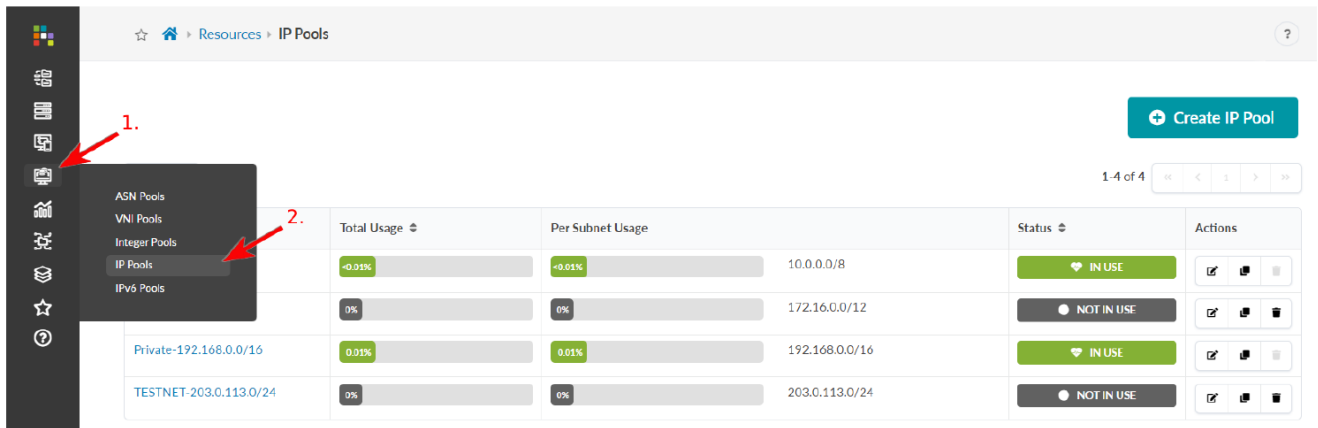
3. Enter device management IP addresses.
4. Select FULL CONTROL, then select Junos from the platform drop-down list.
5. Enter a username and password.
6. Click Create to create the agent and return to the managed devices summary view.
7. Select the check boxes for the devices, then click the Acknowledge selected systems button (first one on the left).
8. Click Confirm. The fields in the Acknowledged column change to green check marks indicating that those devices are now under Apstra management. You'll assign them to your blueprint later.



Create Resource Pools

You can create resource pools, then when you're staging your blueprint and you're ready to assign resources, you can specify which pool to use. Apstra will pull resources from the selected pool. You can create resource pools for ASNs, IPv4, IPv6 and VNIs. We'll show you the steps for creating IP pools. The steps for the other resource types are similar.

1. From the left navigation menu, navigate to Resources > IP Pools and click Create IP Pool.



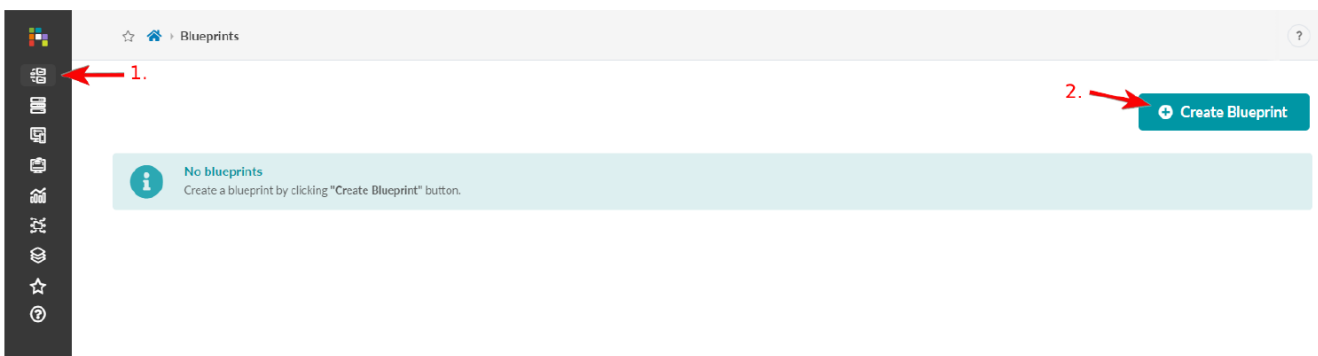
2. Enter a name and valid subnet. To add another subnet, click Add a Subnet and enter the subnet.
3. Click Create to create the resource pool and return to the summary view.

