Microsemi

SyncServer S600

SyncServer S650

User's Guide

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User's Guide updates are available at: www.microsemi.com/ftdsupport

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How to Use This Guide

This section describes the format, layout, and purpose of this guide.

In This Preface

Purpose of This Guide

The *SyncServer S6x0 User's Guide* describes the procedures for unpacking, installing, using, maintaining, and troubleshooting the Microsemi SyncServer S6x0. It also includes appendixes that describe alarms and events, the languages that you use to communicate with the SyncServer S6x0, default values, and other information.

Who Should Read This Guide

Chapter 1, Overview, is written for non-technical audiences who need general information about the product. Chapters 2 through 5 contain detailed information and instructions about the product. Other chapters and appendixes describe installation, maintenance, and configuration instructions or details primarily intended for qualified maintenance personnel.

This User's Guide is designed for the following categories of users:

- **Systems Engineers** – Chapter 1 provides an introduction to the SyncServer S6x0. Cross-references in this chapter direct you to detailed system information in other chapters as appropriate.
- **Installation Engineers** – Chapter 2 through Chapter 7 and the appendixes provide detailed information and procedures to ensure proper installation, operation, configuration, and testing of the SyncServer S6x0.
- **Maintenance Engineers** – Chapter 7 and the appendices provide preventive and corrective maintenance guidelines, as well as procedures for diagnosing and troubleshooting fault indications and alarms.

Structure of This Guide

This guide contains the following sections and appendixes:

Chapter, Title	Description
Chapter 1, Overview	Provides an overview of the product, describes the major hardware and software features, and lists the system specifications.
Chapter 2, Installing	Contains procedures for unpacking and installing the system, and for powering up the unit.
Chapter 3, Keypad / Display Interface	Describes the Keypad / Display interface.
Chapter 4, Web Interface	Describes the Web Interface.

Chapter, Title	Description
Chapter 5, Command Line Interface (CLI)	Describes the CLI command conventions, functions, and features.
Chapter 6, Provisioning	Describes the commands and procedures required to provision the SyncServer S6x0 after installing the unit.
Chapter 7, Maintenance, Troubleshooting & Part Numbers	Contains preventive and corrective maintenance, and troubleshooting procedures for the product. Also contains part number and ordering information and procedures for returning the SyncServer S6x0.
Appendix A, System Messages	Lists the alarms and events and provides basic indications of the source of the alarm.
Appendix B, Specifications and Factory Defaults	Lists the specifications and factory defaults for the SyncServer S6x0.
Appendix C, Installing GNSS Antennas	Provides details about GNSS Antenna kits and procedures for installing the GNSS antenna.
Appendix D, Software Licenses	Contains licensing information for third party software.
Appendix E, IP Port Details	Provides details about Ethernet, Management, and Timing ports.

Conventions Used in This Guide

This guide uses the following conventions:

- **Acronyms and Abbreviations** – Terms are spelled out the first time they appear in text. Thereafter, only the acronym or abbreviation is used.
- **Revision Control** – The title page lists the printing date and versions of the product this guide describes.
- **Typographical Conventions** – This guide uses the typographical conventions described in the table below.

When text appears this way...	... it means:
SyncServer S6x0 User's Guide	The title of a document.
CRITICAL	An operating mode, alarm state, status, or chassis label.
Select **File**, **Open**...	Click the Open option on the File menu.
Press **Enter** Press**;**	A named keyboard key. The key name is shown as it appears on the keyboard. An explanation of the key's acronym or function immediately follows the first reference to the key, if required.
`Username:`	Text in a source file or a system prompt or other text that appears on a screen.
`ping` `status`	A command you enter at a system prompt or text you enter in response to a program prompt. You must enter commands for case-sensitive operating systems exactly as shown.
qualified personnel	A word or term being emphasized.
Microsemi ***does not*** recommend...	A word or term given special emphasis.

Warnings, Cautions, Recommendations, and Notes

Warnings, Cautions, Recommendations, and Notes attract attention to essential or critical information in this guide. The types of information included in each are explained in the following examples.

Warning: To avoid serious personal injury or death, *do not* disregard warnings. All warnings use this symbol. Warnings are installation, operation, or maintenance procedures, practices, or statements, that if not strictly observed, may result in serious personal injury or even death.

Caution: To avoid personal injury, *do not* disregard cautions. All cautions use this symbol. Cautions are installation, operation, or maintenance procedures, practices, conditions, or statements, that if not strictly observed, may result in damage to, or destruction of, the equipment. Cautions are also used to indicate a long-term health hazard.

ESD Caution: To avoid personal injury and electrostatic discharge (ESD) damage to equipment, *do not* disregard ESD cautions. All ESD cautions use this symbol. ESD cautions are installation, operation, or maintenance procedures, practices, conditions, or statements that if not strictly observed, may result in possible personal injury, electrostatic discharge damage to, or destruction of, static-sensitive components of the equipment.

Electrical Shock Caution: To avoid electrical shock and possible personal injury, do not disregard electrical shock cautions. All electrical shock cautions use this symbol. Electrical shock cautions are practices, procedures, or statements, that if not strictly observed, may result in possible personal injury, electrical shock damage to, or destruction of components of the equipment.

Recommendation: All recommendations use this symbol. Recommendations indicate manufacturer-tested methods or known functionality. Recommendations contain installation, operation, or maintenance procedures, practices, conditions, or statements, that provide important information for optimum performance results.

Note: All notes use this symbol. Notes contain installation, operation, or maintenance procedures, practices, conditions, or statements, that alert you to important information, which may make your task easier or increase your understanding.

Where to Find Answers to Product and Document Questions

For additional information about the products described in this guide, please contact your Microsemi representative or your local sales office. You can also contact us on the web at www.microsemi.com/ftdsupport.

When this manual is updated the updated version will be available for downloading from Microsemi's internet web site. Manuals are provided in PDF format for ease of use. After downloading, you can view the manual on a computer or print it using Adobe Acrobat Reader.

Manual updates are available at:

www.microsemi.com/ftdsupport

What's New In This Guide

The following corrections and additions have been made to the SyncServer S6x0 User's Guide with Rev. C, in addition to other changer.

- Added Configuring Network Timing Services, Mapping a Network Timing Service to a LAN Port, Observing Status of Network Timing Services and Monitoring Network Packets to Provisioning Outputs section in Chapter 6.
- Added information about IRIG with Flex Port Option
- Added PTP input/output details
- Added GPS/GLONASS/BeiDou antenna information
- Added GPS/GLONASS/BeiDou splitter information
-

The following corrections and additions have been made to the SyncServer S6x0 User's Guide with Rev. B:

- Added v1.1 feature information NTP Reflector in NTP / PTP Services Configuration Window section and in Security Features section.

- Updated image for Upgrading the Firmware section to show new Authentication file required for firmware upgrade.
- Added new CLI commands for configuring serial timing output with NENA format: `set nena active`, `set nena-format`, and `show nene-format`.
- Updated screen images for some Web Interface windows to reflect changes to the GUI.

Related Documents and Information

See your Microsemi representative or sales office for a complete list of available documentation.

To order any accessory, contact the Microsemi Sales Department. See www.microsemi.com/sales-contacts/0 for sales support contact information. If you encounter any difficulties installing or using the product, contact Microsemi Frequency and Time Division (FTD) Services and Support:

U.S.A. Call Center:
including Americas, Asia and Pacific Rim
Frequency and Time Division
3870 N 1st St.
San Jose, CA 95134

Toll-free in North America: 1-888-367-7966
Telephone: 408-428-7907
Fax: 408-428-7998
email: ftd.support@microsemi.com
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Chapter 1 Overview

This chapter provides introductory information for the SyncServer S6x0.

In This Chapter

Overview

SyncServer S600

Modern networks require accurate, secure and reliable time services as provided by the Microsemi SyncServer S600. The security hardened S600 network time server is purpose built to deliver exact hardware-based NTP time stamps. The unparalleled accuracy and security is rounded out with outstanding ease-of-use features for reliable network time services ready to meet the needs of your network and business operations today and tomorrow.

SyncServer S650

The modular Microsemi SyncServer S650 combines the best of time and frequency instrumentation with unique flexibility and powerful network/security based features.

The base Timing I/O module with 8 BNC connectors comes standard with the most popular timing I/O signals (IRIG B, 10MHz, 1PPS, etc.). When more flexibility is required, the unique Microsemi FlexPort™ Technology option enables 6 of the BNCs to output any supported signal (time codes, sine waves, programmable rates, etc.) all configurable in real time via the secure web interface. This incredibly flexible BNC by BNC configuration makes very efficient and cost effective use of the 1U space available. Similar functionality is applied to the two input BNCs as well. Unlike legacy modules with fixed count BNCs outputting fixed signal types per module, with FlexPort™ Technology you can have up to 12 BNCs output any combination of supported signal types.

This level of timing signal flexibility is unprecedented and can even eliminate the need for additional signal distribution chassis and there is no degradation in the precise quality of the coherent signals.

SyncServer S650i

The Microsemi SyncServer S650i is a S650 base chassis with no GNSS receiver. The S650i also includes a single installed Timing I/O module. All software upgrade options are applicable except GL-ONASS/BEIDOU/SBAS.

SyncServer S6x0 Key Features

- <15ns RMS to UTC(USNO) for S650
- 1×10^{-12} Frequency accuracy
- Modular timing architecture with unique and innovative FlexPort™ technology (optional)

- Most popular timing signal inputs/outputs are standard in the base Timing I/O module (IRIG B, 10MHz, 1PPS, etc.) available for the S650.
- Four (4) GbE ports standard, all with NTP hardware time stamping
- Ultra high-bandwidth NTP time server
- Stratum 1 Operation via GNSS satellites
- DoS detection/protection (optional)
- Web-based management with high security cipher suite
- TACACS+, RADIUS, LDAP, and more (optional)
- -20C to +65C operating temperature (Standard and OCXO)
- IPv6/ IPv4 on all ports
- Rubidium Atomic clock or OCXO oscillator upgrades
- Dual power supply option
- PTP and GLONASS/Beidou/SBAS (optional)

Software Options

The SyncServer S600/S650 includes built-in hardware features enabled via software license keys.

- Security Protocol License Option: The SyncServer S600/S650 can be seriously hardened from both an NTP perspective and an authentication perspective via this option. This license option includes:
  - NTP Reflector - high capacity and accuracy
  - Per port packet monitoring and limiting
- FlexPort Timing License Option: The FlexPort™ Technology option enables the 6 output BNCs (J3-J8) to output any supported signal (time codes, sine waves, programmable rates, and so on.) all configurable in real time through the secure web interface. The 2 input BNCs (J1-J2) can support a wide variety of input signal types.
- GNSS License Option: This option enables the SyncServer S600/S650 to use GPS, GLONASS, SBAS, and BEIDOU signals.
- PTP License Option: This option enables PTP Enterprise profile master functionality.
- See SyncServer S6x0 Part Numbers, on page 225 for all available options.

Activation keys are associated with the serial number of the device on which the keys are stored and travel with that device. The user must enter key(s) with web interface via LAN1 port to gain access to the licensed software options web page.

Security Features

Security is an inherent part of the SyncServer S600/S650 architecture. In addition to standard security features related to the hardening of the web interface, NTP and server access, unsecure access protocols are deliberately omitted from the S6x0 while remaining services can be disabled. Advanced authentication services such as TACACS+, RADIUS, and LDAP are optionally available.

The four (4) standard GbE ports combined easily handle more than 10,000 NTP requests per second using hardware time stamping and compensation (36,000 is max capacity for NTP reflector, 13,000 is max capacity for NTPd). All traffic to the S6x0 CPU is bandwidth limited for protection against DoS (denial of service) attacks.

Physical Description

The SyncServer S6x0 consists of a 19-inch (48 cm) rack-mountable chassis, plug-in modules (S650 only), and hardware.

All connections for the SyncServer S6x0 are on the rear panel. Figure 1-1 is a front view of the SyncServer S600 version showing LEDs, display screen, navigation buttons and entry buttons. Figure 1-2 shows the rear panel connections for the Single AC version of the SyncServer S600. Figure 1-3 shows the rear panel connections for the Dual AC version of the SyncServer S600.

Figure 1-4 is a front view of the SyncServer S650 version showing LEDs, display screen, navigation buttons and entry buttons. Figure 1-5 shows the rear panel connections for the Single AC version of the SyncServer S600. Figure 1-6 shows the rear panel connections for the Dual AC version of the SyncServer S600.

Figure 1-7 is a front view of the SyncServer S650 version showing LEDs, display screen, navigation buttons and entry buttons. Figure 1-8 shows the rear panel connections for the Single AC version of the SyncServer S600. Figure 1-9 shows the rear panel connections for the Dual AC version of the SyncServer S600.

