

TCX Series Optical Transport System, Release 1.0.0 Release Notes

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Introduction

This release note accompanies the TCX Series Optical Transport System, Release 1.0.

It describes new and changed features, known behavior, and known and resolved problems in the software.

You can also find the TCX Series Optical Transport System release notes in the Juniper Networks TechLibrary, located at <https://www.juniper.net/documentation/>.

TCX Series Optical Transport System, Release 1.0

The TCX Series Optical Transport System is a complete open packet optical layer solution, which includes hardware, open network management, and disaggregated optical software controls. Disaggregation of the optical control management software from the underlying hardware provides multiple benefits including flexible deployment, scalability, enhanced automation, best-of-breed hardware support and multi-layer optimization.

The TCX Series Optical Transport System is a portfolio of products that provide the foundation of a comprehensive, open, and programmable optical transport network. This release of the TCX Series Optical Transport System includes the following products:

- TCX1000 Programmable ROADM or TCX1000-RDM20, Release dcian_R2.1.6_153
- proNX Optical Director, Release 2.0.19



NOTE: Requires Atomic Host Linux: 7.1711 (RedHat or CentOs)

TCX1000 Programmable ROADM

At the center of the TCX Series portfolio is the TCX1000 Programmable ROADM or TCX1000-RDM20, which forms the foundation of an open, programmable, optical transport network. The TCX1000-RDM20 is a standalone, 20-port, reconfigurable optical add-drop multiplexer (ROADM) that provides all features of a route and select ROADM node in a compact, disaggregated, stackable, form factor. The TCX1000-RDM20 enables you to dynamically add and drop wavelengths onto your optical network and supports a variety of network applications and topologies.

In this release, the TCX1000-RDM20 supports single span, point-to-point configurations and scales up to 19.2 Tbps per line using 200 Gbps Coherent wavelengths. It is bit rate transparent and therefore agnostic to framing and modulation formats and enables scalable, agile and automated networks.

Combining the TCX1000-RDM20 with integrated Coherent optics within Juniper Networks routing and switching platforms provides a powerful and comprehensive end-to-end solution. For a flexible, disaggregated model, the BT17800 can be used as a disaggregated transponder layer over the TCX1000-RDM20 line system.

proNX Optical Director

The proNX Optical Director is a distributed software platform that provides optical control and management for all TCX Series optical products and is an integral component of the TCX1000 Series Optical Transport System.

The proNX Optical Director also enables fault, configuration, accounting, performance and security (FCAPS) functionality and optical service activation on optical interfaces residing in Juniper Networks routers and switches.

The proNX Optical Director provides the following functionality:

- Optical control including dynamic real-time control of optical links in your optical transport networks. This includes automatic span loss management and automatic channel power control.

In traditional optical networks, this control function resides on the ROADMs themselves where the ROADMs exchange proprietary control messages with each other on an optical supervisory channel (OSC). This makes interworking across vendor equipment difficult and often leads to the deployment of single-sourced networks. Moving this function to a centralized software controller makes heterogeneous networks with equipment from multiple vendors possible.

- Network management of the optical line system (OLS) including network topology, network visualization, and network monitoring and troubleshooting.

The proNX Optical Director learns and displays the topology of the network and provides various visual indicators so that you can see the health of the network at a glance and deal with problem areas in a proactive manner.

- Device management of OLS elements including device configuration, device visualization, and device monitoring and troubleshooting.

The proNX Optical Director discovers OLS elements and reads and displays their configuration. You can change the configuration, view the equipment inventory, pull up a visual representation of the device, or view performance monitoring counters and alarm details. Additionally, you can use the proNX Optical Director to configure supported transponders attached to the OLS element.



NOTE: TCX Series elements do not support a built-in user interface such as a command line interface. You must use the proNX Optical Director to manage all TCX Series elements.

- End-to-end management of optical services running across the optical transport network including service provisioning, service activation, and service monitoring and troubleshooting.

