JUNIPER NETWORKS ACX7024 Grand Master Clock Support User Guide

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JUNIPER NETWORKS ACX7024 Grand Master Clock Support

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Connect an ACX7024 or ACX7024X Router to the Furuno TB-1 GNSS Receiver
To connect an ACX7024 or ACX7024X router to a Furuno TB-1 GNSS receiver:

1. Connect one end of an RG-58 cable to the PPS connector port on the TB-1 GNSS receiver (labeled PPS) and the other end of the cable to the 1PPS connector port on the ACX7024 or ACX7024X router (labelled 1PPS IN).
2. Connect one end of an RG-58 cable to the 10-MHz connector port on the TB-1 GNSS receiver (labelled 10MHz) and the other end of the cable to the 10-MHz connector port on the ACX7024 or ACX7024X router (labelled 10MHz IN).
3. Use a USB-C to USB-C cable to connect one end of the cable to the data port (labelled DATA) on the TB-1 GNSS receiver and the other end to the USB type C port on the ACX7024 or ACX7024X router.
4. Connect one end of the LMR400 cable to the GNSS connector port (labelled GNSS) on the TB-1 GNSS receiver and the other end to the GNSS antenna.

Install the GNSS Antenna

You must install a Global Navigation Satellite System (GNSS) antenna to ensure optimal signal reception. For information about antenna installation guidelines, see GNSS Antenna Installation in the TB-1 Operation Manual. To enable the Furuno TB-1 GNSS receiver, connect to the Furuno AU-217 antenna. For information about installing the AU-217 antenna, see GNSS Antenna AU-217 Installation Procedure.

Gain and Noise Figure (NF) Calculation
To calculate the total gain and NF, see the GNSS Antenna Installation Appendix on the Furuno data download page.

FAQ

- **Q: What are the clock cable specifications?**
  - A: The clock cable specifications include TE Cable Specifications and Samtec Cable Specifications.
- **Q: How do I connect an ACX7024 or ACX7024X Router to a Furuno TB-1 GNSS Receiver?**
  - A: To connect the router to the receiver, follow the steps provided in the “Connect an ACX7024 or ACX7024X Router to Furuno TB-1 GNSS Receiver” section.
- **Q: How do I install the GNSS antenna?**
  - A: To install the GNSS antenna, refer to the “Install the GNSS Antenna” section for detailed instructions.

About this Guide

- Use this guide to learn more about the Global Navigation Satellite System (GNSS) capabilities on a Juniper

Networks®

- ACX7024 and ACX7024X Cloud Metro router. In this guide, you will learn how to connect an ACX7024 and ACX7024x router to a FURUNO TB-1 GNSS receiver.
- As a network or system administrator, you can use this guide to install the FURUNO TB-1 GNSS receiver on an ACX7024 and ACX7024X router.

Overview

Global Navigation Satellite System (GNSS) capability is essential for the Grand Master (GM) clock functionality. A GNSS receiver receives signals from a navigation satellite constellation. The GNSS receiver gains precise phase and time information by processing these signals and delivers the information across the network.

The ACX7024 and ACX7024 routers support telecom grandmaster (T-GM) functionality using an external GNSS receiver as a source for time information. The GNSS receiver obtains and processes the signals from a navigation satellite constellation to deliver precise phase and time information across the entire packet network. The T-GM functionality can be used, for example, to provide required synchronization to base stations in a data network. With this feature, the ACX7024 and ACX7024X devices can function as an edge T-GM by connecting to an external Furuno TB-1 GNSS receiver.

The Furuno TB-1 GNSS receiver supports the following timing standards:

- IEEE Standard 1588-2008, IEEE Standard for a Precision Clock Synchronization for Networked Measurement and Control Systems, July 2008.
- ITU-T G.8262, G.8263, G.8265, G.8272 PRTC Class A and G.8275.

The Furuno TB-1 GNSS receiver and the Telecom Grand Master (T-GM) functionality on the ACX7024 and ACX7024X devices provide several benefits including the following:

- Multi-constellation receiver that supports:
- GPS L1C/A
- GLONASS L1OF
- GALILEO E1B/E1C
- QZSS L1C/A
- Time traceability to GPS or UTC
- Coherent 10-MHz and 1- 1-pulse per second (PPS) outputs
- OCO-based receiver
- Anti-jamming and anti-spoofing support that includes multipath spoofing, jamming, interference detection and isolation mechanisms.
- Supported on 10G and 25G ports.
- Transmission of Ethernet Synchronization Message Channel (ESMC) and enhanced ESMC packets for synchronous
  Ethernet as per G.8264 standards.

