

Quick Start

Juniper Routing Director 2.10.0 Onboard Devices Quick Start

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Step 1: Begin

SUMMARY

This quick start walks you through the steps to onboard Juniper and non-Juniper devices to Juniper® Routing Director (formerly Juniper® 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 Juniper Routing Director.

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Supported Network Devices

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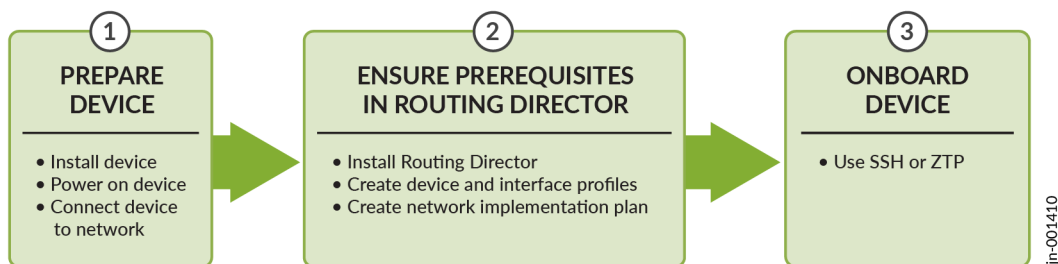
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You can onboard ACX Series, MX Series, PTX Series, EX Series, QFX Series, SRX Series, Cisco devices, and Nokia 7750 SR-s and 7250 IXR devices listed in [Supported Hardware](#) to Routing Director and manage them.

Device Onboarding Workflow

[Figure 1 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 Routing Director:

1. Routing Director is installed. See [Install Routing Director](#).
2. A superuser in Routing Director 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 Routing Director and the device. If a firewall exists, the firewall is configured to allow:
 - Outbound access on TCP ports 443, 2200, 6800, 4189, and 32767, and UDP port 162,
 - Inbound access on TCP port 32767.

Step 2: Up and Running

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To onboard a Juniper device to Routing Director, you must commit the outbound SSH command to connect with Routing Director, 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 Routing Director 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 and Nokia 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 Routing Director, the devices must either use IPv4 addressing or IPv6 addressing to connect with Routing Director. If some devices use IPv4 addressing and others use IPv6, Routing Director might not work as expected.
- For devices to be onboarded and managed by Routing Director, the devices must use either IPv4 addressing only or IPv6 addressing only to connect with Routing Director.

Onboard a Juniper Device

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

To onboard a Juniper device by committing the SSH configuration:

1. Navigate to **Inventory > Network Inventory** on the Routing Director 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 Routing Director.

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 Routing Director and can be managed from Routing Director.

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 Routing Director.

Established in the output indicates that the device is connected with Routing Director.

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 Routing Director 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 Routing Director based on the committed onboarding configuration.

5. After the device connects with Routing Director, Routing Director configures management and telemetry parameters including gNMI by using NETCONF. Routing Director also uses NETCONF to configure the interfaces and protocols based on the network implementation plan associated with the device.
6. Log in to the Routing Director 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$0i4IvHbWNKI.XgXyy$43sTeEU7V0Uw3CB1N/
HFKQT.Xl2wsm54HYaS9pfE9d3VrINIKBq1YlJfE2cTcHsCSSVboNnVtqJEaLNUBAfbu.\n\
set system login user jcloud authentication ssh-rsa \"ssh-rsa
JJJJU3NzaC1yc8EAAAADAQABAAQGCuVTpLmaDwBuB8aTVrzxDQ050BS5GtoGnMBkWB4Yi5EEc0n8eJGmmbINE8auRGG0tY/
CEbIHKSp78ptdzME0uQhc7UZm4Ue18C3FRb3qEYjr1AMJMU+hf4L4MYWYXqk+Y9RvnWBzsT02iEqGU0Jk0y4Urt2e/
YI9r8u8MZlWKdQzegBRIkL4HY0AeAbenNw6ddxRzAP1bPESpmsT+0kChu3jYg8dzKbI+xjDBhQsKCFf05cXyALjBMI3beaxmXRV02UGCEB1
+5Xw6a30CiP7jplr92rFBjbggh/bYoJRYz1Rc3AirDjROQuDdpHRn+DuUjPlyV17QR9Qvwn40AmWM9YKWS/
LZ375L8nac0Hm1v4f0KETU4LScTFQXR6xiJ6RizEp0338+xmiVq6m0cv5VuXfNAPd18F3LW0xLGF1mieB4cEEyJ7MK9U+TgS7M1cAP
+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$0eRp2LWC$/
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 Routing Director REST APIs.

To onboard a non-Juniper device:

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

If you enable this option, you don't need to upload any certificate.

- Enable **Skip Verify** if you have a self-signed TLS certificate to skip verification of the device identity when the device establishes a connection with Routing Director.

Disable this option when TLS is enabled on a device and certificate validation is to be enforced during TLS handshake between the device and Routing Director.



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 Routing Director 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 NETCONF Configuration, enable **NETCONF Enabled** to allow Routing Director to establish SSH connection with the device using NETCONF.
If you enable NETCONF, enter the SSH port that Routing Director can use to establish the SSH connection.
 8. Under **Credentials**, enter username and password to authenticate the device.
 9. Click **+ Add Device** to add more devices.
 10. Repeat step 4 through step 9 to add more non-Juniper devices.
 11. Click **OK**.

Routing Director connects with the device. You can now manage the device by using Routing Director.

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

Step 3: Keep Going

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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 Routing Director 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 .
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 .
Find out how to optimize your network.	See Network Optimization Overview .
Find out more about planning and simulating network scenarios.	See Network Planner Overview
Learn to manage, monitor, maintain, automate, and orchestrate network devices and services using Juniper Routing Director.	See Implementing Juniper Routing Director

Learn with Videos

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If you want to	Then
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.

