User Guide

Thunderbolt®

NTP Time Server

TS200

For use with: Thunderbolt® NTP Time Server TS200 (P/N 111224-50)
Firmware version 1.0.0.0

Version IND8 - March 2018
Part Number 106131-50

Trimble

Legal Notices

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Release Notice

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- a description of the nonconforming Product including the model number
- an explanation of the problem

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Notices

Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This 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.

Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications, ICES-003.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada, ICES-003.

Europe

This product has been tested and found to comply with the requirements for a Class B device pursuant to European Council Directive 89/336/EEC on EMC, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment.

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Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), Call +31 497 53 24 30, and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:

Trimble Europe BV
c/o Menlo Worldwide Logistics Meerheide 45
5521 DZ Eersel, NL

Declaration of Conformity

We, Trimble Inc.,

935 Stewart Drive
Sunnyvale, CA 94085-3913
United States of America
+1-408-481-8000

declare under sole responsibility that the product: Thunderbolt® NTP Time Server Clock complies with Part 15B of FCC Rules.

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
QZSS	Quasi-Zenith Satellite System
RF	Radio Frequency
TCXO	Temperature Controlled Crystal Oscillator
ToD	Time of Day
T-RAIM	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

An absence of specific alerts does not mean that there are no safety risks involved. Always follow the instructions that accompany a Warning or Caution. The information they provide is intended to minimize the risk of personal injury and/or damage to the equipment. In particular, observe safety instructions that are presented in the following formats:

WARNING – *A Warning alerts you to a likely risk of serious injury to your person and/or damage to the equipment.*

CAUTION – *A Caution alerts you to a possible risk of damage to the equipment and/or loss of data*.

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*

Operation and storage

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

WARNING – *The Thunderbolt® NTP Time Server Clock is only to be used in a restricted access location*

WARNING – *Short-circuit (overcurrent) protection device required. The Thunderbolt® NTP Time Server 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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Chapter 1: Product Overview

In this chapter:

The Thunderbolt® NTP Time Server Clock TS200 is a NTP Time Server. It provides very accurate NTP time reference.

The *Thunderbolt® NTP Time Server Clock TS200's User Guide* describes how to integrate and operate the Trimble® Thunderbolt® NTP Time Server Clock TS200.

For more information on GPS, go to http://www.trimble.com/gps/index.shtml.

1.1 Product Overview

Trimble's Thunderbolt® NTP Time Server Clock TS200 is a high quality NTP Time Server Clock with an integrated Trimble GNSS receiver with the best accurate and reliable technology. The Thunderbolt® TS200 is designed and optimized for low latency applications such as high frequency trading, providing the highest performance to meet the stringent time & phase requirements.

It provides NTP timing protocol. Thunderbolt® TS200 uses GNSS (Global Navigation Satellite Systems) signals from GPS, GLONASS, Galileo, and Beidou as the primary time source for synchronization.

Thunderbolt® TS200 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® NTP Time Server clocks.

Thunderbolt® TS200 comes in a rack-mountable enclosure; two Thunderbolt® TS200 units fit side- by-side in a 1RU height 19" rack.

1.2 Key Features

- Network Time Server (NTP v4)
- Multi-GNSS Receiver (GPS, GLONASS, Beidou and Galileo)
- 1 RJ45 Dedicated Management Port
- 1 RJ45 Port (NTP)
- 1 SFP interface (NTP)
- 1 BNC interface (PPS/10MHz outputs
- IPv4, IPv6 and VLAN
- 1 EIA-232 (RS-232) Serial Port
- Small foot print – ½ Rack 1U
- CLI / SNMP traps
- DC (default) and AC power options

1.3 Physical Specifications

The Thunderbolt® TS200 can be installed in a 19-inch rack mount unit. It can fit in ½ rack space, 2 Thunderbolt® TS200 units can be installed side-by-side in a full rack space for additional redundancy.

1.4 Performance

The system level performance is defined by the total number of packets per second. The total/maximum number of packets per second supported is 6,272.

Thunderbolt® NTP Time Server TS200 can support 2,500 NTP transactions per second.

1.5 Front Panel Elements

EIA-232 Serial Port

The EIA-232 (RS-232) serial port provides a craft interface to the Thunderbolt® NTP Time Server TS200 through an EIA-232 female connector.

Sync Out

The Thunderbolt® TS200 features a BNC female connector that provides 1PPS output. It can be configured for 10MHz, see the set output command.

Status LED

The Thunderbolt® NTP TS200 provides 4 LEDs on the front panel that indicate the following status:

- Power
- Antenna
- Sync
- Status/Alarm

Management Port (LAN)

The Thunderbolt® TS200 has one dedicated management Ethernet port. The RJ-45 port provides connectivity to Ethernet LAN for the configuration of the unit.

Ethernet Port

One RJ45 Ethernet port. Provides NTP connectivity to Ethernet Networks

SFP Port

One SFP port. Provides NTP connectivity to Ethernet Networks.

1.6 Back Panel Elements

GNSS Antenna Connection

The Thunderbolt® NTP Time Server TS200 features an SMA connector for the antenna input to the embedded GNSS receiver

Power Input

The standard input power is -48VDC. The Thunderbolt® TS200 provides a 5pole terminal block to connect dual DC power inputs.

Alarm Relay

The Thunderbolt® TS200 provides a 3.81mm 3pin terminal header for dry relay connection. Both Normally Open (NO) and Normally Closed (NC) connections are available to the user. Relay closure is considered **closed** in Critical alarm condition.

Grounding

The frame ground connection on Thunderbolt® TS200 is available through a M5 Grounding Terminal Stud.

1.7 Use and care

The Thunderbolt® TS200 is a high-precision electronic instrument and should be treated with reasonable care. Thunderbolt® TS200 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® TS200 enclosure anywhere. Don't use solvents, aggressive or abrasive cleaning agents anywhere on the Thunderbolt® TS200 device.

CAUTION – There are no user-serviceable parts inside the Thunderbolt® NTP Time Server Clock TS200 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.

CHAPTER

2

Chapter 2: Installation

In this chapter:

This chapter describes the procedure for installing the Thunderbolt® NTP Time Server Clock TS200.

2.1 Getting Started

This section explains how to install and configure the Thunderbolt TS200.

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

- Thunderbolt NTP Time Server Clock TS200
- Mounting brackets and installation accessories
- Dummy plate for single unit installation in 19” rack

2.2 Mounting the Device to a Rack

The Thunderbolt NTP TS200 should be installed indoor or outdoor in an environmental controlled cabinet. The Thunderbolt TS200 will install in an EIA standard 19-inch rack. The unit occupies ½ rack space and if required two TS200 units can be installed side-by-side.

NOTE – It is recommended that 1 rack-unit of space (1.75 in) be kept empty above the device. This allows a small amount of convectional airflow. Forced airflow is not required.

2.3 Connecting Power

The Thunderbolt TS200 supports single or dual redundant AC or DC power supplies. The Thunderbolt TS200 standard option is 48VDC. The Thunderbolt TS200 is capable of operating from -36Vdc to -72Vdc at a maximum current level of 250mA.

The DC input is reverse polarity protected. Reversing polarity with 48VDC 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.

Grounding the Device

The Thunderbolt TS200 M5 Terminal Stud on the back panel is used for grounding.

The Thunderbolt TS200 is suitable for connection to the Central Office and CPE. The Time Server Clock shall be located in a restricted access location where only crafts personnel are allowed access.

The Thunderbolt TS200 shall be grounded via a copper ground conductor. The unit shall be installed and connected to the common bonding network (CBN).

All bare grounding connection points to the Thunderbolt TS200 shall be cleaned and coated with an anti-oxidant solution before connections are made.

All surfaces on the Thunderbolt TS200 that are un-plated shall be brought to a bright finish and treated with and anti-oxidant solution before connection is made.

All non-conductive surfaces on the Thunderbolt TS200 shall be removed from all threads and connection points to ensure electrical continuity

The Thunderbolt TS200 DC power returns shall be treated as DC-I (Isolated from Frame Ground).

Thunderbolt TS200 requires a ring terminal with a 14-AWG wire that utilizes 15in-lbs to secure to primary ground.

Powering-Up

After verification of the input power source, switch on the power supply to the Thunderbolt TS200. 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 TS200 can receive GNSS signal without user intervention– the factory default is GPS and GLONASS. The user can enable Beidou in place of GLONASS or enable single constellation mode.

The Trimble family of Bullet antennas is best matched with Thunderbolt TS200. 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.

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 electro-magnetic 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 TS200

2.5 Communication Ports

The Thunderbolt TS200 has four communications ports on the front panel.

- 1 Serial Port (RS232)
- 1 Management Port Ethernet (eth2) 10/100/1000 Base-T (RJ-45)
- 1 NTP Time Server Port Ethernet (eth1) 10/100/1000 Base-T (RJ-45)
- 1 NTP Time Server Port SFP (Small Form-Factor Pluggable)

Either Serial port or Ethernet eth2 (RJ-45) is the dedicated management port to configure the Thunderbolt NTP Time Server TS200.

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 TS200.

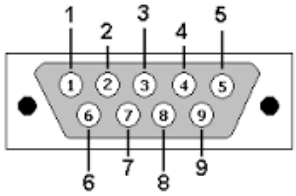


Figure 2.1: Serial Port pin assignments

Use a straight through cable with 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	Not Used
2	RxD	Data Transmit
3	TxD	Data Receive
4	DTR	Not Used
5	GND	Ground
6	DSR	Not Used
7	RTS	Not Used
8	CTS	Not Used
9	RI	Not Used

Management Ethernet Port

The Thunderbolt TS200 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

NTP Electrical Ethernet Port

The Thunderbolt NTP TS200 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.

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

NTP SFP Ethernet Port

The Thunderbolt NTP Time Server Clock TS200 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.

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

2.6 Status LED

Alarm and status information is presented through the use of four LEDs. All LEDs have corresponding dry contact relay outputs at the back side of the Thunderbolt® TS200 device.

LED	Color	Indication	Meaning
Power	Green	ON	System is powered on
		OFF	System does not have power
ANT	Green	ON	Reference acquired & tracking
		Blinking, 1/2Hz	Reference being acquired, or no computing
		OFF	No reference active or antenna
Sync	Green	ON	Locked
		Blinking, 1/2Hz	Acquisition or Holdover
		OFF	Free-run or startup
Status	Red	OFF	No active alarms
		ON	Critical Alarm
		Blink, 1Hz	Minor alarm condition
		Blink, 1/2Hz	Major alarm condition

CHAPTER

3

Chapter 3: GNSS Antenna

In this chapter:

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.

3.1 GNSS Antenna

The antenna receives the GNSS satellite signals and passes them to the receiver. The GNSS signals are spread spectrum signals in the 1551MHz to 1614MHz 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 -130dBm, at the surface of the earth. Trimble's active antenna includes a preamplifier that filters and amplifies the GNSS signals before delivery to the receiver.

The onboard 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 onboard Open/Short detection with integrated current limiter. The Thunderbolt TS200™ has a full antenna monitoring circuit on board.

Antenna requirements

The Thunderbolt TS200™ 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 frontend.

Task b) requires an amplification of at least 15dB, while 20dB is the sweet spot for the Thunderbolt TS200™. 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 30dB 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 15dB with a 30dB LNA. With a different antenna type, take the difference between 15dB and the antenna's LNA gain as the available compensation capability. Subtract the insertion losses of all connectors from the 15dB (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 35dB 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 20dB to 30dB with a minimum of 15dB and a maximum of 35dB.

3.2 Antenna Placement

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 placed south of the obstacles, preferably, in order not to block 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 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.

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.

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 uncountable many variations possible, so that it's not possible to standardize a test scenario.

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.

GNSS Antenna Cabling

Trimble recommends low loss coaxial cabling.

Using any length of coaxial cable will add some time delay to the GNSS 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 6.5ns/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 4.07ns/meter. The delay for a 25-meter cable will be 101.75ns (25 x 4.07 =101.75).

The outer shield on the GNSS cable shall 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 14AWG 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.

Lightning Considerations

Although, it is not possible to 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.

CHAPTER

4

Chapter 4: Command Line Interface Reference

In this chapter:

This chapter describes the CLI command conventions, prompts, features and command syntax used in Thunderbolt® NTP Time Server Clock TS200.

4.1 CLI Overview

The Command Line Interface (CLI), also called the ASCII command set, can be used to control the Thunderbolt® TS200 from a terminal connected to the RS-232 serial port, or the Ethernet port via Telnet/SSH access.

4.2 Command User Levels

The Thunderbolt® TS200 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.

The passwords of each default user is the same as the lower-case user login id, for user level "trimbleadmin" the password is "trimbleadmin".

4.3 Command Line Format

The command line format is as follows:

[action] command [parameter] [data] enter (↵) The type of

action to be taken with a command

- **Config** enables you to configure the device parameters
- **Get** allows you to retrieve specific information
- **Set** allows you to provision a specific parameter
- **View** enables you to 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® TS200
- **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 possible 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 Thunderbolt TS200 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.

4.4 CLI Command Set

This section provides an alphabetical listing and details of all CLI commands. This section describes the topic "**help commands**".

4.4.1 get alarm

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

Command Syntax:

get alarm [<n> [<n>] . . .]↵

- <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

4.4.2 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>	The alarm number, this can be viewed with the 'get alarm' command
<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 set. 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

4.4.3 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

4.4.4 view access

This command shows access level of current logged in user.

Command Syntax:

view access↵

Level: User, Admin and Supervisor

4.4.5.0 get auth

Return the current authentication settings. You can query specific settings with the options:

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

4.4.5.1 get auth local

Return the current settings for the local authentication parameters.

Syntax:

get auth local ↵

Level: Supervisor

4.4.5.2 get auth tacacs

Return the current TACACS+ authentication settings.

Syntax:

get auth tacacs ↵

Level: Supervisor

4.4.5.3 get auth radius

Return the current RADIUS authentication settings.

Syntax:

get auth radius ↵

Level: Supervisor

4.4.6.0 set auth

The *set auth* command allows to change the authentication settings.

Command Syntax:

set auth <options>↵

Where <options> are:

default	Set the authentication to the default settings
type [options]	Set the authentication type options. Please see '*help set auth type'* for additional information
radius [options]	Set the RADIUS authentication options. Please see *help set auth radius* for additional information.
Tacacs [options]	Set the TACACS+ authentication options. Please see *help set auth tacacs* for additional information.

NOTE – Authentication <options> cannot be combined on one line, all command variants must be presented separately.

Level: Supervisor

4.4.6.1 set auth radius

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

Command Syntax:

set auth radius (options)↵

Where the 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

4.4.6.2 set auth tacacs

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

Command Syntax:

set auth tacacs (options)↵

Where the 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 RADIUS server timeout value. 1-60 seconds

Level: Supervisor

4.4.6.3 set auth local

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

Command Syntax:

set auth type [local [<options>]↵

minlen <n>	establishes a measure of complexity related to the password length (more in a moment on this). Range: 2 < minlen < 30
lcredit <n>	sets the minimum number of required lowercase letters. Range: |lcredit| < 6
ucredit <n>	sets the minimum number of required uppercase letters Range: |ucredit| < 6
dcredit <n>	sets the minimum number of required digits Range: |dcredit| < 6
ocredit <n>	sets the minimum number of required other characters. These characters can be any printable character, except for space. Range: |ocredit| < 6
difok <yes|no>	sets 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> is: p0 : require a minimum of 6 characters, no other requirements (default) p1 : require at least 1 uppercase letter. The password must be at least 6 characters long. p2 : require at least 1 uppercase and 2 lowercase letters. The password must be at least 6 characters long. p3 : require at least 1 uppercase, 2 lowercase, and 1 number. The password must be at least 6 characters long. p4 : require at least 1 uppercase, 2 lowercase, 1 number and 1 'other' character. The password must be at least 6 characters long.

'minlen' is actually 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. So let's see 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.

Examples include:
set auth local minlen 12
set auth local pre p2 minlen 10

4.4.6.4 set auth type

The *set auth type* command allows changing of 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 *'set user'* commands. See *'help set auth local'* for additional options.
radius	Use RADIUS as the authentication type. The RADIUS configuration can be set with '*set auth radius'*.
tacacs+	Use TACACS+ as the authentication type. The TACACS+ configuration can be set with '*set auth tacacs[+]'.*
disable	Used 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 in that it will enable all of the above.

NOTE – Note that 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'.

Examples:

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

Level: Supervisor

4.4.7 get auto

Show the current status of the auto-logoff setting for this session. Default is to automatically log off this port after approximately 5 minutes of inactivity.

Command Syntax:

get auto↵

4.4.8 set auto

Control the auto-logoff 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

4.4.9.0 config

Use the *config* command to view, change and select Thunderbolt® TS200 configuration.
Command Syntax:

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

- **config list** output configuration as a list of 'set' commands
- **config load** load Thunderbolt® TS200 configuration previously dumped
- **config save** Reconfigure to the factory settings
- **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

4.4.9.1 config firmware

Use the *config firmware* command to maintain the firmware versions used by the Thunderbolt® TS200.

Command Syntax:

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

Additional help on each of the commands is available.

Level: Supervisor

4.4.9.2 config firmware list

Use the *config firmware* command to view the currently available firmware packages on the Thunderbolt® TS200.

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

4.4.9.3 config firmware stage

Use the *config firmware stage* command to put the firmware into system to allow updating (or rolling back) firmware versions.

Command Syntax:

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

Where:

tftp	to retrieve the firmware. Note that the Thunderbolt TS200 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' 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.

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

Examples include:

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

4.4.9.4 config firmware update

Use the *config firmware update* command to update the firmware on the Thunderbolt® TS200.

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.

Level: Supervisor

4.4.9.5 config firmware unstage

Use the *config firmware unstage* command to remove the firmware load from the Thunderbolt® TS200 for use by *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' to view the new firmware load IDs.

Level: Supervisor

4.4.9.6 config load

Use the *config load* command to reset Thunderbolt® TS200's configuration. This command expects a list of configuration settings as generated by "config list" command.

Command Syntax:

config load [user / factory] ↵

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 the all users are removed and the 'trimble' user restored

Examples include:

config load↵

config load user↵

Level: Admin and Supervisor

4.4.9.7 config list

Use the *config list* command to output Thunderbolt® TS200's configuration as a list of CLI commands.

Command Syntax:

config list ↵

You can make a backup of TS200'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.

NOTE 1 – For security reasons, the list command and subsequent upload cannot be used to restore user settings

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

Level: Admin and Supervisor

4.4.9.8 config save

Use the *config save* command to save the current settings of the Thunderbolt® TS200 to the user settings.

Command Syntax:

config save↵

Level: Admin and Supervisor

4.4.9.9 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 real 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

4.4.10 get comm

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

Command Syntax:

get comm ↵

Level: User, Admin and Supervisor

4.4.11 set comm

The *set comm* command configures the communication port settings.

Command Syntax:

set comm [default] [baud < baud>]↵

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

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.

Examples include:

set comm default ↵

set comm baud 19200 ↵

Level: Admin and Supervisor

4.4.12 get date

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

Command Syntax:

get date [full] ↵

If the option 'full', is given this returns both the date and time.

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

Level: User, Admin and Supervisor

4.4.13 get dlog

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

Command Syntax:

get dlog ↵

Level: User, Admin and Supervisor

4.4.14 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	Reserved, do not use.
stop	Stop the datalogger.

Level: User, Admin and Supervisor

4.4.15 download

The *download* command to download log files from the current system TS200.

Usage:

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.

4.4.16 get freq

The *get freq* command retrieves the current operating mode of the control system.

Command Syntax:

get freq ↵

Level: User, Admin and Supervisor

4.4.17 set freq

The *set freq* command sets 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

4.4.18 view freq

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

Command Syntax:

view freq <stream> ↵

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

Level: User, Admin and Supervisor

4.4.19 get gnss

This command displays the current settings for the GNSS receiver

Command Syntax:

get gnss ↵

Level: User, Admin and Supervisor

4.4.20 set gnss

This command allows change to 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 '|': 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.

<d> is in nanoseconds with a range of +/- 50000000 (50ms).

pos <p> — Set the receiver position or mode. Where <p> is of the format:
{<lat> <lon> <ht>} | auto | survey
Where:
<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:
cold - data transmitted by satellites 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

4.4.21 view gnss

The *view gnss* command displays the current GNSS receiver tracking information.

Command Syntax:

view gnss ↵

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

Examples include:
view gnss ↵
view gnss stream ↵

Level: User, Admin and Supervisor

4.4.22 help

The help command allows 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).

Examples include:
help intro
help commands
help set

4.4.23 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 number 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?

Examples include:
help howto 4

Level: User, Admin and Supervisor

4.4.24 get input

The *get input* command generates a list of the frequency control input candidates.

Command Syntax:

get input <input type>↵

Where:

<input type> is from the list:

GNSS Use the GNSS receiver as source for time/frequency

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

Examples include:

get input ↵

get input gnss ↵

Level: User, Admin and Supervisor

4.4.25 set input

The *set input* command allows setting of the frequency control reference input candidates. You can avoid the unit going into holdover due to the loss of an input as it will be able to select from other input candidates in the event of the loss of an input.

Command Syntax:

set input [<input type>] {enable/disable}↵

Where:

<input type> is from the list:

GNSS*	Use the GNSS receiver as source for time/frequency
enable	Enable the <input type>(s) as valid inputs. If no <input type> is given then the entries marked with '*' above are enabled
disable	Disable the <input type>(s) as usable inputs. If no <input type> is given then all inputs are disabled

The order of preference of the input selection is:

GNSS

Examples include:

set input GNSS enable ↵

set input enable ↵

The last example would enable all '*' inputs as valid candidates.

Level: Admin and Supervisor

4.4.26 view input

The *view input* command displays the statistics on the current input sources for frequency control.

Command Syntax:

view input [<ref type> [stream]] ↵

Options:

<ref type> can be one of:

[GNSS]

stream view continuous output from system. Only valid with a <ref type> selection. You can terminate the stream with: ctrl-C, 'q', 'Q', 'x' or 'X.

If no <ref type> is passed then statistics for all currently enabled input sources is returned

Examples include:

view input ↵

view input gnss ↵

Level: User, Admin and Supervisor

4.4.27 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] ↵

Options:

<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

<level> can be 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.

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.

Examples include:

view logs -n 10 gnss head ↵

view logs all↵

view logs clear↵

Level: Admin and Supervisor

4.4.28 get network

This 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

4.4.29 set network

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

Command Syntax:

set network [<iface>] [default] | [disable] | [<ip>] [<vlan>] ↵

NOTE – The default must be used by itself and restores 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 commanding '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.
<ip>	IP configuration information for this port. This has the following format: [dhcp | dhcp6 | slaac] [addr <i>][mask <m>][gateway <g>][bcast <bm>] [addr6 <i6>]

Where:

dhcp	Sets to 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-

verse).

slaac — Sets the port to utilize the SLAAC (Stateless Address Auto-configuration) IPv6 address assignment.

<i> — IP address of the unit, in xxx.xxx.xxx.xxx format

<m> — Netmask for the unit, in xxx.xxx.xxx.xxx format

<g> — Gateway/Router IP address for the unit, in xxx.xxx.xxx.xxx format

<bm> — Broadcast mask for the unit, in xxx.xxx.xx.xxx format

<i6> — IPv6 address for the unit. 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.

<vlan> — VLAN configuration parameters, valid only for non-management, non- vlan, ports, of the format:

[vlan <vl>] [prio <p>].

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>, where <p> can be a number between 0 (lowest) to 7 (highest). This priority applies to all VLAN connections.

Examples include:

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::/24
set network eth1 dhcp vlan 100,200,300
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

Level: Admin and Supervisor

4.4.30 view network

The *view network* command allows user to view current network interfaces stats.

Command Syntax:

view network <eth0|eth1|eth2> ↵

If no interface name is given, then statistics for all interfaces are presented. Examples include:

view network ↵
view network eth1↵

Level: User, Admin and Supervisor

4.4.31 get ntp

The get ntp command allows user to display 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)

Examples include

get ntp ↵

get ntp eth0↵

get ntp iff↵

Level: User, Admin and Supervisor

4.4.32 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 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 given, 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 max 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 max 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

Examples include:

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

4.4.33 view ntp

The *view ntp* command allows user to display current NTP stats.

Command Syntax:

view ntp [stream] ↵

If the option “stream” is given, then the measurements will be printed at a 1Hz rate for logging. The output stream can be stopped with: ctrl-C, 'q', 'Q', 'x' or 'X.

Examples include:

view ntp stream ↵

Level: User, Admin and Supervisor

4.4.34 get output

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

Command Syntax:

get output [<sel>] ↵

Where <sel> may be:

bnc Get output settings for BNC output only

Examples include:

get output bnc
get output

Level: Admin and Supervisor

4.4.35 set output

The s*et output* command allows setting of the output signal(s) for the system. If no output signal selection is given, 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 that this is a modifier and cannot be used alone.

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

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.

Command Syntax:

set 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.

Examples include:

set output bnc even↵

set output pps↵

Level: Admin and Supervisor

4.4.36 get periodic

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

Command Syntax:

get periodic↵

Level: User, Admin and Supervisor

4.4.37 set periodic

The s*et periodic* command allows setting of 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 go from 0 to <p> - 1.
width <w>	set the pulse width for the periodic output in ns. Range is 100ns to 5E8 (1/2 second)

Examples include:

set periodic period 2 value 1↵

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

Level: Admin and Supervisor

4.4.38 ping

The *ping* command allows validation of 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. The ports may be on separate physical networks, make sure the network interface corresponding to the device pinged is used.

Level: User, Admin and Supervisor

4.4.39 ping6

The *ping6* command allows validation of 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> IPv6 address of the unit without any mask information

NOTE – If no port is given then the management port is assumed. The ports may be on separate physical networks, make sure the network interface corresponding to the device pinged is used.

Level: User, Admin and Supervisor

4.4.40 view pos

The *view pos* 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

4.4.41 view prodconf

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

Command Syntax:

view prodconf↵

Examples include:

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

4.4.45 quit

The *quit* command is use 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

4.4.46 view realtime

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

Examples include:

view realtime↵
view realtime 2↵

4.4.47 help set

The *help set* command allow user to set system parameters. Command

Syntax:

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

Level: Admin and Supervisor

4.4.48 get snmp

The *get snmp* command 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

4.4.49 set snmp

The s*et snmp* command allows configuring the SNMP trap information.

Command Syntax:

set snmp <options>↵

Where <*options*> are:

enable	enable SNMP with the current options
disable>	disable SNMP operation
version <v>	set the SNMP version type, only 'v2c' is currently usable
host <ip>	set the IP address of the unit to receive the traps
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.

Examples include:

set snmp port 162 host 192.168.1.4↵
set snmp readonly "public"↵
set snmp gentraps↵

Level: Admin and Supervisor

4.4.50 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

4.4.51 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

4.4.52 get syslog

This 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

4.4.53 set syslog

The *set syslog* command allows user 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.

Examples include:

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

4.4.54 view temp

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

Command Syntax:

view temp ↵

Level: User, Admin and Supervisor

4.4.55 get time

This command retrieves the current system UTC time.

Command Syntax:

get time [full] ↵

If the option 'full', is given this returns both the date and time.

get time full ↵

Use the get time 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	is the full month string
d	is the day of month (00-31)
Y	is the full year, including century
hh:mm:ss	is the current UTC hour, minute and second

Level: User, Admin and Supervisor

4.4.56 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

4.4.57 get user

This 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

4.4.58 set user

The *set user* command allows changing user configuration.

Command Syntax:

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

Where:

adduser <uname> <level>	Add a new user, named <uname>, with access level <level>. <uname> can contain only letters and numbers, no spaces or punctuation is allowed. If the user already exists, no action is taken. <level> can be one of: 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. Please see 'help set user logout' for information about the options.

Level: Supervisor

4.4.59 set user logout

The *set user logout* command allows the Thunderbolt TS200 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 'view user' 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.

Examples:

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

In the above examples, the first would log out a single user session.
The second example logs out all users connected from a specific IP address.
The third example will only log out a certain user, logged in from a specific IP address

Level: Supervisor

4.4.60 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

4.4.61 view version

The *view version* command displays the current versioning information for the product..

Command Syntax:

view version <hardware|gnss>↵

Where:

<hardware>	View the hardware version of the Thunderbolt TS200
<gnss>	View only the GNSS version

Examples include:

view version↵
view version hardware↵

Level: User, Admin and Supervisor

4.4.62.0 view

The *view* command allows seeing 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
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

Examples include:

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

4.4.62.1 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.

This command takes no options.

4.4.62.2 view dlog

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

view dlog g

view dlog pos

view dlog freq

4.4.63 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 the *'config firmware*' section for more information.

Level: User, Admin and Supervisor

4.5 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 is the following

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 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?

Command format:

help howto <n>

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

For example,

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

  get alarm

>
```

4.5.1 How to get current Alarm status?