Connect an ACX7024 or ACX7024X Router to the Furuno TB-1 GNSS Receiver and Install the GNSS Antenna

Before you connect an ACX7024 or ACX7024X router to the TB-1 GNSS receiver:

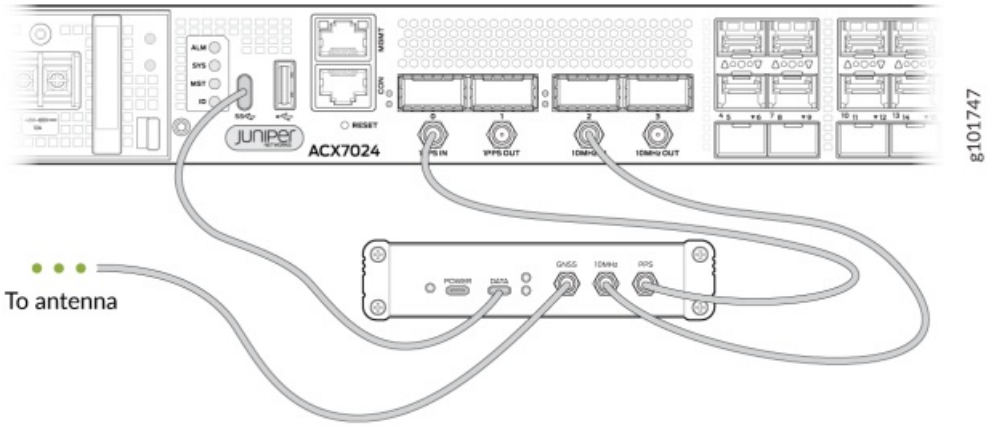
- Before you connect an ACX7024 or ACX7024X router to the TB-1 GNSS receiver:
- Read “Install the GNSS Antenna” on
- Ensure that the following cables are available
- Clock cables. See “Clock Cable Specifications” on
- Antenna cables. See “Antenna Cable Specifications” on
- Follow the instructions in “Cabling Guidelines” on

Connect Receiver

Connect an ACX7024 or ACX7024X Router to the Furuno TB-1 GNSS Receiver

To connect an ACX7024 or ACX7024X router to a Furuno TB-1 GNSS receiver:

1. Connect one end of an RG-58 cable to the PPS connector port on the TB-1 GNSS receiver (labelled PPS) and the other end of the cable to the 1PPS connector port on the ACX7024 or ACX7024X router (labeled 1PPS IN).
2. Connect one end of an RG-58 cable to the 10-MHz connector port on the TB-1 GNSS receiver (labelled 10MHz) and the other end of the cable to the 10-MHz connector port on the ACX7024 or ACX7024X router (labelled 10MHz IN).
3. Use a USB-C to USB-C cable to connect one end of the cable to the data port (labelled DATA) on the TB-1 GNSS receiver and the other end to the USB type C port on the ACX7024 or ACX7024X router.\
4. Connect one end of the LMR400 cable to the GNSS connector port (labelled GNSS) on the TB-1 GNSS receiver and the other end to the GNSS antenna.



Install the GNSS Antenna

- You must install a Global Navigation Satellite System (GNSS) antenna to ensure optimal signal reception. For information about antenna installation guidelines, see GNSS Antenna Installation in the TB-1 Operation Manual.
- To enable the Furuno TB-1 GNSS receiver, connect to the Furuno AU-217 antenna. For information about installing the
- AU-217 antenna, see GNSS Antenna AU-217 Installation Procedure.

Gain and Noise Figure (NF) Calculation
To calculate the total gain and NF, see GNSS Antenna Installation Appendix on the Furuno data download.

Specifications

Clock Cable and Antenna Cable Specifications

- Clock Cable Specifications |
- Antenna Cable Specifications |
- Cabling Guidelines |

Clock Cable Specifications

IN THIS SECTION

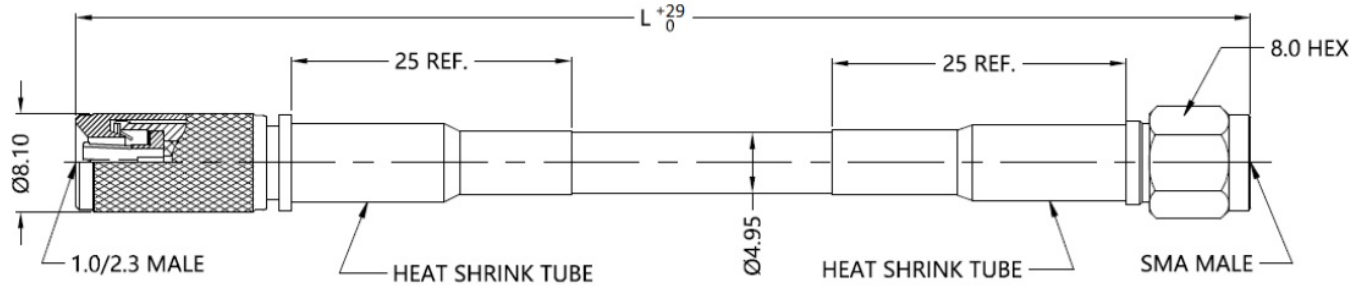
- TE Cable Specifications |
- Samtec Cable Specifications |

The ACX7024 and ACX7024X router supports an RG-58 clock cable that has an SMA male connector at one end and a
DIN 1.0/2.3 connector at the other end.

We recommend the following Juniper-qualified clock cables:

- RG-58 cable from TE Connectivity (Part number: 2423629-4). For more information, see “TE Cable Specifications” on.
- RG-58 cable from Samtec (Part number: RSP-228559-01). For more information, see “Samtec Cable Specifications” on.

