



THUNDERBOLT

PTP GM200 IEEE-1588 GRANDMASTER CLOCK
NTP TIME SERVER

USER GUIDE

For use with: Thunderbolt® PTP Grandmaster Clock (P/N 111224-10)

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- an explanation of the problem

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equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

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CE 0700

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declare under sole responsibility that
the product: Thunderbolt® PTP
Grandmaster Clock complies with
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Operation is subject to the following
two conditions:

(1) this device may not cause harmful
interference, and (2) this device must
accept any interference received,
including interference that may cause
undesired operation.

List of Abbreviations

A-GPS	Assisted GPS
C/No	Carrier-to-Noise power ratio
DC	Direct Current
DOP	Dilution of Precision
EGNOS	European Geostationary Navigation Overlay Service
ESD	Electrostatic Discharge
GLONASS	Globalnaya Navigatsionnaya Sputnikovaya Sistema
GND	Ground
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
I/O	Input / Output
LNA	Low Noise Amplifier
NMEA	National Marine Electronics Association
NTP	Network Time Protocol. Common time distribution over networks
OCXO	Oven Controlled Crystal Oscillator
OD mode	Over-determined clock mode
PoE	Power over Ethernet
PCB	Printed Circuit Board
PDOP	Position Dilution of Precision
PPS	Pulse per Second
PTP	Precision Time Protocol (IEEE-1588)
QZSS	Quasi-Zenith Satellite System
RF	Radio Frequency
Sync E	Synchronous Ethernet
TCXO	Temperature Controlled Crystal Oscillator
ToD	Time of Day
T-R AIM	Timing Receiver Autonomous Integrity Monitoring
T-S UTC	Universal Time Coordinated
VCC	Voltage at the Common Collector; positive supply voltage
VSWR	Voltage Standing Wave Ratio

Safety Information

Warnings and Cautions

Always follow the instructions that accompany a Warning or Caution. The information it provides is intended to minimize the risk of personal injury and/or damage to property. In particular, observe safety instructions that are presented in the following format:

WARNING – This alert warns of a potential hazard which, if not avoided, could result in severe injury or even death.

CAUTION – This alert warns of a potential hazard or unsafe practice which, if not avoided, could result in injury or property damage or irretrievable data loss.

CAUTION – Electrical hazard – risk of damage to equipment. Make sure all electrostatic energy is dissipated before installing or removing components from the device. An electrostatic discharge (ESD) can cause serious damage to the component once it is outside the chassis.



This system can become extremely hot and cause burns. To reduce the risk of injury from a hot system, allow the surface to cool before touching it.

Operation and storage

WARNING – Operating or storing the Thunderbolt® PTP Grandmaster Clock outside the specified temperature range can damage it. For more information, see the product specifications on the data sheet.

WARNING – The Thunderbolt PTP Grandmaster Clock is only to be used in a restricted access location.

WARNING – Short-circuit (overcurrent) protection device required. The Thunderbolt PTP Grandmaster Clock relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is listed rated not greater than 10A.

Routing any cable

CAUTION – Be careful not to damage the cable. Take care to avoid sharp bends or kinks in the cable, hot surfaces (for example, exhaust manifolds or stacks), rotating or reciprocating equipment, sharp or abrasive surfaces, door and window jambs, and corrosive fluids or gases.

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1. Introduction

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1.1 Product Overview

Trimble's Thunderbolt® Grandmaster Clock GM200 is a Stratum 1 IEEE-1588 PTP Grandmaster clock with an integrated Trimble GNSS receiver. The Thunderbolt PTP GMC is designed and optimized for the deployment in wireless service provider networks to meet the stringent time & phase requirements of 4G LTE and small cell networks.

It provides NTP, PTP and Synchronous Ethernet timing protocols. Thunderbolt PTP GMC GM200 uses GNSS (Global Navigation Satellite Systems) signals from GPS, GLONASS, Galileo, and Beidou as the primary time source for synchronization.

Thunderbolt PTP can use its built-in, disciplined OCXO (oven controlled crystal oscillator) as autonomous time base for providing several hours of accurate holdover in case that GNSS signals are not available.

Hardware redundancy can be achieved by using two Thunderbolt PTP Grandmaster clocks.

Thunderbolt PTP comes in a rack-mountable enclosure; two Thunderbolt PTP units fit side-by-side in a 1RU height 19" rack.

1.2 Key features

- IEEE-1588 Precision Time Protocol Grandmaster
- Network Time Server (NTP v4)
- Synchronous Ethernet
- Multi-GNSS Receiver (GPS, GLONASS, Beidou and Galileo)
- 1 RJ45 Dedicated Management Port
- 1 RJ45 Port (NTP/PTP/SyncE)
- 1 SFP interface (NTP/PTP/SyncE)
- 1 BNC port (PPS and 10MHz outputs)
- IPv4, IPv6 and VLAN support
- 1 EIA-232 (RS-232) Serial Port with ToD output (NMEA ZDA or RMC)
- Small foot print – ½ Rack 1U
- SNMP traps
- DC (default) and AC power options
- PTP/SyncE Input
- PTP Freerun mode

- PTP APTS mode
- PTP T-BC mode

1.3 Physical specifications

1.3.1 ETSI standard 19" rack mounting

The Thunderbolt GM200 can be installed in a 19" half rack size mount unit with 1U form factor.

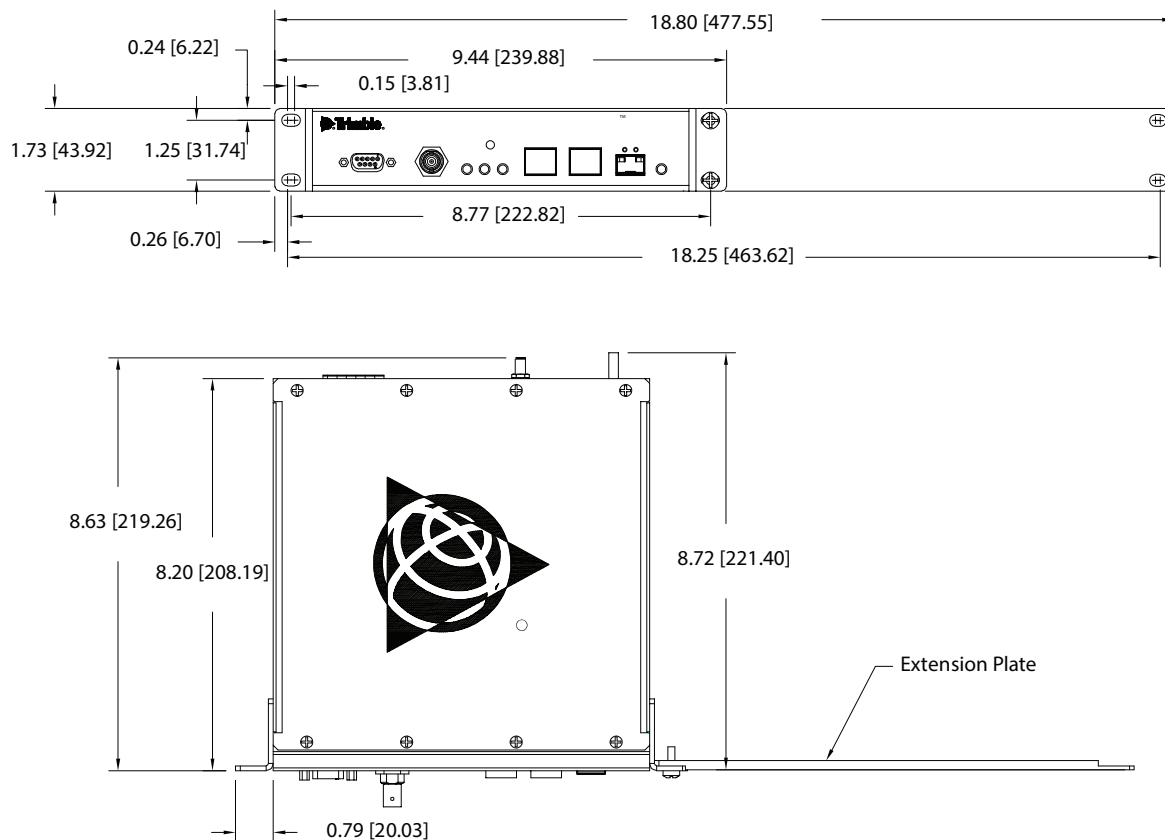
You can install one Thunderbolt GM200 unit with a rack mounting extender (included in the product box in the ETSI standard 19" rack)



or two Thunderbolt GM200 units, installed side-by-side in a full rack space for additional redundancy.



1.3.2 Mechanical spec diagram



1.4 Performance

The Thunderbolt GM200 can support:

- 32 PTP clients at 128 packets per second in most profiles and configurations.

NOTE – When IEEE 1588, G.8265 and G.8275.2 profiles are used in unicast, 2-step configuration, the GM200 can support only 8 clients at 128 packets per second.

- A maximum of 500 PTP slaves in any profile.
- Up to 4 VLANs per port. A total of 8 VLANs can be configured across the two Ethernet ports.

1.5 Front panel elements



1.5.1 Comm EIA-232 Serial Port

The EIA-232 (RS-232) serial port provides a craft interface to the Thunderbolt GM200 through an EIA-232 female connector.

1.5.2 Sync Out

The Thunderbolt GM200 features a BNC female connector that provides 1PPS output. It can be configured for 10 MHz (see the set output command).

PPS Voltage: 3.0 V

PPS Output Impedance : 50 Ohms

Default pulse width: 1000 ns

10 MHz: Square wave 3.0 V

10 MHz: Output Impedance 50 Ohms

1.5.3 Status LED

Alarm and status information is presented through the use of four LEDs. In Critical alarm condition the dry contact relay output at the rear of the Thunderbolt device is closed.

LED	Color	Indication	Meaning
Power	Green	ON	System is powered on
		OFF	System does not have power
ANT	Green	ON	Reference acquired & tracking
		Blinking, 1/2 Hz	Reference being acquired, or no computing
		OFF	No reference active or antenna

LED	Color	Indication	Meaning
Sync	Green	ON	Locked
		Blinking, 1/2 Hz	Acquisition or Holdover
		OFF	Free-run or startup
Status	Red	OFF	No active alarms
		ON	Critical alarm
		Blinking, 1 Hz	Minor alarm condition
		Blinking, 1/2 Hz	Major alarm condition

1.5.4 Management Port (Eth 2)

The Thunderbolt GM200 has one dedicated management Ethernet port. The RJ45 port provides connectivity to Ethernet LAN for the configuration of the unit.

1.5.5 Ethernet Port (Eth 1)

One RJ45 Ethernet port, that provides NTP/PTP connectivity to Ethernet Networks.

1.5.6 SFP Port (Eth 0)

The Thunderbolt GM200 supports one SFP port, that provides NTP/PTP connectivity to Ethernet Networks.

The following SFPs have been tested by Trimble:

Part Number	Type	Manufacturer
ABCU-5730ARZ	RJ45	Electrical Avago
SFP-1GBT-05	RJ45	Electrical Belfuse
SFP-1GBT-09	RJ45	Electrical w/SyncE Belfuse

1.6 Back panel elements



1.6.1 GNSS Antenna Connection

The Thunderbolt GM200 features an SMA connector for the antenna input to the embedded GNSS receiver.

1.6.2 Power Input

The standard input power is -48 VDC, 330 mA. The Thunderbolt PTP GMC provides a 5-pole terminal block to connect dual DC power inputs.

1.6.3 Alarm Relay

The Thunderbolt PTP GMC provides a 3.81 mm 3-pin terminal header for the dry relay connection. Both Normally Open (NO) and Normally Closed (NC) connections are available to the user. The relay closure is considered closed in Critical alarm condition.

1.6.4 Grounding

The frame ground connection on Thunderbolt PTP GMC is available through an M5 Grounding Terminal Stud.

1.7 Use and care

The Thunderbolt PTP is a high-precision electronic instrument and should be treated with reasonable care. Thunderbolt PTP typically doesn't need any care after the first setup. Should you need to clean the unit, use a dry non-static tissue or a light moist tissue for removing dust or stain from the enclosure. Make sure that no water enters the Thunderbolt PTP enclosure anywhere. Don't use solvents, aggressive or abrasive cleaning agents anywhere on the Thunderbolt PTP device.

CAUTION – There are no user-serviceable parts inside the Thunderbolt PTP Grandmaster Clock and any modification to the unit by the user voids the warranty.

1.8 Technical assistance

If you have a problem and cannot find the information you need in the product documentation, contact the Trimble Technical Assistance Center at 800-767-4822 or email tsgsupport@trimble.com.

2. Installation

- ▶ Getting started
- ▶ Mounting the device to a rack
- ▶ Connecting Power
- ▶ GNSS considerations
- ▶ Communication ports

2.1 Getting started

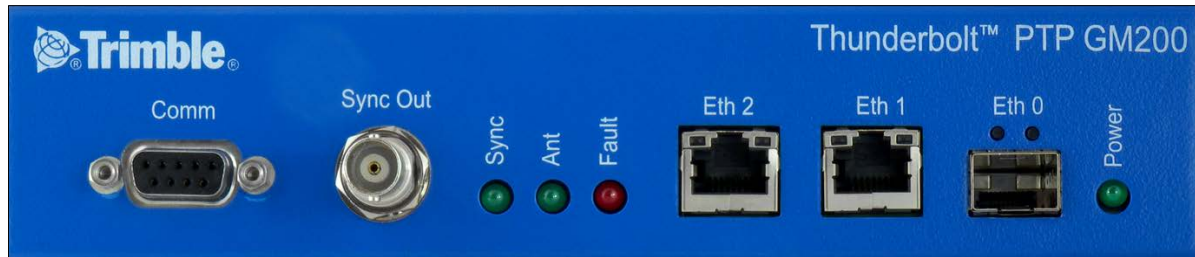
This section explains how to install and configure the Thunderbolt PTP GMC GM200.

Unpack and inspect the content of package. The following items are included in the standard box:

- Thunderbolt PTP Grandmaster Clock GM-200
- Mounting brackets and installation accessories
- Dummy plate for single unit installation in 19" rack

2.2 Mounting the device to a rack

The Thunderbolt PTP GM200 should be installed indoor or outdoor in an environmental controlled cabinet.



ETSI Standard 19 Inch Rack Mounting

GM200 supports 19" half rack size with 1U form factor.

You can install one GM200 with a rack mounting extender, included in the product box in the ETSI standard 19" rack, or can install two GM200 units side by side.

The figure below shows the image of a single GM200 installation.



Below is the Rack Mounting Extender (included in the GM200 box).



The figure below shows the image of dual GM200 installation.



NOTE – Forced airflow is not required.

2.3 Connecting Power

The Thunderbolt PTP GM200 supports single or dual redundant AC or DC power supplies. The standard option is 48 VDC. The unit is capable of operating from -36 VDC to -72 VDC.

The DC input is reverse polarity protected. Reversing polarity with 48 VDC options will not cause damage to the unit and the unit will operate normally.

NOTE – The power cable should be routed separately from the data (signal) cables.

The table below shows the DC power interface information:

Item	Description	Note
Interface Name	DC Power	
Connector Type	Terminal block	
Number of Power input	Dual -48 VDC input	
Max. DC Power Input Range	-36 VDC to -72 VDC	
Max. AC Power Input Range	85 VAC ~ 264 VAC input	With AC/DC power adapter accessory
Overall Power Consumption	Max 16 W	Normal 8 W
Power damage Protection	<ul style="list-style-type: none"> • Over Current Protection • Over Voltage Protection • Reverse Power Polarity input Protection • Power Line Surge Protection 	
Related Alarms Generation	No related alarm generation for DC Power interface connection and operation	

The GM200 is powered by -48 VDC with the default power input terminal block.

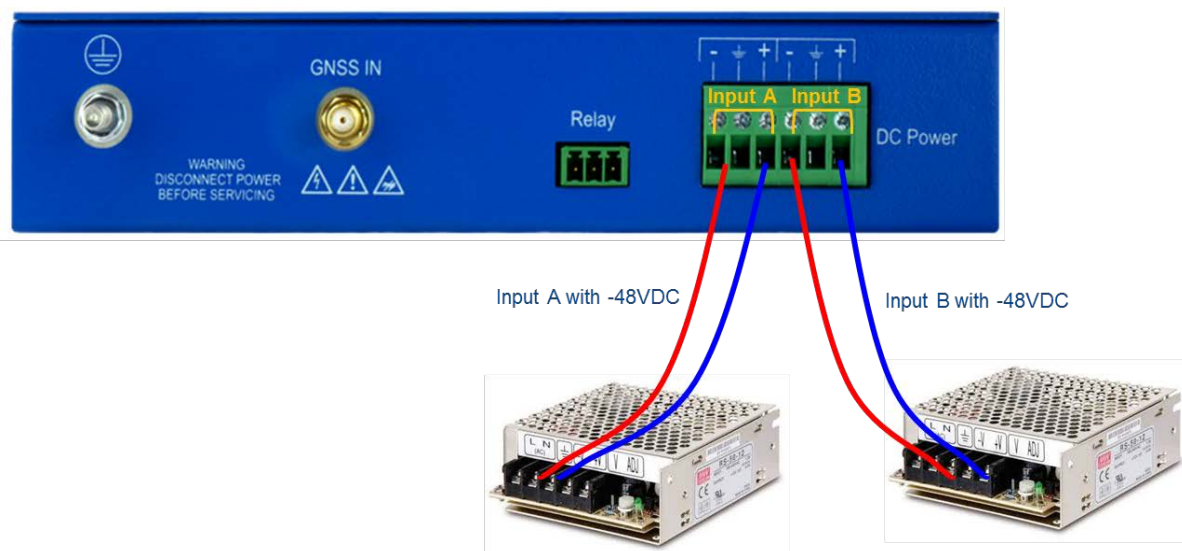
However, if you use a Trimble AC/DC power adapter accessory, you can power the GM200 with AC power with 100 A ~ 240 VAC range.

The GM200 does not have any alarms related with power input failure or related operation except 'Relay' operation.

2.3.1 DC Power connection

The image below shows how to connect dual -48 VDC.

The GM200 supports "Reverse Power Polarity input" protection, so you can connect -48 VDC and GND cable to "-" and "+" as a pair to each input terminals without considering order.

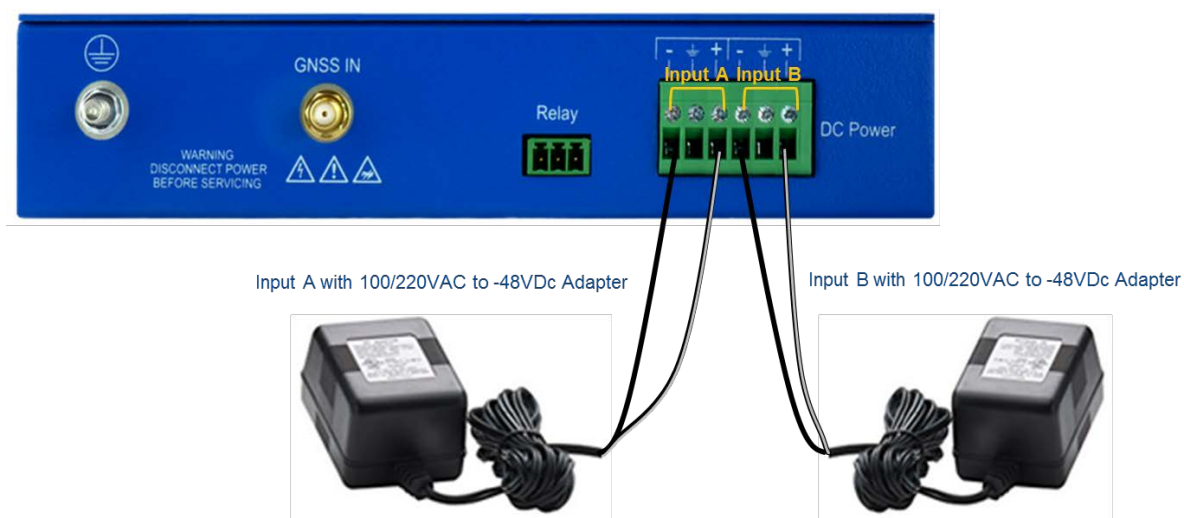


2.3.2 AC Power Connection

The image below shows how to connect dual 100/220 VAC power.

To supply 100/220VAC power, you must use the Trimble AC/DC Power Adapter Accessory (P/N : TPN 120852).

GM200 supports "Reverse Power Polarity input" protection, so you can connect the two strip lines from AC/DC adapter to "-" and "+" as a pair to each input terminals without considering order.



2.3.3 Grounding the Device

The Thunderbolt PTP GM200 M5 Terminal Stud on the back panel is used for grounding. The Thunderbolt PTP GM200 is suitable for connection to the Central Office and CPE. The grandmaster clock must be located in a restricted access location where only craft personnel are allowed access.

The Thunderbolt PTP GM200 must be grounded via a copper ground conductor. The unit must be installed and connected to the common bonding network (CBN).

All bare grounding connection points to the Thunderbolt PTP GM200 must be cleaned and coated with an anti-oxidant solution before connections are made.

All surfaces on the Thunderbolt PTP GM200 that are un-plated must be brought to a bright finish and treated with an anti-oxidant solution before connection is made.

All non-conductive surfaces on the Thunderbolt PTP GM200 must be removed from all threads and connection points to ensure electrical continuity.

The Thunderbolt PTP GM200 DC power returns must be treated as DC-I (Isolated from Frame Ground).

Thunderbolt PTP GM200 requires a ring terminal with a 14-AWG wire that utilizes 15 in-lbs to secure to primary ground.

There are to be no breaks in the outer shield of the GNSS cable.

2.3.4 Powering-Up

After verification of the input power source, switch on the power supply to the Thunderbolt PTP GM200. The Green Power LED should turn ON.

2.4 GNSS considerations

See the next chapter for a full description of how to choose the correct antenna cable/antenna combination.

When connected to a GNSS antenna the Thunderbolt PTP GMC can receive GNSS signal without user intervention– the factory default is GPS and GLONASS. You can enable Beidou in place of GLONASS or enable single constellation mode.

The Trimble family of Bullet™ antennas is best matched with Thunderbolt PTP GMC. The Bullet antenna has following versions:

- Bullet III GPS only antenna
- Bullet GG GPS and GLONASS antenna
- Bullet L1/L2 GPS Dual Band – L1 and L2 frequencies
- Bullet 40dB GPS L1 high gain (40dB) antenna
- Bullet GB GPS and Beidou antenna
- Bullet 360 GPS, GLONASS, Beidou and Galileo antenna

Connecting the GNSS antenna will turn the antenna LED green.

2.4.1 Selecting site for GNSS antenna

It is important that the GNSS antenna has the fullest possible view of the sky. In most cases, this means installing the antenna on a high point, such as roof top. Avoid overhanging objects such as trees and towers. Also take care to place the antenna away from low lying objects such as neighboring buildings that may block a portion of the sky near the horizon. If a full view of the sky is not possible, mount the antenna aiming towards the Equator to maximize the southern view of the sky (choose a northern view in the Southern Hemisphere).

Use the criteria below to select a good outdoor site for the GPS antenna. The best locations provide:

- Unobstructed views of the sky and horizon.
- Low electromagnetic interference (EMI) and radio frequency interference (RFI) – away from high-power lines, transmitting antennas, and powerful electrical equipment.
- Convenient access for installation and maintenance.
- Reasonable access for the antenna cable to reach the Thunderbolt PTP GMC.

2.5 Communication ports

The Thunderbolt PTP GMC has four communications ports on the front panel:

- 1 Serial port (RS232)
- 1 Management port autosensing Ethernet (eth2) 10/100/1000 Base-T (RJ-45)
- 1 Traffic port autosensing Ethernet (eth1) 10/100/1000 Base-T (RJ-45)
- 1 Traffic port SFP (Small Form-Factor Pluggable)

Either the Serial port or Ethernet eth2 (RJ-45) is the dedicated management port to configure the GMC GM200.

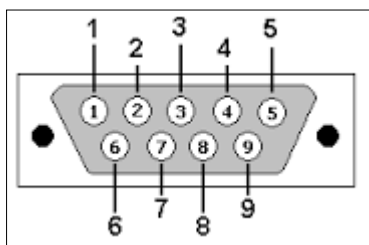
2.5.1 Serial port

A bi-directional EIA standard RS-232 is located on the front panel. The serial port provides access to command line interface (CLI) for limited status and configuration of the Thunderbolt PTP GMC.

Use a straight through cable with the following setting:

Data Rate	115200 baud
Parity	None
Data Bits	8
Stop Bits	1

Serial Port Pin Assignment



Pin	RS-232 Signal	Description on Echo Side
1	DCD	PPS
2	RxD	Data Transmit
3	TxD	Data Receive
4	DTR	Not Used
5	GND	Ground
6	DSR	Not Used

Pin	RS-232 Signal	Description on Echo Side
7	RTS	Not Used
8	CTS	Not Used
9	RI	Not Used

2.5.2 Management Ethernet Port

The Thunderbolt PTP GMC supports one 10/100/1000 Base-T Ethernet port that allows connection to standard CAT-5 / CAT-5e / CAT-6 cables with RJ-45 male connector.

The Ethernet port features an LED that indicates the state of the port. The port is designated as "Ethernet-2". The user can use this port to gain access to the Web interface (HTTPS) or command line interface (TELNET/SSH).

The factory default settings for the Ethernet-2 network port are as follows:

- **IP Address:** 192.168.2.250
- **Mask:** 255.255.255.0
- **Gateway:** 0.0.0.0

The table below shows the Eth2– RJ45 interface:

Item	Description	Notes
Interface Name	Eth2	
Connector Type	RJ45	
Initial operating status	Enabled	
Required cable	Recommended UTP CAT-5E	
Specification	10/100/1000Base-T	
Auto negotiation mode	Supports 1000Base-X auto-nego mode only	
Usage	Management only for remote access	Telnet, SSH, WebUI and NMS (SNMP v2c and v3)
Related SW tool	Terminal Program, Trimble WebUI and NMS	Ex., Teraterm, Putty
Connection information	Default IP address : 192.168.2.250	Netmask : 255.255.255.0

Item	Description	Notes
Connection ID / PW	trimblesuper / Tbolt_<Serial Number>	Supervisor level
Port LED	Left side LED: Link Right side LED: Act	
Related Alarms Generation	Occurred 'Eth-Port-Down' when Eth2 Link is off Occurred 'Eth-Same-Subnet' when Ethernet interfaces have same IP address in subnet class B	Cleared when Eth2 link is on. Cleared when Ethernet interfaces have a different subnet.

NOTE – If GM200 is upgraded from v1.2.0.0 or lower version, default PW is **trimblesuper** for supervisor level. After applying factory configuration, default PW will be changed to **Tbolt_<serial number>** in v1.4.0.0.

The 'Eth2' interface is dedicated for management only to connect remote management system such as telnet, SSH, Trimble WebUI, and NMS with SNMP v2c/v3.

It supports 10/100/1000Base-T with Auto-nego mode only.

It is recommended to use UTP-CAT5E cable or above.

2.5.3 PTP/NTP/SyncE Electrical Ethernet Port

The Thunderbolt PTP GMC GM200 supports one 10/100/1000 Base-T Ethernet port that allows connection to standard CAT-5 / CAT-5e / CAT-6 cables with RJ-45 male connector.

The Ethernet port features an LED that indicates the state of the port. The port is designated as "Ethernet-1". This port is not designed for communication purposes for security reasons. This port is designed for providing NTP/PTP/SyncE.

The factory default settings for the Ethernet-1 network port are as follows:

- **IP Address:** 192.168.1.250
- **Mask:** 255.255.255.0
- **Gateway:** 0.0.0.0

NOTE – The Ethernet interface should not be connected to a cable longer than 6 meters. If a distance greater than 6 meters is required, then the Ethernet interface should be connected to a switch to comply with GR-1089.

The table below shows the Eth1 – RJ45 interface:

Item	Description	Notes
Interface Name	Eth1	
Connector Type	RJ45	
Initial operating status	Disabled	
Required cable	Recommended UTP CAT-6 or CAT-6E	
Specification	10/100/1000Base-T	
Auto negotiation mode	Supports 1000Base-X auto-nego mode only	
Usage	Input and Output for PTP, NTP and SyncE	
PTP Accuracy	ITU-T G.8272 PRTC Class A	
Port LED	Left side LED: Link Right side LED: Act	
Related Alarms Generation	Default: Ignored, no alarm asserted Asserted 'Eth-Port1-Down' when Eth1 Link is off. Asserted 'Eth-Same-Subnet' when Ethernet interfaces have same IP address in subnet class B.	Cleared when Eth1 link is on. Cleared when Ethernet interfaces have different subnet.

The Eth1 interface is dedicated for synchronization signal input and output to support PTP (IEEE 1588), NTP, and SyncE.

It supports 10/100/1000Base-T with Auto-nego mode.

It is recommended to use UTP-CAT6 or UTP-CAT6E cable.

When it is linked on, the left side LED on the RJ45 connector indicates for "Link" connection and the right side LED indicates for "Act" states.



2.5.4 PTP/NTP/SyncE SFP Ethernet Port

The Thunderbolt PTP GMC GM200 supports one 10/100/1000 Base-T Ethernet port that allows connection to standard CAT-5 / CAT-5e / CAT-6 cables with electrical SFP or fiber cables with optical SFP.

The Ethernet port features an LED that indicates the state of the port. The port is designated as “Ethernet-0”. This port is not designed for communication purposes for security reasons. This port is designed for providing NTP/PTP/SyncE.

The factory default settings for the Ethernet-0 network port are as follows:

- **IP Address:** 192.168.0.250
- **Mask:** 255.255.255.0
- **Gateway:** 0.0.0.0

The table below shows the Eth0 – SFP interface:

Item	Description	Notes
Interface Name	Eth0	
Connector Type	SFP	
Initial operating status	Disabled	
Required cable	Single mode or Multi-mode optic fiber	
Specification	1000Base-X	

Item	Description	Notes
Auto negotiation mode	Supports 1000Base-X auto-nego mode and 1000Base-X forced mode (auto-nego off mde)	No support for Forced mode on electrical SFP module
Recommended SFP Module	1000Base-SX, LX, BX and electrical SFP (10/100/1000Base-T SFP)	
Recommended SFP module Vendor	ABCU-5730ARZ : RJ45 - Electrical (Avago) SFP-1GBT-05 : RJ45 - Electrical (Belfuse) SFP-1GBT-09 : RJ45 - Electrical w/SyncE (Belfuse)	
Usage	Input and Output for PTP, NTP and SyncE	To support SyncE with an electrical module, it should be a verified one by Trimble.
PTP Accuracy	ITU-T G.8272 PRTC Class A	
Port LED	Left side LED: Link Right side LED: Act	
Related Alarms Generation	Default: Ignored, no alarm asserted Asserted 'Eth-Port0-Down' when Eth0 Link is off. Asserted 'Eth-Same-Subnet' when Ethernet interfaces have same IP address in subnet class B.	Cleared when Eth0 link is on. Cleared when Ethernet interfaces have different subnet.

The Eth0 interface is dedicated for synchronization signal input and output to support PTP (IEEE 1588), NTP, and SyncE.

Eth0 supports 1000Base-X with supporting "1000Base-X auto-nego" mode and "1000Base-X forced mode" when the "auto-nego" mode is off based on user configuration.

Also it supports Electrical SFP module to support 10/100/1000Base-T auto-nego mode on SFP interface.



2.5.5 Sync Out

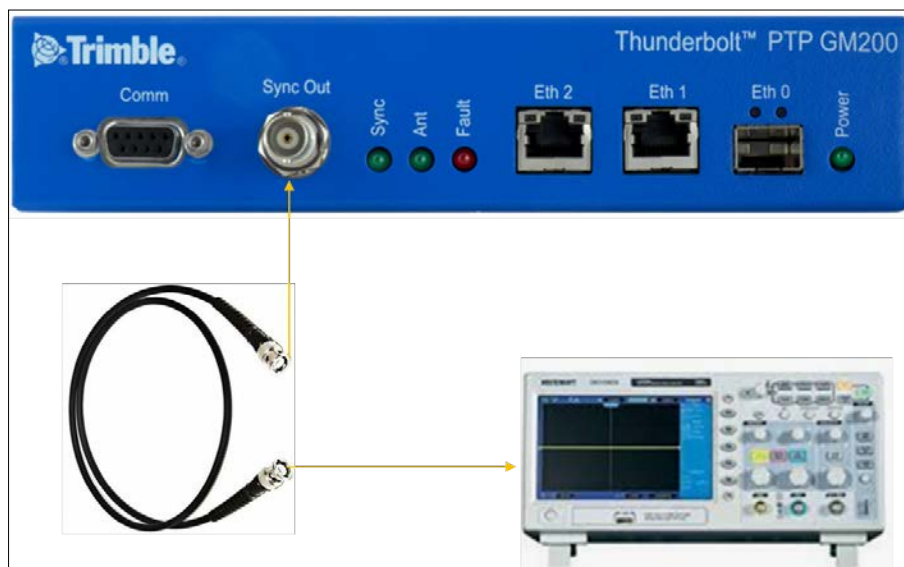
The table below shows the Sync Out interface:

Item	Description	Notes
Interface Name	Sync Out	
Connector Type	BNC (Female), 50Ω	Female type
Specification	3.3VDC CMOS level	
1PPS Accuracy	± 15ns(1-sigma) to GPS time	When GM200 is locking with GNSS
Required cable and connector	50Ω Coaxial cable with BNC (male) connector for GM200 side	
Usage	1PPS output(default) or 10MHz output	By user configuration
Related Alarms Generation	No related alarm generation for 'Sync Out' interface connection	

The Sync Out interface is BNC (Female) connector with 50 Ω.

This interface can output 1PPS or 10 MHz or others as configured by user.

The Coaxial cable: use 50 Ω cable with RG-58 or above specification cable in short distance.



2.5.6 Relay Interface connection



Relay 'Open' and 'short' (close) operations are directly related with Alarm operation.

The alarm conditions are: **CRI**: Critical, **MAJ**: Major, **MIN**: Minor and **IGN**: Ignore.

This Relay interface only reacts when a "CRI" alarm occurred or on Power off; it does not react for "MAJ", "MIN" and "IGN" alarms. However, when the GM200 is in the **Holdover** mode, the relay reacts as for a "CRI" alarm.

Alarm conditions (CRI, MAJ or MIN) can energize the relay and are programmable through the GM200 user interface.

① & ② Pins

- When Power off or a "CRI" alarm occurs on the GM/TS200, these pins are CLOSED (shorted) with 0Ω .
- When the GM/TS200 is in normal operation (without any "CRI" alarms), these pins are OPEN with $\infty\Omega$ as **NO** (normally open).

② & ③ Pins

- When Power off or a "CRI" alarm occurs on the GM/TS200, these pins are OPEN with $\infty\Omega$.
- When the GM/TS200 is in normal operation (without any "CRI" alarms), these pins are CLOSED (shorted) with 0Ω as **NC**(normally closed).

3. GNSS Antenna

A good GNSS antenna, together with a good installation site, is the key for getting the best performance from a GNSS receiver.

This chapter explains the requirements for the antenna and provides recommendations for a good installation.

- ▶ GNSS antenna requirements
- ▶ Antenna placement
- ▶ GNSS tuning parameters

3.1 GNSS antenna requirements

The antenna receives the GNSS satellite signals and passes them to the receiver. The GNSS signals are spread spectrum signals in the 1551 MHz to 1614 MHz range and do not penetrate conductive or opaque surfaces. Therefore, the antenna must be located outdoors with a clear view of the sky. The internal GNSS receiver requires an active antenna with integrated LNA. The received GNSS signals are very low power, approximately -130 dBm, at the surface of the earth. Trimble's active antenna includes a pre-amplifier that filters and amplifies the GNSS signals before delivery to the receiver.

The on-board circuits provide DC supply voltage on the SMA coax connector for the external, active GNSS antenna. The antenna supply voltage is fully protected against short circuit by the on-board Open/Short detection with integrated current limiter. The GM200 device has a full antenna monitoring circuit on board.

3.1.1. Antenna power supply on RF output

Make sure that the current draw of the antenna is above the open circuit and below the short circuit detection thresholds below

Voltage:	+5V DC +/-0.5V
Current detection:	Open circuit < 10 mA
	Short circuit > 100 mA

3.1.2 Antenna gain requirements

The GM200 requires an active GNSS antenna with built-in Low-Noise Amplifier (LNA) for optimal performance. The antenna LNA amplifies the received satellite signals for two

purposes:

- a. Compensation of losses on the cable.
- b. Lifting the signal amplitude in the suitable range for the receiver front-end.

Task b) requires an amplification of at least 15 dB, while 20 dB is the optimum for the GM200. This would be the required LNA gain if the antenna was directly attached to the receiver without cable in-between.

The cable and connector between the antenna and the receiver cause signal loss. The overhead over the minimum required 15 dB and the actual LNA gain of the antenna is available for task a). So in case of a 30 dB LNA gain in the antenna, 15 dB are available for compensating losses.

Or in other words, the attenuation of all elements (cables and connectors) between the antenna and the receiver can be up to a total of 15 dB with a 30 dB LNA. With a different antenna type, take the difference between 15 dB and the antenna's LNA gain as the available compensation capability. Subtract the insertion losses of all connectors from the 15 dB (or whatever the number is) and the remainder is the maximum loss, which your cable must not exceed.

As the GNSS signals are hidden in the thermal noise floor, it is very important that the antenna LNA doesn't add more noise than necessary to the system; therefore a low noise figure is even more important than the absolute amplification.

Trimble does not recommend having more than 35 dB remaining gain (LNA gain minus all cable and connector losses) at the antenna input of the receiver module. The recommended range of remaining LNA gain at the connector of the receiver module is 20 dB to 30 dB, with a minimum of 15 dB and a maximum of 35 dB.