```
get alarm
```

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

NOTE: This is only possible from an admin (or higher) access level

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

4.5.3 How to disable Ethernet port 0/1?

NOTE: This is only possible from an admin (or higher) access level

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

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

NOTE: This is only possible from an admin (or higher) access level

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

4.5.5 How to set bnc output of even?

NOTE: This is only possible from an admin (or higher) access level

```
set output bnc even
```

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

NOTE: This is only possible from an admin (or higher) access level

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

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

NOTE: This is only possible from an admin (or higher) access level

```
set comm baud 19200
```

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

NOTE: This is only possible from a supervisor access level

```
set user adduser trimble1 user
```

4.5.9 How to delete an existing user trimble?

NOTE: This is only possible from a supervisor access level

```
set user deluser trimble
```

4.5.10 How to change user password?

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

4.5.11 How to restore factory default settings?

NOTE: This is only available from an admin (or higher) access level

```
config load factory
```

4.5.12 How to reboot the system?

NOTE: This is only available from a supervisor access level

```
config system reboot
```

4.6 List of “What if” help topics

This section gives some information about some scenarios, you may encounter and how to recover from those.

4.6.1 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 refer to the **'config firmware**' section for more information.

CHAPTER

5

Chapter 5: Web Interface

This chapter provides explanation on the web interface of Thunderbolt® NTP Time Server Clock TS200

In this chapter:

5.1 Home Page

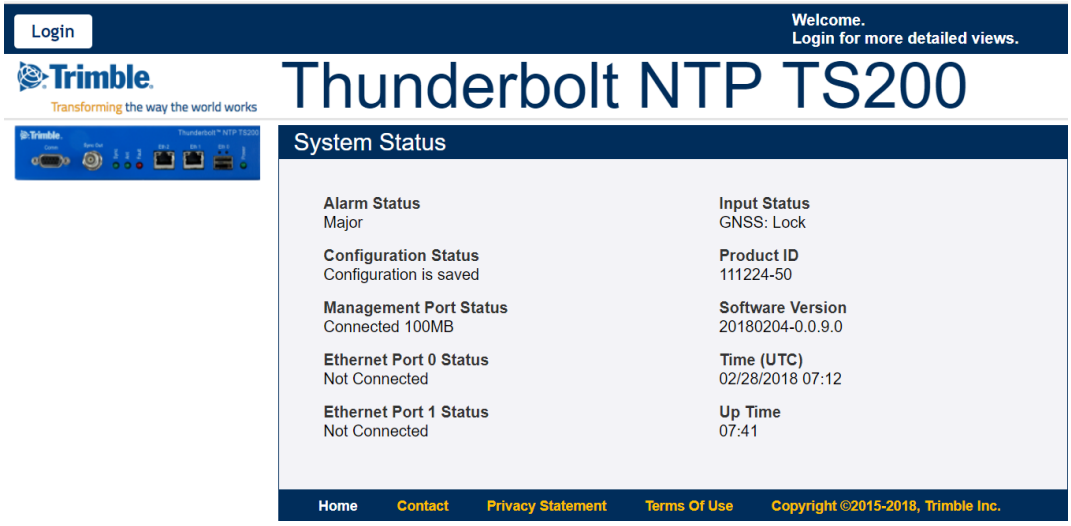
Launch a web browser and open a connection to Thunderbolt® NTP Time Server Clock TS200 by entering the URL that specifies the IP address.

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 – *Trimble recommends using Google Chrome browser for better rendering of Thunderbolt® NTP Time Server Clock TS200 web pages.*

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



The main page will display a brief status of the Thunderbolt® TS200. 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 NTP Ethernet Port 0
- **Ethernet Port 1 Status** Displays the status of NTP Ethernet Port 1

Log in to the Thunderbolt® TS200 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.

5.2 Login Page

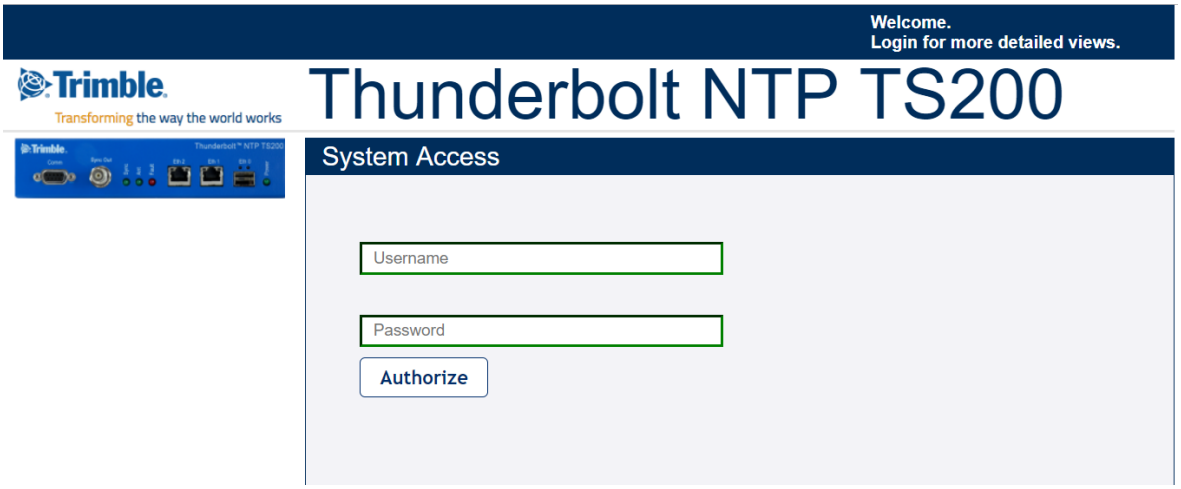
Use the Thunderbolt® TS200 Login page to view system status. The login page requires a valid username and password.

The default users are:

- **Username:** trimble
- **Password:** trimble
- **Access level:** *User*

- **Username:** trimbleadmin
- **Password:** trimbleadmin
- **Access level:** *Admin*

- **Username:** trimblesuper
- **Password:** trimblesuper
- **Access level:** *Super*



5.3 System Page

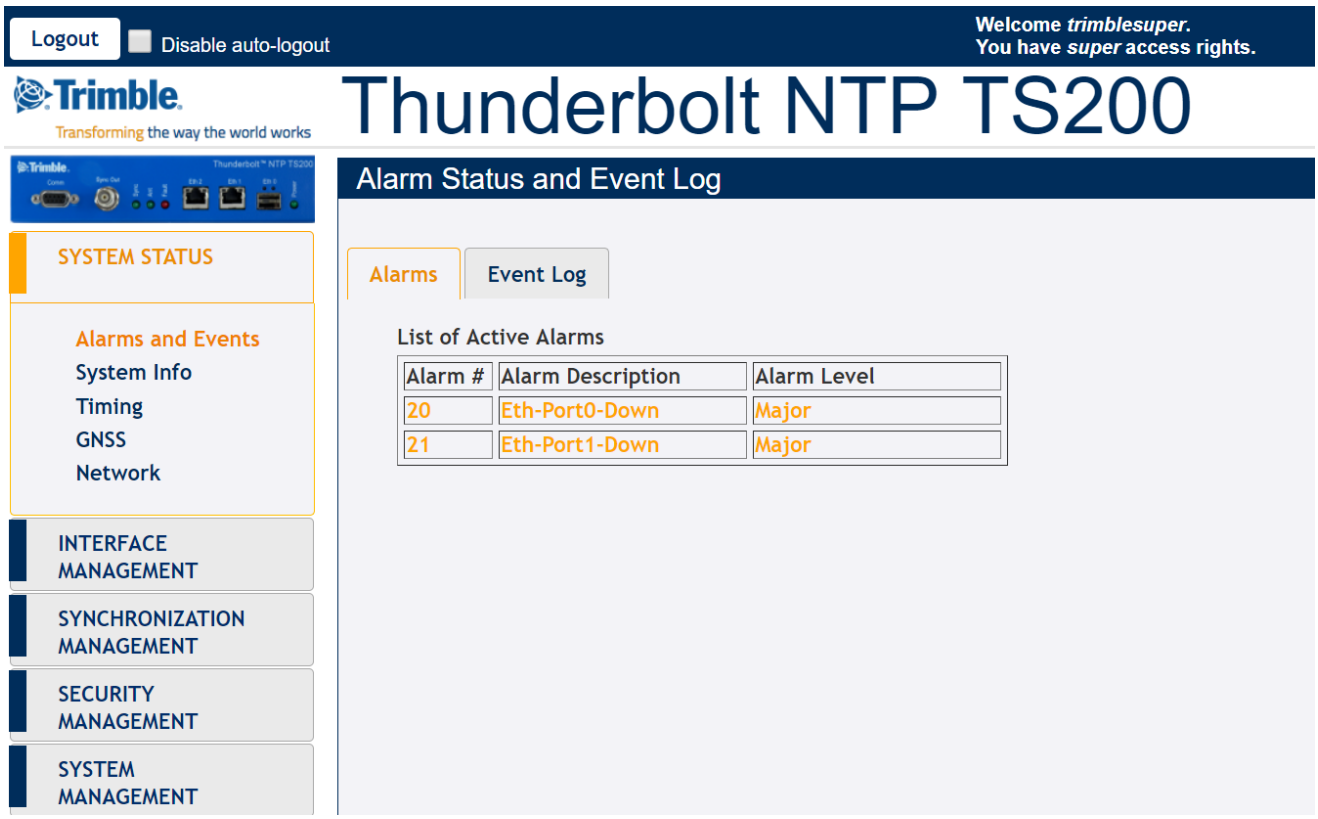
After entering the valid credentials, the Thunderbolt® TS200 launches the **System Page**. The system page is organized in two frames – the navigation and content.

The start page gives general status information of the Thunderbolt® NTP Time Server Clock TS200. By using the navigation menu on the left side of the screen, user can view a number of configuration pages which are described in following pages.

5.4 System Status

Alarms and Events - Alarms

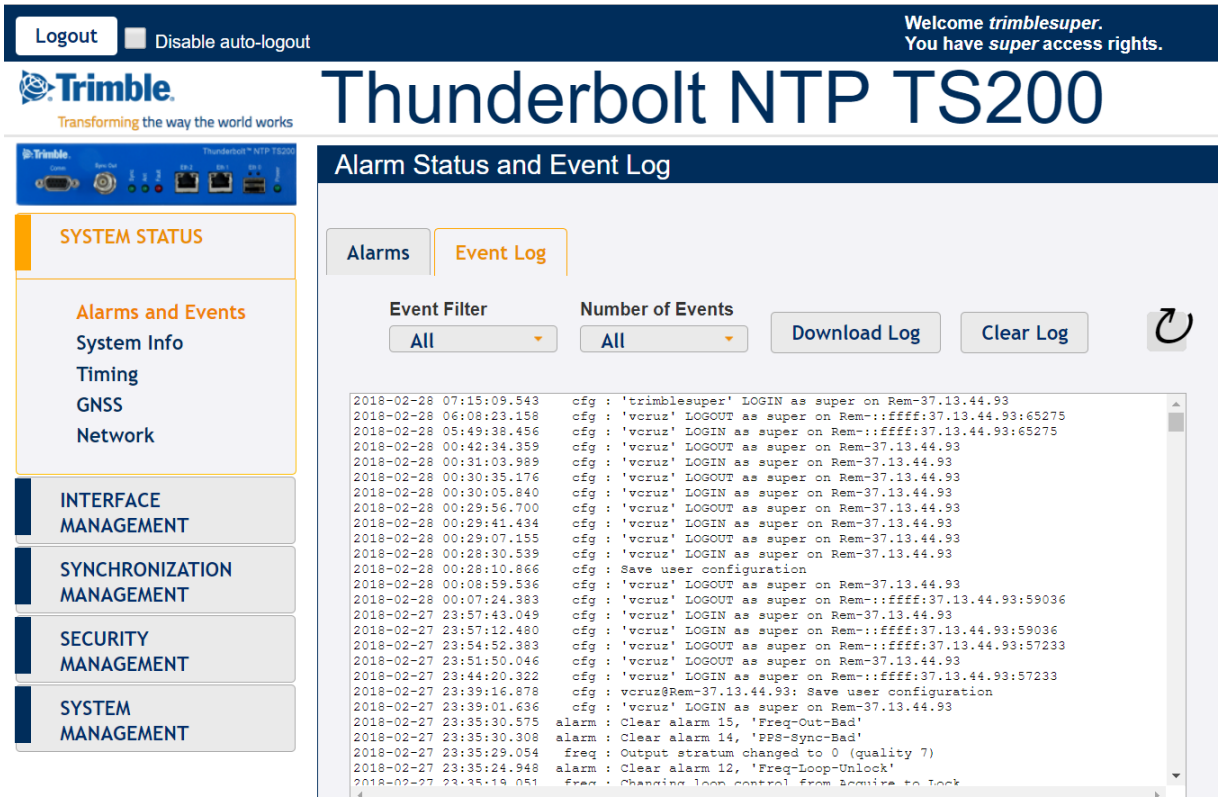
The page shows currently active alarm condition on the system.



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

Alarms and Events – Event Log

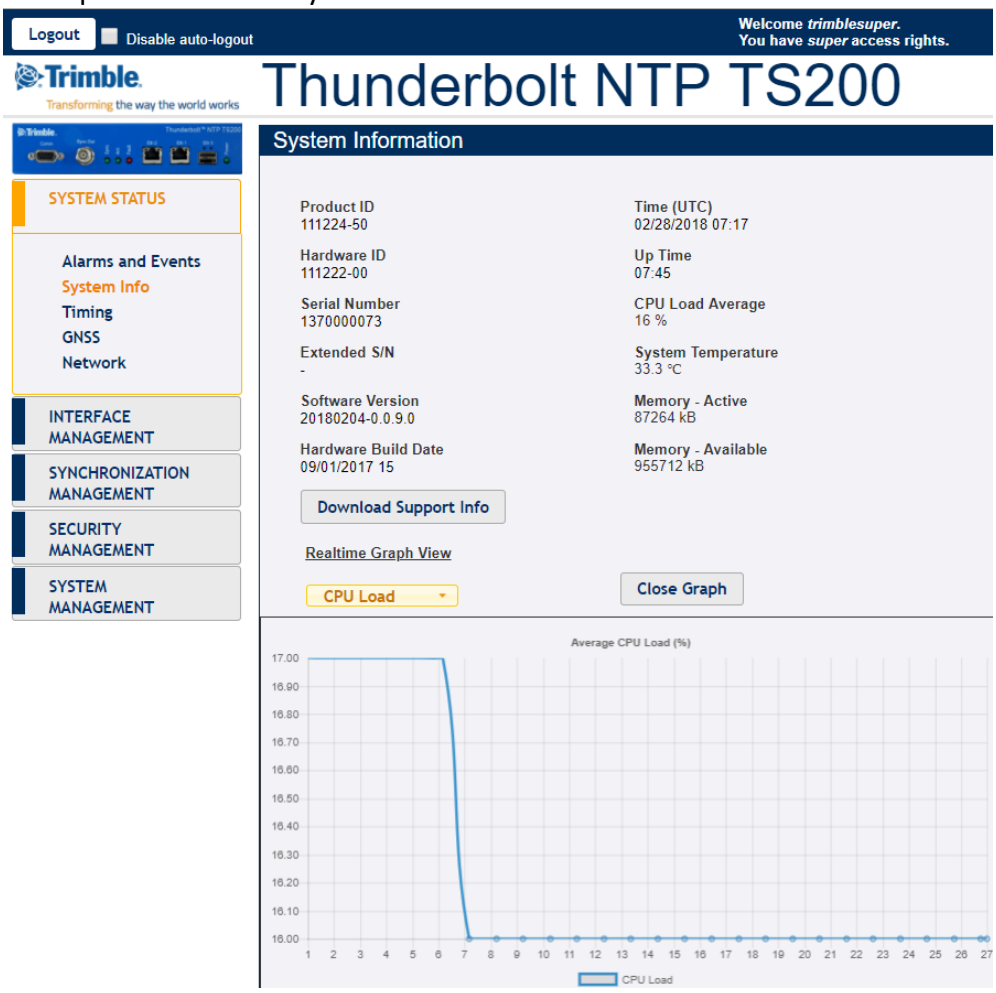


The Event Log window provides the list of system messages and notifications.

- **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.

System Info

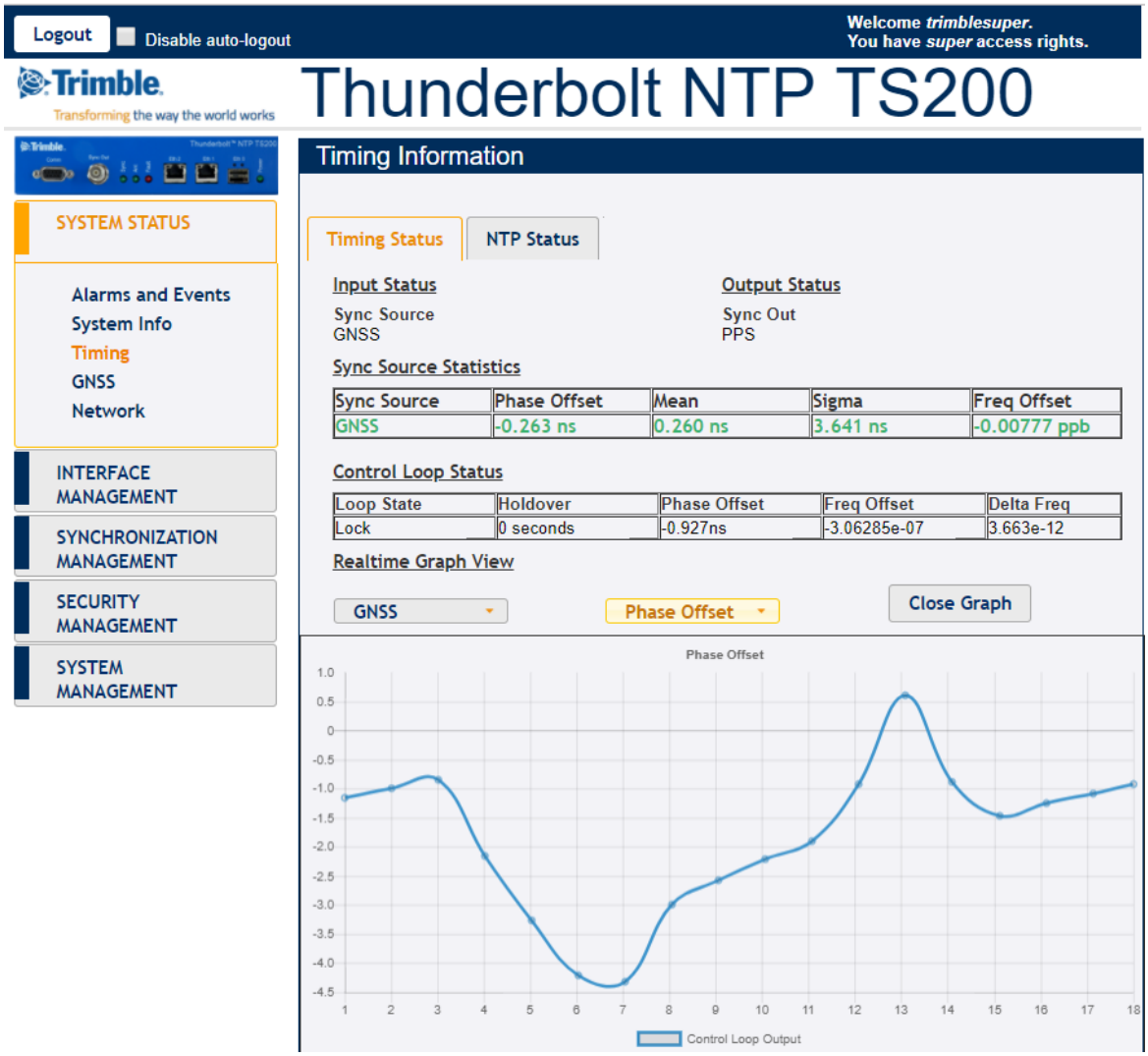
The System Info status provides overall system information:



- **Product ID or Model:** The model number of the Thunderbolt® TS200.
- **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® TS200**.**
- **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 TS200
- **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

Timing Status

This page provides the status information of System clock



- **Input Status**
  - **Sync Source:** Indicates the current sync source

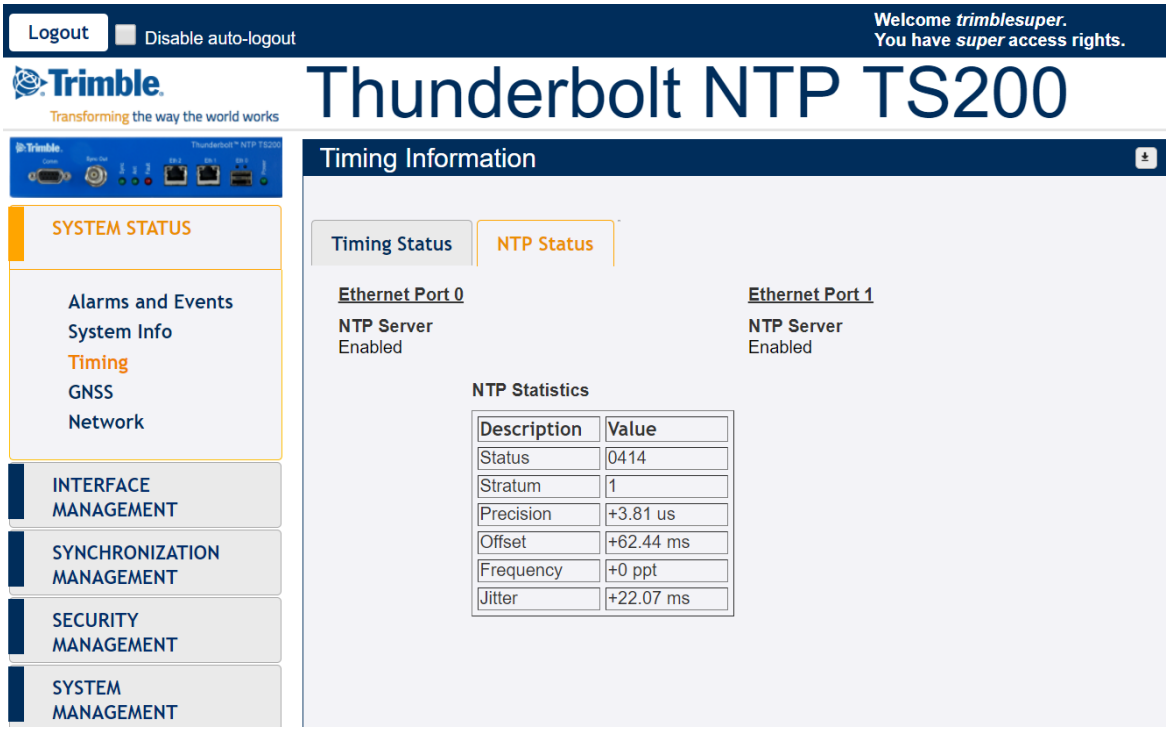
- **Output Status**
  - **BNC Output:** Indicates the current configuration of BNC connector.

- **Sync Source Statistics**
  - **Sync Source:** Distinguishes the name of the Sync Source
  - **Phase Offset:** TS200 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 TS200

    - **Holdover:** The estimated holdover time available

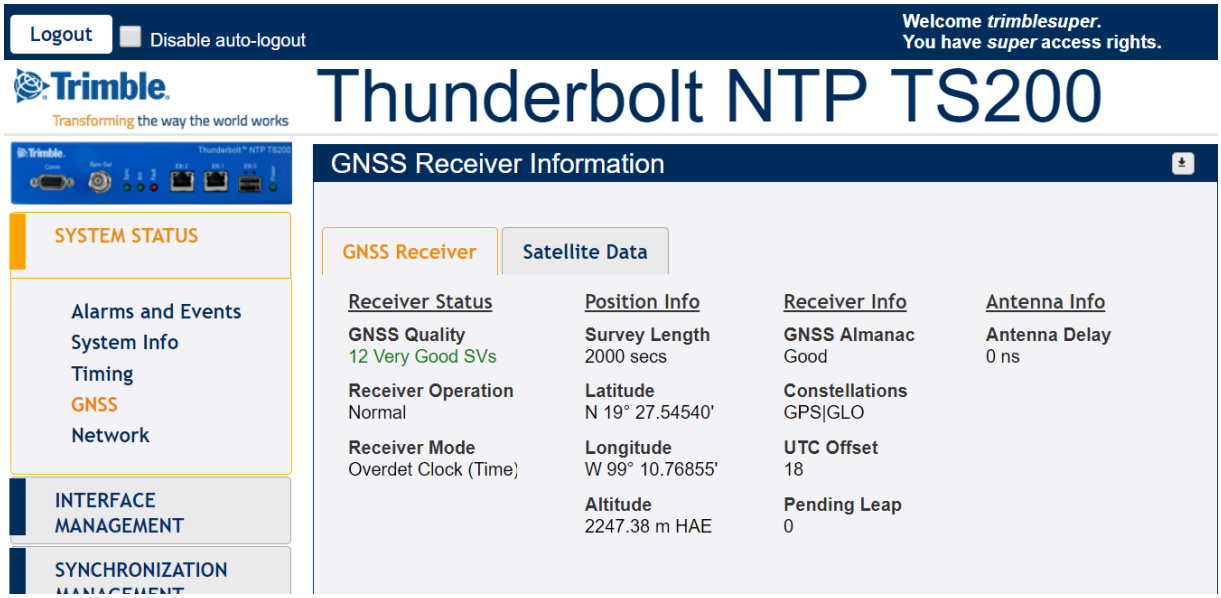
NTP Status



- **Ethernet Port:** Identifies the Ethernet port – Eth0 or Eth1
- **NTP Status:** Show the status of port connection
- **NTP Time Server Statistics:** Shows the statistics of various server parameters

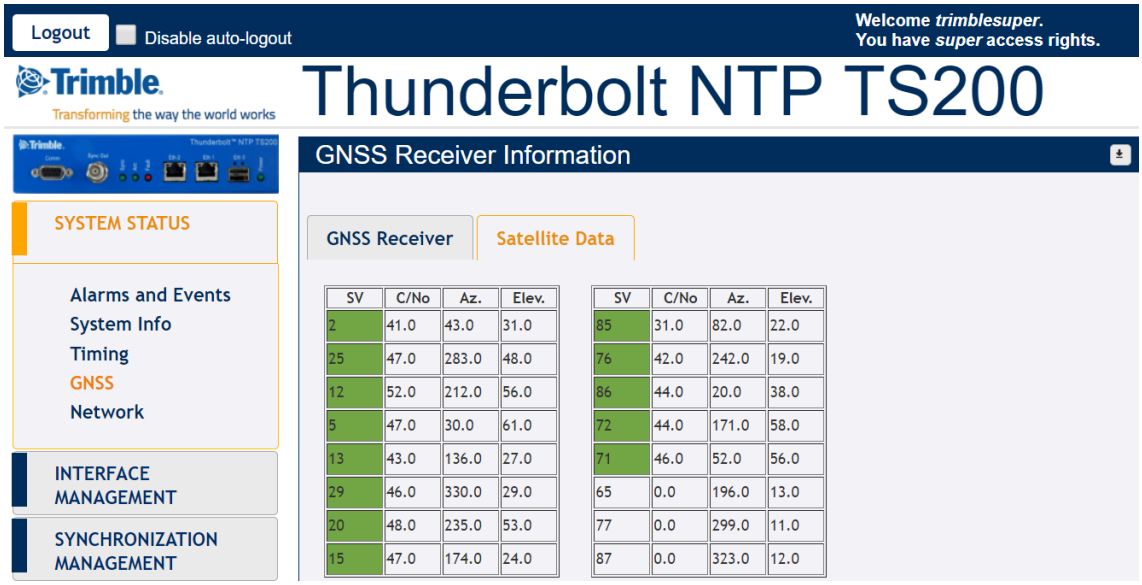
GNSS Receiver Status

