JUNIPER NETWORKS | Engineering Simplicity

Day One+

Juniper Apstra

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Step 1: Begin

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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 4.1.1 onto a VMware ESXi hypervisor. From the Apstra GUI, we'll walk through the elements used to build a network in the Apstra environment. Then we'll show you how to build (stage) a network and deploy it. Depending on the complexity of your design, other tasks may be required in addition to the ones included in this workflow.

Meet Juniper Apstra

Juniper Apstra automates and validates the design, deployment, and operations of your data center network. Once you specify the outcomes you want Apstra will set up the network, assure that it's secure and runs as intended, alert you to anomalies, and manage changes and maintenance. Juniper Apstra intent-based software automates and validates your data center network design, deployment, and operations across a wide range of vendors. With support for nearly any network topology and domain, Apstra delivers built-in design templates for creating repeatable, continuously validated blueprints. It leverages advanced intent-based analytics to continually validate the network, thereby eliminating complexity, vulnerabilities, and outages resulting in a secure and resilient network.

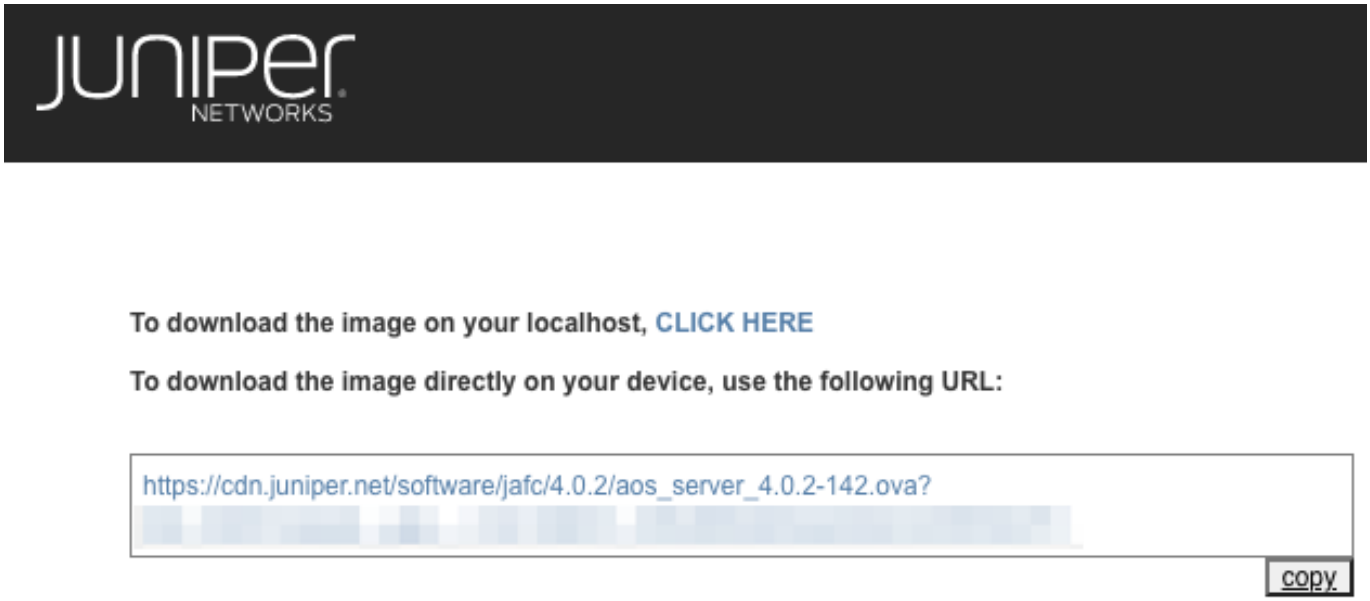
Get Ready

Apstra software comes pre-installed on a single virtual machine (VM). You'll need a server that meets the following specifications:

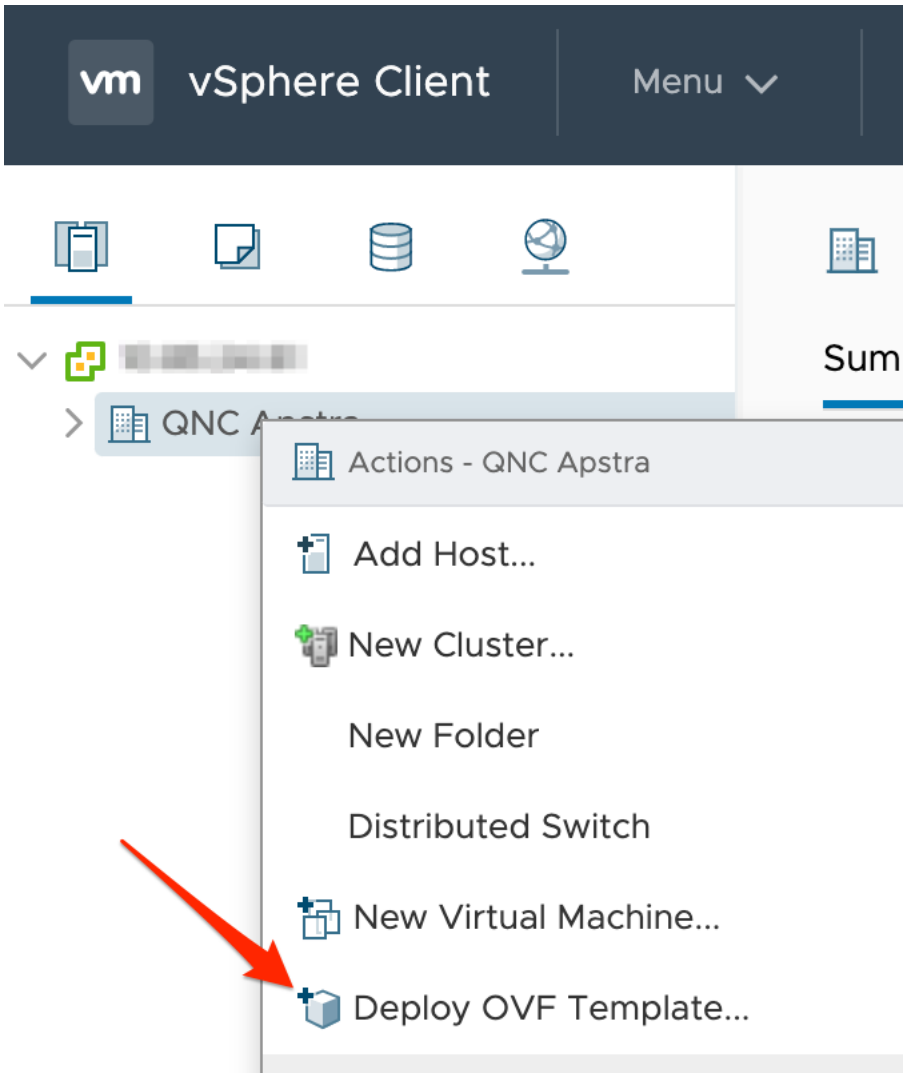
Resource	Recommendation
Memory	64 GB RAM + 300 MB per installed device off-box agent
CPU	8 vCPU
Disk Space	80 GB
Network	1 network adapter, initially configured with DHCP
VMware ESXi installed	Version 7.0, 6.7, 6.5, 6.0 or 5.5