3.1.3 Considering coaxial cable loss and delay

Below is a table of cable types appropriate for different cable lengths to ensure proper GNSS signal strength. If the GM200 does not receive the appropriate signal strength, it will not be synchronized with GNSS and it will not provide PTP service for slave devices.

To calculate the **cable loss**:

RF in Gain in GM200: GNSS Antenna Gain - (Surge Protector + adapters + Cable Loss) \geq 20 dB

Cable type	dB / 100 ft	dB / 100 meter	Max length for 18 dB loss at 1575 MHz (feet/meter)
RG-6	12	40	150/45

Cable type	dB / 100 ft	dB / 100 meter	Max length for 18 dB loss at 1575 MHz (feet/meter)
RG8 (and 8/U)	9.6	31	185/58
RG-8X	16.8	55	107/33
RG-58	19.6	64	92/28
RG-59	14.7	48.2	122/37
LMR-400	5.3	17.2	340/105
LMR-600	3.4	11.2	530/161

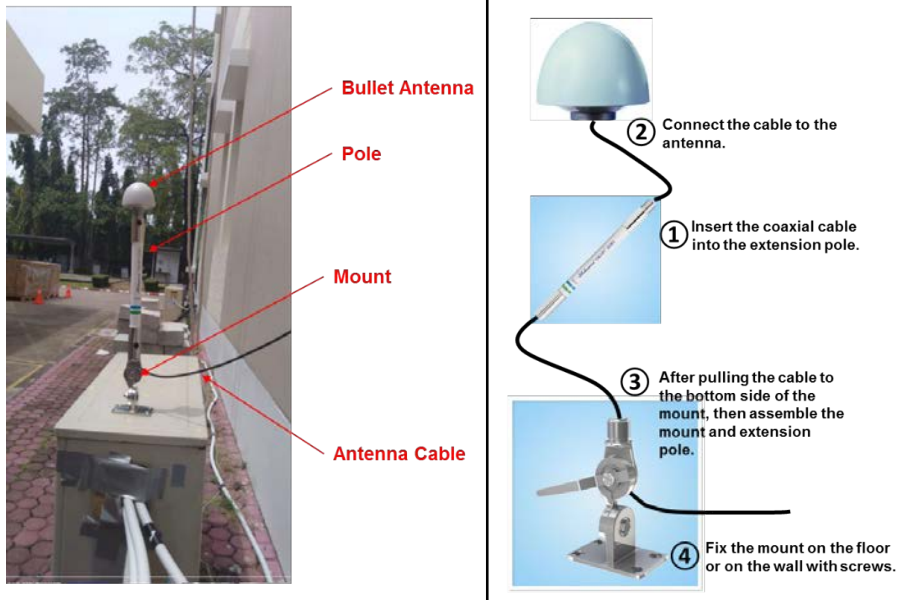
When you use a long coaxial cable you must also consider the **coaxial cable delay**. Typical delay with RG-59 is around 1.24 ns/ft or around 4 ns/1meter.

You can compensate the cable delay time by using CLI command on GM200.

3.2 Antenna placement

3.2.1 Mounting bracket for GNSS antenna

The mounting bracket installation and dimensions for Trimble Bullet 360 antenna are shown below.



3.2.2 Sky-Visibility

GNSS signals can only be received on a direct line of sight between antenna and satellite. The antenna should see as much as possible of the total sky.

Seen from the northern hemisphere of the earth, more satellites will be visible in the southern direction rather than in northern direction. The antenna should therefore have open view to the southern sky. If there are obstacles at the installation site, the antenna should be preferably placed south of the obstacles, in order not to block the sky-view to the south.

If the installation site is in the southern hemisphere of the earth, then the statements above are reversed – more satellites will be visible in the northern direction. Near to the equator, it doesn't matter.

Partial sky visibility causes often poor DOP (Dilution of Precision) values due to the geometry of the visible satellites in the sky. If the receiver can only see a small area of the sky, the DOP has a high degree of uncertainty and will be worse compared to a condition with better geometric distribution. It may happen that a receiver is seeing 6 satellites, all close together, and still get a much worse DOP than a receiver which sees 4 satellites, but all in different corners of the sky. The receiver's DOP filter rejects fixes with high DOP (high uncertainty), therefore it can take longer to get the first acceptable fix if sky visibility is partly obstructed.

3.2.3 Multipath-reflections

Multipath occurs when the GNSS signals are reflected by objects, such as metallic surfaces, walls, and shielded glass for example. The antenna should not be placed near a wall, window or other large vertical objects if it can be avoided.

3.2.4 Jamming

Jamming occurs when the receiver function is disturbed by external RF sources that interfere with GNSS signals or saturate the antenna LNA or receiver front-end. A good indicator to detect jamming is switching off all other equipment except the GNSS. Watch the satellite signal levels in this condition. Then switch on other equipment and see if the signal levels go down. A drop of signal levels indicates interference to GNSS from the other equipment. This method cannot, however, detect all possible kinds of jamming. Spurious events are hard to catch. Low frequency fields, like 50 Hz, are unlikely to jam the receiver. Broadband sparks are a potential source of spurious jamming. There's no general installation rule or specification though, because the effect of jamming highly depends on the nature of the jamming signal and there are countless potential variations, so that it's not possible to standardize a test scenario.

3.2.5 Ground plane

A metal plate or surface under the antenna can block signal reflections from below. This is a good method to mitigate reflections, if the receiver is mounted on high masts or other elevated sites.

3.2.6 GNSS antenna cabling

Trimble recommends low-loss coaxial cabling.

Using any length of coaxial cable will add some time delay to the GPS signal, which affects the absolute accuracy of the computed time solution. The time delay is dependent on the type of dielectric material in the cable, and ranges from 3.3 to 6.5 ns/meter.

The Antenna Cable Delay advances the Hardware Clock slightly to cancel out the signal delay caused by the length of the GPS antenna cable. To calculate the adjustment, select the signal propagation rate for the appropriate cable type and multiply it by the length of the cable.

For example, the standard RG-59 antenna cable has a propagation rate of 4.07 ns/meter. The delay for a 25-meter cable will be 101.75 ns ($25 \times 4.07 = 101.75$).

The outer shield on the GNSS cable must be grounded to the chassis via the cable shell to the connector ground on the chassis. The connector ground is tied to the chassis. The chassis is connected to the primary ground, which utilizes a ring terminal with a 14 AWG wire connected to the rack. There are to be no breaks in the outer shield of the GNSS cable. Reference ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93.

NOTE – The GNSS antenna cable should only be connected when the unit is properly Earth grounded.

3.2.7 Lightning considerations

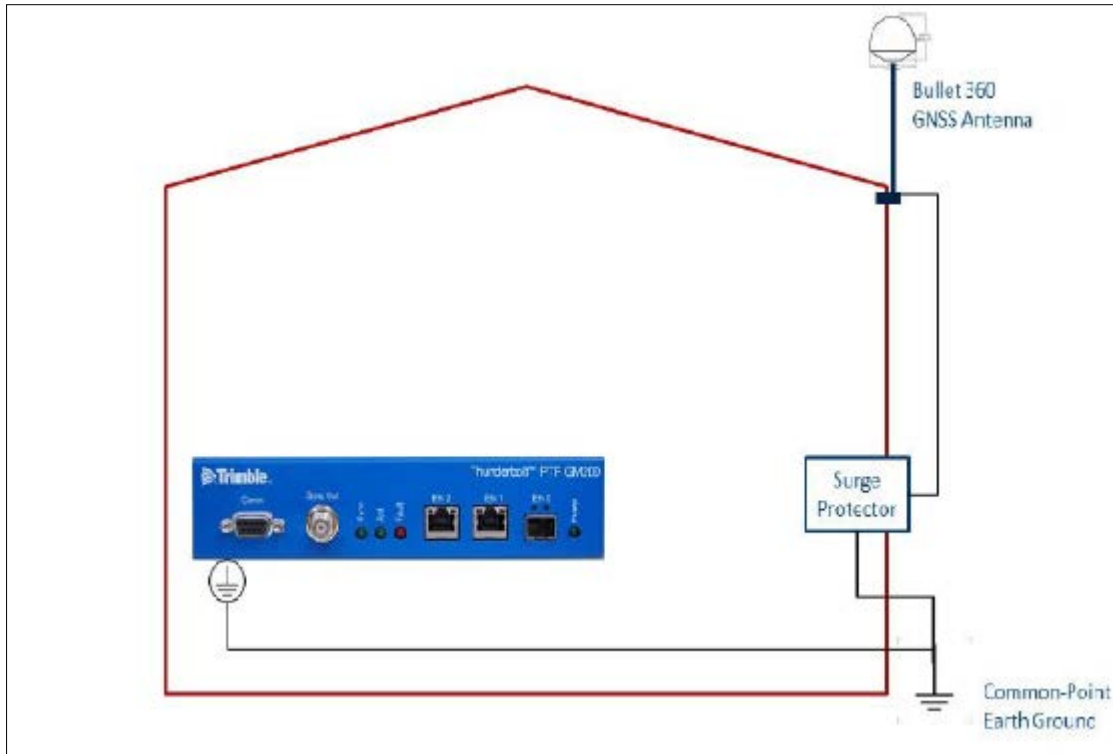
Although you cannot protect the antenna from a direct lightning strike, the connected devices can be protected from secondary effects through protection devices.

Trimble recommends installing an in-line lightning arrestors in the antenna line to protect the receiver and connected devices. In-line lightning arrestors are mounted on a low-impedance ground, between the antenna and the point where the cable enters the building.

3.2.8 Installing surge protection

The surge protection must be installed at the cable entrance into the building with a proper earth/ground connection.

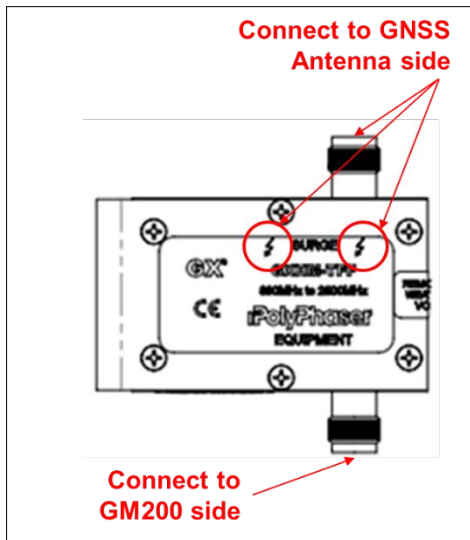
The image below shows how to connect and place the surge protector.



It is recommended to use a minimum 6 AWG (13.3 mm) wire or larger.

NOTE – Refer to local electrical codes.

The image below shows the direction of coaxial cable connection between GNSS antenna and GM200.



3.3 GNSS tuning parameters

The default GNSS parameters are suitable for most installations of the Thunderbolt PTP or NTP Server. These can include antenna installations with good- or less than ideal views of the sky.

The parameters that are set from the factory should not be changed, unless there are specific identified reception problems or timing issues. We would recommend discussing any changes with your local Trimble representative beforehand.

NOTE – The exception is the Antenna Delay parameter that must be changed, since it needs to be custom to the specific cable length of the installation.

The tuning parameters should only be changed once all the antenna position and cabling instructions listed earlier in this chapter have been followed correctly. The parameters can be changed either by the web interface (Synchronization Management/GNSS) or the CLI (get/set gnss).

For the following parameter descriptions the web page for GNSS is used for demonstration purposes, but the CLI commands are also available and are described in [CLI Reference, page 63](#).

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. The user is logged in as 'trimblesuper' with 'super access rights'. The main header displays the Trimble logo and the device name 'Thunderbolt PTP GM200'. The left sidebar contains a menu with the following items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT (highlighted), PTP, NTP, GNSS (highlighted), Sync Source, Output, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The main content area is titled 'GNSS Configuration' and includes the following settings:

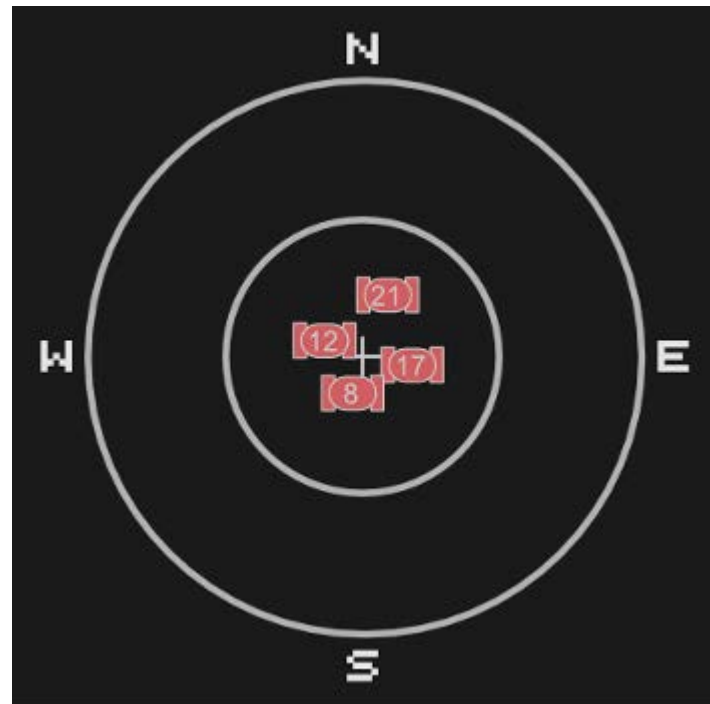
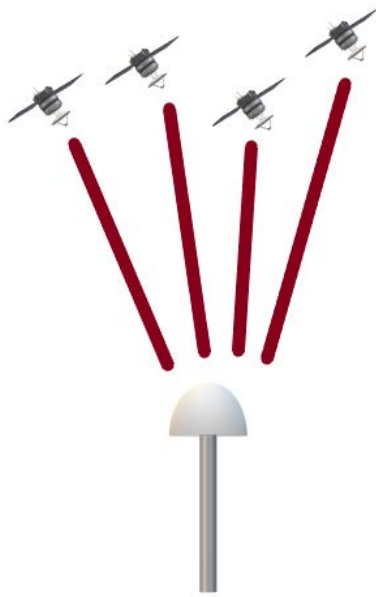
- Constellation Selection:** GPS (checked), GLONASS (checked), Beidou (unchecked), Galileo (unchecked), QZSS (unchecked).
- Position Settings:**
 - Positioning Mode: Automatic
 - Latitude (degrees): 37.38433
 - Longitude (degrees): -122.00631
 - Height (meters): -5.84
 - Survey Length (secs): 2000
 - Elevation Mask: 10.0
 - PDOP Mask: 3.0
 - Signal Level Mask: 0.00
- Receiver Status:** Normal
- Receiver Mode:** Overdet Clock (Time)
- Antenna Delay (nS):** 0

At the bottom of the configuration page, there is a 'Restart GNSS Receiver' section with a dropdown menu set to 'Do nothing'.

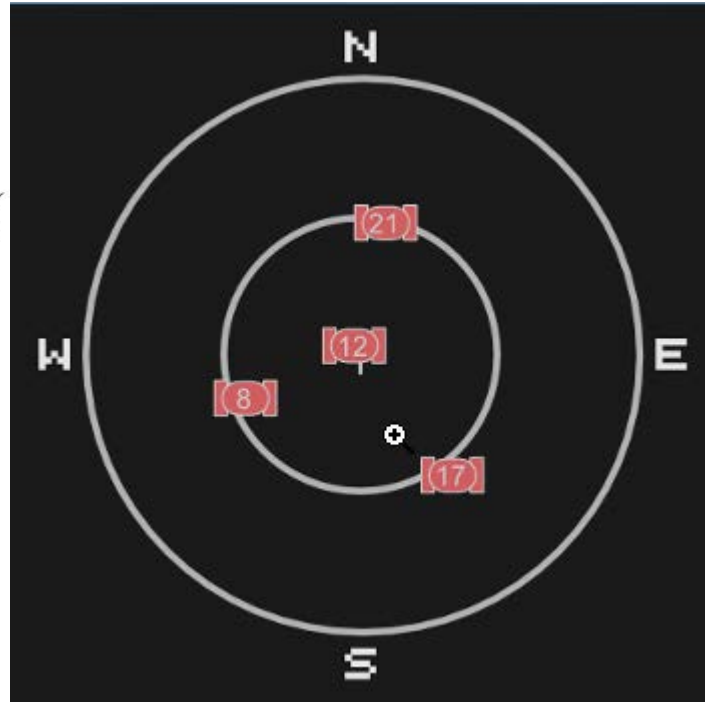
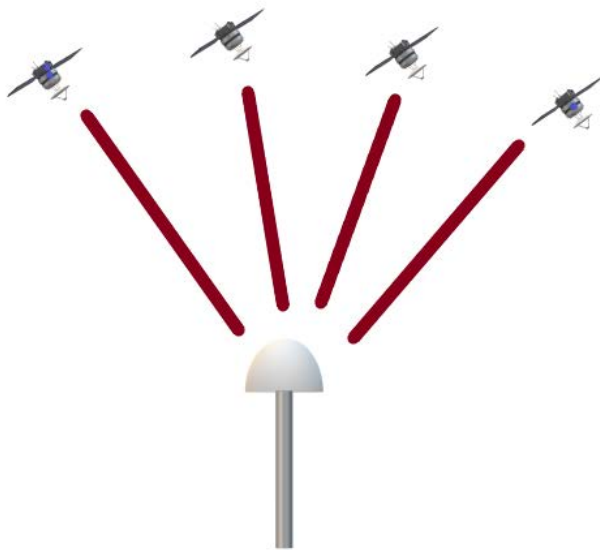
3.3.1 PDOP mask

Position Dilution of Precision (PDOP) is a measure of the error caused by the geometric relationship of the satellites used in the position solution. Satellite sets that are tightly clustered together in the sky have a high PDOP and contribute to lower position accuracy. Satellites that when viewed by the receiver are widely separated apart have a low PDOP and contribute to better position accuracy.

Satellites with poor geometry (High DOP)



Satellites with good geometry (Low DOP)



The Dilution of Precision indicates the confidence level of a position fix. Low DOP values indicate a high confidence level, while high DOP values indicate a low confidence level. High DOP values are caused by poor geometry of the visible satellites. Lowering the DOP mask will exclude fixes with poor (high) DOP and will thereby improve the quality of the reference position by only accepting fixes with high confidence level. A too low DOP mask setting may, however, cause extended self-survey times, because less position fixes will pass the mask criteria, so that it takes longer to collect the amount of position fixes to complete the self-survey. The default DOP mask is 3. It is configurable by the user, if needed. For most applications, a PDOP mask of 3 offers a satisfactory trade-off between accuracy and GPS coverage.

Permitted range: 0.0 to 10.0. Default: 3.

NOTE – PDOP is applicable only during self-survey or whenever the receiver is performing position fixes.

3.3.2 Survey Length

Default value is 2000 seconds. At power-on, the Thunderbolt performs a self-survey by averaging 2000 position fixes. The number of position fixes until survey completion is configurable. The receiver mode during self-survey is 2D/3D Automatic, where the receiver

must obtain a three-dimensional (3-D) position solution. The very first fix in 2D/3D Automatic mode must include 5 satellites or more. After a successful first fix only 4 satellites are required. If fewer than the required number of satellites are visible, the Thunderbolt suspends the self-survey. 3-D mode may not be achieved when the receiver is subjected to frequent obscuration or when the geometry is poor due to an incomplete constellation.

Once the survey is completed, the receiver automatically moves into over-determined mode, where the average value of the position calculations is saved and used for the timing solution.

Over-determined clock mode is used only in stationary timing applications. This is the default mode for the Thunderbolt once a surveyed position is determined. The timing solution is qualified by the T-RAIM algorithm, which automatically detects and rejects faulty satellites from the solution.

To improve the consistency of the time solution, the length of the self-survey can be extended to 14400 seconds (4 hours). Four hours allows for the satellites to move either completely, or halfway, through their trajectory. That should allow the PDOP to be minimized at least sometime during that period if some of the satellites are blocked. This allows the maximum amount of time that the unit can average a position with what will generally be the best PDOP that is going to be available with the current antenna placement.

The self-survey time can be extended to 86400 seconds (24 hours) that allows the entire constellation to be visible, as well as any diurnal movement due to ionospheric model errors. This will provide a very good position fix average, that will utilize all the satellites that the receiver will observe in the sky over a day. Obviously, 24 hours to wait for Over Determined mode is much longer than the default 33 minutes (2000 seconds). This may be a factor in the user application, but otherwise lengthening the self-survey period can potentially improve our solution.

Permitted range: 60 to 259200. Default: 2000.

3.3.3 Elevation mask

Generally, signals from low-elevation satellites are of poorer quality than signals from higher elevation satellites. These signals travel farther through the ionospheric and tropospheric layers and undergo distortion due to these atmospheric conditions. For example, an elevation mask of 10° excludes very low satellites from position fix computations and reduces the likelihood of potential errors induced by using those signals.

Permitted range: 0.0 to 90.0. Default: 10.

3.3.4 C/No mask

The quality of received GNSS satellite-signals is reported as C/No value (Carrier-to-Noise power ratio). Low C/No values can result from low-elevation satellites, partially obscured signals (due to dense foliage for example), or reflected RF signals (multipath).

Multipath can degrade the position and timing solution. Multipath is most commonly found in urban environments with many tall buildings and a preponderance of mirrored glass. Reflected signals tend to be weak (low C/No value), since each reflection diminishes the signal.

If the antenna has a clear view of the sky (outdoor antenna placement), a C/No mask of 35 dB-Hz is recommended for optimal results. However, for indoor use or operation with an obscured view

of the sky, the mask must be low enough to allow valid weak signals to be used. For indoor operation, a C/No mask of 0 dB-Hz (zero) is recommended.

Permitted range: 0.0 to 55.0. Default: 0.

3.3.5 GNSS IN interface

The table below shows the possible constellation options you can select.

GPS	Galileo	GLONASS	BeiDou	QZSS
√				
	√			
		√		
			√	
√	√			
√		√		
√			√	
√	√			√
√		√		
√			√	√
√				√

If you select a single constellation, then the PPS and Time alignment will be set automatically to the same constellation.

4. GM200 Startup Operation

When GM200 is turned on, it automatically begins to acquire and track GNSS satellite signals.

During the satellite acquisition process, the GM200 is not in PTP operation mode but in GNSS acquiring mode to establish its accurate position so that it can generate accurate time/phase signals.

In Default configuration, the GM200 takes around 6 minute to lock with GNSS satellites and start operating PTP/NTP if the network configuration is done appropriately and the connected GNSS antenna sees fully clear sky.

If the connected GNSS antenna is installed in a position with limited sky view, the PTP operation mode will take longer to be enabled (up to 30 minutes), depending on the number of valid GNSS satellite tracking.

In cold start, Trimble recommends to start the PTP service 33 minutes later in OD (Over Determined) mode from the boot up, since GM200 should lock with GNSS satellites and calculate accurate position itself during self-survey mode.

- ▶ [User levels](#)
- ▶ [GM200 startup configuration](#)
- ▶ [GM200 initial installation procedure](#)

4.1 User levels

The Thunderbolt PTP GMC GM200 provides a hierarchy of CLI users that permit an increasing level of access to system parameters.

- **User:** This is the basic login level. The login id for this level is “trimble”. This only allows for viewing of status, nothing can be changed other than their password.
- **Admin:** This is the next level. The login id for this level is “trimbleadmin”. This user can configure everything about the unit, except user accounts.
- **Supervisor:** This is the highest level. The login id for this level is “trimblesuper”. This allows configuration of everything, including user accounts. This is the Trimble user access level by default.

NOTE – See CLI command [Use set user command to update user configuration.](#) or the [User Management](#) section of the Web Interface.

4.1.1 Initial default login password

NOTE – There is a change in default password to comply with California State Bill SB-327.

The SB-327 Information privacy: connected devices bill requires that the pre-programmed password is unique to each device manufactured.

The SB-327 bill is effective since January 1, 2020. To meet this requirement, Trimble has removed the **trimble** and **trimbleadmin** default accounts. Only the user **trimblesuper** is available by default, with the default password as outlined in this section.

Starting with v1.4.0.0, the unique password is based on the serial number of the unit. Here is the format:

User name: trimblesuper

Password: Tbolt_<serialnumber>

For example, if the serial number is 1234567890, the password will be "Tbolt_1234567890".

As a 'Best security practices', Trimble recommends to change the default user credentials of the 'trimblesuper' account. If desired, the user accounts of 'trimble' and 'trimbleadmin' can be added with unique passwords, to allow user and admin level access as were previously available by default.

4.2 GM200 startup configuration

4.2.1 Default configuration values for the GM200 startup

Default setting of ...	Description	Notes
GNSS constellation	GPS and GLONASS	
Mask	Elevation Mask: 10.0 deg Signal level Mask: 0.0dB/Hz PDOP Mask : 3.0	
Survey mode (position fix mode)	Automatic	
Self Surveying	2000 times	Around 33 minute
GNSS Antenna Power feeding	Enable	5VDC
GNSS cable delay Compensation	0 (Zero)	
Network Interface states	Enabled for Eth0, Eth1, Eth2	With default IP addresses
Network Interface IP address	Eth0(disabled): 192.168.0.250, 255.255.255.0 Eth1(disabled): 192.168.1.250, 255.255.255.0 Eth2(enabled): 192.168.2.250, 255.255.255.0	Eth0 and Eth1 are disabled as a default configuration.
PTP configuration	Eth0(disabled): ITU-T G.8275.1 Eth1(disabled): ITU-T G.8275.1	User must enable each PTP interfaces manually after GNSS locking and all related alarm are cleared.
NTP configuration	Eth0: NTPv4 (Only for PN: 111224-10) Eth1: NTPv4 (Only for PN: 111224-10)	Automatically enabled after GNSS locking and all related alarm are cleared.

Default setting of ...	Description	Notes
Required FW version	System : v1.5.0.0 or higher Hardware : v18.3.15 or higher GNSS : v1.5.0.0 or higher	

4.2.2 General conditions for normal startup of the GM200

The following parameter values and actions are required in default configuration for a correct PTP/NTP operation startup.

Conditions	Description	Notes
GNSS antenna status	Should be OK .	Open or Short are not valid statuses on startup.
Required Min. GNSS number for Self Surveying after Cold Start	At least 5 Satellites with > 35dB each for C/No value.	
Required Min. GNSS number for Self Surveying after Warm Start	At least 4 Satellites with > 35dB each for C/No value.	
Update Type after cold restart	Start with Self Survey mode for 33 minute. After Self Survey mode, get into OD (Over Determined mode.	If GM200 is moved away for more than 100 meter from first self-surveyed position, it will restart automatically for self-survey.
Update Type after warm restart	Start with OD (Over Determined) mode after first GNSS tracking.	If GM200 is moved away for more than 100 meter from first self-surveyed position, it will restart automatically for self-survey.
First GNSS Signal receiving time after Power-up	Normally less than 2 minute after showing the Login prompt in CLI.	

Conditions	Description	Notes
Time of week information	Current GPS time	
UTC Offset	18	In case of cold start, this information will show around 12 minutes after the first GNSS tracking.
Leap Second status	0	
GNSS receiver status	Normal	
Required Min. GNSS satellite tracking number after OD mode	At least 2 Satellites with > 35dB each for C/No value.	
First PTP packet generation time (PTP/NTP operation mode Enable)	Normally around 6 minutes after showing the 'Login' prompt in CLI.	With clear sky view for the installed GNSS antenna.

4.2.3 Alarm status for PTP startup of the GM200

Alarms are set during the boot-up sequence, because the GM200 does not receive any GNSS signals in initialization stage.

These alarms are cleared sequentially. When all alarms are cleared in GNSS locking mode, the PTP and NTP operation for both Eth0 and Eth1 are enabled. Then, the GM200 starts generating PTP/NTP packets.

However, those alarms may be occurring during user operation, based on alarm alert conditions.

Alarms list in GM200 initial status	Description	Notes
GNSS-Comm-Loss	Should be cleared immediately right after GM200 boot up normally	Set at boot up or can be set during user operation
GNSS-Time-Bad	Should be cleared immediately when GM200 is receiving any GNSS signal normally	Set at boot up or can be set during user operation

Alarms list in GM200 initial status	Description	Notes
UTC-Corr-Unk	Should be cleared when GM200 is receiving any GNSS signal normally	Set at boot up or can be set during user operation
GNSS-Track-No	Should be cleared when GM200 is receiving any GNSS signal normally	Set at boot up or can be set during user operation
GNSS-PPS-LOSS	Should be cleared when GNSS antenna connected normally and when GM200 is receiving any GNSS signal normally	Set at boot up or can be set during user operation
Time-Set-Bad	Should be cleared when GM200 is in GNSS acquiring mode	Set at boot up or can be set during user operation
Freq-Hold-Exceed	Should be cleared when GM200 is in GNSS acquiring mode	Set at boot up or can be set during user operation
Freq-Hold	Should be cleared when GM200 is in GNSS acquiring mode	Set at boot up or can be set during user operation
Freq-loop-unlock	Should be cleared when GM200 is in GNSS acquiring mode	Set at boot up or can be set during user operation
Freq-Out-Bad	Should be cleared when GM200 is in GNSS acquiring mode	Set at boot up or can be set during user operation
PPS-Sync-Bad	Should be cleared when GM200 is in GNSS locking mode	Set at boot up or can be set during user operation
Time-sync-Bad	Should be cleared when GM200 is in GNSS locking mode	Set at boot up or can be set during user operation

Alarms list in GM200 initial status	Description	Notes
PTP-System-Bad	Should be cleared when GM200 is in GNSS locking mode	Set at boot up or can be set during user operation
Eth-Port0-Down	Depends on user operating situation	Can be set during user operation
Eth-Port1-Down	Depends on user operating situation	Can be set during user operation
Eth-Port2-Down	Depends on user operating situation	Can be set during user operation

4.3 GM200 initial installation procedure

The table below describes the sequence of initial installation using GM200 default configuration for cold start.

Trimble does not recommend to add RF splitter(s) between GNSS antenna and GM200 (to distribute GNSS RF signal to more than one GM200), since it can be a weak point at the GNSS reference and location Redundancy perspective.

Seq #	Initial installation	Checking and CLI commands	Notes and Check point
1	Install a GNSS antenna at the roof top with clear sky view		
2	Install a Surge protector between GNSS and GM200		
3	Install an appropriate coaxial cable		
4	Install all required network configuration		
5	Power up the GM200		
6	Login prompt	Log in	Takes around 2 minute after power up
7	Check System FW version	> view version	Check v1.2.0.0 or higher
8	Check Hardware FW version	> view version hardware	Check v18.3.15 or higher
9	Check GNSS FW version	> view version gnss	Check v1.5.0.0

Seq #	Initial installation	Checking and CLI commands	Notes and Check point
10	Check Product information	> view prodconf	Check ... - Serial number - HW production date - Product option information - Product P/N - Hardware version - other information
11	Check cable delay configuration	For adding cable delay compensation: > set gnss adelay [value] For checking applied value: > get gnss	Check 'Antenna delay : [value]'
12	First GPS time showing	> view freq	Takes less than around 2 minute from the login prompt - Check current GPS time
13	Check GNSS 'Acquiring' status	> view freq	Check 'Mode : Acquiring'
14	Check Antenna status	> view gnss	Check 'antenna : OK'
15	Check GNSS signal status	> view gnss	Check ... - 'Available SVs' number : 5 or more - 'SVs Used' number : 5 or more

Seq #	Initial installation	Checking and CLI commands	Notes and Check point
16	Enable network interface	<pre>> set network eth0 addr 192.168.0.250 mask 255.255.255.0 bcast 192.168.0.255 > set network eth0 enable > set network eth1 addr 192.168.1.250 mask 255.255.255.0 bcast 192.168.1.255 > set network eth1 enable > set network eth2 addr 192.168.2.250 mask 255.255.255.0 bcast 192.168.2.255 > set network eth2 enable</pre>	<p>Or user IP configuration</p> <p>NOTE – Each Ethernet interface MUST have different IP address for Subnet Class B.</p>
17	Check network configuration	<pre>> get network eth0 > get network eth1 > get network eth2 Or > get network</pre>	<p>- Check IP address configuration</p> <p>- Check Status : Connected 1000MB or 100MB or 10MB for each connected interfaces</p> <p>NOTE – If using ITU-T G.8275.1 profile, the IP address should not be an issue since it is an L2 multicast profile</p>
18	Check Survey mode	<pre>> view pos</pre>	Check 'Automatic (2D/3D)' for Self Survey mode
19	Check OD mode	<pre>> view pos</pre>	Check around 33 minute after the Automatic (2D/3D), showing 'Overdet Clock(time)' for OD mode

Seq #	Initial installation	Checking and CLI commands	Notes and Check point
20	Check GNSS 'LOCK' status	> view freq	Check 'Mode : Lock'
21	Check alarm status	> view alarm	Check for clearing all alarms
22	Set PTP interface enable	> set ptp eth0 enable > set ptp eth1 enable	As a default, both Eth0 and Eth1 will be enabled with G.8275.1 profile
23	Check PTP operation status	> get ptp Or > get ptp eth0 > get ptp eth1	Check first for both Eth0 and Eth1 with ... - Enabled : Yes - Mode : Master - Clock ID : 001747FFFE7xxxx-1 - Profile : G8275.1 - Operational Mode : normal - ETC
24	Check PTP locking status on PTP slave device		Check the Master Clock ID in Slave device. It must be same with the GM200 Clock ID.
25	Finished		

5. CLI Reference

This chapter describes the Command Line Interface conventions, prompts, features, and command syntax used in Thunderbolt PTP Grandmaster Clock.

- ▶ [CLI overview](#)
- ▶ [Command line format](#)
- ▶ [CLI command set](#)
- ▶ [List of "How to" help topics](#)
- ▶ [List of "What if" help topics](#)

5.1 CLI overview

The Command Line Interface (CLI), also called the ASCII command set, can be used to control the Thunderbolt PTP GMC GM200 from a terminal connected to the RS-232 serial port, or the Ethernet port via Telnet/SSH access.

5.2 Command line format

The command line format is as follows:

```
[action] command [parameter] [data] enter (↵)
```

The type of actions are:

Config	Configure the device parameters
Get	Retrieve specific information
Set	Configure specific system parameters
View	Display system information. This information cannot be altered by the user.

Help is available on the following topics:

help intro	an introduction to the Thunderbolt PTP GMC
help commands	a list of CLI commands available
help syntax	description of the syntax used in help descriptions
help howto	a list of "how to" help topics
help whatif	a list of "what if" help topics
help alarm	a descriptive list of potential alarm conditions within the system

Help on an individual command is available by typing help and the command name. For example, "help view".

NOTE – The GM200 has an extensive on-line, user level context aware, help system. The on-line help for the most part is more up-to-date and accurate than the information in the user guide.

NOTE – After any configuration change via the SET command, issue a "config save" command to store the user configuration.

5.3 CLI command set

This section provides details of all CLI commands, by function and describes the topic “help commands”.

NOTE – After any configuration change via the SET command, you must issue a “*config save*” command to store the user configuration.

5.3.1 Fault management

Include "alarm" messages.

5.3.1.1 *get alarm*

The *get alarm* command retrieves information about the current system alarm configuration.

Command Syntax:

```
get alarm [ <n> [<n>] . . . ]↵
```

Where:

<n> Alarm number to get configuration. More than one alarm number can be passed. If none given, then the configuration of all alarms is sent.

Level: User, Admin and Supervisor

5.3.1.2 *set alarm*

The *set alarm* command allows configuration of the system alarms.

This is a multi-option command of the format:

Command Syntax:

```
set alarm <n> <level> <settime> <clrtime> ↵
```

Where:

<n> Alarm number to get configuration. More than one alarm number can be passed. If none given, then the configuration of all alarms is sent.

<level>	Alarm level. One of: IGN: This alarm condition is ignored. No indication given. NFY: This alarm condition is a notification only. MIN: This is a minor alarm condition. MAJ: This is a major alarm condition. CRI: This is a critical alarm condition.
<settime>	Alarm set time. This is the time, in seconds, that the alarm condition must be active before the alarm is actually asserted. Range is 0 - 86400 (1 day).
<clrtime>	Alarm clear time. This is the time, in seconds, that the alarm condition must be inactive before it the alarm is actually cleared. Range is 0 - 86400 (1 day).

NOTE – For any entry, but default and <n>, a '-' character may be used to retain the current setting for that particular entry.

Level: Admin and Supervisor

5.3.1.3 *view alarm*

The *view alarm* command displays the currently active alarms within the system. If there is no active alarm, then the command returns "No active alarms".

Command Syntax:

```
view alarm <n> <all> ↵
```

Where:

- <n> The alarm number to view
- <all> View all alarms

Level: User, Admin, and Supervisor

5.3.1.4 *get dlog*

The *get dlog* command retrieves the current data logger configuration.

Command Syntax:

```
get dlog ↵
```

Level: User, Admin, and Supervisor

5.3.1.5 *set dlog*

The *set dlog* command allows for starting or stopping the datalogging process.

Command Syntax:

```
set dlog start[holdover] | stop ↵
```

Where:

- start Start the datalogger; if no **holdover** option is given then the logging will not perform holdover cycling.
- holdover Start the datalogger with holdover cycling.
- stop Stop the datalogger.

Level: User, Admin, and Supervisor

5.3.1.6 *view dlog*

Use the *view dlog* command to display collected data from the datalogger.

Usage:

```
view dlog gnss
```

```
view dlog pos
```

```
view dlog freq
```

5.3.1.7 *download*

Use *download* command to download log files from the current GM200 system.