The page displays the status of GNSS receiver:



- **Latitude:** The latitude of the Thunderbolt TS200
- **Longitude:** The latitude of the Thunderbolt TS200
- **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 in use:** 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
  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 not SVs that have SNR > 20
- **Antenna Delay:** Displays the compensation delay of antenna cable

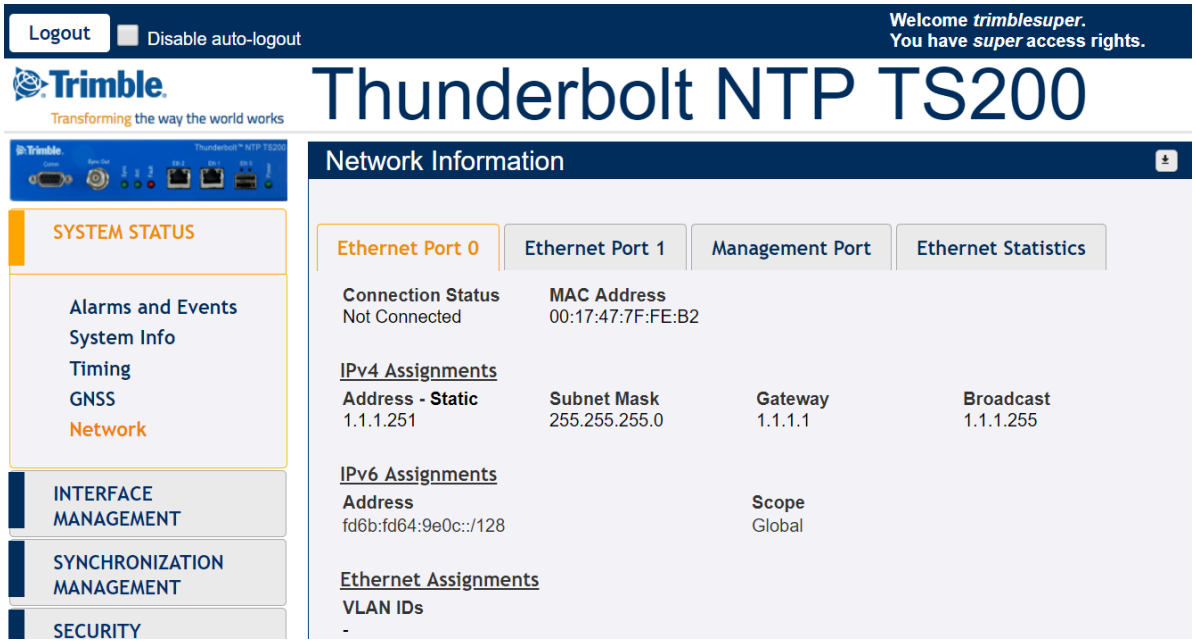
Satellite Data



- **SV:** Satellite Vehicle
- **C/No:** Carrier-to-Noise power ratio
- **Az:** Azimuth
- **Elev:** Elevation

Network eth0

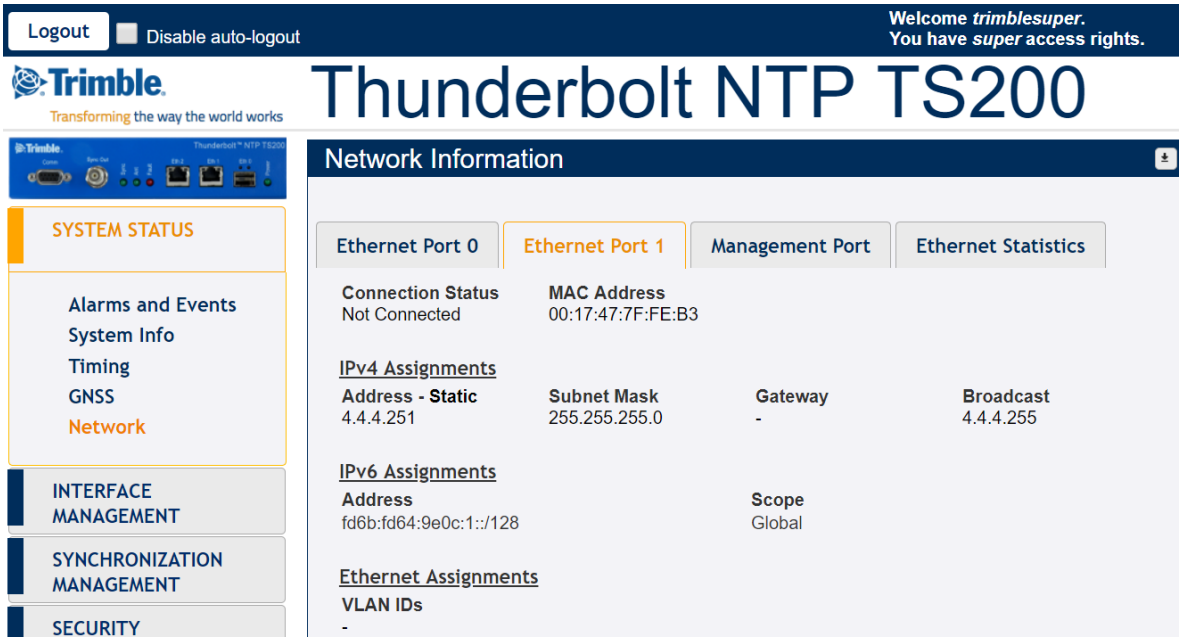
Network status for Ethernet Port 0:



- **IPv4 Address:** 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

Network eth1

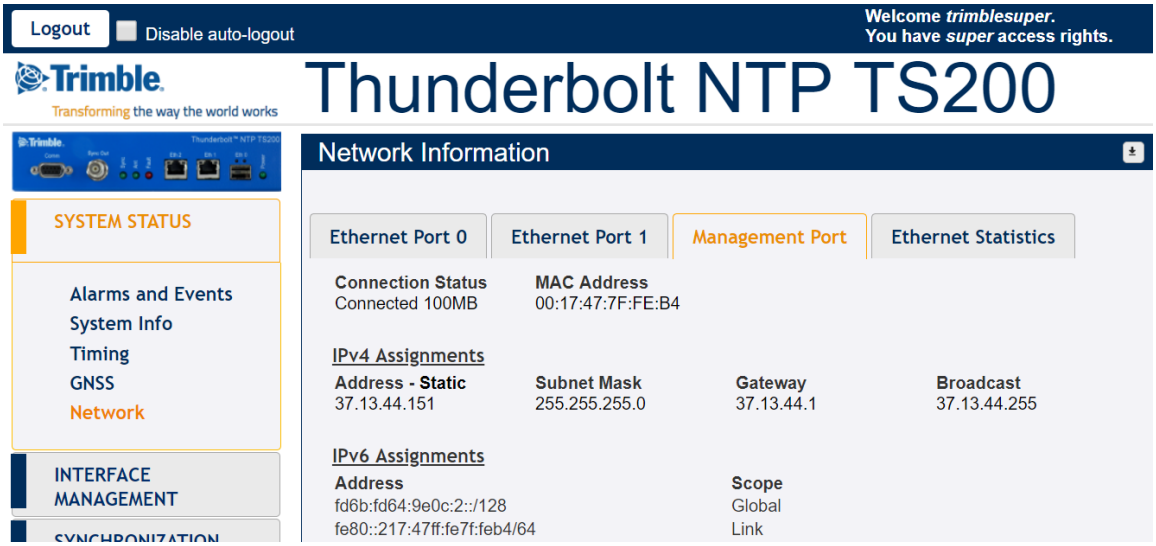
Network status for Ethernet Port 1:



- **IPv4 Address:** 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

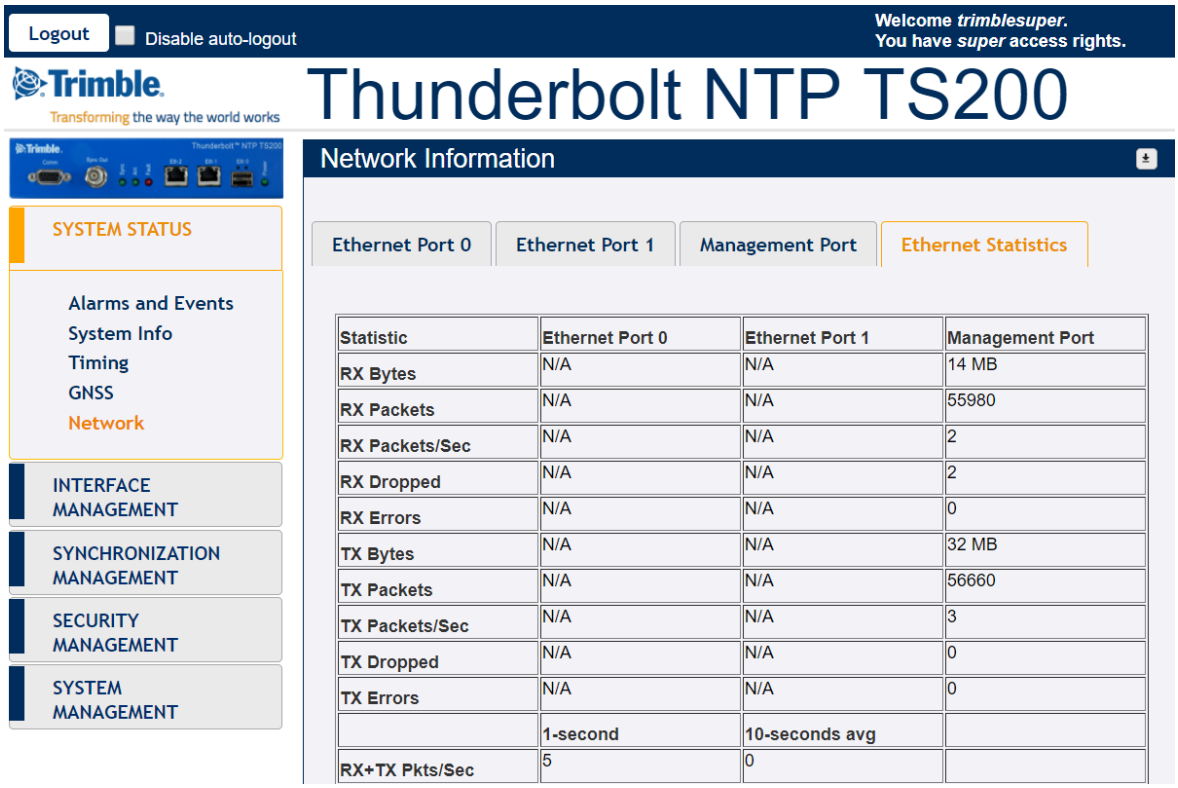
Network Management Port

Network status for Ethernet Management Port:



- **IPv4 Address:** 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

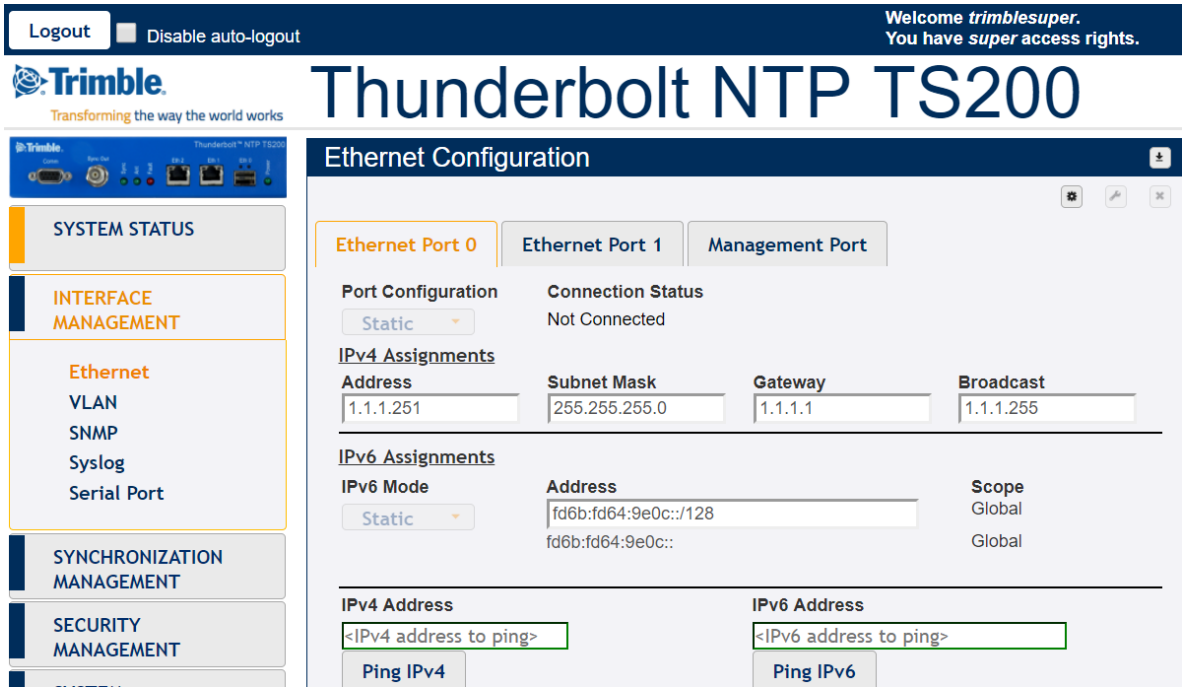
Ethernet Statistics



Statistic	Ethernet Port 0	Ethernet Port 1	Management Port
RX Bytes	N/A	N/A	14 MB
RX Packets	N/A	N/A	55980
RX Packets/Sec	N/A	N/A	2
RX Dropped	N/A	N/A	2
RX Errors	N/A	N/A	0
TX Bytes	N/A	N/A	32 MB
TX Packets	N/A	N/A	56660
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	

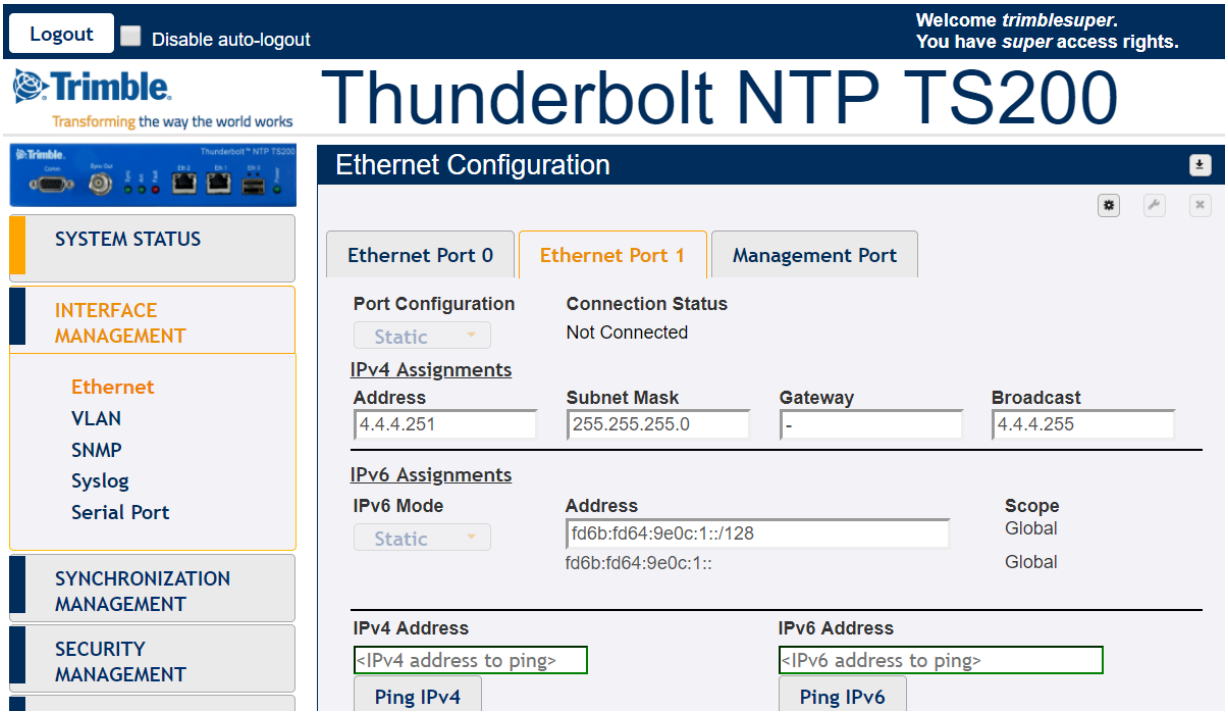
5.5 Interface Management

IP Assignment eth0



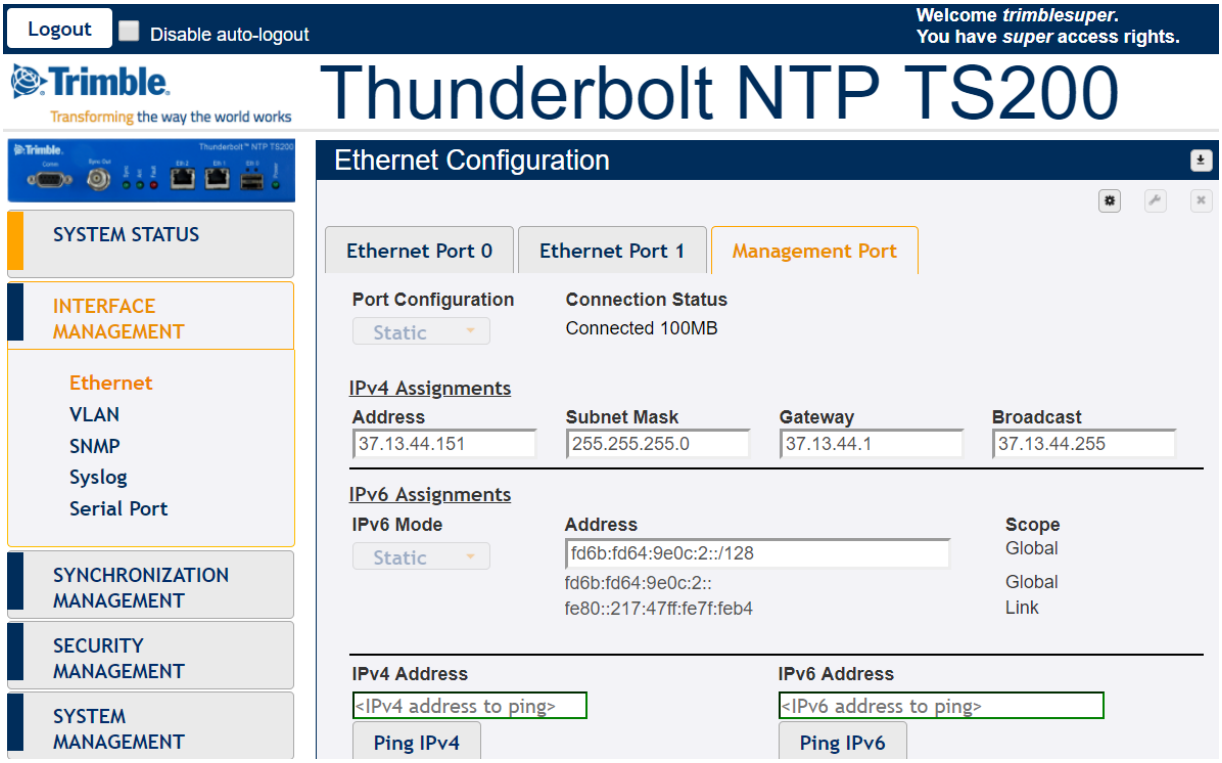
- **Port Configuration:** Either DHCP, Static, Default or Disable this interface
- **IPv4 Address:** IPv4 address of the port
- **IPv4 Subnet Mask:** Subnet mask being used
- **IPv4 Gateway:** Default gateway IPv4 address
- **IPv4 Broadcast:** Either static or DHCP
- **IPv6 Address:** IPv6 Address of the Ethernet interface with the subnet mask.
- **Ping IPv4:** Enter IPv4 Address to test ping
- **Ping IPv6:** Enter IPv6 Address to test ping

IP Assignment eth1



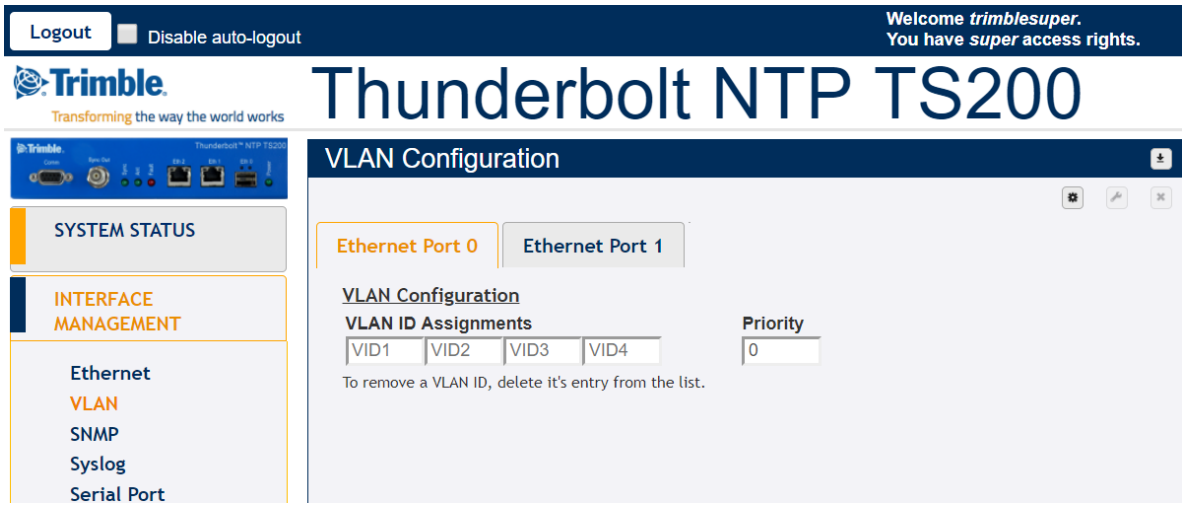
- **Port Configuration:** Either DHCP, Static, Default or Disable this interface
- **IPv4 Address:** IPv4 address of the port
- **IPv4 Subnet Mask:** Subnet mask being used
- **IPv4 Gateway:** Default gateway IPv4 address
- **IPv4 Broadcast:** Either static or DHCP
- **IPv6 Address:** IPv6 Address of the Ethernet interface with the subnet mask.
- **Ping IPv4:** Enter IPv4 Address to test ping
- **Ping IPv6:** Enter IPv6 Address to test ping

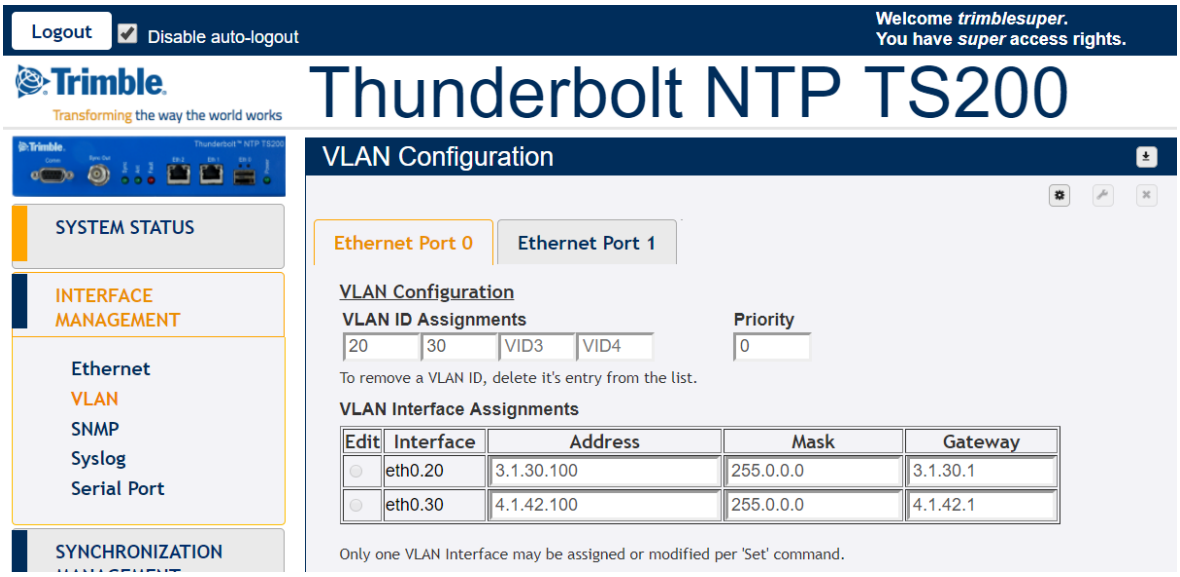
IP Assignment management port



- **Port Configuration:** Either DHCP, Static, Default or Disable this interface
- **IPv4 Address:** IPv4 address of the port
- **IPv4 Subnet Mask:** Subnet mask being used
- **IPv4 Gateway:** Default gateway IPv4 address
- **IPv4 Broadcast:** Either static or DHCP
- **IPv6 Address:** IPv6 Address of the Ethernet interface with the subnet mask.
- **Ping IPv4:** Enter IPv4 Address to test ping
- **Ping IPv6:** Enter IPv6 Address to test ping

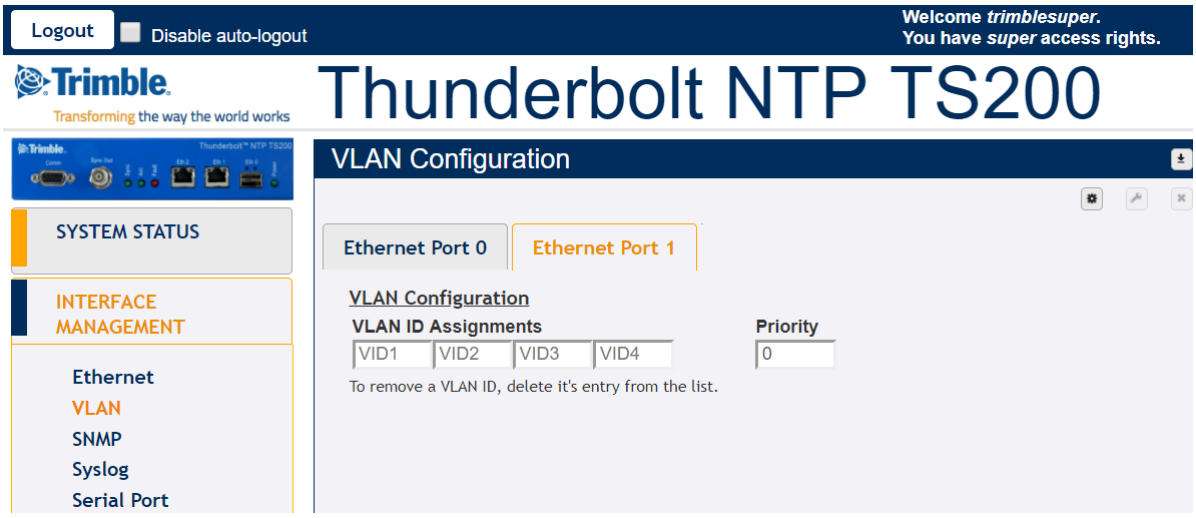
VLAN eth0

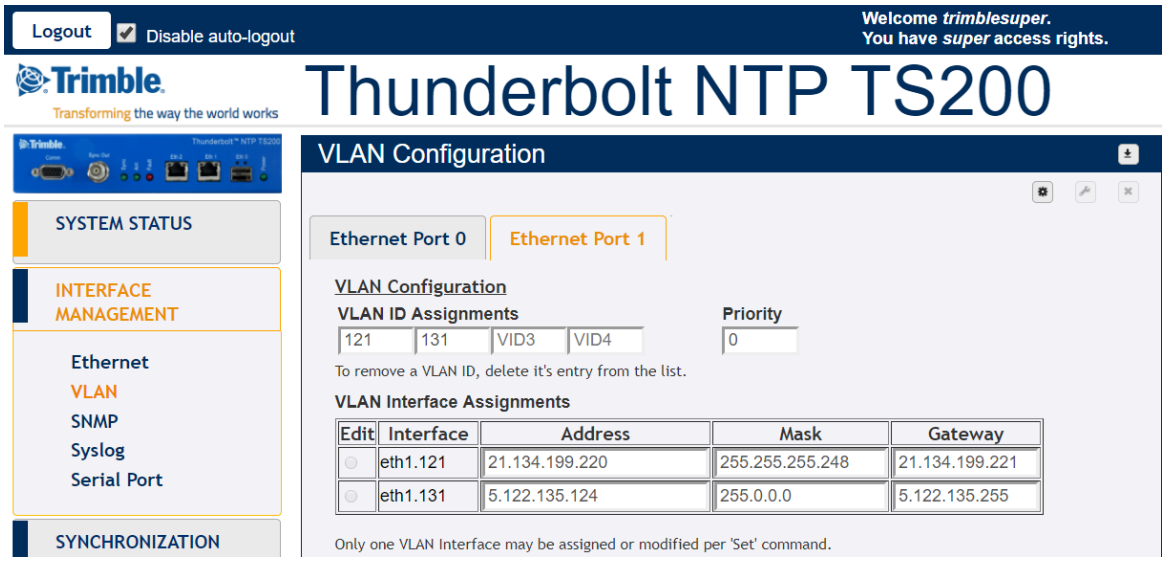




- **VLAN IDs:** List of all VLAN IDs configured
- **Priority:** 0 to 7 where 7 is the highest priority

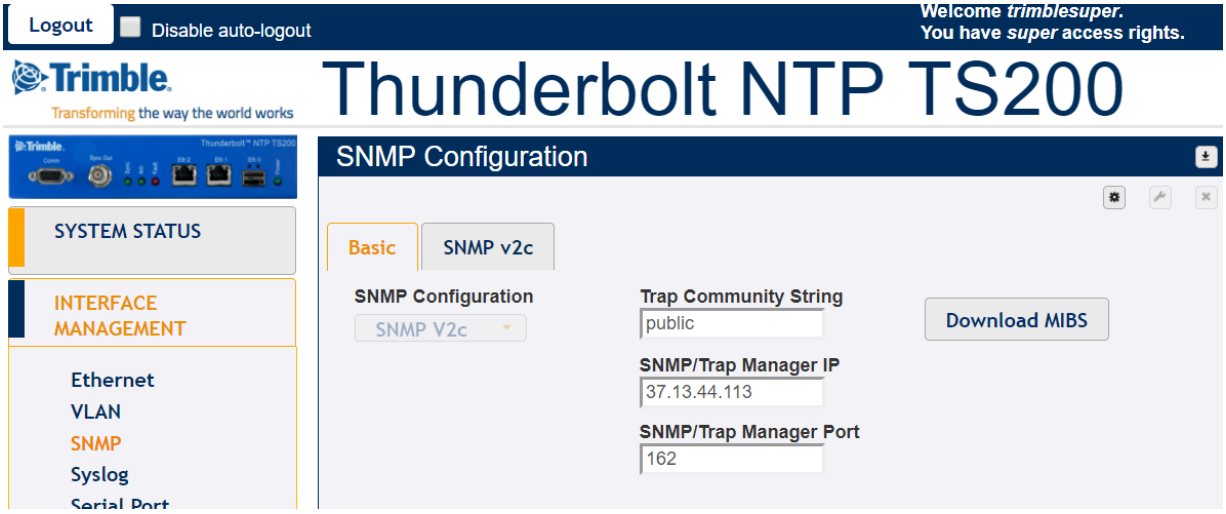
VLAN eth1





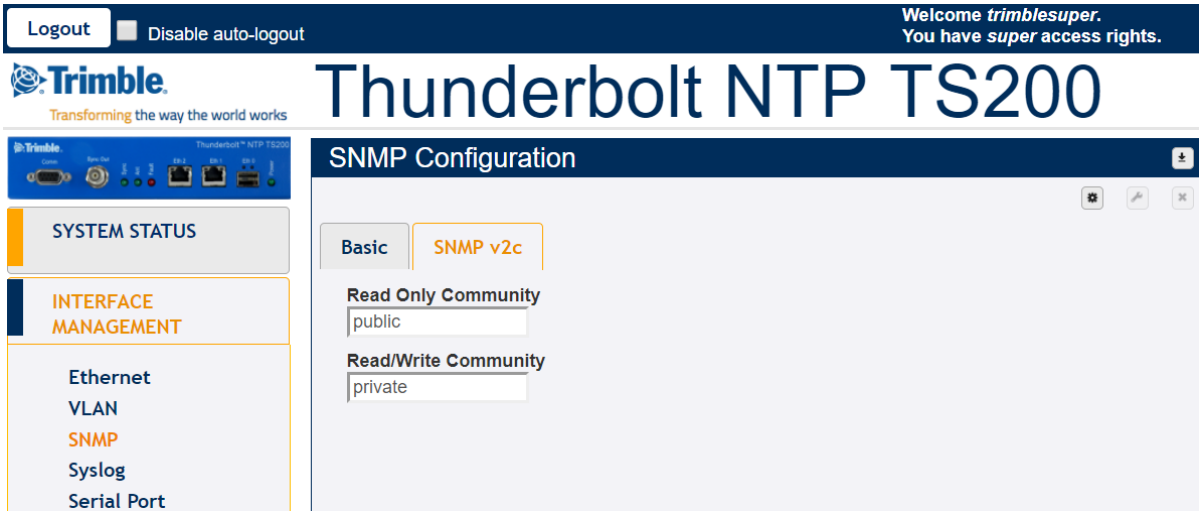
- **VLAN IDs:** List of all VLAN IDs configured
- **Priority:** 0 to 7 where 7 is the highest priority

SNMP Configuration Basic



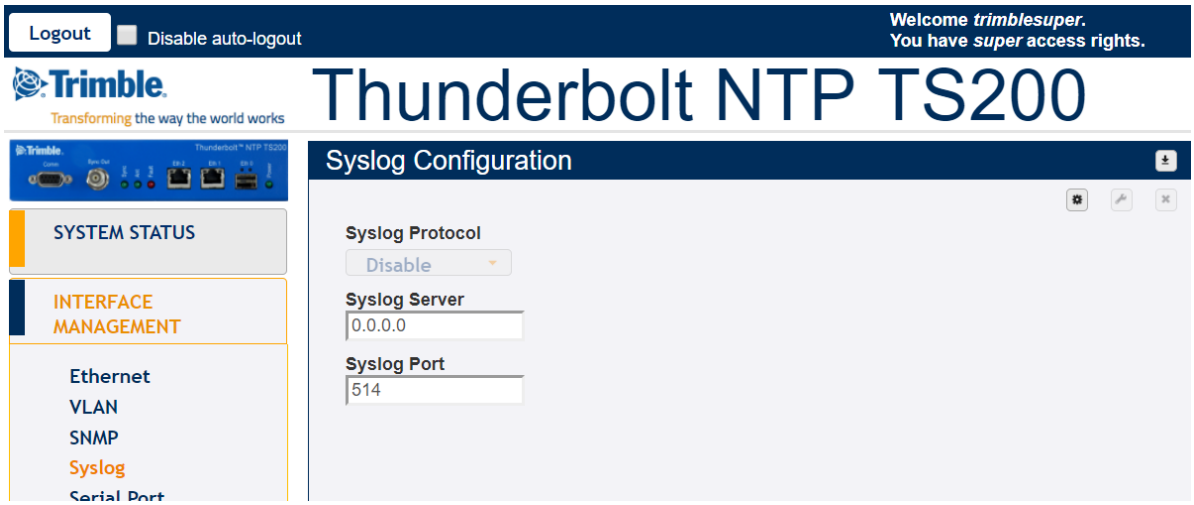
- **SNMP Configuration:** SNMP v2c or Disable
- **Trap Community String:** Community string id for SNMP
- **SNMP Manager IP:** IP address of SNMP manager that receives the TRAP
- **SNMP Manager Port:** Port number of SNMP manager
- **Download MIBs:** This option allows download of SNMP MIB

SNMP Configuration v2c



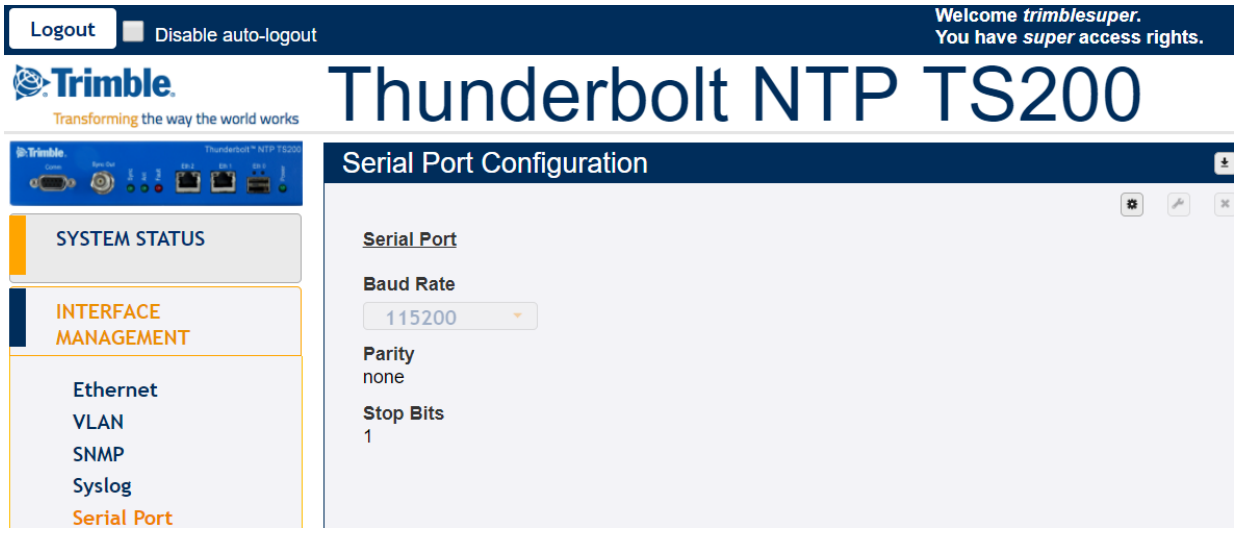
- **Read Community:** Community string for read
- **Write Community:** Community string for write

Syslog



- **Syslog Protocol:** Enable or Disable
- **Syslog Server:** IP Address of Syslog Server
- **Syslog Port:** Enter port

Serial Port

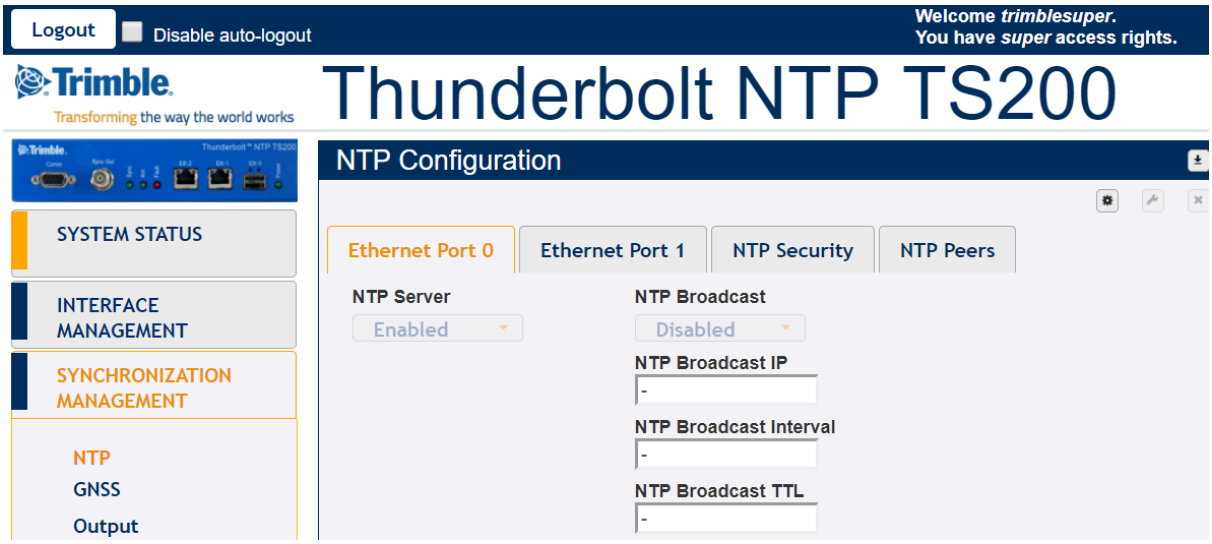


- **Baud Rate:** Serial port speed: 9600, 19200, 38400, 57600, 115200. The default value is 115200
- **Parity:** Serial port parity setting – even, none, odd
- **Stop Bits:** Serial port stop bit setting – 0 or 1

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

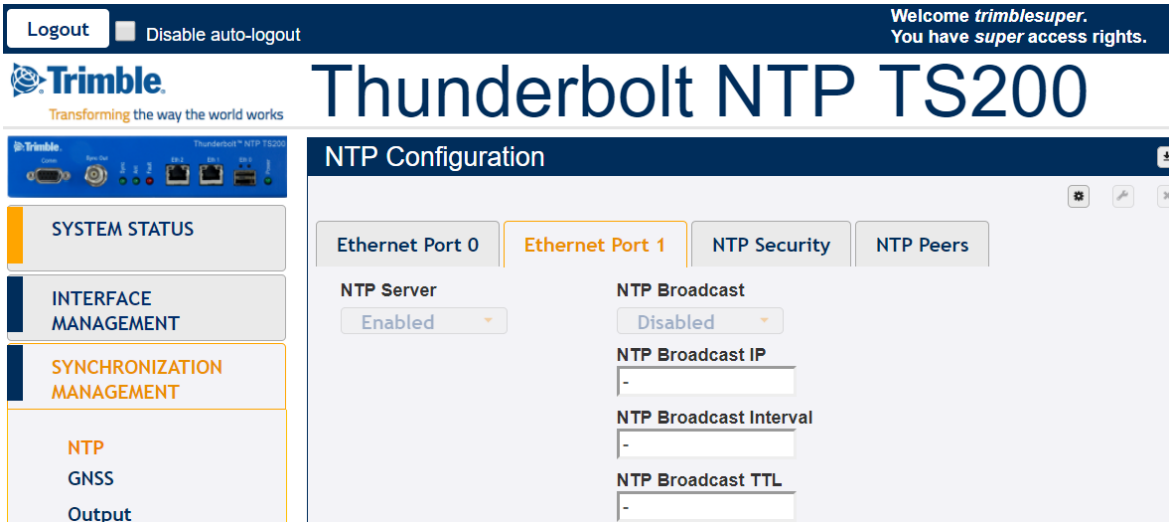
5.6 Synchronization Management

NTP Time Server eth0



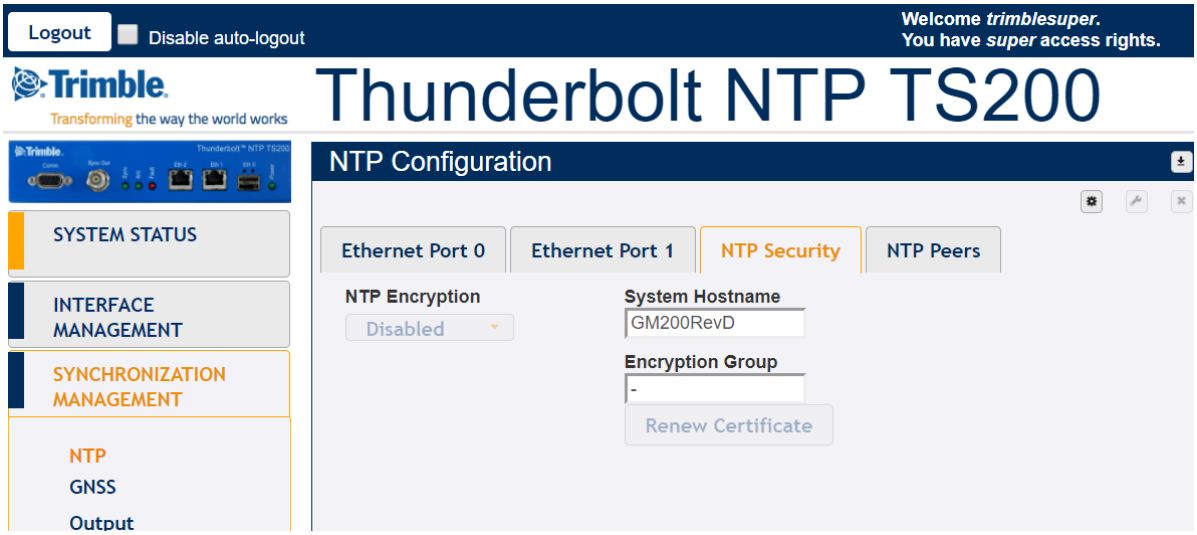
- **NTP Protocol:** Enabled, disabled or default.
- **NTP Broadcast:** Enabled or disabled
- **NTP Broadcast IP:** Broadcast IP for NTP (has to be in same domain as that of port)
- **NTP Broadcast Interval:** Values between 4 and 17 representing 2^{4}(16 secs) and 2^{17}(36.4 hours)
- **NTP Broadcast TTL:** Values between 1 to 7 hops.

NTP Time Server eth1



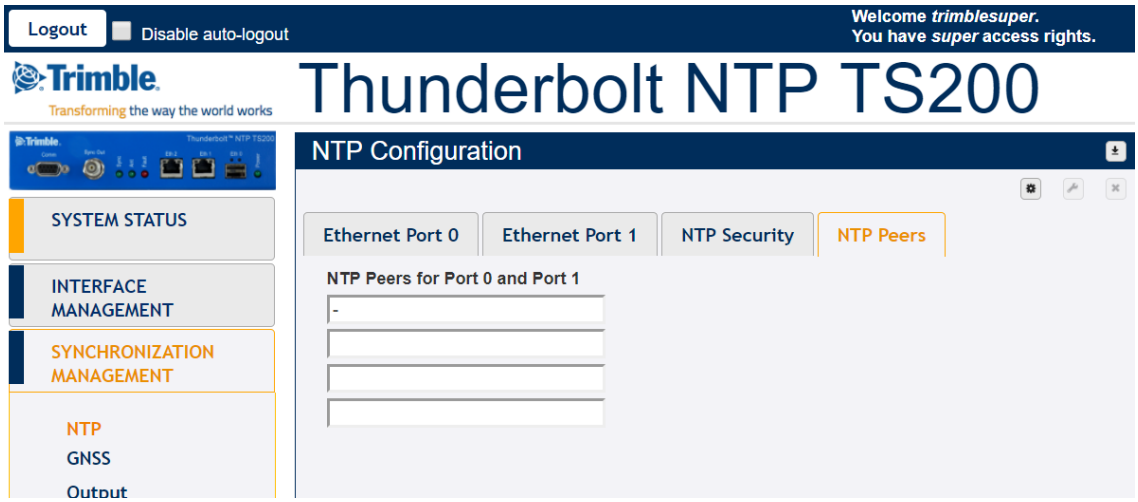
- **NTP Protocol:** Enabled, disabled or default.
- **NTP Broadcast:** Enabled or disabled
- **NTP Broadcast IP:** Broadcast IP for NTP (has to be in same domain as that of port)
- **NTP Broadcast Interval:** Values between 4 and 17 representing 2^{4} (16 secs) and 2^{17} (36.4 hours)
- **NTP Broadcast TTL:** Values between 1 to 7 hops.

NTP Time Server - NTP security



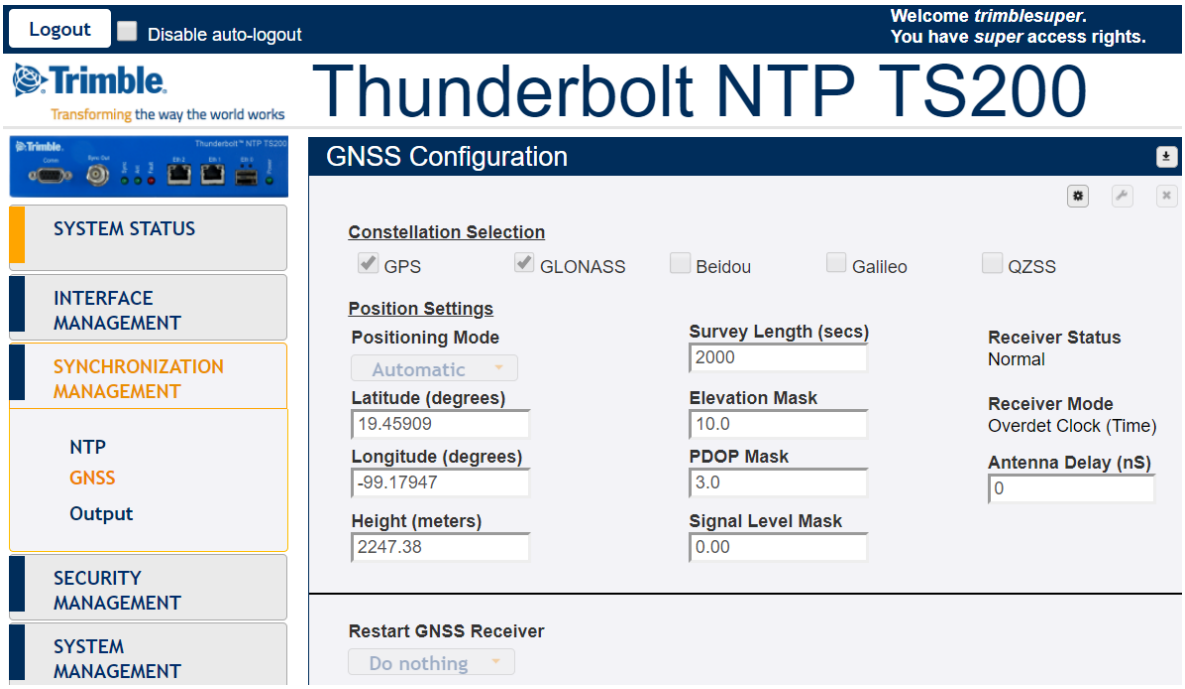
