

# Release Notes for NorthStar Controller/Planner

Release 5.1.0  
25 November 2020

These release notes accompany Juniper Networks NorthStar Controller/Planner Release 5.1.0.

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# Introduction

The Juniper Networks NorthStar Controller is an SDN controller that enables granular visibility and control of IP/MPLS flows in large service provider and enterprise networks. Network operators can use the NorthStar Controller to optimize their network infrastructure through proactive monitoring, planning, and explicit routing of large traffic loads dynamically based on user-defined constraints.

The NorthStar Controller 5.1.0 release is qualified to work with Junos OS Release 18.3R2.4. We recommend contacting JTAC for information about the compatibility of other Junos OS releases. [Table 1 on page 3](#) lists feature-specific Junos OS requirements. The NorthStar features listed have been qualified with the specified Junos OS release and are intended to work with that release.

**Table 1: Feature-Specific Junos OS Requirements**

NorthStar Feature	Junos OS Release
Analytics	15.1F6
Segment Routing (SPRING), MD5 authentication for PCEP, P2MP, Admin groups	17.2R1
PCEP-Provisioned P2MP Groups	18.3R2
PCEP-Provisioned P2MP Groups with MVPN (S,G) Service Mapping via Flowspec	19.4R1
EPE	19.2R1.8
Bandwidth sizing and container LSPs for SR-TE LSPs	19.2R1.2

**NOTE:** The Path Computation Element Protocol (PCEP) configuration on the PCC routers does not persist across upgrades when the SDN package is not part of the installation binary. Before upgrading the Junos OS image to this release, save the existing configuration to a file by using the **save** command. After you upgrade the Junos OS image on each PCC router, use the **load override** command to restore the PCEP configuration.

The NorthStar Controller is supported on the following Juniper platforms: M Series, T Series, MX Series, PTX Series, and QFX10008. As of Junos OS Release 17.4R1, NorthStar Controller is also supported on QFX5110, QFX5100, and QFX5200. Please contact JTAC for more information.

Junos OS supports Internet draft draft-crabbe-pce-pce-initiated-lsp-03 for the stateful PCE-initiated LSP implementation (M Series, MX Series, PTX Series, T Series, and QFX Series).

## Contents of this Release

Table 2 on page 4 describes the downloadable files.

**Table 2: NorthStar Controller 5.1.0 Downloadable Files**

File	Description
NorthStar Application  <b>NOTE:</b> E-signature also available.	Northstar_Bundle_5_1_0.tar.gz
NorthStar JunosVM  <b>NOTE:</b> E-signature also available.	northstar_junosvm_5_1_0.tar.gz

**NOTE:** VMDK installation is also supported, but the files needed for this type of installation are not available on the NorthStar software download page. Please request the files from your account team or NorthStar Product Line Manager.

## New Features

The following new features are introduced in NorthStar Release 5.1.0:

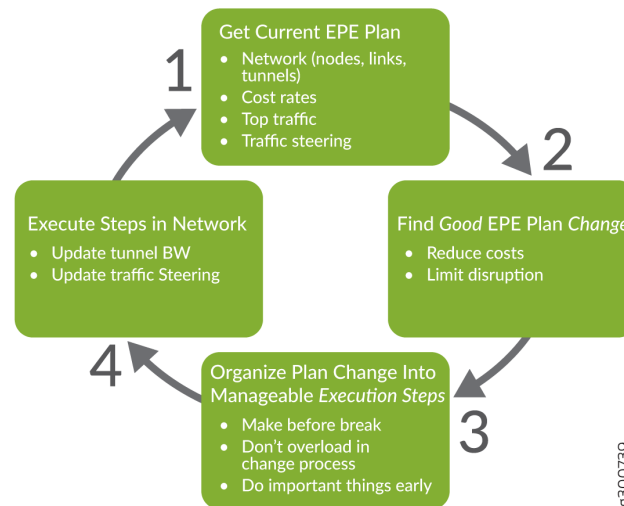
### EPE Planner

The EPE planner is a planning and optimization application for network operators so they can formulate plans to minimize the cost of traffic destined for their peers. The EPE planner is bundled with the NorthStar Controller/Planner, and is installed in the same installation process.

