JUNIPER NETWORKS | Engineering Simplicity

Quick Start

Juniper Paragon Automation 2.4.0 Onboard Devices Quick Start

IN THIS GUIDE

Step 1: Begin

SUMMARY

This guide walks you through the steps to onboard a router (both Juniper and non-Juniper) to Paragon Automation, so that the device can be managed, provisioned, and monitored through automated workflows. Use this guide if you are a user with the Super User or Network Admin role in Paragon Automation.

IN THIS SECTION

Supported Network Devices

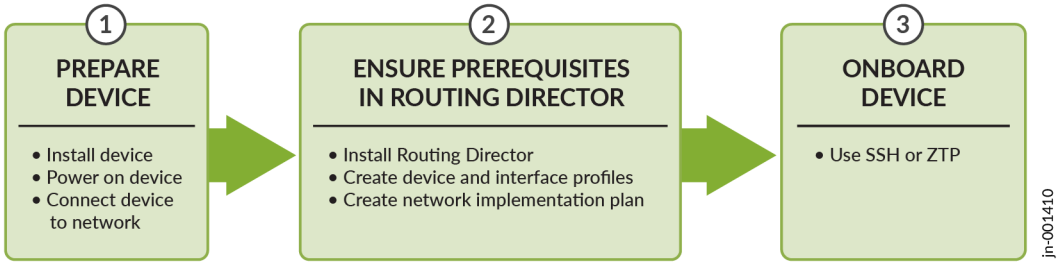
IN THIS SECTION

You can onboard ACX Series, MX Series, PTX Series, EX Series, QFX Series, and Cisco Systems devices listed in Supported Hardware to Paragon Automation and manage them.

Device Onboarding Workflow

Figure on page 2 shows the workflow to onboard a Juniper device to Routing Director.

Figure 1: Workflow to Onboard a Juniper Device to Routing Director



Install the Device

Follow the instructions in the hardware documentation to unbox the device, mount it on a rack, and power on the device. For details about installing a device, follow the instructions in the model-specific Hardware Guide on the Supported Hardware page.

To install devices from other vendors, follow instructions from the respective vendors.

Prerequisites

Ensure that the following prerequisites are fulfilled before you onboard a device to Paragon Automation:

1. Paragon Automation is installed. See Install Routing Director.
2. A superuser in Paragon Automation has:
   a. Created an organization and a site to which the device can be onboarded.
      For information to create an organization, see Add an Organization and to create a site, see Add a Site.
   b. Added one or more users with the Network Admin role.
      For more information, see Invite Users.
3. A superuser or a network administrator has:
   - In Routing Director, created:
     - Network resource pools; see Add a Resource Instance for details.
     - Device profile; see Add a Device Profile for details.
     - Interface profile; see Add an Interface Profile for details.
     - Network implementation plan; see Add an Onboarding Plan for details.
   - On the device, checked if a firewall exists between Paragon Automation and the device. If a firewall exists, the firewall is configured to allow outbound access on TCP ports 443, 2200, 6800, 4189, and 32,767.

Step 2: Up and Running

IN THIS SECTION

To onboard a Juniper device to Paragon Automation, you must commit the outbound SSH command to connect with Paragon Automation, on the device. This method of onboarding a device by committing the outbound SSH commands is also referred to as "Adopting a Device".

You can onboard a Juniper device to Paragon Automation by using any of the following methods:

- Onboard a Juniper device; see "Onboard a Juniper Device" on page 4.
- Onboard a device by using ZTP; see "Onboard a Device by Using ZTP" on page 5.

To onboard a non-Juniper device, see "Onboard a non-Juniper Device" on page 7.

NOTE:

- Among non-Juniper devices, only Cisco Systems devices are supported in this release. For a list of supported Cisco Systems devices, see Supported Hardware.
- For devices to be onboarded and managed by Paragon Automation, the devices must either use IPv4 addressing or IPv6 addressing to connect with Paragon Automation. If some devices use IPv4 addressing and others use IPv6, Paragon Automation might not work as expected.
- For devices to be onboarded and managed by Paragon Automation, the devices must use either IPv4 addressing only or IPv6 addressing only to connect with Paragon Automation.

Onboard a Juniper Device

Paragon Automation provides the outbound SSH configuration that you can commit on the device to enable the device to connect with Paragon Automation.

To onboard a Juniper device by committing the SSH configuration:

1. Navigate to **Inventory > Network Inventory** on the Paragon Automation GUI.
2. On the Routers tab, click **Add Device**.
3. On the Add Devices page, click **Adopt Router**.
4. (Optional) Click the **Select Site** drop-down list to select the site where the device is installed.
5. In the **Select IP Version** field, select the IP version (IPv4 or IPv6) to be used in the outbound SSH command for connecting with Paragon Automation.

   IPv4 is the default version used for the outbound SSH command.
6. Click **Copy Cli Commands** to copy the CLI commands under the **Apply the following CLI commands to adopt a Juniper Device if it meets the requirements** section to clipboard and close **OK**.
7. Access the device by using SSH and log in to the device in configuration mode.
8. Paste the contents of the clipboard and commit the configuration on the device.