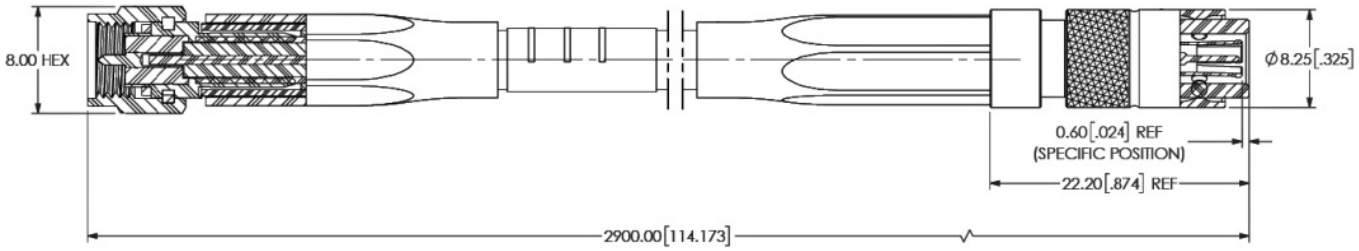
TE Cable Specifications



Electrical Characteristics	
Impedance	50 Ω
Frequency	DC-3GHz

Electrical Characteristics	
Voltage Rating	170 Vrms
Dielectric Withstanding Voltage	750 V min
Insulation Resistance	500 MΩ
Insertion Loss	4 dB max
V.S.W.R	1.2 max

Samtec Cable Specifications



Electrical Characteristics	
Impedance	50 Ω
Frequency	3GHz
Dielectric Withstanding Voltage	750 V
V.S.W.R	1.3 max

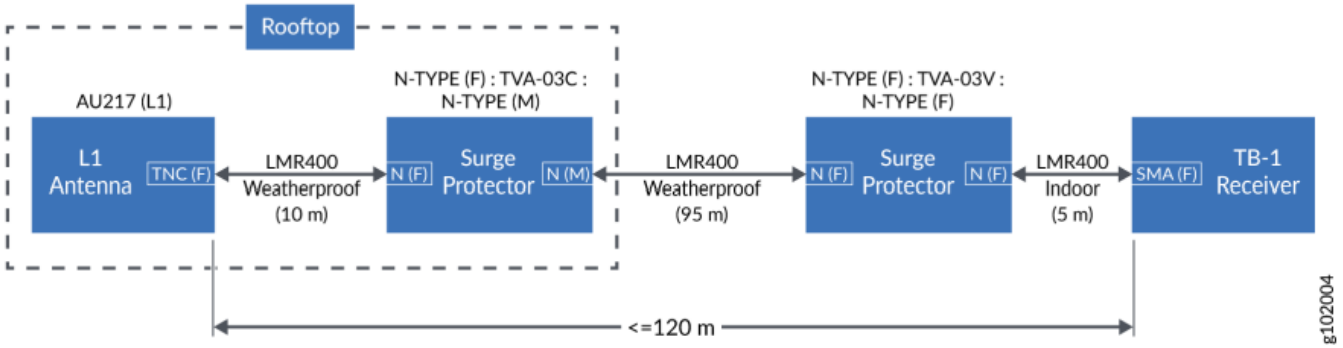
Antenna Cable Specifications

IN THIS SECTION

- LMR400 (10-m Segment) Cable Specifications
- LMR400 (95-m Segment) Cable Specifications
- LMR400 (5-m Segment) Cable Specifications

The following topology depicts the antenna cable connections with connector types. Use this topology as an example to install the antenna cables.

Figure 1: LMR400 Cable Connections

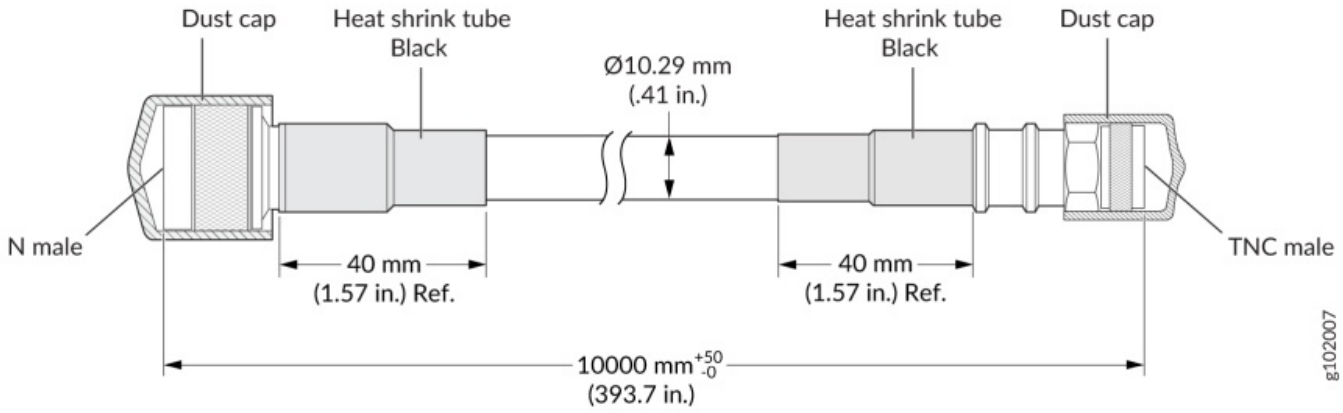


Juniper has tested this topology with the following LMR400 cables:

- LMR400 (10-m segment) from TE Connectivity (Part number: CD-2430293). For more information, see “LMR400 (10-m Segment) Cable Specifications” on page 8 .
- LMR400 (95-m segment) from TE Connectivity (Part number: CD-2430295). For more information, see “LMR400 (95-m Segment) Cable Specifications” on page 8.
- LMR400 (5-m segment) from TE Connectivity (Part number: CD-2430297). For more information, see “LMR400 (5- m Segment) Cable Specifications” on page 9.