Install Apstra Server

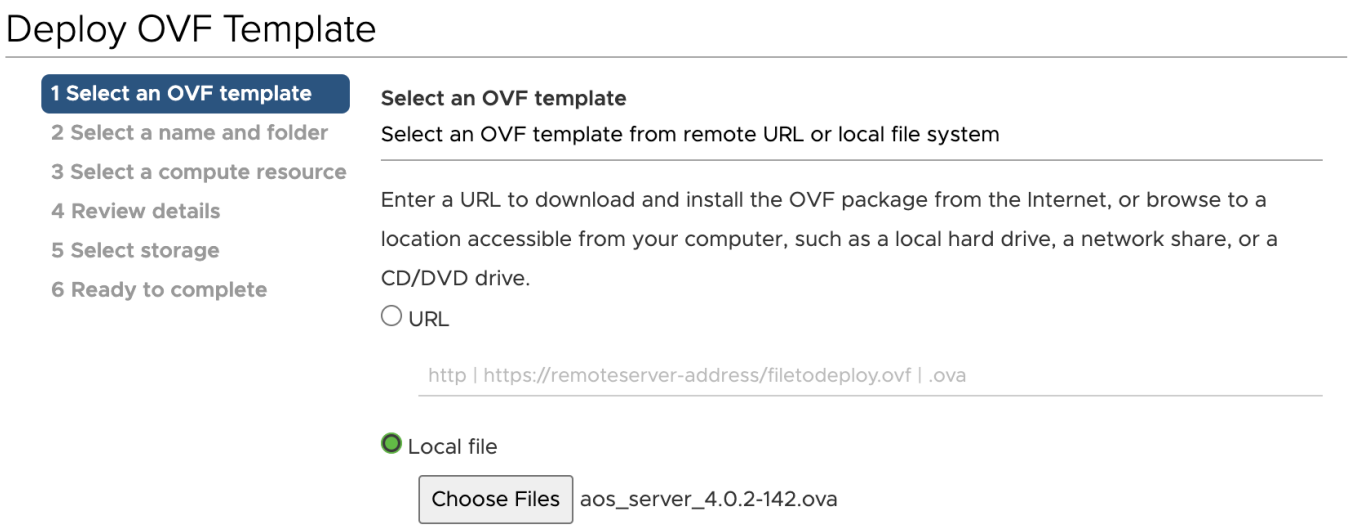
1. As a registered support user, download the latest OVA Apstra VM image from Juniper Support Downloads.



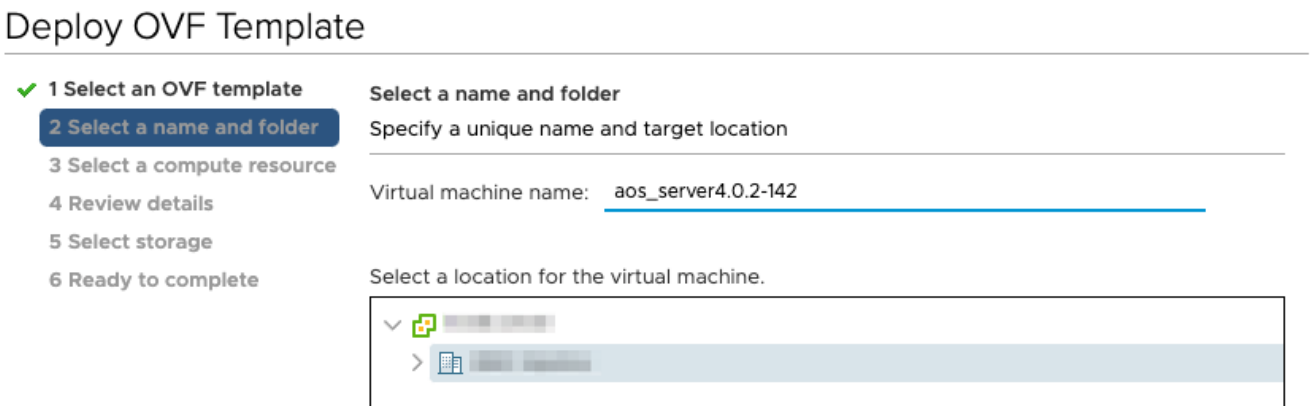
2. Log in to vCenter, right-click your target deployment environment, then click **Deploy OVF Template**.



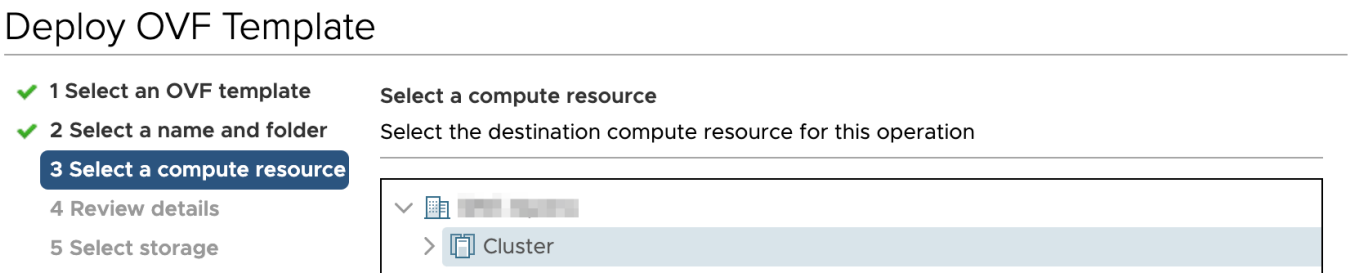
3. Specify the URL or local file location for the downloaded OVA file, then click **Next**.



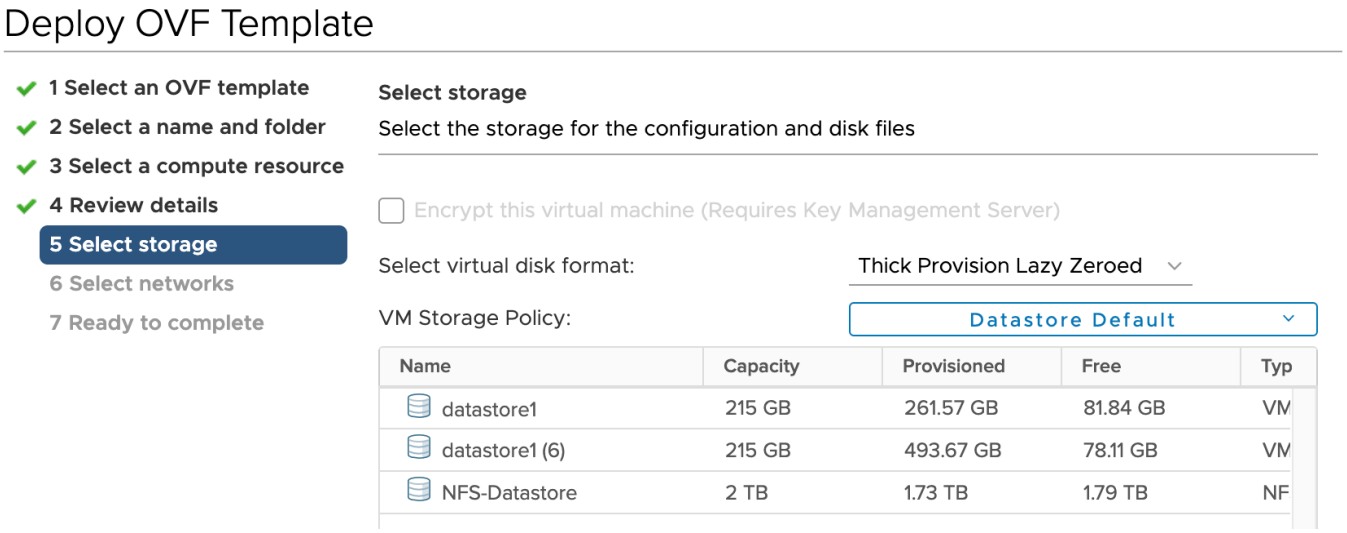
4. Specify a unique name and target location for the VM, then click **Next**.



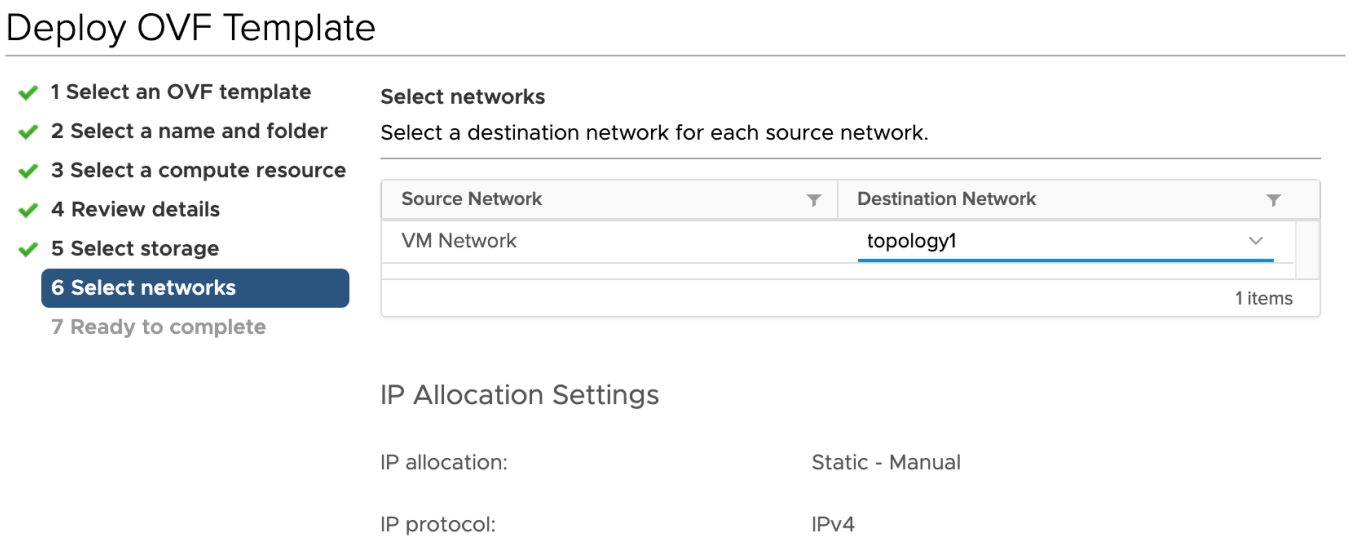
5. Select your destination compute resource, then click **Next**.