Figure 1-1. SyncServer S600 Front Panel

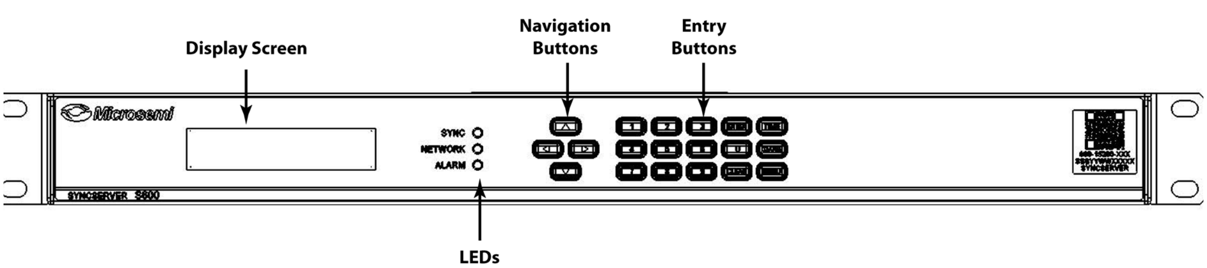


Figure 1-2. SyncServer S600 Rear Panel - Single AC Version

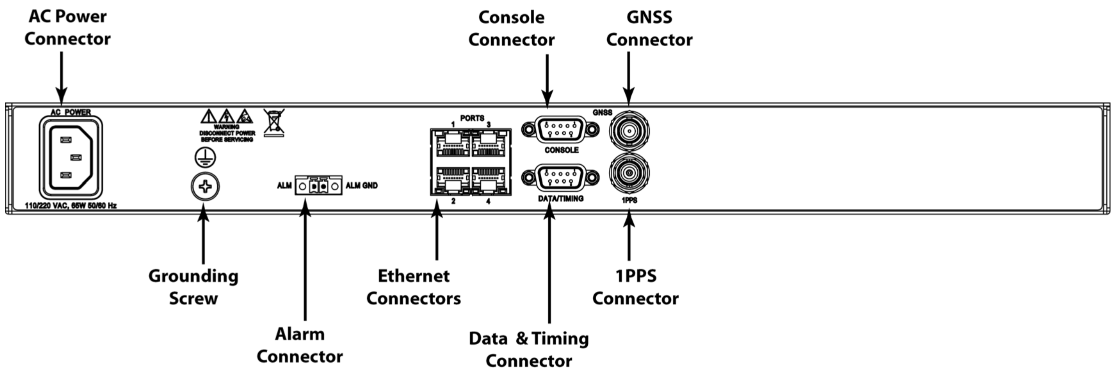


Figure 1-3. SyncServer S600 Rear Panel - Dual AC Version

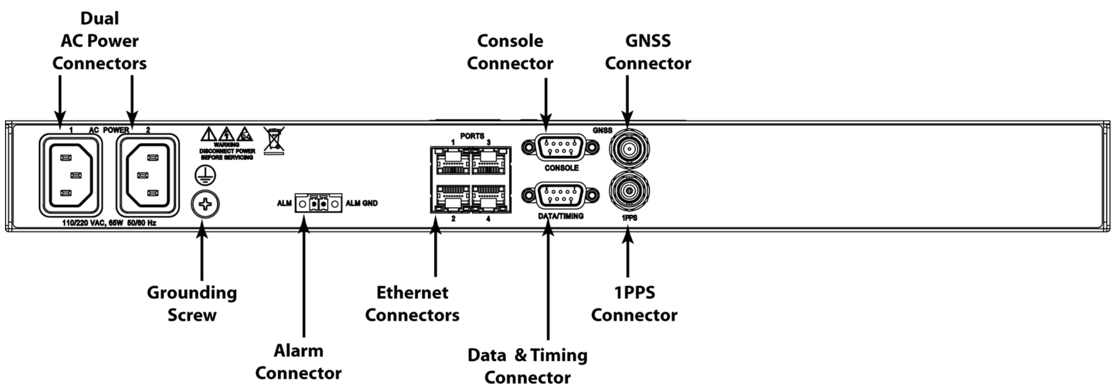


Figure 1-4. SyncServer S650 Front Panel

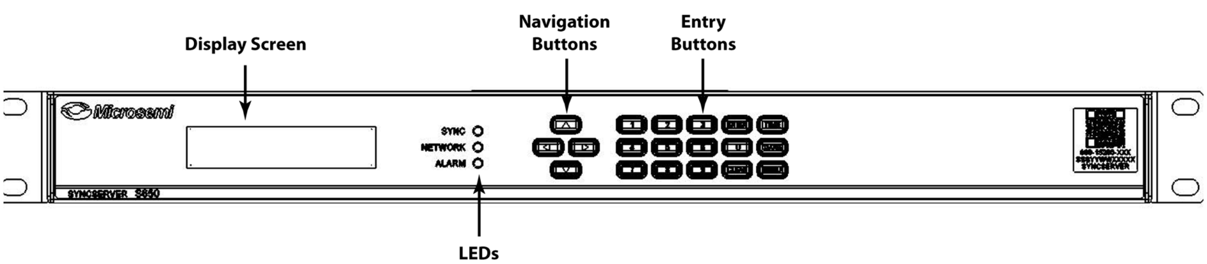


Figure 1-5. SyncServer S650 Rear Panel - Single AC Version

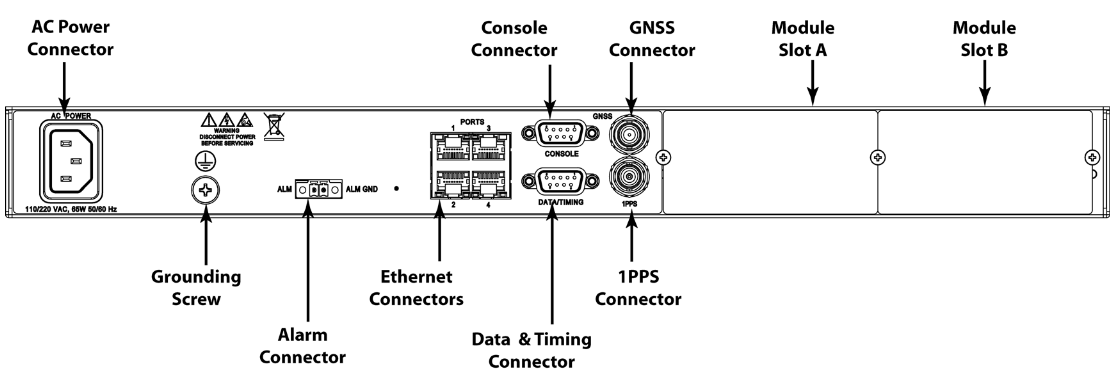


Figure 1-6. SyncServer S650 Rear Panel - Dual AC Version

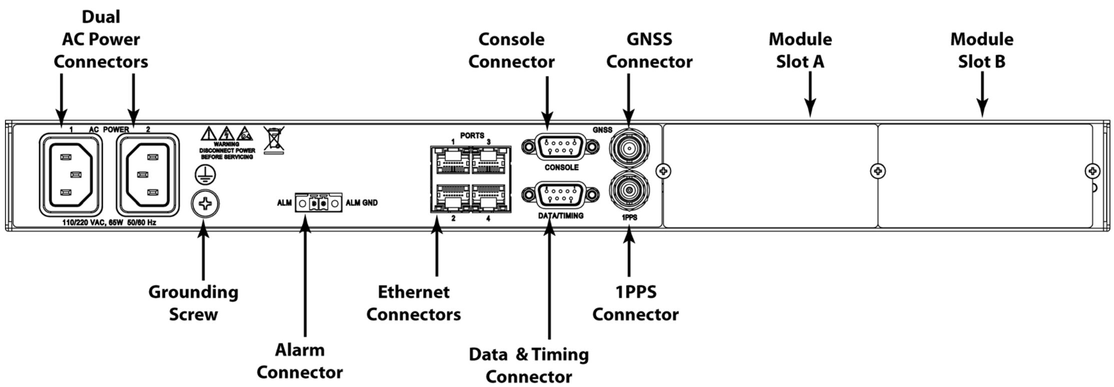


Figure 1-7. SyncServer S650i Front Panel

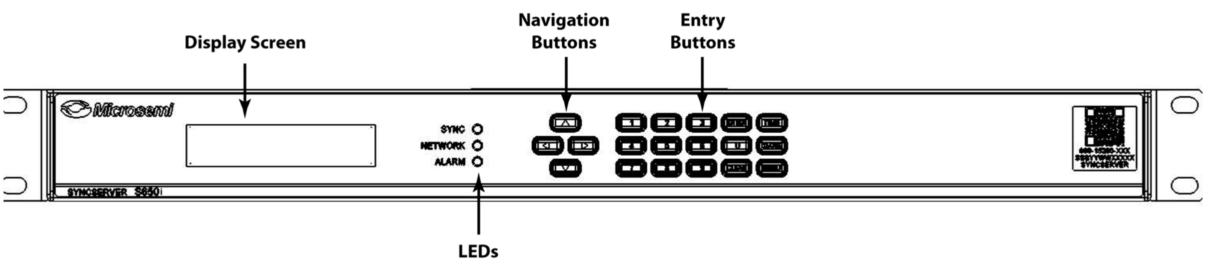


Figure 1-8. SyncServer S650i Rear Panel - Single AC Version

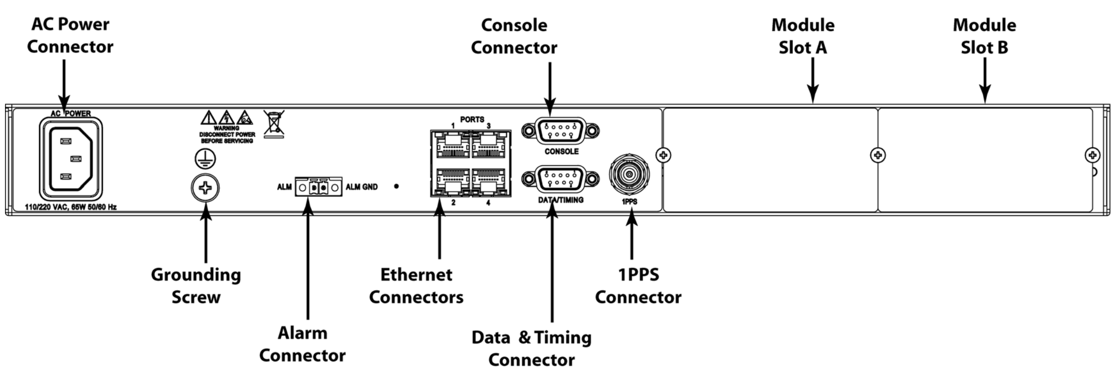
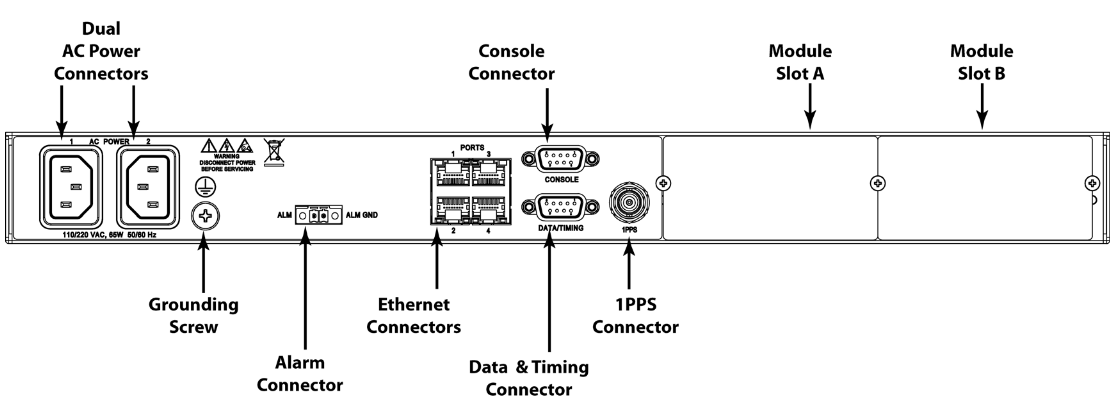


Figure 1-9. SyncServer S650i Rear Panel - Dual AC Version



Communications Connections

The SyncServer S6x0 is primarily controlled through the web interface available on LAN 1. Limited functionality is available via the console serial port.

Ethernet Management Port - LAN1

Ethernet port 1 is the management port that is used to access the web interface. This port is located on the rear panel of the SyncServer S6x0 and is a standard 100/1000 Base-T shielded RJ-45 receptacle. To connect the SyncServer S6x0 to an Ethernet network, use a standard twisted-pair Ethernet RJ-45 cable (CAT5 minimum). Configurable to 100_Full or 1000_Full or Auto :100_Full / 1000_Full.

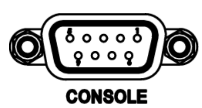
Serial Console Port

The serial port connection is made through a DB-9 female connector on the rear panel of the SyncServer S6x0. This port, which supports a baud rate of 115.2k (115200-8-1-N-1), allows you to connect to a terminal or computer using a terminal emulation software package. When connecting to this port, use a shielded serial direct connect cable.

This port is also used for serial data (NENA ASCII time code, Response mode).

Figure 1-10 shows the DB-9 female connector for the serial port.

Figure 1-10. Serial Port Connector



Input Connections

GNSS Connection

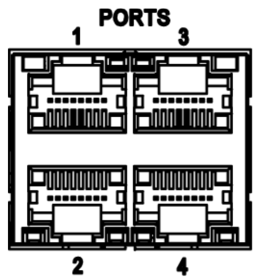
The SyncServer S6x0 features a BNC connector for input from GNSS navigation satellites to provide a frequency and time reference. This port also provides 9.7V tothe power a Microsemi GNSS antenna (see Antenna Kits Overview in Appendix C, Installing GNSS Antennas). See Figure 1-11. This connector is not present on the SyncServer S650i.

Figure 1-11. GNSS Input Connection

NTP Input/Output Connections

The S600 / S650 has four dedicated and software isolated GbE Ethernet ports, each equipped with NTP hardware time stamping. These are connected to a very high-speed microprocessor and an accurate clock to assure high bandwidth NTP performance. See Figure 1-12. See Appendix E, IP Port Details for information on Ethernet port isolation and management port rules.

Figure 1-12. NTP Input/Output Connections



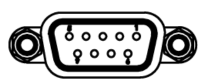
Output Connections

Serial Data/Timing Output Connection

The serial data/timing port connection is made through a DB-9 female connector on the rear panel of the SyncServer S6x0, as shown in Figure 1-13. When connecting to this port, use a shielded serial direct connect cable.

The dedicated Data/Timing port is provided to output NMEA-0183 or NENA PSAP strings. If NENA is selected, the serial Console port also supports the two-way timing aspects of the standard. In addition, the F8 and F9 Microsemi legacy time strings are available.

Figure 1-13. Serial Data/Timing Connection



1PPS Output Connection

The SyncServer S6x0 provides a BNC female connector (Figure 1-14):

Figure 1-14. 1PPS Output Connection

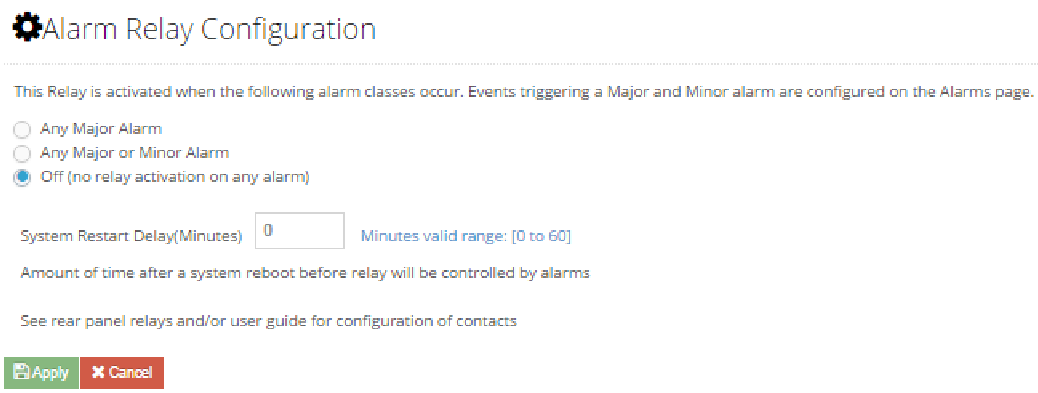
Alarm Relay

The SyncServer S6x0 features a Phoenix connector for an alarm relay output. See Figure 1-15. The relay is open when the configured alarm classes (Figure 1-16) occur. If the SyncServer S6x0 is not powered, then the alarm relay will be open. The relay is energized (shorted), when the SyncServer S6x0 is powered and no configured alarms are active.

Note: The alarm relay is shorted when the alarm is active for firmware releases 1.0 and 1.1.

Figure 1-15. Alarm Relay Connector

Figure 1-16. Alarm Relay Configuration Web GUI



Timing I/O Card Connections

The Timing I/O Module is an exceedingly versatile time and frequency input and output option. In the standard configuration, it supports the most popular input and output time codes, sine waves, and rates.

The standard configuration offers a broad yet fixed selection of signal I/O on its eight BNC connectors (see Figure 1-17). J1 is dedicated to time code and rate inputs, J2 to sine wave inputs, and J3-J8 to mixed signal outputs. The standard Timing I/O Module configuration is 1PPS or IRIG B AM-In, 10 MHz- In, IRIG AM and IRIG DCLS-Out, 1PPS-Out and 10 MHz-Out.

The FlexPort™ Technology option enables the 6 output BNCs (J3-J8) to output any supported signal (time codes, sine waves, programmable rates, etc.), all configurable in real time via the secure web interface. Similarly, the 2 input BNCs (J1-J2) can support a wide variety of input signal types. This uniquely flexible BNC by BNC configuration makes very efficient and cost effective use of the 1U space available.

See Figure 1-18 to view the signal types for the standard configuration and the configuration with the FlexPort™ option.

Figure 1-17. Timing I/O Module BNC Connectors

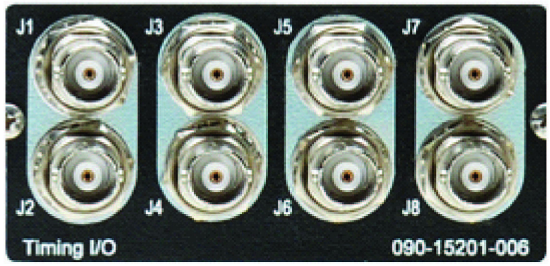
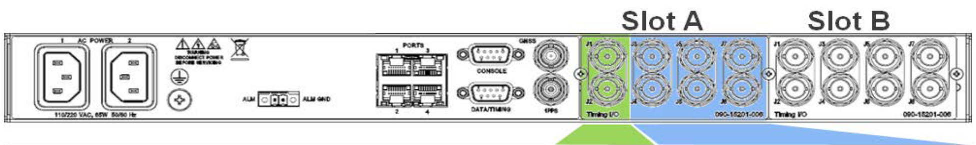


Figure 1-18. Signal Types for Timing I/O Module



→ BNC Connectors		Input		Output					
↓ Signals		J1	J2	J3	J4	J5	J6	J7	J8
Standard	1PPS	●					●	off	off
	IRIG B AM	●		●				off	off
	IRIG B DCLS					●		off	off
	10 MHz		●		●			off	off
FlexPort	IRIG A/B/C37/E/G NASA/2137/XR3 AM/DCLS	■		■	■	■	■	■	■
	Selectable/Programmable Rates	■		■	■	■	■	■	■
	1/5/10 MHz Sine Waves		■	■	■	■	■	■	■

● = Fixed specific signal type
■ = User configurable Time Codes, Selectable/Programmable Rates or Sine Waves

Power and Ground Connections

The SyncServer S6x0 is available with either single or dual 120/240 VAC power. The SyncServer S6x0 is not equipped with a Power switch. AC power is controlled by the unplugging the AC power cord. Frame ground connections on the SyncServer S6x0 are made on the grounding stud located on the left side of the rear panel, as identified with the international Ground marking, as shown in Figure 1-19 and Figure 1-20.

> **Warning:** To avoid serious personal injury or death, exercise caution when working near high voltage lines and follow local building electrical codes for grounding the chassis.

Figure 1-19. SyncServer S6x0 Single AC Version Power and Ground

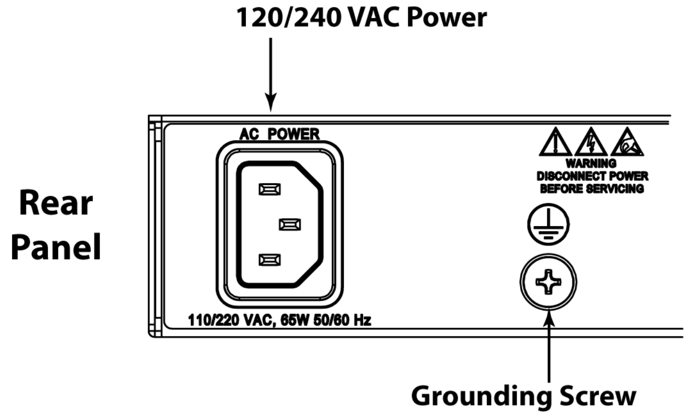
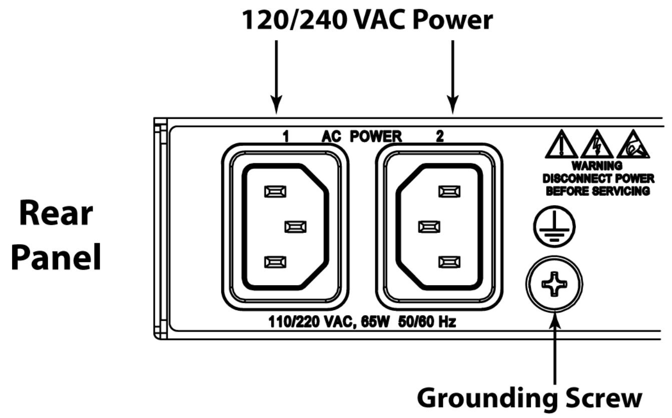


Figure 1-20. SyncServer S6x0 Dual AC Version Power and Ground



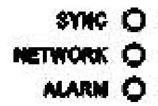
Functional Description

LEDs

The SyncServer S6x0 provides three LEDs on the front panel, as shown in Figure 1-21, that indicate the following:

- Sync Status
- Network Status
- Alarm Status

Figure 1-21. LEDs for SyncServer S3x0



See Figure 2-5 for details about the LEDs.

Communication Ports

Communication ports on the SyncServer S6x0 allow you to provision, monitor, and troubleshoot the chassis with CLI commands.

Management Ethernet Port

The system web interface for full control is located on Ethernet port 1 (LAN1) and is used as the Management Ethernet connector to provide connectivity to an Ethernet local area network. The front panel can be used to configure an IPv4 address (static or DHCP) or enable DHCP for IPv6. Once the IP address is set and a connection is made to a Local Area Network (LAN), you can access the SyncServer S6x0 web interface.

Local Console Serial Port

The serial port supports very limited local control; you can configure the SyncServer S6x0 with CLI commands using a terminal or computer with terminal emulation software. The connector is located on the front panel. The Local port is configured as a DCE interface and the default settings are as follows:

- Baud = 115.2K
- Data Bits = 8 bits
- Parity = None
- Stop bits = 1
- Flow Control = None

Time Inputs

The SyncServer S6x0 can use GNSS, NTP, and IRIG as external input references (depending on model and configuration). The NTP signals use the RJ45 (1 - 4) connectors on the rear panel. The GNSS reference uses a BNC connector on the rear panel. The IRIG signal uses a BNC connector (J1) on the optional Timing I/O module on the rear panel, as described in Table 1-1.

Frequency Inputs

The SyncServer S6x0 can use either 1PPS, 10 MPPS, 10 MHz, 5 MHz, or 1 MHz as external frequency input references. The 1PPS/10 MPPS use the J1 BNC and the 10 / 5 / 1 MHz signals use a BNC connector (J2) on the Timing I/O module on the rear panel, as described in Table 1-1.