- **NTP Encryption:** Disabled or Enabled
- **NTP Encryption Hostname:** Hostname of encryption certificate
- **NTP Encryption Group Name:** Group name for encryption certificate

NTP Time Server - NTP Peers



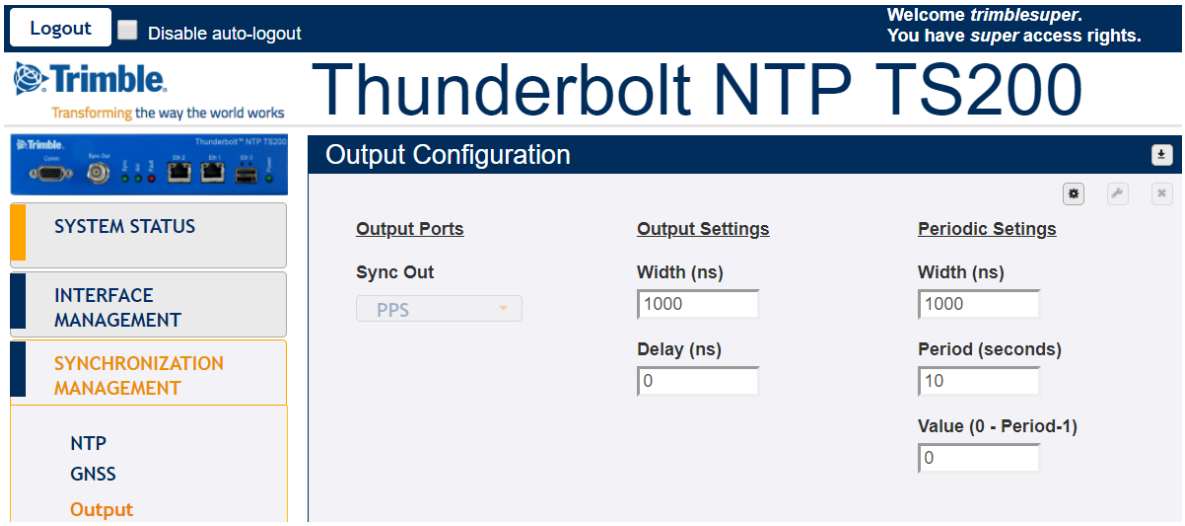
- **NTP Peers :** IP Addresses of up to 4 NTP Peers, valid for Port0 and Port1.

GNSS Receiver



- **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
- **Elevation Mask:** Satellite elevation mask level
- **PDOP Mask:** Satellite PDOP mask level
- **Signal Level Mask:** Set signal level mask
- **Antenna Delay (ns):** Delay compensation of antenna cable.
- **Restart GNSS Engine:** Warm, Cold or Do Nothing

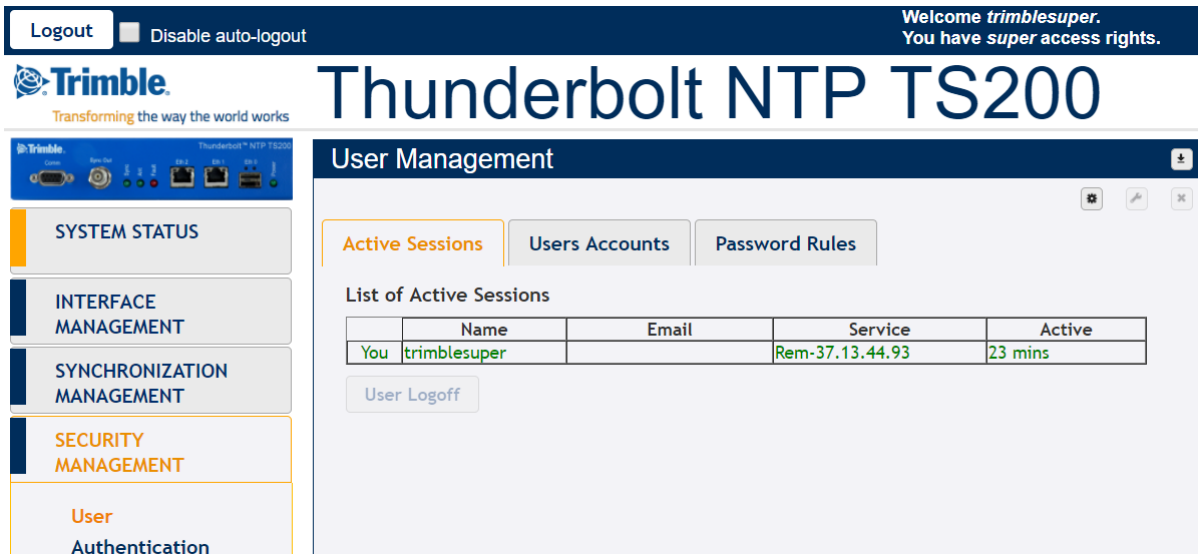
Output Configuration



- **BNC Output:** The type of out signal – PPS, PP2S, Periodic or 10MHz
- **Output Width:** Width of Output in nS
- **Output Delay:** Delay of Output in nS
- **Periodic Width:** Periodic width in ns
- **Period:** Period in seconds
- **Periodic Value:** Periodic value

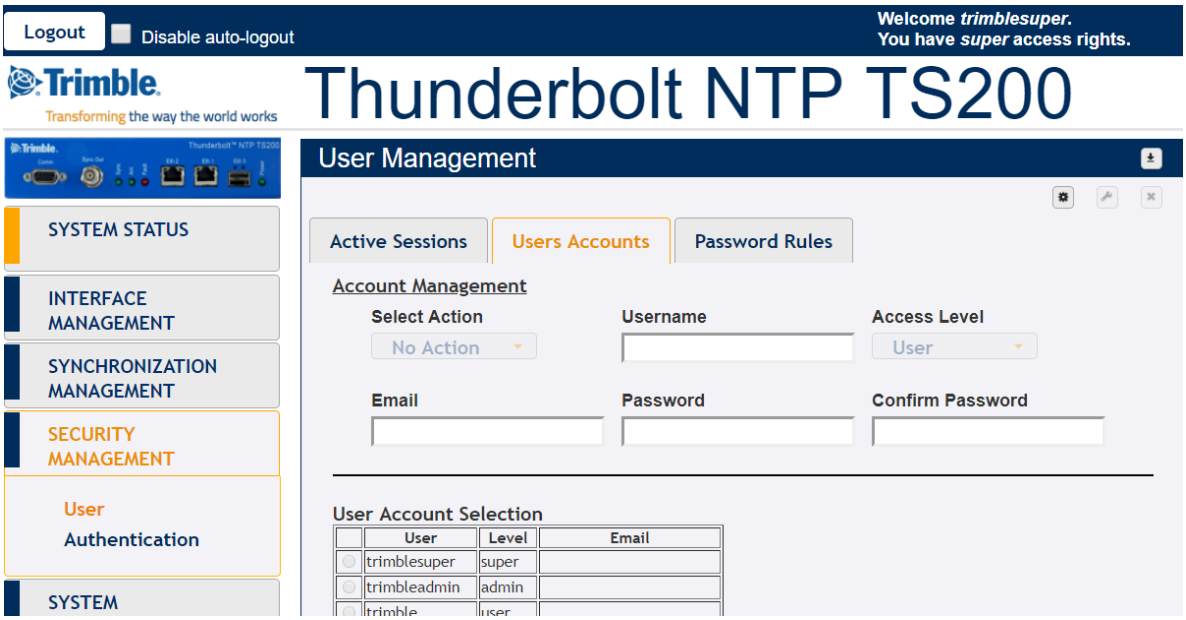
5.7 Security Management

User Management - Active Sessions



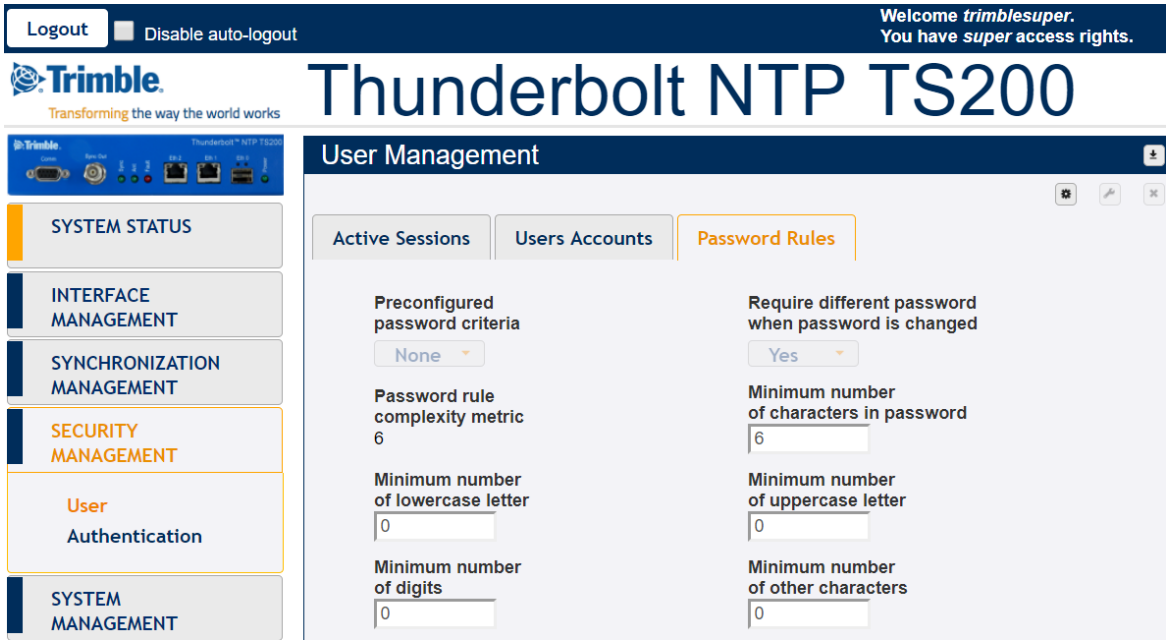
- **Name:** Existing username
- **Email:** Updated email
- **Service:** IP Address used to connect to
- **Active:** The time that the session has been active

User Management - User Accounts



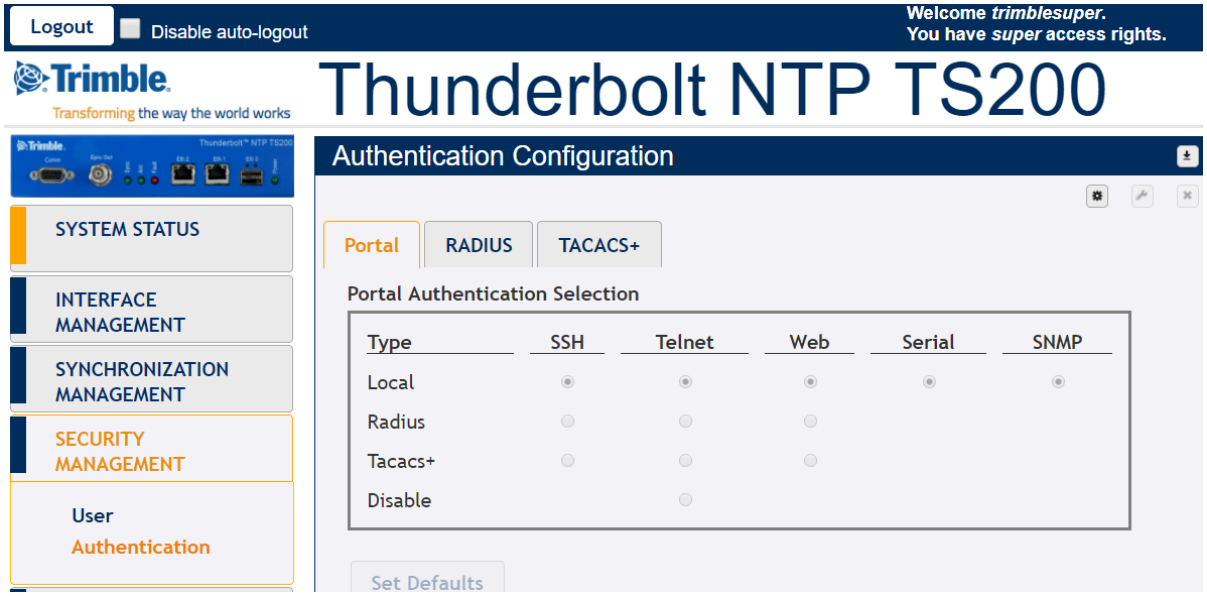
- **Select Action:** No Action, Add, Modify, Delete
- **Username:** New username to be added
- **Password:** New password to be chosen
- **Confirm Password:** Confirm password. Should be same as password.
- **Access Level:** User, Admin or Super(visor)
- **Email:** New email
- **User Account Selection:** This is a list of all users created in TS200

User Management – Password Rules



- **Preconfigured password criteria:** 5 criteria of password already configured
  - None the password doesn't require any rule to be accepted by TS200
  - 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.

Authentication Portal

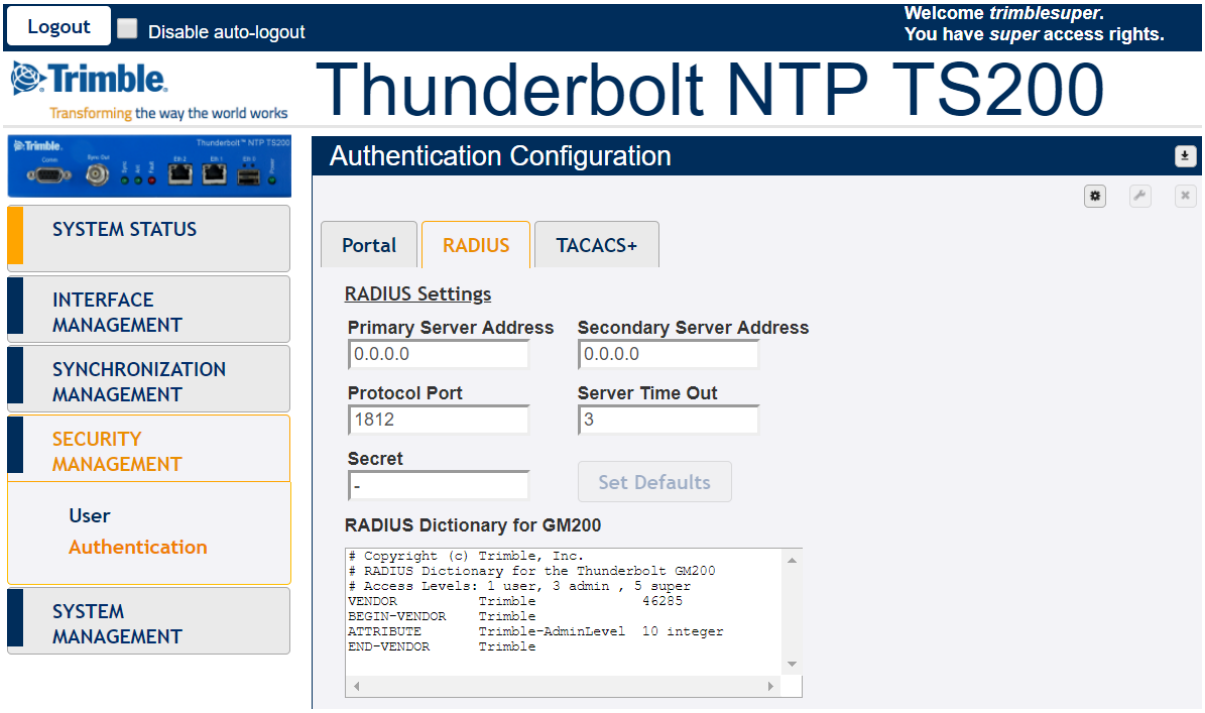


This page shows the authentication type Local, Radius or TACACS+ with the three different portal types: SSH, Telnet or Web.

'Set Defaults' button sets the authentication to the default values.

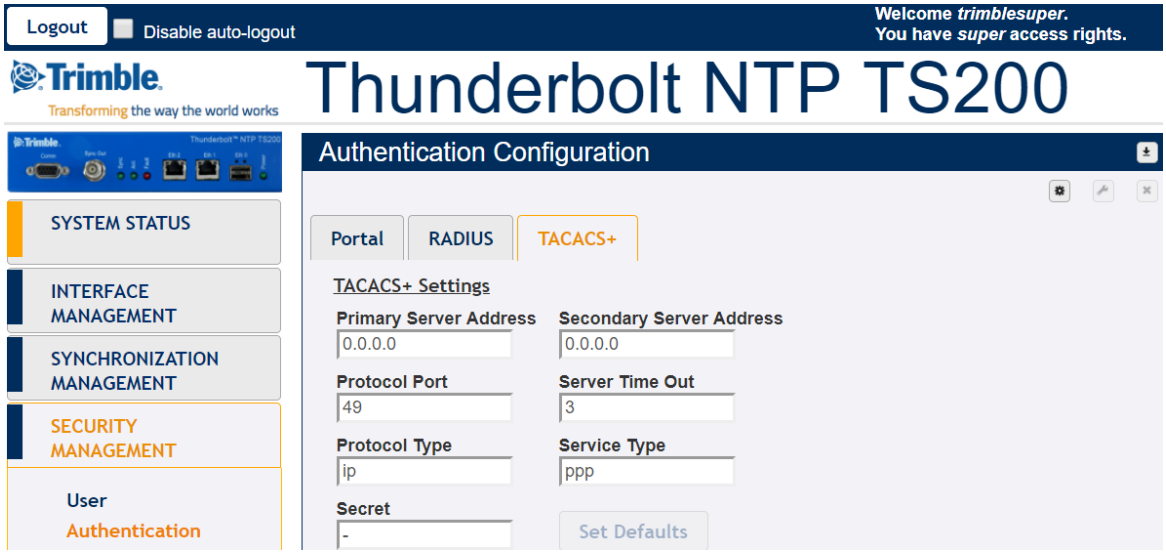
Disable option allow to disable telnet access to TS200.

Authentication RADIUS



- **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.

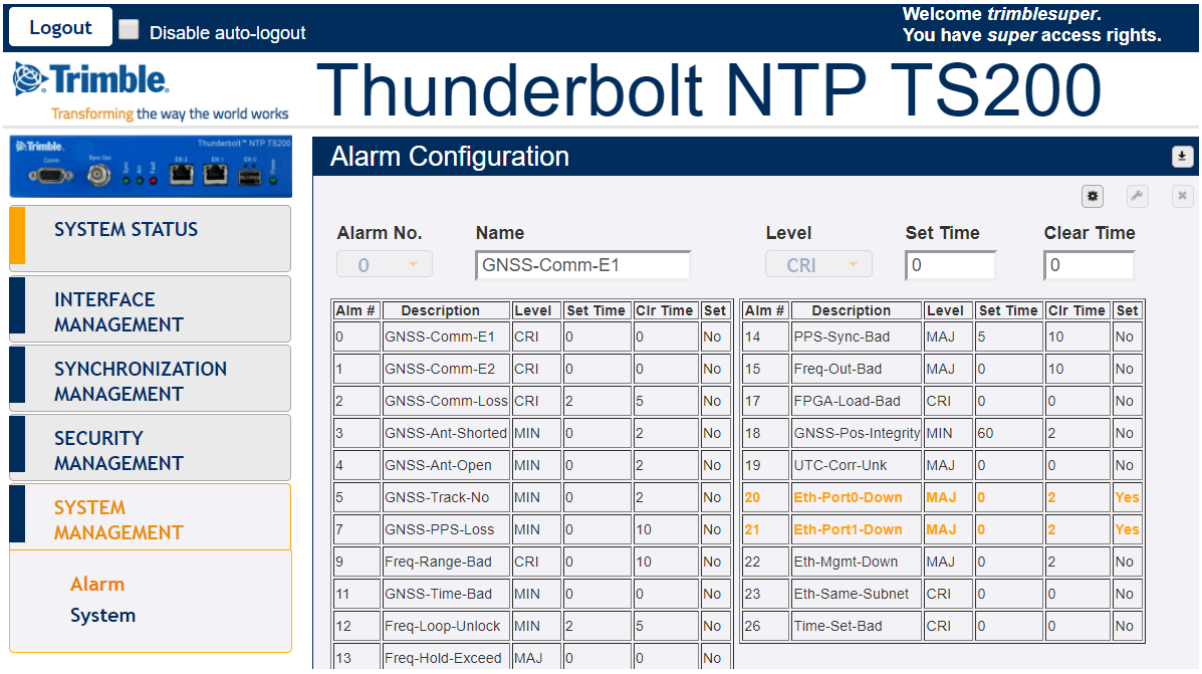
Authentication TACACS+



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

5.8 System Management

Alarm Configuration



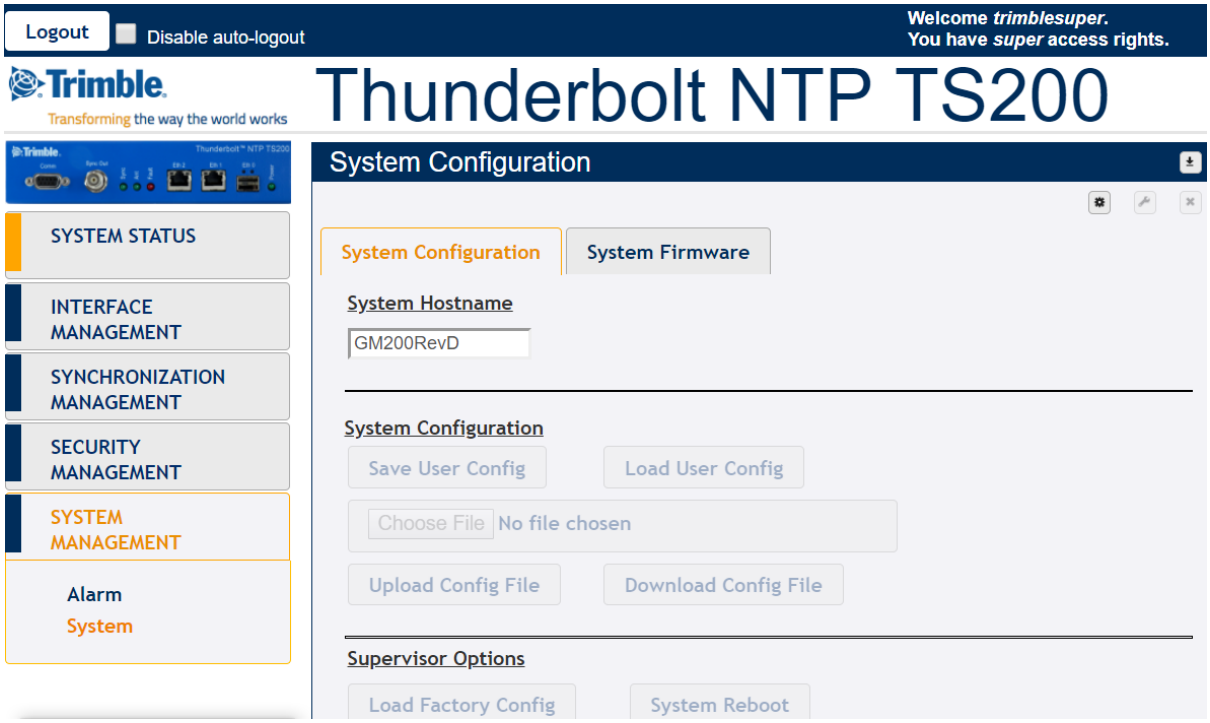
Alm #	Description	Level	Set Time	Clr Time	Set
0	GNSS-Comm-E1	CRI	0	0	No
1	GNSS-Comm-E2	CRI	0	0	No
2	GNSS-Comm-Loss	CRI	2	5	No
3	GNSS-Ant-Shorted	MIN	0	2	No
4	GNSS-Ant-Open	MIN	0	2	No
5	GNSS-Track-No	MIN	0	2	No
7	GNSS-PPS-Loss	MIN	0	10	No
9	Freq-Range-Bad	CRI	0	10	No
11	GNSS-Time-Bad	MIN	0	0	No
12	Freq-Loop-Unlock	MIN	2	5	No
13	Freq-Hold-Exceed	MAJ	0	0	No

Alm #	Description	Level	Set Time	Clr Time	Set
14	PPS-Sync-Bad	MAJ	5	10	No
15	Freq-Out-Bad	MAJ	0	10	No
17	FPGA-Load-Bad	CRI	0	0	No
18	GNSS-Pos-Integrity	MIN	60	2	No
19	UTC-Corr-Unk	MAJ	0	0	No
20	Eth-Port0-Down	MAJ	0	2	Yes
21	Eth-Port1-Down	MAJ	0	2	Yes
22	Eth-Mgmt-Down	MAJ	0	2	No
23	Eth-Same-Subnet	CRI	0	0	No
26	Time-Set-Bad	CRI	0	0	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.

System Configuration



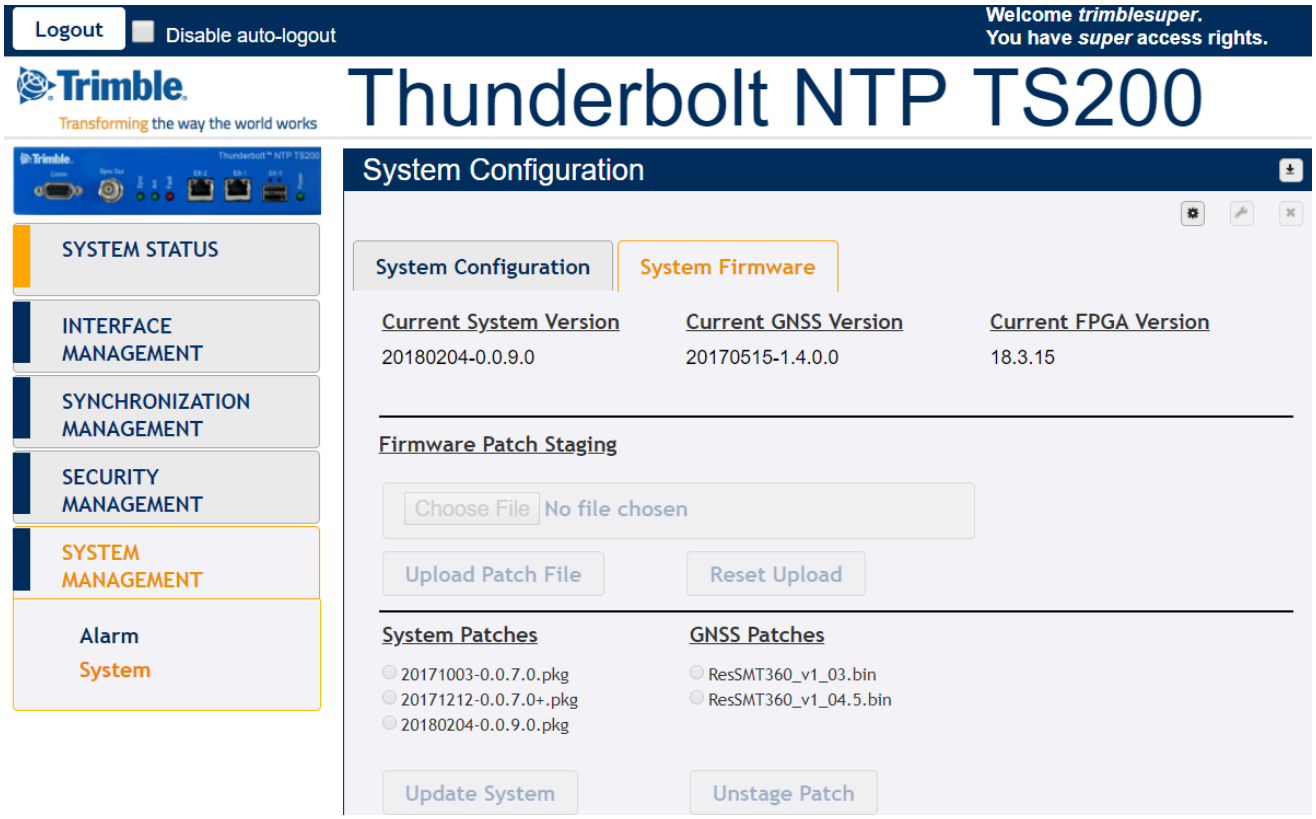
This tab allows Users to Configure System with following options:-

- **Save Configuration**
- **Download Configuration**
- **Upload Configuration**
- **Set Factory Config**
- **System Reboot**

System Software Upload

This page displays the Current System version running on Thunderbolt TS200 alone with the current GNSS version and current FPGA version.
This page allows users to upload the Thunderbolt TS200 firmware package to the system.

The uploading of the package doesn't automatically update the system firmware. Another step to "Update System" is required.



NOTE – The software upload tab is available when logged with super user level access.

CHAPTER

6

Chapter 6: SNMP Support

In this chapter:

This chapter describes the SNMP and SNMP notification setting procedure for Thunderbolt NTP Time Server Clock.

6.1 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 TS200 supports SNMP v2c.

6.2 SNMP Traps

SNMP traps enable an agent to notify the management station of significant events by way of an unsolicited SNMP message.

Thunderbolt NTP Time Server Clock TS200 provides a command line interface to enable the traps. (Refer to Chapter 4: Command Line Interface Reference)

6.3 Accessing the SNMP MIB Files

Thunderbolt NTP Time Server Clock TS200'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 NTP Time Server Clock TS200's SNMP MIB consist of two files:

- TRIMBLE-MIB.mib
- TRIMBLE-TBLT-MIB.mib

CHAPTER

7

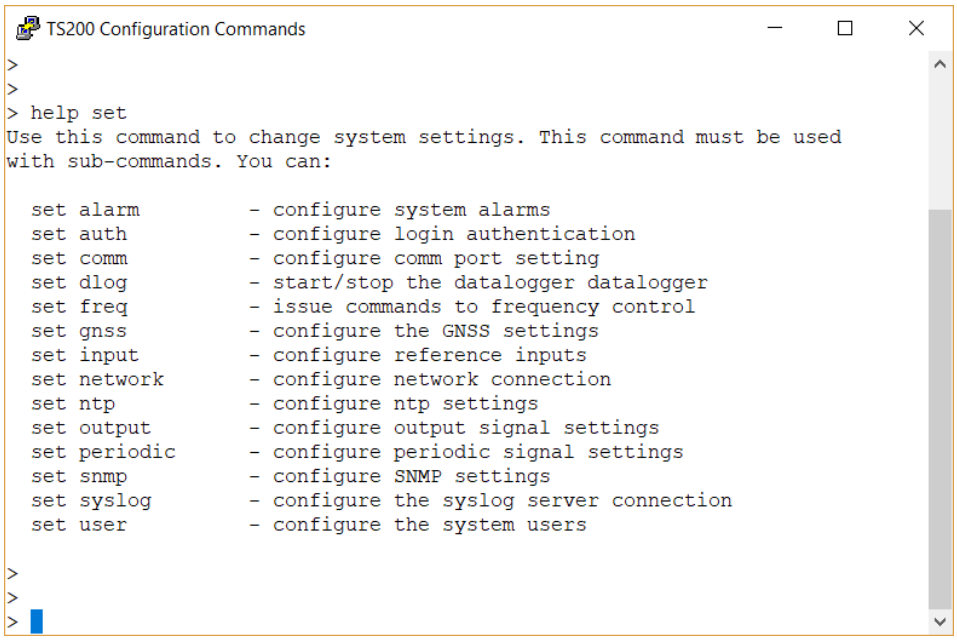
Chapter 7: TS200 Provisioning

This chapter describes the basic TS200 configuration steps when customer will interact with the first time. There are examples of CLI commands used for provisioning, as well the equivalent Web UI configuration.

In this chapter:

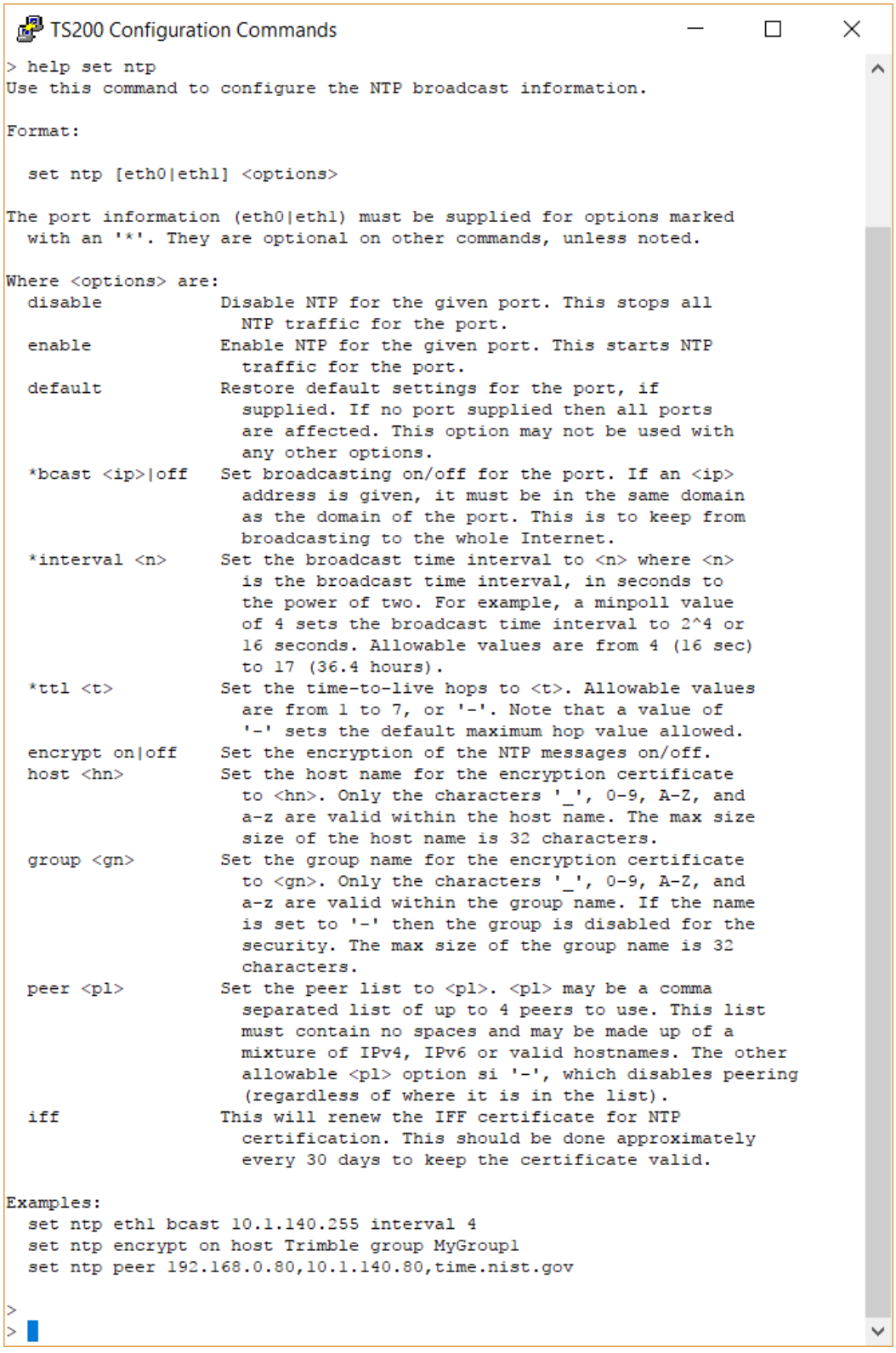
7.1 Help Commands

7.1.1 help set



There is not an equivalent in WebUI since this web user interface is very intuitive.

7.1.2 help set ntp