Command Syntax:

```
download[sats|pos|freq] ↵
```

Options:

- sats Download TEXT logfile of the satellites the receiver has been tracking over time
- pos Download TEXT logfile of position information of the receiver over time
- freq Download TEXT logfile of the oscillator statistics over time

Level: User, Admin, and Supervisor

5.3.1.8 *view logs*

The *view logs* command displays the system messages. Each message displayed will include the data and time of the event as well as short description of the event itself.

Command Syntax:

```
view logs [<type>] [<level>] [head|tail] [all|-n X] [clear]
↵
```

Where <type> can be one of:

<alarm>	View only alarm log information
<freq>	View only Time/Frequency control log information
<gnss>	View only GNSS log information
<cfg>	View only configuration log information
<cli>	View only CLI log information
<comm>	View only communication type log information
<ptp >	View only PTP log information
<sync	View only SyncE log information

Where <level> can be a combination of:

<error>	View only error conditions in the log information.
<warning>	View only warning conditions. These are events that may be significant, but are generated by the system in normal operation.
<notice>	View only notice log information. These are normal but, significant conditions.
<info>	View only informational log information. These are normal but insignificant conditions.

Other options:

<head>	View the beginning of the log (earliest). Default is <tail>.
<tail>	View the end of the log (latest)
<all>	View entire log
<-n X>	View only a count of "X" from the log. Default is 20.
<clear>	Clear the system message log. This should be used sparingly as any traceability of cause/effect will be lost.

NOTE – The system event messages are normally presented with the newest event first. If 'head' is specified then the oldest event is presented first.

EXAMPLE –

```
view logs -n 10 gnss head
view logs all
view logs clear
```

Level: Admin and Supervisor

5.3.1.9 *view pos*

The *ping6* command displays the current receiver position information.

Command Syntax:

```
view pos[stream] ↵
```

Where :

stream View a continuous stream of frequency control data

Level: User, Admin, and Supervisor

5.3.1.10 *view realtime*

Use the *view realtime* command to show/change the current level of the messages display.

This command allows changing of the realtime event message level for this session (not stored).

Default is level 1 (alarms only).

Command Syntax:

```
view realtime [<level>] ↵
```

Where the <level> value means:

- 0 No events will be shown in realtime
- 1 Only alarm events will be shown in realtime (default)
- 2 All events will be shown in realtime

EXAMPLE –

```
view realtime
view realtime 2
```

Level: User, Admin, and Supervisor

5.3.1.11 *view summary*

The *view summary* command displays a summary of the frequency control, GNSS tracking status and receiver positioning information.

Command Syntax:

```
view summary ↵
```

Level: User, Admin, and Supervisor

5.3.1.12 *view stream*

The *view stream* command displays a continuous stream of system performance data. This includes frequency control data as well as GNSS tracking information.

Command Syntax:

```
view stream ↵
```

Level: Supervisor

5.3.1.13 *get syslog*

The *get syslog* command displays the current settings for the syslog server connection configuration. There are no options for this command.

Command Syntax:

```
get syslog ↵
```

Level: User, Admin, and Supervisor

5.3.1.14 *set syslog*

Use the *set syslog* command to configure the syslog server connection. By default this connection is disabled.

Command Syntax:

```
set syslog [enable/disable] [addr <ip>] [port <port>] ↵
```

Where:

- enable Enable the sending of syslog messages to the syslog server. Note that until the address is configured with the address of a valid syslog server no messages will be sent, regardless of whether the service is enabled or not. .
- disable Disable the sending of syslog messages to the syslog server. This has no effect on any other settings.

- <ip> Valid IP address for the syslog server. This may be either an IPv4 type address, or an IPv6 type address. Only one address type at a time is supported. The corresponding 'source' information in the syslog message will be either the IPv4, or IPv6, address of the GM, depending on the format of this setting.
- <port> Valid port for the syslog server. Setting of this value allows deviation from the syslog specification. The default port is 514.

EXAMPLE –

```
set syslog enable addr 192.168.2.100
set syslog disable
set syslog port 4022
```

The last example would set the syslog port to a non-standard port for the protocol. This should be used only in controlled environments.

Level: Supervisor

5.3.1.15 *view temp*

The *view temp* command displays the current system temperature in °C.

Command Syntax:

```
view temp ↵
```

Level: User, Admin, and Supervisor

5.3.1.16 *view gnss stream*

View the current GNSS receiver tracking information as a continuous streaming output. The streaming may be stopped by pressing one of the following keys on your terminal:

ctrl-C, q, Q, x or X.

5.3.1.17 *help whatif*

The *whatif* command gives some information about scenarios you may encounter and how to recover from those.

Command Syntax:

```
help whatif ↵
```

1. You have an FPGA-Load-Bad alarm

This is an indication of an out-of-date FPGA load. This can be remedied by a supervisor level person applying a hardware update load to the system. The supervisor can refer to [config, page 83](#) section for more information.

2. You have a PTP-System-Bad alarm

This is an indication that the PTP system on one, or both, of the Ethernet ports was unable to start. This is usually due to a port not being functional. The **get network** information can be used to get information about the status of the network connections. If a port is unused then an admin can change the PTP operation on that port to disable the PTP operation, which will clear the alarm.

Level: User, Admin and Supervisor

5.3.1.18 *view uptime*

The *view uptime* command displays the current 'up-time' of the system, which is how long the timing system has been operational.

This command takes no options.

Command Syntax:

```
view uptime ↵
```

Level: User, Admin, and Supervisor

5.3.2 Security management

5.3.2.1 *view access*

The *view access* command shows the access level of current logged in user.

Command Syntax:

```
view access ↵
```

Level: User, Admin, and Supervisor

5.3.2.2 *get auth*

The *get auth* command returns the current authentication settings. You can query specific settings with the options.

Command Syntax:

```
get auth <options> ↵
```

Where <options> are:

- local Get the local authentication settings
- tacacs Get the TACACS+ authentication settings
- radius Get the RADIUS authentication settings

Level: Supervisor

get auth local

The *get auth local* command returns the current settings for the local authentication parameters.

Command Syntax:

```
get auth local ↵
```

Level: Supervisor

get auth tacacs

The *get auth tacacs* command returns the current TACACS+ authentication settings.

Command Syntax:

```
get auth tacacs ↵
```

Level: Supervisor

get auth radius

The *get auth radius* command returns the current RADIUS authentication settings.

Command Syntax:

```
get auth radius ↵
```

Level: Supervisor

5.3.2.3 *set auth*

Use the *set auth* command to change the authentication settings.

This command is a multi-command type.

Command Syntax:

```
set auth <options> ↵
```

Where <options> are:

default	Set the authentication to the default settings.
type [options]	Set the authentication type options. See set auth type for additional information.
radius [options]	Set the RADIUS authentication options. See set auth radius for additional information.
tacacs [options]	Set the TACACS+ authentication options. See set auth tacacs for additional information.
https	Regenerate the HTTPS certificate. This will force web users to re-establish web access with the new certificate. The previous Trimble certificate must be removed from the browser, then the user will need to reconnect to the system with their browser. The certificates valid 'From' and 'To' date range is displayed.

NOTE – You cannot combine authentication <options> on one line, all command variants must be presented separately.

Level: Supervisor

set auth type

Use the *set auth type* command to change the authentication method used for user login.

The authentication type is set on a per access portal type.

Command Syntax:

```
set auth type [local[<options>]/radius/tacacs] [<portal type>] ↵
```

Where the authentication type is one of:

default	Set the authentication to the default values, which is local for all portal types.
local	Use only the locally stored username and passwords. These are maintained with the <i>set user</i> commands. See set auth local for additional options.
radius	Use RADIUS as the authentication type. The RADIUS configuration can be set with <i>set auth radius</i> .
tacacs+	Use TACACS+ as the authentication type. The TACACS+ configuration can be set with <i>set auth tacacs[+]</i> .
disable	Use to disable a portal. Only telnet may be disabled. To re-enable, select one of the other authentication types.

where <portal type> is a comma separated (only!) list of:

serial	Set the front serial port access to the authentication type. This setting is not valid for RADIUS or TACACS+ authentication types.
ssh	Enable SSH access for the authentication type.
telnet	Enable Telnet access for the authentication type.
web	Enable the webUI to use the authentication type.
snmp	Allow snmp to use the authentication type (experimental). This is not valid for RADIUS or TACACS+ authentication types.
all	This is a unique setting, that it will enable all of the above.

NOTE – Only one authentication type may be set at a time.

This is a 'set' function and the only way to remove a portal assignment from an authentication type is by assigning that to another authentication type. That means that the settings of one type may alter the settings of another type, as only one authentication type may be enabled per portal. That means that if you issue:

```
set auth type local ssh
set auth type radius ssh
```

SSH will be using RADIUS authentication, not 'local'.

EXAMPLE –

```
set auth type local telnet
set auth type disable telnet
set auth type radius ssh,web
```

Level: Supervisor

set auth local

Use the *set auth local* command to configure the local password configuration requirements.

Command Syntax:

```
set auth type [local[<options>]] ↵
```

Where <options> are:

minlen <n>	Set the measure of complexity related to the password length (see below for more information). Range: 2 < minlen < 30
lcredit <n>	Set the minimum number of required lowercase letters. Range: lcredit < 6
ucredit <n>	Set the minimum number of required uppercase letters. Range: ucredit < 6
dcredit <n>	Set the minimum number of required digits. Range: dcredit < 6
ocredit <n>	Set the minimum number of required other characters. These characters can be any printable character, except for space. Range: ocredit < 6
difok <yes no>	Set if the user is required to enter a different password when changing their password (default 'yes').

pre <o>	Set a 'preconfigured' password criteria, where <o> can be: <p>p0 : require a minimum of 6 characters, no other requirements (default).</p> <p>p1 : require at least 1 uppercase letter. The password must be at least 6 characters long.</p> <p>p2 : require at least 1 uppercase and 2 lowercase letters. The password must be at least 6 characters long.</p> <p>p3 : require at least 1 uppercase, 2 lowercase, and 1 number. The password must be at least 6 characters long.</p> <p>p4 : require at least 1 uppercase, 2 lowercase, 1 number and 1 'other' character. The password must be at least 6 characters long.</p>
timeout	Set the TACACS+ server timeout value. 1-60 seconds.

Level: Supervisor

Additional information

'minlen' is a measure of complexity, not simply length. It specifies a complexity score that must be reached for a password to be deemed as acceptable. If each character in a password added one to the complexity count, then minlen would simply represent the password length but, if some characters count more than once, the calculation is more complex. How this works:

The minlen complexity measure is calculated in a number of steps:

- every character in a password yields one point, regardless of the type of character
- every lowercase letter adds one point, up to the value of **lcredit**
- every uppercase letter adds one point, up to the value of **ucredit**
- every digit adds one point, up to the value of **dcredit**
- every special character adds one point, up to the value of **ocredit**

If **lcredit**, **ucredit**, **dcredit** and **ocredit** were all set to 0, only the password length would be used to determine if it's acceptable. No characters would add extra points to the complexity score.

When you set any of the **lcredit**, **ucredit**, **dcredit** or **ocredit** parameters to a negative number, then you MUST have at least that number of characters for each character class for the password to pass the complexity test.

NOTE – You can combine settings. For instance:

```
set auth local p1 dcredit -1
```

would set the criteria to be: require at least 1 uppercase, 1 digit and a minimum length of 6 characters.

Other examples:

```
set auth local minlen 12
set auth local pre p2 minlen 10
```

set auth radius

The *set auth radius* command configures the RADIUS server connection information.

Command Syntax:

```
set auth radius <options> ↵
```

Where <options> are:

default	Set the RADIUS server information to defaults.
addr	Set the primary server address for the RADIUS server.
saddr	Set the secondary server address for the RADIUS server.
port	Set the IP port for the RADIUS server (same for primary and secondary).
secret	Set the shared secret value for the RADIUS server (same for primary and secondary). This may contain any 'printable' character. It is recommended that, the string be enclosed in "" to allow setting of characters that might be interpreted as parameter separators.
timeout	Set the RADIUS server timeout value. 1-60 seconds.

Level: Supervisor

set auth tacacs

The *set auth tacacs* command configures the TACACS+ server connection information.

Command Syntax:

```
set auth tacacs <options> ↵
```

Where <options> are:

default	Set the TACACS+ server information to defaults.
addr	Set the primary server address for the TACACS+ server.
saddr	Set the secondary server address for the TACACS+ server.
port	Set the IP port for the TACACS+ server (same for primary and secondary).
secret	Set the shared secret value for the TACACS+ server (same for primary and secondary). This may contain any 'printable' character. It is recommended that, the string be enclosed in "" to allow setting of characters that might be interpreted as parameter separators.
service	Set the TACACS+ server service string.
protocol	Set the TACACS+ server protocol string.
timeout	Set the TACACS+ server timeout value. 1-60 seconds.

Level: Supervisor

5.3.2.4 *get auto*

The *get auto* command shows the current status of the auto-logout setting for this session. Default is to automatically log off this port after approximately 5 minutes of inactivity.

Command Syntax:

```
get auto ↵
```

5.3.2.5 *set auto*

Use the *set auto* command to control the auto-logout setting for this session. This allows the port to remain active even beyond the 5-minute timeout period of inactivity. This is effective only for this session (not stored). Default is ON.

This is useful when combined with *view realtime* setting to allow monitoring of events.

Command Syntax:

```
set auto [on|off] ↵
```

EXAMPLE –

```
set auto off
```

5.3.2.6 *get user*

The *get user* command retrieves the current user names, access levels and email addresses for users that are at, or below your, access level.

Command Syntax:

```
get user ↵
```

Level: User, Admin, and Supervisor

5.3.2.7 *set user*

Use *set user* command to update user configuration.

Command Syntax:

```
set user <adduser / deluser / level / passwd | email |  
logout> ↵
```

Where:

adduser <uname> <level>	<p>Add a new user, named <uname>, with access level <level>.</p> <p><uname> can contain only letters and numbers, no spaces or punctuation is allowed. If the user already exists, no action is taken.</p> <p><level> can be one of:</p> <table> <tbody> <tr> <td>user</td> <td>This level can only view status and configuration, no changes to configuration.</td> </tr> <tr> <td>admin</td> <td>All functions of 'user' with added ability to change most configuration settings.</td> </tr> <tr> <td>super</td> <td>All functions of 'admin' with added ability to edit the user table.</td> </tr> </tbody> </table>	user	This level can only view status and configuration, no changes to configuration.	admin	All functions of 'user' with added ability to change most configuration settings.	super	All functions of 'admin' with added ability to edit the user table.
user	This level can only view status and configuration, no changes to configuration.						
admin	All functions of 'user' with added ability to change most configuration settings.						
super	All functions of 'admin' with added ability to edit the user table.						
deluser <uname>	Delete a user. You cannot delete yourself. If the user does not exist, an error is returned.						
level <uname> <level>	Change the access level for a user. See 'adduser' for descriptions of levels.						

passwd	Change the password. If you are changing your own password then you will be queried for your old password first. Only supervisors can change someone else's password. This can accept a username and, if one is given, you can change the password of the user. You will not be prompted for their old password. Note that a blank password is not allowed.
email [<uname>] <email>	Change the email address for user. You will be queried for your password to allow changes. If no <uname> is given then the current user is assumed. Only supervisors can use the optional '<uname>' parameter. This can accept a username and, if one given, you can change the email address of the user.
logout [options]	Log out the user with the given option selections. See <i>set user logout</i> for information about the options.

Level: Supervisor

5.3.2.8 *set user logout*

The *set user logout* command allows the Thunderbolt PTP GMC GM200 to log users out of the system. Users may log in through various methods on the system, this command allows logging out users with varying selection options.

Command Syntax:

```
set user logout [name (n)] [sid(s)] [service(svc)] ↵
```

Where:

<n>	The name of the user. Logged-in users with the name <n> will be logged out. This will affect all services and sessions.
<s>	The session ID to log out. Users logged in with this session ID will be logged out. This limits the logout to only a single entry, since session ID's are unique. The session ID can be found using the <i>view user</i> command.
<svc>	The service name to log out. All users connected to this service type will be logged out. This can affect more than one logged-in user; for instance, if a user has multiple logins from the same IP address, this will log out all of the sessions. Note that users with the same name logged in on a different service will not be affected.

EXAMPLE –

```
set user logout sid 4
set user logout service 10.1.140.111
set user logout name trimble service 10.1.140.111
```

Level: Supervisor

5.3.2.9 *view user*

The *view user* command retrieves the list of currently logged-in user that are at, or below the current access level.

Command Syntax:

```
view user ↵
```

Level: User, Admin, and Supervisor

5.3.2.10 *quit*

Use the *quit* command to end a CLI session. You can use either "quit" or "q" to end the session.

Command Syntax:

```
quit ↵
```

```
q ↵
```

Level: User, Admin, and Supervisor

5.3.3 Configuration management

5.3.3.1 *config*

Use the *config* command to view, change and select Thunderbolt PTP GMC configuration.

Command Syntax:

```
config <list / load / save / firmware / system> ↵
```

Where:

config list	Output configuration as a list of 'set' commands
config load	Load Thunderbolt PTP GMC configuration previously dumped
config save	Stores current settings for restore on restart
config firmware	Utilities to handle firmware updates and loading
config system	Restart or reboot system

NOTE – Config *firmware* option is available only at the supervisor level.

Level: Admin and Supervisor

config firmware

Use the *config firmware* command to maintain the firmware versions used by the Thunderbolt PTP GMC GM200.

Command Syntax:

```
config firmware <list/stage/unstage/update> ↵
```

Additional help on each of the commands is available.

Level: Supervisor

config firmware list

Use the *config firmware list* command to view the currently available packages on the Thunderbolt PTP GMC GM200.

Command Syntax:

```
config firmware list <refresh> ↵
```

Where:

<refresh>	To rescan of the images available on the system
-----------	---

The list will show a unique ID for the firmware and the firmware file name. The ID is to be used to refer to the firmware in the `config firmware update` command.

Level: Supervisor

config firmware stage

Use the `config firmware stage` command to put the firmware into system to allow updating (or rolling back) firmware versions. A maximum of 8 (the most recently released) firmware images will be stored and displayed in the list of available patches. It is suggested that the number of staged files be managed (unstaged) to keep the number of staged packages to 8 or less.

Command Syntax:

```
config firmware stage [tftp <ipaddr> <fname>] [unlock]↵
```

Where:

- `tftp` To retrieve the firmware.
Note that the Thunderbolt PTP GMC GM200 is not running a tftp server. The user must have a tftp server, with the firmware desired, available to use this option.
- `<ipaddr>` The IP address of the tftp server.
- `<fname>` The filename of the update package to load from the server.
- `unlock` Use this option (by itself) to unlock the staging. This may be necessary in the event that a web page has started the upload process but was abandoned before being complete.

If `tftp` option is not used, then the system will use X-Modem protocol to load the firmware.

NOTE – X-Modem is available only on serial port connections, and through telnet or SSH connections.

The firmware package can be updated through Web interface which will be familiar to users.

NOTE – The firmware package can be updated through Web interface, which is familiar to users.

EXAMPLE –

```
config firmware unlock ↵
```

(unlock an abandoned staging process)

```
config firmware stage ↵
```

(X-Modem transfer from serial port)

```
config firmware stage tftp 10.1.1.1 patchFile.tar.gz ↵
```

(tftp transfer of 'patchFile.tar.gz' from server 10.1.1.1)

Level: Supervisor

config firmware update

Use the *config firmware update* command to update the firmware on the Thunderbolt PTP GMC GM200.

Command Syntax:

```
config firmware update <id> ↵
```

Where:

<id> One of the IDs as given with the *config firmware list* command

NOTE – The firmware update will cause a restart of the system, which will cause a loss of network timing output.

NOTE – If upgrading from a version level earlier than v1.4.0.0 you must factory reset the unit after the firmware update. Make sure you have a copy of the unit configuration.

Level: Supervisor

config firmware unstage

Use the *config firmware unstage* command remove the firmware load from the Thunderbolt PTP GMC for use by the *config firmware update* command.

Command Syntax:

```
config firmware unstage <id> ↵
```

Where:

<id> One of the IDs as given with the *config firmware list* command

NOTE – After a firmware load is unstaged the <id> values will change so you will need to use *config firmware list* command to view the new firmware load IDs.

Level: Supervisor

config load

Use the *config load* command to reset Thunderbolt PTP GM200 configuration.

Command Syntax:

```
config load [user | factory | default] ↵
```

If no options are given, this command will present a prompt for an upload as generated by the *config list* commands.

If one of the options is given, then the appropriate settings will be loaded.

NOTE – For security reasons, the list command and subsequent upload cannot be used to restore user settings.

IMPORTANT NOTE! – If the **factory** settings are loaded then all users are removed and the 'trimble' user restored.

IMPORTANT NOTE! – If the **default** settings are loaded then all users are removed, current network settings are retained and the 'trimblesuper' user is restored.

Level: Admin and Supervisor

config list

Use the *config list* command to output Thunderbolt PTP GMC's configuration as a list of CLI commands.

Command Syntax:

```
config list ↵
```

You can make a backup of GM200's configuration by issuing a list command and using copy and paste in your window to save the configuration to a file on your local PC. You can restore the configuration by opening a CLI session, issue a *config load* command and then "pasting" the list of commands saved earlier.

NOTES –

1. For security reasons, the list command and subsequent upload cannot be used

to restore user settings.

2. The `list` command and subsequent upload cannot be used to restore the network settings.

3. To avoid network conflicts on a subsequent load, the `config list` command does not output the current Ethernet settings.

Level: Admin and Supervisor

config save

Use the `config save` command to save the current settings of the Thunderbolt PTP GM200 to the user settings. This allows operational changes from the factory settings, which can still be restored through the `config load` command.

Command Syntax:

```
config save ↵
```

This saved configuration will be loaded if the `config load user` command is issued.

Level: Admin and Supervisor

config system

Use the `config system` command to restart or reboot the system.

Command Syntax:

```
config system <options> ↵
```

Where <options> is one of:

- | | |
|----------|---|
| reboot | Completely reboot the system. This performs a hardware reset of the system. This is very similar to the 'restart' option with the only difference being that the entire system is restarted, which means that all drivers, etc., are restarted on the system. |
| debuglog | Download a debug file for Trimble engineering. This file will be sent with the Z-Modem protocol. Send the resultant file to Trimble support when requested to aid in debugging of issues. |

Level: Supervisor

5.3.3.2 *get comm*

The `get comm` command retrieves the current communication port settings.

Command Syntax:

```
get comm ↵
```

Level: User, Admin and Supervisor

5.3.3.3 *set comm*

Use the *set comm* command to configure the port settings.

Command Syntax:

```
set comm [default] [baud <baud> ] [tod [type <t>] [delay
<d>]
```

NOTE – The **default** must be used by itself and restores the comm settings to their default values. The default baud rate is 115.2kbps-8-N-1.

Where:

- <baud> The baud rate. Valid rates are: 9600, 19200, 38400, 57600, 115200 and 230400
- tod <t> Sets the serial port to output TOD on demand. This is used in conjunction with the PPS output on the serial port (on the DCD pin).
Option <t> selects the output type and can be one of:
- **none**: Disable the TOD output (default)
 - **rmc**: Set NMEA RMC output
 - **zda**: Set NMEA ZDA output
- delay <d> Set a delay for the TOD output in μ s. This delays the TOD message for <d> μ s after the PPS.
- NOTE** – When TOD is enabled the TOD output will come out regardless of any other use of the serial port (i.e., system control).

NOTE – The setting does not affect the baud rate of the port if there is currently a user logged into that port. The port baud rate will change once the user is logged out.

EXAMPLE –

```
set comm default
set comm baud 19200
set comm tod zda delay 1000
```

Level: Admin and Supervisor

5.3.3.4 *get date*

The *get date* command retrieves the current system date.

Command Syntax:

```
get date [full] ↵
```

Use the *get date full* command to retrieve the current system date and UTC time. The format of the output is:

B d Y [hh:mm:ss].

Where:

B	The full month string
d	The day of month (00-31)
Y	The full year, including century
hh:mm:ss	The time, returned only with the full option

Level: User, Admin, and Supervisor

5.3.3.5 *get freq*

Use *get freq* command to retrieve the current operating mode of the control system.

Command Syntax:

```
get freq ↵
```

Level: User, Admin, and Supervisor

5.3.3.6 *set freq*

Use *set freq* command to set the current operating mode of the control system. This command is only for test purposes and is not meant to be used in normal operation.

NOTE – This is not a 'setting' like other commands. The operational mode of the control system is not stored as part of the unit configuration.

Command Syntax:

```
set freq [halt|hold|lock|resync] ↵
```

Where:

halt	Put the control loop into User Halt mode. In this mode the frequency offset is 'frozen' and no computed compensation of the oscillator performance is used.
hold	Put the control loop into User Hold mode. In this mode, the frequency offset is compensated with computed oscillator performance. If there is no data available to perform a holdover then this is the same as 'User Halt'.

- lock** Return the unit to normal operation. This does not command the unit to 'Lock' mode immediately, it merely takes it out of 'User Hold' or 'User Halt' and is not a mechanism to override the operation of the control system.
- resync** Command the unit to force the output PPS to align with the current reference immediately. Note that this can cause jumps in time.

EXAMPLE –

```
set freq hold
set freq lock
```

Level: Supervisor

5.3.3.7 view freq

The *view freq* command displays the current frequency control information

Command Syntax:

```
view freq <stream> ↵
```

If the option *<stream>* is used, then the measurements will be printed at a 1 Hz rate for logging. The output stream can be stopped with **Ctrl-C**.

Level: User, Admin, and Supervisor

5.3.3.8 get gnss

The *get gnss* command displays the current settings for the GNSS receiver.

Command Syntax:

```
get gnss ↵
```

Level: User, Admin, and Supervisor

5.3.3.9 set gnss

Use *set gnss* command to change GNSS receiver settings.

Command Syntax:

```
set gnss [constellation <c>][elev <E>][level <L>]
[pdop <P>][adelay <d>][pos <p>][antenna [on|off]][restart
<r>] ↵
```

Where:

constellation <c>	Set the current constellation in use by the receiver to <c>, where <c> can be any valid combination of the following, separated by ' ': <ul style="list-style-type: none"> gps : GPS constellation glo : GLONASS constellation bds : Beidou constellation gal : Galileo constellation qzs : QZSS constellation (forces GPS on)
elev <E>	Set the satellite elevation mask (degrees) to <E>
level <L>	Set the acquisition/tracking signal level (dBHz) to <L>
pdop <P>	Set the PDOP mask level to <P>
adelay <d>	Set the antenna delay for the system. This affects all timing outputs from the system. <p>The antenna delay setting affects the system time base of GM200. Negative numbers advance the internal time reference, positive numbers retard (delay) the time reference. To compensate for an antenna delay of 500 ns, enter -500 as the GM200 antenna delay setting. <d> is in nanoseconds with a range of +/- 500000000 (50 ms).</p>
pos <p>	Set the receiver position or mode. Where <p> is of the format: {<lat> <lon> <ht>} auto survey . <p>Where:</p> <lat> and <lon> are in degrees and <ht> in meters (HAE).

Note that the position will be validated by the receiver for accuracy and, if it is too far out of range (thereby making the timing of the unit inaccurate) the position will be recomputed.

auto sets the unit to not force a user entered position on startup. If the unit has a stored position then it will be used on startup, with the same validation criteria as used for a user entered position.

survey forces the unit to recompute a surveyed position. The surveyed position will then be used by the system on the next startup (to speed startup). This also forces 'auto' mode.

slength <s>	Set the survey length. This is the number of position fixes that will be averaged. Only fixes that match other criteria (PDOP) will be used in the average. Acceptable range is from 60 (1 minute) to 259200 (3 days).
antenna [on off]	Enable/disable the power to the antenna. If power is turned off then no status will be generated, and no antenna alarm conditions are available (they will be cleared).
restart <r>	Restart the receiver using one of the following restart types: <ul style="list-style-type: none"> cold - data transmitted by satellites is cleared then receiver is restarted. warm - retain satellite data, just restart receiver.

NOTE – The restart option is available at supervisor level access.

EXAMPLE –

```
set gnss constellation gps|bds elev 5 adelay 5000
set gnss pdop 4 elev 10
```

Level: Admin and Supervisor

5.3.3.10 *view gnss*

Use *view gnss* command to display the current GNSS tracking information.

Command Syntax:

```
view gnss [stream] ↵
```

If the option **stream** is used, then the measurements will be printed at a 1Hz rate for logging. The output stream can be stopped with **Ctrl-C**.

EXAMPLE –

```
view gnss
view gnss stream
```

Level: User, Admin, and Supervisor

5.3.3.11 *help*

Use *help* command to get an overview of the GM200 (help intro), to get a list of the available commands (help commands), or to get a description of an individual command.

Help is available for common tasks (HOWTOs), and to answer event or condition related questions (WHATIFs).

Command Syntax:

```
help [intro][commands][set]...[howto <n>] ↵
```

EXAMPLE –

```
help intro
help commands
help set
```

Level: User, Admin, and Supervisor

help howto

The CLI command *howto* provides a list of frequently used task and help on the related CLI options.

Command Syntax:

```
help howto <n> ↵
```

Where <n> is a number from 1 to 12:

- 1 How to get current Alarm status?
- 2 How to set alarm number 2 with setTime as 2 and clearTime as 1?
- 3 How to enable Ethernet port 0/1?
- 4 How to set IP address of 192.168.0.9 on Ethernet 0 port?
- 5 How to set BNC output of even?
- 6 How to set periodic output of period 2 and value 1?
- 7 How to set serial port baud rate to 19200bps?
- 8 How to add a new user called trimble1 with an access level of user?
- 9 How to delete an existing user Trimble?
- 10 How to change user password?
- 11 How to restore factory default settings?
- 12 How to reboot the system?

EXAMPLE –

```
help howto 4
```

5.3.3.12 *help set*

Use the *help set* command to set the system parameters.

Command Syntax:

```
help set <alarm/comm/gnss/input/network/output/ptp/user> ↵
```

Level: Admin and Supervisor

5.3.3.13 *get input*

Use *get input* command to generate a list of the frequency control input candidates.

Command Syntax:

```
get input <input type> ↵
```

Where <input type> is an option from the list:

GNSS	Use the GNSS receiver as source for time/frequency
synce0	SyncE input on interface 0 is valid source for frequency
synce1	SyncE input on interface 1 is valid source for frequency
ptp0	PTP input on interface 0 is valid source for time/frequency
ptp1	PTP input on interface 1 is valid source for time/frequency

If no parameters are passed, the candidacy of all inputs are returned.

EXAMPLE –

```
get input
get input gnss
```

Level: User, Admin, and Supervisor

5.3.3.14 *view input*

Use *view input* command to display the statistics on the current input sources for frequency control.

Command Syntax:

```
view input <gnss> ↵
```

If no parameters are passed the statistics for all currently enabled input sources is returned.

EXAMPLE –

```
view input
view input gnss
```

Level: User, Admin, and Supervisor

5.3.3.15 *get output*

The *get output* command returns the current output settings for the system. If no options given, then all output settings are returned.

Command Syntax:

```
get output [<sel>]↵
```

Where <sel> may be:

bnc Get output settings for BNC output only

EXAMPLE –

```
get output bnc
get output
```

Level: Admin and Supervisor

5.3.3.16 *set output*

Use the *set output* command to set the output signal(s) for the system. If no output signal selection is entered, then all outputs are changed.

If an output is not valid for the given signal, then that output is turned off.

The **invert** (or **falling**) modifier inverts the active state of the output. This affects all levels for the given signal. That means that if the output is set **high** for instance, the 'invert' option changes the output to 'low'. The **falling** modifier is an edge trigger.

NOTE – Note that this is a modifier and cannot be used alone.

The **width** option sets the pulse width for both BNC and digital.

NOTE – Note that the 'periodic' output has its own width, set with the *set periodic* command.

The **delay** option allows setting of a delay for the timing. This is used to compensate for cable and other delays. The <d> value is in nanoseconds.

The output delay setting only affects the PPS pulse on the BNC connector. That value does NOT affect the system time base and has no effect on the PTP and NTP timestamps. Negative numbers advance the PPS pulse, positive numbers retard (delay) the PPS pulse. The output delay can be used for application-specific adjustments of the PPS timing, for example the length of cable that is attached to the BNC output for conducting the PPS pulse signal. It has only a local impact, though. Clients in the LAN network will not see any effect from this value.

The output delay setting has an immediate effect on the PPS pulse. The output delay setting shall NOT be used for compensating the antenna delay!

The PPS output alignment is always set to UTC, regardless of the constellation setting. This is because PTP outputs TAI time, which is most easily derived from GPS time, and the PPS alignment for TAI is defined to be UTC.

Command Syntax:

```
get output [<sel>] <off|low|high|pps|even|10mhz|periodic>
[invert|falling] [width <w>] [delay <d>]↵
```

Where <sel> may be:

bnc Change settings for the BNC output signal

EXAMPLE –

```
set output bnc even
set output pps
```

Level: Admin and Supervisor

5.3.3.17 *get periodic*

The *get periodic* command returns the current settings for the periodic output selection.

Command Syntax:

```
get periodic ↵
```

Level: User, Admin, and Supervisor

5.3.3.18 *set periodic*

Use the *set periodic* command to set the periodic output.

Command Syntax:

```
set periodic [period <p>] [value <v>] [width <w>]↵
```

Where :

period <p>	Set the period for the output in seconds. The smallest value is 2 (otherwise use pps). The largest value is 100000.
value <v>	Set the value for the second count to generate the pulse. This can be from 0 to <p> - 1.
width <w>	Set the pulse width for the periodic output in nanoseconds. Range is 100 ns to 5E8 (1/2 second).

EXAMPLE –

```
periodic period 2 value 1
```

The above would set a pulse output every 2 seconds, on the odd pulse.

Level: Admin and Supervisor

5.3.3.19 view prodconf

The *view prodconf* command displays the production configuration information that was set by Trimble manufacturing during production.

Command Syntax:

```
view prodconf ↵
```

EXAMPLE –

```
view prodconf
```

Returns:

```
Serial number
Build date
Premium bits (this option is available only to supervisor level user)
Product ID
Hardware ID
Extended S/N
```

Level: User, Admin, and Supervisor

5.3.3.20 get system

The *get system* command returns the current system wide host settings for the system.

Command Syntax:

```
get system ↵
```

Level: User, Admin, and Supervisor

5.3.3.21 *set system*

Use the *set system* command to configure the various system wide settings.

Command Syntax:

```
set system [<options>] ↵
```

Where <options> are:

hostname <hn>	Set the hostname for the system to <hn>. Only the characters '!', '-', 0-9, a-z, and A-Z are valid within the host name. The min size size of the host name is 1 alpha-numeric character. The max size size of the host name is 63 characters.						
opermode <m>	Set the operational mode for the system. <m> may be one of: <table> <tr> <td>gm</td> <td>Grand Master operating mode. PTP will not be activated until the system is locked to the GNSS signal and the UTC correction information is available. PTP may be used to improve holdover time. See APTS description below.</td> </tr> <tr> <td>bc</td> <td>Boundary Clock operating mode. In Boundary Clock operating mode the unit will allow for a PTP input to enable steering of the time/freq operation. In BC mode GNSS operation is suspended.</td> </tr> <tr> <td>freerun</td> <td>Free Run operating mode. The PTP protocol will be activated as soon as the system has booted, but without GNSS tracking. This means that the PTP timestamps will either be started from the PTP epoch, hand-set by the user, set from an NTP server (see timesource option), or from GNSS. The frequency control will be in freerun until GNSS tracks and locks. If GNSS tracks and locks, the PTP timestamps will immediately be set to the time based on GNSS.</td> </tr> </table>	gm	Grand Master operating mode. PTP will not be activated until the system is locked to the GNSS signal and the UTC correction information is available. PTP may be used to improve holdover time. See APTS description below.	bc	Boundary Clock operating mode. In Boundary Clock operating mode the unit will allow for a PTP input to enable steering of the time/freq operation. In BC mode GNSS operation is suspended.	freerun	Free Run operating mode. The PTP protocol will be activated as soon as the system has booted, but without GNSS tracking. This means that the PTP timestamps will either be started from the PTP epoch, hand-set by the user, set from an NTP server (see timesource option), or from GNSS. The frequency control will be in freerun until GNSS tracks and locks. If GNSS tracks and locks, the PTP timestamps will immediately be set to the time based on GNSS.
gm	Grand Master operating mode. PTP will not be activated until the system is locked to the GNSS signal and the UTC correction information is available. PTP may be used to improve holdover time. See APTS description below.						
bc	Boundary Clock operating mode. In Boundary Clock operating mode the unit will allow for a PTP input to enable steering of the time/freq operation. In BC mode GNSS operation is suspended.						
freerun	Free Run operating mode. The PTP protocol will be activated as soon as the system has booted, but without GNSS tracking. This means that the PTP timestamps will either be started from the PTP epoch, hand-set by the user, set from an NTP server (see timesource option), or from GNSS. The frequency control will be in freerun until GNSS tracks and locks. If GNSS tracks and locks, the PTP timestamps will immediately be set to the time based on GNSS.						

apts <e>	<p>If the unit is in Grand Master mode, then this allows setting the APTS operation to <e>, where <e> can be 'enable' or 'disable'.</p> <p>In GM mode, GNSS is used as the primary reference source. In the event GNSS fails then APTS allows the unit to use PTP as a frequency source to provide better holdover operation.</p>
ntpip none <ip>	<p>If the unit is in freerun mode, then this allows setting of the IP address of an NTP server to use as a source to establish time.</p> <p><ip> may be an IPv4 or IPv6 address or the keyword 'none'. If set to 'none', the unit will not attempt to establish time from an NTP source. If an IP address is provided, then the server will be queried on system startup to attempt to establish time in the system. In the event that the server is unavailable at system startup, a sync will be attempted every 15 seconds for a user settable timeout period (see the ntpto option).</p> <p>NOTE – Unlike the NTP server options, the NTP server to be queried is not limited to the timing Ethernet ports and time may be obtained through the management port, if the IP address is in that domain.</p>
ntpto <t>	<p>Set the NTP query timeout to <t> minutes, default of 15 minutes.</p> <p><t> has the range of 1 <= t <= 120 to allow the system to attempt to acquire time from an NTP server from 1 minute to 2 hours.</p>

EXAMPLE –

```
set system hostname GM200.bdg11.flr3
set system opermode freerun ntp 192.168.2.17 ntpto 60
```

Level: Supervisor

5.3.3.22 *view uptime*

The *view uptime* command displays the current 'up-time' of the system, which is how long the timing system has been operational.