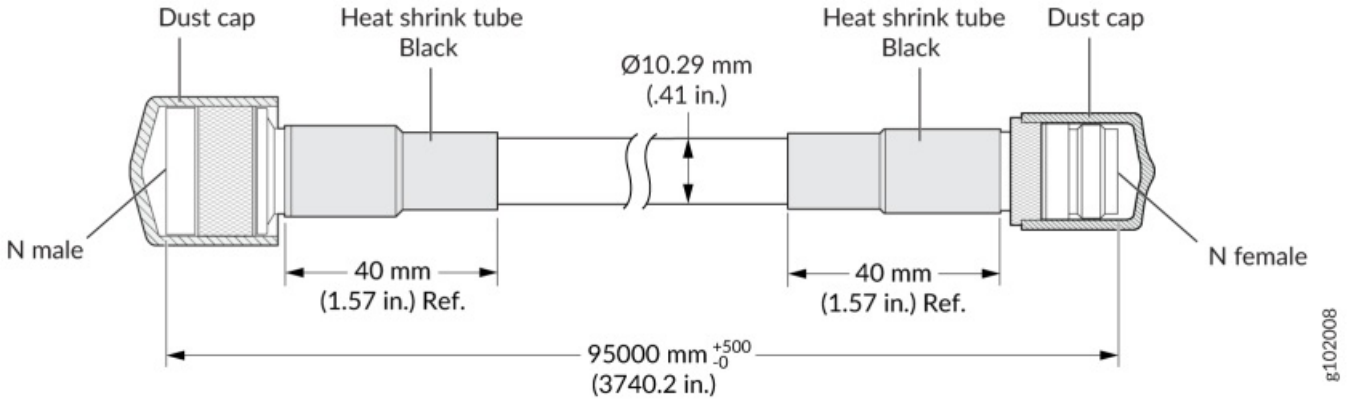
You must ensure that you install a surge protector to protect the GNSS receiver from lightning surges. This topology uses TVA-03C and TVA-03V surge protectors. For more information about the surge protectors, see Coaxial lightning arrestor TVA-03.
The following sections describe the antenna cable specifications:

LMR400 (10-m Segment) Cable Specifications



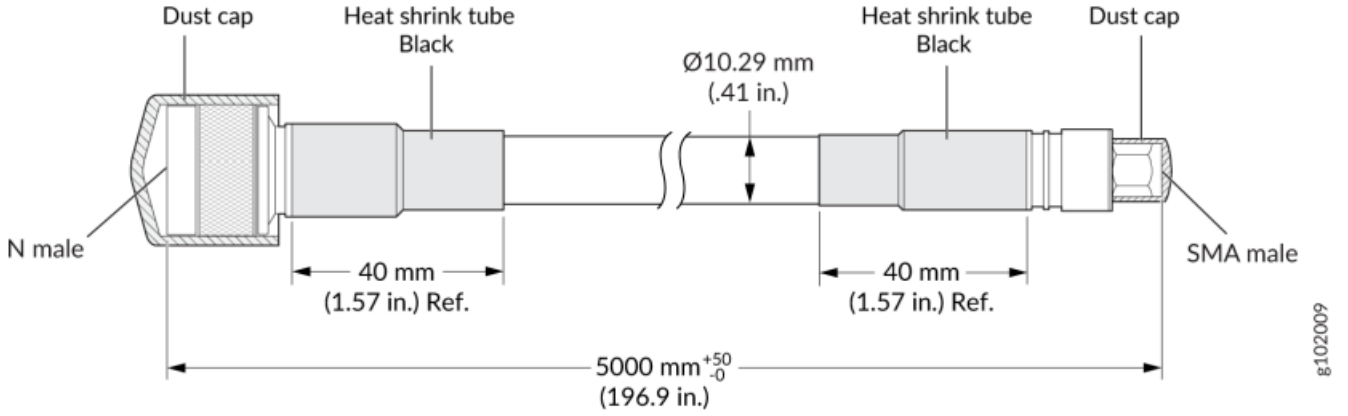
Electrical Characteristics	
Impedance	50 Ω
Frequency	DC-3GHz
Voltage Rating	335 Vrms
Dielectric Withstanding Voltage	> 1000 V
Insulation Resistance	> 5000 MΩ

LMR400 (95-m Segment) Cable Specifications



Electrical Characteristics	
Impedance	50 Ω
Frequency	DC-3GHz
Voltage Rating	335 Vrms
Dielectric Withstanding Voltage	> 1000 V
Insulation Resistance	> 5000 MΩ

LMR400 (5-m Segment) Cable Specifications



Electrical Characteristics	
Impedance	50 Ω
Frequency	DC-3GHz
Voltage Rating	335 Vrms
Dielectric Withstanding Voltage	> 1000 V
Insulation Resistance	> 5000 MΩ

Cabling Guidelines

Follow these guidelines when you install cables:

- Ensure that the GNSS dongle can track the satellites and can acquire a lock.
- Examine the cable endpoints and connectors for any bends or damage.
- Check the electrical continuity of the cable for both inner and outer conductors.
- Check for any electrical short in cables.
- Inspect the cable outer sheath for any damage.