```
> help set ntp
Use this command to configure the NTP broadcast information.

Format:

  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> are:
  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 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 given, 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 max size
                       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. If the name
                       is set to '-' then the group is disabled for the
                       security. The max 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 si '-', 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.

Examples:
  set ntp eth1 bcast 10.1.140.255 interval 4
  set ntp encrypt on host Trimble group MyGroup1
  set ntp peer 192.168.0.80,10.1.140.80,time.nist.gov

>
>
```

‘set ntp’ command is divided in three sections in WebUI. Please select

- Synchronization Management -> NTP and select the Ethernet port to be configured: eth0 or eth1. In this section, it is possible (Image 7.1.2.1):
  - to enable/disable NTP Server
  - to enable/disable NTP Broadcast
  - To configure NTP Broadcast IP
  - To configure NTP Broadcast Interval
  - To configure NTP Broadcast TTL
- Synchronization Management -> NTP -> NTP Security. In this section, it is possible (Image 7.1.2.2):
  - To enable/disable NTP Encryption
  - To configure the system hostname
  - To configure the encryption group
- Synchronization Management -> NTP -> NTP Peers. In this section, it is possible (Image 7.1.2.3):
  - To configure 4 valid IP address working as NTP Peers for eth0 and eth1

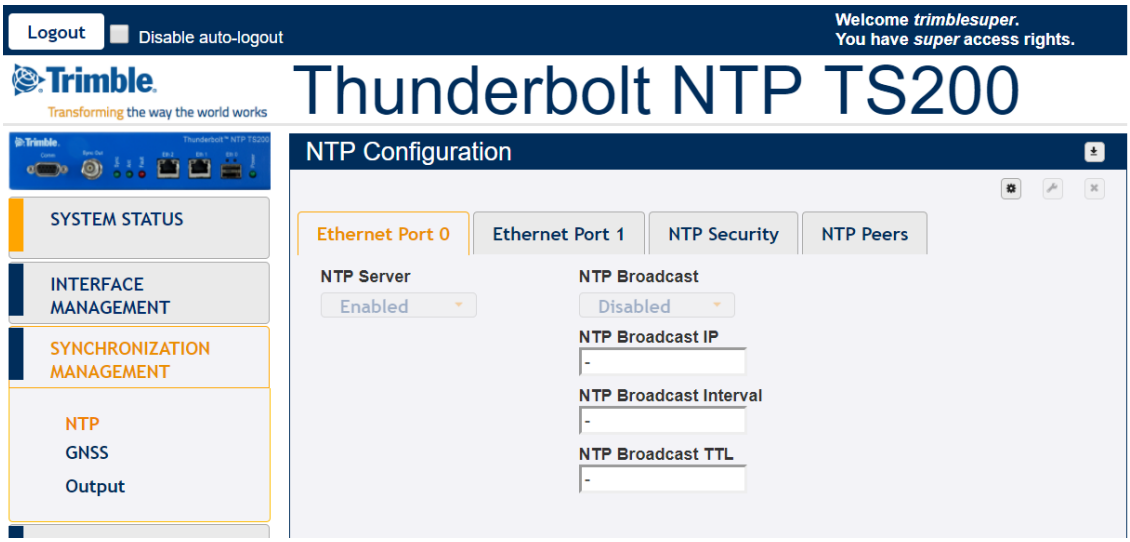


Image 7.1.2.1

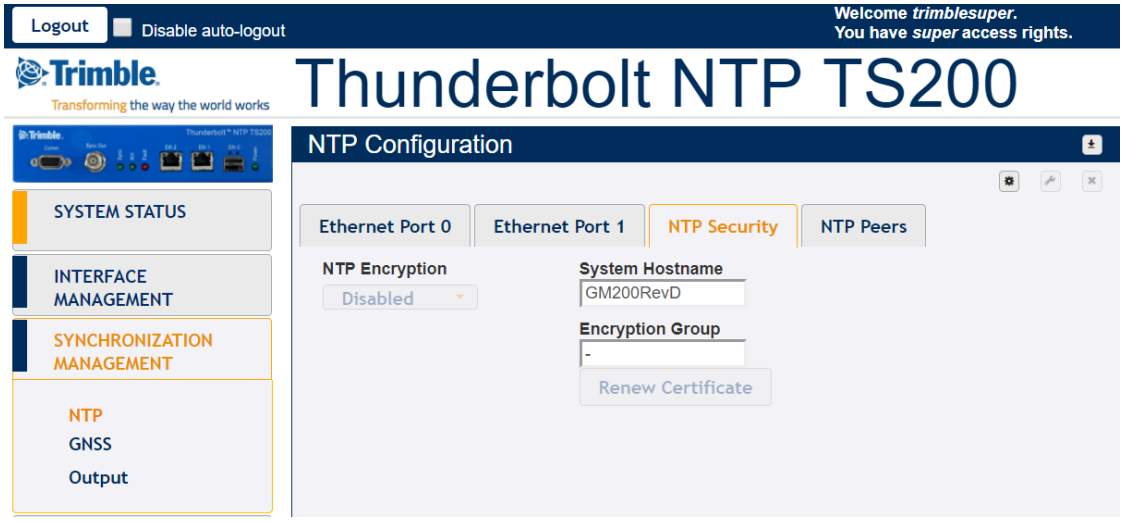


Image 7.1.2.2

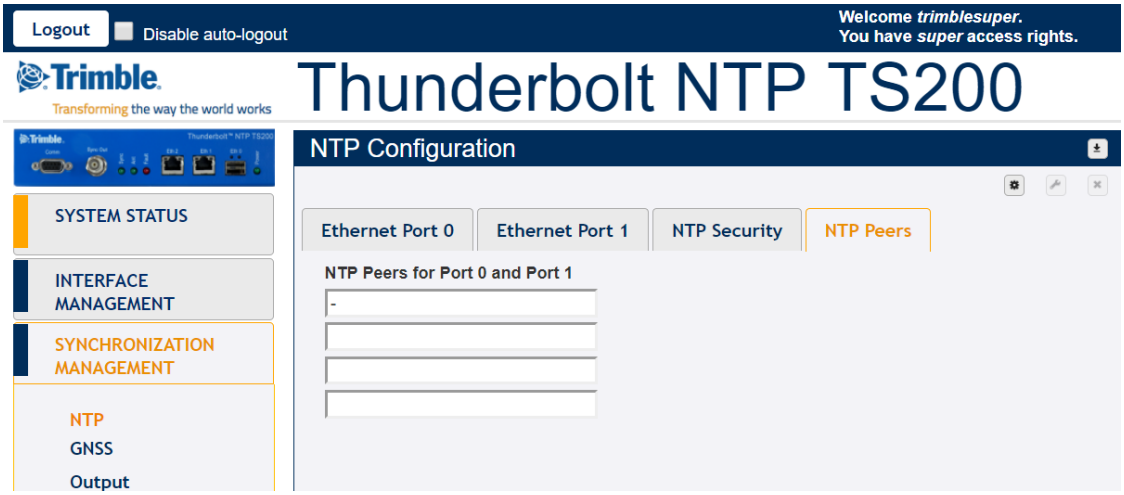
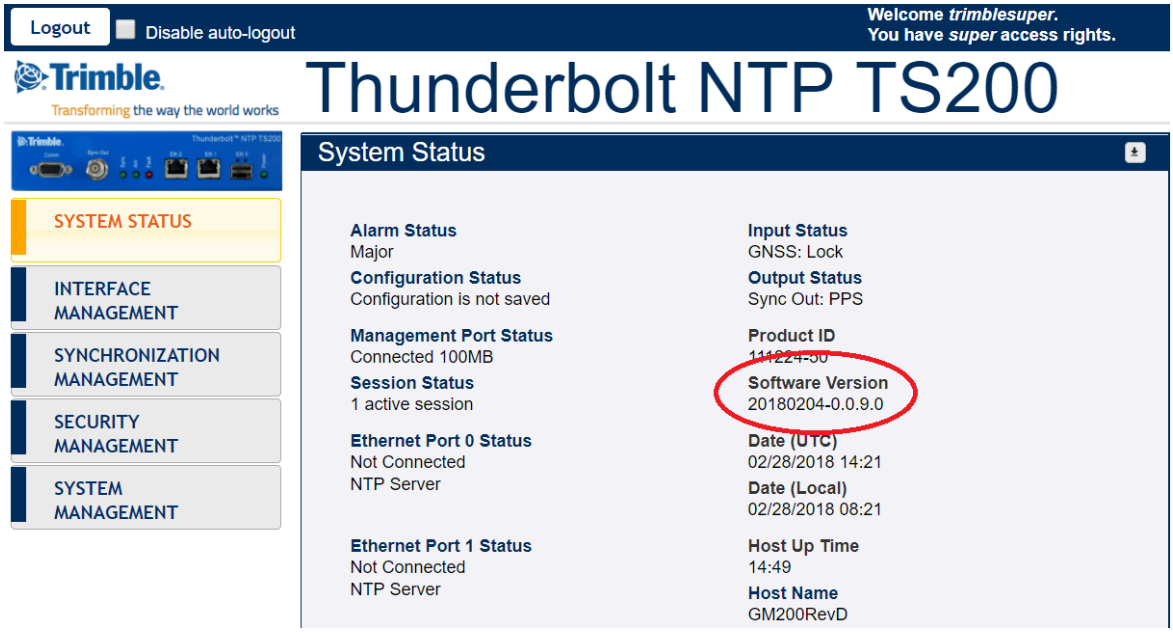


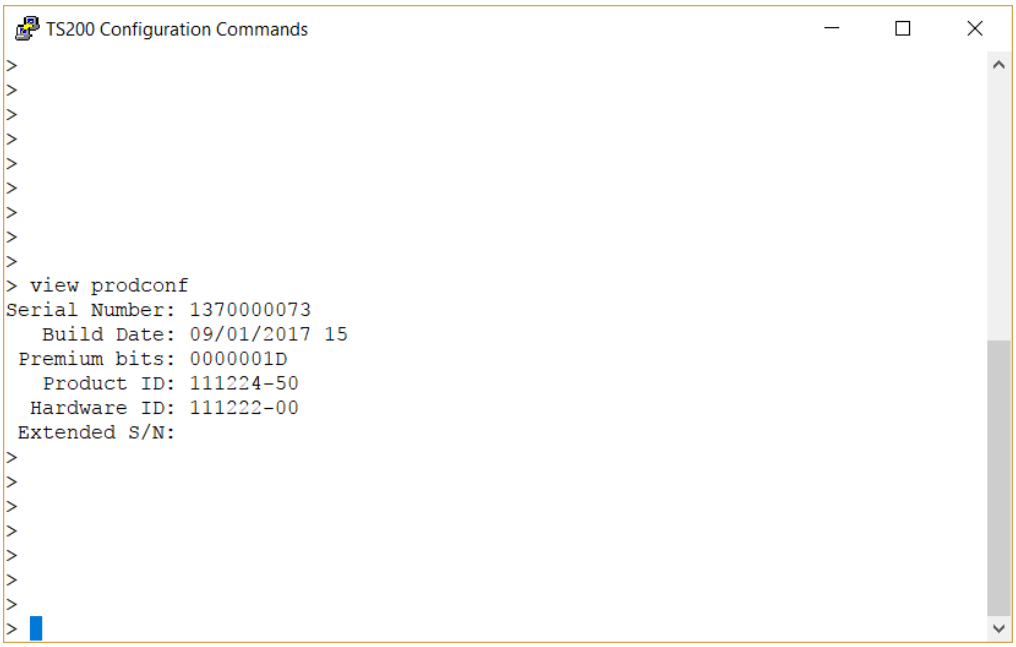
Image 7.1.2.3

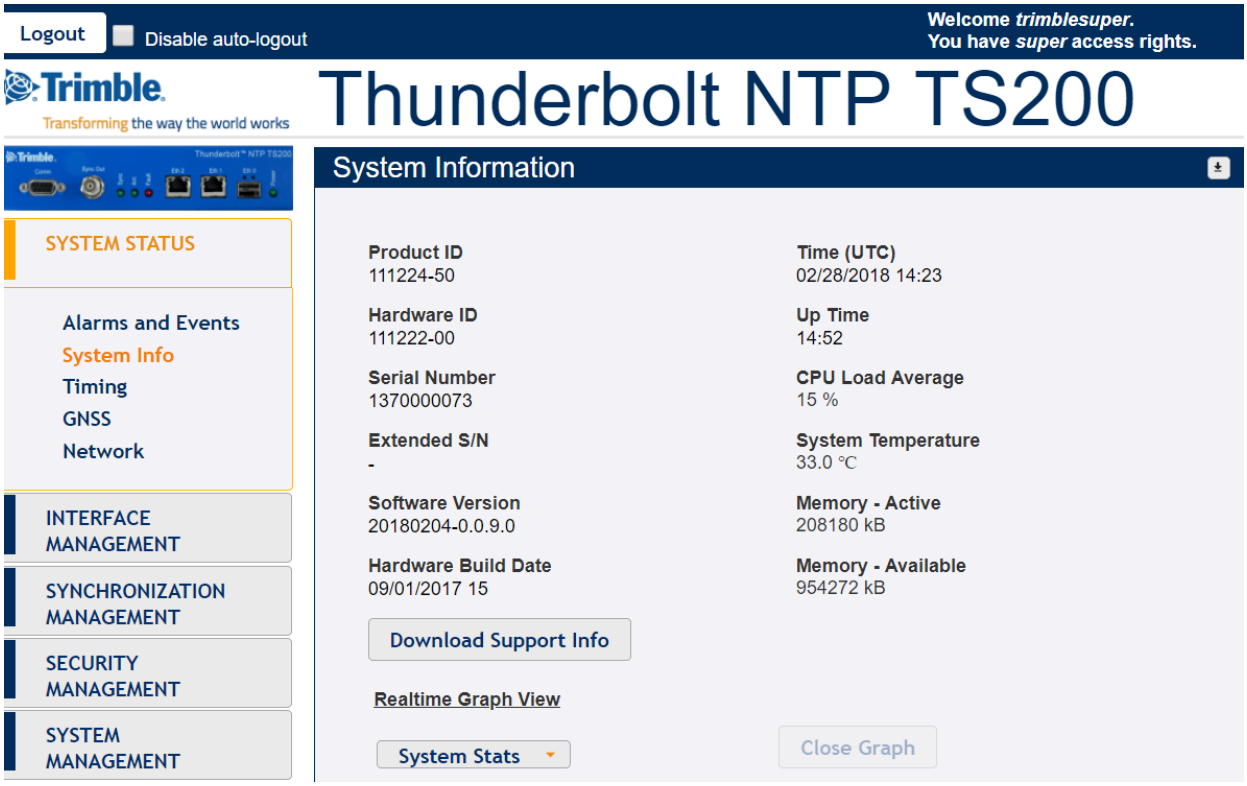
7.2 View System and Hardware Version

7.2.1 view version



7.2.2 view prodconf



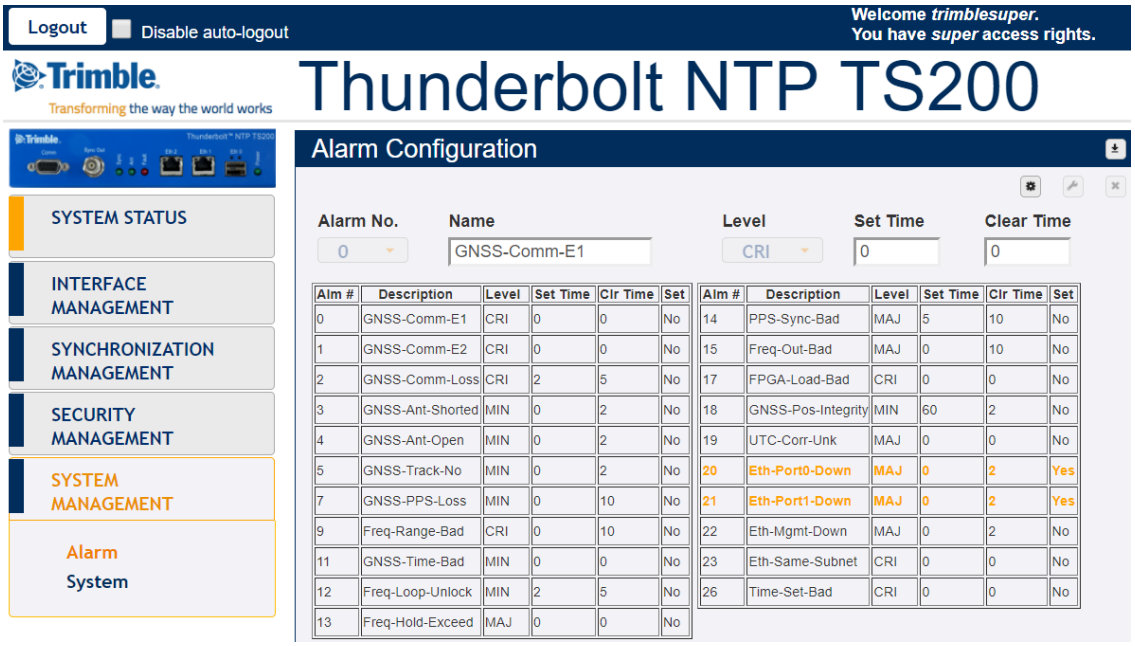


7.3 View Alarms, Status and Firmware

7.3.1 get alarm

TS200 Configuration Commands

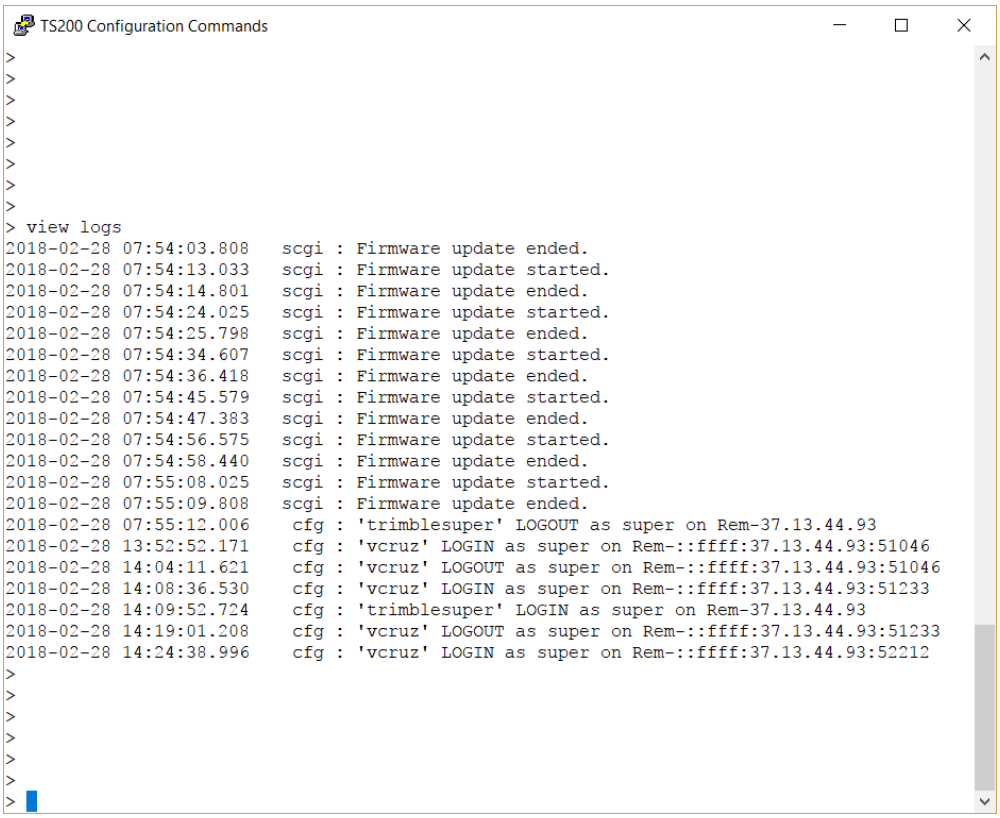
```
>
> get alarm
Current alarm settings:
 #           Alarm Desc     Level    Set Time    Clr Time
--           ----------     -----    --------    --------
 0         GNSS-Comm-E1       CRI           0           0
 1         GNSS-Comm-E2       CRI           0           0
 2       GNSS-Comm-Loss       CRI           2           5
 3     GNSS-Ant-Shorted       MIN           0           2
 4        GNSS-Ant-Open       MIN           0           2
 5        GNSS-Track-No       MIN           0           2
 7        GNSS-PPS-Loss       MIN           0          10
 9       Freq-Range-Bad       CRI           0          10
11        GNSS-Time-Bad       MIN           0           0
12     Freq-Loop-Unlock       MIN           2           5
13     Freq-Hold-Exceed       MAJ           0           0
14         PPS-Sync-Bad       MAJ           5          10
15         Freq-Out-Bad       MAJ           0          10
17        FPGA-Load-Bad       CRI           0           0
18   GNSS-Pos-Integrity       MIN          60           2
19         UTC-Corr-Unk       MAJ           0           0
20       Eth-Port0-Down       MAJ           0           2
21       Eth-Port1-Down       MAJ           0           2
22        Eth-Mgmt-Down       MAJ           0           2
23      Eth-Same-Subnet       CRI           0           0
26         Time-Set-Bad       CRI           0           0
>
```

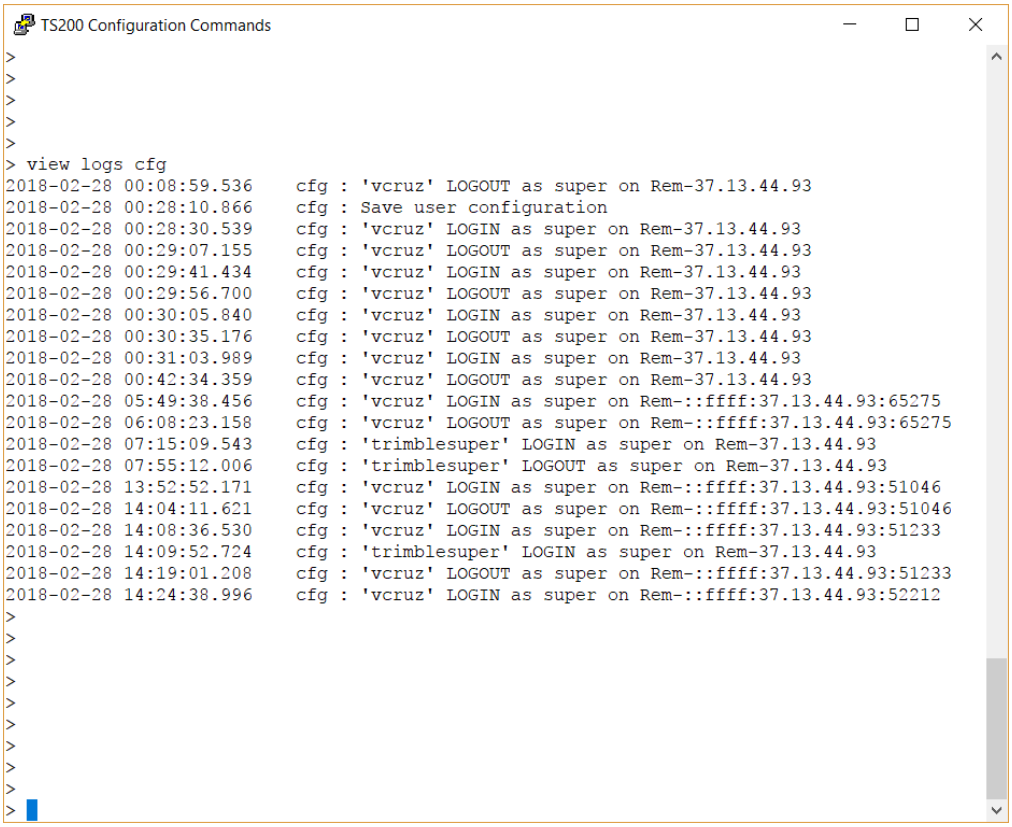


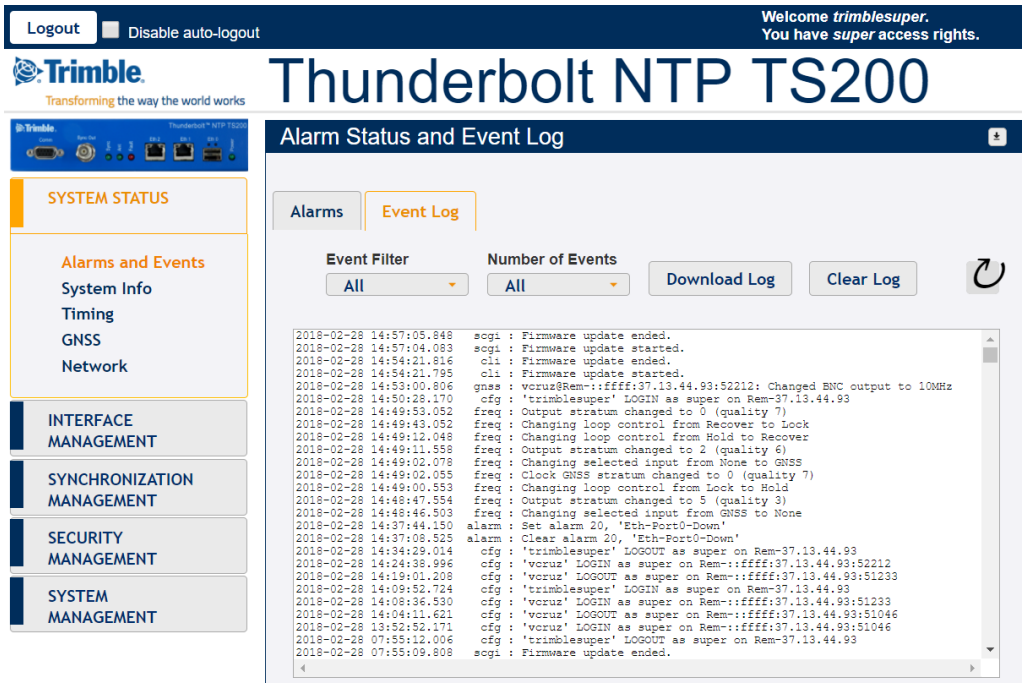
Alm #	Description	Level	Set Time	Clr Time	Set
0	GNSS-Comm-E1	CRI	0	0	No
1	GNSS-Comm-E2	CRI	0	0	No
2	GNSS-Comm-Loss	CRI	2	5	No
3	GNSS-Ant-Shorted	MIN	0	2	No
4	GNSS-Ant-Open	MIN	0	2	No
5	GNSS-Track-No	MIN	0	2	No
7	GNSS-PPS-Loss	MIN	0	10	No
9	Freq-Range-Bad	CRI	0	10	No
11	GNSS-Time-Bad	MIN	0	0	No
12	Freq-Loop-Unlock	MIN	2	5	No
13	Freq-Hold-Exceed	MAJ	0	0	No

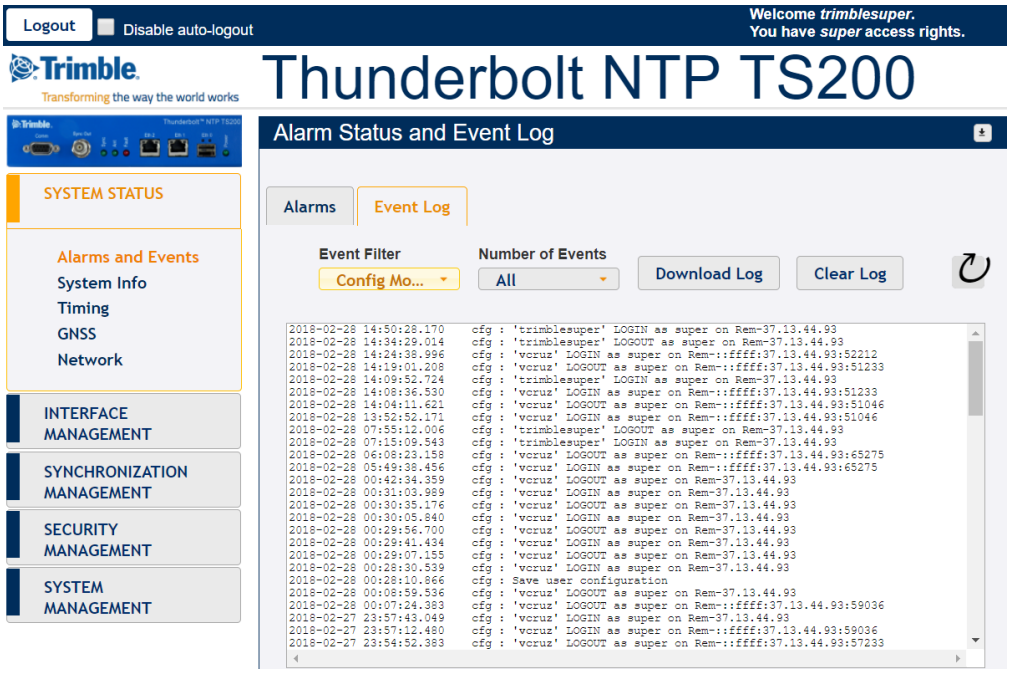
Alm #	Description	Level	Set Time	Clr Time	Set
14	PPS-Sync-Bad	MAJ	5	10	No
15	Freq-Out-Bad	MAJ	0	10	No
17	FPGA-Load-Bad	CRI	0	0	No
18	GNSS-Pos-Integrity	MIN	60	2	No
19	UTC-Corr-Unk	MAJ	0	0	No
20	Eth-Port0-Down	MAJ	0	2	Yes
21	Eth-Port1-Down	MAJ	0	2	Yes
22	Eth-Mgmt-Down	MAJ	0	2	No
23	Eth-Same-Subnet	CRI	0	0	No
26	Time-Set-Bad	CRI	0	0	No

7.3.2 view logs



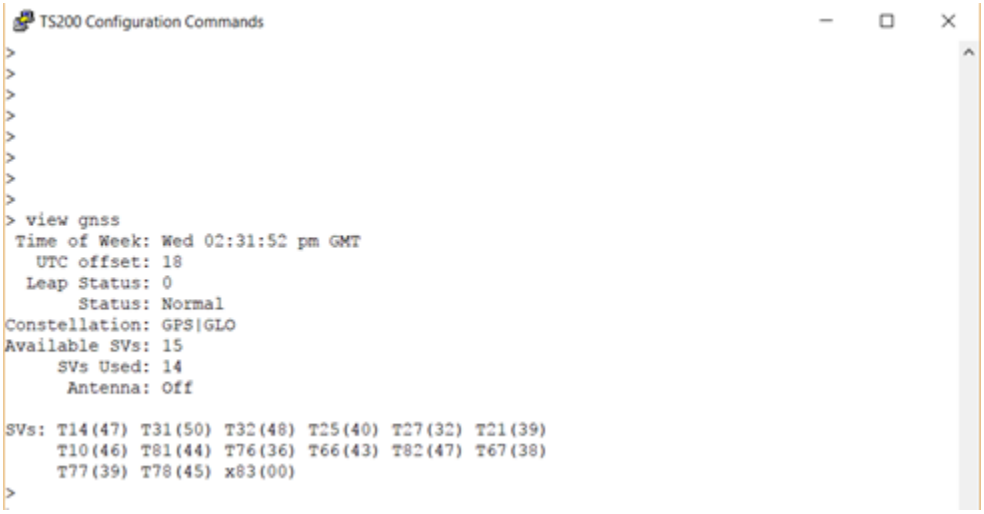


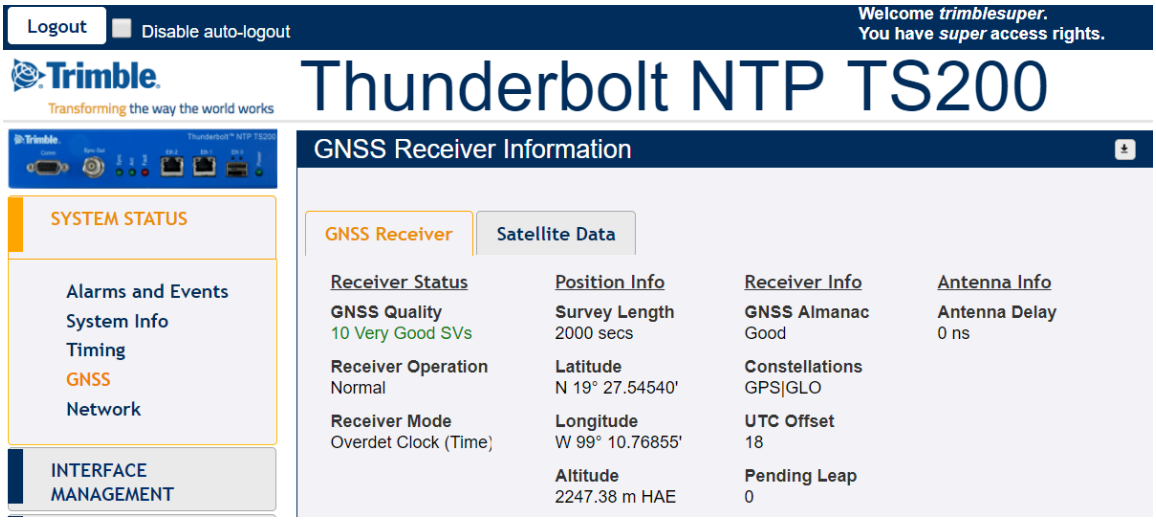

Logout
Disable auto-logout
Welcome trimblesuper.
You have super access rights.
Trimble
Transforming the way the world works
Thunderbolt NTP TS200
SYSTEM STATUS
Alarms and Events
System Info
Timing
GNSS
Network
INTERFACE MANAGEMENT
SYNCHRONIZATION MANAGEMENT
SECURITY MANAGEMENT
SYSTEM MANAGEMENT
Alarm Status and Event Log
Alarms
Event Log
Event Filter
All
Number of Events
All
Download Log
Clear Log
2018-02-28 14:57:05.848 scgi : Firmware update ended.
2018-02-28 14:57:04.083 scgi : Firmware update started.
2018-02-28 14:54:21.816 cli : Firmware update ended.
2018-02-28 14:54:21.795 cli : Firmware update started.
2018-02-28 14:53:00.806 gnss : vcruz@Rem-::ffff:37.13.44.93:52212: Changed BNC output to 10MHz