This command takes no options.

Command Syntax:

```
view uptime ↵
```

Level: User, Admin, and Supervisor

5.3.3.23 *view version*

Use the *view version* command to display the software and hardware version information for the product.

Command Syntax:

```
view version [<hardware | gnss>] ↵
```

Where:

<hardware>	View the hardware version of the Thunderbolt PTP GMC
<gnss>	View only the GNSS version

EXAMPLE –

```
view version
view version hardware
```

Level: User, Admin, and Supervisor

5.3.3.24 *view*

Use the *view* command to display both the current system status and system level operational information.

Command Syntax:

```
help view <X>] ↵
```

Where <X> can be:

access	View access level for logged in user
alarm	View currently active alarms on the system
dlog	View system data logging information
freq	View current frequency control information
gnss	View current GNSS tracking status
input	View statistics for input sources
logs	View system message log data
network	View network statistics
ntp	View current NTP stats
realtime	Configure the messages shown on this port
ptp	View current PTP stats
pos	View current receiver position information

stream	View a continuous stream of frequency control data
summary	View the frequency, GNSS, and position information with one option
temp	View the current system temperature
uptime	View the current 'up-time' of the system
user	View the current logged-in users
version	View the version information for the unit.
prodconf	View the production configuration information

EXAMPLE –

```
view
view gnss
view logs
view dlog
```

NOTE – Some view options like logs, stream are visible to admin and/or supervisor levels.

Level: User, Admin, and Supervisor

5.3.4 Network management

5.3.4.1 *get network*

The *get network* command displays the current network interface status.

Command Syntax:

```
get network [interface] ↵
```

Where:

interface (Optional) Is a network interface such as eth0, eth1 or eth2. If no interface is specified, all are displayed.

Level: User, Admin, and Supervisor

5.3.4.2 *set network*

The *set network* command configures the network connection. This is a multi-option command.

Command Syntax:

```
set network [<iface>] [default] | [disable] | [<ip>] [autoneg  
on|off] | [ip6-disable]  
[<vlan>] [bond enable|disable|swap] [synce <sop>] ↵
```

NOTE – The **default** option must be used by itself, to restore the network settings to their default values.

Where:

<iface> Network interface definition, where <iface> is one of:

- eth0** – Network interface Ethernet 0 (timing port)
- eth1** – Network interface Ethernet 1 (timing port)
- eth2** – Network interface Ethernet 2 (management port)

The iface may indicate a VLAN with the form:

```
<eth0|eth1|eth2|> [.vlanId]
```

default Restore network setting(s) to default value. This must be used with no other setting options.

disable Completely disable this interface. This stops all activity from this interface. The interface is enabled by the command 'enable' or by setting any DHCP or IPAddr for this interface.

enable	Bring a previously disabled interface to the active, or 'up' condition. Note that, if the interface does not have valid parameters set, the interface may still not be usable. Enabling the interface can also be done by setting any DHCP or IPAddr for this interface.
ip6-disable	Disables IPv6 on this interface. Setting any IPv6 option will enable IPv6.
<ip>	IP configuration information for this port. This has the following format: <pre>[dhcp dhcp6 slaac] [addr <i>] [mask <m>] [gateway <g>] [bcast <bm>] [addr6 <i6>] [gw6 <g6>]</pre> <p>Where:</p> <ul style="list-style-type: none"> dhcp Sets the port to utilize Dynamic IP Address (Dynamic Host Configuration Protocol) for IPv4 dhcp6 Sets the port to utilized Dynamic IP Address (Dynamic Host Configuration Protocol) for IPv6. Note that you can have DHCP for IPv6 and static addresses for IPv4 (and vice-versa). slaac Sets the port to utilize the SLAAC (Stateless Address Auto-configuration) IPv6 address assignment. <i> IP address of the port, in xxx.xxx.xxx.xxx format <m> Netmask for the port, in xxx.xxx.xxx.xxx format <g> Gateway/Router IP address for the port, in xxx.xxx.xxx.xxx format <bm> Broadcast mask for the port, in xxx.xxx.xx.xxx format <i6> IPv6 address for the port. This must be in CIDR format, which is the IPv6 address with a /mask value. If no /mask value is given the default mask size of 128-bits is assumed. <g6> IPv6 gateway address for the port. This must be in CIDR format, which is the IPv6 address with a /mask value. If no /mask is given the default mask size of 128-bits is assumed. The gateway setting can be cleared by setting a CIDR address of "::".
<vlan>	VLAN configuration parameters, valid only for non-management, non-vlan, ports, in the format: <pre>[vlan <vl>] [prio <p>]</pre>

Where:

<vl> Comma separated list of VLAN IDs to use as the current VLAN list. Note that this list replaces any other VLAN list that is currently in use.

To disable VLAN on the port, use the special ID of '-1'.

This will delete all VLANs associated with this port.

Value VLAN ID numbers are from 0-4094, with the addition of '-1' to disable VLAN entirely.

prio Set the priority byte for the VLAN to <p>. The assigned priority only applies to the specified VLAN interface.

<p> Can be a number between 0 (lowest) to 7 (highest).

bond Set the bonding for the timing ports. If the interface is given and it is anything other than Eth0, then an error is returned. The bonded ports assume the settings for port Eth0 and that port is made active. Eth1 is put into standby mode.

Where :

enable If bonding is disabled then then port Eth1 is bound to port Eth0. The settings for port Eth0 become the settings for the bonded port and Eth1 is put into standby. If bonding is already enabled then this does nothing.

disable If bonding is enabled then this disables bonding. If bonding is disabled then this does nothing.

swap If bonding is disabled then this is ignored. If bonding is enabled then swap the active/standby ports. This puts the currently active port into standby, and makes the standby port active.

<autoneg> Media auto-negotiation enable, only valid for fiber SFP interfaces. This enables/disables 1000BASE-X auto-negotiation.

<sop> Set the syncE options for this interface. This is only valid for non-management ports.

Where <sop>:

off	Disable syncE operation for this port
output	This port is a syncE output. This port cannot be used as an input source for the loop control
input	This port is a syncE input. This makes it valid to be selected as an input source for the loop control.

NOTE – Input is only valid for non-SFP ports.

NOTE – SyncE is not supported by all SFP types. SyncE output can only be used on optical SFPs, as well as the following electrical SFPs: Belfuse SFP-1GBT-09

EXAMPLE –

```
set network eth0 addr 192.168.0.9 mask 255.255.255.0 bcast
192.168.0.255

set network eth0 gateway 192.168.0.1

set network eth0 addr6 dead:beef:cafe::1/24 gw6 1234:567:1:1::/24

set network eth1 dhcp

set network eth1 vlan 200,300

set network eth1.200 addr 192.168.1.12 mask 255.255.255.0 bcast
192.168.0.255

set network eth0 vlan -1

set network bond enable

set network eth0 syncE output

set network eth1 syncE input
```

Level: Admin, and Supervisor

5.3.4.3 *view network*

Use *view network* command to view current network interfaces stats.

Command Syntax:

```
view network <eth0 | eth1 | eth2> ↵
```

If no interface name is entered, then statistics for all interfaces are presented.

EXAMPLE –

```
view network
view network eth1
```

Level: User, Admin, and Supervisor

5.3.4.4 *get ntp*

The *get ntp* command displays the current NTP broadcast setting for eth0 or eth1 ports. If no option given then all ports are returned. If you desire to view the current NTP statistics then use *view ntp*.

If NTP broadcast is enabled then this command will return the broadcast settings, otherwise it will return '**broadcast disabled**'.

Command Syntax:

```
get ntp <eth0 | eth1 | iff> ↵
```

Where:

- <iff> If encryption is enabled then this will present the IFF certificate information to provide to the clients. This is ONLY available if you are connected through a secure connection (SSH or local serial port). The information presented should be copied from the terminal into a file, named to the filename indicated in the information and then that file distributed, securely, to your clients. (This option is available only to supervisor level user)

EXAMPLE –

```
get ntp
get ntp eth0
get ntp iff
```

Level: User, Admin, and Supervisor

5.3.4.5 *set ntp*

The *set ntp* command configures the NTP broadcast information.

Command Syntax:

```
set ntp [<eth0 | eth1>] <options> ↵
```

The port information (eth0|eth1) must be supplied for options marked with an '*'. They are optional on other commands, unless noted.

Where <options>:

- disable Disable NTP for the given port. This stops all NTP traffic for the port.
- enable Enable NTP for the given port. This starts NTP traffic for the port.

default	Restore default settings for the port, if supplied. If no port is supplied then all ports are affected. This option may not be used with any other options.
*bcast <ip> off	Set broadcasting on/off for the port. If an <ip> address is entered, it must be in the same domain as the domain of the port. This is to keep from broadcasting to the whole internet.
*interval <n>	Set the broadcast time interval to <n> where <n> is the broadcast time interval, in seconds to the power of two. For example, a minpoll value of 4 sets the broadcast time interval to 2 ⁴ or 16 seconds. Allowable values are from 4 (16 sec) to 17 (36.4 hours).
*ttl <t>	Set the time-to-live hops to <t>. Allowable values are from 1 to 7, or '-'. Note that a value of '-' sets the default maximum hop value allowed.
encrypt on off	Set the encryption of the NTP messages on/off.
host (hn)	Set the host name for the encryption certificate to <hn>. Only the characters '-', '_', 0-9, A-Z, and a-z are valid within the host name. The maximum size of the host name is 32 characters.
group <gn>	Set the group name for the encryption certificate to <gn>. Only the characters '-', '_', 0-9, A-Z, and a-z are valid within the group name. The maximum size of the group name is 32 characters.
peer <pl>	Set the peer list to <pl>. <pl> may be a comma separated list of up to 4 peers to use. This list must contain no spaces and may be made up of a mixture of IPv4, IPv6, or valid hostnames. The other allowable <pl> option is '-', which disables peering (regardless of where it is in the list).
iff	This will renew the IFF certificate for NTP certification. This should be done approximately every 30 days to keep the certificate valid.

EXAMPLE –

```
set ntp eth1 bcast 10.1.140.225 interval 4
set ntp eth0 encrypt on host Trimble group MyGroup1
set ntp peer 192.168.0.80,10.1.140.80,time.nist.gov
```

NOTE – Any changes to NTP configurations requires the shutting down and restarting of NTP.

NOTE – IP address changes (as through DHCP) are not service disrupting to NTP.

Level: Admin and Supervisor

5.3.4.6 *view ntp*

The *view ntp* command displays the current NTP status.

Command Syntax:

```
view ntp [stream] ↵
```

If the option “stream” is entered, then the measurements will be printed at a 1Hz rate for logging. The output stream can be stopped with **Ctrl-C**.

EXAMPLE –

```
view ntp stream
```

Level: User, Admin, and Supervisor

5.3.4.7 *ping*

Use the *ping* command to validate a route to another IP system on the network.

Command Syntax:

```
ping[eth0|eth1|eth2] <ipaddr> ↵
```

Where :

<eth0>	Network interface Ethernet 0
<eth1>	Network interface Ethernet 1
<eth2>	Network interface Ethernet 2
<ipaddr>	Valid IPv4 address of the unit, in xxx.xxx.xxx.xxx format

NOTE – If no port is given then the management port is assumed. Because the ports may be on separate physical networks you need to make sure you are using the network interface corresponding to the device you are attempting to ping. If you have a VLAN in Eth0 or Eth1, you should set the Ethernet port number and VLAN ID as in the example.

EXAMPLES –

```
ping eth1 192.168.1.10
ping eth1.100 192.168.1.100
```

Level: User, Admin, and Supervisor

5.3.4.8 ping6

Use the *ping6* command to validate a route to another IP system on the network.

Command Syntax:

```
ping6 [eth0|eth1|eth2] <ipaddr> ↵
```

Where :

<eth0>	Network interface Ethernet 0
<eth1>	Network interface Ethernet 1
<eth2>	Network interface Ethernet 2
<ipaddr>	Valid IPv6 address of the unit without any mask information

NOTE – If no port is given then the management port is assumed. Because the ports may be on separate physical networks you need to make sure you are using the network interface corresponding to the device you are attempting to ping. If you have a VLAN in Eth0 or Eth1, you should set the Ethernet port number and VLAN ID as in the example.

EXAMPLES –

```
ping6 eth1 2200:1::10
ping6 eth1.100 2200:1::100
```

Level: User, Admin, and Supervisor

5.3.4.9 get ptp

The *get ptp* command returns the current user settable PTP settings. If a valid profile has been selected then this command will only return the parameters that are outside the default settings for that profile.

If you desire to view the current PTP operation then use command *view ptp*.

Command Syntax:

```
get ptp <eth0/eth1> ↵
```

If no option is given then all port settings are returned.

Level: User, Admin, and Supervisor

5.3.4.10 *set ptp*

The *set ptp* command configures the PTP interface.

Command Syntax:

```
set ptp [<eth0 | eth1>] <options> ↵
```

Where <options> are:

default	Restore default settings for the user profile.
disable	Disable this PTP port. PTP on the interface must be disabled before any configuration changes are allowed.
enable	Enable this PTP port. By default, all ports are enabled.
mode <m>	Set the current clock mode. <m> may be one of: <ul style="list-style-type: none"> master This port is to operate as a GM output. slave This port is to operate as a slave clock, making this available to be selected as an input. <p>Setting the current clock mode is valid only if the unit is configured for Boundary Clock operation.</p> <p>When the unit has been configured for Boundary Clock operation setting, one port mode automatically sets the other port to the opposite. For example, if the BC mode is enabled, setting eth1 to "slave" automatically sets eth0 to "master".</p>
profile <p>	Set the current profile, <p> may be one of:

g.8275	Select the G8275.1 profile. This profile cannot be used with VLAN and PTP.
g.8275.1	Select the G8275.1 profile. This profile cannot be used with VLAN and PTP.
g.8275.2	Select the G.8275.2 profile.
g.8265	Select the G.8265.1 profile, with Option-II clock class output.
g.8265.1	Select the G.8265.1 profile, with Option-I clock class output.
1588	Select IEEE-1588 operational defaults.
power	Select the Power (C37.238 2011) profile.
smpte	Select the SMPTE (ST-2059-2) profile.
telecom	Select the IEEE-1588 Telecom v2 profile .
enterprise	Select the enterprise (prelim) profile.
802.1as	Select the 802.1AS (gPTP) profile.

dscp <d> Set the DSCP (Differentiated Services Code Point) field to <d> for the PTP traffic generated from this port. This may be disabled (default) by either setting <d> to '0' or '-'.

The following options allow altering profiles. Note that the ability to alter profile settings is determined by the profile selected. In addition, the profile may limit the allowable values.

ai <n>	Set the announce interval.
ar <n>	Set the announce receipt timeout. The number of announce intervals allowed to pass without the receipt of an announce message.
class <n>	Set the clock class.
df <n>	Set the duration field (for unicast grant messages). Range: dependent on profile, absolute range 10 - 1000. Most profiles have a default of 300.
dm <a>	Set the delay mechanism, may be one of E2E or P2P.
domain <n>	Set the domain number for the profile.
dr <n>	Set the delay request interval.
pdr <n>	Set the pdelay request interval (only some profiles)

grantor <g>	For PTP unicast input profiles only: this allows setting the unicast Grandmasters to use as the 'grantor' for the requests. <g> may be a comma separated list of up to 3 GMs to use. This list must contain no spaces and be made up of the same transport types (i.e. , no mixing of IPv6 and IPv4 addresses). NOTE – Before the PTP grantor is assigned an IPv6 address, the user must set the PTP Transport to IPv6.
ipmode <a>	Set the IP Mode of operation. <a> may be one of: multi Set multicast mode uni Set unicast mode hybrid Set Hybrid mode; allow multicast for GM announcement, but time information is delivered through unicast requests from slave clocks.
pri1 <n>	Set the priority 1 value. This must be a number from 0 to 255.
pri2 <n>	Set the priority 2 value. This must be a number from 0 to 255.
si <n>	Set the sync interval.
sm <n>	Set the step mode. 1 -> one-step, 2 -> two-step.
transport <a>	Set the transport mechanism. <a> may be one of: IPv4 IPv4 transport IPv6 IPv6 transport. Eth 802.3 transport (not compatible if VLANs are assigned)
ttl <t>	Set the multicast ttl value for the transmission. This setting is only available if the profile selected allows multicast. Any valid TTL may be set (1-255) but, realistically, the user should limit their value to be between 1 and 6. Please be aware that a profile may limit the range even further than the 1-6 values.
l2mac <a>	Select the layer 2 multicast MAC used: def Forwardable MAC (01-1B-19-00-00-00) (default) alt Non-forwardable MAC (01-80-C2-00-00-0E)

NOTES –

- Stop the PTP interface before setting up.
- When you configure the APTS or BC mode, the PTP slave port should be configured first and then configure the PTP master port.
- You must reboot the system after the PTP slave mode is enabled.

NOTE – Selecting or changing to a different profile will set all PTP parameters to default values for the profile, this includes the PTP Operational Mode.

EXAMPLES –

```
set ptp eth1 disable profile g8275 domain 30 ttl 3

set ptp eth1 profile g2875.2 mode slave grantor 192.168.2.10 ai -3
si -7 dr -7
```

NOTE – The user must disable PTP on the port where the operational changes are required.

Level: Admin and Supervisor

5.3.4.11 *view ptp*

The *view ptp* command displays the current PTP stats.

Command Syntax:

```
view ptp <eth0/eth1> <phase/stream> ↵
```

If the option **<phase>** is used, then only the phase offset between the PTP hardware clock and the system clock is returned (for either or both ports).

When a unicast PTP profile is configured, this command allows to have a list of all PTP slaves taking synchronization from the GM200.

EXAMPLE –

```
view ptp eth0
```

Level: User, Admin, and Supervisor

5.3.4.12 *get snmp*

The *get snmp* returns the current SNMP settings. SNMP needs to be configured for trap generation and to set the SNMP community strings.

Command Syntax:

```
get snmp ↵
```

Level: User, Admin and Supervisor

5.3.4.13 *set snmp*

Use *set snmp* command to configure the SNMP trap information.

Command Syntax:

```
set snmp <options> ↵
```

Where <options> are:

enable	enable SNMP with the current options
disable	Disable SNMP operation
v2c <on/off>	Enable/disable v2c agent operations
readonly <r>	Set read-only v2c agent community string ID to <r>
readwrite <w>	Set read-write v2c agent community string ID to <w>
v3 <on/off>	Enable/disable v3 agent operations
authtype <t>	Set the v3 agent authorization type where <t>:
<none>	No authentication (other than username) is required
<auth>	SHA password authentication is required
<priv>	SHA password is required and AES encryption is active
port <p>	Set the port number SNMP
community <c>	Set the community string ID for SNMP
readonly <r>	Set the read-only community string ID to <r>
readwrite <w>	Set the read-write community string ID to <w>
gentraps	Test generation of all alarm traps (set & clear) that can be generated by the system. No functionality is affected, only the traps are generated. This command cannot be used with any other commands.

EXAMPLE –

```
set snmp enable v2c off v3 on authtype priv
set snmp v2c on v3 off readonly "indivisible" readwrite "diversity"
```

Level: Admin and Supervisor

5.4 List of "How to" help topics

The *howto* command provide a list of frequently used task and help on the related CLI options.

The list of frequently used tasks:

1. [How to get current Alarm status?](#)
2. [How to set alarm of level major, alarm number 2 with setTime as 2 and clearTime as 1?](#)
3. [How to disable Ethernet port 0/1?](#)
4. [How to set ip address of 192.168.0.9, and also set a netmask and a gateway address on ethernet 0 port?](#)
5. [How to set bnc output to even?](#)
6. [How to set periodic output of period 2 and value 1?](#)
7. [How to set serial port baud rate to 19200bps?](#)
8. [How to add a new user called trimble1 with an access level of user?](#)
9. [How to delete an existing user trimble?](#)
10. [How to change user password?](#)
11. [What is the password recovery procedure?](#)
12. [How to restore factory default settings?](#)
13. [How to reboot the system?](#)

Command format:

```
help howto <n>
```

Where: <n> is one of the above topic numbers.

```
EXAMPLE -
>
> help howto 1
How to get current Alarm status:
get alarm
>
```

5.4.1 How to get current Alarm status?

```
get alarm
```

5.4.2 How to set alarm of level major, alarm number 2 with setTime as 2 and clearTime as 1?

You must have admin or higher access level.

```
set alarm 2 maj 2 1
```

5.4.3 How to disable Ethernet port 0/1?

You must have admin or higher access level.

```
set network eth0 disable  
set network eth1 disable
```

5.4.4 How to set ip address of 192.168.0.9, and also set a netmask and a gateway address on ethernet 0 port?

You must have admin or higher access level.

```
set network eth0 addr 192.168.0.9 netmask 255.255.255.0  
gateway 192.168.0.1
```

5.4.5 How to set bnc output to even?

You must have admin or higher access level.

```
set output bnc even
```

5.4.6 How to set periodic output of period 2 and value 1?

You must have admin or higher access level.

```
set periodic period 2 value 1
```

5.4.7 How to set serial port baud rate to 19200bps?

You must have admin or higher access level.

```
set comm baud 19200
```

5.4.8 How to add a new user called trimble1 with an access level of user?

You must have admin or higher access level.

```
set user adduser trimble1 user
```

5.4.9 How to delete an existing user trimble?

You must have supervisor access level.

```
set user deluser trimble
```

5.4.10 How to change user password?

```
set user passwd <new_passwd>
```

5.4.11 What is the password recovery procedure?

Disconnect all the Ethernet connections to the GM200 and then cycle the power.

On startup the front serial port can be logged into with the username **trimblesuper** and a password **Tbolt_<sn>**, where <sn> is the serial number of the unit.

5.4.12 How to restore factory default settings?

You must have admin or higher access level.

```
config load factory
```

5.4.13 How to reboot the system?

You must have supervisor access level.

```
config system reboot
```

5.5 List of "What if" help topics

The *whatif* command provides information about some scenarios you may encounter and how to recover from those.

5.5.1 What if you have an FPGA-Load-Bad alarm

This is an indication of an out-of-date FPGA load.

A supervisor level person applying a hardware update load to the system can remedy this. The supervisor can see [config, page 83](#) section for more information.

5.5.2 What if you have a PTP-System-Bad alarm

This is an indication that the PTP system on one, or both, of the ethernet ports was unable to be started. This is usually due to a port not being functional. The [The get network command displays the current network interface status](#). information can be used to get information about the current status of the network connections.

If a port is known to be unused then an admin can change the PTP operation on that port to disable the PTP operation, which will clear the alarm.

6. Web Interface

This chapter describes the Thunderbolt PTP Grandmaster Clock web interface - configuration and status pages.

- ▶ Home page
- ▶ Login page
- ▶ How to edit a configuration page
- ▶ System page
- ▶ System status
- ▶ Interface Management
- ▶ Synchronization Management
- ▶ Security Management
- ▶ System Management

6.1 Home page

To launch a web browser and open a connection to Thunderbolt PTP Grandmaster Clock GM200, enter the URL that specifies the IP address:

<http://192.168.2.250>

Web access is permitted only through Ethernet port-2. The default IP Address for Ethernet port-2 is 192.168.2.250.

NOTE – IE11, Firefox, and Chrome browsers are supported on Windows and Linux operating systems. Trimble recommends using Google Chrome browser for better rendering of Thunderbolt PTP Grandmaster Clock GM200 web pages.

Entering the IP address will launch the main or home page.

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads 'Welcome trimblesuper. You have super access rights.' The main header displays the 'Trimble' logo and the title 'Thunderbolt PTP GM200'. Below the header is a navigation menu with the following items: SYSTEM STATUS (highlighted), INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The main content area is titled 'System Status' and contains the following information:

Alarm Status Critical	Input Status GNSS: Lock
Configuration Status Configuration is saved	Output Status Sync Out: PPS
Management Port Status Connected 1000MB	Product ID 111224-10
Session Status 0 cli : 1 web	Software Version 20200409-1.5.0.0
Ethernet Port 0 Status Not Present SyncE is Off NTP Server PTP is disabled	Date (GNSS UTC) 05/14/2020 14:14
Ethernet Port 1 Status Not Connected SyncE is Off NTP Server PTP is disabled	Date (Local) 05/14/2020 07:13
	Host Up Time 8 days 20:57
	Host Name TrimbleJDDesk

The footer contains links for Home, Contact, Privacy Statement, Terms Of Use, and Copyright ©2015-2020, Trimble Inc.

The main page displays a brief status of the Thunderbolt PTP GMC. The components of this page are:

- **Alarm Status:** Shows the list of active alarms
- **Input Status:** Shows the input reference of GM200

- **Configuration Status:** Shows the status of the current configuration saved
- **Product ID:** Shows the Trimble part number of GM200
- **Management Port Status:** Shows the status of the Management Ethernet port
- **Software Version:** Displays the current firmware version on the unit
- **Time (UTC):** Displays the time in UTC format
- **Up Time:** Displays how long the unit is powered on
- **Ethernet Port 0 Status:** Displays the status of PTP/NTP/SnycE Ethernet Port 0
- **Ethernet Port 1 Status:** Displays the status of PTP/NTP/SnycE Ethernet Port 1

Log in to the Thunderbolt PTP GMC GM200 to view or change system parameters. The login option is available at the top left of main landing page.

Refresh Rate

The main page is refreshed at a rate of 1 second.

6.2 Login page

Use the Thunderbolt PTP GMC GM200 Login page to view system status. The login page requires a valid username and password.

NOTE – There is a change in default password to comply with California State Bill SB-327.

The SB-327 Information privacy: connected devices bill requires that the pre-programmed password is unique to each device manufactured.

The SB-327 became effective on January 1, 2020.

Trimble has removed the trimble/trimble user/password as the initial default login.

Starting with v1.4.0.0, the unique password is based on the serial number of the unit. Here is the format:

User name: trimblesuper

Password: Tbolt_<serialnumber>

For example, if the serial number is 1234567890, the password will be Tbolt_1234567890.

Welcome.
Login for more detailed views.

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Thunderbolt PTP GM200

System Access

Username

Password

Authorize

As a 'Best security practices' Trimble recommends to change the default user credentials of the 'trimblesuper' account.

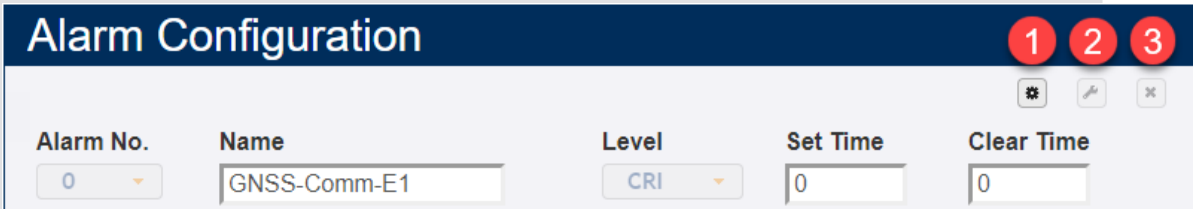
6.3 How to edit a configuration page

All configuration pages have 3 icons on the top right of the configuration area. Numbered from left to right they are:


- ① – **Enable System Configuration** – put the screen in edit mode. Editable fields and pull down items will change from greyed to highlighted.
- ② – **Set** – Sets the configuration. You will need to **SAVE** the configuration in a separate step.
- ③ – **Exit** – Returns the screen to read only mode.

EXAMPLES –

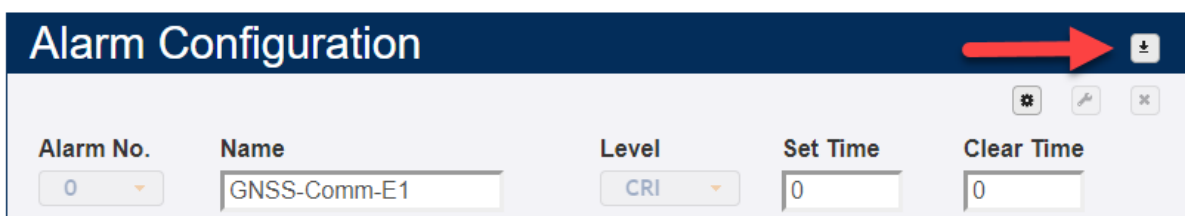
Alarm Configuration – Read Only



Alarm Configuration – Edit Mode



To save the configuration, click **Save System Configuration**:



Then click **OK** in the confirmation box to commit the system configuration:

10.1.141.1 says

Commit system configuration?

Please confirm.

6.4 System page

After entering the valid credentials, the Thunderbolt PTP Grandmaster Clock GM200 launches the **System Page**. The system page is organized in two frames – the navigation and content.

The start page gives general status information of the Thunderbolt PTP Grandmaster Clock GM200. By using the navigation menu on the left side of the screen, you can view a number of configuration pages, which are described in following pages.

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads: 'Welcome trimblesuper. You have super access rights.' The main header includes the Trimble logo and the title 'Thunderbolt PTP GM200'. Below the header is a navigation menu on the left with the following items: SYSTEM STATUS (highlighted in yellow), INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The main content area is titled 'System Status' and displays the following information:

Alarm Status Critical	Input Status GNSS: Lock
Configuration Status Configuration is saved	Output Status Sync Out: PPS
Management Port Status Connected 1000MB	Product ID 111224-10
Session Status 0 cli : 1 web	Software Version 20200409-1.5.0.0
Ethernet Port 0 Status Not Present SyncE is Off NTP Server PTP is disabled	Date (GNSS UTC) 05/14/2020 14:14
Ethernet Port 1 Status Not Connected SyncE is Off NTP Server PTP is disabled	Date (Local) 05/14/2020 07:13
	Host Up Time 8 days 20:57
	Host Name TrimbleJDdesk

At the bottom of the page, there is a footer with links for Home, Contact, Privacy Statement, Terms Of Use, and Copyright ©2015-2020, Trimble Inc.

6.5 System status

6.5.1 Alarms and Events

6.5.1.1 Alarm Status and Event Log - Alarms

The page shows currently active alarm condition on the system.

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads 'Welcome *trimblesuper*. You have *super* access rights.' The main header features the Trimble logo and the title 'Thunderbolt PTP GM200'. Below the header, there is a 'SYSTEM STATUS' section with a sub-section for 'Alarms and Events'. The 'Alarms and Events' section includes links for 'System Info', 'Timing', 'GNSS', and 'Network'. To the right, the 'Alarm Status and Event Log' page is displayed, showing a 'List of Active Alarms' table.

Alarm #	Alarm Description	Alarm Level
20	Eth-Port0-Down	Major
21	Eth-Port1-Down	Major

The Alarm Description window provides the details of each alarm and the alarm level:

Alarm #: Alarm code

Alarm Description: Description of the alarm condition

Alarm Level: Severity of alarm condition; can be notification only, minor, major or critical

6.5.1.2 Alarm Status and Event Log - Event Log

Logout Disable auto-logout

Welcome *trimblesuper*.
You have *super* access rights.

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Thunderbolt PTP GM200

Alarm Status and Event Log

Alarms | **Event Log**

Event Filter: All | Number of Events: All | Download Log | Clear Log

```

2018-03-02 01:06:57.536   cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-03-01 06:47:44.601   cfg : 'voruz' LOGOUT as admin on Rem-37.13.44.93
2018-03-01 06:41:39.234   cfg : 'voruz' LOGOUT as admin on Comm-1
2018-03-01 06:35:02.840   alarm : Clear alarm 8, 'Time-Sync-Bad'
2018-03-01 06:34:58.581   alarm : Clear alarm 16, 'PTP-System-Bad'
2018-03-01 06:34:55.500   cfg : 'voruz' LOGIN as admin on Rem-37.13.44.93
2018-03-01 06:34:46.371   cfg : 'voruz' LOGOUT as admin on Rem-37.13.44.93
2018-03-01 06:34:35.034   alarm : Clear alarm 15, 'Freq-Out-Bad'
2018-03-01 06:34:35.025   alarm : Clear alarm 14, 'PPS-Sync-Bad'
2018-03-01 06:34:34.056   freq : Output stratum changed to 0 (quality 7)
2018-03-01 06:34:30.014   alarm : Clear alarm 12, 'Freq-Loop-Unlock'
2018-03-01 06:34:24.044   freq : Changing loop control from Acquire to Lock
2018-03-01 06:31:44.412   cfg : 'voruz' LOGIN as admin on Rem-37.13.44.93
2018-03-01 06:31:38.875   cfg : 'voruz' LOGIN as admin on Comm-1
2018-03-01 06:31:18.204   alarm : Clear alarm 13, 'Freq-Hold-Exceed'
2018-03-01 06:31:18.061   freq : Changing loop control from Init to Acquire
2018-03-01 06:31:18.054   freq : Clock GNSS stratum changed to 0 (quality 7)
2018-03-01 06:31:17.948   alarm : Clear alarm 7, 'GNSS-PPS-Loss'
2018-03-01 06:31:15.188   alarm : Clear alarm 26, 'Time-Set-Bad'
1970-04-26 00:07:14.047   freq : Time error of -1519885811.656 seconds detected, correcting
1970-01-01 00:00:57.517   alarm : Clear alarm 19, 'UTC-Corr-Unk'
1970-01-01 00:00:56.395   freq : Clock GNSS qualified
1970-01-01 00:00:51.250   alarm : Clear alarm 5, 'GNSS-Track-No'
1970-01-01 00:00:45.485   alarm : Clear alarm 11, 'GNSS-Time-Bad'
1970-01-01 00:00:41.476   alarm : Clear alarm 2, 'GNSS-Comm-Loss'
1970-01-01 00:00:37.466   alarm : Set alarm 5, 'GNSS-Track-No'

```

The Event Log window provides the list of system messages and notifications.

Event Filter: All, Alarms, Frequency, GNSS, Config Mods, Errors, Warnings, Notices, Information

Number of Events: All, 10, 25, 50, 100

Download Log: Select this button to download a text file with the message logs.

Clear Log: Select this button to clear all message logs.

6.5.2 System Information

The System Info option provides overall system information:

The screenshot shows the 'System Information' page for a Thunderbolt PTP GM200. The page includes a navigation sidebar on the left with options like 'SYSTEM STATUS', 'ALARMS AND EVENTS', and 'INTERFACE MANAGEMENT'. The main content area displays the following system information:

Product ID 111224-10	Time (GNSS UTC) 05/14/2020 14:17
Hardware ID 111222-00-E	Up Time 8 days 21:00
Serial Number 1181000001	CPU Load Average 13 %
Extended S/N -	System Temperature 40.0 °C
Software Version 20200409-1.5.0.0	Memory - Active 241320 kB
Hardware Build Date 05/16/2018 10	Memory - Available 983812 kB

Below the system information, there is a 'Download Support Info' button and a 'Realtime Graph View' section. The graph shows 'Average CPU Load (%)' over a 24-hour period, with a constant value of 13.0%.

The Alarm Description window provides the details of each alarm and the alarm level:

Product ID or Model: The model number of the Thunderbolt PTP GMC.

Time (UTC): Displays the time in UTC format.

Hardware ID: Displays the hardware part number.

Up Time: Displays how long the unit is powered on.

Serial Number: The unique serial number of the Thunderbolt PTP GMC.

CPU Load Average: A figure of merit for the operating system "load".

Extended S/N: Displays the extended serial number.

System Temperature: Displays the temperature of GM200.

Software Version: Displays the current firmware version on the unit.

Memory - Active: The amount of memory occupied by the system.

Hardware Build Date: The date of firmware build.

Memory - Available: The amount of free memory remaining.

Download Support Info: The support info can be downloaded as a file.

Realtime Graph View: Displays the realtime graph of the following values:

- CPU Load
- Temperature
- Mem – Active
- Mem - Available

6.5.3 Timing

6.5.3.1 Timing Status

This page provides the status information of the System clock.

The screenshot shows the web interface for the Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' The main title is 'Thunderbolt PTP GM200'. The left sidebar contains navigation menus for 'SYSTEM STATUS' (Alarms and Events, System Info, Timing, GNSS, Network), 'INTERFACE MANAGEMENT', 'SYNCHRONIZATION MANAGEMENT', 'SECURITY MANAGEMENT', and 'SYSTEM MANAGEMENT'. The main content area is titled 'Timing Information' and has three tabs: 'Timing Status' (selected), 'NTP Status', and 'PTP Status'. Under 'Timing Status', there are sections for 'Input Status' (Sync Source: GNSS) and 'Output Status' (Sync Out: PPS). The 'Sync Source Statistics' table is as follows:

Sync Source	Qualified	Level	Phase Offset	Mean	Sigma	Freq Offset
GNSS	Yes	0	-10.675 ns	0.550 ns	3.455 ns	-0.00004 ppb
PTP eth1	No	7	n/a	n/a	n/a	n/a

The 'Frequency Control Status and Output' table is as follows:

Loop State	Holdover	Phase Offset	Freq Offset	Delta Freq
Lock	3 seconds	-0.384ns	-3.20880e-07	-3.954e-11

The 'Realtime Graph View' section includes dropdown menus for 'Sync Source' and 'Graph Type', and a 'Close Graph' button.