The EPE planner application is launched and operated through the NorthStar Controller web UI, where the user can plan how to steer traffic into tunnels, taking internal transit, external transit, and peering costs into consideration.

Users work on “projects” which are, essentially, planning sessions. A session begins with a “current plan”, represented by a snapshot of the live network. From there, plan changes are formulated, along with step-by-step execution plans to make the proposed changes safely in the network. Ultimately, the plans can be executed in the live network. [Figure 1 on page 5](#) illustrates the general work flow.

**Figure 1: EPE Planner Work Flow**



See *Understanding the EPE Planner Application* in the *NorthStar Controller User Guide* for more information about the EPE Planner application.

## ECMP LSP Placement (Least-Fill or Random)

With this feature, NorthStar takes link bandwidth reservation into consideration when performing path computation, distributing LSP traffic over multiple paths of equal cost rather than using only the first path with the shortest metric.

If ECMP LSP Placement is enabled, NorthStar distributes traffic over ECMP whenever path computation is required, such as:

- When a link goes down, requiring LSP rerouting
- When path optimization is initiated
- At the beginning and end of maintenance events

This feature is disabled by default. To enable it, navigate to **Administration > System Settings** (Admin user only).

**Limitation:** When provisioning LSPs via NETCONF, the PCS does not allocate bandwidth until it receives a response from either the configServer or PCEP. This is a different behavior from provisioning LSPs via PCEP where the PCS allocates bandwidth immediately. When provisioning LSPs via NETCONF one at a time, there is the potential for a provisioning order to be sent before the response to a previous provisioning order is received—which means the second order might not have correct bandwidth allocation information and NorthStar might not be able to provide an ECMP. We recommend provisioning multiple LSPs via NETCONF in one operation (bulk provisioning) in order to avoid this issue.

See *Subscribers and System Settings* in the *NorthStar Controller User Guide* for more information.

## CRPD Alternative to Junos VM in NorthStar Installation

NorthStar can now be installed with an optional parameter (`--crpd`) to use Containerized Routing Protocol Daemon (cRPD) instead of Junos VM. When you install with cRPD, the Main Menu in the `net_setup.py` script has a cRPD option. Once you select that option, you are presented with Junos CRPD Configuration Settings.

The *NorthStar Controller Getting Started Guide* includes the steps to install NorthStar with cRPD.

## TimeZone User Preferences Saved in Database

The NorthStar Controller UI displays timestamps on components such as the network information table, network status, and event charts and tables. By default, the timestamps are displayed in the client's time zone.

Functionality has always been provided in **Account Settings** to select a different time zone and date/time format, but prior to this release, those preferences were only valid in the current session, and the user had to reset them with every log-in. Those preferences were also limited in where they took effect, so the user would have to keep track of which displays were in the default time zone/format and which were not.

In this release, time zone/format preferences are saved in the database and persist across sessions for that user, including both NorthStar Controller and NorthStar Planner. Also, all displays of time/date conform to the configured preferences, with only the following exceptions (because these functions fetch files from the server):

- Reports
- Logs

See *User Management* in the *NorthStar Controller User Guide* for more information.

## RADIUS Client Support

You can specify that users are to be authenticated using a RADIUS server. The NorthStar server sends authentication requests to the RADIUS server; the RADIUS server authenticates or rejects the requests. The settings associated with this option must coincide with the RADIUS server configuration. Prior to this release, only local and LDAP server authentication were supported.

Access this setting by navigating to **Administration > Authentication** (only the admin has the necessary permission).

See *Authentication* in the *NorthStar Controller User Guide* for more information.

## NorthStar Planner Imports

This feature enables you to run or schedule a device collection task and have the collection data added to the database for use by the NorthStar Planner. For a scheduled task, all instances of the task are saved in the database, even though only the latest is available to the NorthStar Operator. Any instance can be used to create a network in the NorthStar Planner. Operator and Planner are independent of one another with regard to deleting tasks.