2018-02-28 14:50:28.170 cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-02-28 14:49:53.052 freq : Output stratum changed to 0 (quality 7)
2018-02-28 14:49:43.052 freq : Changing loop control from Recover to Lock
2018-02-28 14:49:12.048 freq : Changing loop control from Hold to Recover
2018-02-28 14:49:11.558 freq : Output stratum changed to 2 (quality 6)
2018-02-28 14:49:02.078 freq : Changing selected input from None to GNSS
2018-02-28 14:49:02.055 freq : Clock GNSS stratum changed to 0 (quality 7)
2018-02-28 14:49:00.553 freq : Changing loop control from Lock to Hold
2018-02-28 14:48:47.554 freq : Output stratum changed to 5 (quality 3)
2018-02-28 14:48:46.503 freq : Changing selected input from GNSS to None
2018-02-28 14:37:44.150 alarm : Set alarm 20, 'Eth-Port0-Down'
2018-02-28 14:37:08.525 alarm : Clear alarm 20, 'Eth-Port0-Down'
2018-02-28 14:34:29.014 cfg : 'trimblesuper' LOGOUT as super on Rem-37.13.44.93
2018-02-28 14:24:38.996 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:52212
2018-02-28 14:19:01.208 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:51233
2018-02-28 14:09:52.724 cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-02-28 14:08:36.530 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:51233
2018-02-28 14:04:11.621 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:51046
2018-02-28 13:52:52.171 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:51046
2018-02-28 07:55:12.006 cfg : 'trimblesuper' LOGOUT as super on Rem-37.13.44.93
2018-02-28 07:55:09.808 scgi : Firmware update ended.

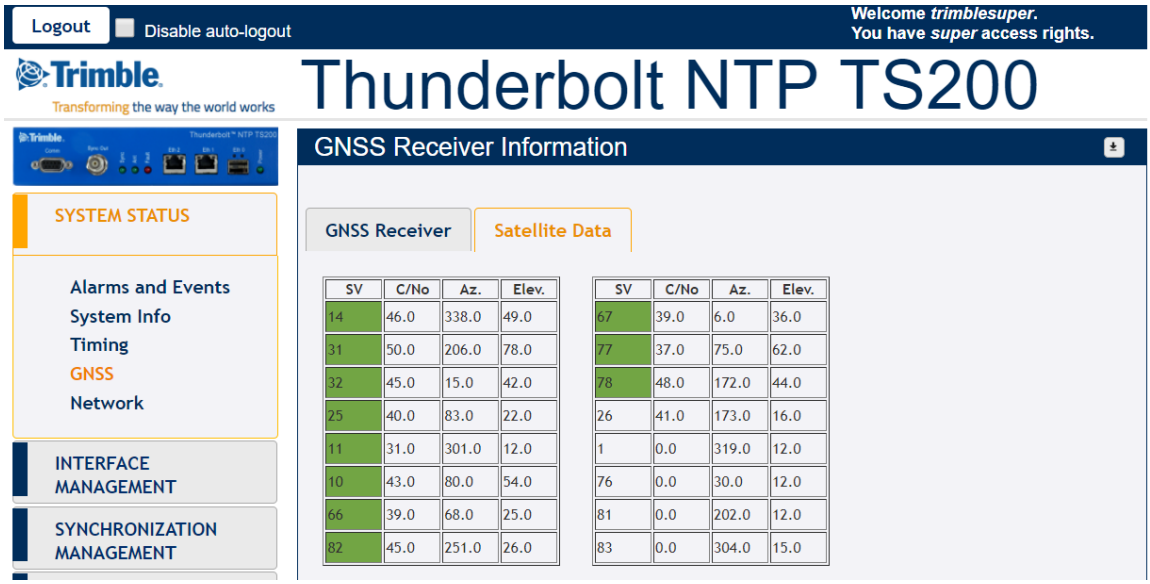

Logout
Disable auto-logout
Welcome trimblesuper.
You have super access rights.
Trimble
Transforming the way the world works
Thunderbolt NTP TS200
SYSTEM STATUS
Alarms and Events
System Info
Timing
GNSS
Network
INTERFACE MANAGEMENT
SYNCHRONIZATION MANAGEMENT
SECURITY MANAGEMENT
SYSTEM MANAGEMENT
Alarm Status and Event Log
Alarms
Event Log
Event Filter
Config Mo...
Number of Events
All
Download Log
Clear Log
2018-02-28 14:50:28.170 cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-02-28 14:34:29.014 cfg : 'trimblesuper' LOGOUT as super on Rem-37.13.44.93
2018-02-28 14:24:38.996 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:52212
2018-02-28 14:19:01.208 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:51233
2018-02-28 14:09:52.724 cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-02-28 14:08:36.530 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:51233
2018-02-28 14:04:11.621 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:51046
2018-02-28 13:52:52.171 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:51046
2018-02-28 07:55:12.006 cfg : 'trimblesuper' LOGOUT as super on Rem-37.13.44.93
2018-02-28 07:15:09.543 cfg : 'trimblesuper' LOGIN as super on Rem-37.13.44.93
2018-02-28 06:08:23.158 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:65275
2018-02-28 05:49:38.456 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:65275
2018-02-28 00:42:34.359 cfg : 'vcruz' LOGOUT as super on Rem-37.13.44.93
2018-02-28 00:31:03.989 cfg : 'vcruz' LOGIN as super on Rem-37.13.44.93
2018-02-28 00:30:35.176 cfg : 'vcruz' LOGOUT as super on Rem-37.13.44.93
2018-02-28 00:30:05.840 cfg : 'vcruz' LOGIN as super on Rem-37.13.44.93
2018-02-28 00:29:56.700 cfg : 'vcruz' LOGOUT as super on Rem-37.13.44.93
2018-02-28 00:29:41.434 cfg : 'vcruz' LOGIN as super on Rem-37.13.44.93
2018-02-28 00:29:07.155 cfg : 'vcruz' LOGOUT as super on Rem-37.13.44.93
2018-02-28 00:28:30.539 cfg : 'vcruz' LOGIN as super on Rem-37.13.44.93
2018-02-28 00:28:10.866 cfg : Save user configuration
2018-02-28 00:08:59.536 cfg : 'vcruz' LOGOUT as super on Rem-37.13.44.93
2018-02-28 00:07:24.383 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:59036
2018-02-27 23:57:43.049 cfg : 'vcruz' LOGIN as super on Rem-37.13.44.93
2018-02-27 23:57:12.480 cfg : 'vcruz' LOGIN as super on Rem-::ffff:37.13.44.93:59036
2018-02-27 23:54:52.383 cfg : 'vcruz' LOGOUT as super on Rem-::ffff:37.13.44.93:57233

7.4 GNSS and Lock Status

7.4.1 view gnss

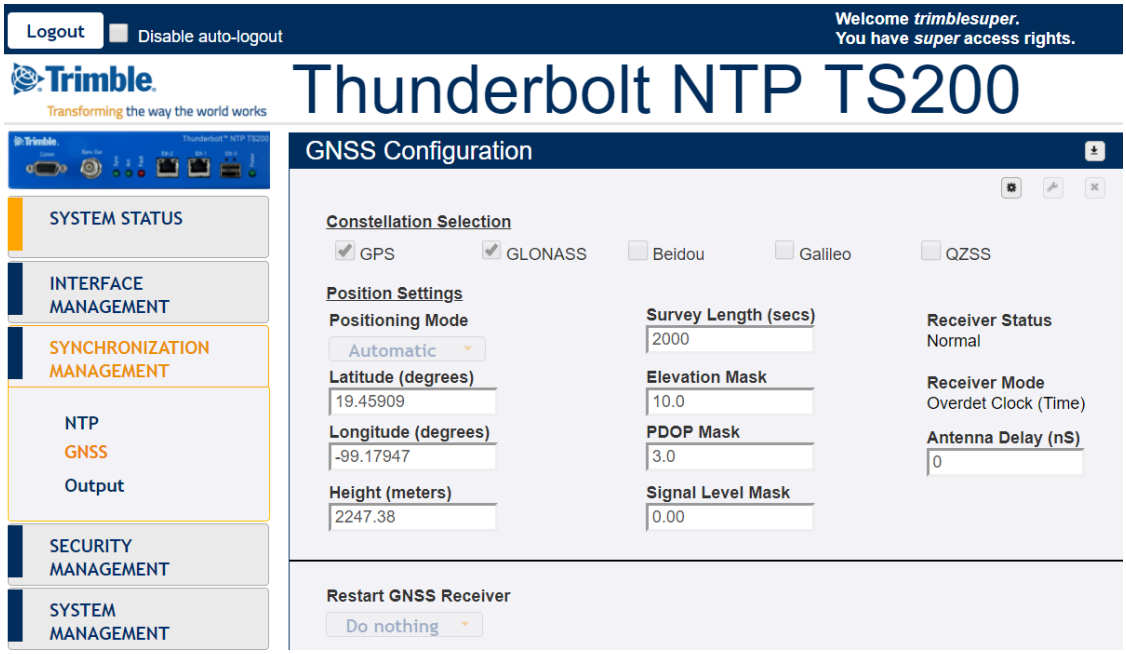




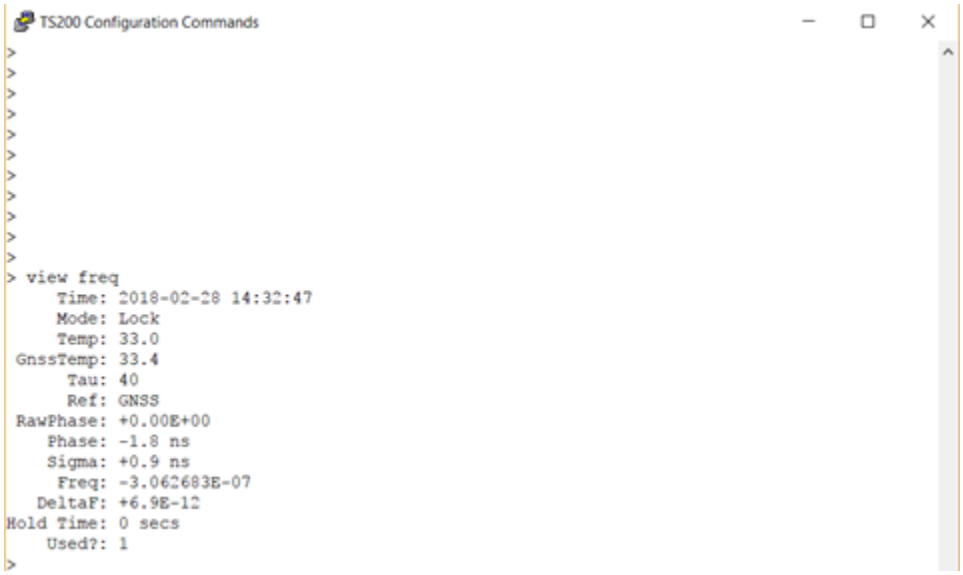


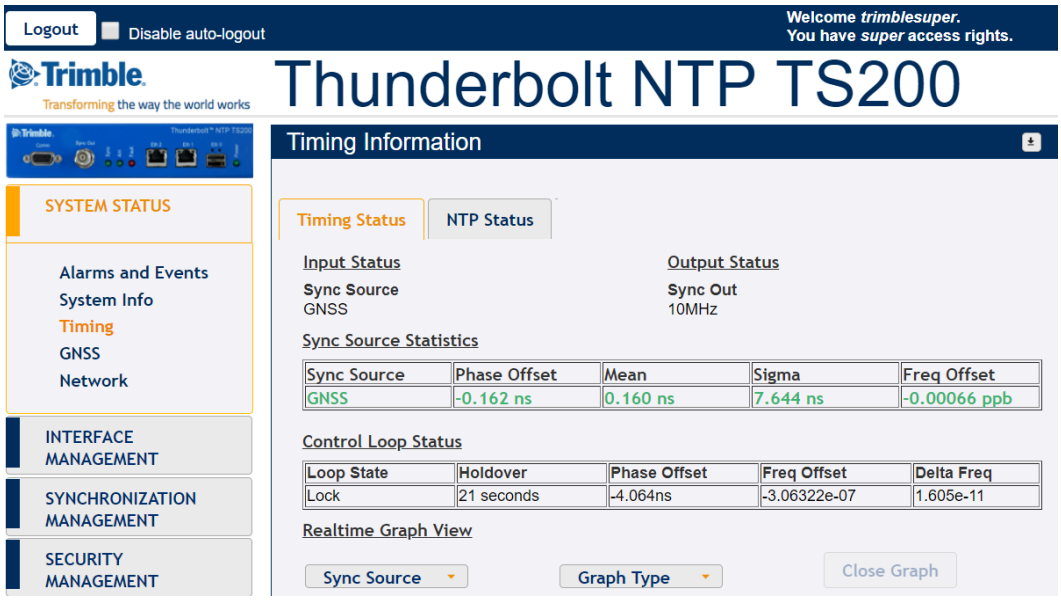
7.4.2 get gnss


TS200 Configuration Commands
> get gnss
Constellation: GPS|GLO
Elevation mask: 10.0 deg
Signal level mask: 0.00 db/Hz
PDOP mask: 3.0
Antenna delay: 0 ns
Pos: auto
Survey length: 2000
Antenna: Off


Logout
Disable auto-logout
Welcome trimblesuper.
You have super access rights.
Trimble
Transforming the way the world works
Thunderbolt NTP TS200
SYSTEM STATUS
INTERFACE MANAGEMENT
SYNCHRONIZATION MANAGEMENT
NTP
GNSS
Output
SECURITY MANAGEMENT
SYSTEM MANAGEMENT
GNSS Configuration
Constellation Selection
GPS
GLONASS
Beidou
Galileo
QZSS
Position Settings
Positioning Mode
Automatic
Latitude (degrees)
19.45909
Longitude (degrees)
-99.17947
Height (meters)
2247.38
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
Restart GNSS Receiver
Do nothing

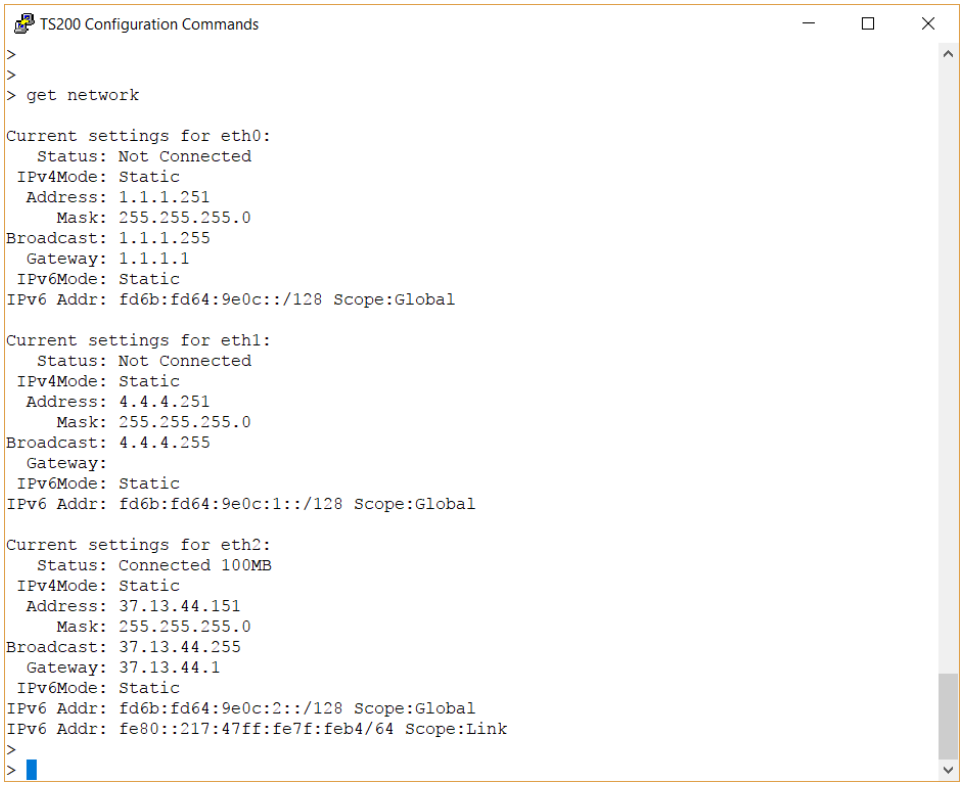
7.4.3 view freq



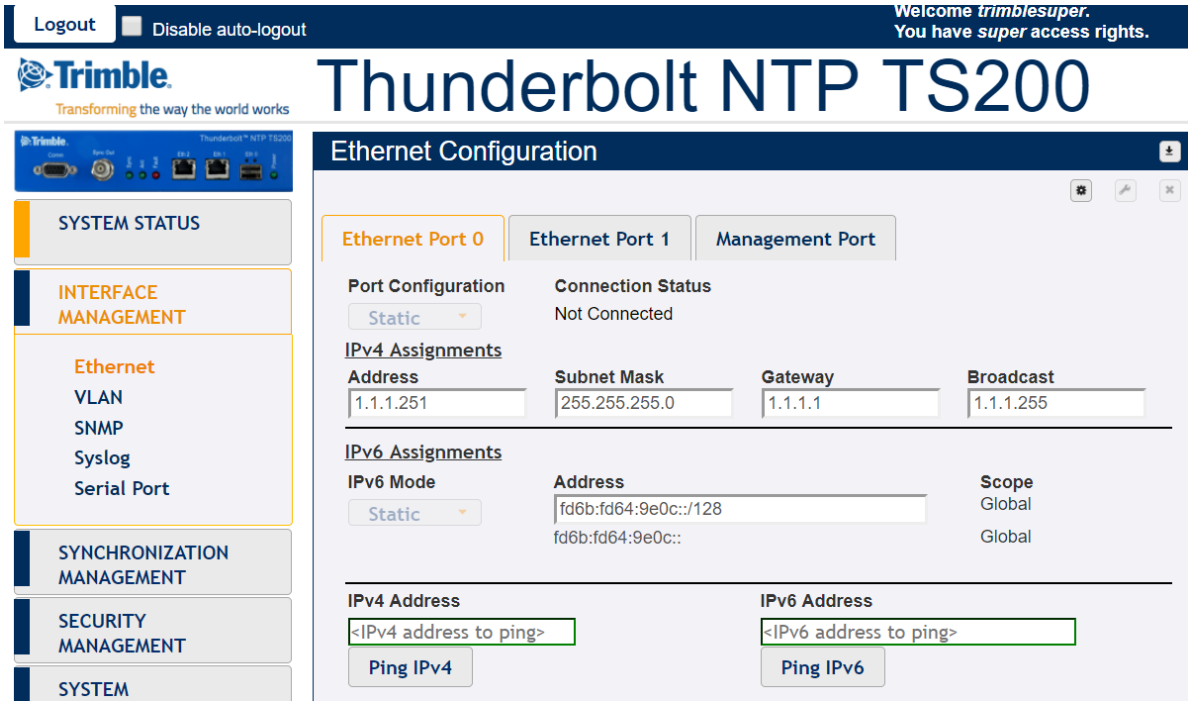


7.5 Network Configuration

7.5.1 get network

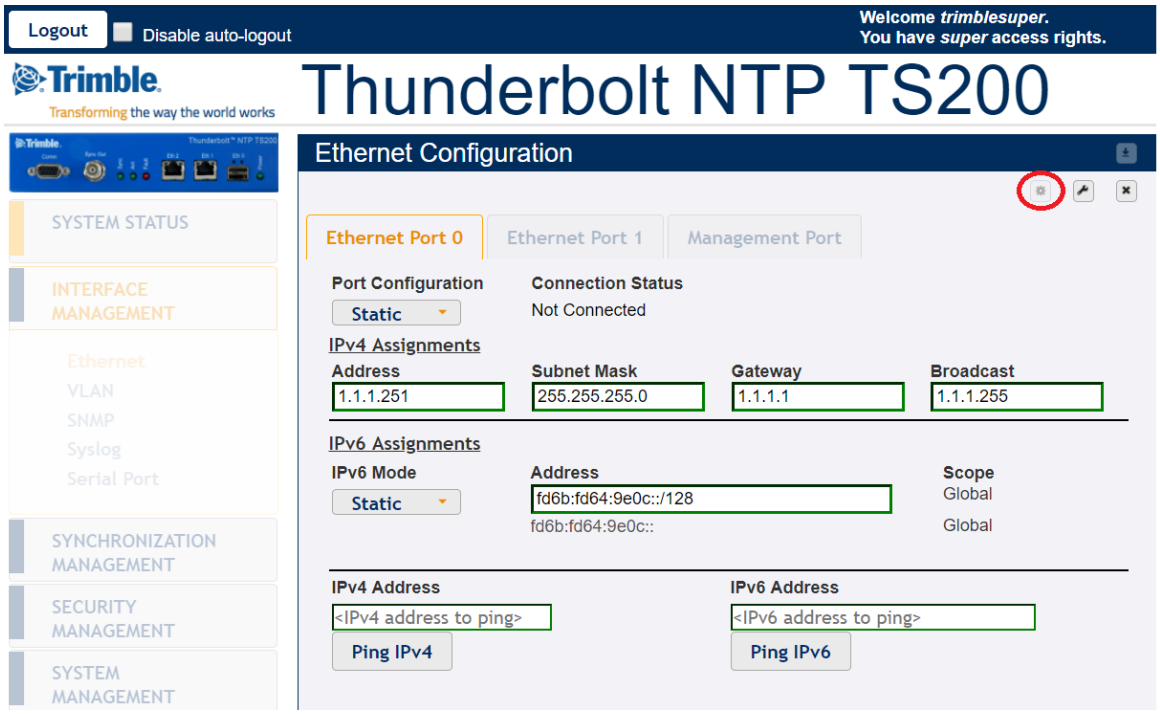


Note: Each network interface should be on different subnet



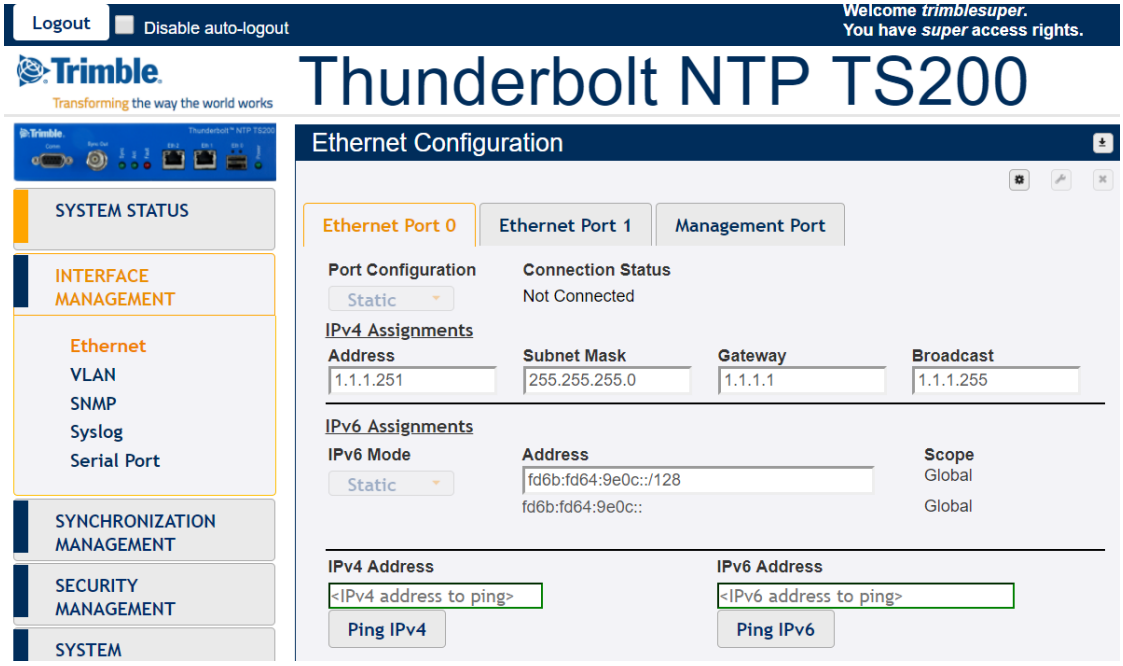
7.5.2 set network