Frequency and Timing Outputs

The SyncServer S6x0 can provide NTP,10 / 5 / 1 MHz, 1PPS, IRIG, or TOD output signals. The NTP signals use the RJ45 (1 - 4) connectors on the rear panel. The serial TOD output connects to a DB9 connector (DATA/SERIAL) on the rear panel. The IRIG, PPS, 10 MPPS, and 10 / 5 / 1 MHz signals use BNC connectors (J3 - J8) on the Timing I/O module on the rear panel. A 1PPS output is also available using a BNC connector (1PPS) on the rear panel.

Table 1-1. Timing Input/Output Module

Config.	Input BNCs		Output BNCs					
	J1	**J2**	**J3**	**J4**	**J5**	**J6**	**J7**	**J8**
Standard	IRIG B AM 124 or 1PPS	10 MHz	IRIG B AM	10 MHz	IRIG B B004 DCLS	1PPS	off	off
Flex Port Option	A004 A134 IRIG B000 IRIG B001 IRIG B002 IRIG B003 IRIG B004 IRIG B005 IRIG B006 IRIG B120 IRIG B121 IRIG B122 IRIG B123 IRIG B124 IRIG B125 IRIG B126 IRIG B127 IRIG E115 IRIG E125 IRIG G005 IRIG G145 IEEE 1344 C37.118.1 NASA 36 XR3 2137 1PPS 10 MPPS	1 MHz 5 MHz 10 MHz	FlexPort J3-J8 Software Selectable Outputs per BNC (Configured via the web interface): a) Pulse: i) Fixed Rate: 10/5/1MPPS, 100/10/1/kPPS, 100/10/1/0.5PPS ii) Programmable Period: 100 ns to 2 sec, step size of 10 ns b) Timecode: IRIG B 000/004/1344 DCLS, 120/124/1344 AM c) Sine: 1/5/10 MHz					

Note: The SyncServer S6x0 uses IRIG 1344 version C37.118.1-2011.

- On the input side, the code performs a subtraction using control bits 14 - 19 from the supplied IRIG time with the expectation that this will produce UTC time. This aligns with the C37.118.1-2011 definition.
- On the output side, control bits 14 - 19 will always be zero, and the encoded IRIG time will be UTC (if using an input 1344 IRIG as the reference the 2011 rules are applied to get that value). Hence, any code receiving S6x0 IRIG 1344 output should work regardless of which version they are decoding (since there is nothing to add or subtract).

Configuration Management

The SyncServer S6x0 can be configured using the keypad interface, web interface or Command Line Interface.

Keypad/Display Interface

The keypad/display interface displays the time, system status, and provides the following functions:

- Configuring and enabling/disabling the LAN1 network port
- Setting the time and entering freerun mode
- Adjusting the brightness
- Locking the keypad
- Shutting down the SyncServer

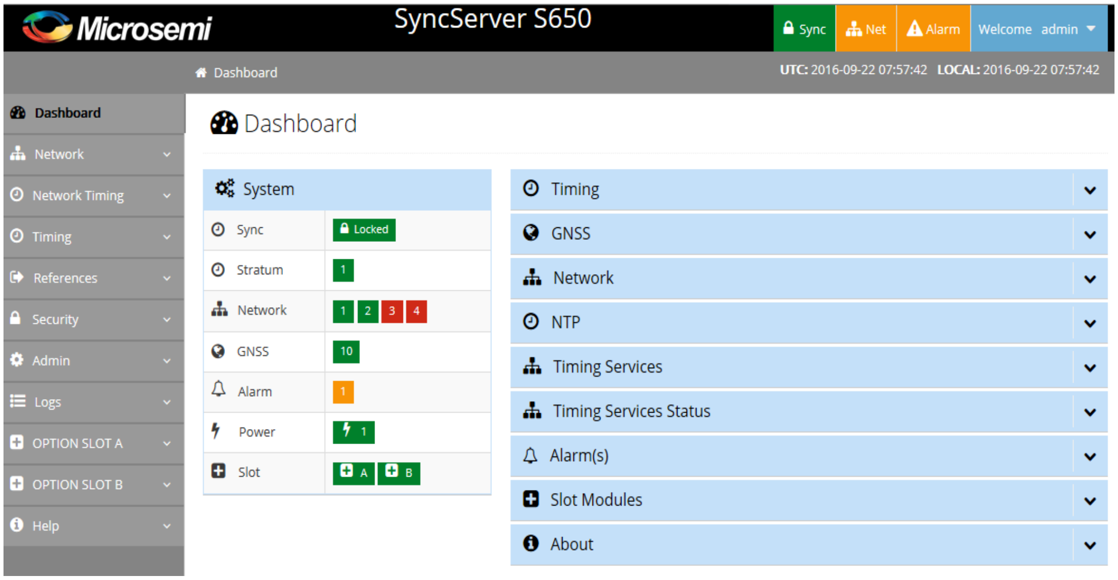
Web Interface

The SyncServer S6x0 also allows the user to access information via the LAN1 Ethernet port using HTTPS protocol. To use the SyncServer S6x0 web interface, enter the IP address for Ethernet port 1 into a web browser. Enter your user name and password for the SyncServer S6x0 when prompted.

Dashboard View

See Figure 1-22 for an example of the dashboard status screen that will appear.

Figure 1-22. Web Interface - Dashboard



Command Line Interface (CLI)

The Command Line Interface can be used to control specific function of the SyncServer S6x0 from a terminal connected to the EIA-232 serial port or the Ethernet LAN1 port. Refer to Chapter 5, Command Line Interface (CLI) for further details.

Note: Before you can communicate with the SyncServer S6x0 through an Ethernet connection, you must first configure the Ethernet port using the serial connection or front panel (see Provisioning the Ethernet Ports, on page 166).

Alarms

The SyncServer S6x0 uses alarms to notify you when certain conditions are deteriorating below specified levels or when issues arise, such as loss of power or loss of connectivity. These alarms are indicated by LEDs, WebGUI status, CLI status, alarm connector (configurable), SNMP Trap (configurable), message log (configurable), and email (configurable). For more information, see Provisioning Alarms, on page 211 and Appendix A, System Messages.

Chapter 2 Installing

This chapter describes the procedures for installing the SyncServer S6x0.

In This Chapter

Getting Started

Before you begin to install the SyncServer S6x0, review the information in this section.

If you encounter any difficulties during the installation process, contact Microsemi Frequency and Time Division (FTD) Services and Support. See Contacting Technical Support, on page 232 for telephone numbers. Contact Microsemi FTD Services and Support for technical information. Contact Customer Service for information about your order, RMAs, and other information.

Security Considerations for SyncServer S6x0 Installation

- The SyncServer S6x0 should be installed in a physically secure and restricted location.
- Whenever possible, the SyncServer S6x0's Ethernet ports should be installed behind the company's firewall to prevent public access.

Site Survey

The SyncServer S6x0 can be installed in a wide variety of locations.

Before you begin installation, determine the chassis location, ensure the appropriate power source is available (120/240 VAC), and ensure that the equipment rack is properly grounded.

The SyncServer S6x0 is designed to mount in a 19-inch (48 cm) rack, occupies 1.75 in (4.5 cm, 1 RU) of vertical rack space, and has a depth of 15” (38.1 cm).

The SyncServer S6x0 is to be installed into a rack. The AC power connection is to be made to a 120 or 240 VAC power receptacle following local codes and requirements. An external Surge Protective Device is required to be used with the AC version of the SyncServer S6x0.

Environmental Requirements

To prevent the unit from malfunctioning or interfering with other equipment, install and operate the unit according to the following guidelines:

- Operating temperature: –40° F to 149° F (–20° C to 65° C) for SyncServer S6x0 with quartz oscillator (standard or OCXO); 23° F to 131° F (–5° C to 55° C) for SyncServer S6x0 with Rubidium oscillator.
- Operating Humidity: 5% to 95% RH, maximum, w/condensation

- Secure all cable screws to their corresponding connectors.

Caution: To avoid interference, you must consider the electromagnetic compatibility (EMC) of nearby equipment when you install the SyncServer S6x0.

Electromagnetic interference can adversely affect the operation of nearby equipment.

Installation Tools and Equipment

You will need the following tools and equipment to install the SyncServer S6x0:

- Standard tool kit
- Cable ties, waxed string, or acceptable cable clamps
- 1 mm² / 16 AWG wire to connect grounding lug to permanent earth ground
- One UL listed Ring Lugs for grounding connections
- Crimping tool to crimp the ring lug
- Shielded cabling of the appropriate impedance required by the specific signal type for signal wiring (including GNSS)
- Mating connectors for terminating signal wiring
- ESD wrist strap for installing modules
- Fasteners for mounting the equipment in rack
- Digital multimeter or standard Voltmeter for verifying ground connections to the chassis

Unpacking the Unit

The SyncServer S6x0 is packaged to protect them from normal shock, vibration and handling damage. (Each unit is packaged separately.)

Caution: To avoid ESD damage to parts that are packaged with the SyncServer S6x0, observe the following procedures.

Unpack and inspect the unit as follows:

1. Wear a properly grounded protective wrist strap or other ESD device.

2. Inspect the container for signs of damage. If the container appears to be damaged, notify both the carrier and your Microsemi distributor. Retain the shipping container and packing material for the carrier to inspect.

3. Open the container, being careful to cut only the packaging tape.

4. Locate and set aside the printed information and paperwork that is included in the container.

5. Remove the unit from the container and place it on an anti-static surface.

6. Locate and set aside small parts which may be packed in the container.

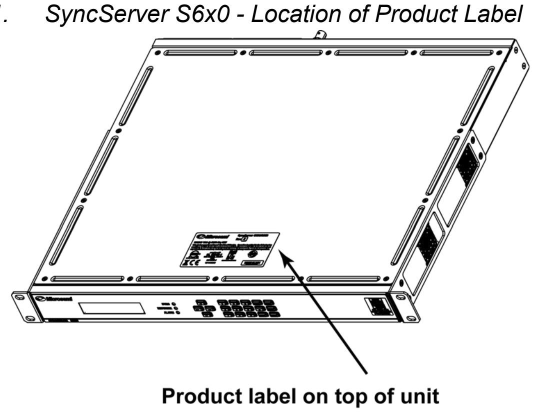
7. Remove the accessories from the container.

8. Remove the anti-static packaging from the unit and accessories.

9. Verify that the model and item number shown on the shipping list agrees with the model and item number on the equipment. The item number can be found on a label affixed to the top of the unit. See Figure 2-1 for the location of the label on the SyncServer S6x0. Contact your Microsemi distributor if the model or item number do not match.

For a complete listing of item numbers, see Table 7-4, Table 7-5 and Table 7-6.

Figure 2-1. SyncServer S6x0 - Location of Product Label



Rack Mounting the SyncServer S6x0

The installation procedure described in this section provides general guidelines for installing the SyncServer S6x0. Always follow applicable local electrical standards.

SyncServer S6x0 is shipped with 19-inch rack mounting brackets attached.

Mount the chassis to the front of the equipment rack rails with four screws and associated hardware, as shown in Table 2-3. Use the proper screws for the equipment rack.

Figure 2-2. Dimensions for SyncServer S6x0

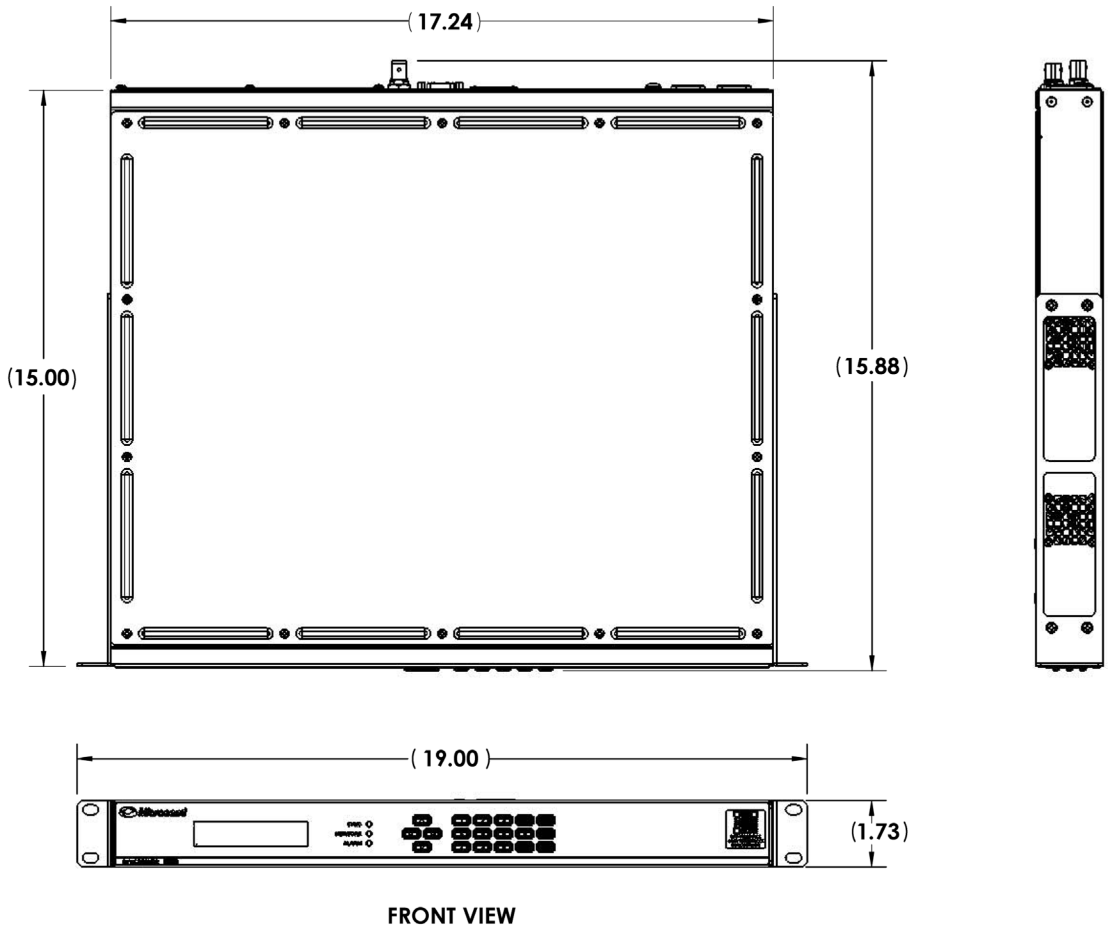
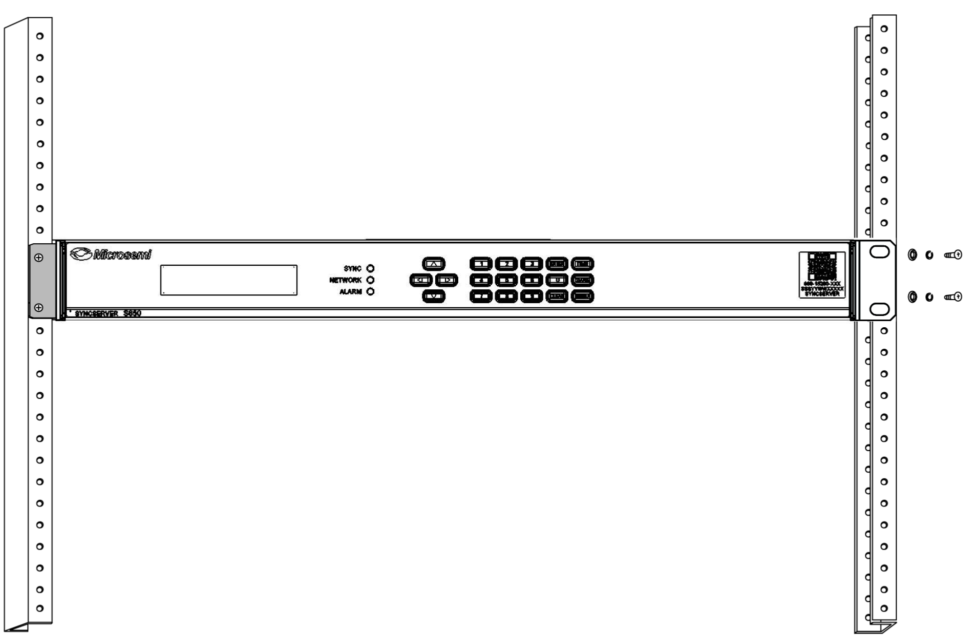


Figure 2-3. Rack Mounting the SyncServer S6x0



Making Ground and Power Connections

The SyncServer S6x0 has either one or two 120/240 VAC connectors, depending on the specific model, which are located on the left side of the rear panel. (see Figure 2-4 and Figure 2-5).

Ground Connections

The frame ground connection is made using the grounding screw, which is marked with the universal ground symbol, as shown in Figure 2-6. This screw is located on the left side of the rear panel for all models of the SyncServer S6x0, as shown in Figure 2-4 and Figure 2-5.

Figure 2-4. SyncServer S600/S650 Power & Ground Connections - Single AC Version

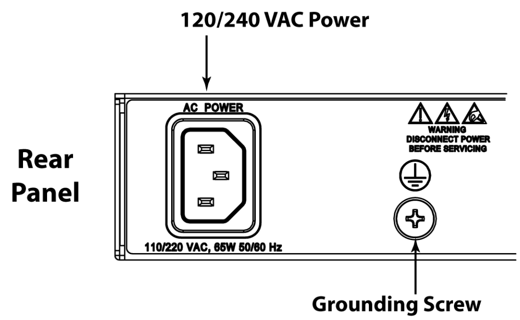


Figure 2-5. SyncServer S600/S650 Power & Ground Connections - Dual AC Version

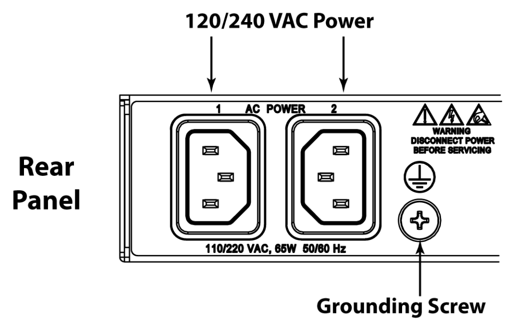
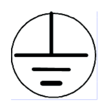


Figure 2-6. Universal Ground Symbol



After installing the SyncServer S6x0 into the rack, connect the chassis to the proper grounding zone or master ground bar per local building codes for grounding.

Run a 16 AWG green/yellow-striped insulated wire from the SyncServer S6x0 grounding lug to the earth Ground on the rack. The rack grounding method is below.