ACX7024 Device GNSS Configuration

The ACX7024 device supports the G.8275.1 profile, Telecom Grand Master (T-GM) time management functionality for all devices on the network on 10G and 25G ports. Additionally, the system supports the following functionalities:

- Compliance to ITU-T G.8272 (Unified functional architecture for transport networks) PRTC Class A.
- Support for multiple constellations such as GPS, GLONASS, QZSS and Galileo.
- Support for multipath spoofing, jamming, interference detection and isolation mechanisms.

Use the following commands to configure the T-GM functionality:

- set chassis synchronization GNSS-receiver <(0/1)> receiver-type ‹name>
- set chassis synchronization GNSS-receiver <(0/1)> interface

Use the following commands to enable GM functionality:

- set protocols to clock-mode ordinary
- set protocols to profile-type g.8275.1
- set protocols to master interface ‹interface-name> multicast-mode transport ie-802.3
- pp-mode
- GNSS-receiver
- show chassis synchronization GNSS-receiver extensive
- show chassis synchronization extensive
- show pop lock-status detail

In T-GM mode router functions as an ordinary clock and all PTP-configured ports are in a “Master only” state. Up to 512 master ports are supported on ACX7024.

NOTE: A synchronous Ethernet (SyncE) input is not allowed when the system is functioning as a T-GM. Use the following command to configure a wait-to-restore check for SyncE input: set chassis synchronization source interfaces et-0/0/4 quality-level PRC wait-to-restore 0

Configure GNSS Receiver

- The Furuno TB-1 GNSS receiver is designed to operate with multiple constellations. When connected to an external
- GNSS antenna, the receiver contains all the circuitry necessary to automatically acquire GNSS satellite signals, track
- GNSS satellites, and acquire precise position and timing solutions. It provides 1 pulse-per-second (PPS)

precision timing and stable 10-MHz frequency output.

- To optimize the GNSS capability, establish a common time scale and coordinated system between all the systems. This coordinated system simplifies network synchronization and provides flexibility and resiliency.
- Table 1 describes the steps to configure the GNSS receiver on the ACX7024 router.

Table 1: GNSS Receiver Configuration

Configuration Step	Command

Step 1: (Mandatory) Enable GNSS receiver and grand master clock functionality. Enable the GNSS receiver by using the gnss-receiver 0 interface statement at the edit chassis synchronization hierarchy level. By enabling the GNSS receiver, you establish communication between the ACX7024 router and the GNSS receiver. Configure the satellite constellation by using the gnss-receiver 0 constellation statement at the edit chassis synchronization hierarchy level. Various constellations are available. Through this configuration, you can configure the GNSS receiver to explicitly use a specific constellation or combination of constellations. For more information, see clock-mode, profile-type, transport- ieee-802.3, gnss-receiver, and ptp-mode.	1. Set clock mode. [edit protocols ptp] user@host# **set clock-mode ordinary** 2. Set G.8275.1 profile type. [edit protocols ptp] user@host# **set profile-type g.8275.1** 3. Set transport protocol as IEEE 802.3. [edit protocols ptp master interface *interface name* multicast- mode] user@host# **set transport ieee-802.3** 4. Set the GNSS receiver interface. [edit chassis synchronization gnss-receiver *number*] user@host# **set interface** 5. Configure the GNSS receiver type as TB-1. [edit chassis synchronization gnss-receiver *number*] user@host# **set receiver-type *tb-1*** 6. Set the GNSS receiver constellation. [edit chassis synchronization gnss-receiver *number*] user@host# **set constellation** 7.Set PTP mode for FPC and PIC. [edit chassis fpc 0 pic 0] user@host# **set ptp-mode**

Step 2: (Optional) Specify the position mode. TB-1 as timing receiver has two different position modes— position-fix-mode and survey-mode. The default position mode is survey-mode if no specific mode is configured. • position-fix-mode: Use this mode when you know the accurate antenna location. • survey-mode: Use this mode when you do not know the fixed location of the antenna. For more information about position mode, see gnss-receiver.	[edit chassis synchronization gnss-receiver *number*] user@host# **set position-mode**

Configuration Step	Command
Step 3: (Optional) Specify the cable delay compensation value. This configuration is used to compensate the delay introduced due to RF cable which is routed from Antenna to TB-1 RF input. You can also use this command to compensate the PPS cable delay by adding both RF cable and PPS cable delays. For long cable runs, this delay can be significant. The range is from -1000000 to 1000000 nanoseconds. For more information about cable delay compensation, see gnss- receiver.	[edit chassis synchronization gnss-receiver *number*] user@host# **set cable-delay-compensation *value***
Step 4: (Optional) Specify the Signal-to-Noise Ratio (SNR) threshold value. The SNR is the ratio of the signal power to the noise power. GNSS receiver measures SNR value to indicate the signal strength of the received satellite signal and the noise density. You can configure the SNR threshold value. Satellites with the signal level equal to or above the threshold value can only be used for positioning. • range: 0 – 99 dBHz For more information about SNR threshold, see gnss-receiver.	[edit chassis synchronization gnss-receiver *number*] user@host# **set snr-threshold *value***