   The device connects to Paragon Automation and can be managed from Paragon Automation.

   After you adopt a device, you can verify connectivity status by running the following command on the device:

```
user@host> show system connections |match 2200
tcp 0 0 ip-address:38284 ip-address:2200 ESTABLISHED 6692/sshd: jcloud-s
```

   Where, *ip-address* is the VIP address of Paragon Automation.

   `Established` in the output indicates that the device is connected with Paragon Automation.

After the device is onboarded, the status of the device on the Inventory page (**Inventory > Devices > Network Inventory**) shows as Connected, You can now start managing the device. See Device Management Workflow.

Also, you can move the device to In Service after onboarding so that services can be provisioned on the device. See Approve a Device for Service.

Onboard a Device by Using ZTP

Prerequisites:

- (Recommended) A network implementation plan be configured for the device.
- The device should be zeroized or in its factory-default settings.
- A TFTP server reachable from the device.
- A DHCP server reachable from the device, with the ability to respond to the device with the TFTP server and configuration file (Python or SLAX script) name.

To onboard a device by using ZTP:

1. Create an onboarding script (in Python or SLAX) by saving the outbound SSH configuration statements in a file. You can obtain the outbound SSH configuration statements by using the `getOutboundSshCommand` REST API.

   See **API Docs** under the **Help** menu of the Paragon Automation GUI for information about using the API.
2. Upload the onboarding script to the TFTP server.
3. Configure the DHCP server with the onboarding script filename and path in the TFTP server.
4. Install the device, connect it to the network, and power on the device.

   For information about installing the device, see the respective Hardware guide at https://www.juniper.net/documentation/.

   After the device is powered on:

   a. The factory default settings in the device triggers a built-in script (**ztp.py**) which obtains the IP addresses for the management interface, default gateway, DNS server, TFTP server, and the path of the onboarding script (Python or SLAX) on the TFTP server, from the DHCP server.

   b. The device configures its management IP address, static default route, and the DNS server address, based on the values obtained from the DHCP network.

   c. The device downloads the onboarding script, based on the values from the DHCP network, and executes it, resulting in the onboarding configuration statements being committed.

   d. The device opens an outbound SSH session with Paragon Automation based on the committed onboarding configuration.
5. After the device connects with Paragon Automation, Paragon Automation configures management and telemetry parameters including gNMI by using NETCONF. Paragon Automation also uses NETCONF to configure the interfaces and protocols based on the network implementation plan associated with the device.
6. Log in to the Paragon Automation GUI and view the status of device onboarding on the Inventory (**Inventory > Devices > Network Inventory**) page. After the device status changes to Connected, you can start managing the device. See Device Management Workflow for details.