Recommendation: Although there are a number of methods for connecting the equipment to earth ground, Microsemi recommends running a cable of the shortest possible length from the ground lug to earth ground.

1. Remove the grounding screw from the rear panel of the SyncServer S6x0.

2. Crimp the customer-supplied UL listed Ring Lug to one end of the 16 AWG wire. Coat the lug with an electrically conductive antioxidant compound such as Kopr-shield spray. Use the grounding screw to connect the ring lug to the left side of the rear panel. The surface of the SyncServer S6x0 rear panel and threads where the grounding screw attaches must be clean of contaminants and oxidation.

3. Connect the other end of the 1 mm^2 / 16 AWG green/yellow-striped wire to earth ground using local building electrical codes for grounding.

   The suggested method is to crimp the appropriate customer-supplied UL listed Ring Lug to the other end of the 1 mm^2 / 16 AWG green/yellow-striped wire. Remove the paint and sand the area around the screw hole to ensure the proper conductivity. Coat the connection with an electrically conductive antioxidant compound such as Kopr-shield spray. Connect this Ring Lug to the rack with appropriate customer supplied screws and external star lock washers, tightening to a torque value of 53.45 in-lbs.

4. Using a digital voltmeter, measure between the ground and chassis and verify that no voltage exists between them.

AC Power Connection

Use the following procedure to make the power connections for the AC version of the SyncServer S6x0. An Over-Current Protection Device must be placed in front of the shelf power.

Figure 2-7. SyncServer S6x0 Single AC Power Connector

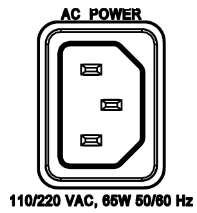
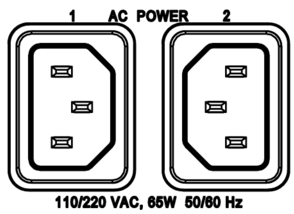


Figure 2-8. SyncServer S6x0 Dual AC Power Connector



Warning: To avoid possible damage to equipment, you must provide power source protective fusing as part of the installation. The SyncServer S6x0 is intended for installation in a restricted-access location.

1. Insert the female end of the AC power cord into the AC power connector on the SyncServer S6x0. The power receptacles support IEC cable with V-locks. The V-lock will latch the cable to prevent accidental removal of the power cord.

2. Plug the male end of the AC power cord into an active 120 VAC or 240 VAC power socket.

3. For dual AC versions, repeat steps 1-3 for the second AC power connector.

Signal Connections

The connectors for the SyncServer S6x0 are located on the rear panel.

Communications Connections

The communication connections allow user control of the SyncServer S6x0. The EIA-232 serial port and Ethernet port 1 (LAN1) are located on the rear panel are shown in Figure 1-5.

Ethernet Port 1

Ethernet port 1 is a standard 100/1000 Base-T shielded RJ-45 receptacle on the rear panel of the unit. It is used to provide connectivity to a web interface and to an Ethernet local area network (as well as for NTP input/output). To connect the SyncServer S6x0 to an Ethernet network, use an Ethernet RJ-45 cable. See Table 2-2 for connector pinouts.

Serial (Console) Port

The serial port connection is made through a DB-9 female connector on the rear panel of the unit. This port, which supports a baud rate of 115.2k (115200-8-1-N-1), allows you to connect to a terminal or computer using a terminal emulation software package for remote monitoring and control. This port is also used for serial data (NENA ASCII time code, Response mode). When connecting to this port, use a shielded serial direct connect cable.

Figure 2-9. Serial Port Male Mating Connector Pins

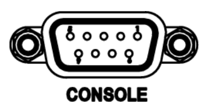


Figure 2-10 shows the DB-9 male connector that mates with the serial port on the SyncServer S6x0.

Figure 2-10. Serial Port Male Mating Connector Pins

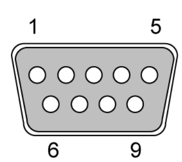


Table 2-1 describes the DB-9 connector pin assignments for the serial port

.

Table 2-1. Serial Port Connector Pin Assignments

Signal	Pin
TXD	2
RXD	3
Ground	5

SyncServer S6x0 Synchronization and Timing Connections

The SyncServer S6x0 has one GNSS input and four NTP input/output connections. The SyncServer S6x0 has one 1PPS output. The SyncServer S650 may also have an optional Timing I/O Module.

GNSS Connection

To connect a GNSS signal to the SyncServer S6x0, you must install a GPS antenna. See Connecting the GNSS Antenna, on page 55.

Caution: The GNSS cable should only be connected while the unit is properly earth grounded.

Warning: To avoid possible damage to equipment, you must provide external lightning protection when installing the GNSS antenna to prevent transients.

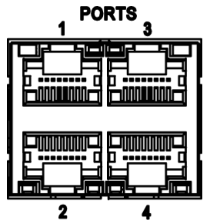
Ethernet Connections

The Ethernet ports are standard 100/1000 Base-T shielded RJ-45 receptacles, which are used for NTP inputs. To connect the SyncServer S6x0 to an Ethernet network, use an Ethernet RJ-45 cable. See Table 2-2 for connector pinouts.

Table 2-2. System Management Ethernet Connector Pin Assignments

RJ-45 Pin	100Base-T Signal	1000Base-T Signal
1	TX+ (Transmit positive)	BI_DA+
2	TX- (Transmit negative)	BI_DA–
3	RX+ (Receive positive)	BI_DB+
4	Not Used	BI_DC+
5	Not Used	BI_DC–
6	RX- (Receive negative)	BI_DB–
7	Not Used	BI_DD+
8	Not Used	BI_DD–

Figure 2-11. Ethernet Connections



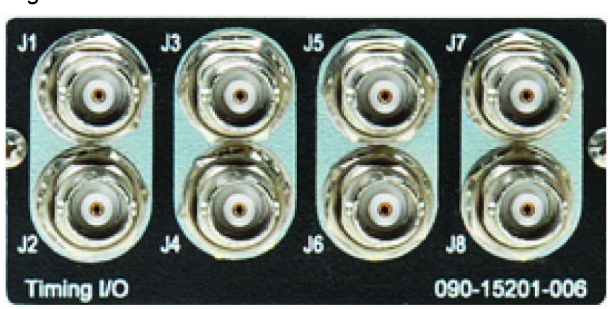
Timing I/O Module Connections

The standard configuration offers a broad yet fixed selection of signal I/O on its eight BNC connectors (see Figure 1-17). J1 is dedicated to time code and rate inputs, J2 to sine wave inputs, and J3-J8 to mixed signal outputs. The standard Timing I/O Module configuration is 1PPS or IRIG B AM-In, 10 MHz- In, IRIG AM and IRIG DCLS-Out, 1PPS-Out and 10 MHz-Out.

The FlexPort™ Technology option enables the 6 output BNCs (J3-J8) to output any supported signal (time codes, sine waves, programmable rates, and so on.) on all configurable in real time via the secure web interface. Similarly, the 2 input BNCs (J1-J2) can support a wide variety of input signal types. This uniquely flexible BNC by BNC configuration makes very efficient and cost effective use of the 1U space available.

See Figure 2-12 to view the signal types for the standard configuration and the configuration with the FlexPort™ option. See Figure 2-12.

Figure 2-12. Timing I/O BNC Connections



Serial Timing Connection

The SyncServer S6x0 features a DB-9 female connector on the rear panel of the unit. This port supports a baud rate of 4800 to 115.2k (115200-8-1-N-1). When connecting to this port, use a shielded serial direct connect cable. See Figure 2-13. See Table 2-3 for pin-outs for this RJ-45 connector.

Figure 2-13. Data/Timing Connection

.

Table 2-3. Serial Data/Timing Port Pin-Outs - DB9 Connector

Signal	Pin
TXD	2
RXD	3
Ground	5

See Table B-14 in Appendix B for TOD format details.

1PPS Output Connection

The SyncServer S6x0 features a single BNC female connector for the 1PPS signal. See Figure 2-14.

Figure 2-14. 1PPS Output Connection

Connecting the GNSS Antenna

Caution: The GNSS cables should only be connected while the unit is properly earth grounded.

The antenna connections for the SyncServer S6x0 are made at the BNC female connector labeled GNSS. Allow at least one hour for the unit to track and lock to GNSS satellites, though it typically takes far less time provided the antenna has an adequate view of the sky.

Note: The SyncServer S650i does not include a GNSS antenna connector.

Figure 2-15. GNSS Input Connection

Proper cable, grounding techniques, and lightning arrestors should be used. Mount the antenna outside, preferably on the roof with an unobstructed view of the sky. Avoid mounting the antenna near a wall or other obstruction blocking part of the sky. Mount the antenna well above roads or parking lots.

Note: For the best possible timing accuracy the cable delay must be determined and entered into SyncServer S6x0 with the web interface. See Table C-1 for cable delay values of SyncServer S6x0 GNSS antenna kits.

Warning: To avoid serious personal injury or death, exercise caution when working near high voltage lines. In particular:

- Use extreme caution when installing the antenna near, under, or around high voltage lines.
- Follow local building electrical codes for grounding the chassis.

Connecting Alarm Relay

The alarm relay output is open when an alarm activation on this page is configured and the alarm is in alarm state:

ALARM=OPEN

Note: The SyncServer S650i does not include a GNSS antenna connector.

The external Alarm mating connector is not supplied. The mating connector is made by Phoenix Contact, and the manufacturer's part number is 1827703.

Figure 2-16. Alarm Connections

Installation Check List

To verify that the installation of the SyncServer S6x0 is complete, perform the checks and procedures in Table 2-4.

Table 2-4. Installation Completeness Checklist

Operation	Complete
Ensure the SyncServer S6x0 chassis is securely attached to mounting rack	
Verify that all power and ground wires are installed correctly and securely	
Verify that all communications cables are properly installed	
Verify that all input and output cables are properly installed	

Applying Power to the SyncServer S6x0

The SyncServer S6x0 is not equipped with a Power switch. After installing the unit in a rack and making the necessary connections described in previous sections, turn on power at the distribution panel.

Normal Power Up Indications

As the SyncServer S6x0 powers up and begins normal operation, the LEDs all turn on. After the self-test is complete and the firmware is operational, the LED states may change to indicate the appropriate state or status.

Table 2-5 provides a description of the SyncServer S6x0 LEDs.

Table 2-5. LED Descriptions

Label	LED	Description
SYNC	Clock Status	**Green** - Time or Frequency clock in Normal or Bridging state **Amber** - Time or Frequency clock in Freerun or Holdover state
NETWORK	Network Status	**Red** - Management port (LAN1) is not configured or is down **Amber** - Some configured ports are down (LAN2 to LAN4) **Green** - All configured ports are up
ALARM	Alarm System alarm/fault indicator	**Off** -Operating normally **Amber** - Minor Alarm(s) **Red** - Major/Critical Alarm(s)

The SyncServer 6x0 does not contain a battery-backed real time clock. Therefore, it will always boot up with a default value for the system time. This time will be updated when it obtains time from a time reference such as GNSS, IRIG, or NTP. The default value for the date is the software build date. This date will be used for the first log entries when booting up the unit. The time will change to local time during the boot-up process if a time zone has been configured.

Chapter 3 Keypad / Display Interface

This chapter describes the keypad / display interface.

Overview

The keypad / display interface displays the time, system status, and provides the following functions:

- Configuring and enabling/disabling the LAN1 network port.
- Setting the time and entering freerun mode.
- Adjusting the brightness.
- Locking the keypad.
- Shutting down the SyncServer.

When the SyncServer starts, the display shows "Booting SyncServer please wait...". Shortly thereafter, the SyncServer displays the default time screen.

The following buttons are user-input devices for the keypad/display interface.

- ENTER: Use with MENU - Applies a menu selection or function setting.
- CLR: Use with MENU - Returns to the previous screen without saving changes.
- Left/Right Arrow Buttons: In functions, will change where the next number will be entered left or right. In status, scrolls a screen horizontally when "<previous:next>" is displayed.
- Up/Down Arrow Buttons: In functions, will change where the next number will be entered. In status, scrolls a screen vertically, displays the previous/next screen.
- Number Buttons: Enters a number, or selects a numbered menu item.

The following three buttons change the function of the display.

- TIME: Changes the format and contents of the time display.
- STATUS: Displays status of basic SyncServer operational conditions.
- MENU: Displays a menu of functions.

The following sections cover these three buttons in more detail.

TIME Button

Cycling the TIME button changes the predefined format and contents of the time display:

Large numeric time display on full screen. Hours:Minutes:Seconds

Medium numeric time display on the left, current reference and NTP Stratum on the right

Small date and time, reference, and NTP stratum.

The time display also indicates a time scale:

If the time zone setting on the TIMING - Time Zone web page is set to UTC, the time display shows "UTC" as the time scale.

If the time zone setting on TIMING - Time Zone page is set to a non-UTC (local) time zone, the time display leaves the time scale blank, or adds AM/PM if the user selects the 12-hour time scale. (Press the MENU button and select 2) Display > 3) 12/24 > 1) 12 (AM/PM).

If the Ignore UTC Corrections from GPS Reference setting on the TIMING - HW Clock page is enabled (selected), the time display shows "GPS" as the time scale.

Note: The TIMING - Time Zone page configures the display for UTC or local time. The TIMING -

STATUS Button

Pressing the STATUS button repeatedly displays a series of status screens for:

- NTP
- Alarms
- Network Ports
- Clock
- GPS Receiver
- SyncServer model, serial number, software version, and software upgrade availability. If installed, the configuration for each port of the timing/IO module.

Figure 3-1. NTP Status Screen

```
2015.11.12        04:33:44 UTC
Ref: ---       NTP Stratum: 16
```

Some screens have a "Next>" in the upper right. This means more information is available by pressing the right arrow button. This cycles through screens on that topic.

NTP Status Screen

Network Time Protocol (NTP) status.

Stratum: The Stratum number of the SyncServer. Stratum 1 means it is locked to a Hardware Clock.

Hardware Clock Input Reference that is a Stratum 0 source. Stratum 2-15 means the SyncServer is locked to another NTP time source. Stratum 16 means that the SyncServer is unsynchronized.

REF: This field identifies the "system peer". While stratum is 16, this field shows the progression of the NTP clock PLL. The field starts with a value of "INIT". Once a peer has been selected, the clock may be stepped, in which case the reference ID field changes to "STEP".

Once the PLL is locked, the stratum is updated and the reference ID provides information about the selected peer. When the SyncServer is operating at stratum 1, the reference ID displays the name of the Hardware Clock reference input.

NTP Packet I/O: The number of NTP packets the SyncServer has replied to and initiated. The SyncServer replies to clients that send NTP requests. The SyncServer also sends NTP requests when the NTP daemon isn't synchronized (i.e., Sync LED is RED) and when it is configured to synchronize to an NTP association (e.g., a Server type association).

Alarm Status Screen

Current alarm status. Use the right or left arrow to show details about the alarms.

Major: List of up to three current major alarms

Minor: List of up to three current minor alarms

LAN Status Screens

Multiple screens, four for each network port. There are two screen for IPv4 and two for IPv6. Use Next> to see the entire IP address configuration.

State: Shows “Up” if the port is enabled and “Down” if the port is disabled.

IP: IP address for the port

SM: Subnet mask

GW: Gateway address

Hardware Clock Status Screen

Hardware Clock and Input Reference status.

GPS Receiver Status Screen

GPS receiver status.

GNSS Satellites next>

GPS: 1

Max CNo: 2

1= number of GPS satellites currently “used” (the number being tracked). Value can be from 0 – 32.

2= The highest CNo (Carrier-to-Noise ratio) of all satellites that were included in result 1.

SyncServer Status Screen

Hardware and software identification. Software upgrade availability.

Model: The model number.

S.N.: The serial number.

Version: The software "Release Version" number.

Option Slot A/B Status Screens

Shows the configuration of each of the slot A/B input and output connections.

Option: Description of installed module (if any)

Flex I/O Option: Enabled | Disabled

J1 Input: Configuration of input

J2: Input: Configuration of input

J3 Output: Configuration of output

J4 Output: Configuration of output

J5 Output: Configuration of output

J6 Output: Configuration of output

J7 Output: Configuration of output

J8 Output:Configuration of output

MENU Button

Pressing the MENU button presents a numbered menu of functions, as shown in Figure 3-2.

Figure 3-2. Menu of Functions

1) LAN1	2) Disp
3) Sys Control	4) Keypad

LAN1

Selecting LAN1 brings up the Display menu screen on the display, as shown in Figure 3-3.

Figure 3-3. Configure LAN1 Screen

Configure LAN1	
1) Configure	2) On / Off

1. **Configure**: Use to select IPv4 or IPv6 address mode for LAN1 port. IPv6 automatically configures LAN1 with a dynamic IPv6 address.

   If Configure is selected, the Select LAN1 screen will appear, as shown in Figure 3-4.

2. **On/Off**: Use On to enable the LAN1 network port. Off disables the LAN1 network port for all traffic types.

Figure 3-4. Select LAN1 IP Mode Screen

```
Select  LAN1
1) IPv4        2) IPv6 (DHCPv6)
```

1. **IPv4**: Select IPv4address mode for LAN1 port.

   If IPv4 is selected, the Select Addressing Type screen will appear, as shown in Figure 3-5.

2. **IPv6**: Select IPv6 address mode for LAN1 port.

   If IPv6 (DHCPv6) is selected, the SyncServer automatically configures LAN1 with a dynamic IPv6 address.

Figure 3-5. Select IPv4 Addressing Type Screen

```
Select  Addressing Type:
1) Static Addr        2) DHCP
```

1. **Static Addr**: Select IPv4address mode for LAN1 port.

   If Static Address is selected, the Enter LAN1 Address screen will appear, as shown in Figure 3-6. After the address is entered press the ENTER button and you will be prompted to enter the Subnet mask (then ENTER) followed by the Gateway address. Once the gateway address has been entered the LAN 1 port will be reconfigured.

2. **DHCP**: Select DHCP addressing type for LAN1 port. DHCP automatically configures LAN1 with a dynamic IPv4 address.

Figure 3-6. Enter LAN1 Static IPv4 Address Screen

```
Enter  LAN1  Address:
           192.168.107.122
```

Display

Selecting Display brings up the Display menu screen on the display, as shown in Figure 3-7.

Figure 3-7. Display Menu Screen

```
1) Set Time   2) Brightness
3) 12/24  (non-UTC only)
```

1. **Set Time**: Enter the UTC date and time using 24-hour format. Select OK to apply the entered time to the Hardware Clock and not use external time references. See Figure 3-8.