Build Your Network

When you've got your design elements, devices and resources ready, you can start staging your network in a blueprint. Let's create one now.

Create a Blueprint

1. From the left navigation menu, click Blueprints, then click Create Blueprint.



2. Type a name for the blueprint.
3. Select Datacenter reference design.
4. Select a template type (all, rack-based, pod-based, collapsed).
5. Select a template from the Template drop-down list. A preview shows template parameters, a topology preview, network structure, external connectivity, and policies.
6. Click Create to create the blueprint and return to the blueprint summary view. The summary view shows the overall status and health of your network. When you meet

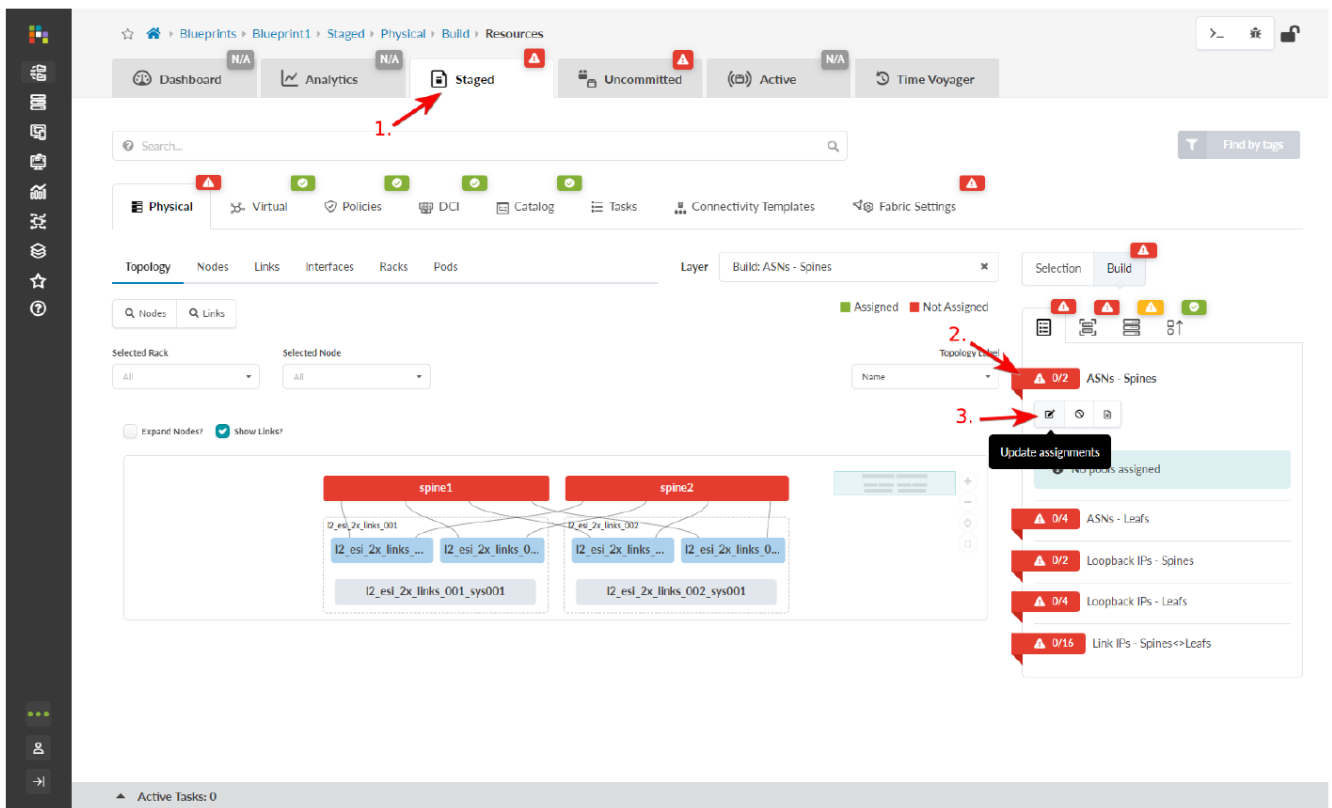
all the requirements for building the network, the build errors are resolved and you can deploy the network. We'll start by assigning resources.