Step 5: Commit the configuration.	[edit] user@host# **commit**
Step 6: Verify the configuration. For more information about the operational commands, see show chassis synchronization gnss-receiver extensive, show chassis synchronization extensive, and show ptp lock-status detail.	[edit] user@host# **run show chassis synchronization gnss-receiver extensive** [edit] user@host# **run show chassis synchronization extensive** [edit] user@host# **run show ptp lock-status detail** [edit] user@host# **run show ptp clock detail**

Configuration Statements

clock-mode

Syntax

- clock-mode (ordinary);

Hierarchy Level

- [edit protocols ptp]

Description

Configure the clock mode as an ordinary clock with GNSS configuration. The clock mode determines whether the

node behaves as a client or a primary node. This attribute is mandatory and has no default value.

Options

The clock mode of the node is a system clock that acts either as a primary node or as a client node.

Required Privilege Level

- routing-To view this statement in the configuration.
- routing-control adds this statement to the configuration.

profile-type

Syntax

profile-type (g.8275.1);

Hierarchy Level

[edit protocols ptp]

Description

On the ACX7024 router, configure the G.8275.1 profile for GNSS configuration that requires accurate phase and time synchronization. This profile supports the architecture defined in ITU-T G.8271.1 specification to enable the distribution of phase and time with full timing support. This profile requires all devices in the network to operate in combined or hybrid modes. To fulfil this requirement, you must enable Precision Time Protocol (PTP) and Synchronous Ethernet on all devices.

Options

g. 8275.1-Enable the G.8275.1 PTP profile.

Required Privilege Level

- routing-To view this statement in the configuration.
- routing-control adds this statement to the configuration.

Administrative Commands

ptp-mode

Syntax (ACX7024)

ptp-mode;

Hierarchy Level

[edit chassis fpc name pic name]

Description

- The PTP mode configuration is mandatory to enable the PTP ordinary clock feature in ACX7024.
- When you enable PTP mode, the system disables one of the ports that are used for data traffic. For example, on ACX7024, when you enable PTP mode, port 27 is disabled.
- For more information about valid port configurations on the ACX7024 router, see Port Speed on the ACX7024 Router.

Required Privilege Level

- interface view this statement in the configuration.
- Interface-control adds this statement to the configuration.

gnss-receiver

Syntax (ACX7024)

```
gnss-receiver {
      cable-delay-compensation;
      constellation {
            galileo (e1);
            glonass (l1of);
            gps (l1ca);
            qzss (l1ca);
      }
      interface;
      position-mode {
            position-fix-mode (latitude | longitude | altitude);
            survey-mode (survey-length);
      }
      receiver-type;
      snr-threshold
}
```

Hierarchy Level
[edit chassis synchronization]

Description
Configure GNSS receiver with ACX7024 router. The GNSS receiver receives signals from a navigation satellite constellation. The receiver gains precise phase and time information by processing these signals and delivers the information across the packet network.

Options

cable-delay-compensation-GNSS receiver unit to router RF cable delay compensation in nanoseconds. You can specify a value in nanoseconds to compensate for the delay that the cable introduces.

- **Range:** -1000000 through 1000000 nanoseconds constellation- Various constellations are available. You can configure the GNSS receiver to explicitly use a specific constellation or combination of constellations.
  The following constellations are available:
- **GPS:** Enables detection and locking to the GPS constellation.

GPS signals enable you to determine the position of the receiver on earth and maintain a high level of time accuracy.

The GPS L1CA receiver with 10MHz clock frequency output is synchronized to a GPS satellite.

NOTE: You can use only GPS L1CA to configure the GNSS receiver.

- **galileo:** Enables detection and locking to the GALILEO constellation.
- **GLONASS:** Enables detection and locking to the GLONASS constellation.
- **qss:** Enables detection and locking to the QZSS constellation. interface-Enable/Disable GNSS port/slot communication.

  NOTE: For the ACX7024 router, only one port of the GNSS receiver is supported. position-mode-GNSS receiver's position modes. You can configure two position modes of the GNSS receiver- position-fix- mode and survey mode. position-fix-mode: Use this mode when you know the accurate antenna location.
- **Latitude**— Latitude in degrees.
- **Range:** -90.0000000 to 90.0000000 degrees
- **Longitude—** Longitude in degrees.
- **Range:** -180.0000000 to 180.0000000 degrees
- **Altitude—** Altitude in meters.
- **Range:** -1000 to 18000 meters

  NOTE: Be cautious when you use this mode. Ensure that you configure the correct position. Configuring the wrong position might cause erroneous receiver function and faulty grandmaster clock performance.
- **survey-mode:** Use this mode when you do not know the fixed location of the antenna.
- GNSS receiver does a self-survey of its position for a period mentioned in survey length and then moves to position fix mode. This is the default mode and the default survey length is 120 minutes. receiver-type— Only TB-1 is supported as the GNSS receiver.
- GNSS receiver does a self-survey of its position for a period mentioned in survey length and then moves to position fix mode. This is the default mode and the default survey length is 120 minutes. receiver-type— Only TB-1 is supported as the GNSS receiver. snr-threshold- GNSS receiver measures the signal-to-noise ratio (SNR) value to indicate the signal strength of the received satellite signal and the noise density. You can configure the SNR threshold value. You can perform positioning by using only those satellites that have signal levels equal to or above the threshold value with a range of 0 to 99 dBHz.