Figure 3-8. Set Time Screen

```
Enter 24h time:
2015-11-12, 11:32.30
```

2. **Brightness**: Adjust the brightness of the front panel display. See Figure 3-9.

Figure 3-9. Set Brightness Screen

```
Select Brightness Level:
1) Low   2) Medium   3) High
```

3. **12/24 (non-UTC Only)**: Select a 12 (AM/PM) or 24-hour clock format. See Figure 3-10.

Note: The 12/24 and 24 Hour only appear if a local time zone has been specified via the web inteface.

Figure 3-10. Select Time Format Screen

```
Select Format:
1) 12 (AM/PM)   2) 24 Hour
```

Many keypad functions timeout after approximately 10 seconds of inactivity (no user inputs).

Sys Control

Selecting Sys Control brings up the Shutdown / Factory Default screen on the display, as shown in Figure 3-11.

Figure 3-11. Shutdown / Factory Default Screen

```
1) Shutdown
2) Factory Default
```

See Factory Defaults in Appendix B for default settings.

1. **Shutdown**: Halts the SyncServer. The message Press the ENTER button to Confirm appears in the display, as shown in Figure 3-12.

2. Factory Default

Figure 3-12. Confirmation Screen

```
Press ENTER to Confirm
Press CLR to Cancel
```

Keypad

Selecting Keypad brings up the Keypad Control screen on the display, as shown in Figure 3-13.

Figure 3-13. Keypad Control Display Screen

```
Keypad Control:
1) Set Password     2) Lockout
```

1. **Set Password**: Sets the password for the Lockout function. The *first time* the interface asks for the "Current Password", enter 95134. No password recover or reset feature is available for the keypad, except to reset factory defaults using the Sys Control - Factory Reset page.

2. **Lockout**: The Lockout function password protects the keypad from changes. Asks for confirmation. The factory default password for the keypad is “95134”.

Chapter 4 Web Interface

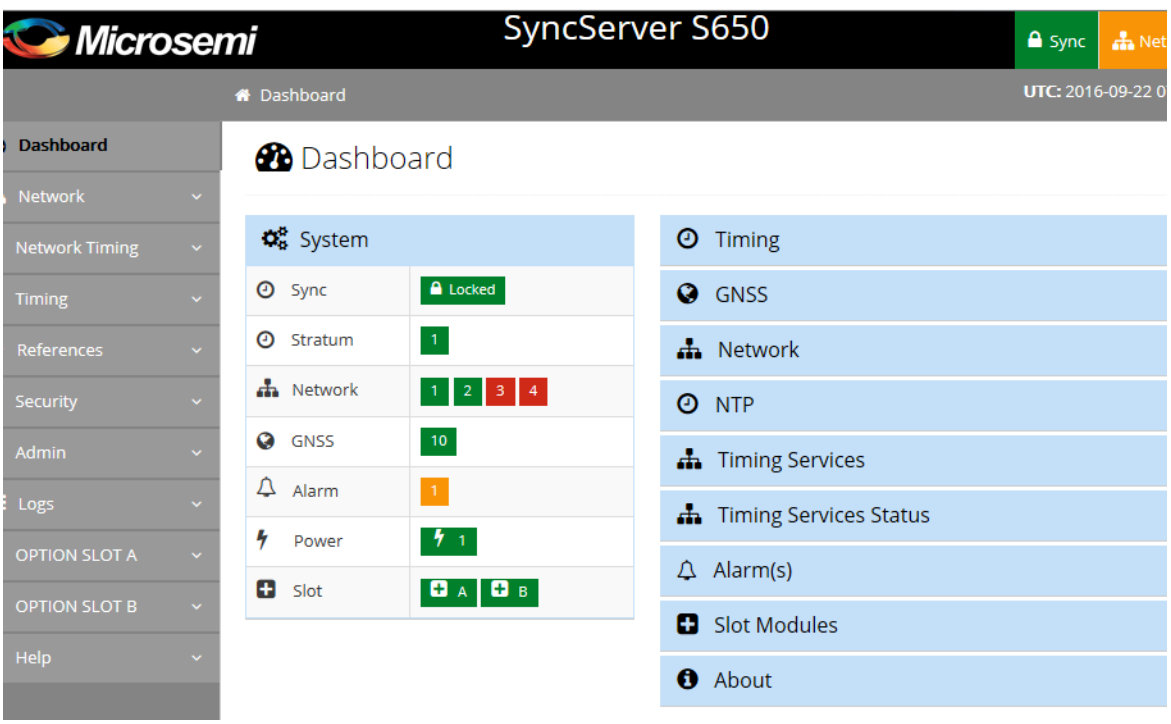
This chapter describes the web interface for the SyncServer S6x0.

In This Chapter

Note: For security reasons, the SyncServer S6x0 only supports https However, the user will get warnings from most web browsers that a self-signed certificate is being used (not from a recognized certificate authority). Users should accept the warnings and proceed to the login page.

The internal self-signed certificate can be renewed and updated on the Security->https page. Users can also request and install a https certificate

Figure 4-1. Dashboard Screen

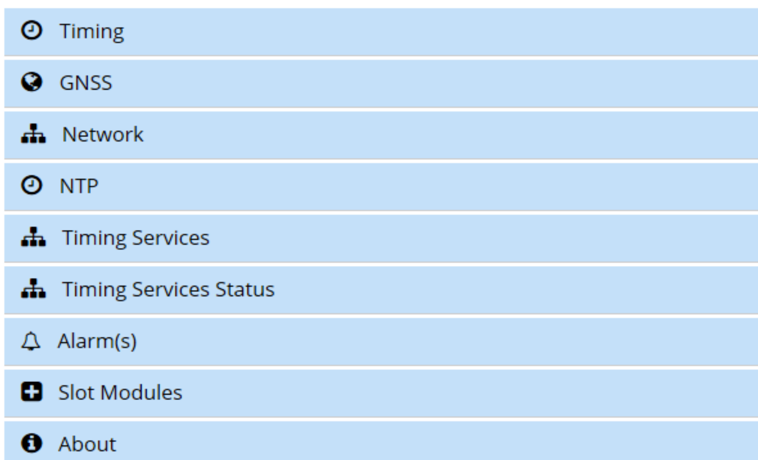


Note: If the browser is displaying a busy indicator, then please wait until the previous action is complete before starting another action. Depending on the browser used, the web page responsiveness will vary due to the use of the encryption cipher suite used in the S6x0. Microsemi recommends using the Google Chrome browser.

System Information

The System information window in the Dashboard, as shown in Figure 4-2, displays an overall summary of the system.

Figure 4-2. System Status



Status / Information Windows

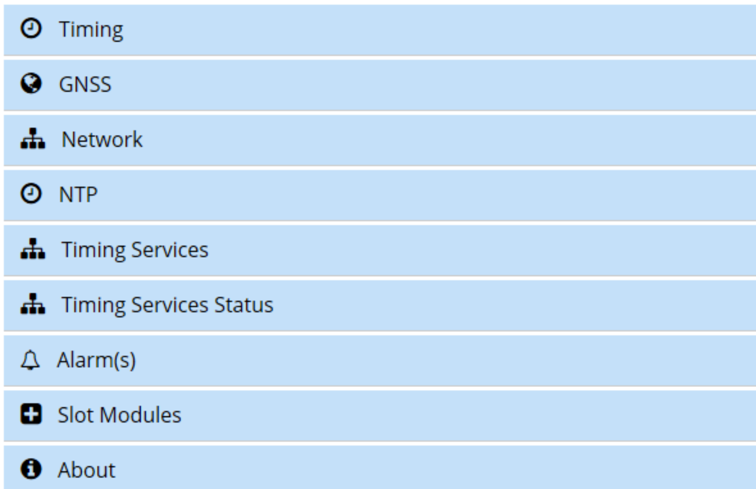
The Status/Information windows in the dashboard, as shown in Figure 4-3, displays status details and information regarding the following:

- Timing
- GNSS
- Network
- NTP
- Timing Services
- Timing Services Status

- Alarms
- Slot Modules
- About

Clicking on the down arrow on a window expands the information under that topic.

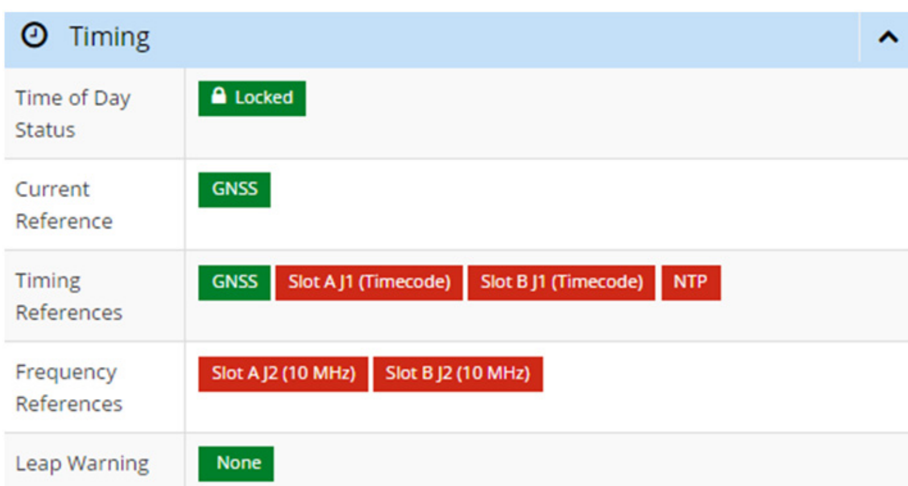
Figure 4-3. Status/Information Windows



Timing Status & Information

The Timing window in the dashboard, as shown in Figure 4-4, displays status details and information about system timing, including current reference, lock status, and status of input references. See Table 4-1.

Figure 4-4. Timing Window



Note: The SyncServer 6x0 does not contain a battery-backed real time clock. Therefore, it will always boot up with a default value for the system time. This time will be updated when it obtains time from a time reference such as GNSS, IRIG, or NTP. The default value for the date is the software build date. This date will be used for the first log entries when booting up the unit. The time will change to local time during the boot-up process if a time zone has been configured.

Table 4-1. Timing Window Descriptions

Item	Details	Color Scheme
Time of Day Status	This row is essentially showing the time clock state. See Table 4-2 for descriptions of clock states.	Warmup Freerun Handset Locking Locked Bridging Holdover Holdover Relocking
Current Reference	This row shows the input reference that is currently “driving” the SyncServer. It could be a timing source (best case), an external holdover source, or the SyncServer internal reference (worst case). See Table 4-3 for details of current sources.	Green if any externally selected reference, Amber if internal oscillator.
Timing References	This row shows all enabled time references.	If a time reference is ready to be used it will be green. If it is not ready it will be red.

Table 4-1. Timing Window Descriptions

Item	Details	Color Scheme
Frequency References	This row shows all enabled frequency-only references. The use of a frequency reference is thought of as a method for holding-over time when there either was never an active time source or it was lost.	If a holdover source is ready to be used it will be green. If it is not ready it will be red.
Leap Warning	This row indicates if a Leap second is pending.	If there is no warning of a Leap second pending it will be green. If there is a warning of a Leap second pending it will be red.

Table 4-2. Status - Clock State Descriptions

Status Indication	Meaning	Details
Warmup	SyncServer not ready for any type of synchronization functionality. This is a one-time status following power-up	Directly equal to the common warmup clock state (to both freq and time)
Freerun	SyncServer does not have a time reference and never has had one since powerup.	
Handset	For future use.	
Locking	SyncServer has selected a qualified active time input for use and is now in process of aligning all outputs to it.	In this status, the Current Source row will, by definition, have a “green” item that has a match to it in the Timing Sources row. An “active” time source just means one that is continuously providing time (where continuous is a relative term – in general it is an update per second).
Locked	SyncServer outputs are now aligned to a selected active time source.	

Table 4-2. Status - Clock State Descriptions

Status Indication	Meaning	Details
Bridging	SyncServer no longer has a selected active time source, but it hasn't been that way for very long.	This is really just the beginning of holdover, but is a period where the output performance should be as good as when in Locked. It provides a hysteresis buffer to prevent nuisance Locked-Holdover-Locked transitions. In this state the Current Source row will NOT have a green item from the Timing Sources row.
Holdover	SyncServer no longer has a selected active time source, and it has been that way for longer than the Bridging duration. Also the condition for "red holdover" (next row) is not met.	Either we are holdover using an external frequency reference OR we are in holdover using the SyncServer internal reference AND the duration is less than a user-specified time duration.
Holdover	Same as prior row but specific additional conditions are met. This condition occurs if the current source is the internal oscillator and the duration in time holdover has exceeded the time defined by user in the Timing > Holdover window.	The unit has been in holdover for more than a user-specified duration and the holdover is based on the SyncServer internal reference. In this case the Holdover Sources row will not contain any green items.
Relocking	SyncServer has selected a qualified active time input for use and is now in process of aligning all outputs to it.	

Table 4-3. Status - Current Source Details

Item	Status Where it Will Happen	Details
No current source	Warmup	Directly equal to the common warmup clock state (to both freq and time)
Current Source taken from Timing Sources	Locking Locked Relocking	When the status is any of these there MUST be a selected time source, which takes precedence in the Current Source row (more important than if there is also a qualified holdover source). There must be at least one green item in the Timing Sources row. The leftmost green one will be identically indicated in the Current Source row. This is because the leftmost green item in Timing Sources is the highest priority time source and therefore must be selected. For example, if it is GNSS it will appear identically as Current Source and in Timing Sources row.
Current Source taken from Holdover Sources	Freerun Bridging Holdover Holdover	For any Status in this category there cannot be a qualified Timing Source (nothing green in that row), so it is certain that SyncServer is using frequency-only reference. If there is a qualified Holdover Source (meaning something green in this row), then the leftmost green one will be the current source. If there is no qualified Holdover source (nothing green in that row) then all that remains is the SyncServer internal reference, which is what appears in the Current Source row. In this case the entry will be one of the following, depending on the specific SyncServer product oscillator type: ■ Internal Rb, ■ Internal OCXO ■ Standard

GNSS Status & Information

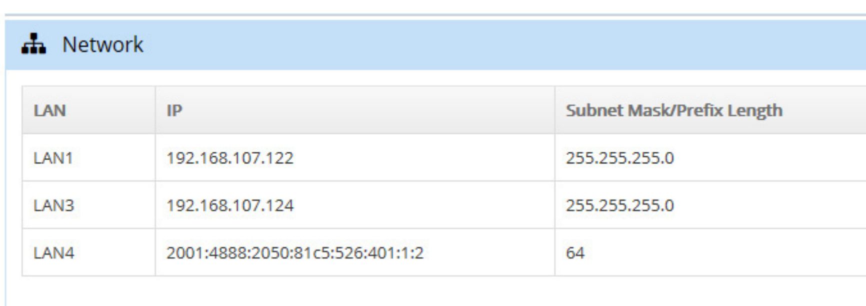
The GNSS window in the dashboard, as shown in Figure 4-5, displays status details and information about GNSS. C/No is the carrier-to-noise density which is defined as the carrier power divided by the noise power spectral density. Higher C/No results in better tracking and performance.

Figure 4-5. GNSS Window

Network Status & Information

The Network window in the dashboard, as shown in Figure 4-6, displays status details and information about the network ports in use.

Figure 4-6. Network Window



LAN	IP	Subnet Mask/Prefix Length
LAN1	192.168.107.122	255.255.255.0
LAN3	192.168.107.124	255.255.255.0
LAN4	2001:4888:2050:81c5:526:401:1:2	64

NTP Status & Information

The NTP window in the dashboard, as shown in Figure 4-7, displays status details and information about the NTP configuration.

Figure 4-7. NTP Window

NTP		
NTPd	System Peer	127.127.47.0
	System Peer Mode	client
	Leap Indicator	0
	Stratum	1
	Reference ID	FREE

Note: The dashboard will provide Leap indicator information as soon as it is available. For GPS, this is usually many months ahead.

The Leap indicator information in the NTP messages sent out the Ethernet port(s) will only be sent out the last 24 hours before the event for the "01" or "10" values of this parameter.

Timing Services Information

The Timing Services window in the dashboard, as shown in Figure 4-8, displays status details and information about the NTP reflector and PTP configuration.

Figure 4-8. Timing Services Window

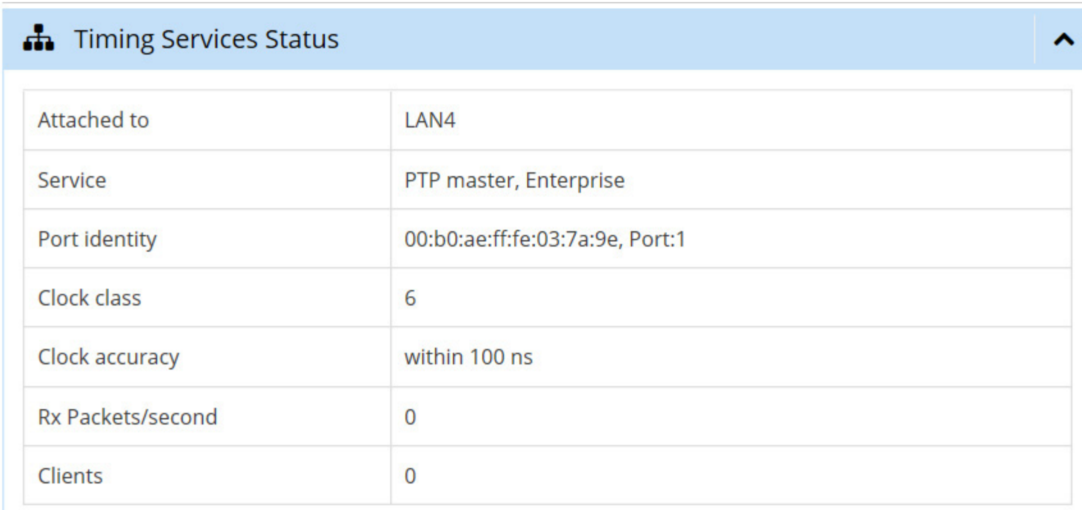
Timing Services

LAN	Name	Timing Service	IP
3	(2) PTP 1	PTP master	192.168.107.124

Timing Services Status

The Timing Services Status window in the dashboard, as shown in Figure 4-9, displays status details and information for the NTP reflector and PTP.