The Timing Status window provides the details of each alarm and the alarm level:

Input Status

Sync Source Indicates the current sync source

Output Status

BNC Output Indicates the current configuration of BNC connector

Sync Source Statistics

Sync Source Distinguishes the name of the Sync Source

Phase Offset GMC output PPS with reference to the sync source

Frequency Offset The absolute frequency offset of the internal OCXO with reference to sync source

Mean The mean phase offset

Sigma The standard deviation of phase offset -

Control Loop Status	Status of system control loop of the system.
Phase Offset	Control loop output with reference to the sync source
Frequency Offset	The frequency offset of control loop of GM200
Holdover	The estimated holdover time available

6.5.3.2 NTP Status

The screenshot shows the web interface for the Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button and a 'Disable auto-logout' checkbox. The main header displays the Trimble logo and the title 'Thunderbolt PTP GM200'. Below the header, there is a 'Timing Information' section with three tabs: 'Timing Status', 'NTP Status' (which is selected), and 'PTP Status'. The 'NTP Status' tab shows the status of two Ethernet ports (0 and 1), both with 'NTP Server Enabled'. A table titled 'NTP Time Server Statistics' provides the following data:

Description	Value
Status	0114
Stratum	1
Precision	+3.81 us
Offset	+45.45 us
Frequency	+0 ppt
Jitter	+34 us

The left sidebar contains a 'SYSTEM STATUS' section with links for 'Alarms and Events', 'System Info', 'Timing' (highlighted), 'GNSS', and 'Network'. Below this are sections for 'INTERFACE MANAGEMENT', 'SYNCHRONIZATION MANAGEMENT', 'SECURITY MANAGEMENT', and 'SYSTEM MANAGEMENT'.

Ethernet Port: Identifies the Ethernet port – Eth0 or Eth1

NTP Status: Shows the status of port connection

NTP Time Server Statistics: Shows the statistics of various server parameters

6.5.3.3 PTP Status

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads 'Welcome trimblesuper. You have super access rights.' The main header displays the Trimble logo and the title 'Thunderbolt PTP GM200'. Below the header is a 'Timing Information' section with three tabs: 'Timing Status', 'NTP Status', and 'PTP Status' (which is selected). The 'PTP Status' section is divided into two columns for 'Ethernet Port 0' and 'Ethernet Port 1'. Each column lists the following information: PTP Profile : Status (G8275.1 : Master), PTP BMC ID (001747FFFE7008A2), PTP Clock Class (6), PTP Clock Accuracy (0x21, <= 100nS), and Operational Mode (normal). Below this information, there are input fields for 'PTP Port 0 Unicast Client Count is 0' and 'PTP Port 1 Unicast Client Count is 0', each with a table of fields: Address, VLAN ID, AI, SI, and DRI.

Ethernet Port

Identifies the Ethernet port – Eth0 (RJ45) or Eth1 (SFP)

PTP Status

Shows the status of port connection

PTP Clock ID

Identifies the PTP clock ID

PTP Statistics

Description

Name of the Statistic

Value

Value

Operational Mode

PTP Operational Mode: Normal or Freerun

When the operational mode is configured for 'normal', the system will operate in a traditional GrandMaster manner, requiring a (GNSS) frequency and time reference to be established prior to starting PTP. When the operational mode is configured for 'freerun', the system will start PTP as soon as the system is booted and interfaces are functional.

**PTP Port 1/2 Unicast
Clients**

Only available for unicast PTP profiles.
The table will show either PTP slaves (when port configured as PTP GM) or PTP Master (when port is configured as PTP Slave).

6.5.4 GNSS

6.5.4.1 GNSS receiver status

The page displays the status of GNSS receiver:

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'GNSS Receiver Information' and is divided into two tabs: 'GNSS Receiver' (selected) and 'Satellite Data'. The 'GNSS Receiver' tab displays a table of receiver status and position information.

Receiver Status	Position Info	Receiver Info	Antenna Info
GNSS Quality 13 Very Good SVs	Survey Length 2000 secs	GNSS Almanac Good	Antenna Delay 0 ns
Receiver Operation Normal	Latitude N 19° 27.54540'	Constellations GPS GLO	
Receiver Mode Overdet Clock (Time)	Longitude W 99° 10.76855'	UTC Offset 18	
	Altitude 2247.38 m HAE	Pending Leap 0	

On the left side of the interface, there is a sidebar menu with the following sections: SYSTEM STATUS (containing Alarms and Events, System Info, Timing, GNSS, and Network), INTERFACE MANAGEMENT, and SYNCHRONIZATION.

The Alarm Description window provides the details of each alarm and the alarm level:

Latitude: The latitude of the Thunderbolt PTP GMC GM200

Longitude: The longitude of the Thunderbolt PTP GMC GM200

Altitude: The altitude of the GNSS receiver

Receiver Status: The current status of the receiver (doing fixes, in clock mod)

GNSS Almanac: The status of GNSS Almanac

Constellations: Current constellations that are being used

GNSS Quality Status: A metric used to provide the user with a snapshot of the number of SVs with Very Good, Good, or Poor Signal Strength/Quality, coloured Green, Orange and Red respectively.

- Quality is **Very Good** if there are at least 4 SVs that have SNR > 35
- Quality is **Good** if there are at least 4 SVs that have SNR > 20
- Quality is **Poor** if there are no SVs that have SNR > 20

Antenna Delay: Displays the compensation delay of antenna cable.

The **antenna delay** setting affects the **system time base** of GM200. Negative numbers advance the internal time reference, positive numbers retard (delay)

the time reference. To compensate for an antenna delay of 500 ns you would enter -500 as the GM200 antenna delay setting. <d> is in nanoseconds with a range of +/- 50000000 (50 ms).

All PTP and NTP timestamps are derived from the system time base, which means that you want to make sure that the antenna delay is correctly compensated because that value affects the PTP and NTP clock accuracy in the LAN network.

Note that, since this setting affects the disciplined oscillator of GM200, the effect of changing the antenna delay value is not seen immediately on the system output. The antenna delay value will advance (or retard) the internal GNSS time measurements, which go into the oscillator's PLL control loop, which will then gradually steer the disciplined oscillator toward that new value. If the value is jumped too far after the GM200 has achieved lock (remember, this is normally an installation setting), then the unit may issue a "PPS-Sync-Bad" and/or a "Freq-Loop-Unlock" alarm. After a while, when the time base has moved to the new value, these alarms will be cleared.

6.5.4.2 Satellite data

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

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Thunderbolt PTP GM200

GNSS Receiver Information

SYSTEM STATUS

- Alarms and Events
- System Info
- Timing
- GNSS**
- Network

INTERFACE MANAGEMENT

SYNCHRONIZATION

GNSS Receiver
Satellite Data

SV	C/No	Az.	Elev.	SV	C/No	Az.	Elev.
6	45.0	191.0	38.0	28	43.0	29.0	45.0
19	48.0	279.0	52.0	76	31.0	339.0	25.0
30	47.0	150.0	60.0	87	44.0	221.0	16.0
1	44.0	44.0	22.0	75	45.0	29.0	62.0
17	50.0	321.0	59.0	74	47.0	119.0	37.0
7	48.0	148.0	33.0	85	43.0	15.0	40.0
13	47.0	271.0	25.0	86	48.0	265.0	67.0

SV: Satellite vehicle

C/No: Carrier-to-Noise power ratio

AZ: Azimuth

Elev: Elevation

6.5.5 Network

6.5.5.1 Ethernet Port 0

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'Network Information' and contains several tabs: 'Ethernet Port 0', 'Ethernet Port 1', 'Management Port', and 'Ethernet Statistics'. The 'Ethernet Port 0' tab is active and displays the following information:

Ethernet Port 0		Ethernet Port 1		Management Port		Ethernet Statistics	
Connection Status Not Connected		MAC Address 00:17:47:7F:FE:B2					
IPv4 Assignments							
Address - Static 1.1.1.251	Subnet Mask 255.255.255.0	Gateway 1.1.1.1	Broadcast 1.1.1.255				
IPv6 Assignments							
Ethernet Assignments						SyncE Status Off	
VLAN IDs -							

On the left side of the interface, there is a sidebar with a 'SYSTEM STATUS' section containing links for 'Alarms and Events', 'System Info', 'Timing', 'GNSS', and 'Network' (which is highlighted). Below this are sections for 'INTERFACE MANAGEMENT' and 'SYNCHRONIZATION MANAGEMENT'.

IPv4: IP address of the port

IPv4 Subnet Mask: Subnet mask being used

IPv4 Gateway: Default gateway

IPv4 Broadcast: Broadcast IP address

IPv6 Address/Mask: IPv6 Address of the Ethernet interface with the subnet mask

IP Assignment: Either static or DHCP

Connection Status: Status of Ethernet connection

MAC Address: The MAC Address of the port

SyncE Status: Status of Synchronous Ethernet

6.5.5.2 Ethernet Port 1

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome *trimblesuper*. You have *super* access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'Network Information' and features a sidebar with navigation options: 'SYSTEM STATUS' (with sub-items: Alarms and Events, System Info, Timing, GNSS, Network), 'INTERFACE MANAGEMENT', and 'SYNCHRONIZATION'. The main panel shows details for 'Ethernet Port 1' (highlighted in orange). It includes a 'Connection Status' of 'Not Connected', a 'MAC Address' of '00:17:47:7F:FE:B3', and 'IPv4 Assignments' with a static address of '4.4.4.251', a subnet mask of '255.255.255.0', a gateway of '4.4.4.1', and a broadcast address of '4.4.4.255'. It also lists 'IPv6 Assignments' and 'Ethernet Assignments' (VLAN IDs) as empty, and a 'SyncE Status' of 'Off'.

IPv4: IP address of the port

IPv4 Subnet Mask: Subnet mask being used

IPv4 Gateway: Default gateway

IPv4 Broadcast: Broadcast IP address

IPv6 Address/Mask: IPv6 Address of the Ethernet interface with the subnet mask

IP Assignment: Either static or DHCP

Connection Status: Status of Ethernet connection

MAC Address: The MAC Address of the port

SyncE Status: Status of Synchronous Ethernet

6.5.5.3 Network Management Port

The screenshot shows the web interface for the Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message for 'trimblesuper'. The main header displays the 'Trimble' logo and the device name 'Thunderbolt PTP GM200'. A left sidebar contains menu items for 'SYSTEM STATUS', 'INTERFACE MANAGEMENT', 'SYNCHRONIZATION MANAGEMENT', 'SECURITY MANAGEMENT', and 'SYSTEM MANAGEMENT'. The 'SYSTEM STATUS' menu is expanded, showing sub-items like 'Alarms and Events', 'System Info', 'Timing', 'GNSS', and 'Network'. The main content area is titled 'Network Information' and features four tabs: 'Ethernet Port 0', 'Ethernet Port 1', 'Management Port' (which is selected), and 'Ethernet Statistics'. The 'Management Port' tab displays the following information:

Ethernet Port 0		Ethernet Port 1		Management Port		Ethernet Statistics	
MAC Address		Connection Status					
00:17:47:70:08:A4		Connected 1000MB					
IPv4 Assignments							
Address - Static		Subnet Mask		Gateway		Broadcast	
10.1.140.100		255.255.254.0		10.1.140.1		10.1.141.255	
IPv6 Assignments							
Address				Scope			
fe80::217:47ff:fe70:8a4/64				Link			

IPv4: IP address of the port.

IPv4 Subnet Mask: Subnet mask being used.

IPv4 Gateway: Default gateway

IPv4 Broadcast: Broadcast IP address

IPv6 Address/Mask: IPv6 Address of the Ethernet interface with the subnet mask.

IP Assignment: Either static or DHCP

Connection Status: Status of Ethernet connection

MAC Address: The MAC Address of the port

6.5.5.4 Ethernet Statistics

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

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Network Information

Ethernet Port 0 Ethernet Port 1 Management Port **Ethernet Statistics**

Statistic	Ethernet Port 0	Ethernet Port 1	Management Port
RX Bytes	N/A	N/A	15 MB
RX Packets	N/A	N/A	59331
RX Packets/Sec	N/A	N/A	2
RX Dropped	N/A	N/A	3
RX Errors	N/A	N/A	0
TX Bytes	N/A	N/A	34 MB
TX Packets	N/A	N/A	57666
TX Packets/Sec	N/A	N/A	3
TX Dropped	N/A	N/A	0
TX Errors	N/A	N/A	0
	1-second	10-seconds avg	
RX+TX Pkts/Sec	5	0	

SYSTEM STATUS

- Alarms and Events
- System Info
- Timing
- GNSS
- Network**

INTERFACE MANAGEMENT

SYNCHRONIZATION MANAGEMENT

SECURITY MANAGEMENT

SYSTEM MANAGEMENT

6.6 Interface Management

6.6.1 Ethernet

6.6.1.1 Ethernet Port 0

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the device name 'Thunderbolt PTP GM200'. The main content area is titled 'Ethernet Configuration' and features three tabs: 'Ethernet Port 0' (selected), 'Ethernet Port 1', and 'Management Port'. The configuration for 'Ethernet Port 0' is shown, including 'Port Configuration' (Static), 'Connection Status' (Not Present), and 'SyncE Configuration' (Off). The 'IPv4 Assignments' section includes fields for Address (192.168.3.250), Subnet Mask (255.255.255.0), Gateway (-), and Broadcast (192.168.3.255). The 'IPv6 Assignments' section includes a dropdown for Type (DHCPv6), an Address field (-), a Gateway field, and a Scope dropdown (Global). At the bottom, there are fields for 'IPv4 Address' and 'IPv6 Address', both containing '<IPv4 address to ping>' and '<IPv6 address to ping>' respectively, with 'Ping IPv4' and 'Ping IPv6' buttons below them. A left sidebar contains navigation menus for SYSTEM STATUS, INTERFACE MANAGEMENT (with Ethernet selected), SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT.

Port Configuration: Either DHCP, Static, Default or Disable this interface

Connection Status: Either Connected, Not Connected

SyncE Configuration: Either Output, Input, Off

IPv4 Address: IPv4 address of the port

IPv4 Subnet Mask: Subnet mask being used

IPv4 Gateway: Default gateway IPv4 address

IPv4 Broadcast: Broadcast IPv4 address

IPv6 Mode: Either DHCPv6, SLAAC, Static

IPv6 Address: IPv6 Address of the Ethernet interface

IPv6 Gateway: IPv6 gateway address for the port.

This must be in CIDR format which is the IPv6 address with a /mask /value.

If no /mask is given the default mask size of 128-bits is assumed.
The gateway setting can be cleared by setting a CIDR address of "::::".

Ping IPv4: Enter IPv4 Address to test ping.

Ping IPv6: Enter IPv6 Address to test ping.

6.6.1.2 Ethernet Port 1

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with 'Logout' and 'Disable auto-logout' options, and a welcome message: 'Welcome trimblesuper. You have super access rights.' The main header reads 'Thunderbolt PTP GM200'. On the left, a sidebar contains menu items: SYSTEM STATUS, INTERFACE MANAGEMENT (highlighted), Ethernet, VLAN, SNMP, Syslog, Serial Port, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM. The main content area is titled 'Ethernet Configuration' and shows settings for 'Ethernet Port 1'. The configuration includes:

- Port Configuration:** Static
- Connection Status:** Not Connected
- SyncE Configuration:** Off (SyncE support unknown)
- IPv4 Assignments:**
 - Address: 4.4.4.251
 - Subnet Mask: 255.255.255.0
 - Gateway: 4.4.4.1
 - Broadcast: 4.4.4.255
- IPv6 Assignments:**
 - IPv6 Mode: SLAAC
 - Address: -
 - Scope: Global
- IPv4 Address:** <IPv4 address to ping> (with a 'Ping IPv4' button below)
- IPv6 Address:** <IPv6 address to ping> (with a 'Ping IPv6' button below)

Port Configuration: Either DHCP, Static, Default or Disable this interface

Connection Status: Either Connected, Not Connected

SyncE Configuration: Either Output, Input, Off

IPv4 Address: IPv4 address of the port

IPv4 Subnet Mask: Subnet mask being used

IPv4 Gateway: Default gateway IPv4 address

IPv4 Broadcast: Broadcast IPv4 address

IPv6 Mode: Either DHCPv6, SLAAC, Static

IPv6 Address: IPv6 Address of the Ethernet interface.

IPv6 Gateway: IPv6 gateway address for the port.

This must be in CIDR format which is the IPv6 address with a /mask /value.

If no /mask is given the default mask size of 128-bits is assumed.

The gateway setting can be cleared by setting a CIDR address of "::::".

Ping IPv4: Enter IPv4 Address to test ping.

Ping IPv6: Enter IPv6 Address to test ping.

6.6.1.3 Ethernet Management Port

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' The main header features the 'Trimble' logo and the device name 'Thunderbolt PTP GM200'. A sidebar on the left contains menu items: 'SYSTEM STATUS', 'INTERFACE MANAGEMENT' (highlighted), 'Ethernet', 'VLAN', 'SNMP', 'Syslog', 'Serial Port', 'SYNCHRONIZATION MANAGEMENT', 'SECURITY MANAGEMENT', and 'SYSTEM MANAGEMENT'. The main content area is titled 'Ethernet Configuration' and shows three tabs: 'Ethernet Port 0', 'Ethernet Port 1', and 'Management Port' (selected). Under 'Management Port', the 'Port Configuration' is set to 'Static' and the 'Connection Status' is 'Connected 1000MB'. The 'IPv4 Assignments' section includes fields for 'Address' (10.1.140.100), 'Subnet Mask' (255.255.254.0), 'Gateway' (10.1.140.1), and 'Broadcast' (10.1.141.255). The 'IPv6 Assignments' section shows 'Type' set to 'SLAAC', 'Address' as '-', and 'Scope' as 'Global'. A 'Gateway' field is also present. At the bottom, there are input fields for 'IPv4 Address' and 'IPv6 Address', both containing the placeholder '<IPv4 address to ping>' and '<IPv6 address to ping>' respectively, with 'Ping IPv4' and 'Ping IPv6' buttons below them.

Port Configuration: Either DHCP, Static, Default or Disable this interface

Connection Status: Either Connected, Not Connected

IPv4 Address: IPv4 address of the port

IPv4 Subnet Mask: Subnet mask being used

IPv4 Gateway: Default gateway IPv4 address

IPv4 Broadcast: Broadcast IPv4 address

IPv6 Mode: Either DHCPv6, SLAAC, Static

IPv6 Address: IPv6 Address of the Ethernet interface

IPv6 Gateway: IPv6 gateway address for the port

Ping IPv4: Enter IPv4 Address to test ping

Ping IPv6: Enter IPv6 Address to test ping

6.6.2 VLAN and Bonding

6.6.2.1 VLAN Ethernet Port 0

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

VLAN and Bonding Configuration

Configure either VLANs or Bonding, do not configure both.

Ethernet Port 0 | Ethernet Port 1 | Bonding

VLAN Configuration
VLAN ID Assignments

VID1 VID2 VID3 VID4

Valid range 3-4094. To remove a VLAN ID, delete its entry from the list.

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

VLAN and Bonding Configuration

VLAN configuration was successful.

Ethernet Port 0 | Ethernet Port 1 | Bonding

VLAN Configuration
VLAN ID Assignments

20 30 VID3 VID4

Valid range 3-4094. To remove a VLAN ID, delete its entry from the list.

VLAN Interface Assignments

Edit	Interface	QoS	Address	Mask	Gateway
<input type="radio"/>	eth0.20	-1	192.168.0.100	255.255.255.0	
<input type="radio"/>	eth0.30	-1	192.168.0.200	255.255.255.0	

IPv6 Disable Addr Gateway

IPv6 Disable Addr Gateway

Only one VLAN Interface may be assigned or modified per 'Set' command.

VLAN IDs: List of all VLAN IDs configured

Priority: 0 to 7, where 7 is the highest priority

NOTE – There is a limit of 4 VLANs per port

6.6.2.2 VLAN Ethernet Port 1

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

VLAN and Bonding Configuration

Ethernet Port 0 Ethernet Port 1 **Bonding**

Port Bonding	Ethernet Port 0	Ethernet Port 1
Enable	Bonding is Standby 192.168.0.250 00:17:47:70:08:72	Bonding is Active 192.168.0.250 00:17:47:70:08:72

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

VLAN and Bonding Configuration

VLAN configuration was successful.

Ethernet Port 0 **Ethernet Port 1** Bonding

VLAN Configuration

VLAN ID Assignments

151 262 VID3 VID4

Valid range 3-4094. To remove a VLAN ID, delete its entry from the list.

VLAN Interface Assignments

Edit	Interface	QoS	Address	Mask	Gateway
<input type="radio"/>	eth1.151	-1	192.168.1.111	255.255.255.0	
	IPv6	Disable	Addr	Gateway	
<input type="radio"/>	eth1.262	-1	192.168.1.222	255.255.255.0	
	IPv6	Disable	Addr	Gateway	

Only one VLAN Interface may be assigned or modified per 'Set' command.

VLAN IDs: List of all VLAN IDs configured

Priority: 0 to 7, where 7 is the highest priority

NOTE – There is a limit of 4 VLANs per port.



6.6.2.3 Port Bonding configuration with NTP

The main tasks to link the GM200 with NTP are:

1. Link On for both Eth0 and Eth1.
2. Configure the IP address to meet with the installed network.
3. Ping to an NTP Client and then confirm it works.
4. Enable NTP operation.
5. Enable Bonding function.
6. Ping to NTP Client and then confirm it works with the “Bonding” operation.
7. Check NTP clients, whether it synchronizes with TS200.
8. Remove or Swap the “Active” interface and then confirm that Clients are still synchronizing with TS200.

The basic operation of the port bonding in GM200 is to bond two Ethernet interfaces with the same IP address and Mac address, as one port is active and the other port is standby, so that two physical interfaces act as one logical interface.



1. Select INTERFACE MANAGEMENT ① and then VLAN & Bonding ②.
2. Click the Bonding tab ③.
3. Click Configure  ④.
4. In the Port Bonding drop-down list, select Enable ⑤.
5. Click Set  to apply the settings ⑥.

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

VLAN and Bonding Configuration

Bonding configuration requires about 30 seconds to complete... (7)

Port Bonding	Ethernet Port 0	Ethernet Port 1
Disable	Bonding is Disabled 192.168.0.250 00:17:47:70:08:72	Bonding is Disabled 192.168.1.250 00:17:47:70:08:73 (8)

VLAN and Bonding Configuration

Bonding configuration was successful. (6)

The GM200 shows a message with **Bonding configuration requires about 30 seconds to complete...** (7).

After 30 secs the **Bonding configuration was successful** message shows.

NOTE – During this 30 secs, the **Configure** and **Set** icons are deactivated so that you can not set any other configuration while applying the bonding.

NOTE – During the process of applying the bonding, the Eth0 and Eth1 still show 'Bonding is Disabled', with different IP address and Mac address (8).

6. Within 30 seconds of seeing the completion message, the screen shows the same IP address and Mac address with 'Bonding is Standby' in Eth0 and 'Bonding is Active' in Eth1 (9):

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

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VLAN and Bonding Configuration

SYSTEM STATUS

INTERFACE MANAGEMENT

Ethernet
VLAN & Bonding
SNMP
Syslog
Serial Port

SYNCHRONIZATION MANAGEMENT

SECURITY MANAGEMENT

SYSTEM MANAGEMENT

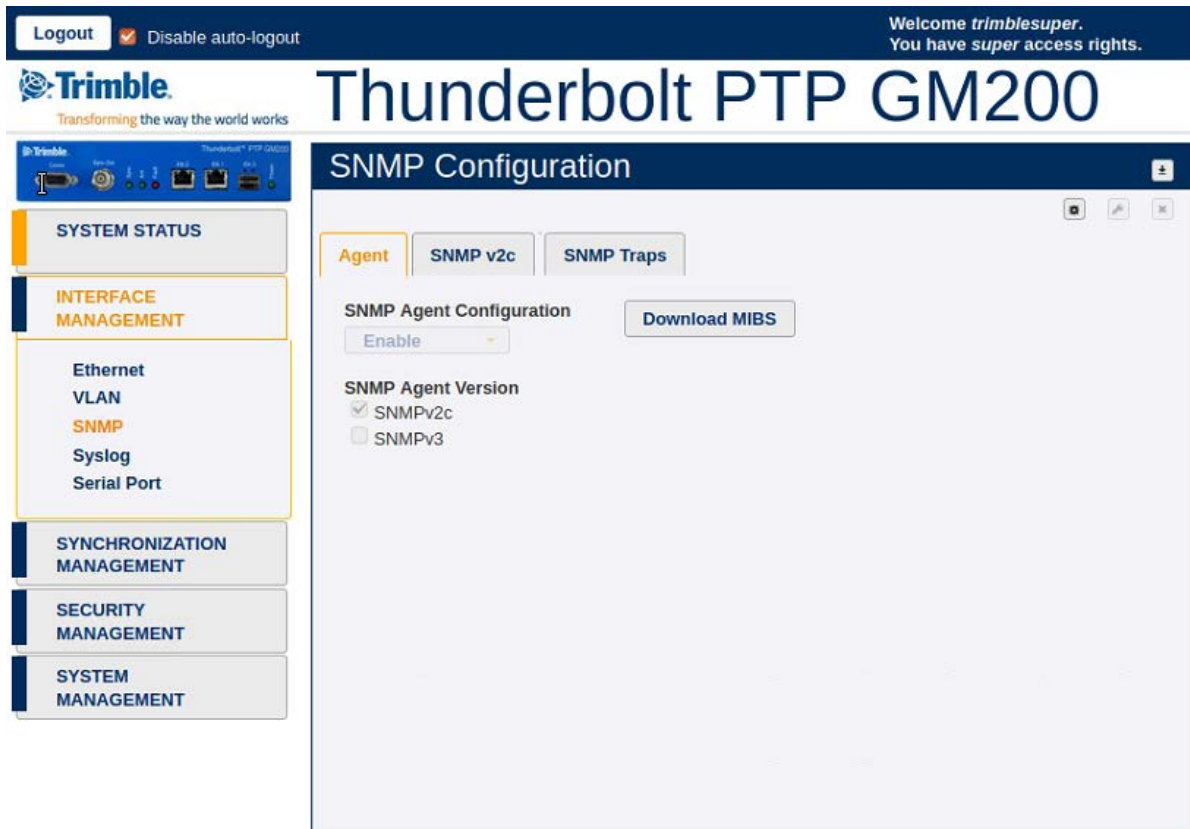
Ethernet Port 0
Ethernet Port 1
Bonding

Port Bonding	Ethernet Port 0	Ethernet Port 1
<input type="button" value="Enable"/>	Bonding is Standby <u>192.168.0.250</u> 00:17:47:70:08:72	Bonding is Active <u>192.168.0.250</u> 00:17:47:70:08:72

7. Click **Save configuration** to store and restore your configuration after power on reset 10.

6.6.3 SNMP

6.6.3.1 SNMP configuration Basic



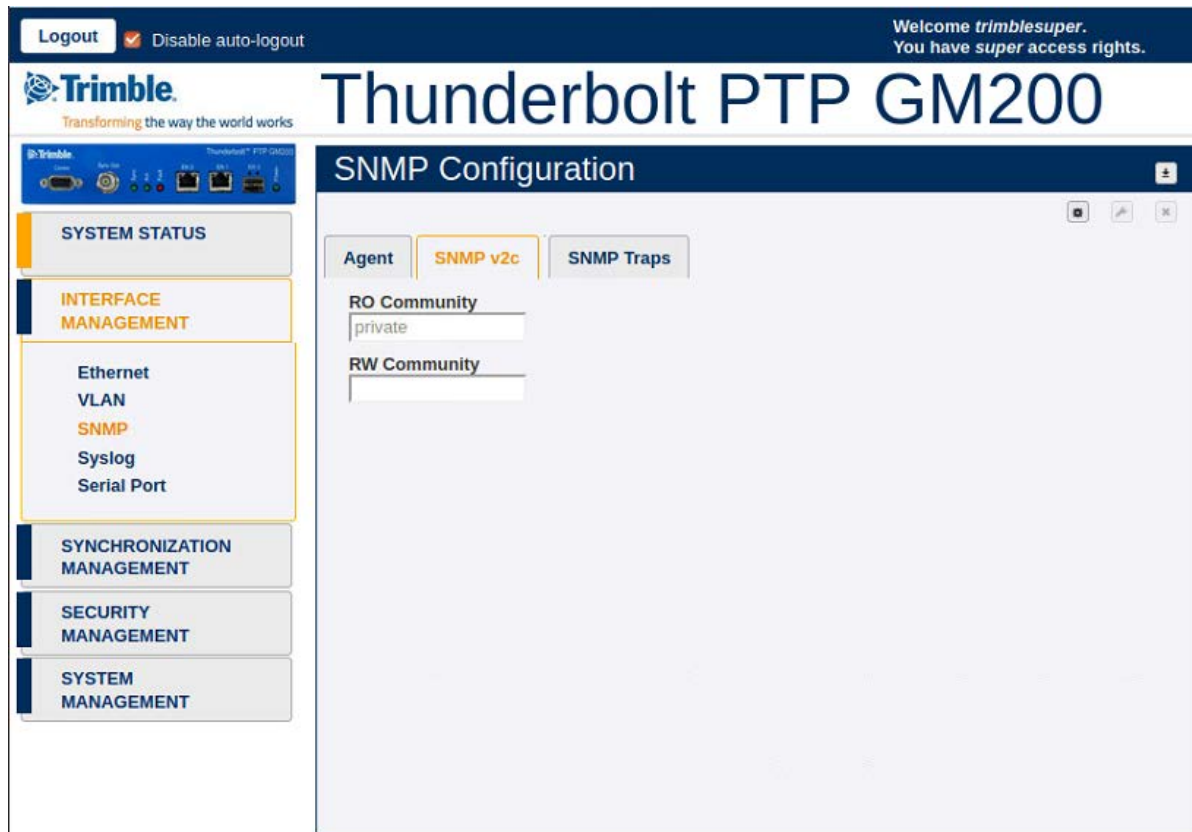
The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a "Logout" button and a "Disable auto-logout" checkbox. A welcome message reads "Welcome trimblesuper. You have super access rights." The main header features the Trimble logo and the device name "Thunderbolt PTP GM200". On the left, a sidebar menu includes "SYSTEM STATUS", "INTERFACE MANAGEMENT" (highlighted), "SYNCHRONIZATION MANAGEMENT", "SECURITY MANAGEMENT", and "SYSTEM MANAGEMENT". Under "INTERFACE MANAGEMENT", options for "Ethernet", "VLAN", "SNMP", "Syslog", and "Serial Port" are listed. The main content area is titled "SNMP Configuration" and contains three tabs: "Agent", "SNMP v2c", and "SNMP Traps". The "Agent" tab is active, showing "SNMP Agent Configuration" with a dropdown menu set to "Enable" and a "Download MIBS" button. Below this, the "SNMP Agent Version" section has two radio buttons: "SNMPv2c" (checked) and "SNMPv3" (unchecked).

SNMP Configuration: Enable or Disable

Download MIBS: Download SNMP MIB files

SNMP Agent Version: SNMP v2c, SNMPv3

6.6.3.2 SNMP configuration v2c



The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a "Logout" button, a checked "Disable auto-logout" option, and a welcome message: "Welcome *trimblesuper*. You have *super* access rights." The main header features the Trimble logo and the device name "Thunderbolt PTP GM200". A left sidebar contains a menu with categories: "SYSTEM STATUS", "INTERFACE MANAGEMENT" (highlighted), "SYNCHRONIZATION MANAGEMENT", "SECURITY MANAGEMENT", and "SYSTEM MANAGEMENT". Under "INTERFACE MANAGEMENT", sub-items include "Ethernet", "VLAN", "SNMP" (highlighted), "Syslog", and "Serial Port". The main content area is titled "SNMP Configuration" and has three tabs: "Agent", "SNMP v2c" (selected), and "SNMP Traps". Under the "SNMP v2c" tab, there are two input fields: "RO Community" with the value "private" and "RW Community" which is currently empty.

RO Community: Community string for read

RW Community: Community string for write

6.6.3.3 SNMP configuration v3

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome *trimblesuper*. You have *super* access rights.' The main header shows the 'Trimble' logo and the device name 'Thunderbolt PTP GM200'. On the left, a sidebar menu lists various management sections: SYSTEM STATUS, INTERFACE MANAGEMENT (highlighted), SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The 'INTERFACE MANAGEMENT' section is further divided into Ethernet, VLAN, SNMP (highlighted), Syslog, and Serial Port. The main content area is titled 'SNMP Configuration' and features three tabs: 'Agent', 'SNMP v3' (selected), and 'SNMP Traps'. Under the 'SNMP v3' tab, there is a section for 'SNMPv3 Authentication' with three radio button options: 'None', 'SHA Authentication', and 'SHA+AES Privacy'.

SNMP v3 agent authorization type

- <none>: no authentication (other than username) is required
- <SHA auth>: SHA password authentication is required
- <SHA+AES privacy>: SHA password is required and AES encryption is active

6.6.3.4 SNMP Traps

The screenshot displays the web interface for the Thunderbolt PTP GM200. The main content area is titled "SNMP Configuration" and features three tabs: "Agent", "SNMP v3", and "SNMP Traps". The "SNMP Traps" tab is selected, showing a configuration table with four columns for "Trap Destination #1" through "#4". Each column contains a "Disable" dropdown menu, a "Destination IP" field (all set to "-"), a "Trap Port" field (all set to "162"), an "Agent Type" dropdown menu (all set to "V2c - Com..."), and a "Community String" field (all set to "public").

The left sidebar contains navigation menus: "SYSTEM STATUS", "INTERFACE MANAGEMENT" (with sub-items: Ethernet, VLAN, **SNMP**, Syslog, Serial Port), "SYNCHRONIZATION MANAGEMENT", "SECURITY MANAGEMENT", and "SYSTEM MANAGEMENT". The top header includes a "Logout" button, a "Disable auto-logout" checkbox, and a welcome message: "Welcome trimblesuper. You have super access rights."

Trap Community String: Community string id for SNMP

SNMP Manager IP: IP address of SNMP manager that receives the TRAP

SNMP Manager Port: Port number of SNMP manager

6.6.4 Syslog

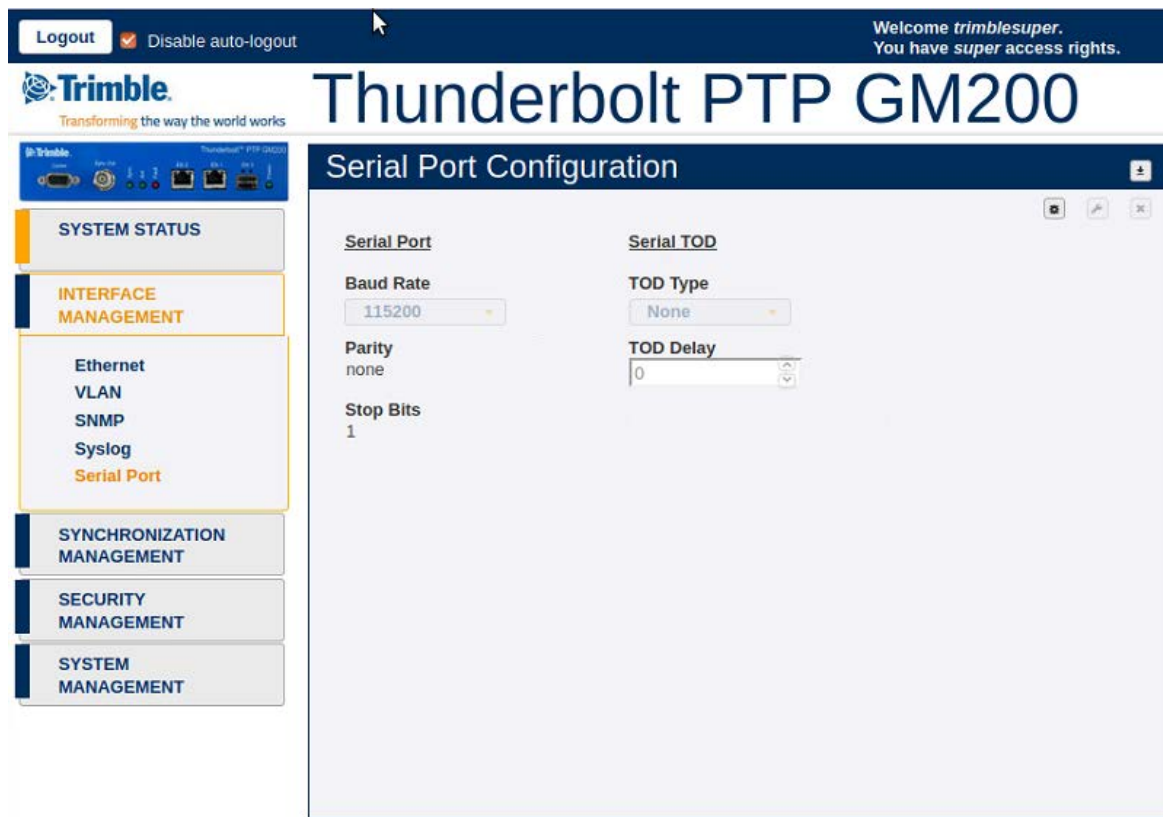
The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome *trimblesuper*. You have *super* access rights.' Below this is the Trimble logo and the device name 'Thunderbolt PTP GM200'. The left sidebar contains several menu items: 'SYSTEM STATUS', 'INTERFACE MANAGEMENT' (highlighted), 'Ethernet', 'VLAN', 'SNMP', 'Syslog' (highlighted), 'Serial Port', 'SYNCHRONIZATION MANAGEMENT', 'SECURITY MANAGEMENT', and 'SYSTEM MANAGEMENT'. The main content area is titled 'Syslog Configuration' and features four columns for configuring Syslog Servers #1 through #4. Each column includes a 'Disable' dropdown menu, a 'Server IP' text input field (all containing '0.0.0.0'), and a 'Port' spinner control (all set to '514').