Physical Structure:	1 pod, 2 racks 2 spines, 4 leaves, 2 generic systems
Virtual Structure:	1 routing zone
Analytics	
Service Deployment Status	N/A
Service Anomalies	N/A
Probe Anomalies	N/A
Root Causes:	N/A

Version 1 Last modified a few seconds ago

Assign Resources

1. From the blueprint summary view, click the blueprint name to go to the blueprint dashboard. After you deploy your blueprint, this dashboard will show details about the status and health of your networks.
2. From the top navigation menu of the blueprint, click Staged. This is where you'll build your network. The Physical view appears by default, and the Resources tab in the Build panel is selected. Red status indicators mean that you need to assign resources.
3. Click one of the red status indicators, then click the Update assignments button.

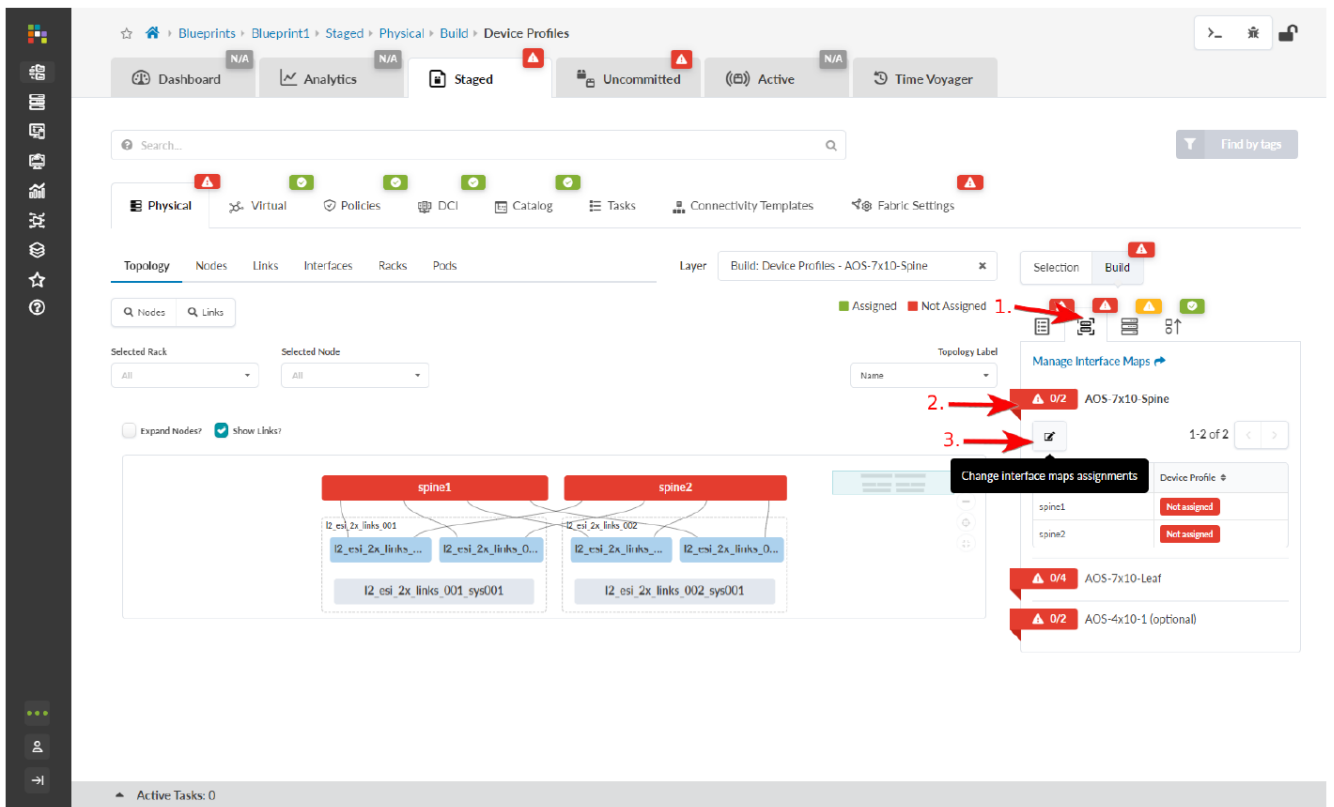


4. Select a resource pool (that you created earlier), then click the Save button. The required number of resources are automatically assigned to the resource group from the selected pool. When the red status indicator turns green, the resources are assigned. Changes to the staged blueprint aren't pushed to the fabric until you commit your changes. We'll do that when we're done building the network.
5. Continue assigning resources until all status indicators are green.