6. Review template details, then click **Next**.
7. Select storage for the files, then click **Next**. We recommend thick provisioning for the Apstra server.



8. Map the Apstra Management network to enable it to reach the virtual networks that the Apstra server will manage, then click **Next**.

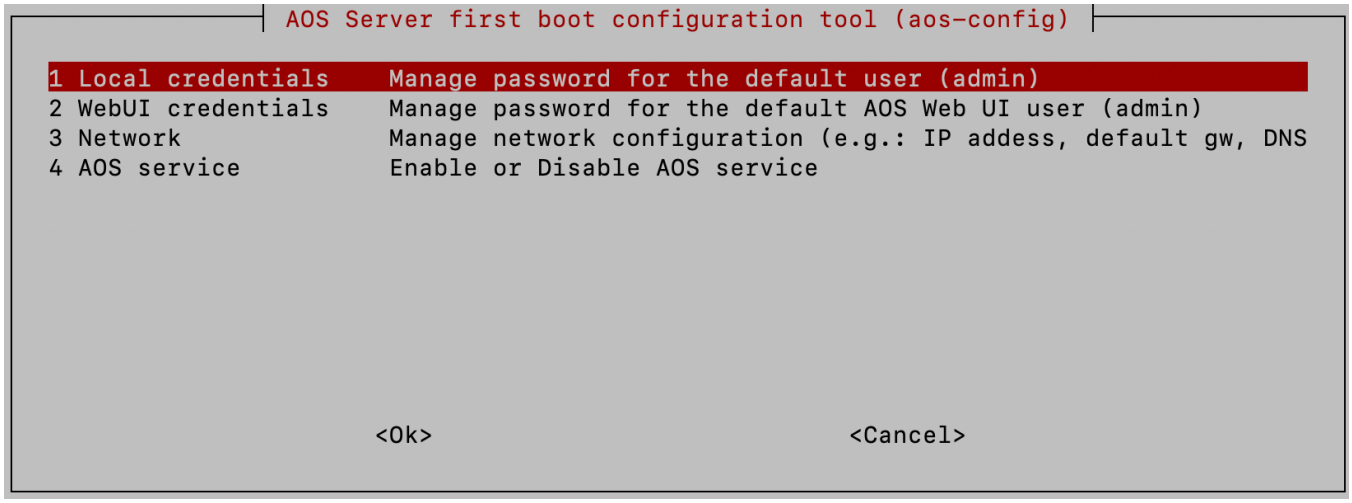


9. Review your specifications, then click **Finish**.

Configure Apstra Server

1. From the Apstra server CLI, run the command `sudo service aos status` to confirm that the service is up and running (Active: active).
2. If the Apstra server VM is not running (Active: inactive), start it with the command `sudo service aos start`.
3. The default credentials for the Apstra console are user=admin and password=admin. SSH into the Apstra server (`ssh admin@<apstra-server-ip>` where `<apstra-server-ip>` is the IP address of the Apstra server.) The first time you boot the Apstra server VM, a configuration tool opens to assist you with basic settings. (You can open this tool at any time with the command `aos_config`.)
4. You're asked to change the default administrator password. Select **<yes>** and follow the prompts to enter a secure password.

5. When you're prompted to start Apstra service, select **<yes>**.
6. Enter the admin password. You'll see a message that says the service is up and running.
7. Select **<OK>**. The configuration tool menu appears.



> **NOTE**: You updated the default local credentials in the previous steps. To change the password again, select **Local Credentials** and follow the prompts. You can do this at any time.

8. Select **WebUI credentials**, then change the Apstra GUI user password for **admin** to a secure one. (To change this password, services must be up and running.)
9. Select **Network** to change the machine's network settings. By default DHCP is used. If you change the default to static you'll have the option to provide a CIDR IP address, gateway, primary / secondary DNS and domain values.
10. After you've completed the configuration, choose **<yes>** to restart the network service, Docker and Apstra service.

Now that you've installed and configured Apstra software, you're ready to build your network in the Apstra GUI.

Step 2: Up and Running

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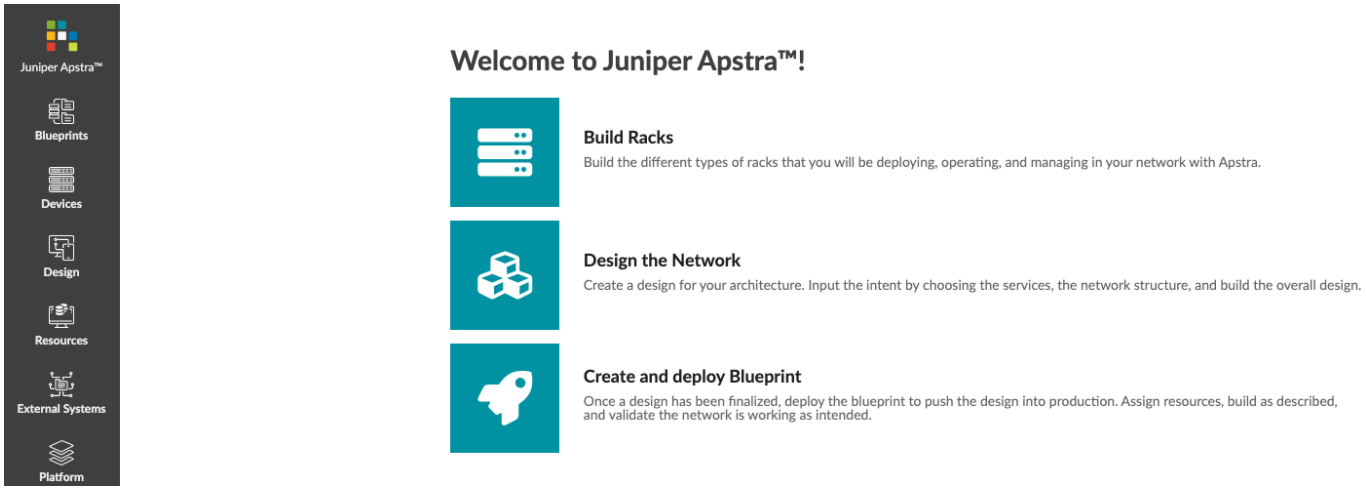
Access the Apstra GUI

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** and the password is the secure password that you created when configuring the Apstra server. The main Apstra GUI screen appears.