The proNX Optical Director supports A-to-Z provisioning and activation of optical services. You select the two service endpoints and the proNX Optical Director provides you a list of paths that you can choose for that service. When you activate the service,

the proNX Optical Director automatically configures the service across all the devices in the path.

- Web-based user interface. You can access the proNX Optical Director user interface from supported web browsers.

TCX Series Optical Transport System Models and Licenses

Table 1 on page 5 describes the TCX1000-RDM20 hardware models available in this release.

Table 1: TCX1000-RDM20 Hardware Models

Model Number	Description
TCX1000-RDM20-AC	This system includes the chassis, two fan modules, and two AC power supplies.
TCX1000-RDM20-DC	This system includes the chassis, two fan modules, and two DC power supplies.



NOTE: You can purchase an AC or DC model of the TCX1000-RDM20 that allows you to use 8 of the 20 universal ports, see [Table 1 on page 5](#). You can purchase additional licenses to enable 2, 4, or 12 additional universal ports. See [Table 2 on page 5](#).

Table 2 on page 5 describes the TCX1000-RDM20 software licenses.

Table 2: TCX1000-RDM20 Software Licenses

Model Number	Description
TCX1000-RDM-2P-UP	License for 2 additional universal ports.
TCX1000-RDM-4P-UP	License for 4 additional universal ports.
TCX1000-RDM-12P-UP	License for 12 additional universal ports.

For a complete list of spares, see [TCX1000 Programmable ROADM Hardware Guide](#).

Table 3 on page 5 describes the proNX Optical Director software licenses.

Table 3: proNX Optical Director Software Licenses

SKU	Description
PRONX-OPT-DIR	<p>proNX Optical Director Software License</p> <p>This software license allows you to download and install the proNX Optical Director.</p> <p>You do not require a right-to-use (RTU) license to use the proNX Optical Director to manage TCX1000 Series devices, but you do require RTU licenses to use the proNX Optical Director to manage other devices.</p>

Table 3: proNX Optical Director Software Licenses (*continued*)

SKU	Description
PRONX-OD-RTU-G1	<p>proNX Optical Director RTU License - Group 1 Devices</p> <p>This RTU license allows you to use the proNX Optical Director to manage MX Series routers.</p>
PRONX-OD-RTU-G2	<p>proNX Optical Director RTU License - Group 2 Devices</p> <p>This RTU license allows you to use the proNX Optical Director to manage PTX Series routers and QFX10000 switches.</p>
NOTE: All software licenses are perpetual.	

Documentation

In addition to these release notes, see the following links for the TCX Series Optical Transport System:

- [TCX1000 Programmable ROADM Hardware Guide](#)
- [TCX Series Optical Transport System Feature Guide](#)
- [proNX Optical Director Installation Guide](#)
- [proNX Optical Director User Guide](#)

Features

This section describes the features for the TCX Series Optical Transport System, Release 1.0, which enables the following features:

- [Features for TCX1000-RDM20 on page 6](#)
- [Features for proNX Optical Director on page 7](#)
- [High Availability Requirements for the ProNX Optical Director on page 8](#)

Features for TCX1000-RDM20

20-Port Route and Select ROADM

The TCX1000-RDM20 is a reconfigurable add-drop multiplexer (ROADM) that multiplexes and demultiplexes Coherent channels from the 20 universal ports to a single composite signal for transmission out the line port. You can use the universal ports to dynamically add and drop channels onto your optical network or, to multiply the number of channels the ROADM supports, you can connect the BT17800-FMD96 fixed optical multiplexer-demultiplexer to a single universal port. This configurations supports up to 96 channels with 50GHz channel spacing. The universal ports support channel wavelengths from 1528.578 nm through 1566.928 nm and frequency ranges 191.325 THz through 196.125 THz respectively.

Complete End-to-End Juniper Networks Coherent Packet-Optical Solution

The TCX1000-RDM20 can scale up to 19.2 Tbps on the composite line when you use 200 Gbps Coherent wavelengths on the universal add/drop ports. It supports a diverse range of packet-optical network use cases, including ultra high capacity connectivity in the metro and between data centers. It provides complete support for 100 Gbps and 200 Gbps Coherent interfaces across Juniper Networks and BTI platforms.