Assign Interface Maps

Now it's time to specify the characteristics for each of your nodes in the topology. You'll assign the actual devices in the next section.

1. In the Build panel, click the Device Profiles tab.



2. Click a red status indicator, then click the Change interface maps assignments button (looks like an edit button).
3. Select the appropriate interface map for each node from the drop-down list, then click Update Assignments. When the red status indicator turns green, the interface maps have been assigned.
4. Continue assigning interface maps until all the required status indicators are green.

Assign Devices

1. In the Build panel, click the Devices tab.

1. Click the 'Build' button in the top right corner.

2. Click the status indicator for Assigned System IDs (if the nodes list is not already displayed). Unassigned devices are indicated in yellow.

3. Click the Change System IDs assignments button (below Assigned System IDs) and, for each node, select system IDs (serial numbers) from the drop-down list.

4. Click Update Assignments. When the red status indicator turns green, system IDs have been assigned.

- Click the status indicator for Assigned System IDs (if the nodes list is not already displayed). Unassigned devices are indicated in yellow.
- Click the Change System IDs assignments button (below Assigned System IDs) and, for each node, select system IDs (serial numbers) from the drop-down list.
- Click Update Assignments. When the red status indicator turns green, system IDs have been assigned.

Cable Up Devices

- Click Links (towards the left of the screen) to go to the cabling map.

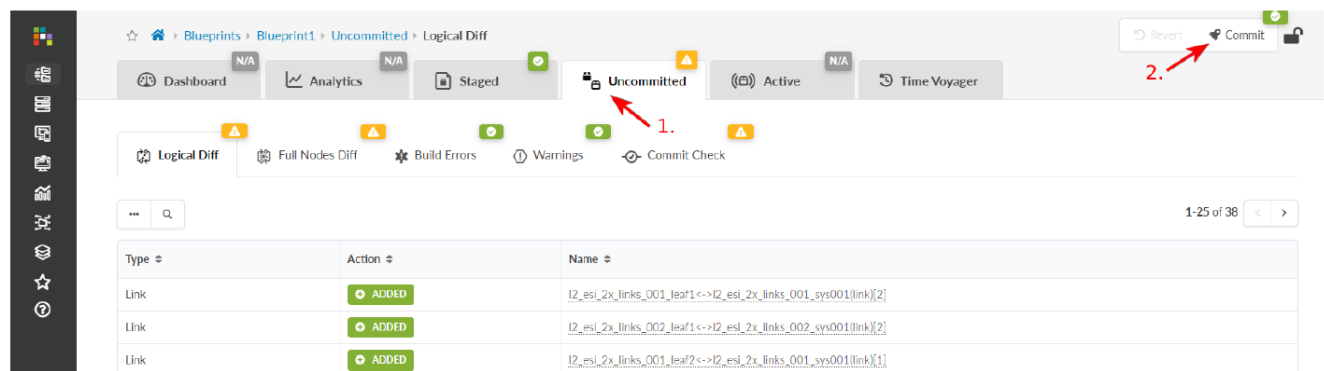
2. Review the calculated cabling map and cable up the physical devices according to the

map. If you have a set of precabled switches, ensure that you have configured interface maps according to the actual cabling so that calculated cabling matches the actual cabling.

Deploy the Network

When you’ve assigned everything that needs to be assigned and the blueprint is error-free, all status indicators are green. Let’s deploy the blueprint to push the configuration to the assigned devices.

1. From the top navigation menu, click Uncommitted to review staged changes. To see details of changes, click one of the names in the table.