Design Your Network

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- Install Device System Agents | 10
- Create Resource Pools | 12

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

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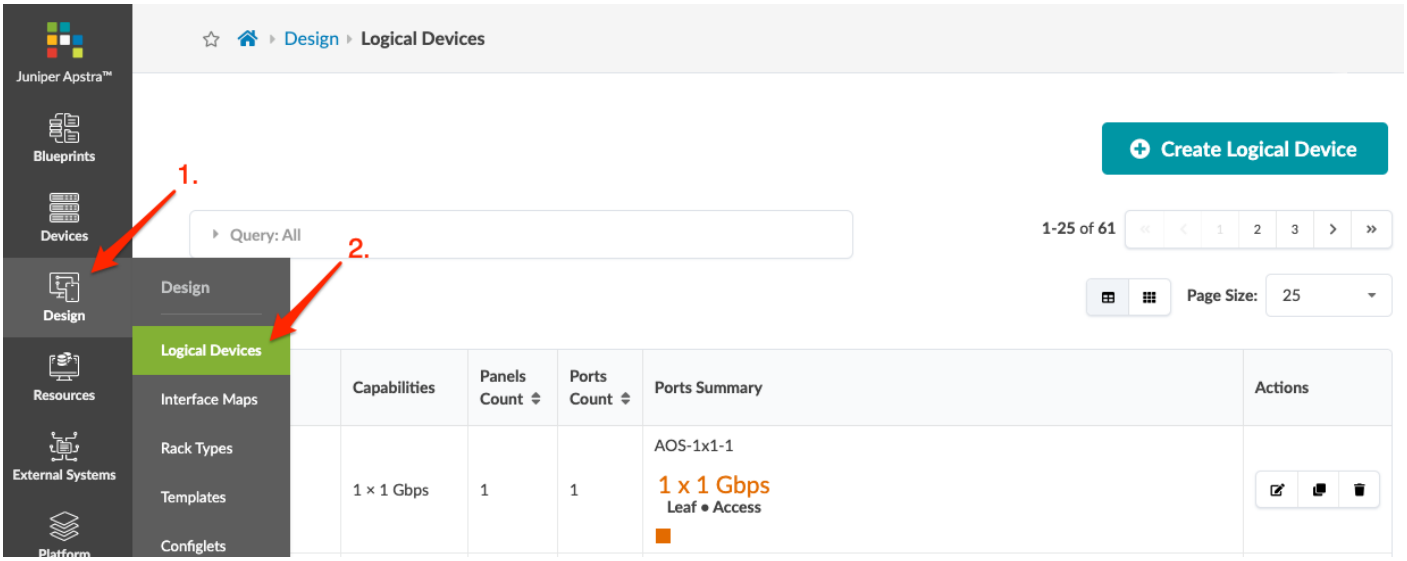
- Interface Maps | 9
- Rack Types | 9
- Templates | 10

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.

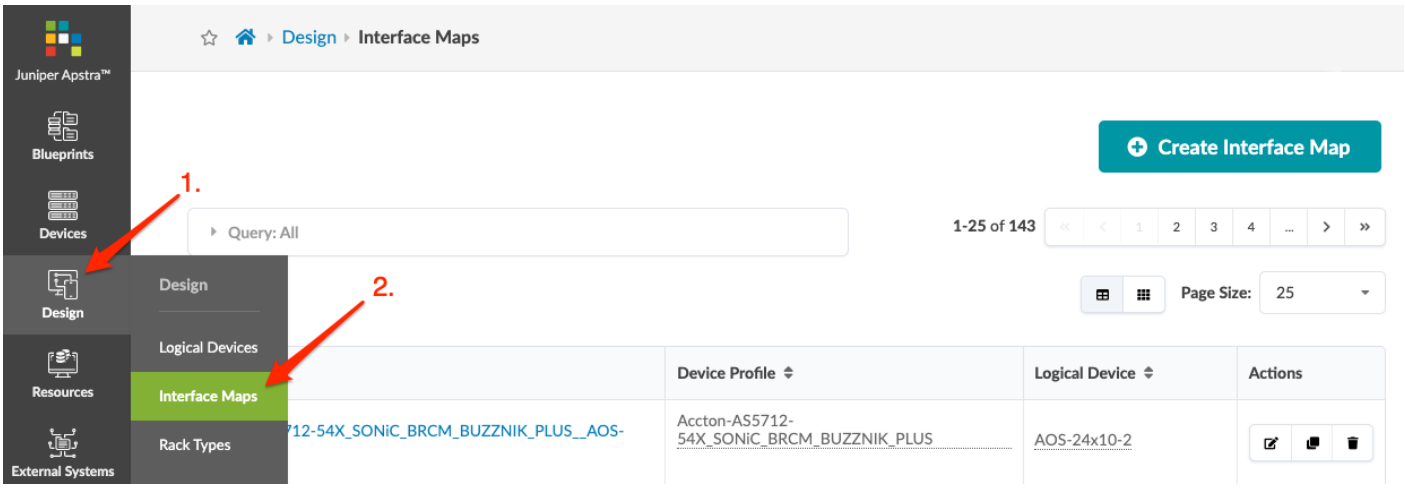
Apstra ships with many predefined logical devices. You can view them through the logical devices design (global) catalog. From the left navigation menu, navigate to **Design > Logical Devices**. Go through the table to find ones that meet your specifications.



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.

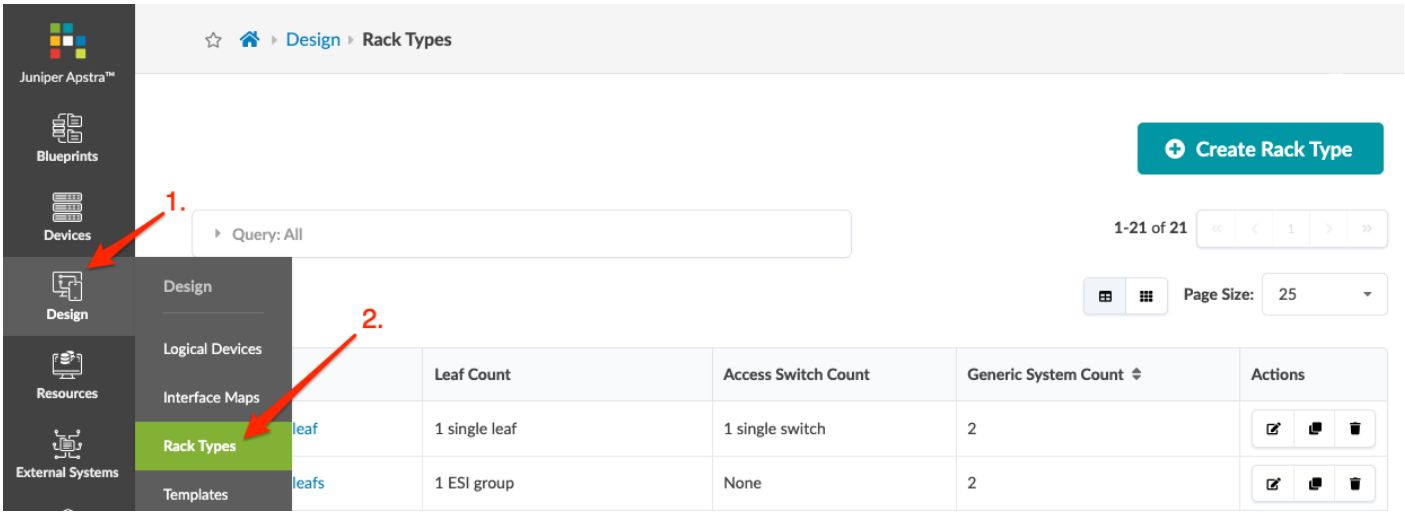
Apstra ships with many predefined interface maps. You can view them through the interface maps design (global) catalog. From the left navigation menu, navigate to **Design > Interface Maps**. Go through the table to find ones that match your devices.



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.