Syslog Protocol: Enable or Disable

Syslog Server: IP Address of Syslog Server

Syslog Port: Enter Syslog Port

6.6.5 Serial Port



Baud Rate: Serial port speed – 9600, 19200, 38400, 57600, 115200. The default value is 115200.

Parity: Serial port parity setting – even, none, odd

Stop Bits: Serial port stop bit setting – 0 or 1

TOD Type: Sets the serial port to output TOD on demand. This is used in conjunction with the PPS output on the serial port (on the DCD pin). Option selects the output type and can be one of:

- none – Disable the TOD output (default)
- rmc – Set NMEA RMC output
- zda – Set NMEA ZDA output

TOD Delay: Set a delay for the TOD output in us (microseconds). This delays the TOD message for <d> us (microseconds) after the PPS.

NOTE – The parity and stop bits are for reference only and are not user configurable.

6.7 Synchronization Management

6.7.1 PTP Configuration

6.7.1.1 PTP Grandmaster Ethernet Port 0

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'PTP Configuration' and shows a 'PTP configuration successful' message. The interface is divided into two tabs: 'Ethernet Port 0' (selected) and 'Ethernet Port 1'. The configuration parameters for Ethernet Port 0 are as follows:

PTP Port Status	Domain Number	Clock Class
Enabled	24	6
PTP Profile	Announce Interval	Announce Timeout
G8275.1	-999	-999
Sync Mode	Sync Interval	Delay Request Interval
One-Step	-999	-999
Transport Protocol	Priority 1	Priority 2
802.3	-999	128
IP Mode	Multicast MAC	Multicast TTL
Multicast	01-1B-19-00-00-0...	1
Delay Mechanism	P2P Delay Request Interval	DiffServ Code Point
E2E	-999	0

Below the configuration table, the 'System Operational Mode' is set to 'Grandmaster', with a note: 'System Mode, not individual port'.

PTP Port Status: PTP port status - enabled or disabled

PTP Profile: G8275, G8265, G8265 -I, telecom or 1588

Sync Mode: 1-step or 2-Step

Transport Protocol: Transport mechanism - IP or Ethernet

IP Mode: Multicast or Unicast

Delay Mechanism: E2E or P2P

PTP Mode: Master or Slave clock.

NOTES –

1. When you configure the APTS or BC mode, you must first configure

- the PTP slave port and then configure the PTP master port.
- 2. You must reboot the system after the PTP slave mode is enabled.
- 3. Before the PTP grantor is assigned an IPv6 address, you must set the PTP Transport to IPv6.

Domain Number: The PTP domain number

Announce Interval: Mean time interval between successive announce messages

Announce Timeout: Mean timeout interval between successive announce messages

Sync Interval: Mean time interval between successive sync messages

Delay Request Interval: Mean time interval between delay requests

P2P Delay Request Interval: Mean time interval between delay requests of peers

Grantor Address: For PTP unicast input profiles only, IP address (es) of the unicast GrandMasters to use as the 'grantor' for the requests.

PTP Clock Id: ID of the PTP clock

Priority 1: Priority 1 value between 0 and 255

Priority 2: Priority 2 value between 0 and 255

Clock Class: View the clock class.

Multicast TTL: Set the multicast ttl value for the transmission (from 1 to 6).

DiffServ Code Point: Diff Serv Code Point

Lease Duration: For unicast grant messages, set the duration field.

System Operational Mode: Normal or Freerun. This feature is configured through the **System Management, System Configuration** tab. When the operational mode is configured for 'normal', the system will operate in a traditional GrandMaster manner, requiring a (GNSS) frequency and time reference to be established prior to starting PTP. When the operational mode is configured for 'freerun', the system will start PTP as soon as the system is booted and interfaces are functional.

6.7.1.2 PTP Grandmaster Ethernet Port 1

The screenshot displays the web interface for the Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' The main header shows the Trimble logo and the title 'Thunderbolt PTP GM200'. A left sidebar contains menu items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT (highlighted), PTP, NTP, GNSS, Output, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The main content area is titled 'PTP Configuration' and shows settings for 'Ethernet Port 1'. The configuration is organized into three columns:

PTP Port Status	Domain Number	Clock Class
Enabled	44	6
PTP Profile	Announce Interval	Announce Timeout
G8275.2	-3	3
Sync Mode	Sync Interval	Delay Request Interval
One-Step	-7	-7
Transport Protocol	Priority 1	Priority 2
IPV4	128	128
IP Mode	Multicast MAC	Multicast TTL
Unicast	01-1B-19-00-00-0...	0
Delay Mechanism	P2P Delay Request Interval	DiffServ Code Point
E2E	0	0

At the bottom of the configuration panel, the 'System Operational Mode' is set to 'Grandmaster' with the note 'System Mode, not individual port'.

PTP Port Status: PTP port status - enabled or disabled

PTP Profile: G8275, G8265, G8265 -I, telecom or 1588

Sync Mode: 1-step or 2-Step

Transport Protocol: Transport mechanism – IP or Ethernet

IP Mode: Multicast or Unicast

Delay Mechanism: E2E or P2P

PTP Mode: Master or Slave clock.

NOTES –

1. When you configure the APTS or BC mode, you must first configure the PTP slave port and then configure the PTP master port.
2. You must reboot the system after the PTP slave mode is enabled.
3. Before the PTP grantor is assigned an IPv6 address, you must set the PTP Transport to IPv6.

Domain Number: The PTP domain number

Announce Interval: Mean time interval between successive announce messages

Announce Timeout: Mean timeout interval between successive announce messages

Sync Interval: Mean time interval between successive sync messages

Delay Request Interval: Mean time interval between delay requests

P2P Delay Request Interval: Mean time interval between delay requests of peers

Grantor Address: For PTP unicast input profiles only, IP address (es) of the unicast GrandMasters to use as the 'grantor' for the requests.

PTP Clock Id: ID of the PTP clock

Priority 1: Priority 1 value between 0 and 255

Priority 2: Priority 2 value between 0 and 255

Clock Class: View the clock class.

Multicast TTL: Set the multicast ttl value for the transmission (from 1 to 6).

DiffServ Code Point: Diff Serv Code Point

Lease Duration: For unicast grant messages, set the duration field.

System Operational Mode: Normal or Freerun. When the operational mode is configured for 'normal', the system will operate in a traditional GrandMaster manner, requiring a (GNSS) frequency and time reference to be established prior to starting PTP. When the operational mode is configured for 'freerun', the system will start PTP as soon as the system is booted and interfaces are functional.

6.7.2 NTP configuration

6.7.2.1 NTP Time Server - Ethernet Port 0

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a checked checkbox for 'Disable auto-logout', and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the slogan 'Transforming the way the world works'. The main title of the page is 'Thunderbolt PTP GM200'. On the left side, there is a sidebar menu with categories: 'SYSTEM STATUS', 'INTERFACE MANAGEMENT', and 'SYNCHRONIZATION MANAGEMENT'. Under 'SYNCHRONIZATION MANAGEMENT', 'NTP' is highlighted. The main content area is titled 'NTP Configuration' and has four tabs: 'Ethernet Port 0' (selected), 'Ethernet Port 1', 'NTP Security', and 'NTP Peers'. The 'Ethernet Port 0' tab shows the following configuration options:

- NTP Server:** A dropdown menu currently set to 'Disabled'.
- NTP Broadcast:** A dropdown menu currently set to 'Disabled'.
- NTP Broadcast IP:** An input field with a hyphen '-' as the value.
- NTP Broadcast Interval:** An input field with a hyphen '-' as the value.
- NTP Broadcast TTL:** An input field with a hyphen '-' as the value.

NTP Server: Enabled, Disabled or Default

NTP Broadcast: Enabled or Disabled

NTP Broadcast IP: Broadcast IP for NTP (has to be in same domain as that of the port)

NTP Broadcast Interval: Values between 4 and 17 representing 2^4 (16 secs) and 2^{17} (36.4 hours)

NTP Broadcast TTL: Values between 1 to 7 hops.

6.7.2.2 NTP Time Server - Ethernet Port 1

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome *trimblesuper*. You have *super* access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'NTP Configuration' and shows a success message: 'NTP configuration successful'. The interface is divided into several sections: 'Ethernet Port 0', 'Ethernet Port 1' (selected), 'NTP Security', and 'NTP Peers'. Under 'Ethernet Port 1', there are four configuration options: 'NTP Server' (set to 'Enabled'), 'NTP Broadcast' (set to 'Disabled'), 'NTP Broadcast IP' (empty field), 'NTP Broadcast Interval' (empty field), and 'NTP Broadcast TTL' (empty field). On the left side, there is a sidebar menu with categories: 'SYSTEM STATUS', 'INTERFACE MANAGEMENT', and 'SYNCHRONIZATION MANAGEMENT'. Under 'SYNCHRONIZATION MANAGEMENT', there are sub-items: 'PTP', 'NTP' (highlighted), 'GNSS', and 'Output'.

NTP Server: Enabled, Disabled or Default

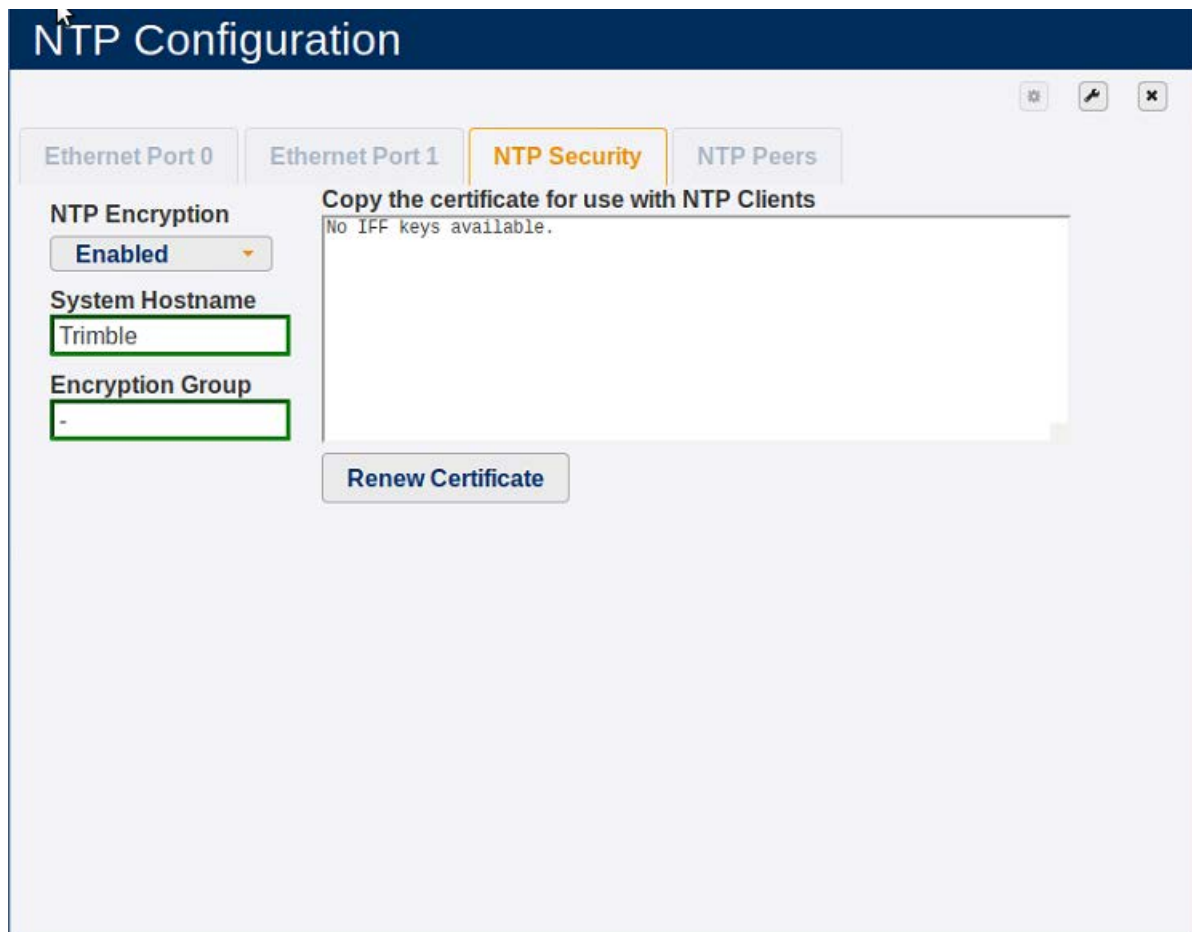
NTP Broadcast: Enabled or Disabled

NTP Broadcast IP: Broadcast IP for NTP (has to be in same domain as that of the port)

NTP Broadcast Interval: Values between 4 and 17 representing 2^4 (16 secs) and 2^{17} (36.4 hours)

NTP Broadcast TTL: Values between 1 to 7 hops.

6.7.2.3 NTP Time Server - NTP security



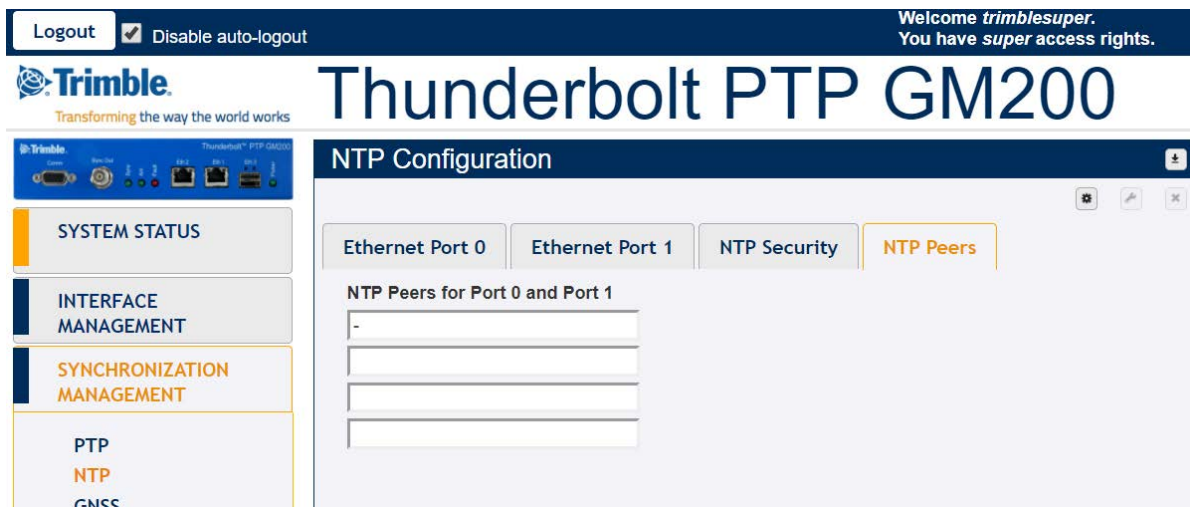
The screenshot displays the 'NTP Configuration' web interface. At the top, there are four tabs: 'Ethernet Port 0', 'Ethernet Port 1', 'NTP Security' (which is selected and highlighted in orange), and 'NTP Peers'. Below the tabs, on the left side, there are three configuration sections: 'NTP Encryption' with a dropdown menu set to 'Enabled', 'System Hostname' with a text input field containing 'Trimble', and 'Encryption Group' with a text input field containing '-'. On the right side, there is a large text area titled 'Copy the certificate for use with NTP Clients' containing the text 'No IFF keys available.'. Below this text area is a 'Renew Certificate' button.

NTP Encryption: Enabled or Disabled

System Hostname: Hostname of encryption certificate

Encryption Group: Group name for encryption certificate

6.7.2.4 NTP Time Server - NTP Peers



The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a "Logout" button, a "Disable auto-logout" checkbox, and a welcome message: "Welcome *trimblesuper*. You have *super* access rights." Below this is the Trimble logo and the product name "Thunderbolt PTP GM200". The main content area is titled "NTP Configuration" and features four tabs: "Ethernet Port 0", "Ethernet Port 1", "NTP Security", and "NTP Peers" (which is currently selected). Under the "NTP Peers" tab, there is a section labeled "NTP Peers for Port 0 and Port 1" containing four empty input fields for configuring IP addresses.

NTP Peers: IP Addresses for up to 4 NTP Peers, valid for Port0 and Port1.

6.7.3 GNSS Configuration

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads 'Welcome trimblesuper. You have super access rights.' The main header features the Trimble logo and the title 'Thunderbolt PTP GM200'. On the left, a sidebar lists management categories: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT (highlighted), SECURITY MANAGEMENT, and SYSTEM MANAGEMENT. The 'SYNCHRONIZATION MANAGEMENT' section includes sub-items: PTP, NTP, GNSS (highlighted), and Output. The main content area is titled 'GNSS Configuration' and contains the following settings:

- Constellation Selection:**
 - GPS
 - GLONASS
 - Beidou
 - Galileo
 - QZSS
- Position Settings:**
 - Positioning Mode:** Automatic
 - Latitude (degrees):** 37.50936
 - Longitude (degrees):** 127.05741
 - Height (meters):** 78.26
 - Survey Length (secs):** 2000
 - Elevation Mask:** 10.0
 - PDOP Mask:** 3.0
 - Signal Level Mask:** 0.00
- Receiver Status:** Don't have GNSS ...
- Receiver Mode:** Overdet Clock (Time)
- Antenna Delay (ns):** 0

At the bottom of the configuration area, there is a 'Restart GNSS Receiver' button set to 'Do nothing'.

GNSS Constellations: Combination of GPS, GLONASS, Beidou, Galileo and/or QZSS

Positioning Mode: Automatic, Surveyed or Manual

Latitude: Latitude in degrees

Longitude: Longitude in degrees

Height: Height in meters

Survey Length: In seconds

Elevation Mask: Satellite elevation mask level

PDOP Mask: Satellite PDOP mask level

Signal Level Mask: Set signal level mask

Antenna Delay (ns): The antenna delay setting affects the system time base of the GM200. Negative numbers advance the internal time reference, positive numbers retard (delay) the time reference. So, to compensate for an antenna delay of 500 ns you would enter -500 as the GM200 antenna delay setting.

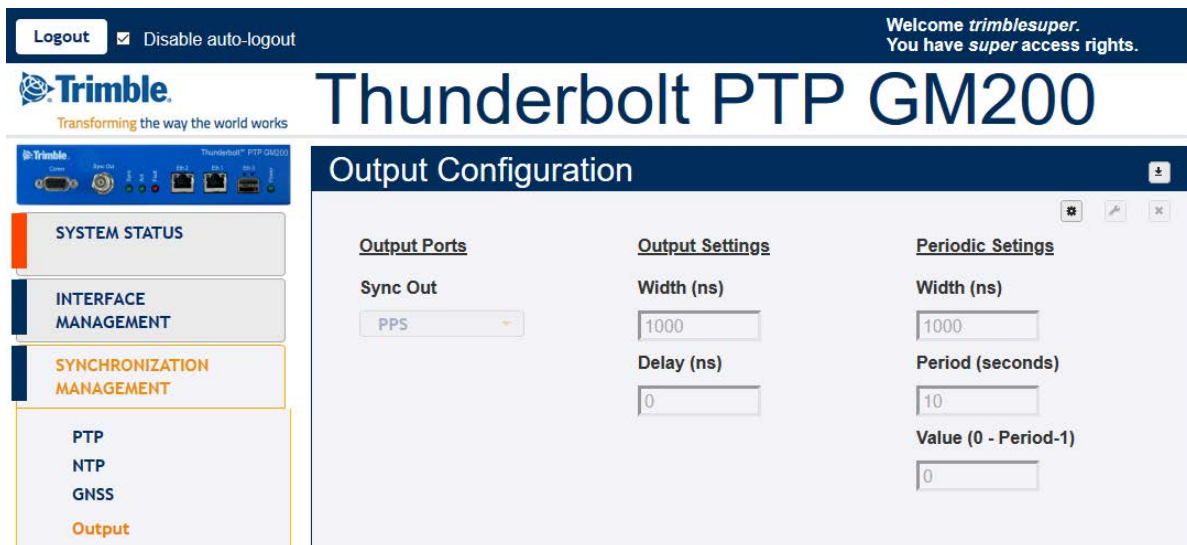
All PTP and NTP timestamps are derived from the system time base, which means that you want to make sure that the antenna delay is correctly

compensated because that value affects the PTP and NTP clock accuracy in the LAN network.

Note that, since this setting affects the disciplined oscillator of GM200, the effect of changing the antenna delay value is not seen immediately on the system output. The antenna delay value will advance (or retard) the internal GNSS time measurements, which go into the oscillator's PLL control loop, which will then gradually steer the disciplined oscillator toward that new value. If the value is jumped too far after the GM200 has achieved lock (remember, this is normally an installation setting) then the unit may issue a "PPS-Sync-Bad" and/or a "Freq-Loop-Unlock" alarm. After a while, when the time base has moved to the new value, these alarms will be cleared.

Restart GNSS Engine: Warm, Cold or Do Nothing

6.7.4 Output Configuration



BNC Output: The type of output signal – PPS, PP2S, Periodic or 10 MHz

Output Width: Width of Output in nS

Output Delay: Delay of Output in nS. The output delay setting, only affects the PPS pulse on the BNC connector. That value does NOT affect the system time base and has no effect on the PTP and NTP timestamps. Negative numbers advance the PPS pulse, positive numbers retard (delay) the PPS pulse. The output delay can be used for application-specific adjustments of the PPS timing, for example the length of cable that is attached to the BNC output for conducting the PPS pulse signal. It has only a local impact, though. Clients in the LAN network will not see any effect from this value.

The output delay setting has an immediate effect on the PPS pulse.

The output delay setting should NOT be used for compensating the antenna delay!

Periodic Width: Periodic width in ns

Period: Period in seconds

Periodic Value: Periodic value

6.8 Security Management

6.8.1 User Management

6.8.1.1 User Management – Active Sessions

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads: 'Welcome *trimblesuper*. You have *super* access rights.' The main header displays the Trimble logo and the device name 'Thunderbolt PTP GM200'. On the left, a sidebar contains menu items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT (highlighted), User Authentication, and SYSTEM MANAGEMENT. The main content area is titled 'User Management' and has three tabs: 'Active Sessions' (selected), 'Users Accounts', and 'Password Rules'. Below the tabs, there is a 'List of Active Sessions' table with the following data:

	Name	Email	Service	Active
You	trimblesuper		Rem-37.13.44.93	50 mins

Below the table is a 'User Logoff' button.

Name: Existing username

Email: Updated email

Service: IP Address used to connect to

Active: The time that the session has been active

6.8.1.2 User Management – User Accounts

The screenshot displays the 'User Management' interface for the Thunderbolt PTP GM200. The interface includes a navigation sidebar on the left and a main content area. The main content area has three tabs: 'Active Sessions', 'Users Accounts', and 'Password Rules'. The 'Users Accounts' tab is active, showing a form for adding a new user. The form includes a 'Select Action' dropdown menu (currently set to 'No Action'), a 'Username' text input field, an 'Access Level' dropdown menu (currently set to 'User'), an 'Email' text input field, a 'Password' text input field, and a 'Confirm Password' text input field. Below the form is a 'User Account Selection' table with the following data:

	User	Level	Email
<input type="checkbox"/>	trimblesuper	super	
<input type="checkbox"/>	trimbleadmin	admin	
<input type="checkbox"/>	trimble	user	
<input type="checkbox"/>	vcruz	super	victor_cruz@trimble.com
<input type="checkbox"/>	test01	super	

Select Action: No Action, Add, Modify, Delete

Username: New username to be added

Password: New password to be chosen

Confirm Password: Confirm password. Should be same as password.

Access Level: User, Admin or Super(visor)

- User – this level can only view status and configuration, cannot make changes to configuration.
- Admin – all functions of 'user' with added ability to change most configuration settings.
- Super – all functions of 'admin' with added ability to edit the user table.

Email: New email

User Account Selection: This is a list of all users created in GM200

6.8.1.3 User Management – Password Rules

The screenshot shows the 'User Management' section of the Thunderbolt PTP GM200 web interface. The 'Password Rules' tab is selected. The configuration is as follows:

Field	Value
Preconfigured password criteria	None
Require different password when password is changed	Yes
Password rule complexity metric	6
Minimum number of characters in password	6
Minimum number of lowercase letter	0
Minimum number of uppercase letter	0
Minimum number of digits	0
Minimum number of other characters	0

Preconfigured password criteria: 5 criteria of password already configured:

- **None:** the password doesn't require any rule to be accepted by GM200
- **p0:** 6 characters as minimum (complexity = 6)
- **p1:** 7 characters as minimum, 1 uppercase letter as minimum (complexity 8)
- **p2:** 9 characters as minimum, 1 uppercase letter as minimum, 2 lowercase letter as minimum (complexity 12)
- **p3:** 10 characters as minimum, 1 uppercase letter as minimum, 2 lowercase letter as minimum, 1 digit as minimum (complexity 14)
- **p4:** 11 characters as minimum, 1 uppercase letter as minimum, 2 lowercase letter as minimum, 1 digit as minimum, 1 other character as minimum (complexity 16)

Require different password when password is changed: Yes or No. It sets if the user is required to enter a different password when changing their password.

Password rule complexity metric: The sum of all conditions configured.

Minimum number of characters in password: Password requires <n> characters as minimum.

Minimum number of lowercase letter: password requires <n> lowercase letters as minimum

Minimum number of uppercase letter: password requires <n> uppercase letters as minimum

Minimum number of digits: password requires <n> digits as minimum.

Minimum number of other characters: password requires <n> other characters as minimum. These other characters can be any printable character, except for space.

6.8.2 Authentication

6.8.2.1 Authentication Portal

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Trimble Transforming the way the world works **Thunderbolt PTP GM200**

Authentication Configuration

Portal | RADIUS | TACACS+ | HTTPS Certificate

Portal Authentication Selection

Type	SSH	Telnet	Web	Serial	SNMP
Local	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Radius	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tacacs+	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[Set Defaults](#)

This page shows the authentication type Local, Radius or TACACS+ with the three different portal types: SSH, Telnet or Web.

Set Defaults button sets the authentication to the default values.

Disable option allow to disable telnet access to GM200.

6.8.2.2 Authentication RADIUS

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the title 'Thunderbolt PTP GM200'. The main content area is titled 'Authentication Configuration' and features four tabs: 'Portal', 'RADIUS', 'TACACS+', and 'HTTPS Certificate'. The 'RADIUS' tab is active, showing the following settings:

- RADIUS Settings:**
 - Primary Server Address: 0.0.0.0
 - Secondary Server Address: 0.0.0.0
 - Protocol Port: 1812
 - Server Time Out: 3
 - Secret: -
 - Set Defaults button
- RADIUS Dictionary:**

```
# Copyright (c) Trimble, Inc.
# RADIUS Dictionary for the Thunderbolt PTP GM200
# Access Levels: 1 user, 3 admin, 5 super
VENDOR      Trimble      46285
BEGIN-VENDOR Trimble
ATTRIBUTE   Trimble-AdminLevel 16 integer
END-VENDOR  Trimble
```

Below the dictionary, there is a note: 'Copy the dictionary and add to the RADIUS server'.

Primary Address: Displays or allows to enter the primary server address for the RADIUS server.

Secondary Address: Displays or allows to enter the secondary server address for the RADIUS server.

Protocol Port: Displays or allows to set the IP port for the RADIUS server (same for primary and secondary).

Server Time Out: Sets the RADIUS server timeout value. 1-60 seconds.

Secret: Sets the shared secret value for the RADIUS server

RADIUS Dictionary

Set Defaults Button: Sets the RADIUS server information to defaults.

6.8.2.3 Authentication TACACS+

The screenshot shows the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the product name 'Thunderbolt PTP GM200'. The main content area is titled 'Authentication Configuration' and has four tabs: 'Portal', 'RADIUS', 'TACACS+', and 'HTTPS Certificate'. The 'TACACS+' tab is selected and highlighted in orange. Underneath the tabs, there is a section titled 'TACACS+ Settings' with the following fields and values:

Primary Server Address	Secondary Server Address
0.0.0.0	0.0.0.0
Protocol Port	Server Time Out
49	3
Protocol Type	Service Type
ip	ppp
Secret	
-	

There is a 'Set Defaults' button located below the Secret field.

Primary Address: Displays or allows to enter the primary server address for the TACACS+ server.

Secondary Address: Displays or allows to enter the secondary server address for the TACACS+ server.

Protocol Port: Displays or allows to set the IP port for the TACACS+ server (same for primary and secondary).

Server Time Out: Sets the TACACS+ server timeout value. 1-60 seconds.

Protocol Type: Sets the TACACS+ server protocol string

Service Type: Sets the TACACS+ server service string

Secret: Sets the shared secret value for the TACACS+ server

Set Defaults Button: Sets the TACACS+ server information to defaults.

6.8.2.4 HTTPS Certificate

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a "Logout" button, a "Disable auto-logout" checkbox, and a welcome message: "Welcome *trimblesuper*. You have *super* access rights." Below this is the Trimble logo and the slogan "Transforming the way the world works". The main title of the page is "Thunderbolt PTP GM200".

The interface is divided into a left sidebar and a main content area. The sidebar contains several menu items: "SYSTEM STATUS", "INTERFACE MANAGEMENT", "SYNCHRONIZATION MANAGEMENT", "SECURITY MANAGEMENT" (highlighted in orange), "User Authentication" (highlighted in orange), and "SYSTEM MANAGEMENT".

The main content area is titled "Authentication Configuration" and features four tabs: "Portal", "RADIUS", "TACACS+", and "HTTPS Certificate" (highlighted in orange). Under the "HTTPS Certificate" tab, the following information is displayed:

- HTTPS Certificate**
- Valid Certificate Dates**
- From: Oct 3 21:13:21 2016 GMT
- To: Jan 1 01:01:01 2090 GMT
- A "Renew Certificate" button is located to the right of the date range.


Renew Certificate: Displays or allows to enter the primary server address for the TACACS+ server.

Regenerate the HTTPS certificate. This will force web users to re-establish web access with the new certificate. The previous Trimble certificate must be removed from the browser, then the user will need to reconnect to the system with their browser. The certificate's valid 'From' and 'To' date range is displayed.

6.9 System Management

6.9.1 Alarm Configuration

Logout Disable auto-logout
Welcome *trimblesuper*.
You have *super* access rights.



Thunderbolt PTP GM200

SYSTEM STATUS

INTERFACE MANAGEMENT

SYNCHRONIZATION MANAGEMENT

SECURITY MANAGEMENT

SYSTEM MANAGEMENT

Alarm System

Alarm Configuration

Alarm No.
Name
Level
Set Time
Clear Time

Alm #	Description	Level	Set Time	Clr Time	Set	Alm #	Description	Level	Set Time	Clr Time	Set
0	GNSS-Comm-E1	CRI	0	0	No	15	Freq-Out-Bad	MAJ	0	10	No
1	GNSS-Comm-E2	CRI	0	0	No	16	PTP-System-Bad	CRI	5	10	No
2	GNSS-Comm-Loss	CRI	2	5	No	17	FPGA-Load-Bad	CRI	0	0	No
3	GNSS-Ant-Shorted	MIN	0	2	No	18	GNSS-Pos-Integrity	MIN	60	2	No
4	GNSS-Ant-Open	MIN	0	2	No	19	UTC-Corr-Unk	MAJ	0	0	No
5	GNSS-Track-No	MIN	0	2	No	20	Eth-Port0-Down	MAJ	0	2	Yes
6	PTP-PPS-Loss	MIN	0	10	No	21	Eth-Port1-Down	MAJ	0	2	Yes
7	GNSS-PPS-Loss	MIN	0	10	No	22	Eth-Mgmt-Down	MAJ	0	2	No
8	Time-Sync-Bad	MAJ	2	10	No	23	Eth-Same-Subnet	CRI	0	0	No
9	Freq-Range-Bad	CRI	0	10	No	24	SyncE0-Unsupported	CRI	0	0	No
11	GNSS-Time-Bad	MIN	0	0	No	25	SyncE1-Unsupported	CRI	0	0	No
12	Freq-Loop-Unlock	MIN	2	5	No	26	Time-Set-Bad	CRI	0	0	No
13	Freq-Hold-Exceed	MAJ	0	0	No	27	Freq-Hold	NFY	0	0	No
14	PPS-Sync-Bad	MAJ	5	10	No						

Alarm No.: Select the alarm number to be configured

Level: IGN(ignored), NFY(notification), MIN(minor),MAJ(major) or CRI(critical)

setTime: Time for which the alarm condition must be active before it is set

clrTime: Time for which alarm condition is inactive before it is cleared

The table shows the list of available alarms along with their current level, set and clear time.

The table allows changing the severity level, the set and clear time.

6.9.2 System

6.9.2.1 System Configuration

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome trimblesuper. You have super access rights.' Below this is the Trimble logo and the product name 'Thunderbolt PTP GM200'. The left sidebar contains a menu with the following items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT (which is highlighted in orange). Under SYSTEM MANAGEMENT, there is a sub-menu with 'Alarm' and 'System' (highlighted in orange). The main content area is titled 'System Configuration' and has two tabs: 'System Configuration' (active) and 'System Firmware'. The 'System Configuration' tab is divided into three sections: 'System Wide Settings' with fields for System Hostname (Thunderbolt), System Mode (GrandMaster), APTS (Disable), NTP IP Addr (-), and Timeout (minutes) (15); 'System Configuration' with buttons for Save User Config, Load User Config, a file browser (Browse... No file selected), Upload Config File, and Download Config File; and 'Supervisor Options' with buttons for Load Factory Config, Load Default Config, and System Reboot.

Use this tab to configure the system with following options:

System Hostname: Enter hostname

System Mode: Change the system operating mode for **Freerun** or **Normal**. See the description in the [Synchronization Management](#) section.

Save User Configuration: Store the current user settings to be the defaults used on a system restart.

Load User Config: Restore the previously saved user configuration.

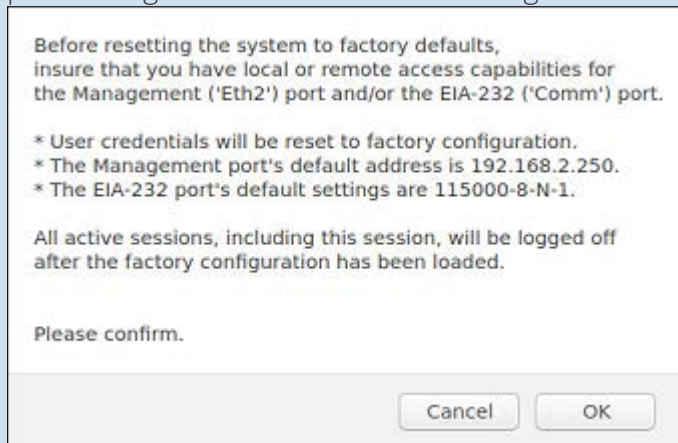
Upload Config File: Load file selected in **Browse** button.

Download Conf File: Download a user configuration file that can later be uploaded through **Upload Config File**.

Load Default Config: To set factory configuration, *except network config*. This restores settings to those configured during Trimble production, *except the network config*.

Load Factory Config: To set factory configuration. This restores settings to those configured during Trimble production.

NOTE – You will be prompted with this pop-up window before proceeding. Take care before confirming.



System Reboot: Reboot the system.

6.9.2.2 System Firmware

This page displays the **Current System Version** running on Thunderbolt PTP GM200, **Current GNSS Version** and **Current FPGA Version**.

From this page you can also upload the Thunderbolt PTP GM200 firmware patches to the system.

The uploading of the patches doesn't automatically update the system firmware.

You must select **Update System** to update the system firmware.

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Trimble Transforming the way the world works

Thunderbolt PTP GM200

System Configuration

SYSTEM STATUS

INTERFACE MANAGEMENT

SYNCHRONIZATION MANAGEMENT

SECURITY MANAGEMENT

SYSTEM MANAGEMENT

Alarm System

System Configuration

System Firmware

<u>Current System Version</u>	<u>Current GNSS Version</u>	<u>Current FPGA Version</u>
20191122-1.4.0.0	20180403-1.5.0.0	18.3.15

Firmware Patch Staging

No file selected.

System Patches

- 20191122-1.4.0.0.pkg
- 20190516-1.2.0.0.pkg
- 20190127-1.1.0.0.pkg
- 20180619-1.0.0.0.pkg

GNSS Patches

- ResSMT360_v1.05.bin

A maximum of 8 (the most recently released) firmware images will be stored and displayed in the list of available patches. It is suggested that the number of staged files be managed (unstaged) to keep the number of staged packages to 8 or less.

NOTE – The software upload tab is available when logged with supervisor user level access.

7. SNMP Support

This chapter describes the SNMP and SNMP notification setting procedure for Thunderbolt PTP Grandmaster Clock GM200.

- ▶ [SNMP overview](#)
- ▶ [SNMP traps](#)
- ▶ [Accessing the SNMP MIB files](#)

7.1 SNMP overview

Simple Network Management Protocol (SNMP) is an Internet-standard application-layer protocol for managing and monitoring network elements. It has been defined by the Internet Engineering Task Force (IETF) under RFC 1157 for exchanging management information between network devices.

An SNMP-managed network consists of three key components:

- Managed device
- Agent — software which runs on managed devices
- Network management station (NMS) — software which runs on the manager

SNMP agents expose management data on the managed systems as variables. The variables accessible via SNMP are organized in hierarchies. These hierarchies, and other metadata (such as type and description of the variable), are described by Management Information Bases (MIBs).