2. Click Commit to go to the dialog box where you can add a description and commit changes.
3. Add a description. When you need to roll back a blueprint to a previous revision, this description is the only information available regarding what has changed.
4. Click Commit to push the staged changes to the active blueprint and create a revision. Congratulations! Your physical network is up and running.

Keep Going

Congratulations! You’ve designed, built, and deployed your physical network with Apstra software. Here are some things you can do next:

What’s Next?

If You Want To	Then
----------------	------

Onboard switches and perform ZTP	See the Onboarding Data Center Switches with Apstra – Quick Start
Replace the SSL certificate with a secure one	See the Juniper Apstra Installation and Upgrade Guide
Configure user access with user profiles and roles	See the User/Role Management Introduction section in the Juniper Apstra User Guide
Build your virtual environment with virtual networks and routing zones	See the Create Virtual Networks section in the Juniper Apstra User Guide
Learn about Apstra telemetry services and how you can extend the services	See the Services section under Telemetry in the Juniper Apstra User Guide
Learn how to leverage Intent-Based Analytics (IBA) with apstra- cli	See the Intent-Based Analytics with apstra- cli Utility in the Juniper Apstra User Guide

General Information

If you want to	Then
See all Juniper Apstra documentation	Visit Juniper Apstra documentation
Stay up-to-date about new and changed features and known and resolved issues in Apstra 5.1.0	See the Juniper Apstra Release Notes

Learn With Videos

Our video library continues to grow! We've created many videos that demonstrate how to do everything from install your hardware to configure advanced network features. Here are some great video and training resources that will help you expand your knowledge of Apstra and other Juniper products.

If you want to	Then
Watch short demos to learn how to use Juniper Apstra to automate and validate the design, deployment, and operation of data center networks, from Day 0 through Day 2+.	See Juniper Apstra Demos and Juniper Apstra Data Center videos on Juniper Networks Product Innovation YouTube page
Get short and concise tips and instructions that provide quick answers, clarity, and insight into specific features and functions of Juniper technologies	See Learning with Juniper on Juniper Networks main YouTube page
View a list of the many free technical trainings we offer at Juniper	Visit the Get Started page on the Juniper Learning Portal

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FAQs

- **Q: What hypervisors are supported by Apstra software?**
 - **A:** Apstra software supports VMware ESXi, KVM, Hyper-V, and Virtual Box hypervisors. Refer to the specific installation guides for each hypervisor type.
- **Q: Can I use a server with specifications different from the recommended ones?**
 - **A:** It is recommended to adhere to the specified server resource requirements to ensure optimal performance and functionality of the Apstra software.

Documents / Resources



[Juniper NETWORKS Abstract Intent Based Networking \[pdf\] User Guide](#)
5.1.0, Abstract Intent Based Networking, Abstract, Intent Based Networki
ng, Based Networking, Networking

References

- [📄 Get Started with Free Juniper Training](#)
- [📄 Downloads](#)
- [📄 CEC Juniper Community](#)
- [📄 Juniper Apstra Documentation | Juniper Networks](#)
- [📄 Apstra 4.2 | Quick Start | Step 1: Begin | Juniper Networks](#)
- [📄 Replace SSL Certificate on Apstra Server with Signed One | Apstra 5.1 | Juniper Networks](#)
- [📄 Supported Hypervisors and Versions | Apstra 5.1 | Juniper Networks](#)
- [📄 Required Server Resources | Apstra 5.1 | Juniper Networks](#)
- [📄 Install Apstra on VirtualBox | Apstra 5.1 | Juniper Networks](#)
- [📄 Install Apstra on KVM | Apstra 5.1 | Juniper Networks](#)
- [📄 Apstra Server Introduction | Apstra 5.1 | Juniper Networks](#)
- [📄 Analytics Telemetry Services | Apstra 5.1 | Juniper Networks](#)
- [📄 User / Role Management Introduction | Apstra 5.1 | Juniper Networks](#)
- [📄 Intent-Based Analytics with apstra-cli Utility | Apstra 5.1 | Juniper Networks](#)
- [📄 Create Virtual Network | Apstra 5.1 | Juniper Networks](#)
- [User Manual](#)

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📌 5.1.0, Abstract, Abstract Intent Based Networking, Based Networking, Intent Based Networking, JUNIPER NETWORKS, Networking

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