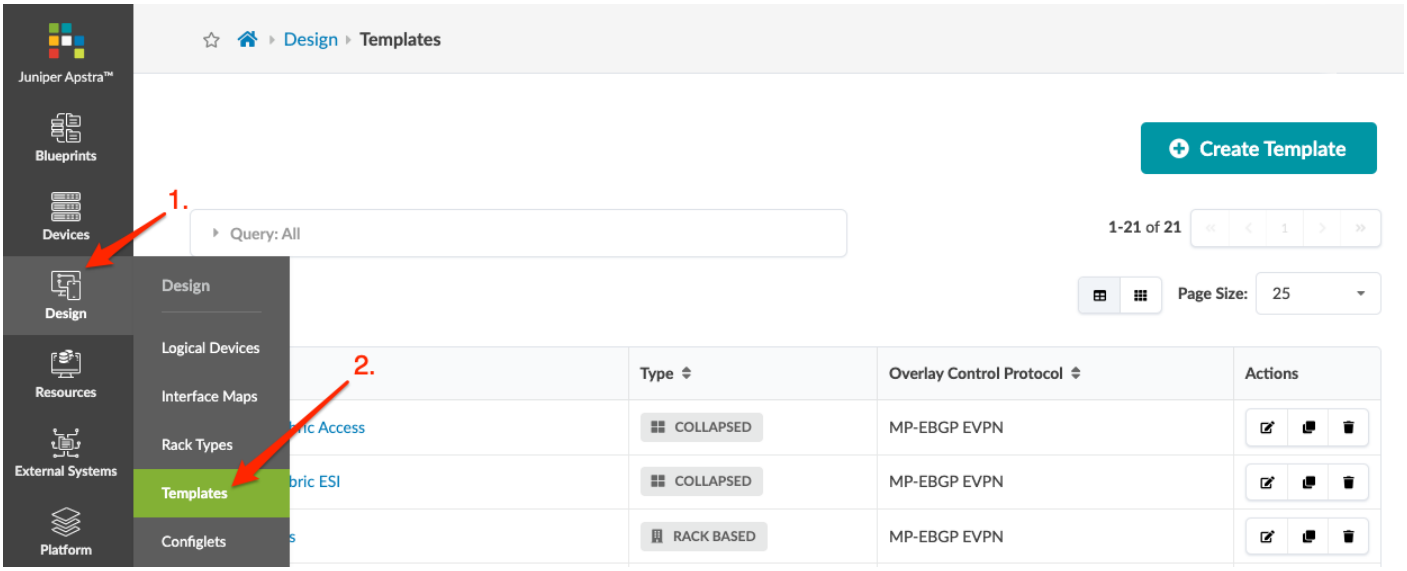
Apstra ships with many predefined rack types. You can view them in the rack type design (global) catalog: From the left navigation menu, navigate to **Design > Rack Types**. Go through the table to find ones that match your design.



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.



Install Device System Agents

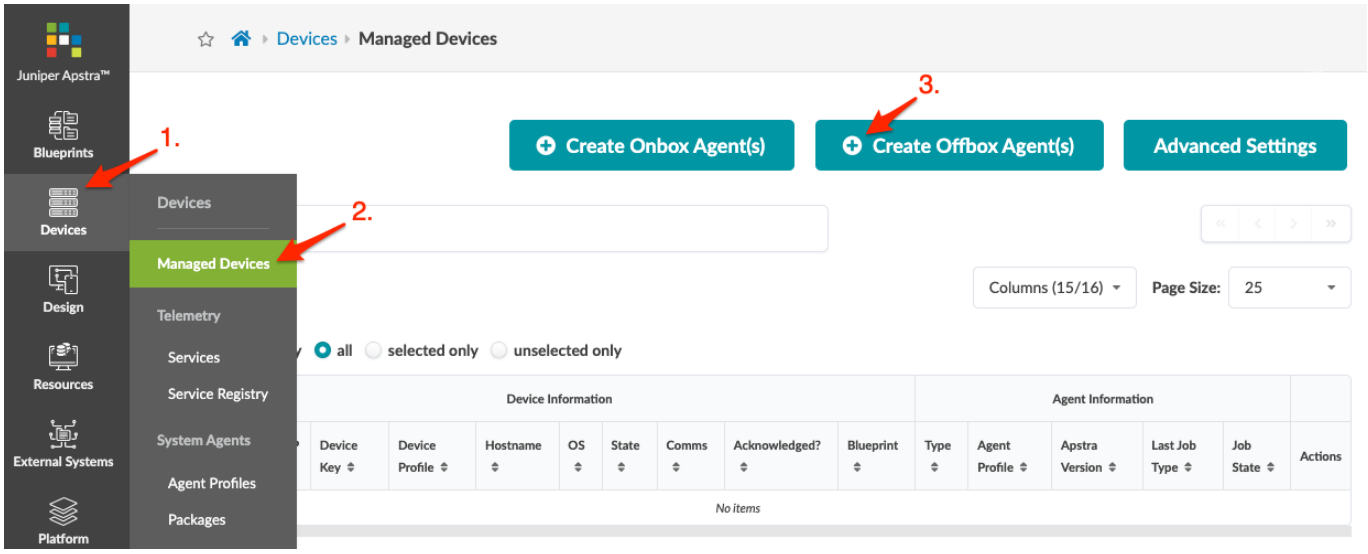
Device system agents manage devices in the Apstra environment. They manage configuration, device-to-server communication, and telemetry collection. We'll use Juniper Junos devices with off-box agents for our example.