Thunderbolt PTP GMC supports SNMP v2c.

7.2 SNMP traps

SNMP traps enable an agent to notify the management station of significant events by way of an unsolicited SNMP message.

Thunderbolt PTP Grandmaster Clock GM200 provides a command line interface to enable the traps. (See [CLI Reference](#)).

Below is a list of available alarms through SNMP trap in Thunderbolt PTP Grandmaster Clock.

7.2.1 Description: Set alarm 0, GNSS-Comm-E1 (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.2 Description: Clear alarm 0, GNSS-Comm-E1 (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.3 Description: Set alarm 1, GNSS-Comm-E2 (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.4 Description: Clear alarm 1, GNSS-Comm-E2 (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.5 Description: Set alarm 2, GNSS-Comm-Loss (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.6 Description: Clear alarm 2, GNSS-Comm-Loss (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.7 Description: Set alarm 3, GNSS-Ant-Shorted (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.8 Description: Clear alarm 3, GNSS-Ant-Shorted (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.9 Description: Set alarm 4, GNSS-Ant-Open (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.10 Description: Clear alarm 4, GNSS-Ant-Open (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.11 Description: Set alarm 5, GNSS-Track-No (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.12 Description: Clear alarm 5, GNSS-Track-No (MIN)

iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.13 Description: Set alarm 6, PTP-PPS-Loss (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.14 Description: Clear alarm 6, PTP-PPS-Loss (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.15 Description: Set alarm 7, GNSS-PPS-Loss (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.16 Description: Clear alarm 7, GNSS-PPS-Loss (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2Events.tbIt2EvNotifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.17 Description: Set alarm 8, Time-Sync-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.18 Description: Clear alarm 8, Time-Sync-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.19 Description: Set alarm 9, Freq-Range-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.20 Description: Clear alarm 9, Freq-Range-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.21 Description: Set alarm 11, GNSS-Time-Bad (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.22 Description: Clear alarm 11, GNSS-Time-Bad (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.23 Description: Set alarm 12, Freq-Loop-Unlock (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.24 Description: Clear alarm 12, Freq-Loop-Unlock (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.25 Description: Set alarm 13, Freq-Hold-Exceed (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.26 Description: Clear alarm 13, Freq-Hold-Exceed (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.27 Description: Set alarm 14, PPS-Sync-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.28 Description: Clear alarm 14, PPS-Sync-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.29 Description: Set alarm 15, Freq-Out-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.30 Description: Clear alarm 15, Freq-Out-Bad (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.31 Description: Set alarm 16, PTP-System-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.32 Description: Clear alarm 16, PTP-System-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.33 Description: Set alarm 17, FPGA-Load-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.34 Description: Clear alarm 17, FPGA-Load-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.35 Description: Set alarm 18, GNSS-Pos-Integrity (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.36 Description: Clear alarm 18, GNSS-Pos-Integrity (MIN)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.37 Description: Set alarm 19, UTC-Corr-Unk (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.38 Description: Clear alarm 19, UTC-Corr-Unk (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.39 Description: Set alarm 20, Eth-Port0-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyPrefix.tbIt2EvNfyAlarm

7.2.40 Description: Clear alarm 20, Eth-Port0-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tbIt2EvNtifications.tbIt2EvNfyObject.tbIt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.41 Description: Set alarm 21, Eth-Port1-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.42 Description: Clear alarm 21, Eth-Port1-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.43 Description: Set alarm 22, Eth-Mgmt-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.44 Description: Clear alarm 22, Eth-Mgmt-Down (MAJ)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.45 Description: Set alarm 23, Eth-Same-Subnet (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.46 Description: Clear alarm 23, Eth-Same-Subnet (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.47 Description: Set alarm 24, SyncE0-Unsupported (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.48 Description: Clear alarm 24, SyncE0-Unsupported (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.49 Description: Set alarm 25, SyncE1-Unsupported (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.50 Description: Clear alarm 25, SyncE1-Unsupported (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.51 Description: Set alarm 26, Time-Set-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.2.52 Description: Clear alarm 26, Time-Set-Bad (CRI)

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-
1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyObject.tblt2EvNfyAlDescr.0

Trap OID:

.iso.iso-3.iso-3-6.iso-3-6-1.iso-3-6-1-4.iso-3-6-1-4-

1.trimble.trimbleTiming.trimbleTBlT2.tblt2Events.tblt2EvNotifications.tblt2EvNfyPrefix.tblt2EvNfyAlarm

7.3 Accessing the SNMP MIB files

Thunderbolt PTP Grandmaster Clock GM200's private MIB files can be downloaded through the WebUI of the system.

The MIB download option is available under the **Interface Management** tab of the unit.

The Thunderbolt PTP Grandmaster Clock GM200's SNMP MIB consist of two files:

- TRIMBLE-MIB.mib
- TRIMBLE-TBOLT2-MIB.mib

8. PTP Input

Trimble GNSS receivers are used to deliver timing references accurate to ± 15 ns. This provides timing-critical applications with the world's most precise and stable source of timing information.

However, when GNSS tracking is unavailable there must be a backup reference besides holdover. PTP Input is the answer to this call, and GNSS is complemented by network-based timing distribution to maintain the time base during GNSS reference failure.

- ▶ [PTP Input overview](#)
- ▶ [How PTP Input works in APTS mode](#)
- ▶ [Configuring with CLI commands](#)
- ▶ [Configuring with Web interface](#)
- ▶ [Configuring PTP input examples](#)

8.1 PTP Input overview

Deployment of PTP Grandmasters having GNSS receiver references is very simple and quick, however these devices have a point of failure: the antenna. It is always exposed outside the building, in order to have the best line-of-sight to multiple satellites. The consequence is that it is always subject to lightning strikes, interference due to weather conditions, reflections, jamming, and so on.

Thunderbolt PTP Grandmaster Clock GM200 has the best holdover in the market, however, in order to provide even more protection and trying to keep longer time accuracy, Thunderbolt PTP Grandmaster Clock GM200 also has a feature called PTP Input that is a network-based timing distribution backup reference.

The Thunderbolt PTP Grandmaster Clock GM200 will continue utilizing GNSS as the primary time reference. PTP Input will work as a complement that will help and maintain the time when GNSS reference is not available.

PTP Input feature is a secondary reference and will be active if GNSS tracking is lost. GM200 will never work as a Boundary Clock because the GM200 has superior holdover specifications to a network device due to excellent oscillator specifications.

8.2 How PTP Input works in APTS mode

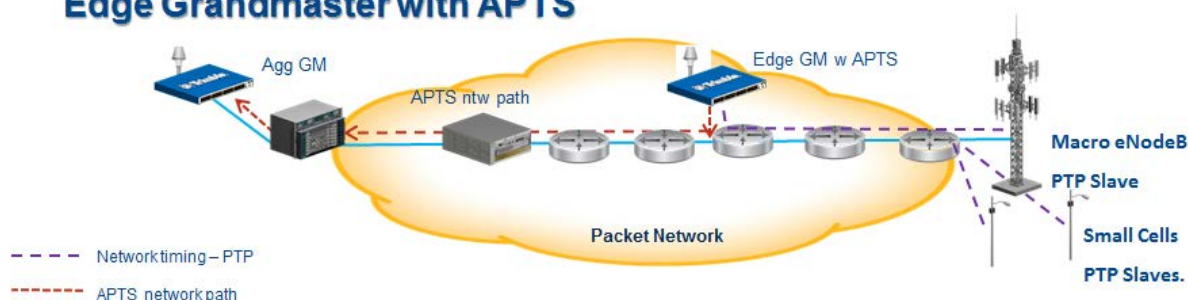
PTP Input is designed as a secondary (backup) reference of GNSS reference of PTP Grandmaster Clock GM200.

It can be configured in Ethernet port 0 or 1. It will be an additional input for the PTP Grandmaster Clock GM200. The Ethernet port will be configured as a PTP slave for the GM200.

Since the Ethernet port will be configured as PTP slave, it will require a grandmaster reference or 'grantor'. GM200's PTP Input supports up to 3 (three) grantors to be configured.

PTP Input can be used with all unicast PTP profiles supported by GM200: G.8265.1 Profile Option I or II and IEEE-1588 Telecom Profile v2 (unicast). All previous grandmasters deployed by telecom operators are working right now with those PTP profiles.

Phase Synchronization: G.8275.2 Partial On-Path Support Edge Grandmaster with APTS



8.3 Configuring with CLI commands

PTP Input is related to the following CLI commands. Remember that you need to first configure the network interface (IP addresses and/or VLAN IDs) in order to use any Ethernet port:

To do any PTP configuration change, you must disable the PTP service in Ethernet port.

To disable/enable PTP service:

```
set ptp eth0/1 enable/disable
```

Use the `set ptp` command to do changes in PTP configuration. In this case, the command will change the profile required, the mode from grandmaster to slave, and to add at least one grantor:

```
set ptp eth0/1 profile <yyyyyyy> mode slave grantor  
<x.x.x.x>
```

Where:

<x.x.x.x> is an IP address

<yyyyyyy> is one of the following options:

- g8265 - Profile G.8265.1 Option II (clock class 80)
- g8265-I - Profile G.8265.1 Option I (clock class 84)
- telecom - Profile IEEE-1588 Telecom Profile v2 (unicast)

To configure port Ethernet 0 or 1 into PTP input, set the system mode first:

```
set system apts enable
```

or

```
set system opermode bc
```

To see all inputs/references of GM200 or a specific one: GNSS or PTP input in Ethernet 0 (ptp0) or PTP input in Ethernet 1 (ptp1):

```
view input (gnss or ptp1 or ptp0)
```

To see PTP configuration in Ethernet ports (for verification purposes):

```
get ptp eth0/1
```

NOTE – If you need to use this command after doing any change in PTP configuration, allow at least 15 seconds before seeing the changes done.

8.4 Configuring with Web interface

8.4.1 Configure the System Mode

The screenshot displays the web interface for configuring a Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message for 'trimblesuper' is visible. The main header reads 'Thunderbolt PTP GM200'. The left sidebar contains a navigation menu with the following items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, SECURITY MANAGEMENT, and SYSTEM MANAGEMENT (highlighted). The main content area is titled 'System Configuration' and is divided into two tabs: 'System Configuration' (active) and 'System Firmware'. Under 'System Wide Settings', the 'System Hostname' is set to 'Thunderbolt'. The 'System Mode' is set to 'GrandMaster' in a dropdown menu, with a list of options including GrandMaster, Freerun, and BoundaryClock. The 'APTS' field is set to 'Enable'. The 'NTP IP Addr' field is empty, and the 'Timeout (minutes)' field is set to '15'. Below these settings are buttons for 'Save User Config' and 'Load User Config'. A file upload section shows a 'Browse...' button and the text 'No file selected.', with buttons for 'Upload Config File' and 'Download Config File'. At the bottom, there are buttons for 'Load Factory Config', 'Load Default Config', and 'System Reboot'.

In the System Configuration screen, select the System Mode from the drop-down options:

- GrandMaster: GM Mode
- Freerun: Freerun mode
- BoundaryClock: BC mode

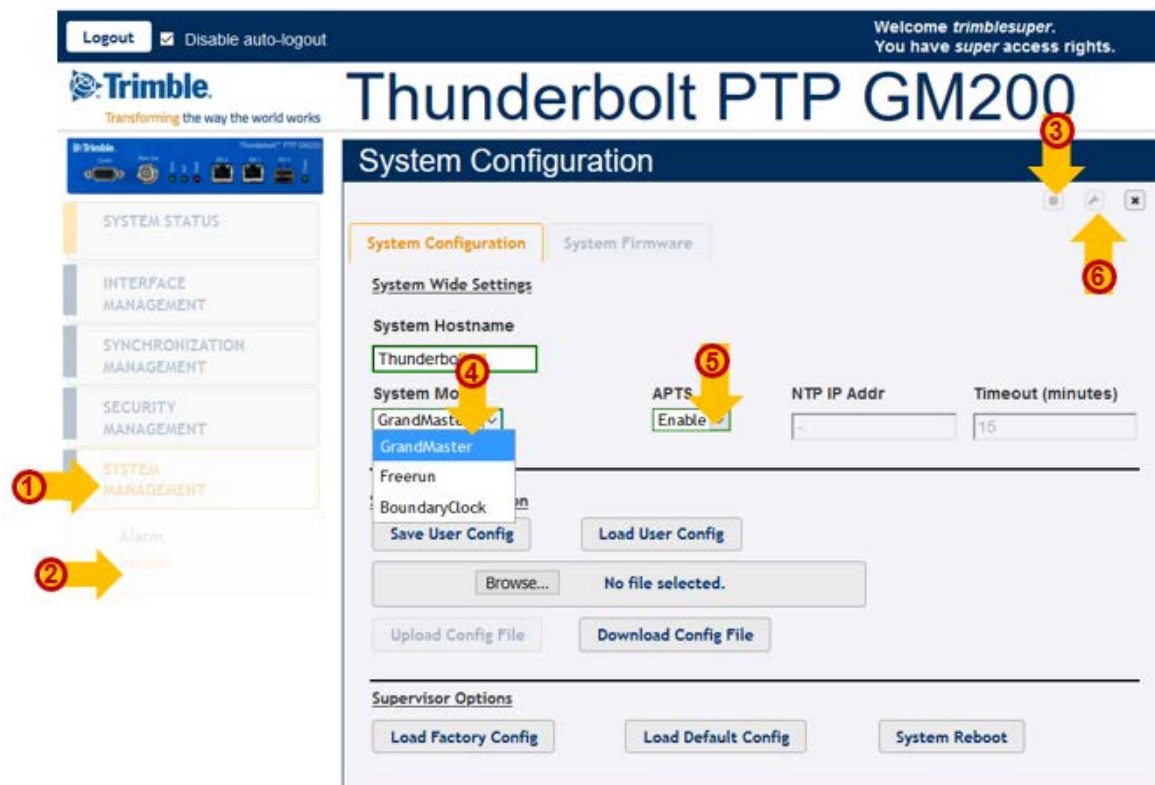
In the APTS field (APTS mode for GM), select **Enable**.



NOTE – If you change the system mode, first save your configuration and then reboot the system to apply the changed mode.

8.4.2 APTS PTP Slave configuration procedure - 1

Before starting configuration, make sure that GM200 is connected with GNSS (or GPS) antenna FIRST to be set as APTS slave mode.

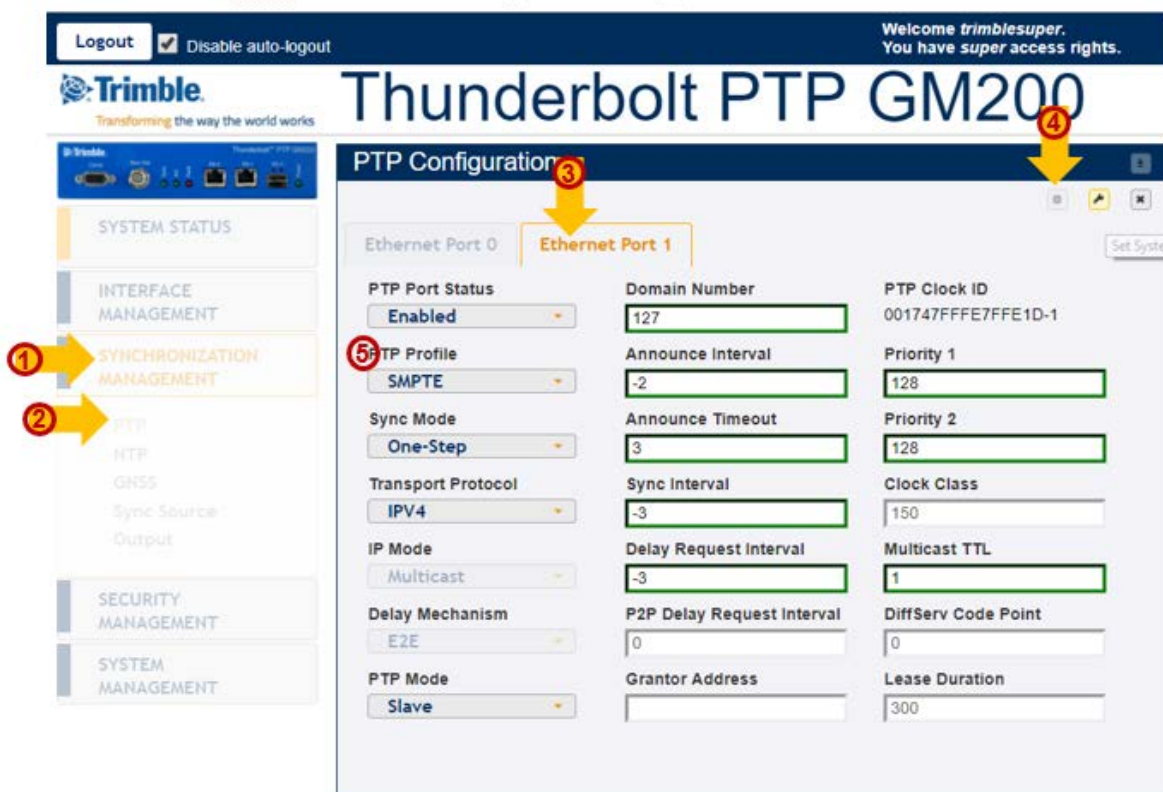
Connect GNSS Antenna if not connected already.




1. Select SYSTEM MANAGEMENT ① and then System ②.
2. To make changes, click Configure  ③.
3. From the System Mode drop-down list, select GrandMaster ④.
4. From the APTS drop-down list, select Enable ⑤.
5. Click Set  to apply the settings ⑥.

8.4.3 APTS PTP PTP slave configuration - 2

After configuring the System Mode:



1. Select SYNCHRONIZATION MANAGEMENT ① and then PTP ②.
2. Select Ethernet Port 1 tab ③ or Ethernet Port 0 if using ETH0.
3. Click Configure  ④.
4. From the PTP Profile drop-down list, select a PTP profile ⑤.
5. When all parameters are activated, the following screen appears:

The screenshot shows the 'PTP Configuration' page for Ethernet Port 1. The 'PTP Port Status' is set to 'Enabled' (6). The 'PTP Profile' is set to 'SMPT' (7). The 'PTP Mode' is set to 'Slave' (8). The 'Domain Number' is 127. The 'PTP Clock ID' is 001747FFFE7FFEC2-1. The 'Priority 1' is 128 and 'Priority 2' is 128. The 'Clock Class' is 150. The 'Multicast TTL' is 1. The 'DiffServ Code Point' is 0. The 'Lease Duration' is 300. A red box highlights the 'Unicast Profile Only' warning.

6. Select a profile from the PTP Profile drop-down list (6).

Most parameters are changed automatically based on the selected profile, so if you don't have any specific settings for the profile you chose, just use default values for the profile (7).

NOTE – If you are using Unicast profile, you have to set the Grantor Address field to **Unicast Profile Only**. This is the Master GM IP address. If you are using Multicast profile, you don't need to set the Grantor Address.

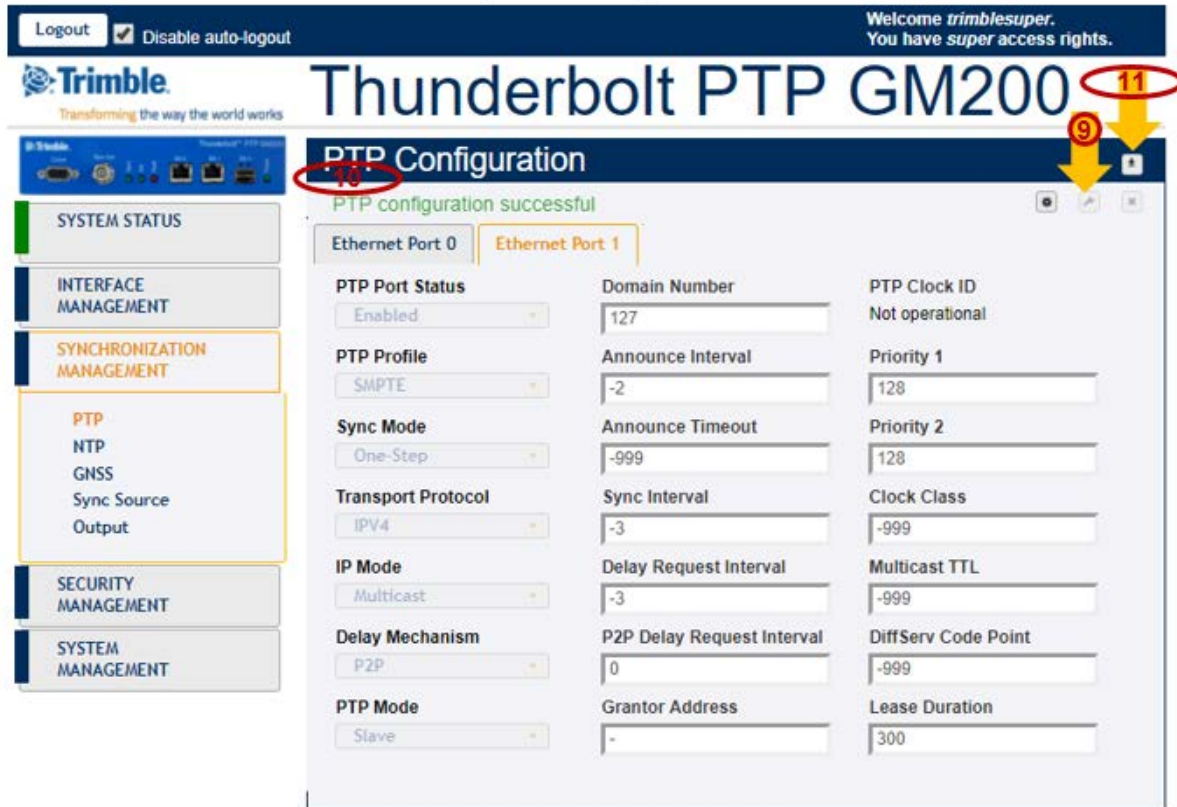
7. From the PTP Mode list, select **Slave** (8).

NOTE – Configure the PTP slave port first and enable it (it is still disabled at this point).

Then, go to the PTP master port and enable it. Now both Master and Slave ports are enabled at once.

8. Click Set  to apply the settings ⑨.

A confirmation message PTP configuration successful appears ⑩.



Logout Disable auto-logout

Welcome *trimblesuper*.
You have *super* access rights.

Trimble
Transforming the way the world works

Thunderbolt PTP GM200

PTP Configuration

PTP configuration successful

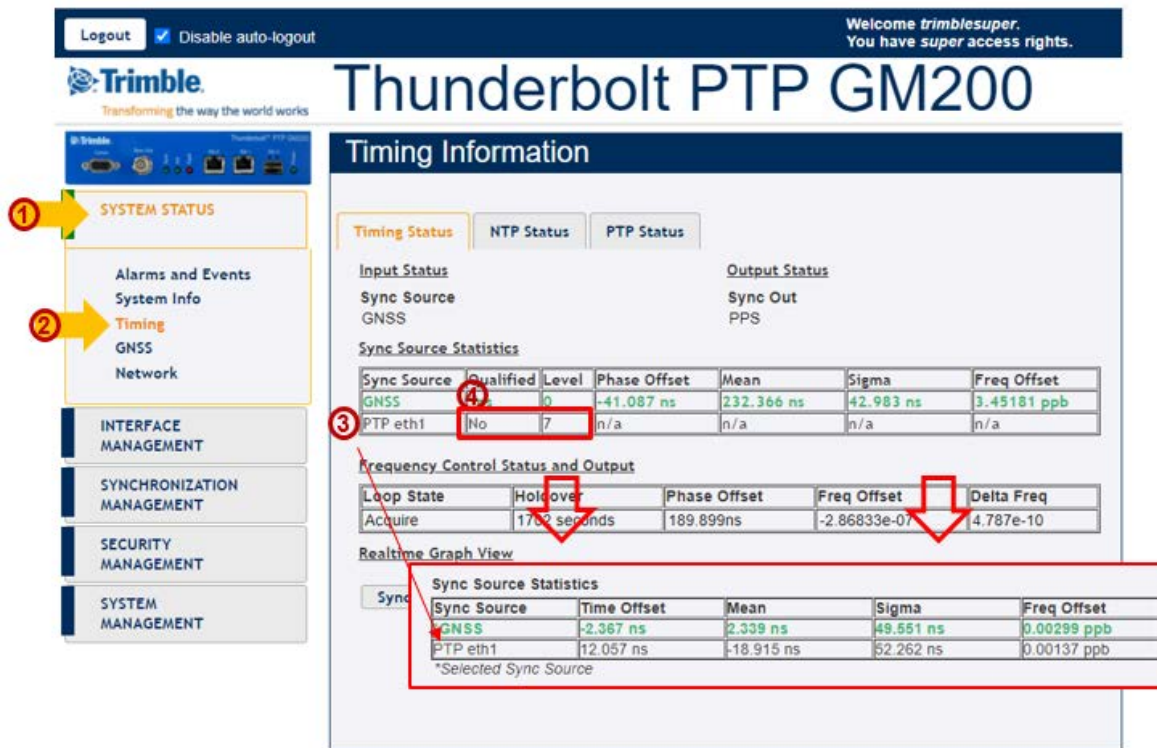
Ethernet Port 0 | Ethernet Port 1

PTP Port Status	Domain Number	PTP Clock ID
Enabled	127	Not operational
PTP Profile	Announce Interval	Priority 1
SMPTE	-2	128
Sync Mode	Announce Timeout	Priority 2
One-Step	-999	128
Transport Protocol	Sync Interval	Clock Class
IPV4	-3	-999
IP Mode	Delay Request Interval	Multicast TTL
Multicast	-3	-999
Delay Mechanism	P2P Delay Request Interval	DiffServ Code Point
P2P	0	-999
PTP Mode	Grantor Address	Lease Duration
Slave	-	300

9. Click the Save System Configuration icon to save the current settings ⑪.

8.4.4 APTS PTP PTP Slave configuration - Timing

After completing the PTP slave configuration, you can confirm the status of the GM200.



1. Select **SYSTEM STATUS** ① and then **Timing** ②.

After about 5 minutes, you will see time offset values as in the example above on PTP eth1 ③.

Note that the GNSS Sync Source line is colored in green.

2. Check the **Qualified** and **Level** values.

To start the APTS slave mode operation, it should be **Yes** and **1** ④. If you see "Yes" and "1", the GM200 is ready to operate the APTS Slave mode.

Alternatively, you can remove the GNSS antenna for an APTS test case.

8.4.5 APTS PTP PTP slave configuration - removing GNSS reference

If you remove the GNSS reference:

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Trimble
Transforming the way the world works

Thunderbolt PTP GM200

1 → SYSTEM STATUS

- Alarms and Events
- System Info

2 → Timing

- GNSS
- Network

INTERFACE MANAGEMENT

SYNCHRONIZATION MANAGEMENT

SECURITY MANAGEMENT

SYSTEM MANAGEMENT

Timing Information

3 Timing Status | NTP Status | PTP Status

3 Input Status Output Status

Sync Source: PTP eth1 Sync Out: PPS

Sync Source Statistics

Sync Source	Phase Offset	Mean	Sigma	Freq Offset
PTP eth1	11.362 ns	-12.228 ns	8.041 ns	0.00084 ppb

Control Loop Status

4 Loop State: Lock

Loop State	Holdover	Phase Offset	Freq Offset	Delta Freq
Lock	15 seconds	-6.869ns	-3.50033e-07	2.497e-12

Realtime Graph View

Sync Source: Sync Source | Graph Type: Graph Type | Close Graph

1. Select SYSTEM STATUS **1** and then Timing **2**.

You will see that the Sync Source has been changed from GNSS to PTP eth1 **3**.

Also you will see the PTP Eth1 (or Eth0) shown in green color (it is a time reference source now).

2. Check that the Loop State field status is Lock **4**.

Now the GM200 is locked to external PTP input.

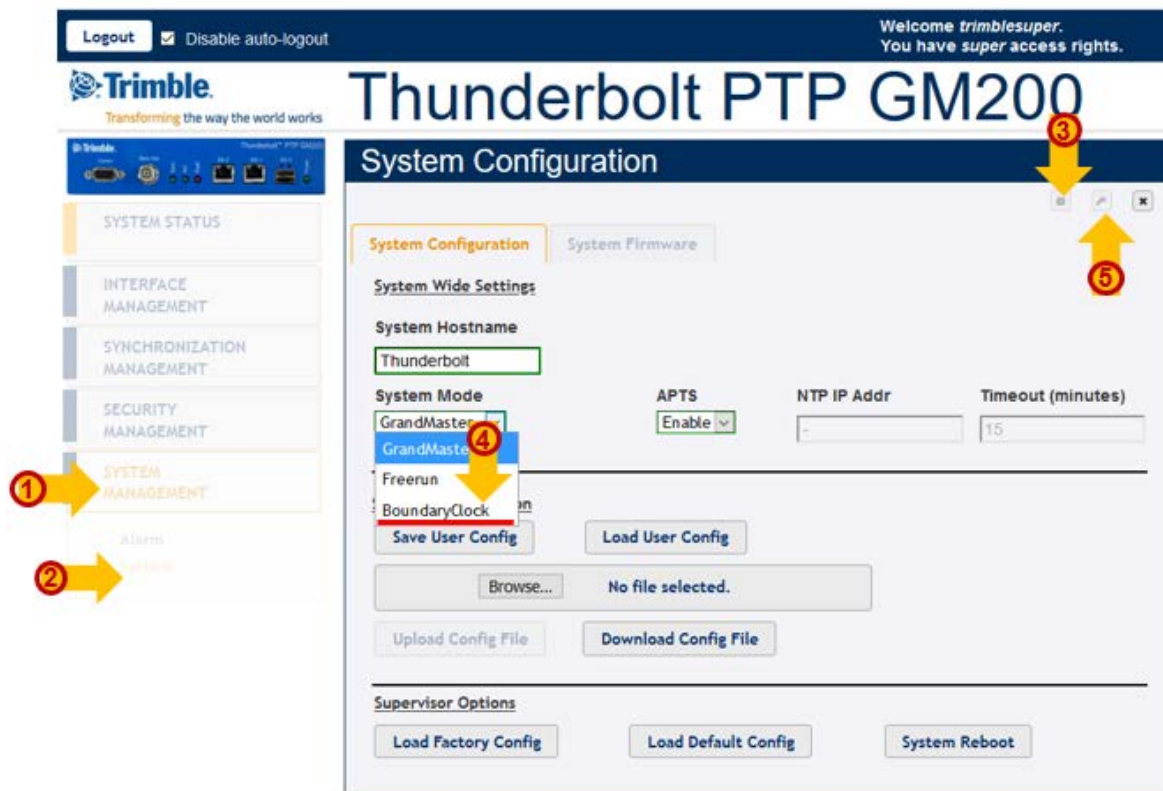
3. If you want to see Real-time Graph View for phase offset of incoming PTP reference:
 - a. Click Realtime Graph View to expand the information. The following screen appears:





- b. Click PTP eth1 ⑤.
- c. Click Phase Offset ⑥.

You will see a real time graph for a selected reference source.

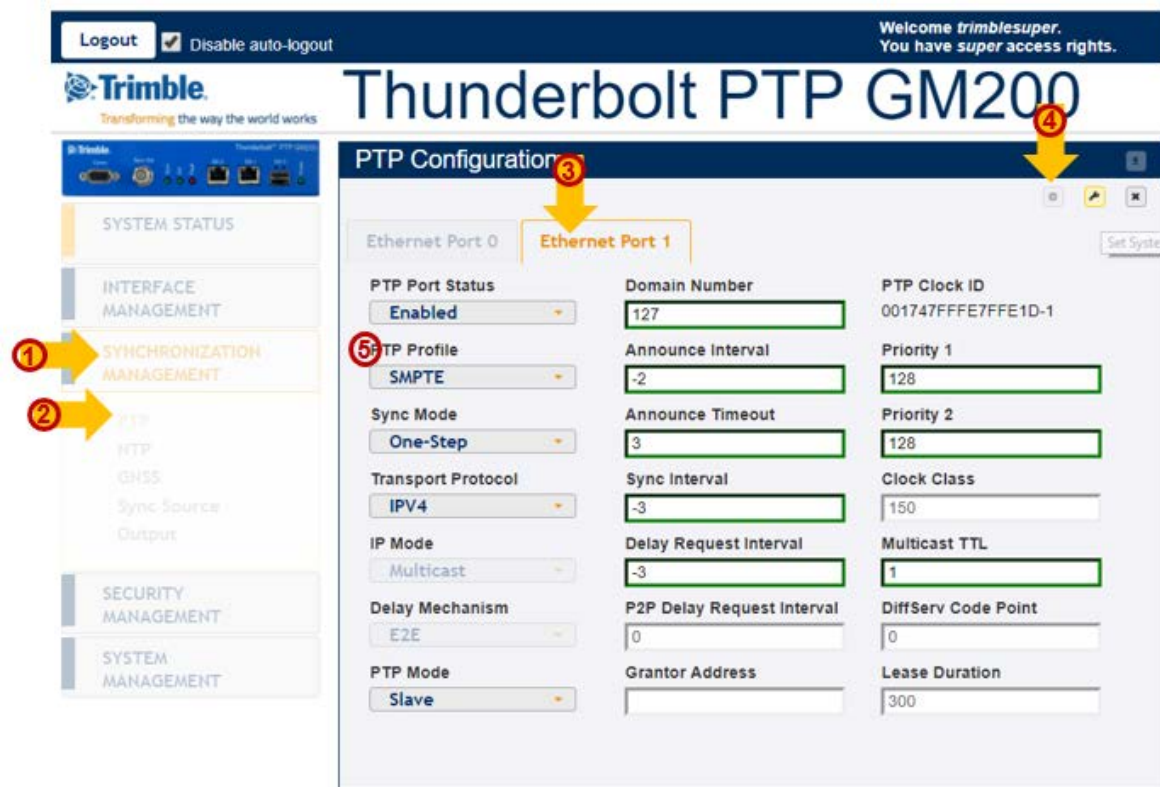
8.4.6 BC PTP Slave configuration - 1




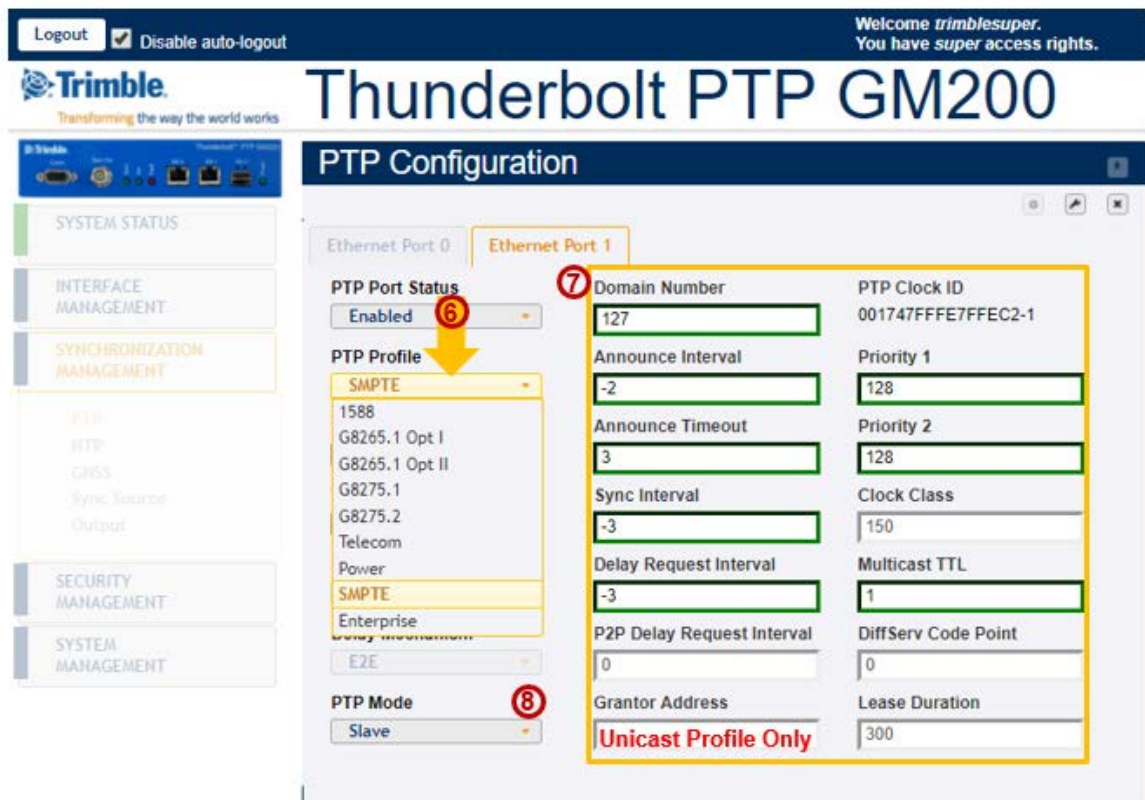
1. Select SYSTEM MANAGEMENT **1** and then System **2**.
2. Click Configure  **3**.
3. From the System Mode drop-down list, select BoundaryClock **4**.
4. Click Set  to apply the settings **5**.

8.4.7 BC PTP PTP slave configuration - 2

After configuring the System Mode:



1. Select SYNCHRONIZATION MANAGEMENT ❶ and then PTP ❷.
2. Select Ethernet Port 1 tab ❸ or Ethernet Port 0 if using ETH0.
3. Click Configure  ❹. The parameters are activated.
4. From the PTP Profile drop-down list, select a PTP profile ❺.
5. When all parameters are activated, the following screen appears:



6. Select a profile from the **PTP Profile** drop-down list **6**.

Most parameters are changed automatically based on the selected profile, so if you don't have any specific settings for the profile you chose, just use default values for the profile **7**.