See *Scheduling Device Collection for Analytics* in the *NorthStar Controller User Guide* and *Importing Raw Network Data into NorthStar Planner* in the *NorthStar Planner Web UI Guide* for more information.

## Analytics Geo-HA

While original analytics HA using ElasticSearch is effective for local (same data center) clusters, Geo-HA makes all data available on all nodes, to better serve networks where the nodes are geographically remote from one another. To achieve this, a local RabbitMQ (messaging bus) is installed on each analytics (ElasticSearch) node. This improves the tolerance for latency and helps compensate for the tendency of remote nodes to become out of sync.

Geo-HA is selected and configured using a new option in the `net_setup.py` script.

See *Installing Data Collectors for Analytics* in the *NorthStar Getting Started Guide* for more information.

## HealthBot Integration, Phase 1

The integration of the NorthStar Controller and HealthBot products is an ongoing development effort and is being released with a phased approach. Phase 1 requires NorthStar Controller Release 5.1.0 with HealthBot Release 2.1.

NorthStar Controller can use HealthBot as its analytics collector in a side-by-side installation scenario. You install and manage NorthStar and HealthBot independently, but configure some analytics collector functions in NorthStar to be handled by HealthBot instead of Elasticsearch. In NorthStar Controller Release 5.1.0, only Juniper nodes are supported (as opposed to multi-vendor support), and only the following analytics collections can be handled by HealthBot:

- Junos Telemetry Interface (JTI) LSP statistics
- JTI interface statistics (logical and physical)
- Link latency statistics using RPM probes
- LDP demand statistics using LDP **show** commands

See *NorthStar Integration with HealthBot* in the *NorthStar Controller User Guide* for more information.

## Experimental Support for T-API 2.1

NorthStar's multilayer functionality now supports transport controllers that use the T-API 2.1 standard. As with other supported standards, NorthStar can:

- Display the topology
- Access link discovery and configuration
- Import SRLG and delay information
- Provide dynamic updates

This is experimental support and has some limitations:

- Topology filtering is not currently supported
- Topology change notifications are not currently supported (transport controller topology polling can be configured, however, to provide information).

See *Configuring the Multilayer Feature* in the *NorthStar Controller User Guide* for more information.



## PCEP-Provisioned P2MP Groups with Service Mapping

Beginning with Junos OS Release 19.4R1, Junos OS has the ability to associate multicast flows (S,G) in the multicast VPN context to a PCEP P2MP LSP provisioned via the NorthStar Controller, in accordance with *draft-ietf-pce-pcep-flowspec-05*. Beginning with NorthStar Controller Release 5.1.0, you can leverage that Junos OS functionality by provisioning PCEP P2MP groups in NorthStar that you associate with one or more multicast flows (S,G) in a multicast VPN. Once a P2MP group is associated with a particular (S,G) in a multicast VPN, traffic from that particular source IP S going to group IP G, is able to utilize that particular P2MP group.

For PCEP P2MP service mapping with flowspec, certain router configuration statements are required, in addition to those required to support PCEP provisioning in general.

See *Provision and Manage P2MP Groups* in the *NorthStar Controller User Guide* for more information.

## Integration with Ericsson Orchestrator

The NorthStar API now includes a northbound API to Ericsson Orchestrator so that using RESTCONF and a data model, NorthStar can export topology to Ericsson and provision LSPs from Ericsson Orchestrator. LSP provisioning supports Segment Routing (SR) and RSVP.

The *ietf-te-topology@2017-01-10* and *ietf-te@2016-10-26* models are provided over RESTCONF.

## Ability to Add/Modify/Delete Links, Tunnels, and Demands in NorthStar Planner

In the NorthStar Planner, you can now make adjustments to a network in order to see the impact. In the Topology view of a network, you can add, modify, or delete links, tunnels, or demands from the Links, Tunnels, or Demands tabs in the network information table. The add, modify, and delete buttons appear at the bottom of the table, as in the NorthStar Controller UI. Clicking a button brings up a secondary window, presenting you with options, or in the case of the delete function, with a confirmation request.

See *Network Information Table Bottom Tool Bar* in the *NorthStar Planner Web UI Guide* for more information.