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

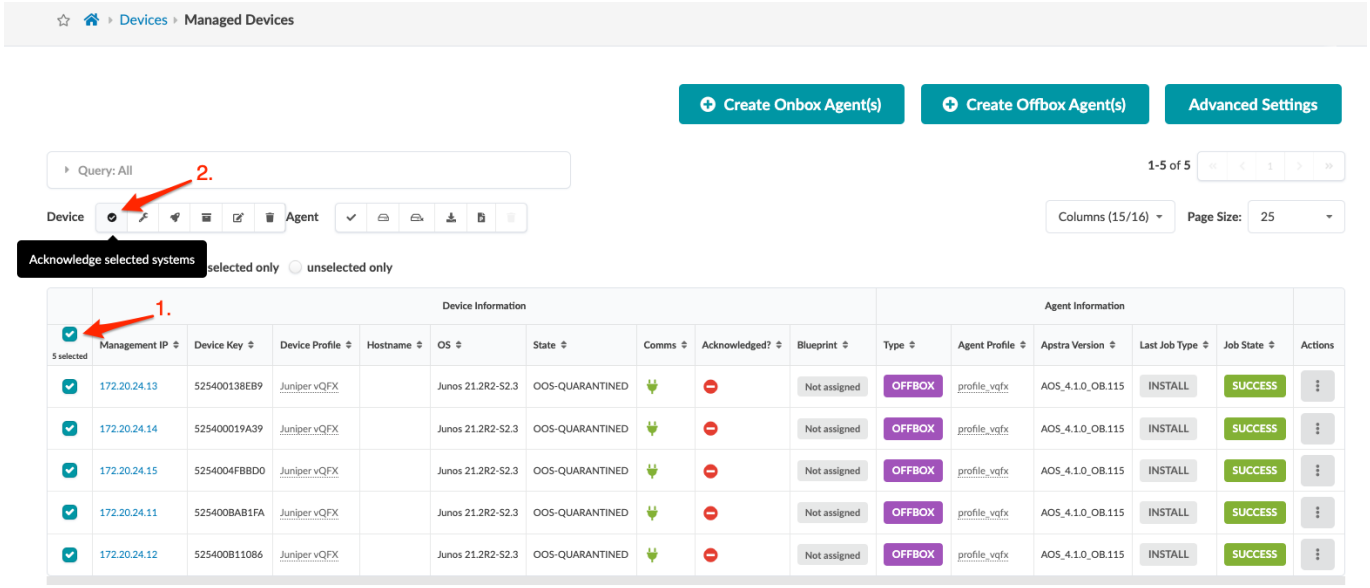
```
system {
    login {
        user aosadmin {
            uid 2000;
            class super-user;
            authentication {
                encrypted-password "xxxxx";
            }
        }
    }
    services {
        ssh;
        netconf {
            ssh;
        }
    }
    management-instance;
}
```

```
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)**.



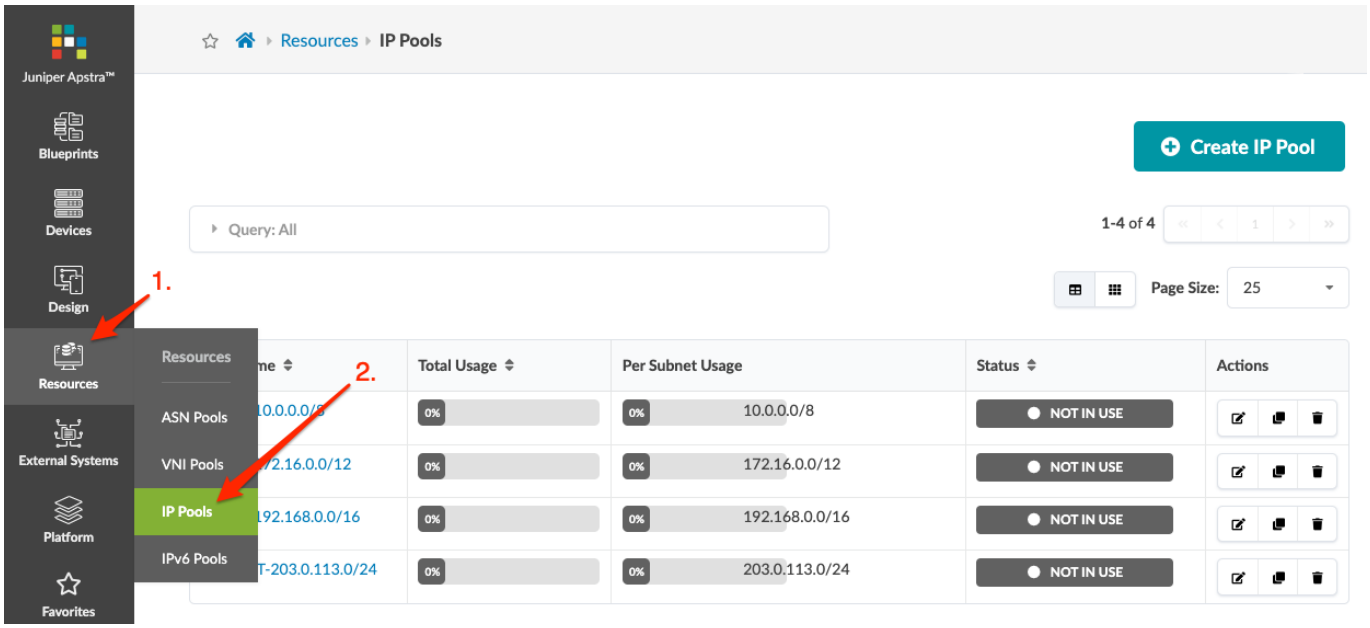
3. Enter device management IP addresses.
4. Select **FULL CONTROL**, then select **Junos** from the platform drop-down list.
5. Enter a username and password.
6. Click **Create** to create the agent and return to the managed devices summary view.
7. Select the check boxes for the devices, then click 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

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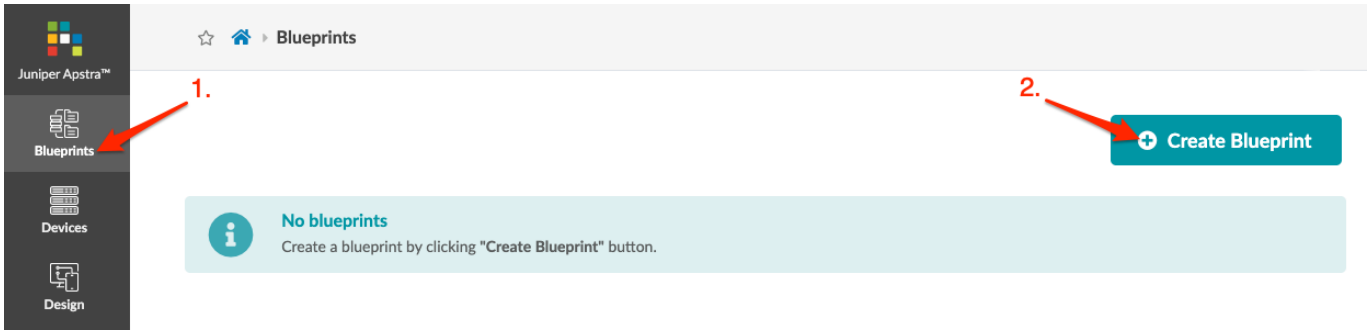
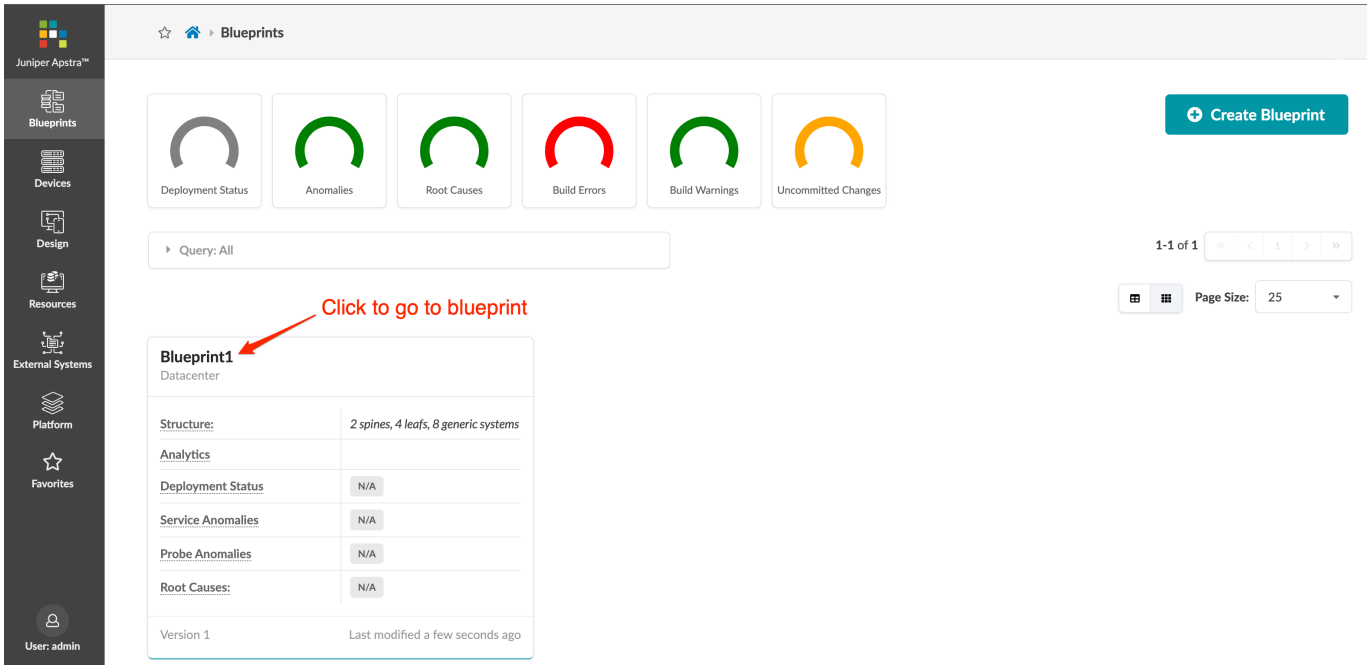
When you've got your design elements, devices and resources ready, you can start staging your network in a blueprint. Let's create one now.

Create a Blueprint

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