Figure 4-9. Timing Services Status Window



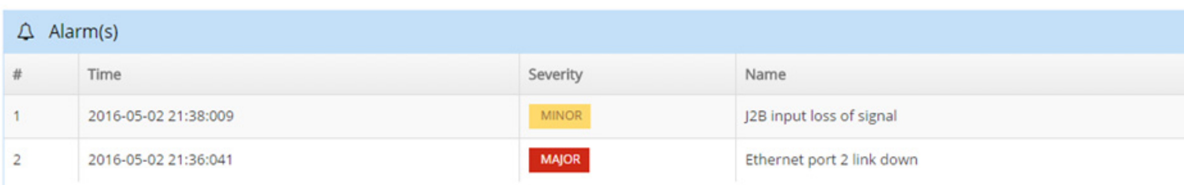
Timing Services Status

Attached to	LAN4
Service	PTP master, Enterprise
Port identity	00:b0:ae:ff:fe:03:7a:9e, Port:1
Clock class	6
Clock accuracy	within 100 ns
Rx Packets/second	0
Clients	0

Alarm Information

The Alarms window in the dashboard, as shown in Figure 4-10, displays active alarms.

Figure 4-10. Alarms Window



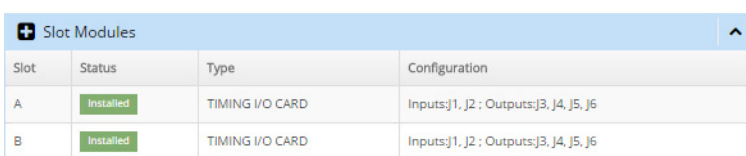
Alarm(s)

#	Time	Severity	Name
1	2016-05-02 21:38:009	MINOR	J2B input loss of signal
2	2016-05-02 21:36:041	MAJOR	Ethernet port 2 link down

Slot Modules Status & Information

The Slot Modules window in the dashboard, as shown in Figure 4-11, displays status details about the modules installed in the Options Slots.

Figure 4-11. Slot Modules Window



Slot Modules

Slot	Status	Type	Configuration
A	Installed	TIMING I/O CARD	Inputs:J1, J2 ; Outputs:J3, J4, J5, J6
B	Installed	TIMING I/O CARD	Inputs:J1, J2 ; Outputs:J3, J4, J5, J6

"About" Device Information

The "About" window in the dashboard, as shown in Figure 4-12, displays system information about the unit.

Figure 4-12. About Window

About	
Hostname	SyncServer
Model	SyncServer S650
Serial Number	RKT-15309032
Release Version	2.0.0.0
Up Time	3 day(s) 11 hour(s) 59 minute(s) 40 second(s)
Memory free	86.32 %
Oscillator	Standard

Note: The update available feature will only function if LAN1 has been configured with an IPv4 address and a DNS server is configured. The DNS server can be either automatically configured via DHCP or manually when using a static IP address. The update available feature can be disabled on the Admin->General page.

Note: You can check for the latest version number of SyncServer S600 and S650 software at these URLs:

http://update.microsemi.com/SyncServer_S600

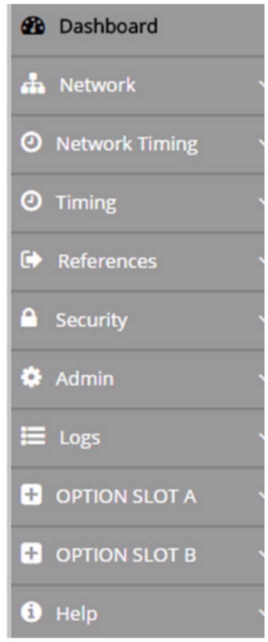
http://update.microsemi.com/SyncServer_S650

The number of the most current version of the software will appear. You can compare this to the version number installed in the SyncServer by proceeding to the web GUI Dashboard and finding the version number in the About drop down on the right side. If you do not have the latest version installed consider contacting Technical Support.

Navigation Windows

The navigation portion of the web interface is used to access the various pages to configure different aspects of the SyncServer S6x0 and to view status information. See Figure 4-13. The navigation menu will expand and contract depending on the current selection.

Figure 4-13. Navigation Portion of Dashboard



Network Configuration Windows

The Network tab on the dashboard provides access to windows for Ethernet, SNMP, SNMP Trap configuration, and Ping.

Network - Ethernet Configuration

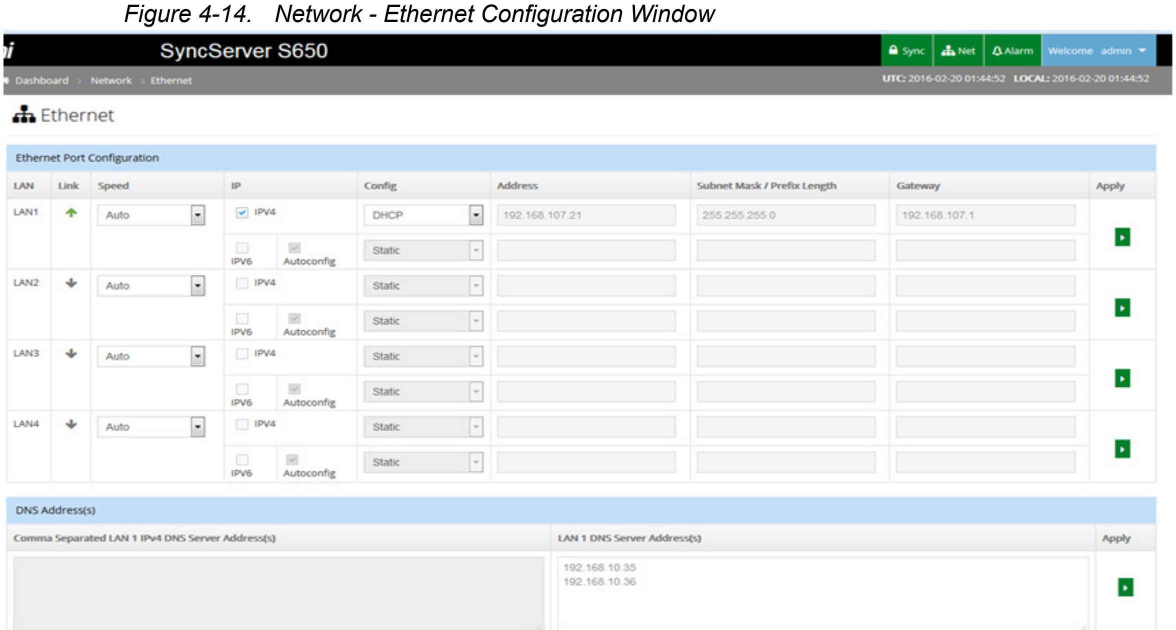
Use this window to configure or modify the Ethernet setting for LAN1 - LAN4, and to manually set the DNS server address for LAN1. There is a separate "Apply" button for each Ethernet port and the DNS server address configuration.

The following Ethernet parameters can be configured:

- Speed
  - Auto | Full 100 | Full 1000
- IP format
  - IPv4 | IPv6
- Config
  - Static | Dynamic
  - IPv6 Auto Config
- IP address
- Subnet mask for IPv4, prefix length for IPv6
- Gateway address

See Figure 4-14. See Appendix E, IP Port Details for information on Ethernet port isolation, management port rules, and timing port rules.

Figure 4-14. Network - Ethernet Configuration Window



Network - SNMP Configuration

Use this window to add, edit or delete v2 communities, and to add or delete SNMP users.

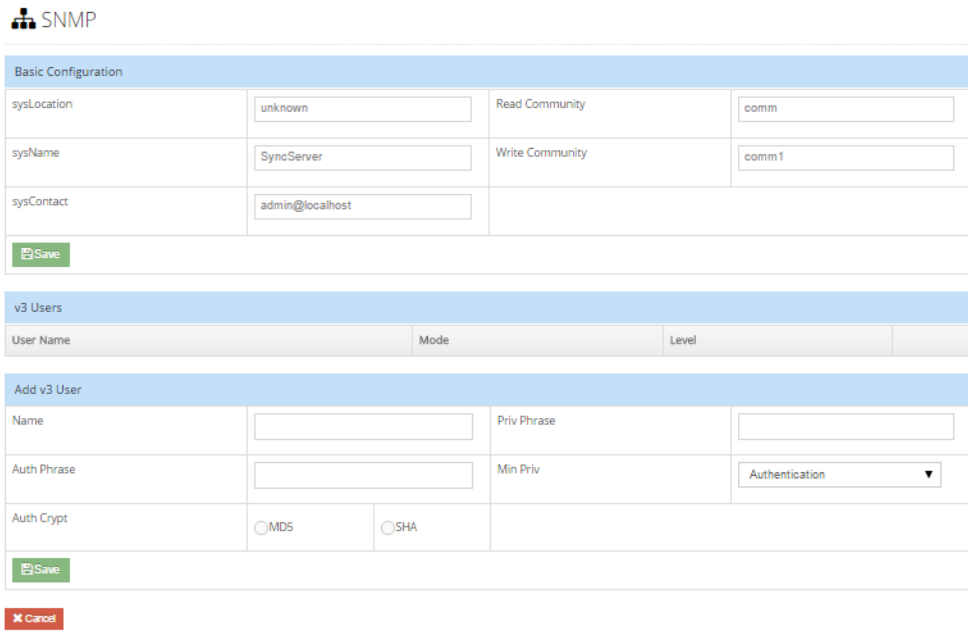
The following SNMP parameters can be configured:

- Basic Configuration
  - sysLocation, 1-49 characters
  - sysName, 1-49 characters
  - sysContact, 1-49 characters
  - Read Community, 1-49 characters
  - Write Community, 1-49 characters
- Add v3 User - up to 10 users can be added
  - Name, 1-32 characters
  - Authentication Phrase, 1-49 characters
  - Authentication Encryption: MD5 or SHA
  - Privacy Phrase, 8-99 characters
  - Privacy Selection: "Authentication" or "Authentication & Privacy". Privacy uses AES128

Note: SNMP user names, community names, and privacy/authentication phrases can contain all ASCII characters except (<), (&), (>), ("), (').

See Figure 4-15.

Figure 4-15. Network - SNMP Window



Network - SNMP Trap Configuration

Use this window add or edit SNMP trap recipients

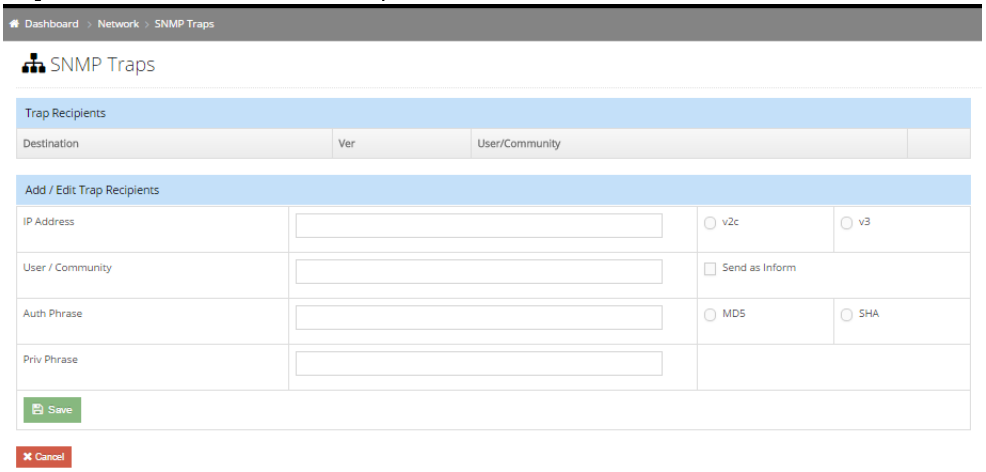
The following parameters can be configured:

- IP Address - up to 10 trap managers can be added
- Trap Version: v2 or v3
- User / Community, 1-32 characters
- Authentication Phrase (v3 only), 1-99 characters
- Privacy Phrase (v3 only, privacy uses AES128), 1-99 characters
- Authentication Encryption: MD5 or SHA (v3 only)

See Figure 4-16.

Note: Some SNMP browsers and trap managers require that an SNMPv3 user be created with the same username and authentication as used for the trap configuration in order for the SNMPv3 discovery process to complete properly.

Figure 4-16. Network - SNMP Traps

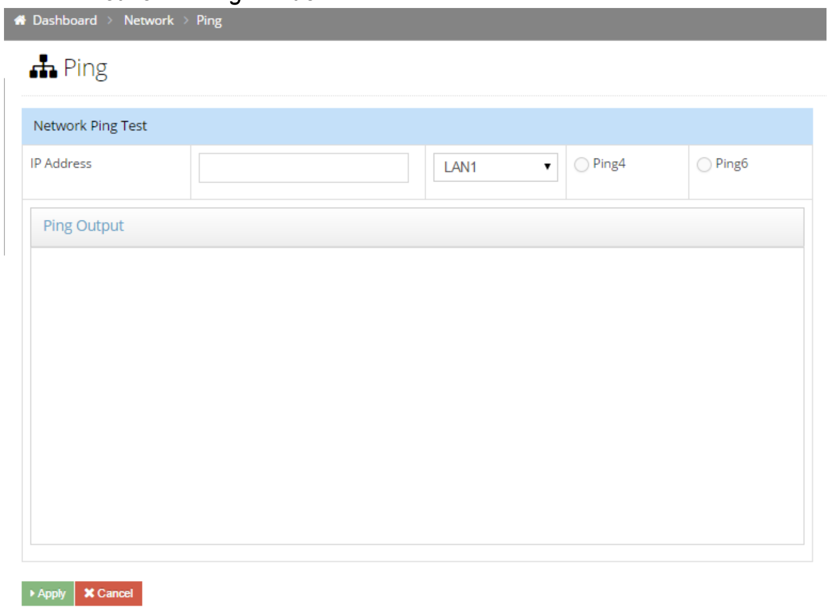


Network - Ping

Use this window to perform network ping tests. Use ping to test network connectivity out the LAN ports as needed. The result of the ping will be displayed in the window when completed.

See Figure 4-17.

Figure 4-17. Network - Ping Window



Network Timing Windows

The Network Timing tab on the dashboard provides access to windows to configure NTP, view NTP Daemon Status and Control, and to view NTP Associations.

NTP SysInfo Window

Use this window to view NTP Daemon Status and Control.

See Figure 4-18. See Table 4-4 for descriptions of NTP Daemon Status and Control parameters.

Figure 4-18. NTP SysInfo Window

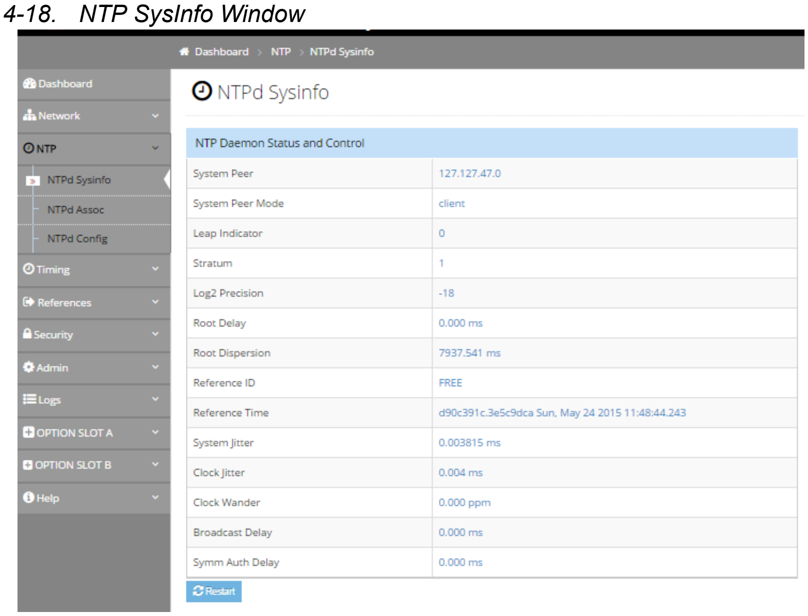


Table 4-4. NTPd SysInfo Parameter Descriptions

Parameter	Description
System Peer	The IP address of the clock source. The source is selected by the NTP daemon that is most likely to provide the best timing information based on: stratum, distance, dispersion and confidence interval. The address of the local SyncServer Hardware Clock can be viewed in the hardware reference clock section of the NTP associations page.
System Peer Mode	The relationship of the SyncServer to a system peer, usually a "client". Depending the configuration, the mode can be: ■ **Client**: A host operating in this mode sends periodic messages regardless of the reachability state or stratum of its peer. By operating in this mode the host, usually a LAN workstation, announces its willingness to be synchronized by, but not to synchronize the peer. ■ **Symmetric Active**: A host operating in this mode sends periodic messages regardless of the reachability state or stratum of its peer. By operating in this mode the host announces its willingness to synchronize and be synchronized by the peer. ■ **Symmetric Passive**: This type of association is ordinarily created upon arrival of a message from a peer operating in the symmetric active mode and persists only as long as the peer is reachable and operating at a stratum level less than or equal to the host; otherwise, the association is dissolved. However, the association will always persist until at least one message has been sent in reply. By operating in this mode the host announces its willingness to synchronize and be synchronized by the peer. A host operating in client mode (a workstation, for example) occasionally sends an NTP message to a host operating in server mode (the SyncServer), perhaps right after rebooting and at periodic intervals thereafter. The server responds by simply interchanging addresses and ports, filling in the required time information and returning the message to the client. Servers need retain no state information between client requests, while clients are free to manage the intervals between sending NTP messages to suit local conditions. In the symmetric modes, the client/server distinction (almost) disappears. Symmetric passive mode is intended for use by time servers operating near the root nodes (lowest stratum) of the synchronization subnet and with a relatively large number of peers on an intermittent basis. In this mode the identity of the peer need not be known in advance, since the association with its state variables is created only when an NTP message arrives. Furthermore, the state storage can be reused when the peer becomes unreachable or is operating at a higher stratum level and thus ineligible as a synchronization source. Symmetric active mode is intended for use by time servers operating near the end nodes (highest stratum) of the synchronization subnet. Reliable time service can usually be maintained with two peers at the next lower stratum level and one peer at the same stratum level, so the rate of ongoing polls is usually not significant, even when connectivity is lost and error messages are being returned for every poll.