# Changes in Behavior

The following changes in behavior are introduced with NorthStar Controller Release 5.1.0.

- If you are upgrading to NorthStar 5.1 from a NorthStar release earlier than 4.3 *and you are not using analytics*, you can upgrade using the procedure described in *Installing the NorthStar Controller* in the *NorthStar Controller Getting Started Guide*.

If you *are* using NorthStar analytics, you must manually upgrade to NorthStar 5.1 using the procedure described in *Upgrading from Pre-4.3 NorthStar with Analytics* in the *NorthStar Controller Getting Started Guide*.

- NorthStar Controller is Federal Information Processing Standard (FIPS) compliant. This only affects, and is a benefit to, customers with FIPS enabled on their Linux servers.
- As of this release, Web port 8091 is no longer used, in favor of port 8443.

# Known Behavior

The following behaviors are known to occur in NorthStar Controller Release 5.1.0:

- **Important:** It is currently necessary to remove any lingering NorthStar RPM packages before performing a fresh installation of NorthStar Release 5.1.0. This will be unnecessary in future releases.
- **Limitation related to cRPD installation:** If you require multiple BGP-LS peering on different subnets for different AS domains at the same time, you should choose the default JunosVM installation approach. This configuration for cRPD is not supported.
- **EPE Planner:** Testing shows that Junos PRPD/SR/Steering functionality is very sensitive to load and routing can be adversely affected if the functionality is driven too hard by NorthStar. As a result, when executing a plan change, the EPE Planner must pace the rate of operations that change the network to a configured rate.

A configuration setting is available in both `northstar.cfg` and in the settings that can be managed by the REST API to help manage this.

This parameter is the maximum rate at which the EPE Planner executes NorthStar REST API calls that change the network in units of calls per second. The NorthStar REST API calls that the EPE Planner executes in the process of executing a plan change are:

- Posts, Patches, Puts, and Deletes of demands to change the LSP bindings and steer traffic
- Patches of LSPs to change the tunnel bandwidth

See *Understanding the EPE Planner Application* for information about setting this parameter and the effect it has.

- **PCEP P2MP:** NorthStar automatically reroutes PCEP P2MP groups around a network element failure. After the failed element comes back up, the group might not be automatically restored to the original path, even if the user chooses to optimize LSP paths. In a future NorthStar release, the concept of what constitutes an optimal P2MP group will be addressed.
- Behaviors and limitations related to PCEP-provisioned P2MP Groups:

- This feature requires that you use Junos OS Release 18.3R2 or later, in which the following Junos OS PRs have been fixed:

- Junos OS PR 1412649

The fix for this PR enables you to define a separate template for P2MP (separate from the one used for P2P), one that does not allow “adaptive” to be configured. To define the new template, configure the following statements on the head end PE of the PCE-initiated P2MP LSP:

```
set protocols mpls lsp-external-controller pccd label-switched-path-template
pccd_default_template
set protocols mpls label-switched-path pccd_default_template template
set protocols mpls label-switched-path pccd_default_template adaptive
set protocols mpls lsp-external-controller pccd label-switched-path-p2mp-template
pccd_p2mp_default_template
set protocols mpls label-switched-path pccd_p2mp_default_template template
set protocols mpls label-switched-path pccd_p2mp_default_template p2mp
```

- Junos OS PR 1412490

The fix for this PR ensures that deletion of P2MP PCEP branches is properly reported.

- Junos OS PR 1358245 (not specific to P2MP).

The fix for this PR ensures that segment routing (SR) path names are properly reported in Junos OS Release 18.3R2.

- When viewing P2MP groups in the network information table, be aware that the refresh button at the bottom of the table periodically turns orange to prompt you for a refresh. When you click the refresh button, the web UI client retrieves the latest P2MP sub-LSP status from the NorthStar server.
- **NETCONF P2MP (Re-provisioning LSPs):**
  - For a NETCONF-provisioned P2MP tree, reprovisioning individual sub-LSPs to go around a failed link can fail under the following conditions:
    - The user reprovisions sub-LSPs separately.
    - The user has a mixture of sub-LSPs with a user-specified strict path and paths computed by NorthStar.