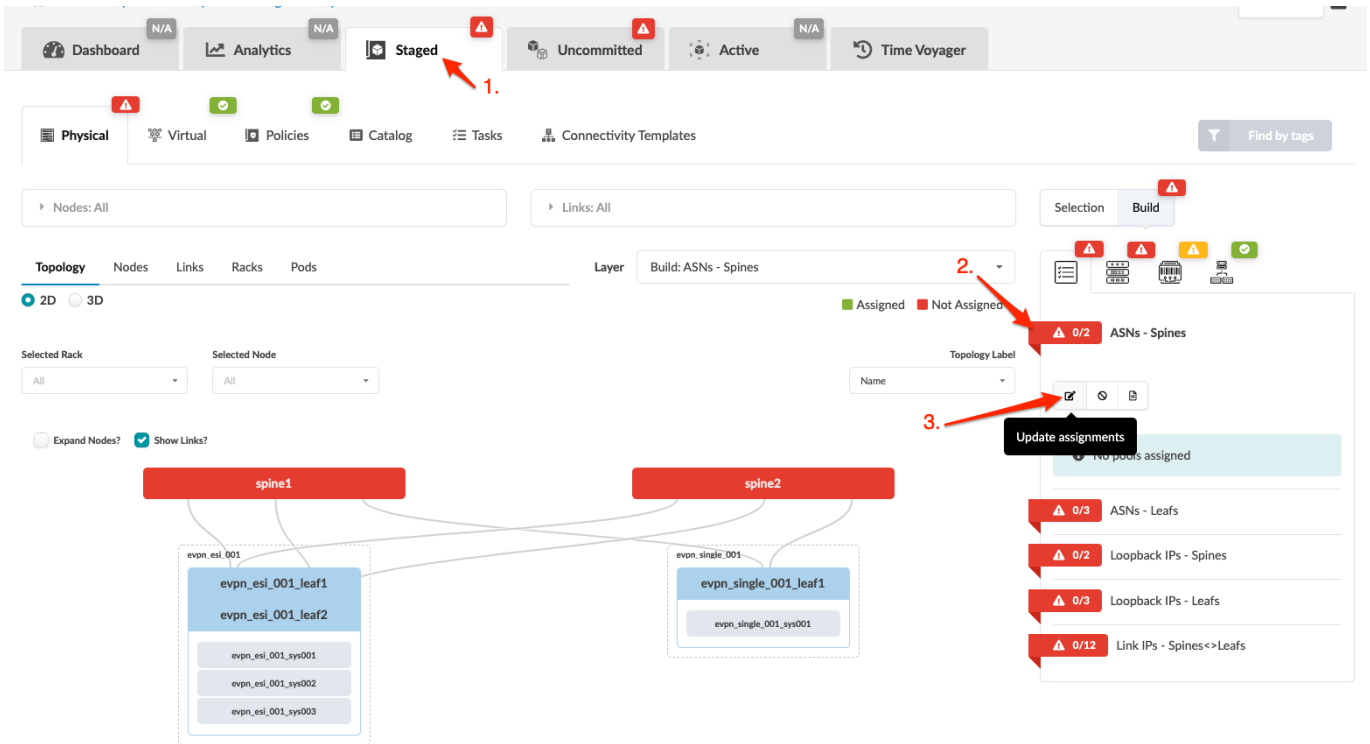


2. Type a name for the blueprint.
3. Select **Datacenter** reference design.
4. Select a template type (all, rack-based, pod-based, collapsed).
5. Select a template from the **Template** drop-down list. A preview shows template parameters, a topology preview, network structure, external connectivity, 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.



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.

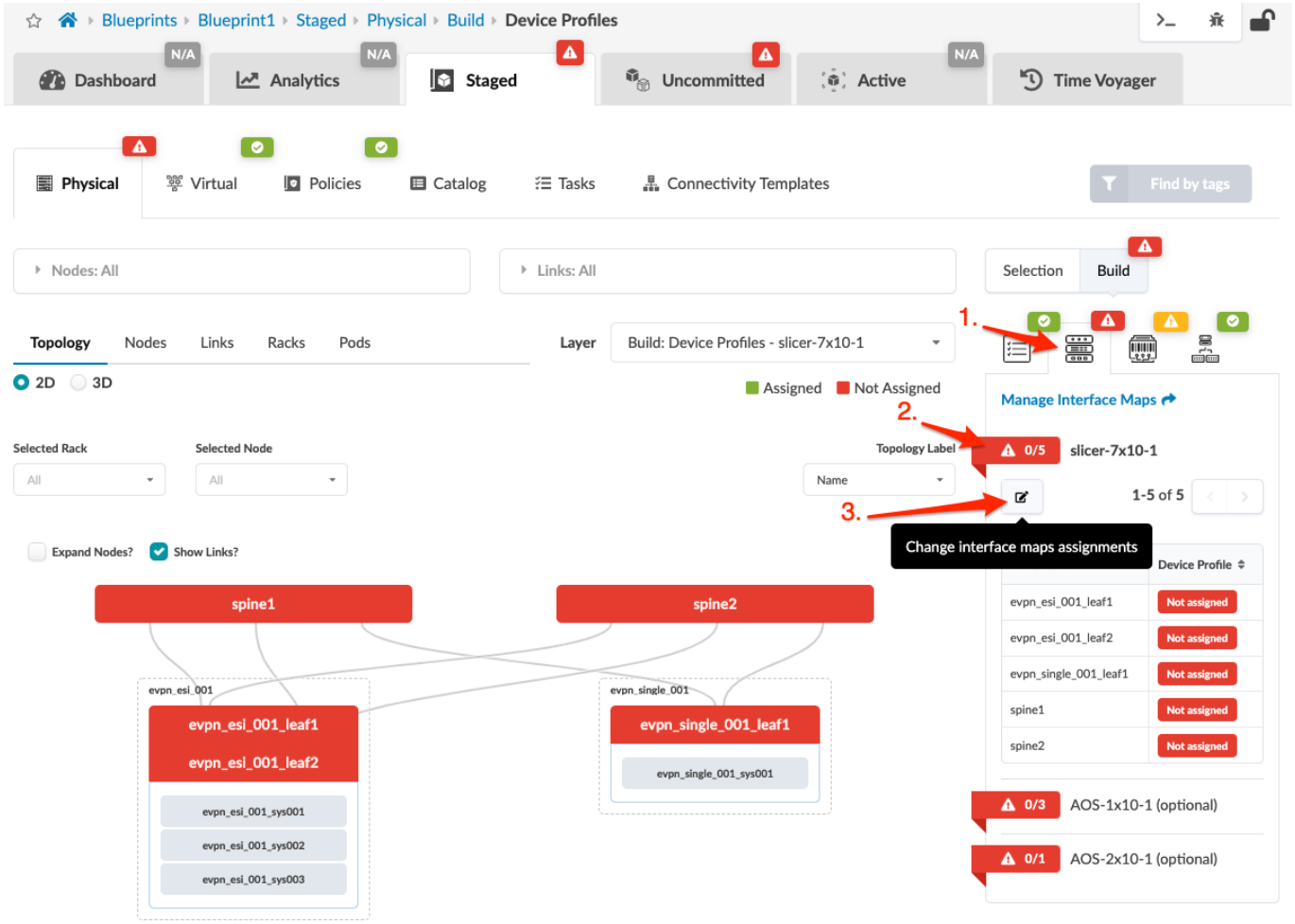


4. Select a resource pool (that you created earlier), then click the **Save** button. The required number of resources are automatically assigned to the resource group from the selected pool. When the red status indicator turns green, the resources are assigned. Changes to the staged blueprint aren't 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.

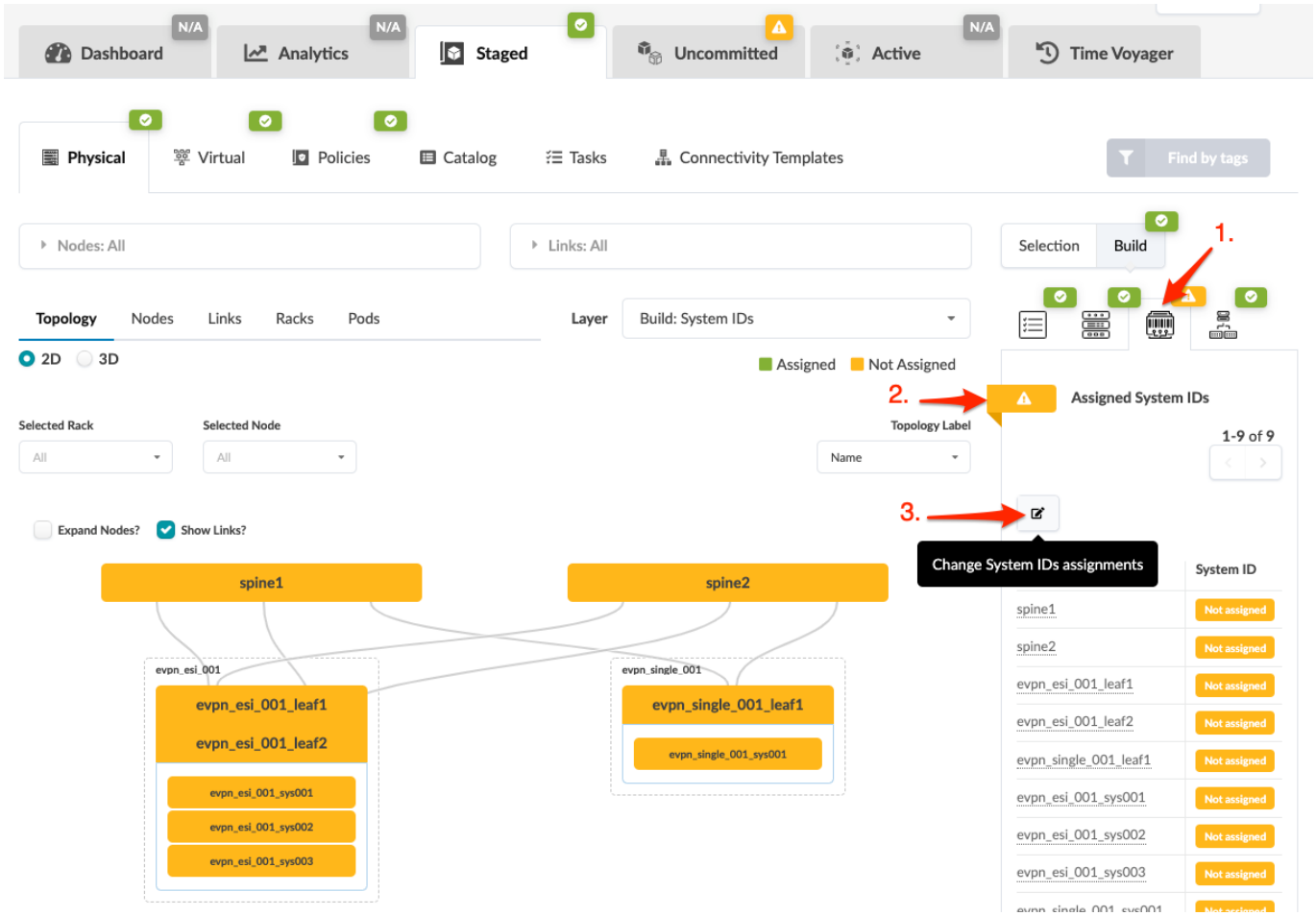
1. In the **Build** panel, click the **Device Profiles** tab.



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

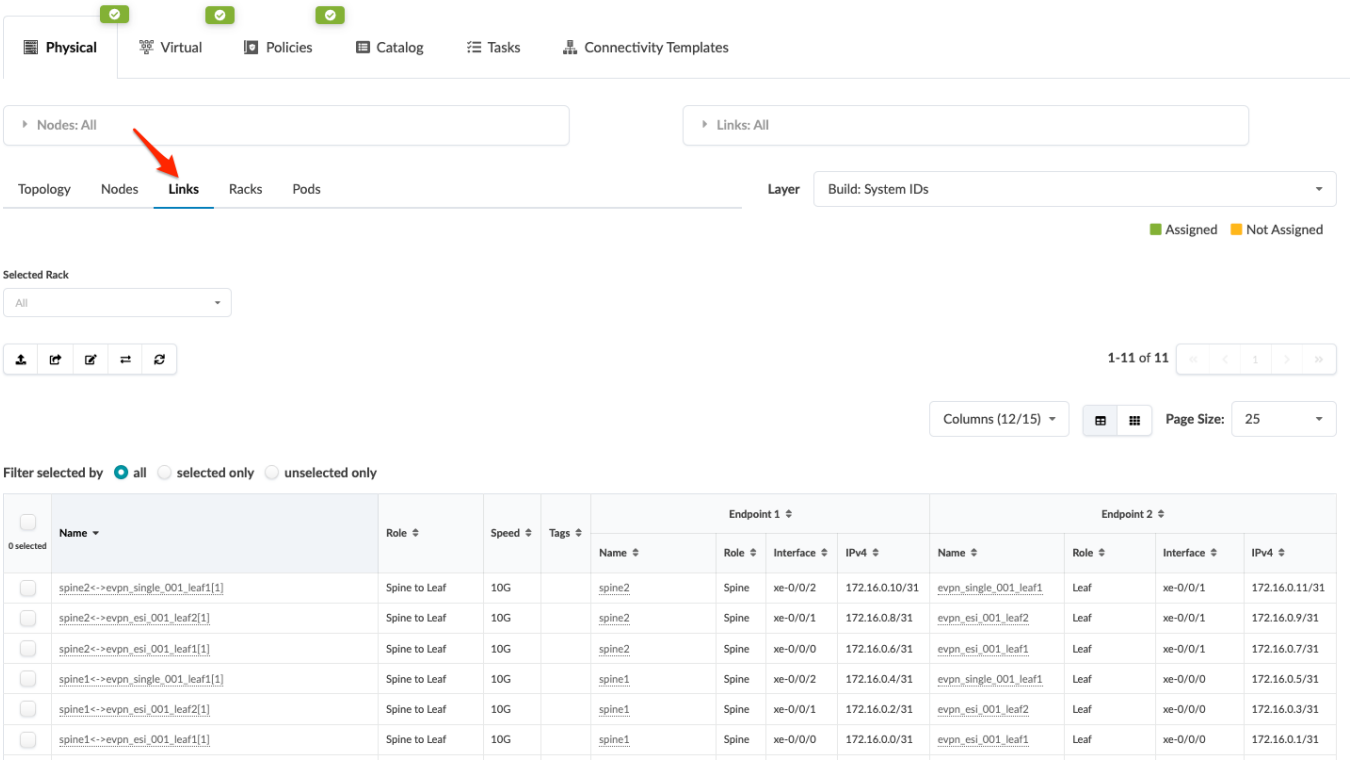
1. In the **Build** panel, click the **Devices** tab.



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.

Cable Up Devices

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