Required Privilege Level

- interface view this statement in the configuration.
- Interface control adds this statement to the configuration.

transport-ie-802.3

Syntax
transport ie-802.3;

Hierarchy Level
[edit protocols to master interface ‹interface-name> multicast-mode]

Description
Configure Ethernet as the encapsulation type for the transport of Precision Time Protocol (PTP) packets. Ethernet

encapsulation type is supported for transmission of PT packets in multicast mode.

NOTE: The transport statement is mandatory in the configuration of a primary clock.

Options
802.3-Enable encapsulation for PTP packet transport in multicast mode. link-local-Enable primary or client to choose either of the two MAC addresses defined in the IEEE 1588-2008 standard. When you configure this option, the system attempts to use the MAC address (link-local multicast address) for multicast transmission.

If the link-local multicast address is not available, the system uses the standard Ethernet multicast address as a second priority. The link-local multicast MAC address ensures complete end-to-end support of PTP and eliminates the chance of packet transmission through any network element that does not support PTP. The address is the default address for G.8275.1 (PTP profile for time or phase distribution), and a node with this MAC address is a node that supports the processing of PTP packets.

Required Privilege Level

- routing-To view this statement in the configuration.
- routing-control adds this statement to the configuration.

Monitoring Commands

show chassis synchronization extensive

Syntax
show chassis synchronization extensive

- < interface interface-name>
- <no-forwarding>

Description
Display detailed clock synchronization information.

Options

- **interface interface-name** (Optional) Display clock synchronization information for the specified interface. no-forwarding
- **(Optional)** Display clock synchronization information for interfaces configured with a- forwarding option.

Required Privilege Level
maintenance

Output Fields
Table 1 lists the output fields for the show chassis synchronization extensive command. Output fields are listed in the approximate order in which they appear.

Table 2: show chassis synchronization extensive Output Fields

Field Name	Field Description
Current clock status	Indicates the current status of chassis synchronization: • Locked—Clock is operational. • Holdover—Clock is not operational. • Freerun—Clock is locked to the free-run local oscillator. • Acquiring—Clock is attempting to acquire a lock on the specified clock source.
Clock locked to	The source to which the clock is locked. The clock can be locked to either the primary source or the secondarysource.
SNMP trap status	Indicates the SNMP trap generation status (Enabled or Disabled) on ACX7024 router.

Sample Output
show chassis synchronization extensive

```
user@host> show chassis synchronization extensive
Current clock status  : LOCKED
Clock locked to       : Primary
SNMP trap status      : Disabled

Configured ports:

Name                : gnss-rx-0
Current ToD         : Sat Nov 12 14:14:19 2022 PST
Last ToD update     : Sat Nov 12 14:14:18 2022 PST
GPS receiver status : Synchronized
UTC Pending         : FALSE
UTC Offset          : 37

One PPS status : Active
```

Syntax
show ptp lock-status detail

Description
Display information about the lock status of the client. The output verifies whether the ACX7024 is locked to the GNSS receiver or not.

Options
This command has no options.

Required Privilege Level
View

Output Fields
Table 1 lists the output fields for the show to lock-status detail command. Output fields are listed in the approximate order in which they appear.

Table 3: show ptp lock-status detail Output Fields

Field Name	Field Description
Lock State	State of the client clock with respect to its primary clock: • Freerun • Holdover • Phase Aligned • Acquiring • Initializing
State since	Date, time, and how long ago the lock status of the PTP client or client clock changed. T he format is State since year-month-day hour:minute:second: timezone (hour:minute: second ago). For example, 2022-11-10 04:18:40 PST (00:47:10 ago).
Source	Information about external clock sources.

Sample Output

show oto lock-status details

```
user@host> show ptp lock-status detail
Lock Status:

Lock State    : 5 (PHASE ALIGNED)
State since   : 2022-11-10 04:18:40 PST (00:47:10 ago)

Source: GNSS
```

show chassis synchronization gnss-receiver extensive

Syntax
show chassis synchronization GNSS-receiver extensive <time>

Description
Display information about the status of the GNSS receiver.

Options
(Optional) Display GNSS receiver time information in detail.

Output Fields
Table 1 lists the output fields for the show chassis synchronization GNSS-receiver extensive command. Output fields are listed in the approximate order in which they appear.

Table 4: show chassis synchronization GNSS-receiver extensive Output Fields

Field Name	Field Description

Lock status	Indicates the lock status of the GNSS receiver: • Warmup—In this state the GNSS receiver waits for internal clock synchronization after you turn on the power supply. • Pull-in—In this state the receiver receives the signal from a satellite constellation. • Coarse-lock—In this state the receiver is locked to a satellite constellation but requires further synchronization. • Fine-lock—In this state the receiver is locked accurately to the satellite constellation and starts synchronizing. • Holdover—In this state the GNSS RF signals are lost or not strong enough to enable locking. • Out of Holdover—In this state 10-MHz frequency and 1-PPS signal are beyond holdover specification.
Receiver-type	Indicates the type of the receiver. **NOTE**: Only TB-1 is supported.
Port Status	Indicates the status of the configured port. • Up— TB-1 is connected to ACX7024 and can communicate over channel. • Down— TB-1 is not connected.
Port Details	GNSS receiver port details, type of interface, and speed.