- The workflow is to reprovision all sub-LSPs of a tree together; NorthStar computes sub-LSPs of a tree as a whole, not individually.
- **Automatic rerouting:** Automatic rerouting of NETCONF-provisioned LSPs (including NETCONF-provisioned SR LSPs) due to a failure in the network is not supported.
- **PCE-initiated LSP:** During PCE-initiated LSP, some Cisco routers configured with IOS-XR version can return an error code for an unknown reason. Currently NorthStar Application only reports “NS\_ERR\_GENERIC” when this issue happens. It is planned to improve this behavior and report the exact error code (e.g. PCEP Error Type = 24 error value = 2 ) in future releases.
- **Empty Results in Service Tab:** In rare case, you might get an empty result in the network information table, Service tab for both summary and detailed information, for example, after a system upgrade. If this happens, you can resolve it by restarting the web process:

```
supervisorctl restart infra:web
```

- **Netflow Collector:** It can happen that during a NorthStar upgrade, netflowd cannot be started. If netflowd fails to start, run the following command on the system hosting the netflowd collector:

```
sudo -u pcs /opt/northstar/thirdparty/python/bin/pip -q install --upgrade --no-deps
--force-reinstall /opt/pcs/lib/python/*.whl
```

After running the command, restart the Netflow process:

```
supervisorctl restart netflow:netflowd
```

## Known Issues

[Table 3 on page 12](#) lists known issues in NorthStar Controller Release 5.1.0. If an identifier is reported, it is the assigned identifier in the GNATS problem report tracking system.

Table 3: Known Issues in NorthStar Controller Release 5.1.0.

Identifier	Description
1421093	Junos OS: A user can configure a template in the router and map that template to an external controller. The router inherits the required configuration from the template and then provisions the external controller-initiated LSP. Unbinding the template from the external controller or changing template configuration can trigger deletion of the PCE-initiated LSPs (only LSPs which are using that particular template). Later, the LSPs are re-provisioned by the external controller.

Table 3: Known Issues in NorthStar Controller Release 5.1.0. (*continued*)

Identifier	Description
1446941	Before performing a fresh install of NorthStar Release 5.0.0, you must use the <code>./uninstall_all.sh</code> script to uninstall any older versions of NorthStar on the device.
1452486	PRPD does not remove prefixes (prefixes that have mapping) that were withdrawn by PCCs.
1464201	<p>P2MP: During transient make-before-break, the PCE server might erroneously send a delete event message to the PCS, potentially causing a branch to go from “live” to “unknown” state. The PCS then detects the unknown state and tries to reprovision. The PCE server accepts the order and forwards it to the PCC, but the PCC returns an error saying the LSP already exists. The only workaround is to deactivate and activate the PCEP protocol.</p> <p>See “PCS Out of Sync with Toposerver” in the <i>NorthStar Controller Troubleshooting Guide</i> for instructions to recover when the PCS is out of sync with Toposerver.</p>
1473136	P2MP: LSPs are being deleted when they should be modified.
1473362	NorthStar cRPD does not forward adjacency-SID data to the topology server. As a consequence, cRPD cannot be used for applications that use segment routing (including EPE steering). This is due to Junos OS behavior.
NA	NorthStar web UI Planner: Network spec files will be overwritten if an existing network name exists when using Save or Save As. A warning dialog appears if an existing name is found using Save As.
NA	NorthStar web UI Planner: If a user leaves the browser open without activity for a period of time, the session may get disconnected and not be able to fully resume later. As a result, some UI operations may not response properly. The workaround is to use the close network menu option and reopen the network.
NA	The routing method is CSPF for P2MP groups which are configured from devices (as opposed to from within NorthStar), when the expected routing method is routeByDevice.
NA	NETCONF-Provisioned SR Tunnels: NETCONF-provisioned SR tunnels can only depend on static (as opposed to dynamic) SIDs. Dynamic SIDs can change at any time due to various network events such as interface flaps. If SIDs change, NorthStar detects the tunnels affected and marks their paths as “down”, but still shows their tunnels as “up”. The paths for these tunnels are no longer highlighted in the topology.
NA	For IOS-XR devices, you must run device collection before doing any LSP delegation. This applies to LSPs that were manually created using the router CLI.