Table 4-4. NTPd SysInfo Parameter Descriptions (Continued)

Parameter	Description
Leap Indicator	The Leap Indicator (LI) is a two-bit binary number in the NTP packet header that provides the following information: ■ Advance warning that a leap second adjustment will be made to the UTC timescale at the end of the current day. Leap seconds are events mandated by the world time authority (BIPM) in order to synchronize the UTC time scale with the earth's rotation. ■ Whether the NTP daemon is synchronized to a timing reference. <u>LI</u> <u>Meaning</u> 00 No Warning 01 Leap second insertion: Last minute of the day has 61 seconds. 10 Leap second deletion: Last minute of the day has 59 seconds. 11 Alarm condition (Not synchronized) When the SyncServer or NTP daemon is started or restarted, the leap indicator is set to "11", the alarm condition. This alarm condition makes it possible for NTP clients to recognize that an NTP server (the SyncServer) is present, but that it has yet to validate its time from its time sources. Once the SyncServer finds a valid source of time and sets its clock, it sets the leap indicator to an appropriate value. The NTP Leap Change Alarm on the ADMIN - Alarms page can be configured to generate an alarm and send notifications each time the leap indicator changes state.
Stratum	This is an eight-bit integer that indicates the position of an NTP node within an NTP timing hierarchy. It is calculated by adding 1 to the stratum of the NTP system peer. For the SyncServer, the stratum values are defined as follows: <u>Stratum</u> <u>Meaning</u> 0 Hardware Clock when locked 1 Primary server 2-15 Secondary server 16-255 Unsynchronized, unreachable For example, the SyncServer is: ■ stratum 1 when the Hardware Clock (stratum 0) is synchronized to an input reference, in holdover mode, or in freerun mode. ■ stratum 2 through 15 when it is synchronized to a remote NTP server. ■ stratum 16 when it is unsynchronized, indicating that it is searching for a valid source of timing information.
Log2 Precision	This is a signed integer indicating the precision of the selected peer clock, in seconds to the nearest power of two. A typical value is -18 for a Hardware Clock where the uppermost 18 bits of the time stamp fractional component have value, indicating a precision in the microsecond range.

Table 4-4. NTPd SysInfo Parameter Descriptions (Continued)

Parameter	Description
Root Delay	This is a measure of the total round trip delay to the root of the synchronization tree. A typical value for a SyncServer operating at stratum 1 would be 0 since the SyncServer is a root of the synchronization tree For other stratum levels, an appropriate value is displayed. Depending on clock skew and dispersion, this value could be positive or negative.
Root Dispersion	This is a signed fixed-point number indicating the maximum error relative to the primary reference source at the root of the synchronization subnet, in seconds. Only positive values greater than zero are possible.
Reference ID	This is a four-byte field used to identify the reference clock source. At initialization, while the stratum is 16, this field shows the progression of the NTP clock PLL. The field will start with a value of INIT (may be displayed as 73.78.73.84, the ASCII decimal values). Once a peer has been selected, the clock may be stepped, in which case the reference ID field will change to STEP (or 83.84.69.80). Once the PLL is locked, the stratum will be updated and the reference ID will identify the selected peer. In the case of a SyncServer operating at stratum 1, the reference ID will display the source for the local timing reference (e.g., GNSS, IRIG, FREE). In the case where the selected peer is another NTP server, the reference ID will display the IP address of the server or a hash unique to the association between the SyncServer and the remote server.
Reference Time	The time when the SyncServer last received an update from the selected peer. Represented using time stamp format in local time. If the local clock has never been synchronized, the value is zero. A time stamp of zero corresponds to a local time of Thu, Feb 7 2036 6:28:16.000. This value is typically updated every 16 seconds for a locally attached hardware reference (e.g., GNSS, IRIG) and in an interval of 64- 1024 seconds for a readily accessible remote NTP server.
System Jitter	Jitter (also called timing jitter) refers to short-term variations in frequency with components greater than 10 Hz.
Clock Jitter	Jitter (also called timing jitter) refers to short-term variations in frequency with components greater than 10 Hz.
Clock Wander	
Broadcast Delay	The broadcast and multicast modes require a special calibration to determine the network delay between the local and remote servers. Typically, this is done automatically by the initial protocol exchanges between the client and server. This is the broadcast or multicast delay reported by the NTP daemon.
Symm Auth Delay	When NTP authentication is enabled and performed on outgoing NTP packets, this adds a trivial amount of fixed delay that can be removed based on the authdelay value. This value is always set to zero on the SyncServer.

NTP Associations

Use this window to view NTP Associations.

See Figure 4-19. See Table 4-5for descriptions of NTPd Associations parameters.

Figure 4-19. NTPd Associations Window

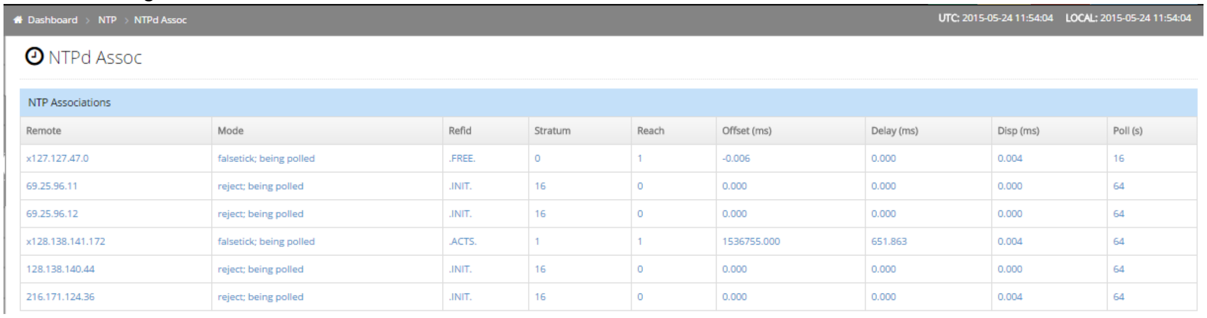


Table 4-5. NTPd Associations Parameters

Parameter	Description
Remote	The domain name or IP address of the remote end of the NTP association. "Hardware Clock" is the SyncServer's Hardware Clock. In the case of a remote NTP connection, this will be the IP address of the remote end. The character in the left margin indicates the mode in which this peer entry is operating: ■ (space) reject The peer is discarded as unreachable, synchronized to this server (synch loop) or outrageous synchronization distance. ■ x = falsetick The peer is discarded by the intersection algorithm as a falseticker. ■ ,(period) = excess The peer is discarded as not among the first ten peers sorted by synchronization distance and so is probably a poor candidate for further consideration. ■ - (minus) = outlier The peer is discarded by the clustering algorithm as an outlier. ■ + (plus) = candidate The peer is a survivor and a candidate for the combining algorithm. ■ # (pound sign) = selected The peer is a survivor, but not among the first six peers sorted by synchronization distance. If the association is ephemeral, it may be demobilized to conserve resources. ■ * (asterisk) = sys.peer The peer has been declared the system peer and lends its variables to the system variables. ■ o = pps.peer The peer has been declared the system peer and lends its variables to thesystem variables. However, the actual system synchronization is derived from a pulse-per-second (PPS) signal, either indirectly via the PPS reference clock driver or directly via kernel interface.
Mode	

Table 4-5. NTPd Associations Parameters (Continued)

Parameter	Description
Ref Id	This is a four-byte field used to identify the reference clock source. At initialization, while the stratum is 16, this field shows the progression of the NTP clock PLL. The field will start with a value of INIT (may be displayed as 73.78.73.84, the ASCII decimal values). Once a peer has been selected, the clock may be stepped, in which case the reference ID field will change to STEP (or 83.84.69.80). Once the PLL is locked, the stratum will be updated and the reference ID will identify the selected peer. In the case of a SyncServer operating at stratum 1, the reference ID will display the source for the local timing reference (e.g., GNSS, IRIG, FREE). In the case where the selected peer is another NTP server, the reference ID will display the IP address of the server or a hash unique to the association between the SyncServer and the remote server.
Stratum	The stratum level of the remote clock in the NTP hierarchy. Lower values are given more emphasis. For the local Hardware Clock, stratum 0 is a special value that indicates the Hardware Clock it is synchronized by a "timing root" reference such as GNSS. Values in the range of 1 through 15 indicate the number of steps the remote NTP connection is from its timing root. Stratum 16 is a special value that indicates that the remote connection is not synchronized. The stratum reported by the SyncServer is incremented by one from its synchronizing peer. For example, while synchronized to the Hardware Clock (Stratum 0), the stratum of the SyncServer is one (Stratum 1).
Reach	This is an 8-bit shift register that keeps track of the last 8 attempts to reach the remote end of the association. New bits are added to the rightmost end of the register (1 for reached or 0 for unreached) and old bits "fall off" the left hand side. The shift register is represented in octal. For example, by converting "377" from octal to binary, one gets "11111111", indicating 8 successful polls. For a sequence of eight successful polling attempts on a new association, the octal value of Reach increases as follows: 1, 3, 7, 17, 37, 77, 177, 377. If the value isn't one of those just shown, there may be a problem polling the remote end of the association. If the value remains at 0, or decreases to 0, the association is becoming unreachable. The reach value stays 0 if the SyncServer is a broadcast or multicast server.
Offset (ms)	The time offset between the SyncServer and the remote server, in seconds, of the last poll. The NTP daemon's clock selection algorithm gives preference to lower Offset values. The Offset for the Hardware Clock is usually in the microsecond range. For external NTP associations, the offset is affected by the time base of the remote node and the characteristics of the network path, with values typically in the 1 - 10 millisecond range.
Delay (ms)	The total delay, in seconds, of the round trip to the remote end of the NTP association. For example, a value of "0.07817" equals approximately 78 milliseconds. The Delay for the Hardware Clock is "0". For most NTP associations, typical values range from tens to hundreds of milliseconds. The NTP daemon's clock selection algorithm gives preference to lower Delay values.

Table 4-5. NTPd Associations Parameters (Continued)

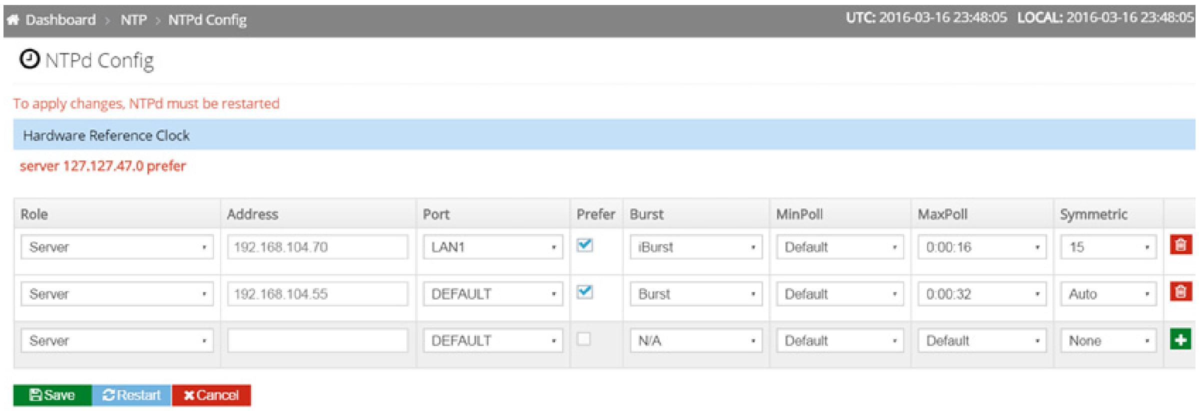
Parameter	Description
Disp (ms)	Dispersion represents the maximum error of the SyncServer relative to the NTP association.There are two components in dispersion, those determined by the peer relative to the primary reference source of standard time and those measured by the SyncServer relative to the peer. They provide not only precision measurements of offset and delay, but also definitive maximum error bounds, so that the SyncServer can determine not only the time, but the quality of the time as well.
Poll (s)	The length of the interval (in seconds) with which the SyncServer polls the remote server, usually starting at 64 seconds and gradually increasing to 1024 seconds. Valid values range from 16 to 65535, increasing by powers of 2. The polling interval for the Hardware Clock is fixed at 16 seconds. The user-configured Minimum and Maximum Poll Interval settings on the NTP - Config page limit this interval.

NTP Configuration Window

Use this window to configure NTP parameters, including the Role (Server, Peer, or Broadcast), Address, and Port.

See Figure 4-20. See Table 4-4 for descriptions of NTP Configuration parameters.

Figure 4-20. NTP Configuration Window



Click the Save button after making changes to save the changes. Click the Restart button to apply the changes.

Table 4-6. NTPd Association Configuration Parameters

Parameter	Description
Role	**Server** Creates a persistent association between the SyncServer (client) and an NTP node (server). The client synchronizes with the server if the client's clock selection algorithm selects this server as the best clock. Typical server associations include: the hardware clock, the factory default NTP servers, and servers added by the user. The user creates a Server association to designate an NTP node that has an NTP Stratum better or equal to that of the SyncServer (client). Often, the NTP server is another Stratum 1 server with a GPS reference that is outside the user's administrative jurisdiction.
	Peer Creates a persistent symmetric-active association between the SyncServer (peer1) with an NTP node (peer2). For the NTP node running in symmetric-passive mode, there is nothing needs to be done on the NTP node. However, the NTP node can be configured in symmetric active mode too. When configured, the two nodes can synchronize with each other in a variety of failure scenarios, such as loss of GPS and Internet connectivity. The user configures NTP associations on two NTP nodes that point to the each other. The two nodes are usually of equal stratum and have independent references, such as two separate GPS installations or two separate network paths to NTP servers on the Internet. In the event of a reference failure, the peerscan synchronize to the node that has the best remaining reference.
	Broadcast Creates a broadcast server association. When configured with a broadcast address (e.g., 192.168.61.255), the association broadcasts NTP messages from the network interface with the matching IP address (e.g., 192.168.61.58). Broadcast messages go out to all nodes on the subnet, and are usually blocked by routers from reaching adjacent subnets. Consult with the network administrator to select a correctly-scoped address and Time-to-Live (TTL) value. Typical Usage: Broadcast associations to reduce network traffic with a large number of NTP clients.
Address	The IP address or DNS name of the NTP association.
Port	With the default setting, the NTP daemon automatically detects and uses a valid network port to communicate with configured NTP server(s). Depending on the IP routing infrastructure, this is typically LAN1. The user can override this by selecting a specific network port. If so, the address must be specified using an IP address instead of a DNS name. The Port setting is only available for Server, Peer, Broadcast, and Multicast associations. (Factory Default = "Default")

Table 4-6. NTPd Association Configuration Parameters (Continued)

Parameter	Description
Prefer	The NTP daemon will synchronize with an association marked prefer over an equivalent association that is not. The internal hardware reference clock prefer setting can be cleared in order to allow an external NTP server to be preferred over the internal hardware reference clock. By default the SyncServer S600 Series has the NTP Prefer selected for the local hardware reference clock. In most operating scenarios the local hardware reference clock (which more often than not will be tracking GNSS) will be the only reference being used. With the Prefer being selected, and no statistically better reference available, the time server will achieve Stratum 1 status on startup or restart as rapidly as possible. If the Prefer is not selected for the hardware reference clock then the NTP daemon will go through a standard validation procedure for a reference clock. This procedure will take several minutes and should happen by the time the reach indicates 377 on the reference clock association. For optimal operation, Microsemi recommends the local hardware reference remain selected as a Prefer in the configuration.
Burst	**Burst** When the server is reachable, send a burst of eight packets instead of the usual one. The packet spacing is about two seconds. This is designed to improve timekeeping quality for server associations. This setting should only be used in agreement with the administrator of the remote NTP device as the traffic load may be onerous.
	iBurst When the server is unreachable, send a burst of eight packets instead of the usual one. As long as the server is unreachable, the packet spacing is about 16s to allow a modem call to complete. Once the server is reachable, the packet spacing is about two seconds. This is designed to speed the initial synchronization acquisition with the server command.
MinPoll	This option specifies the minimum poll interval for NTP messages, in seconds to the power of two. The minimum poll interval defaults to 6 (64 s), but can be decreased to a lower limit of 4 (16 s).
MaxPoll	This option specifies the maximum poll interval for NTP messages, in seconds to the power of two. The maximum poll interval defaults to 10 (1,024 s), but can be increased to an upper limit of 17 (36.4 h).
Symmetric	This option specifies an optional MD5 symmetric key ID.
Restart	After changing the NTP configuration, click the RESTART button to put the new configuration into effect. While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.

The SyncServer S6x0 supports both broadcast and multicast.

- For broadcast, the IP address is the local subnet broadcast address.

- For multicast, the IP address is an IPv4 or IPv6 multicast address. This can beeither the IANA designated NTP multicast address (224.0.1.1 IPv4 or FF0X:0:0:0:0:0:0:101 IPv6) or any unassigned multicast address (typically in the range 224.0.1.0 to 238.255.255.255 for IPv4 or FF0X:x:x:x:x:x:x:x for IPv6).
- You can configure multiple multicast addresses but only one broadcast address on a SyncServer S6x0.

The broadcast and multicast NTP requires authentication on both server and client(s).

- SyncServer S6x0 requires user to configure MD5 symmetric authentication and apply a MD5 key to broadcast and multicast.
- SyncServer S6x0 does NOT support unauthenticated broadcast and multicast.
- SyncServer S6x0 does NOT support broadcast and multicast with Authkey.

The TTL used for multicast is in the range: [1, 7].

NTP / PTP Services Configuration Window

Use this window to configure NTP reflector and PTP services. This window is only available if the security license option is installed. See Figure 4-21.

This page can be used to configure multiple NTPr and PTP configurations. However, only one timing service can be mapped to one port.

Figure 4-21. NTP / PTP Service Configuration Window

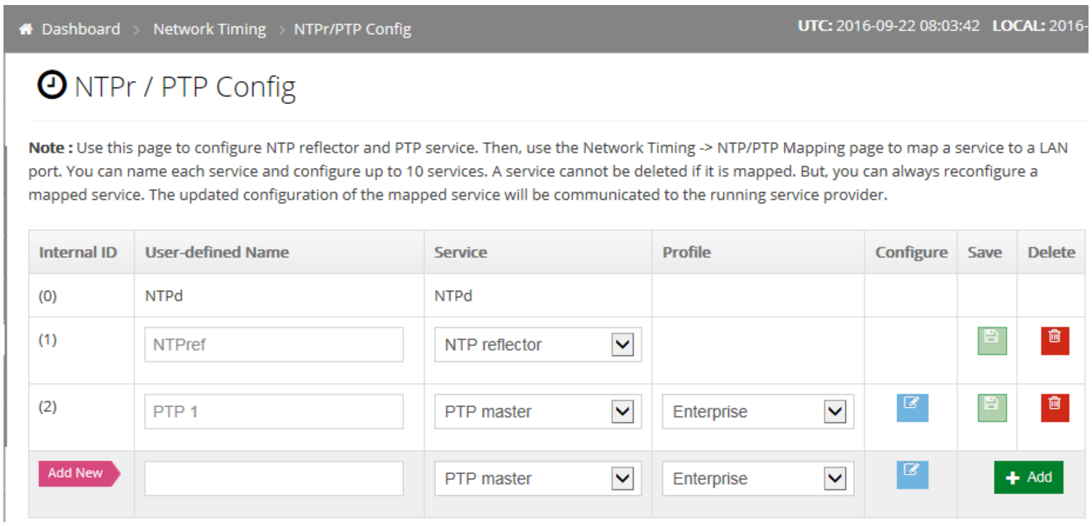


Table 4-7. NTP / PTP Services Configuration Parameters

Parameter / Column	Description
Internal ID	The S6x0 automatically assigns this number as a unique identifier to reference this specific timing service when it appears on other forms. The assigned values will not necessarily be consecutive.
User-defined Name	Use this entry to provide a helpful name to describe the specific service. Maximum number of characters in the name is 47. Although probably not a good idea, multiple rows can have the same entry. The internal ID assures that they are always unique.