Current TOD	The current time of the day indicated by the receiver.
UTC Pending	The status of UTC leap collection by the receiver. • True— UTC parameters are not available. • False— UTC parameters are available.
UTC offset (TAI-UTC)	UTC offset between International Atomic Time (TAI) scale and Coordinated Universal Time (UTC) scale.
Future leap sec & schedule	Indicates the schedule and leap second correction values. A leap second is a one-second adjustment that is occasionally applied to Coordinated Universal Time (UTC) in order to keep its time of day close to the solar time.
1PPS STATUS	Indicates PPS signal received on the GPS interface of ACX7024. • Available— 1PPS from TB-1 is received on the GPS interface. • Not available—1PPS from TB-1 is not received on the GPS interface.
10mhz status	Indicates frequency output status of 10-MHz availabilty from receiver. • Available—10-MHz frequency from TB-1 is received on the GPS interface. • Not available—10-MHz frequency from TB-1 is not received on the GPS interface.
Time source	The standard time source to which the receiver current time is aligned.

Alarms	Alarm signals or messages. Possible messages are: • Spoofing detected • Jamming detected • Antenna short circuit • Receiver oscillator error • Receiver data errors • No PPS • No 10MHz
Antenna port status	Status of the configured antenna. • Open— No antenna is connected. • Good— Antenna is connected and detected. • Bad— Antenna is connected but failed to detect due to less antenna power circuitry within receiver.
Constellation	Satellite constellation that GNSS detects and locks to.
Position mode	Position modes of the GNSS receiver.
Self Survey Length	Duration for which the GNSS receiver can survey its own position before moving to po sition-fix- mode. The Self-survey length is specified in minutes.
Cable Delay Compens ation	Indicates the time duration to compensate the delay introduced due to RF cable which is routed from the antenna to TB1 RF input. Cable delay compensation is specified in nanoseconds.

Latitude	GNSS receiver’s latitude in degree minutes.
Longitude	GNSS receiver’s longitude in degree minutes.
Altitude	GNSS receiver’s altitude in meters.

Alarms	Alarm signals or messages. Possible messages are: • Spoofing detected • Jamming detected • Antenna short circuit • Receiver oscillator error • Receiver data errors • No PPS • No 10MHz
Antenna port status	Status of the configured antenna. • Open— No antenna is connected. • Good— Antenna is connected and detected. • Bad— Antenna is connected but failed to detect due to less antenna power circuitry within receiver.
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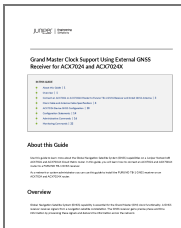
Cable Delay Compens ation	Indicates the time duration to compensate the delay introduced due to RF cable which is routed from the antenna to TB1 RF input. Cable delay compensation is specified in nanoseconds.
Latitude	GNSS receiver’s latitude in degree minutes.
Longitude	GNSS receiver’s longitude in degree minutes.
Altitude	GNSS receiver’s altitude in meters.

Sample Output
show chassis synchronization gnss-receiver extensive

```
user@host> show chassis synchronization gnss-receiver extensive

Lock status                    : warmup / pull-in / coarse-lock / fine-lock / holdover / out of holdover
Receiver-type                  : TB-1
Port Status                    : Up / Down
Port Details                   : UART 9600 bps / USB
Current ToD                    : 05:02:15 29/11/2019
UTC Pending                    : FALSE
UTC offset (TAI-UTC)           : 37
Future leap sec & schedule     : -99/+99 date and Time
1PPS STATUS                    : Available /Not available
10MHz status                   : Available /Not available
Time source                    : GPS/UTC/USNO/SU/Eu/NCIT
Alarms                         : NONE
Antenna port status:           : Open/Good(connected)/Bad
Constellation                  : GPS L1CA
Position mode                  : Position-fix-mode/survey-mode
Self Survey Length             : 120 mins
Cable Delay Compensation       : 0 ns
Snr-threshold                  : 0 dBHz
Latitude                       : 37 33' 0.036000'' N
Longitude                      : 126 58' 23.483999'' E
Altitude                       : 976 m
No. of Satellites Used         : 13
Visible Satellite List:
Sat-Num   Signal-level     Status        Type
222       41    dBHz       Acquired      GPS
216       40    dBHz       Acquired      GPS
213       40    dBHz       Acquired      GPS
209       39    dBHz       Acquired      GPS
202       39    dBHz       Acquired      GPS
221       38    dBHz       Acquired      GLONASS
205       37    dBHz       Acquired      Galileo
```

Documents / Resources

	**JUNIPER NETWORKS ACX7024 Grand Master Clock Support** [pdf] User Guide ACX7024, ACX7024X, ACX7024 Grand Master Clock Support, ACX7024, Grand Master Clock Support, Master Clock Support, Clock Support, Support

References

- Box
- Box
- Coaxial lightning arrestor TVA-03C/TVA-03V | GPS/GNSS Antennas | Products | FURUNO
- Port Speed Overview | Junos OS | Juniper Networks
- User Manual