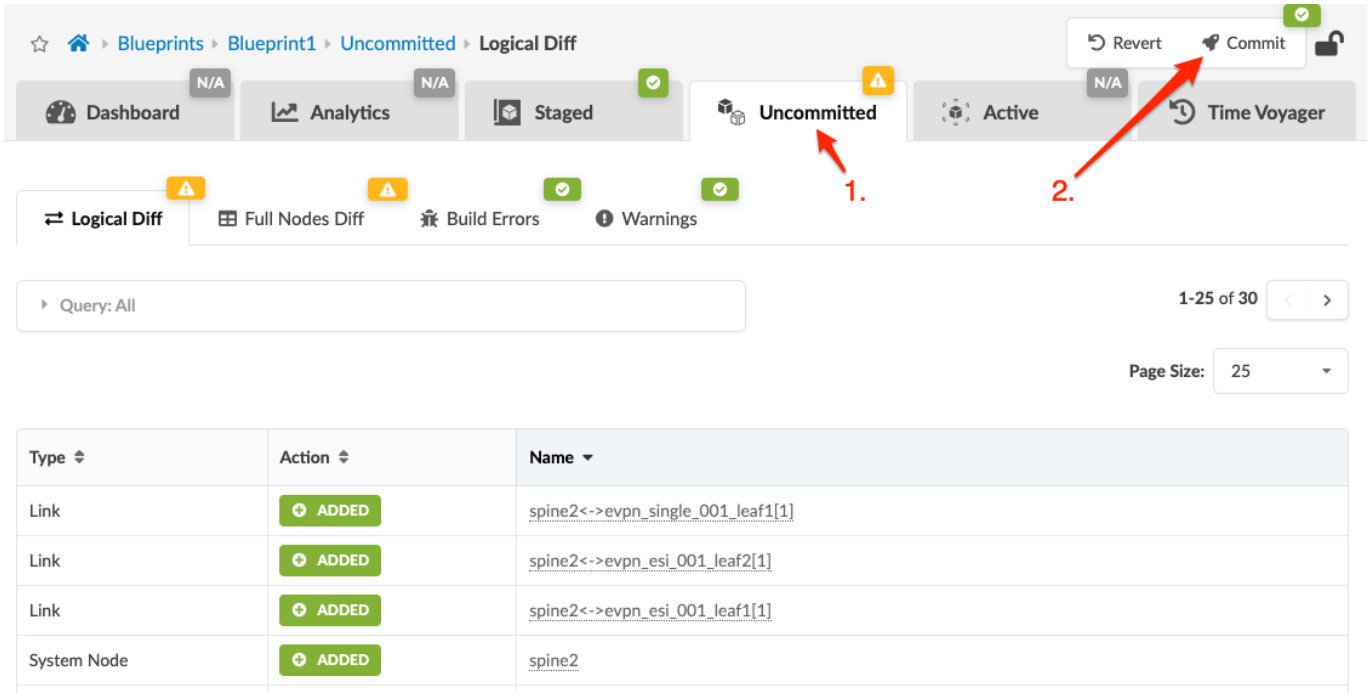


2. Review the calculated cabling map and cable up the physical devices according to the map. If you have a set of pre-cabled switches, ensure that you have configured interface maps according to the actual cabling so that calculated cabling matches the actual cabling.

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 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.

Step 3: Keep Going

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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
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** section in the Juniper Apstra User Guide
Build your virtual environment with virtual networks and routing zones	See the **Virtual Networks** section in the Juniper Apstra User Guide
Learn about Apstra telemetry services and how you can extend them	See the **Telemetry** section in the Juniper Apstra User Guide
Learn how to leverage Intent-Based Analytics (IBA) with apstra-cli	See **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 4.1.1	See 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 Getting Started page on the Juniper Learning Portal

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