Integrated Optical Amplification

The TCX1000-RDM20 integrates booster and pre-amplification to compensate for link and component losses.

Integrated OSC

This release supports a 1511 nm optical supervisory channel (OSC).

Automatic Laser Shutdown

Due to the potential safety hazard that is posed by the high power optical outputs, the TCX1000-RDM20 has an automatic laser shutdown (ALS) mechanism that guards against the risk of direct human exposure to high-powered lasers.

The ALS mechanism acts to detect a fiber disconnection or fiber cuts along the span, and upon doing so, causes the shutdown of the high-powered WDM composite signal.

Performance Monitoring

The TCX1000-RDM20 reports performance metrics to the proNX Optical Director for all external ports on the system. The TCX1000-RDM20 also has a number of internal monitors that provide information about the total optical powers and per-channel powers (spectral information) at different points within the system. You can measure performance from these internal monitors at the following external ports:

- **Line In/Line Out** ports:
 - Total power monitoring (In and Out)
 - Spectral power monitoring (In and Out)
- **OSC 0 and OSC 1** ports:
 - Total power monitoring (In and Out)
- **Universal** ports:
 - Total power monitoring on Ux Input (add) ports
 - Spectral power on Ux Input (add) ports

Features for proNX Optical Director

This is the first release of the proNX Optical Director.

The proNX Optical Director receives streams of real-time optical link measurements from all the TCX1000 Series elements under management. From this data, the proNX Optical Director builds an always current view of the optical links in the network. This allows the proNX Optical Director to make real-time control decisions on all aspects of optical link management, including the following:

- Channel power control and equalization
- Span loss management
- Graceful ramp up and ramp down of channel powers as wavelengths are brought into and taken out of service

These control decisions are translated into commands that are communicated to the managed elements for execution. This ongoing control loop allows the proNX Optical Director to deliver optimal optical transmission performance for the managed elements by dynamically and automatically controlling all aspects of optical link output.

High Availability Requirements for the ProNX Optical Director

In this release, you must connect both the TCX1000-RDM20 and the proNX Optical Director to your highly available data communications network.. This is required to ensure there is a redundant path to each ROADMs for proNX Optical Director communications.

The proNX Optical Director software requires frequent updates on the current operating conditions of the ROADMs in your network in order to make the required intelligent decisions to maintain the optical performance of the managed device. This requirement for frequent updates drives the need for high availability and low latency in your management network.

Refer to the [proNX Optical Director Installation Guide](#) for complete details on the high availability requirements for the proNX Optical Director.

Known Behavior

This section contains the known behaviors, system maximums, and limitations in hardware and software in Release 1.0 of the TCX Series Optical Transport System.

- [Known Behavior for TCX Series Optical Transport System on page 9](#)
- [Known Behavior for proNX Optical Director on page 9](#)

Known Behavior for TCX Series Optical Transport System

- In this release, you can deploy the TCX1000-RDM20 in point-to-point, single span configurations.

Known Behavior for proNX Optical Director

- In this release the proNX Optical Director supports only point-to-point services.

Known Issues

This section lists the known issues in this release of the TCX Series Optical Transport System.

For the most complete and latest information about known defects, use the Juniper Networks online [Problem Report Search](#) application.

- [Known Issues for the TCX1000-RDM20 on page 9](#)
- [Known Issues for the proNX Optical Director on page 10](#)

Known Issues for the TCX1000-RDM20

- In some situations, a very low span loss (less than 2 dB) combined with a higher transmit output power at the far end OSC might cause a Receiver Overload alarm to be raised on a TCX1000-RDM20 OSC port.

Workaround: Add a fixed loss attenuator on either the far end transmit line port or the local receive line port to increase span loss by approximately 3 dB. [PR1334598](#)

- If a single fiber is cut in a fiber pair, the receiving device detects the failure and invokes automatic laser shutdown (ALS) procedures. This causes the device at the transmitting end of the fiber to correctly raise an Optical Line Failure alarm. However, this alarm is not properly masked, which results in the alarm being raised and cleared every 5 seconds (approximately) for the duration of the failure. ALS functionality continues to operate and is not affected by this issue.