NOTE – If you are using Unicast profile, you have to set the **Grantor Address** field to **Unicast Profile Only**. This is the Master GM IP address. If you are using Multicast profile, you don't need to set the **Grantor Address**.

7. From the **PTP Mode** list, select **Slave** **8**.

NOTE – Configure the PTP slave port first and enable it (it is still disabled at this point).

Then, go to the PTP master port and enable it. Now both Master and Slave ports are enabled at once.

8. Click **Set**  to apply the settings **9**.

A confirmation message **PTP configuration successful** appears **10**.

Logout Disable auto-logout Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

PTP Configuration

PTP configuration successful

Ethernet Port 0 | **Ethernet Port 1**

PTP Port Status Enabled	Domain Number 127	PTP Clock ID Not operational
PTP Profile SNTPTE	Announce Interval -2	Priority 1 128
Sync Mode One-Step	Announce Timeout -999	Priority 2 128
Transport Protocol IPV4	Sync Interval -3	Clock Class -999
IP Mode Multicast	Delay Request Interval -3	Multicast TTL -999
Delay Mechanism P2P	P2P Delay Request Interval 0	DiffServ Code Point -999
PTP Mode Slave	Grantor Address -	Lease Duration 300

9. Click the Save System Configuration icon to save the current settings 11.

8.4.8 BC PTP PTP Slave configuration - Timing

After completing the PTP slave configuration, you can confirm the status of the GM200.

The screenshot shows the Thunderbolt PTP GM200 web interface. The sidebar on the left has a 'SYSTEM STATUS' menu item highlighted with a red circle and arrow (1). Below it, the 'Timing' option is also highlighted with a red circle and arrow (2). The main content area has a 'Timing Information' header. Underneath, there are two tabs: 'Timing Status' (selected) and 'PTP Status'. The 'Timing Status' tab displays the following information:

Input Status: Sync Source: PTP eth1

Output Status: Sync Out: PPS

Sync Source Statistics: A table with columns: Sync Source, Qualified, Level, Phase Offset, Mean, Sigma, and Freq Offset. The row for 'PTP eth1' has values: Yes, 0, 127.197 ns, 3.259 ns, 53.359 ns, and -0.26393 ppb. A red box highlights the 'Qualified' and 'Level' columns, and a red circle highlights the 'Mean' column (3).

Frequency Control Status and Output: A table with columns: Loop State, Holdover, Phase Offset, Freq Offset, and Delta Freq. The row for 'Lock' has values: 89 seconds, -20.805ns, -2.70579e-07, and -5.794e-10. A red circle highlights the 'Lock' value in the 'Loop State' column (5).

At the bottom, there is a 'Realtime Graph View' section with a 'Sync Source' dropdown menu, a 'Graph Type' dropdown menu, and a 'Close Graph' button.

1. Select **SYSTEM STATUS** ① and then **Timing** ②.

After about 5 minutes, you will see time offset values as in the example above on PTP eth1 ③.

2. Check the **Sync Source Statistics** values ④, for the external PTP reference:

Sync Source = PTP eth1

Qualified = Yes

Level = 0

3. Check that the **Loop State** field status is **Lock** ⑤.

Now the GM200 is locked to external PTP input.

4. If you want to see Real-time Graph View for phase offset of incoming PTP reference:
 - a. Click Realtime Graph View to expand the information. The following screen appears:



- b. Click PTP eth1 ⑥.
- c. Click Phase Offset ⑦.

You will see a real time graph for a selected reference source.

8.4.9 PTP protocol configuration (slave mode)

1. Open the web page using http or https.
2. Login with proper credentials (admin or super user).
3. Select **SYNCHRONIZATION MANAGEMENT / PTP** and then the Ethernet port tab that will be used as PTP Input.

NOTE – To configure to the slave mode, the GM200 should be first configured **APTS enable** or **BC mode** in the **System management -> System**.

For the APTS slave mode, the GNSS antenna has to be connected, to qualify the PTP input based on the GNSS reference.

The screenshot shows the web interface for the Thunderbolt PTP GM200. The top navigation bar includes a 'Logout' button, a 'Disable auto-logout' checkbox, and a welcome message: 'Welcome *trimblesuper*. You have *super* access rights.' The main header displays the 'Thunderbolt PTP GM200' logo and the 'PTP Configuration' title. The interface is divided into a left sidebar with navigation options (SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT, PTP, NTP, GNSS, Sync Source, Output, SECURITY MANAGEMENT, SYSTEM MANAGEMENT) and a main content area. The main content area is titled 'PTP Configuration' and has two tabs: 'Ethernet Port 0' and 'Ethernet Port 1'. The 'Ethernet Port 1' tab is active, showing a grid of configuration fields:

PTP Port Status Enabled	Domain Number 24	PTP Clock ID 001747FFFE7FFEB3-1
PTP Profile G8275.1	Announce Interval -3	Priority 1 128
Sync Mode One-Step	Announce Timeout 3	Priority 2 255
Transport Protocol 802.3	Sync Interval -4	Clock Class 255
IP Mode Multicast	Delay Request Interval -4	Multicast TTL 1
Delay Mechanism E2E	P2P Delay Request Interval 0	DiffServ Code Point 0
PTP Mode Slave	Grantor Address -	Lease Duration 300

4. Configure the **PTP Profile**, the **PTP Mode** as **Slave**, the Grantor address (es) and the possible changes on Sync and Delay Request Intervals.

5. To save changes, click **Configure** .

6. Click **Save System Configuration**  to apply the changes.

NOTES –

1. When you configure the APTS or BC mode, the PTP slave port should be configured first and then configure the PTP master port.
2. You must reboot the system after the PTP slave mode is enabled.

8.4.10 View PTP configuration

1. Open the web page using http or https.
2. Login with proper credentials (admin or super user).
3. Select SYNCHRONIZATION MANAGEMENT and then PTP.

The screenshot displays the web interface for the Thunderbolt PTP GM200. At the top, there is a navigation bar with a 'Logout' button and a 'Disable auto-logout' checkbox. A welcome message reads: 'Welcome trimblesuper. You have super access rights.' The main header features the Trimble logo and the text 'Transforming the way the world works' next to the device name 'Thunderbolt PTP GM200'.

The left sidebar contains a menu with the following items: SYSTEM STATUS, INTERFACE MANAGEMENT, SYNCHRONIZATION MANAGEMENT (highlighted in orange), PTP (with sub-items: NTP, GNSS, Sync Source, Output), SECURITY MANAGEMENT, and SYSTEM MANAGEMENT.

The main content area is titled 'PTP Configuration' and shows settings for 'Ethernet Port 1'. The configuration is organized into three columns:

Parameter	Value	Parameter	Value
PTP Port Status	Enabled	Domain Number	24
PTP Profile	G8275.1	Announce Interval	-3
Sync Mode	One-Step	Announce Timeout	3
Transport Protocol	802.3	Sync Interval	-4
IP Mode	Multicast	Delay Request Interval	-4
Delay Mechanism	E2E	P2P Delay Request Interval	0
PTP Mode	Slave	Grantor Address	-
		PTP Clock ID	001747FFFE7FFEB3-1
		Priority 1	128
		Priority 2	255
		Clock Class	255
		Multicast TTL	-999
		DiffServ Code Point	-999
		Lease Duration	-999

8.4.11 View the list of Sync Sources

1. Open the web page using http or https.
2. Login with proper credentials (admin or super user).

3. Select SYSTEM STATUS and then Timing.

Logout Disable auto-logout
Welcome *trimblesuper*.
You have *super* access rights.

Thunderbolt PTP GM200

SYSTEM STATUS

Alarms and Events

System Info

Timing

GNSS

Network

Timing Information

Timing Status

NTP Status

PTP Status

Input Status

Sync Source
GNSS

Output Status

Sync Out
PPS

Sync Source Statistics

Sync Source	Phase Offset	Mean	Sigma	Freq Offset
GNSS	9.601 ns	0.512 ns	4.086 ns	-0.00020 ppb
SyncE eth0	N/A	N/A	N/A	N/A
PTP eth1	N/A	N/A	N/A	N/A

Control Loop Status

Loop State	Holdover	Phase Offset	Freq Offset	Delta Freq
Lock	1 seconds	8.025ns	-3.05962e-07	9.364e-12

Realtime Graph View

Sync Source ▾

Graph Type ▾

Close Graph

8.5 Configuring PTP input examples

Below are examples of PTP input configuration steps.

8.5.1 Example of APTS slave mode configuration

In APTS slave operation eth0 will be used as PTP Input and eth1 will be used as PTP Grandmaster. There will be two grantors used (two grandmasters already used in Aggregation or Core network that will serve as reference of GM200), with IP addresses 10.173.230.225 and 10.75.134.224. It will be used IEEE-1588 Telecom Profile v2 (unicast). The sequence of commands is:

```
set system aptos enable

set ptp eth0 disable

set ptp eth0 profile telecom mode slave grantor
10.173.230.225, 10.75.134.224

set ptp eth0 enable

get ptp eth0

view input
```

8.5.2 Example of BC Slave mode configuration

In the BC slave operation eth1 will be used as PTP Input and eth0 will be used as PTP master. There will be one grantors used (one grandmaster already used in Aggregation or Core network that will serve as reference of GM200) with IP addresses 10.73.130.251. It will use the G.8275.2 profile. The sequence of commands is:

```
set system opermode bc

set ptp eth1 profile g8275.2 mode slave grantor
10.73.130.251

set ptp eth1 enable

get ptp eth1

view input
```

9. VLANs

Trimble GNSS receivers are used to deliver timing references accurate to ± 15 ns. This provides timing-critical applications with the world's most precise and stable source of timing information.

However, when GNSS tracking is unavailable there must be a backup reference besides holdover. PTP Input is the answer to this call, and GNSS is complemented by network-based timing distribution to maintain the time base during GNSS reference failure.

- ▶ [VLANs overview](#)
- ▶ [Configuring VLAN support with CLI commands](#)
- ▶ [Configuring VLAN with Web interface](#)
- ▶ [Configuring one VLAN ID](#)
- ▶ [Adding another VLAN ID](#)
- ▶ [Removing all VLAN IDs](#)
- ▶ [Port Bonding configuration with NTP](#)

9.1 VLANs overview

Thunderbolt PTP Grandmaster Clock GM200 supports up to 4 VLANs on each port, in total 8 VLANs.

Each VLAN must have its own address and subnet.

There is no default VLAN configuration. The VLANs can be configured with a default gateway.

All VLANs configuration can be deleted with a CLI command:

```
set network eth0/1 vlan -1
```

9.2 Configuring VLAN support with CLI commands

Add up to 4 different VLAN IDs for each Ethernet port:

```
set network eth0/1 vlan ID1, ID2, ...
```

Configure IP address, subnet mask and gateway address for each VLAN ID:

```
set network eth0/1.ID addr <x.x.x.x> mask <y.y.y.y>  
gateway <z.z.z.z>
```

Disable VLAN on the Ethernet port selected. Use the special ID of '-1':

```
set network eth0/1 vlan -1
```

Show Ethernet port configuration including VLAN configuration on the Ethernet port selected.

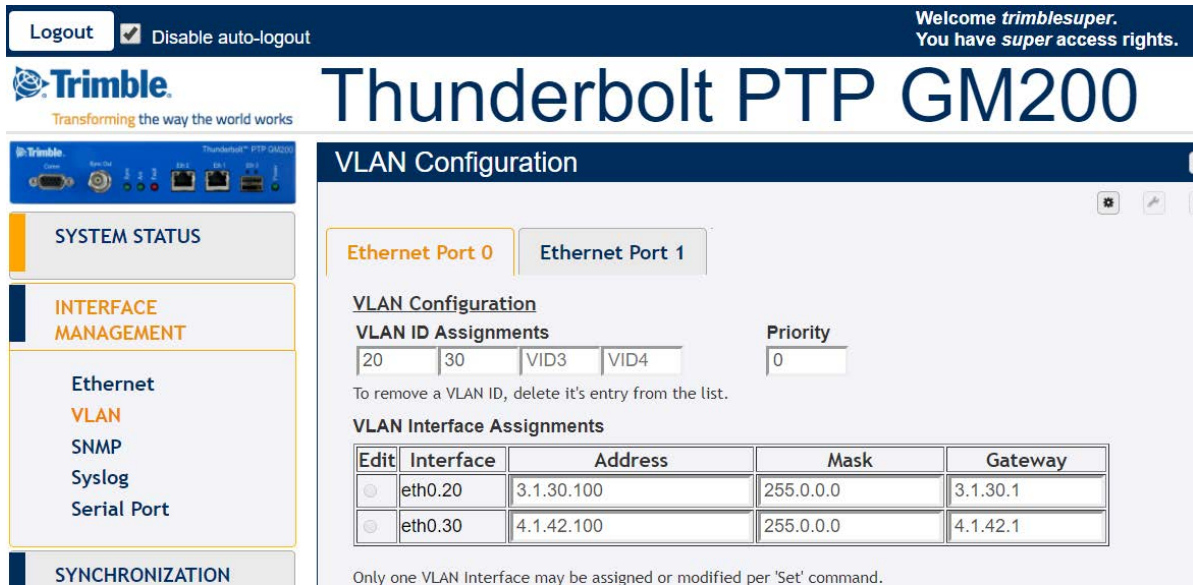
```
get network eth0/1
```

NOTE – When changes are applied to any Ethernet port, it takes up to 30 seconds to see changes in Ethernet port configuration.

9.3 Configuring VLAN with Web interface

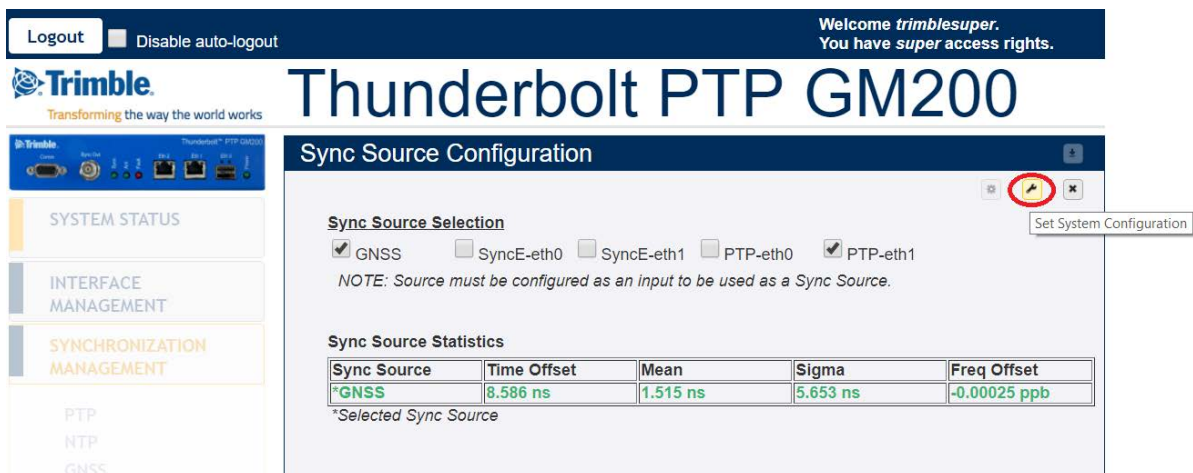
Ethernet port needs to be configured as input in order to be used as PTP input.

1. Connect to GM200 using http or https.
2. Login with the correct username and privileges like admin or supervisor access level.
3. Select INTERFACE MANAGEMENT and then VLAN.



4. To make changes, click **Configure** .

5. Click **Set**  to apply the changes.



NOTE – VLAN IDs 1 and 2 are reserved, you cannot use them.

You must add the **VLAN ID**, **Priority** (0 is the highest priority), the **IP address** and **subnet mask**.

9.4 Configuring one VLAN ID

In order to provide configuration steps, see the following examples.

Example 1:

Use the following procedure to configure a VLAN on the eth0 port, an ID 452, IPv4 address of 21.153.200.230, a netmask of 255.255.255.248, and a gateway of 21.153.200.225:

1. Login with username with admin or super level.
2. Disable NTP and PTP services in order to configure any VLAN ID:

```
set ptp eth0 disable
set ntp eth0 disable
```

3. Type the following command and then press **Enter**:

```
set network eth0 vlan 452
```

4. Type the following command and then press **Enter**:

```
set network eth0.452 addr 21.153.200.230 mask 255.255.255.248
gateway 21.153.200.225
```

5. Type the following command and then press **Enter**:

```
get network eth0
```

The Console output shows:

```
>
>
> get network eth0
Current settings for eth0:
Status: Connected 1000MB
Mode: Static
Address: 192.168.0.250
Mask: 255.255.255.0
Broadcast: 192.168.0.255
Gateway: 192.168.0.1
IPv6 Addr: fe80::217:47ff:fe7f:fdad/64 Scope:Link
VLAN IDs: 452
syncE: Off

Current settings for eth0.452:
Status: Connected 1000MB
```

```

Mode: Static
Address: 21.153.200.230
Mask: 255.255.255.248
Broadcast: 21.153.200.231
Gateway: 21.153.200.225
IPv6 Addr: fe80::217:47ff:fe7f:fdad/64 Scope:Link
>
>
>

```

6. You can now enable again the NTP or PTP service:

```

set ptp eth0 enable
set ntp eth0 enable

```

NOTE – VLAN IDs 1 and 2 are reserved, you cannot use them.

9.5 Adding another VLAN ID

In order to provide configuration steps, see the following example.

Example 2:

Use the following procedure to add a VLAN ID 444 on Ethernet eth1 port. This port has already a VLAN ID:

```

VLAN ID 333
IP address 21.134.199.220
Subnet mask 255.255.255.248
Gateway 21.134.199.215

```

The new VLAN information will be:

```

VLAN ID 444
IP address 11.34.99.20
Subnet mask 255.255.255.248
Gateway 11.34.99.15

```

1. Login with username with admin or super level.
2. Disable NTP and PTP services in order to configure any VLAN ID:

```

set ptp eth1 disable
set ntp eth1 disable

```

3. Type the following command and then press **Enter**:

```

get network eth1

```

The Console output shows:

```
>
> get network eth1

Current settings for eth1:
Status: Connected 1000MB
Mode: Static
Address: 4.4.4.4
Mask: 255.255.255.0
Broadcast: 4.4.4.255
Gateway:
IPv6 Addr: fe80::217:47ff:fe7f:fdde/64 Scope:Link
VLAN IDs: 333
syncE: Off

Current settings for eth1.333:
Status: Connected 1000MB
Mode: Static
Address: 21.134.199.220
Mask: 255.255.255.248
Broadcast: 21.134.199.223
Gateway: 21.134.199.215
IPv6 Addr: fe80::217:47ff:fe7f:fdde/64 Scope:Link

>
>
>
```

4. Type the following command and then press **Enter**:

```
set network eth1 vlan 333,444
```

5. Type the following command and then press **Enter**:

```
get network eth1
```

The Console output shows:

```
>
> get network eth1
Current settings for eth1:
Status: Connected 1000MB
Mode: Static
Address: 4.4.4.4
Mask: 255.255.255.0
Broadcast: 4.4.4.255
Gateway:
IPv6 Addr: fe80::217:47ff:fe7f:fdde/64 Scope:Link
```

```
VLAN IDs: 333, 444
```

```
syncE: Off
```

```
Current settings for eth1.333:
```

```
Status: Connected 1000MB
```

```
Mode: Static
```

```
Address: 21.134.199.220
```

```
Mask: 255.255.255.248
```

```
Broadcast: 21.134.199.223
```

```
Gateway: 21.134.199.215
```

```
IPv6 Addr: fe80::217:47ff:fe7f:fdae/64 Scope:Link
```

```
Current settings for eth1.444:
```

```
Status: Connected 1000MB
```

```
Mode: Static
```

```
Address: 21.134.199.220
```

```
Mask: 255.255.255.248
```

```
Broadcast: 21.134.199.223
```

```
Gateway: 21.134.199.215
```

```
IPv6 Addr: fe80::217:47ff:fe7f:fdae/64 Scope:Link
```

```
>
```

```
>
```

6. Type the following command and then press **Enter**:

```
set network eth1.444 addr 11.34.99.20 mask 255.255.255.248
gateway 11.34.99.15
```

7. Type the following command and then press **Enter**:

```
get network eth1
```

The Console output shows:

```
>
```

```
> get network eth1
```

```
Current settings for eth1:
```

```
Status: Connected 1000MB
```

```
Mode: Static
```

```
Address: 4.4.4.4
```

```
Mask: 255.255.255.0
```

```
Broadcast: 4.4.4.255
```

```
Gateway:
```

```
IPv6 Addr: fe80::217:47ff:fe7f:fdae/64 Scope:Link
```

```
VLAN IDs: 333, 444
```

```
syncE: Off
```

```
Current settings for eth1.333:
```

```
Status: Connected 1000MB
```

```

Mode: Static
Address: 21.134.199.220
Mask: 255.255.255.248
Broadcast: 21.134.199.223
Gateway: 21.134.199.215
IPv6 Addr: fe80::217:47ff:fe7f:fdae/64 Scope:Link

Current settings for eth1.444:
Status: Connected 1000MB
Mode: Static
Address: 11.34.99.20
Mask: 255.255.255.248
Broadcast: 11.34.99.23
Gateway: 11.34.99.15
IPv6 Addr: fe80::217:47ff:fe7f:fdae/64 Scope:Link
2017-07-12T07:38:17.731Z: Set alarm 20, 'Eth-Port0-
Down'
2017-07-12T07:38:18.744Z: Set alarm 21, 'Eth-Port1-
Down'
2017-07-12T07:38:25.265Z: Clear alarm 21, 'Eth-Port1-
Down'
>
>
>
>

```

8. You can now enable again the NTP or PTP service:

```

set ptp eth1 enable
set ntp eth1 enable

```

9.6 Removing all VLAN IDs

To disable all VLAN configuration on a specific Ethernet port, use the following command:

```

set network eth0/1 vlan -1

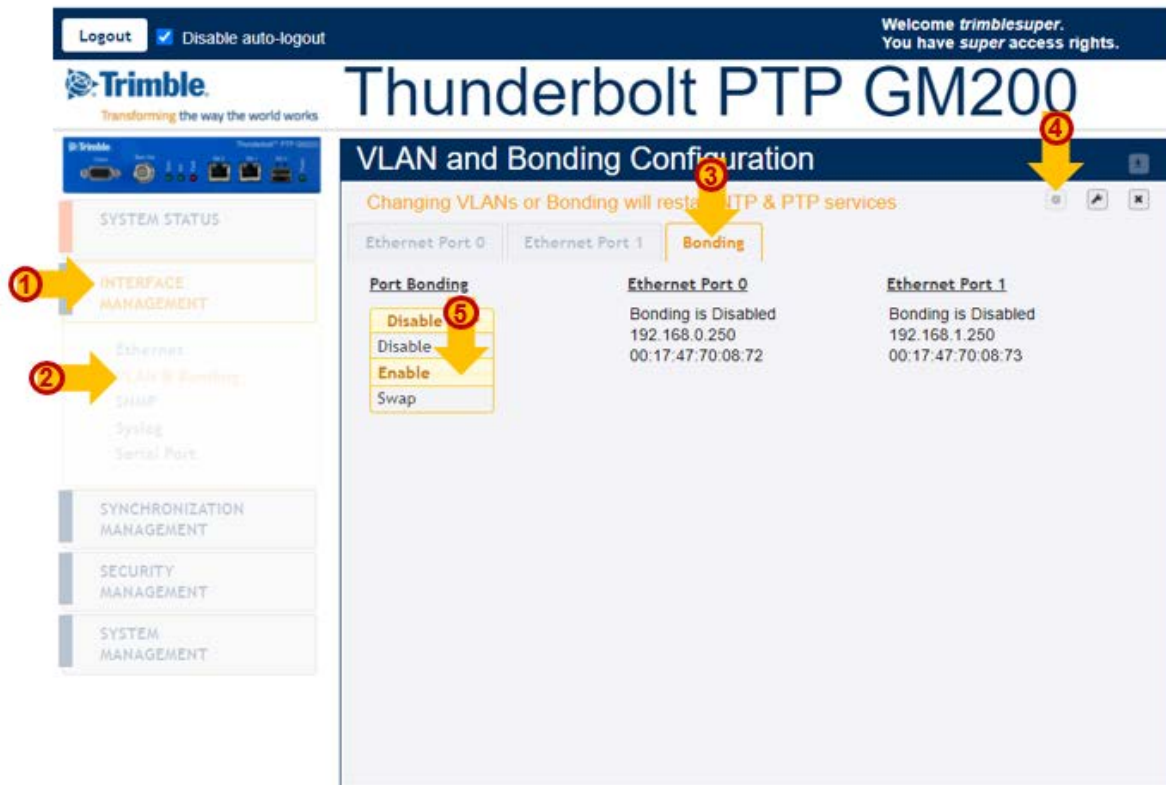
```



9.7 Port Bonding configuration with NTP

The main tasks to link the GM200 with NTP are:

1. Link On for both Eth0 and Eth1.
2. Configure the IP address to meet with the installed network.
3. Ping to an NTP Client and then confirm it works.
4. Enable NTP operation.
5. Enable Bonding function.
6. Ping to NTP Client and then confirm it works with the “Bonding” operation.
7. Check NTP clients, whether it synchronizes with TS200.
8. Remove or Swap the “Active” interface and then confirm that Clients are still synchronizing with TS200.

The basic operation of the port bonding in GM200 is to bond two Ethernet interfaces with the same IP address and Mac address, as one port is active and the other port is standby, so that two physical interfaces act as one logical interface.



1. Select INTERFACE MANAGEMENT ① and then VLAN & Bonding ②.
2. Click the Bonding tab ③.
3. Click Configure  ④.
4. In the Port Bonding drop-down list, select Enable ⑤.
5. Click Set  to apply the settings ⑥.

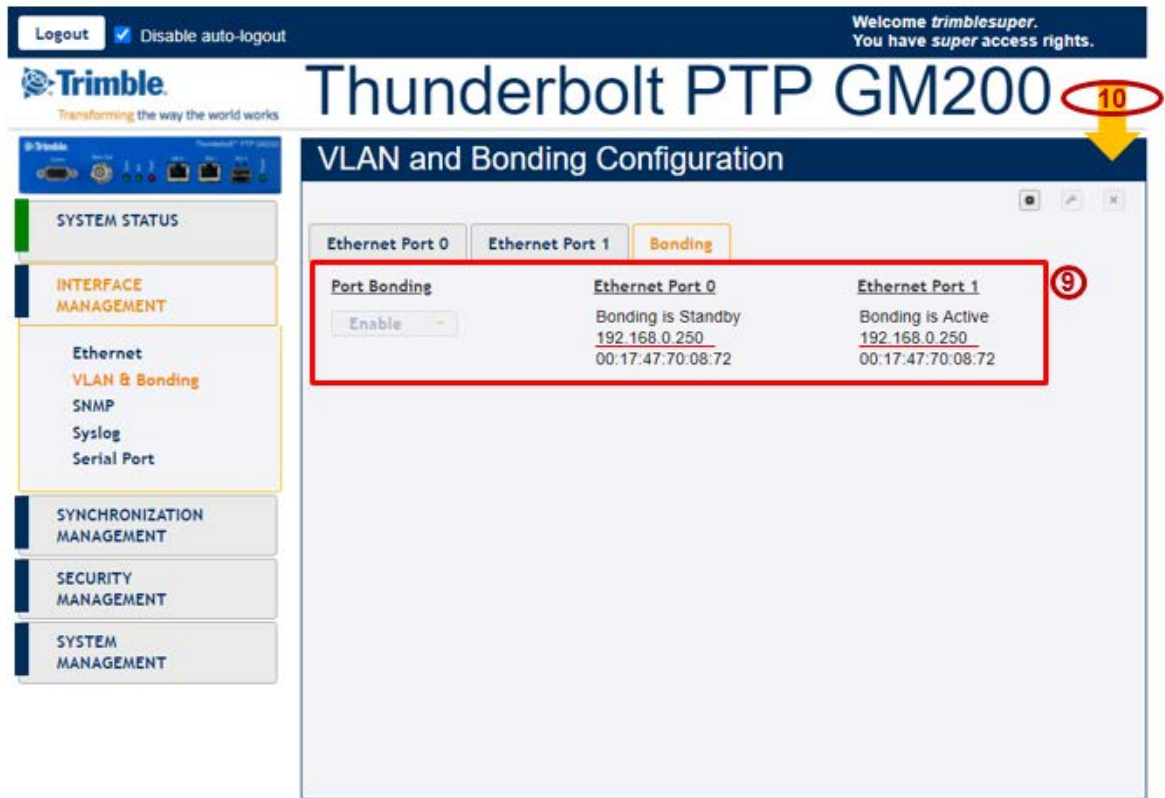
The GM200 shows a message with **Bonding configuration requires about 30 seconds to complete...** ⑦.

After 30 secs the **Bonding configuration was successful** message shows.

NOTE – During this 30 secs, the **Configure** and **Set** icons are deactivated so that you can not set any other configuration while applying the bonding.

NOTE – During the process of applying the bonding, the Eth0 and Eth1 still show 'Bonding is Disabled', with different IP address and Mac address ⑧.

6. Within 30 seconds of seeing the completion message, the screen shows the same IP address and Mac address with 'Bonding is Standby' in Eth0 and 'Bonding is Active' in Eth1 ⑨:



- Click **Save configuration** to store and restore your configuration after power on reset **10**.

Appendix A: Alarms

This appendix lists the available alarms in Thunderbolt PTP Grandmaster Clock.

Alarm	Alarm Desc	Level	Description	How to resolve
0	GNSS-Comm-E1	CRI	An internal GNSS communication alarm that indicates that the system is unable to process characters from the GNSS receiver as fast as it is being generated. This alarm should never be present and is used as a BIST (build-in self-test) indication of a hardware failure.	Call Trimble Technical Support
1	GNSS-Comm-E2	CRI	An internal GNSS communication alarm that indicates that the system is unable to process GNSS response data from the GNSS receiver as fast as it is being generated. This alarm should never be present and is used as a BIST (build-in self-test) indication of a hardware issue. This may be caused by excessive processing load on the system (denial of service attack).	Call Trimble Technical Support
2	GNSS-Comm-Loss	CRI	An indication that complete communication has been lost to the GNSS receiver. This may be due to a bad receiver, or a bad receiver firmware update was recently applied. If an update was recently applied, the system administrator can try loading the firmware again, or loading a previous firmware version. Note that this alarm may be set on startup as the GNSS receiver is restarting.	Call Trimble Technical Support

Alarm	Alarm Desc	Level	Description	How to resolve
3	GNSS-Ant-Shorted	MIN	An indication of an over-current event on the antenna feed. This is an indication that the unit may not be able to acquire satellites, as the antenna may be damaged. The condition should be remedied before continuing operation.	Disconnect the antenna cable from the unit and verify the alarm clears; the GNSS-Ant-Open alarm should become active. Replace antenna, verify the alarm is clear; if the alarm is still active replace the antenna cable.
4	GNSS-Ant-Open	MIN	An indication of an under-current event on the antenna feed. This may be 'normal' if the antenna input is from a splitter or another device that blocks DC power. In this condition the antenna must be externally powered. It is acceptable for the administrator to set the alarm level for this alarm to 'Ign' to clear this alarm condition.	Verify that the antenna and antenna cable are securely fastened. If they are, replace antenna.
5	GNSS-Track-No	MIN	An indication that the system is unable to track any satellites at this time. This may be a 'normal' condition in the event of poor satellite coverage. For this reason it is acceptable for this alarm to have a set and clear time associated with it to alleviate 'nuisance' type alarms.	This alarm is active whenever the system is powered-up or antenna is disconnected. Ensure the antenna is connected and the view of the sky is good.

Alarm	Alarm Desc	Level	Description	How to resolve
6	PTP-PPS-Loss	MIN	An indication that the system is unable to detect the 1PPS signal from the PTP input.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
7	GNSS-PPS-Loss	MIN	An indication that the system is not detecting the 1PPS signal from the GNSS system. This may be due to loss of GNSS signaling, or invalid GNSS data. The unit will enter into holdover in this condition.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
8	Time-Sync-Bad	MAJ	An indication that the phase relationship for the PTP vs the time/frequency control is out of specification. This occurs during startup, while the phase is being aligned to GNSS, but it can also be an indication of extreme environmental changes that are causing the system phase to move faster than the control loop is able to compensate. This condition should clear when the conditions settle.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
9	Freq-Range-Bad	CRI	Set when the frequency control reaches a limit of $20E-6$. Unless this is during a test condition, or the unit is tracking a simulator that is not locked to a valid frequency source, this is an indication of a failure of the frequency control and the unit requires service.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
10	N/A		There is no Alarm 10 within the system	

Alarm	Alarm Desc	Level	Description	How to resolve
11	GNSS-Time-Bad	MIN	Set when the GNSS system is indicating that the time has not been acquired from the satellites. This alarm will clear when the unit begins tracking valid satellite signals.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
12	Freq-Loop-Unlock	MIN	An indication that the frequency control loop has not yet established a locking condition. This is set during startup, while the control loop is settling, but may also be set during recover from holdover or in the event of severe environmental changes. This alarm will clear when the unit has achieved lock to the GNSS signal.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
13	Freq-Hold-Exceed	MAJ	Set when the unit is in the halt condition (no compensation during holdover), or the unit has been in a holdover condition for more than 24 hours.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
14	PPS-Sync-Bad	MAJ	Set when the PPS output (timing) from the system will not meet specification. This may occur during extreme environmental changes and should clear when the system becomes stable.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support

Alarm	Alarm Desc	Level	Description	How to resolve
15	Freq-Out-Bad	MAJ	Set when the frequency output from the unit is adversely affecting performance. This may occur during extreme environmental changes and should clear when the system becomes stable.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
16	PTP-System-Bad	CRI	Set when the PTP system is not operational. PTP is only started after the phase and frequency alarms, as well as the time sync alarm, have all been cleared.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
17	FPGA-Load-Bad	CRI	Set if the FPGA hardware image is too old for this firmware. The hardware should be updated with the <i>config firmware</i> command.	Call Trimble Technical Support
18	GNSS-Pos-Integrity	MIN	Set if the unit has not tracked enough satellites to allow for a validation of the position. This is cleared once the unit has validated the position. When the position is not known then the integrity of the timing solutions may be suspect.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support
19	UTC-Corr-Unk	MAJ	Set if the unit does not have the UTC corrections from the GNSS system. This is cleared once the UTC corrections have been acquired from the GNSS system. This is an issue because PTP requires the UTC correction be transmitted on most systems so that the sync to UTC may be established.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support

Alarm	Alarm Desc	Level	Description	How to resolve
20	Eth-Port0-Down	MAJ	Set when Ethernet Port 0 is not operational. Note that, if the user commands the port to be disabled, this alarm is cleared. The alarm is set only when it is a fault condition and disabling of the port is not considered a fault.	Check to make sure the ethernet cable is connected at both ends. If this port is not to be used, then Ethernet Port can be disabled to clear this alarm.
21	Eth-Port1-Down	MAJ	Set when Ethernet Port 1 is not operational. Note that, if the user commands the port to be disabled, this alarm is cleared. The alarm is set only when it is a fault condition and disabling of the port is not considered a fault.	Check to make sure the ethernet cable is connected at both ends. If this port is not to be used, then Ethernet Port can be disabled to clear this alarm.
22	Eth-Mgmt-Down	MAJ	Set when Ethernet Port 2 is not operational. Note that, if the user commands the port to be disabled, this alarm is cleared. The alarm is set only when it is a fault condition and disabling of the port is not considered a fault.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support

Alarm	Alarm Desc	Level	Description	How to resolve
23	Eth-Same-Subnet	CRI	<p>Set when any of the Ethernet ports are on the same subnet. This is problematic for PTP because PTP requires that the data is timestamped on the physical port which received the packet. Due to the routing and socket parsing within the network, if 2 ports have the same subnet, the data may actually be received on a different physical port. For PTP that would then mean that the timestamp was for a completely different path than what may be intended. Worse yet, if a timing port and the management port are on the same subnet then the PTP traffic may be received over the management port, which does not have the hardware timestamping capabilities. That makes all timestamps in the communication '0'.</p> <p>NOTE – The above is only an issue if you are using PTP as unicast on an IPv4 network. If you are multicast, or using IPv6 or 802.3 then this alarm can be safely ignored.</p>	Configure the ethernet ports to use different subnets.
24	SyncE0-Unsupported	CRI	Set when SyncE (either input or output) is enabled on eth1 and the SFP that is inserted does not support SyncE functions. If there is no SFP, or there are no SyncE functionality enabled for the port, this alarm is clear.	If SyncE support is required the SFP must be changed to a model that supports SyncE, otherwise the alarm may be set to IGN. Call Trimble Technical Support

Alarm	Alarm Desc	Level	Description	How to resolve
25	SyncE1-Unsupported	CRI	Set when SyncE (either input or output) is enabled on eth1 and the SFP that is inserted does not support SyncE functions. If there is no SFP, or there are no SyncE functionality enabled for the port, this alarm is clear.	If SyncE support is required the SFP must be changed to a model that supports SyncE, otherwise the alarm may be set to IGN. Call Trimble Technical Support
26	Time-Set-Bad	CRI	Indicates that the hardware time has never been set to agree with a valid phase source. This occurs only on startup and will clear as soon as the unit has a valid phase time to establish a valid time reference.	If the alarm persists for longer than 60 minutes, call Trimble Technical Support

NOTE – “Level” means default set level of alarm. It has several levels and you can choose one of options below.

- IGN : This alarm condition is ignored. No indication given.
- NFY : This alarm condition is a notification only.
- MIN : This is a minor alarm condition.
- MAJ : This is a major alarm condition.
- CRI : This is a critical alarm condition.