Sample Onboarding Script for Committing SSH Configuration on a Device

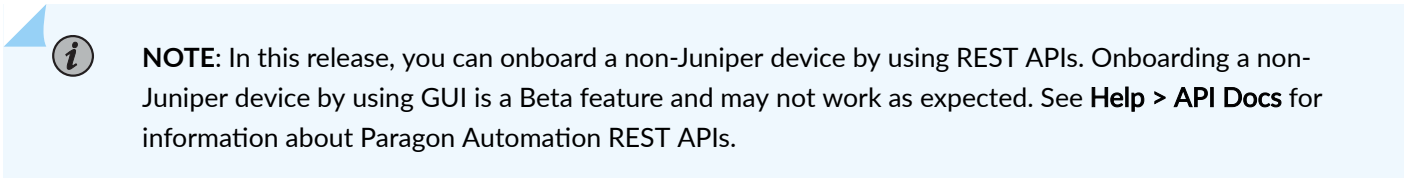
The following is a sample of the onboarding script that is downloaded from the TFTP server to the device:

```
#!/usr/bin/python
from jnpr.junos import Device
from jnpr.junos.utils.config import Config
from jnpr.junos.exception import *
import sys

def main():
    config = "set system services ssh protocol-version v2\n\
set system authentication-order password\n\
set system login user jcloud class super-user\n\
set system login user jcloud authentication encrypted-password $6$Oi4IvHbWNKI.XgXyy$43sTeEU7V0Uw3CBlN/
HFKQT.Xl2wsm54HYaS9pfE9d3VrINIKBqlYlJfE2cTcHsCSSVboNnVtqJEaLNUBAfbu.\n\
set system login user jcloud authentication ssh-rsa \"ssh-rsa
JJJJJU3NzaC1yc8EAAAADAQABAAABgQCuVTpLmaDwBuB8aTVrzxDQO50BS5GtoGnMBkWbYi5EEc0n8eJGmmbINE8auRGGOtY/
CEbIHKSp78ptdzME0uQhc7UZm4Uel8C3FRb3qEYjr1AMJMU+hf4L4MYWYXqk+Y9RvnWBzsTO2iEqGU0Jk0y4Urt2e/
YI9r8u8MZlWKdQzegBRIkL4HYYOAeAbenNw6ddxRzAP1bPESpmsT+0kChu3jYg8dzKbI+xjDBhQsKCFfO5cXyALjBMI3beaxmXRV02UGCEBl
+5Xw6a3OCiP7jplr92rFBjbqgh/bYoJRYz1Rc3AirDjROQuDdpHRn+DuUjPlyV17QR9Qvwn4OAmWM9YKWS/
LZ375L8nacOHmlv4f0KETU4LScTFQXR6xiJ6RizEpO338+xmiVq6mOcv5VuXfNApdl8F3LWOxLGFlmieB4cEEyJ7MK9U+TgS7MlcAP
+XAeXYM2Vx1b+UCyYoEyDizaRXZvmP5BPpxpb5L2iuXencZMbbpEbnNX/sk3teDc=
jcloud@5c96fb73-4e3a-4d8b-8257-7361ef0b95e7\"\n\
set system services outbound-ssh client jcloud secret
f72b785d71ea9017f911a5d6c8c95f12a265e19e886f07a364ce12aa99c6c1ca072a1ccc7d39b3f8a7c94e7da761d1396714c0b32ef32b6e
7d3c9ab62cf49d8d\n\
set system services outbound-ssh client jcloud services netconf keep-alive retry 12 timeout 5\n\
set system services outbound-ssh client jcloud oc-term.cloud.juniper.net port 2200 timeout 60 retry 1000\n\
set system services outbound-ssh client jcloud device-id
5c96fb73-4e3a-4d8b-8257-7361ef0b95e7.0ad21cc9-1fd6-4467-96fd-1f0750ad2678\n\
set system root-authentication encrypted-password \"$6$OeRp2LWC$/
ZLm9CMiR.SeEunv.5sDksFHIkzafuHLf5f7sp1ZANYT0iiz6rk2A1d/4Bq1gmxBhEb1XFtskrocLD7VHvPU10\""
    dev = Device()
    dev.open()
    try:
        with Config(dev, mode="exclusive") as cu:
            print ("Loading and committing configuration changes")
            cu.load(config, format="set", merge=True)
            cu.commit()
    except Exception as err:
        print (err)
    dev.close()
```

```
if __name__ == "__main__":
    main()
```

Onboard a non-Juniper Device



NOTE: In this release, you can onboard a non-Juniper device by using REST APIs. Onboarding a non-Juniper device by using GUI is a Beta feature and may not work as expected. See **Help > API Docs** for information about Paragon Automation REST APIs.

To onboard a non-Juniper device:

1. Navigate to **Inventory > Network Inventory** on the Paragon Automation GUI.
2. On the Routers tab, click **Add Device**.
3. On the Add Devices page, click **Adopt a Device**.
4. In the Add A Device section, enter the device details—Device name, IPv4 address and port, site, vendor, model, operating system, connection timeout (in minutes), and retry delay (in minutes).
5. (Optional) Under **Authorization**:
   - Enable **Insecure** when TLS is disabled on the device so that the connection with Paragon Automation is established without any encryption.

     If you enable this option, you don't need to upload any certificate.
   - Enable **Skip Verify** when TLS is enabled on the device and Paragon Automation should skip verifying the device's identity when the device establishes a connection.

     Enable this option when TLS is enabled on a device and the device has a self-signed certificate that cannot be verified against a certificate authority.

     NOTE: We recommend that you enable **Insecure** or **Skip Verify** only when security is not a major concern (for example, while testing connectivity in a lab). The connection between the device and Paragon Automation is vulnerable to man-in-the-middle attack when **Insecure** or **Skip Verify** are enabled.
6. If **Skip Verify** is disabled, under **Certificates**, upload:
   - TLS certificate for the device in **Certificate**.
   - Certificate key for the device in **Key Certificate**.
   - Root certificate of the Certificate Authority (CA) in **Certificate Authority**.
7. Under **Credentials**, enter username and password to authenticate the device.
8. Click **+ Add Device** to add more devices.
9. Repeat step4 through step 8 to add more non-Juniper devices.

10. Click **OK**.

    Paragon Automation connects with the device. You can now manage the device by using Paragon Automation.

    After the device connects with Paragon Automation, you can view the details of the device on the Inventory page (**Inventory > Devices > Network Inventory**).

Step 3: Keep Going

IN THIS SECTION

What's Next

Now that you've onboarded the device, here are some things you might want to do next.

If you want to	Then
Use Paragon Automation to manage and monitor your devices.	See User Guide.

General Information

If you want to	Then
Find out more about the device LCM use case.	See Device Life Cycle Management Overview.
Find out more about the observability use case.	See Observability Overview.
Find out more about the trust and compliance use case.	See Trust and Compliance Overview.

(Continued)

If you want to	Then
Find out how to use active, synthetic traffic to monitor your network.	See Active Assurance.
Find out how to provision and monitor a network service.	See Service Orchestration.
Learn to manage, monitor, maintain, automate, and orchestrate network devices and services using Juniper Paragon Automation.	See Implementing Juniper Paragon Automation

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