Workaround: None. The alarm will clear and remain cleared once the fiber is repaired. [PR1318917](#)

Known Issues for the proNX Optical Director

General

- After power is restored following a power outage, the proNX Optical Director might occasionally not recover.

Workaround: This is a rare occurrence. If, after 15 minutes, the output of the `kubectl get pods` command from the master node shows that one or more pods have still not changed STATUS to Running, contact JTAC. [PR1337857](#)

- When changing port parameters in tail facility ports (for example, a transponder port on a supported router or switch), the changes take effect but are sometimes not displayed.

Workaround: If the port parameter changes are not displayed on a refreshed page after a few minutes, manually rediscover the tail facility device. [PR1330856](#)

- After the proNX Optical Director discovers a TCX1000-RDM20 device that is in factory default state (either because the device is being brought up for the first time or the device has been explicitly reset to factory defaults), some of the initialization tasks that the proNX Optical Director runs on the device might fail. These are shown as failed Device Edit tasks in the Administration>Tasks page.

Workaround: None required. The proNX Optical Director automatically retries the failed tasks. [PR1330318](#)

- The DEMUX Output Power historical PM metric on a TCX1000-RDM20 universal port is not supported but it is collected and displayed in the Port Metrics page. [PR1329226](#)
- The web socket between the web browser GUI and the proNX Optical Director server might time out too quickly, causing “Failed to connect to device-service for events” and similar messages to be displayed in the notification area.

Workaround: None required. The GUI reconnects automatically. Dismiss the message. [PR1322304](#)

- The GUI displays the internal software version number for MX Series and PTX Series routers and QFX Series switches.

Workaround: None required. The last part of the internal software version number indicates the external software version number. [PR1316840](#)

Optical Control

- A Tx Span Loss Out of Range alarm, an Rx Span Loss Out of Range alarm, and/or an OTI Communication Failure alarm might occasionally remain raised even when the underlying issue that caused the alarm is resolved.

Workaround: Rediscover the device with the stuck alarm. [PR1332922](#)

Network Topology and Services

- When creating a service with a tail facility endpoint, you can select the tail facility endpoint as the Source Device and Source Endpoint but not as the Destination Device and Destination Endpoint.

Workaround: To select a tail facility endpoint at the Destination, select the TCX1000-RDM20 as the Destination Device and then use the Destination Endpoint drop-down list to select the desired tail facility endpoint. [PR1338788](#)

- When you delete a topology link from the Network > Topology page, the link sometimes remains undeleted.

Workaround: If the link remains undeleted on a refreshed page after a few minutes, manually rediscover the devices at each end of the link. [PR1330606](#)

- A port can be provisioned as an endpoint for more than one topology link.

Workaround: Before creating a link, ensure the endpoints are not already configured for another link. [PR1324934](#)

- Since physical links are not displayed in the service view, the state of physical links does not affect the service view. This can lead to a perceived anomaly where the service view shows all links as green but the service itself is operationally down because a physical link is down.

Workaround: Use the service state in the Network > Services > Provisioned page as the indicator on whether a service is up or down. [PR1324929](#)

Documentation Updates

This section lists the errata and changes in the TCX Series documentation.

- [TCX1000 Programmable ROADM Quick Start Guide on page 11](#)

TCX1000 Programmable ROADM Quick Start Guide

This is the updated section for the *TCX1000 Programmable ROADM Compliance Statements for NEBS*:

- The equipment is suitable for installation as part of the Common Bonding Network (CBN).
- The equipment is suitable for installation in Network Telecommunications Facilities.

- The battery return connection is to be treated as an isolated DC return (that is, DC-I), as defined in GR-1089-CORE.
- You must provision a readily accessible device outside of the equipment to disconnect power. The device must also be rated based on local electrical code practice.