```
TS200 Configuration Commands
>
>
> set network eth0 disable
Interface: eth0
Disabling interface
> set network eth0 addr 1.1.1.251 mask 255.255.255.0 gateway 1.1.1.1
Interface: eth0
Setting IP address to 1.1.1.251
Setting network mask to 255.255.255.0
Setting gateway address to 1.1.1.1
>
>
```

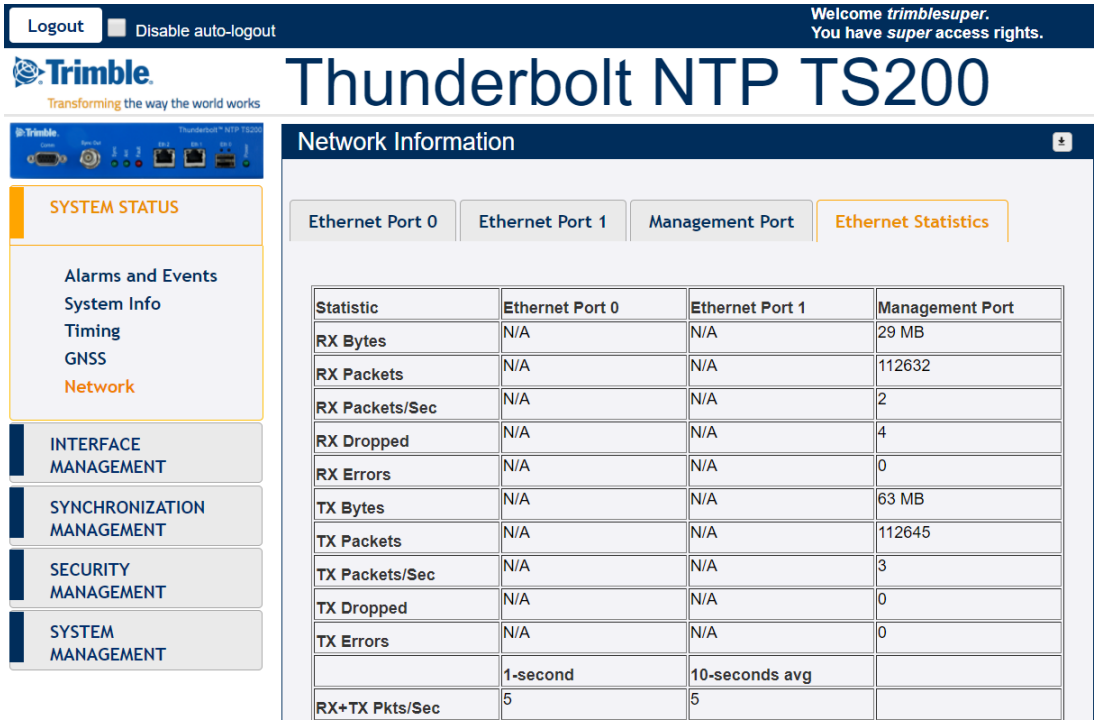


7.5.3 get network eth<x>

```
TS200 Configuration Commands
>
>
> get network eth0

Current settings for eth0:
   Status: Not Connected
 IPv4Mode: Static
  Address: 1.1.1.251
     Mask: 255.255.255.0
Broadcast: 1.1.1.255
  Gateway: 1.1.1.1
 IPv6Mode: Static
IPv6 Addr: fd6b:fd64:9e0c::/128 Scope:Global
>
>
```



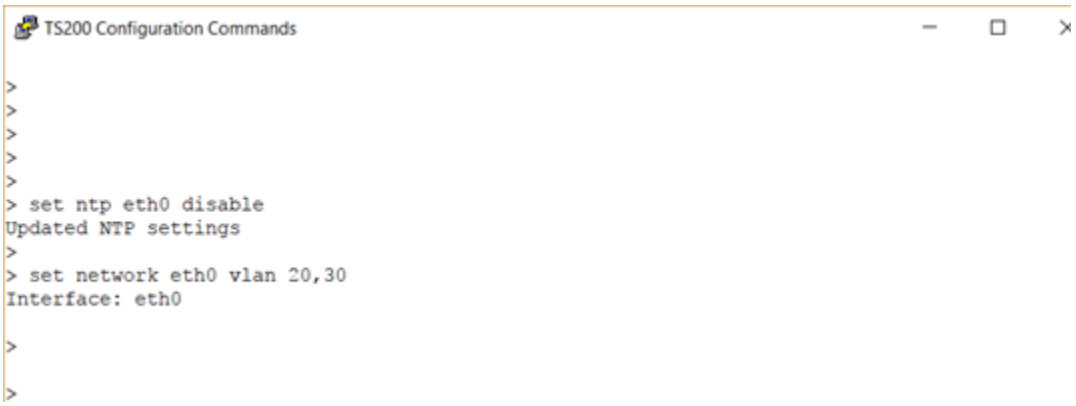
7.5.4 view network eth<x>

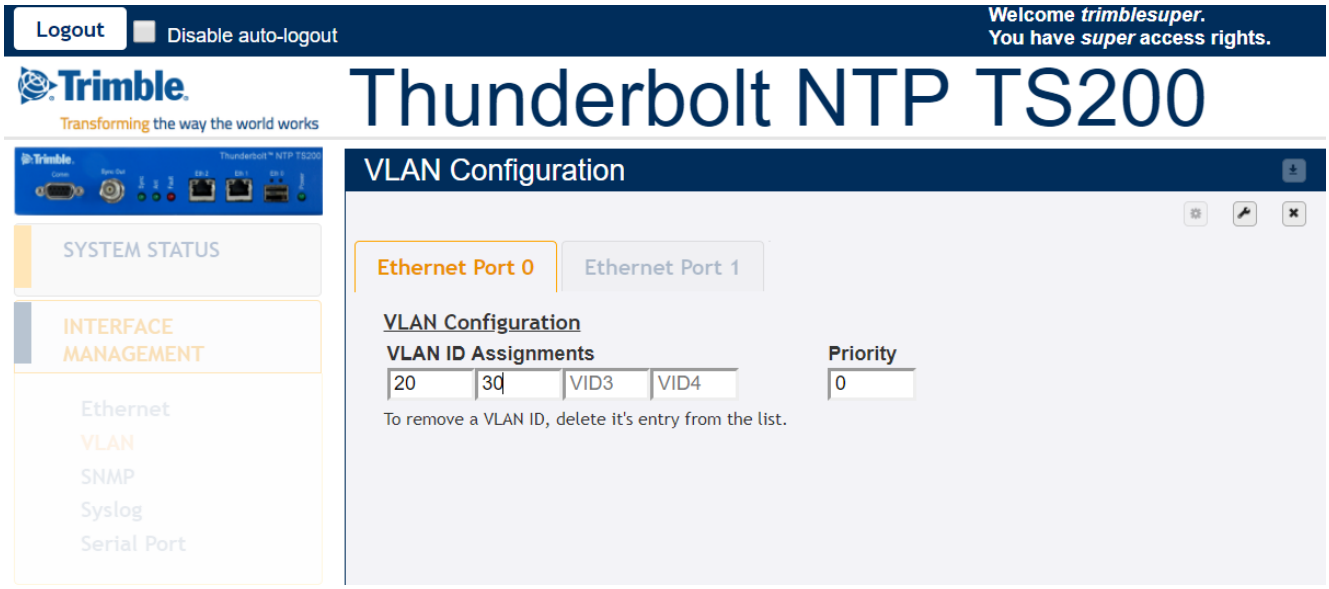


7.6 VLAN Configuration

7.6.1 set network eth0 vlan

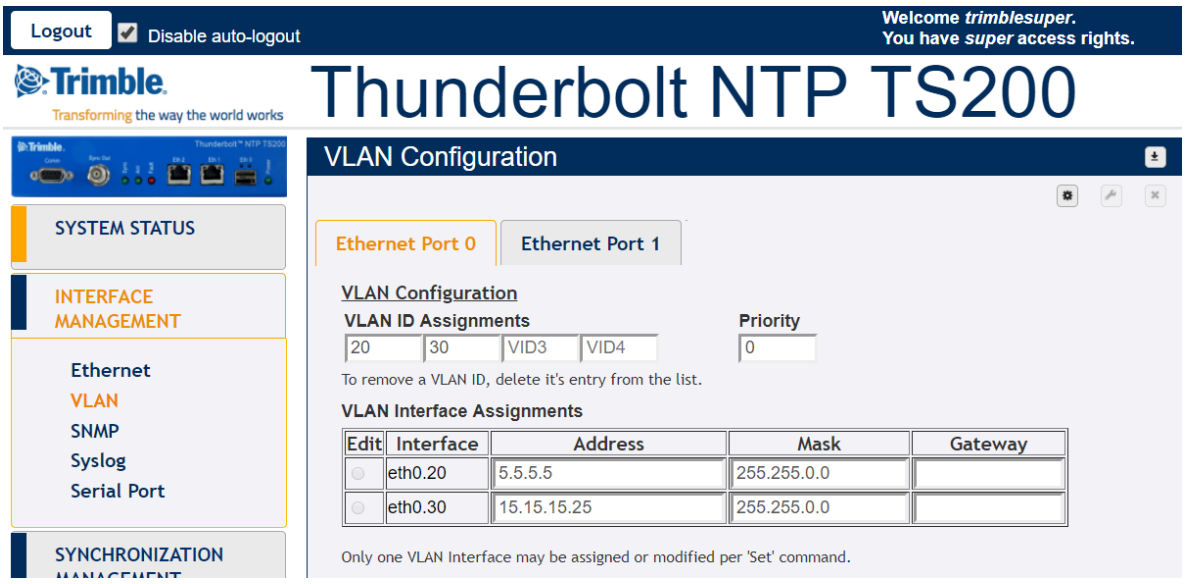
Note: need to stop NTP first





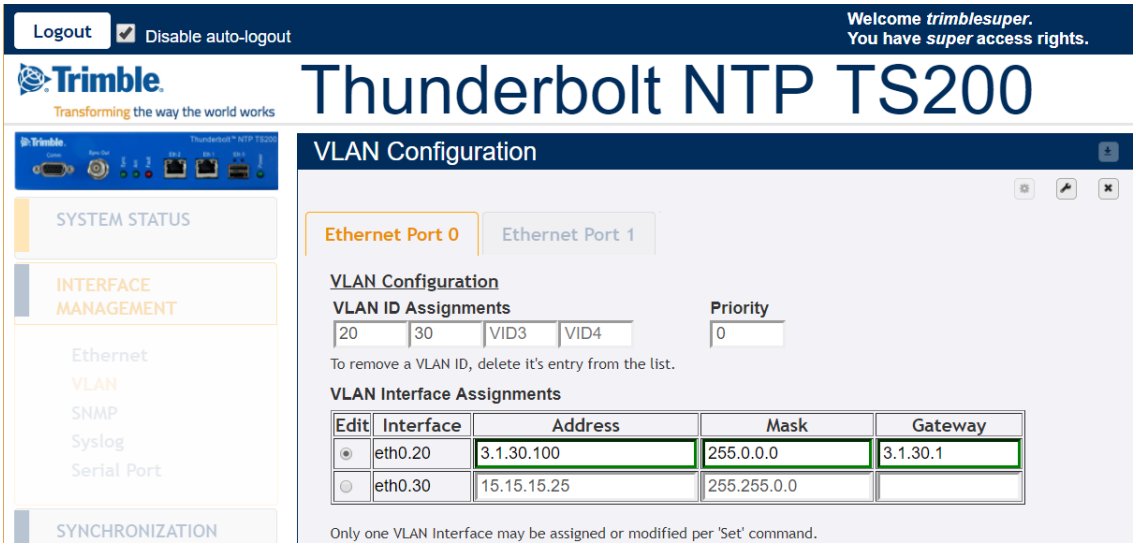
7.6.2 get network eth0

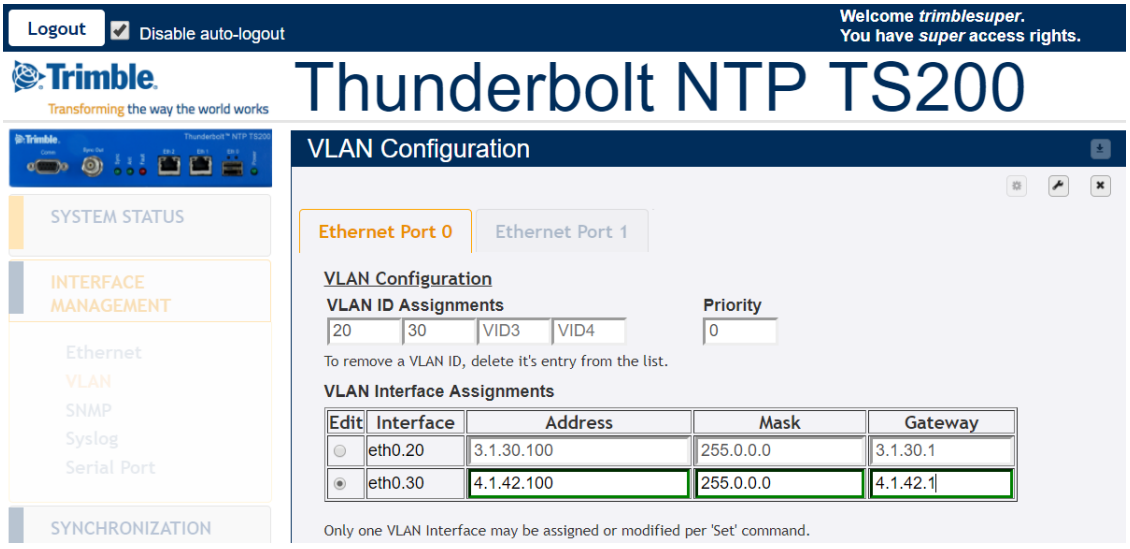
```
TS200 Configuration Commands
>
>
>
>
>
> get network eth0