Table 3: Known Issues in NorthStar Controller Release 5.1.0. (continued)

Identifier	Description
NA	NETCONF network information table update: when you delete an interface, the interface list is not updated in the Interface tab of the network information table.
NA	PRPD does not update Top N Prefixes properly.
NA	Normally, the web UI automatically switches to safe mode, and allows the admin user to log in when the Cassandra database is down. In this release, the automatic switch does not work. The workaround is to restart web server when you cannot log in to the web UI during a Cassandra failure.
NA	NorthStar Planner Desktop: There is no validation on the NorthStar Planner Desktop when a license upload is attempted.
NA	The privateForwardingAdjacency (a pair of binding SID SR LSPs from A->Z and Z->A) logical link could be marked as down after the TopoServer process is restarted. The current workaround is to run a Device Collection task in the Task Scheduler, which would restore the correct status to the privateForwardingAdjacency logical link. This issue will be addressed in the next release.
NA	Diversity group does not work as expected for individually-created LSPs assigned to the same diversity group. We recommend provisioning diverse LSPs using <b>Applications &gt; Provision Diverse LSP</b> .
NA	<p>EPE Planner application can fail to start after a fresh install of NorthStar Controller. Sample log messages when this happens:</p> <ul style="list-style-type: none"> <li>• 2019/11/26 18:38:11.711786 INFO:ConfigReader Configurations initialized are: map[...q_password_enc:&lt;nil&gt; admin_password_enc:nil&gt;...]</li> <li>• 2019/11/26 18:38:11.711828 CRIT:logger Password to connect to the Northstar REST server:127.0.0.1, with the username: admin, not provide</li> <li>• 2019/11/26 18:38:11 Password to connect to the Northstar REST server:127.0.0.1, with the username: admin, not provide</li> </ul> <p>To recover, restart the EPE Planner process:</p> <pre># supervisorctl restart epe:epeplanner</pre>
NA	PCViewer does not update PCE-controlled LSP paths, resulting in LSP delay not being calculated and updated in the NorthStar web UI.

## Resolved Issues

Table 4 on page 15 lists resolved issues in NorthStar Controller Release 5.1.0. If an identifier is reported, it is the assigned identifier in the GNATS problem report tracking system.

Table 4: Resolved Issues in NorthStar Controller Release 5.1.0.

Identifier	Description
1457561	P2MP: When new branches to the P2MP LSP were added, multicast traffic was not being received at the receivers of the new branch. The new branch interface was not adding to the downstream list of the multicast forwarding entry.
NA	Changing a demand's LSP binding directly from one LSP to another in one operation (without setting it to unbound first, then to the new LSP), the colored route insertion fails. NorthStar behaves as if it has the new LSP binding and colored route, but in reality the old colored route corresponding to the old binding is in the network. If you need to change the LSP binding of a demand with an existing binding, do it in two steps. First, clear the LSP Binding, and then set the LSP binding to the new LSP. This applies both to changing an LSP binding using the UI, and using REST API calls.
NA	The Bandwidth Sizing task ( <b>Administration &gt; Task Scheduler</b> ) was not able to collect the counters for LSPs on IOS-XR devices, so the bandwidth for these LSPs was not resized.
NA	NETCONF SR-LSP bandwidth was displaying non-zero when adding an SR-LSP with a specific bandwidth.

## Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active Juniper Care or Partner Support Services support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <https://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes:  
<https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications:  
<https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum:  
<https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool:  
<https://entitlementsearch.juniper.net/entitlementsearch/>

## Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see  
<https://support.juniper.net/support/requesting-support/>.

## Revision History

25 November 2020—Added caveat about cRPD installation in the Known Behavior section.

11 May 2020—Changed name to Controller/Planner to more clearly indicate the release notes document covers both.



12 December 2019—NorthStar Controller Release 5.1.0.

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