Migration, Upgrade, and Downgrade Instructions

This section contains information about how to upgrade release 1 of the TCX Series optical transport system using the proNX Optical Director. Upgrading or downgrading the TCX Series optical transport system can take time, depending on the size and configuration of the network.

- [Migration, Upgrade, and Downgrade Instructions for TCX Series Optical Transport System on page 12](#)
- [Migration, Upgrade, and Downgrade Instructions for proNX Optical Director on page 13](#)

Migration, Upgrade, and Downgrade Instructions for TCX Series Optical Transport System

TCX1000 Series devices support nondisruptive software upgrades where the device retains the last known configuration and passes traffic uninterrupted. You can perform software upgrades on a single device or on multiple devices simultaneously. All software upgrades are initiated from proNX Optical Director.

TCX1000 Series device software is upgraded using the integrated Ethernet interface under control of Netconf and uses SFTP for load transfer. Software upgrades are delivered as a single file, which contains all the software for the various components of the device. The TCX1000-RDM20 uses a two bank boot structure which allows for the running load to remain in place while the new load is installed to, and run from, the other bank. This enables reversion to the original running load should an upgrade fail or you choose to revert before the process completes. Banks are referred to as A and B and either can function as the currently active bank.

There are two phases in the software upgrade process: Stage and Activate. Once the SFTP Server and file are selected in the management system, you can chose to either Stage or Activate the upgrade.

- Staging copies the software upgrade file to the TCX1000 Series device.
- Activate performs the upgrade on the device

Upgrading Software Packages

To upgrade the software on a TCX1000 device:

1. Download the TCX1000 software from the Juniper Networks website.
2. Save the TCX1000 software upgrade file to an SFTP Server.



NOTE: The path of the software upgrade file must be relative to the directory you provided when the SFTP server was configured, or if no path was selected, then it must be relative to your SFTP home directory. You can also browse the SFTP server for the software upgrade file.

3. In proNX Optical Director:
 - a. Select the SFTP server on which the software upgrade file resides.
 - b. Select the name of the TCX1000 software upgrade file.
 - c. Select the **Stage** operation to copy the software upgrade file to the TCX1000 device. Ensure this task completes successfully before proceeding.
 - d. Select the **Activate** operation to upgrade the device software. Ensure this task completes successfully before proceeding.

After you initiate the software upgrade, the management system notifies you when the upgrade is complete.

Migration, Upgrade, and Downgrade Instructions for proNX Optical Director



NOTE: The installation procedures for proNX Optical Director require you to be familiar with Linux. If you are not comfortable installing Linux or running Linux commands from the command line, ensure that a crafts person with Linux administration responsibilities is on hand throughout the installation process.

The proNX Optical Director software is installed on a cluster of (typically) three Linux machines. You need to setup each cluster server with the required Linux distribution prior to installing the proNX Optical Director.

To facilitate installation, we recommend that you use an additional computer to download, distribute, and install the required images on to the servers in the cluster. This additional computer is called the control machine. Once you set up the control machine, you can use the supplied scripts to carry out the installation on the cluster without having to work with each cluster member individually.

You can set up a new computer for the control machine or you can use an existing computer if you have one available.

The proNX Optical Director software is supplied as a single gzipped tarball. This tarball includes everything you need to install the proNX Optical Director including the installation scripts and the full set of container images. The proNX Optical Director installation process leverages the use of Ansible scripts to facilitate installation.

Refer to the [proNX Optical Director Installation Guide](#) for complete instructions on installing the proNX Optical control and management software.

Finding More Information

For the latest, most complete information about known and resolved issues with the TCX Series optical transport system, see Juniper Networks Problem Report Search application at:

<https://prsearch.juniper.net>.

All documentation for the TCX Series optical transport system can be found at [Juniper Networks TechLibrary](#).

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page of the Juniper Networks TechLibrary site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <http://www.juniper.net/techpubs/feedback/>.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service 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 <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://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: <http://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <http://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/>.
- 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 <http://www.juniper.net/support/requesting-support.html>.

Revision History

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