Current settings for eth0:
   Status: Not Connected
 IPv4Mode: Static
  Address: 1.1.1.251
     Mask: 255.255.255.0
Broadcast: 1.1.1.255
  Gateway: 1.1.1.1
 IPv6Mode: Static
IPv6 Addr: fd6b:fd64:9e0c::/128 Scope:Global
 VLAN IDs: 20, 30

Current settings for eth0.20:
   Status: Not Connected
 IPv4Mode: Static
  Address: 15.15.15.15
     Mask: 255.255.255.0
Broadcast: 15.15.15.255
  Gateway:
 IPv6Mode: Static

Current settings for eth0.30:
   Status: Not Connected
 IPv4Mode: Static
  Address: 15.15.15.15
     Mask: 255.255.255.0
Broadcast: 15.15.15.255
  Gateway:
 IPv6Mode: Static
>
```



7.6.3 set network eth0.20

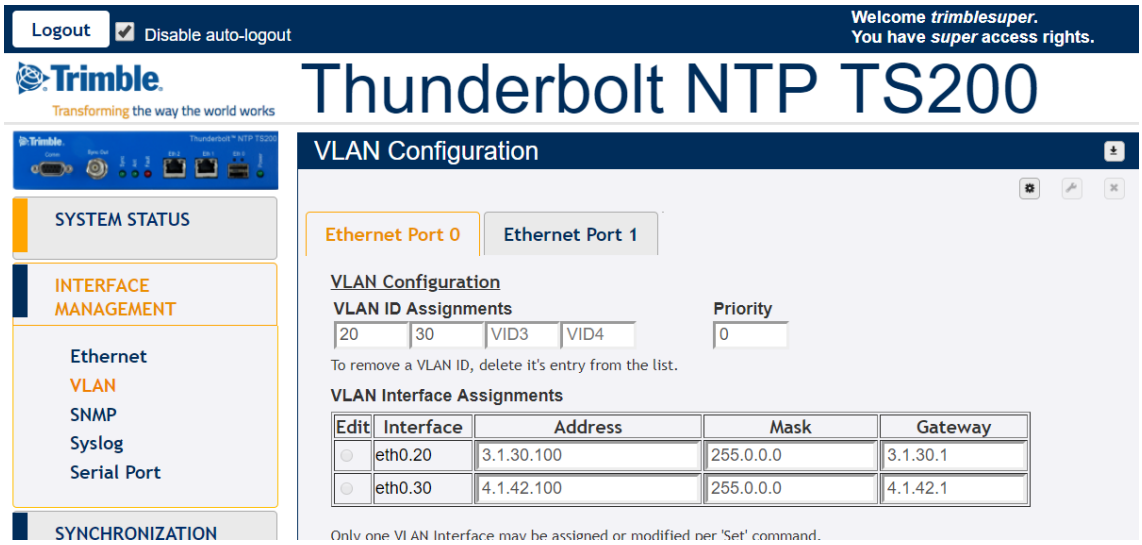
```
TS200 Configuration Commands
>
>
> set network eth0.20 addr 3.1.30.100 mask 255.0.0.0 gateway 3.1.30.1
Interface: eth0.20
Setting IP address to 3.1.30.100
Setting network mask to 255.0.0.0
Setting gateway address to 3.1.30.1
>
>
> set network eth0.30 addr 4.1.42.100 mask 255.0.0.0 gateway 4.1.42.1
Interface: eth0.30
Setting IP address to 4.1.42.100
Setting network mask to 255.0.0.0
Setting gateway address to 4.1.42.1
>
>
```





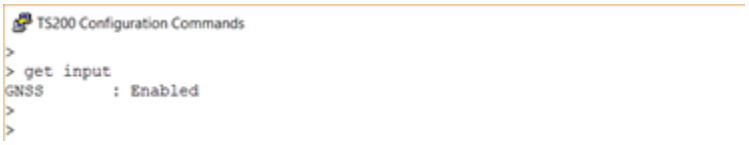
7.6.4 get network eth0

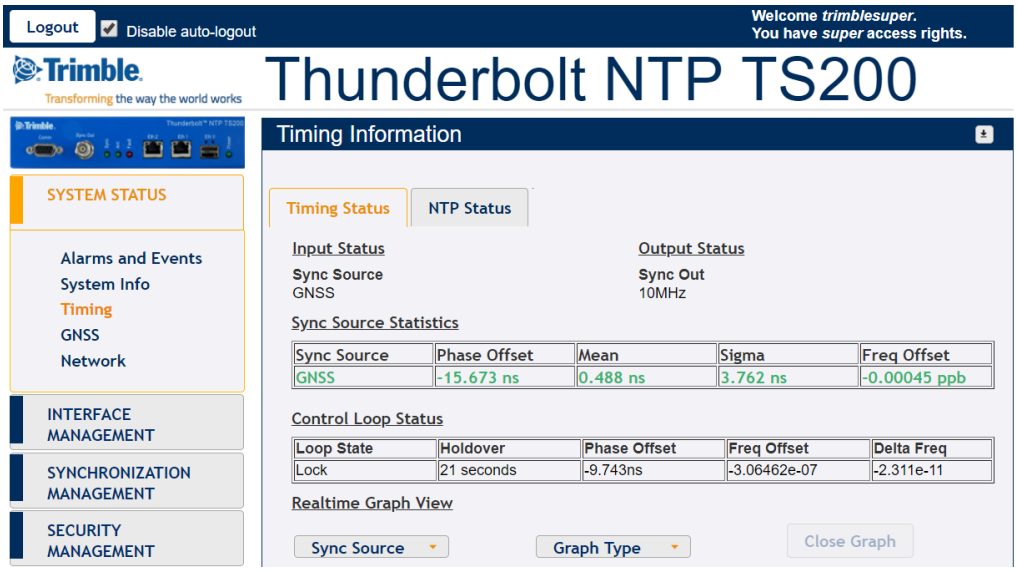
```
TS200 Configuration Commands
>
>
>
> get network eth0

Current settings for eth0:
   Status: Not Connected
 IPv4Mode: Static
  Address: 1.1.1.251
     Mask: 255.255.255.0
Broadcast: 1.1.1.255
  Gateway: 1.1.1.1
 IPv6Mode: Static
IPv6 Addr: fd6b:fd64:9e0c::/128 Scope:Global
 VLAN IDs: 20, 30

Current settings for eth0.20:
   Status: Not Connected
 IPv4Mode: Static
  Address: 3.1.30.100
     Mask: 255.0.0.0
Broadcast: 3.255.255.255
  Gateway: 3.1.30.1
 IPv6Mode: Static

Current settings for eth0.30:
   Status: Not Connected
 IPv4Mode: Static
  Address: 4.1.42.100
     Mask: 255.0.0.0
Broadcast: 4.255.255.255
  Gateway: 4.1.42.1
 IPv6Mode: Static
>
>
>
```



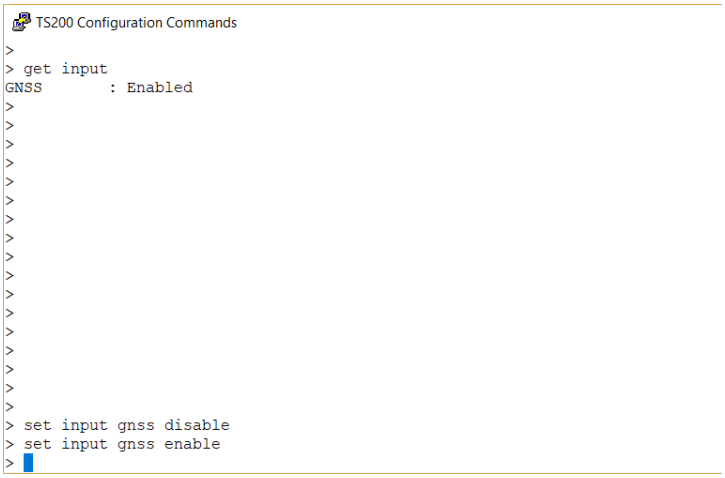
7.8 Input Clock Source Control

7.8.1 get input





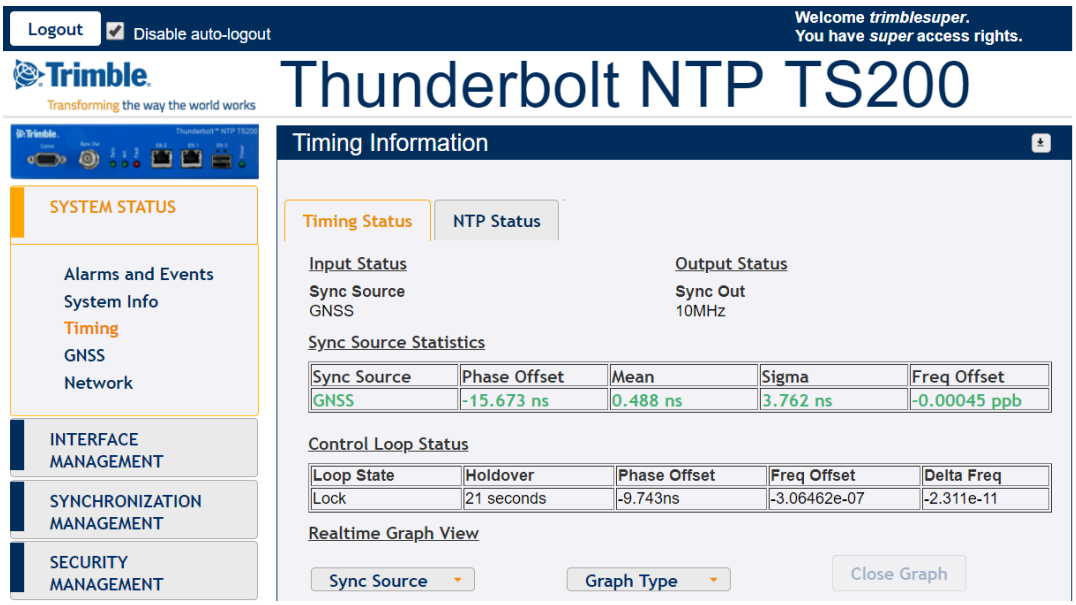
7.8.2 set input



It is not supported in the WebUI

7.8.3 view input

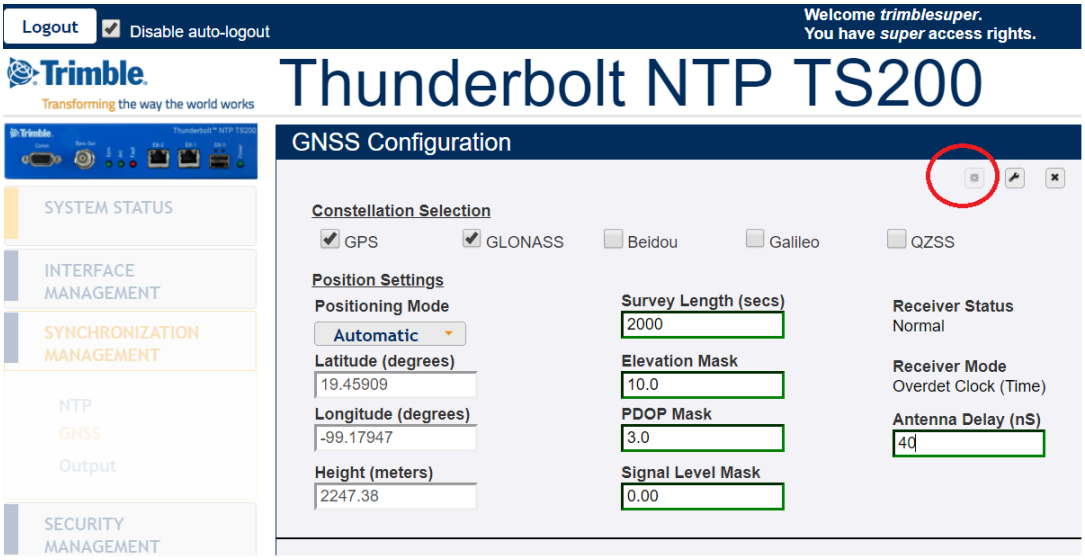
```
TS200 Configuration Commands
>
> set input gnss disable
> set input gnss enable
>
> view input

GNSS : reference
 qualified: No
     level: 0
  No data available
> view input

GNSS : reference
 qualified: No
     level: 0
  No data available
> view input

GNSS : reference
 qualified: No
     level: 0
  No data available
> view input

GNSS : reference
 qualified: No
     level: 0
  No data available
> view input

GNSS : reference
 qualified: No
     level: 0
    offset: +9.68 ns
      mean: +0.44 ns
     sigma: 72.07 ns
      freq: -0.722 ppt
>
```



7.9 Antenna Cable Delay and BNC Port Output

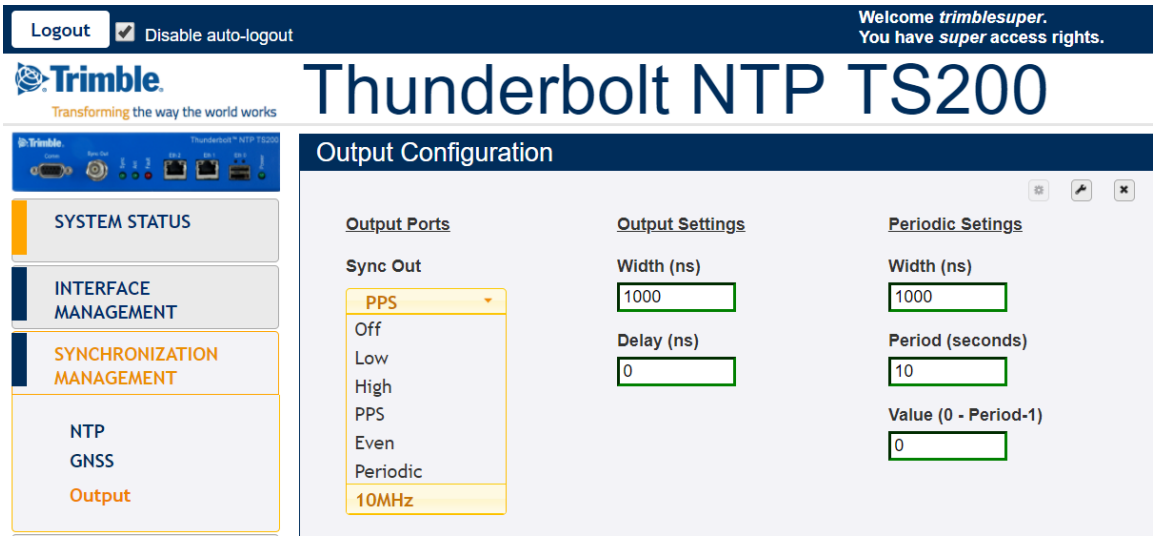
7.9.1 set gnss adelay 40

```
TS200 Configuration Commands
> get gnss
Constellation: GPS|GLO
Elevation mask: 10.0 deg
Signal level mask: 0.00 db/Hz
PDOP mask: 3.0
Antenna delay: 0 ns
Pos: auto
Survey length: 2000
Antenna: Off
>
>
> get gnss
Constellation: GPS|GLO
Elevation mask: 10.0 deg
Signal level mask: 0.00 db/Hz
PDOP mask: 3.0
Antenna delay: 0 ns
Pos: auto
Survey length: 2000
Antenna: Off
> set gnss adelay 40
>
> get gnss
Constellation: GPS|GLO
Elevation mask: 10.0 deg
Signal level mask: 0.00 db/Hz
PDOP mask: 3.0
Antenna delay: 40 ns
Pos: auto
Survey length: 2000
Antenna: Off
>
```



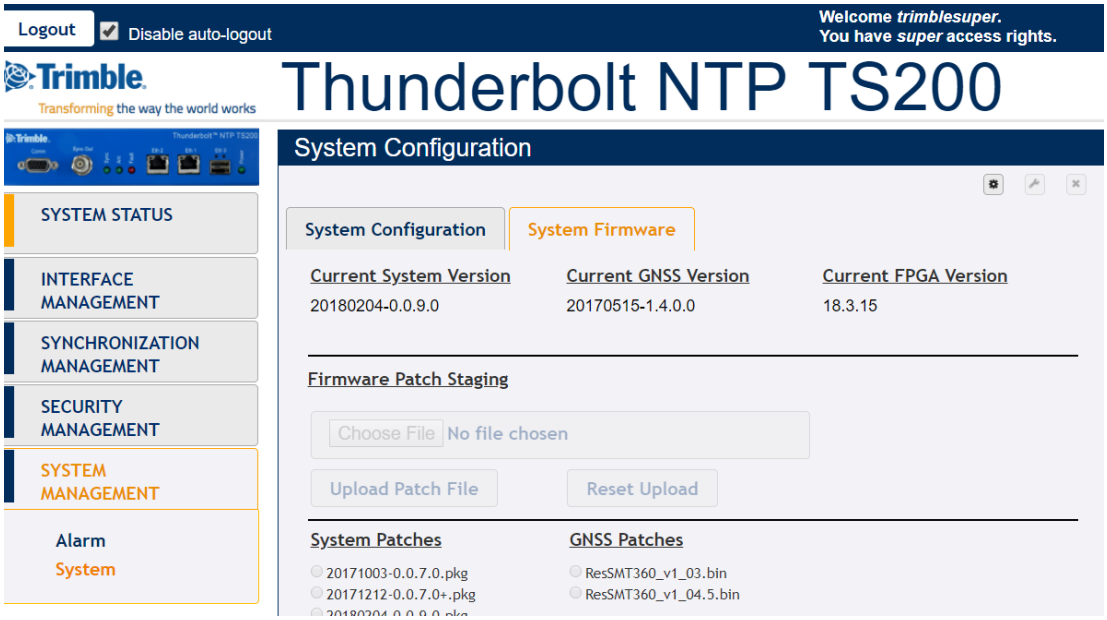
7.9.2 set output 10Mhz

```
TS200 Configuration Commands
>
>
> get output
     BNC output: PPS
Width: 1000 ns
Delay: 0 ns
>
> set output 10MHz
>
> get output
     BNC output: 10MHz
Width: 1000 ns
Delay: 0 ns
>
>
>
>
```



7.9.3 config firmware list

```
TS200 Configuration Commands
>
>
> config firmware list
Available firmware update packages:
P0        : 20171003-0.0.7.0.pkg
P1        : 20171212-0.0.7.0+.pkg
P2        : 20180204-0.0.9.0.pkg

Available GNSS update firmware:
G0        : ResSMT360_v1_03.bin
G1        : ResSMT360_v1_04.5.bin
>
>
```



CHAPTER

8

Chapter 8: VLANs

In this chapter:

This chapter describes the VLAN setting procedure for Thunderbolt NTP Time Server Clock TS200.

8.1 VLANs Overview

Thunderbolt NTP Time Server Clock TS200 supports up to 4 VLANs on each port in total 8 VLAN. Each VLAN must have its own address and subnet. There is no default VLAN configuration. These VLANs can be configured with a default gateway. All VLANs configuration can be deleted with a CLI command "`set network eth0/1 vlan -1`".

8.2 Configuring VLAN support with CLI commands

set network eth0/1 vlan ID1,ID2,...

This command allows to add up to 4 different VLAN IDs for each Ethernet port.

set network eth0/1.ID addr x.x.x.x mask y.y.y.y gateway z.z.z.z

This command allows to configure IP address, subnet mask and gateway address for each VLAN ID

set network eth0/1 vlan -1

This command allows to disable VLAN on the Ethernet port selected.
Please use the special ID of '-1'.

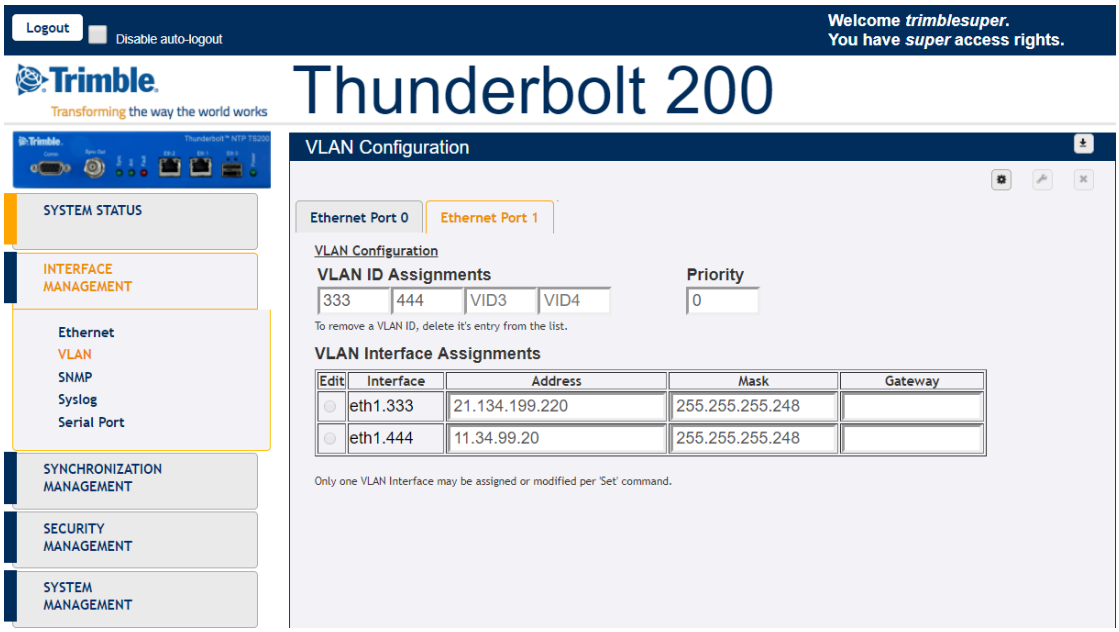
get network eth0/1

This command allows to show Ethernet port configuration including VLAN configuration on the Ethernet port selected.

NOTE: When changes are applied to any Ethernet port, it takes up to 30 seconds to see changes in Ethernet port configuration.

8.3 Configuring VLAN with Web Interface

Connect to TS200 using web interface using https. Then login with a proper username with correct privileges like admin or super access level.
Then click on “INTERFACE MANAGEMENT” and then click on “VLAN”.



In order to do changes, it is required to click on “Configure” icon and in order to apply the changes, it is required to click on “Set” icon .

Note – VLAN IDs 1 and 2 are reserved, you cannot use them.
It is required to add the VLAN ID, Priority (0 is the highest priority), the IP address and subnet mask.

8.4 Configuring one VLAN ID

In order to provide configuration steps, some examples will be used.

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:

- Login with username with admin or super level.
- Disable NTP services in order to configure any VLAN ID

```
set ntp eth0 disable
```

- Type

```
set network eth0 vlan 452
```

- Press Enter
- Type

```
set network eth0.452 addr 21.153.200.230 mask 255.255.255.248 gateway 21.153.200.225
```

- Press Enter
- Type

```
get network eth0
```

- Press Enter
- Console output is below

```
>
>
> 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

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
>
>
>
```

- It is now possible to enable again NTP service

```
set ntp eth0 enable
```

Note – VLAN IDs 1 and 2 are reserved, you cannot use them.

8.5 Adding another VLAN ID

In order to provide configuration steps, some examples will be used.

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

- Login with username with admin or super level.
- Disable NTP services in order to configure any VLAN ID

```
set ntp eth1 disable
```

- Type

```
get network eth1
```

- Press Enter
- Console output is below

```
>
> 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


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
   >
>
>
```

- Type

```
set network eth1 vlan 333,444
```

- Press Enter
- Type

```
get network eth1
```

- Press Enter
- Console output is below

```
>
> 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

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
>
```

- Type

```
set network eth1.444 addr 11.34.99.20 mask 255.255.255.248 gateway 11.34.99.15
```

- Press Enter
- Type

```
get network eth1
```

- Press Enter
- Console output is below

```
>
> 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
```

```
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'
>
>
>
>
```

- It is now possible to enable again NTP service

```
set ntp eth1 enable
```

8.6 Procedure to remove all VLAN IDs

The command is used to disable all VLAN configuration on a specific Ethernet port:

```
set network eth0/1 vlan -1
```

APPENDIX

A

Appendix A: SNMP Traps

In this appendix:

This appendix list the available alarms through SNMP trap in Thunderbolt® NTP Time Server Clock

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 0 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 0, GNSS-Comm-E1 (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 1, GNSS-Comm-E2 (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 2 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 2, GNSS-Comm-Loss (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 3 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 3, GNSS-Ant-Shorted (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 4 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 4, GNSS-Ant-Open (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 5 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 5, GNSS-Track-No (MIN)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 6 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 6, PTP-PPS-Loss (MIN)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 7 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 7, GNSS-PPS-Loss (MIN)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 8 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 8, Time-Sync-Bad (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 9 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 9, Freq-Range-Bad (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 11 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 11, Time-Set-Bad (MIN)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 12 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 12, Freq-Loop-Unlock (MIN)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 13 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 13, Freq-Hold-Exceed (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 14 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 14, PPS-Sync-Bad (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 15 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 15, Freq-Out-Bad (MAJ)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 16 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 16, PTP-System-Bad (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 17 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 17, FPGA-Load-Bad (CRI)"

TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmEchoNotification TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmNumber = INTEGER: 18 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationAlarmActivity = INTEGER: 1 TRIMBLE-TBOLT2-ALARM-MIB::trimbleEchoAlarmNotificationDescr = STRING: "Set alarm 18, GNSS-Pos-Integrity (MIN)"

APPENDIX

B

Appendix B: Alarms

In this appendix:

This appendix lists the available alarms in Thunderbolt® NTP Time Server Clock

Alarm	Alarm Desc	Level	Set Time	Clear Time	Description	How to resolve
0	GNSS-Comm-E1	CRI	0	0	An internal GNSS communication alarm that indicates that the system is unable to process character 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	0	0	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	2	5	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

3	GNSS-Ant-Shorted	MIN	0	2	An indication of an over-current indication 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	0	2	An indication of an under-current indication 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	0	2	An indication that the system is unable to track any satellites at this time. This may be a 'normal' condition 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.
6	GNSS-PPS-Loss	MIN	0	10	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
7	Time-Sync-Bad	MAJ	2	10	An indication that the phase relationship for the NTP 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	if the alarm persists for longer than 60 minutes, call Trimble Technical Support

					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.	
8	Freq-Range-Bad	CRI	0	10	is 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
9	GNSS-Time-Bad	MIN	0	0	indicates that 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
10	Freq-Loop-Unlock	MIN	2	5	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
11	Freq-Hold-Exceed	MAJ	0	0	is 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
12	PPS-Sync-Bad	MAJ	5	10	is set when the PPS output (timing) from the system will not meet specification. This	if the alarm persists for longer than 60 minutes, call Trimble Technical Support

					may occur during extreme environmental changes and should clear when the system becomes stable.	
13	Freq-Out-Bad	MAJ	0	10	is 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
14	FPGA-Load-Bad	CRI	0	0	is set if the FPGA hardware image is too old for this firmware. The hardware should be updated with the config firmware command.	Call Trimble Technical Support
15	GNSS-Pos-Integrity	MIN	60	2	is 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
16	UTC-Corr-Unk	MAJ	0	0	is 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 NTP 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
17	Eth-Port0-Down	MAJ	0	2	is 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.

18	Eth-Port1-Down	MAJ	0	2	is 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.
19	Eth-Mgmt-Down	MAJ	0	2	is 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.	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.
20	Eth-Same-Subnet	CRI	0	0	is 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'. NOTE: The above is only an issue if you are using PTP as unicast on an IPv4 network. If you are	Configure the ethernet ports to use different subnets.

					multicast, or using IPv6 or 802.3 then this alarm can be safely ignored.	
21	Time-Set-Bad	CRI	0	0	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 1: "Level" means default set level of alarm. It has several levels and user 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.

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