Table 4-7. NTP / PTP Services Configuration Parameters (Continued)

Parameter / Column	Description
Service	This selection provides a top-level control for the type of network timing service being defined. The drop-down list provides all candidates. In release 2.0 the selections are NTPr (NTP reflector) and PTP master. See note below about NTPd **Note**: These columns are context-aware based on the current Service column selection. Configure column may be additionally context-aware based on the selected Profile. Hence the best way to work with these 3 columns (Service, Profile, Configure) is left-to-right.
Profile	When appropriate, this column is used to further refine the categorization of the timing service. A good example of this in 2.0 release is a PTP master (top-level service), which always operates with a specific PTP profile.
Configure	For a timing service that has additional configuration parameters, this selection brings up a form where all remaining parameters can set as desired. Selecting OK on the configure form maintains this configuration as long as the associated timing service row is being worked on. When (if) the Save selection in that row is executed, then the configuration becomes part of that service.
Save	Use this to save the timing service configured on this row. This also saves the settings (if any) that are associated with Configure for this same row.
Delete	Remove the specific timing service configuration associated with this row. If the row being deleted is currently mapped for use on a physical port, this action will not be allowed. If you really want to do it, first unmap it on the Network Timing'NTP/PTP Mapping form.

Reflector capability is only available when the existing Security License option is installed. PTP is only available when the PTP license option.

The reflector does not support symmetric security keys or Autokey.

The NTP reflector will only support one IP address. When using IPv6, there could be multiple IPv6 addresses associated with the Ethernet port. The IPv6 address used by the NTP reflector will be selected in the following order.

1. Configured static IPv6

2. First available global address - DHCP or autoconfig

3. Link-local

The unit will not respond to IPv4 NTP packets if the reflector is enabled for IPv6. The unit will not respond to IPv6 NTP packets if the reflector is enabled for IPv4.

The SyncServer S600 Series implements real-time, hardware-based network packet processing in tandem with accurate hardware based NTP time stamping, general packet limiting and alarming. The reflector protects the SyncServer CPU from excessive network traffic Denial of Service (DoS) attacks, while concurrently providing high-bandwidth, high-accuracy NTP operations.

The NTP Reflector is a real-time, hardware-based NTP packet identification and time-stamping engine. The high capacity hardware uses the extremely accurate S600 Series clock to deliver the best possible NTP timestamps. At line speed, NTP client packets are identified, the precise and accurate T2 and T3 time stamps are added and the packets returned to the requesting NTP client, while also bandwidth-limiting all other packets to the CPU. Since all operations are in hardware operating at 1GbE line speed the NTP packet capacity is in excess of 120,000 NTP packets per second.

The NTP Reflector supports the most common NTP Mode 3 NTP client requests for time. The NTP daemon running on the embedded CPU on the other hand is capable of more NTP features and functions. The advantage of the SyncServer S600 Series is that it can simultaneously perform NTP reflector operations on one user-selectable port while conducting traditional NTP Daemon operations on the other ports. This provides the best of both NTP operational models including common NTP daemon functions, such as peering, clustering, selection, MD5 and Autokey authentication. The primary trade-offs are shown in Table 4-8.

Figure 4-22. NTP Packet Reflector

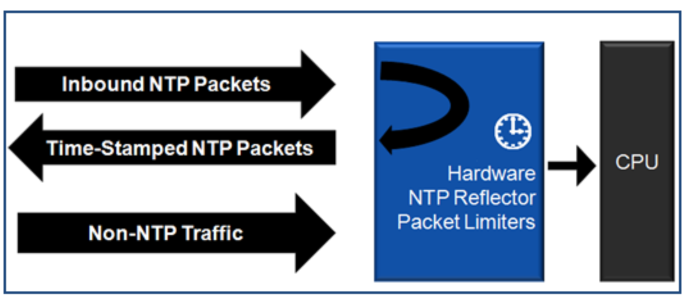


Table 4-8. NTP Reflector vs. NTP Daemon Performance Trade-Offs

Feature	NTP Reflector	NTP Daemon
Enhanced Security	X	
120,000 NTP requests/second	X	

Table 4-8. NTP Reflector vs. NTP Daemon Performance Trade-Offs

Feature	NTP Reflector	NTP Daemon
Enhanced Time Stamp Accuracy	X	
DoS Detection/Alarming	X	
CPU Protection	X	
NTP Peering, Clustering, Selection		X
MD5 and Autokey Functions		X

It is important to note that NTP is UDP/IP and is by nature susceptible to DoS attacks as no TCP/IP connection is required. The Security-Hardening of the line speed NTP Reflector is such that in the event of an NTP DoS attack the NTP packets will not reach the CPU and compromise the server operation. Instead, all NTP packets can be responded to (or limited) and if the NTP load is in excess of what is expected an alarm is sent notifying the user. The alarm threshold can be set on the packet monitoring page, which is part of the Security section tab..

Note: There is a 1 microsecond bias compared to the S6xx clock accuracy when using the NTP Reflector at 100BaseT speeds. This bias will be largely undetectable by any NTP client, but the bias should be removed in a future release.

When changing the configuration between IPv4 and IPv6, the reflector will be disabled for up to 15 seconds. During this time, the traffic will be forwarded to the CPU. If the traffic rate exceeds the all-packets threshold, then the traffic will be dropped and an alarm generated.

Figure 4-23. PTP Configuration Parameters

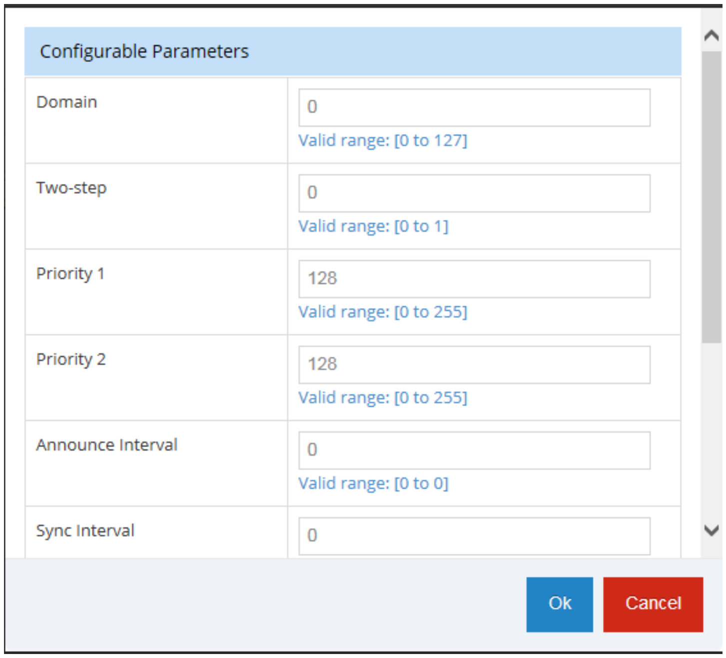


Table 4-9. PTP Parameter Descriptions - Enterprise Profile

Parameter	Valid Range	Default	Description
Domain	0 to 127	0	Sets the domain value for the Grandmaster clock. IEEE-1588-2008 defines a domain as a logical grouping of clocks that synchronize to each other using the protocol, but that are not necessarily synchronized to clocks in another domain.
Two-Step	0 to 1	0 (Disabled)	Use to enable the grandmaster for two-step clock mode on the specified port. If two-step clock mode is disabled, the grandmaster uses one-step clock mode.
Priority 1	0 to 255	128	Sets the advertised Priority 1 value for the Grandmaster for the specified port. PTP clients use the Best Master Clock (BMC) algorithm to determine which Grandmaster provides the best signal by first comparing Priority 1 values, then dynamic elements from the Grandmasters (such as clock class, accuracy and variance), and then Priority 2 values.

Table 4-9. PTP Parameter Descriptions - Enterprise Profile (Continued)

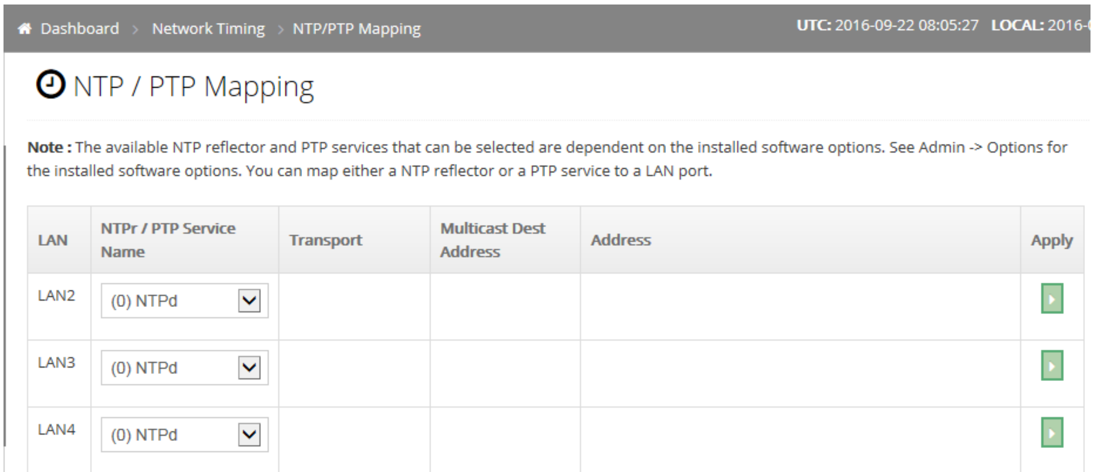
Parameter	Valid Range	Default	Description
Priority 2	0 to 255	128	Sets the advertised Priority 2 value for the PTP server for the specified port. Clients use the Best Master Clock (BMC) algorithm to determine which Grandmaster provides the best signal by first comparing Priority 1 values, then dynamic elements from the Grandmasters (such as clock class, accuracy and variance), and then Priority 2 values.
Announce Interval	0 (fixed)	0	Sets the announce interval for the PTP server, how often to send announce messages to clients on the specified port. Applies to Multicast PTP profiles. The interval is 2^z seconds, where z= announce interval value.
Sync Interval	-7 t0 7	0	Sets the synchronization interval for the PTP server, how often to send synchronization messages to clients on the specified port. Applies to Multicast PTP profiles. The interval is 2^z seconds, where z= sync interval value.
Delay Interval	-7 to 7	3	Sets the minimum delay interval for the PTP server. The clients should use this field to determine the minimum interval that the client will send delay request messages to the PTP server. The interval is 2^z seconds, where z= delay interval value.
AnnounceTime out	3 (fixed)	3	Sets the announce timeout value for Multicast. This should be set to a consistent value in the PTP domain.
Diffserv Code	0 to 64	0	The Differentiated Services Code Point is an 6-bit field in the 8-bit Differentiated Services (DS) field of the IP packet header to specify what classes of traffic will be provided, what guarantees are needed for each class, and how much data will be sent for each class. When used with the PTP server, it provides a way to prioritize packets for PTP traffic.

NTP / PTP Mapping Window

Use this window to map either a NTP reflector or a PTP service to a LAN port. This window is only available if the security license option is installed. See Figure 4-24.

Only one port can be actively running NTP Reflector at any time. The NTP Reflector and PTP capability is supported on the LAN2, LAN3 and LAN4 ports, but it is not supported on LAN1.

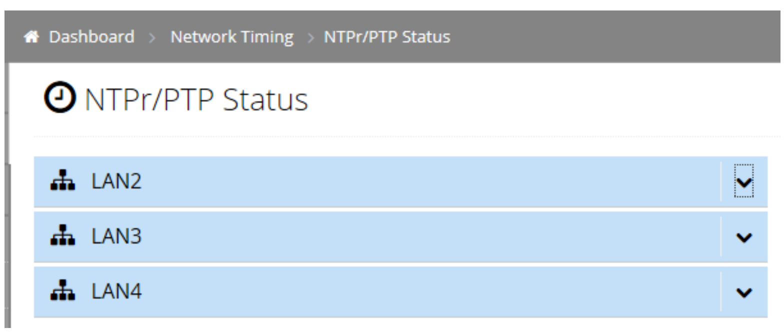
Figure 4-24. NTP/PTP Mapping Window



NTPr / PTP Status Window

Use this window to view status of ports with NTP reflector or PTP service. See Figure 4-25.

Figure 4-25. NTP/PTP Status Window



Timing Configuration Windows

The Timing tab on the dashboard provides access to windows to enable time and holdover sources, manually set time, set the time zone, and to configure format of the serial output.

Note: The SyncServer 6x0 does not contain a battery-backed real time clock. Therefore, it will always boot up with a default value for the system time. This time will be updated when it obtains time from a time reference such as GNSS, IRIG, or NTP. The default value for the date is the software build date. This date will be used for the first log entries when booting up the unit. The time will change to local time during the boot-up process if a time zone has been configured.

Timing - Input Control Window

Use this window to enable external time and frequency references, and manually set the time when no external time reference will be supplied. There are special limitations associated with this mode of operation, as described on the form itself. If "Ignore UTC corrections" is enabled, then local time is not available on the front panel or the web page.

Use this window to manually set the IRIG input year, UTC offset from TAI, and Leap Second Notification. See Provisioning Inputs with Manual Entry Controls, on page 174 for details.

When using the forced manual time entry mode, the unit should not have NTP configured as an input reference. Therefore, no NTP devices should configured on the NTP config page if using this mode.

Note: If "Forced Manual Time Entry" is selected on the Input Control form (while Time of Day status = Freerun), or if time is set from front-panel, the unit may not lock to GNSS upon return to the "External Time Sources" setting on the Input Control form.

The workaround for this is to disable GNSS (and apply) after setting the unit to "External Time Sources". Then enable GNSS again (and apply).

It is recommended that the SyncServer S6x0 be rebooted when leaving manual time mode.

See Figure 4-26 and Figure 4-27.

Figure 4-26. Timing - Input Control Window - Upper Portion

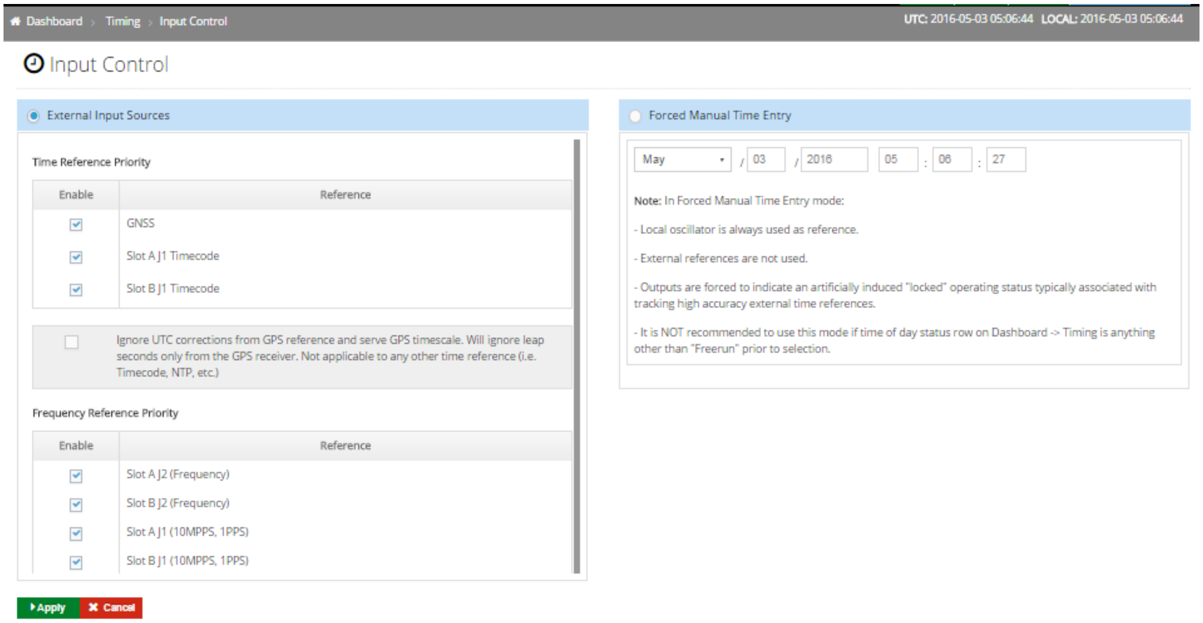
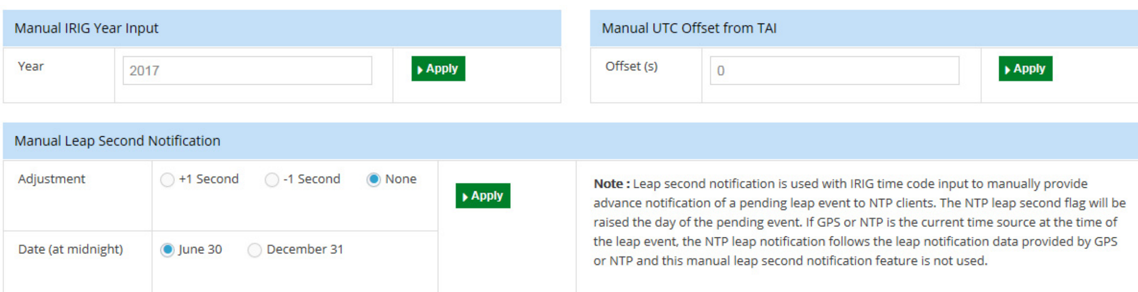


Figure 4-27. Timing - Input Control Window - Lower Portion

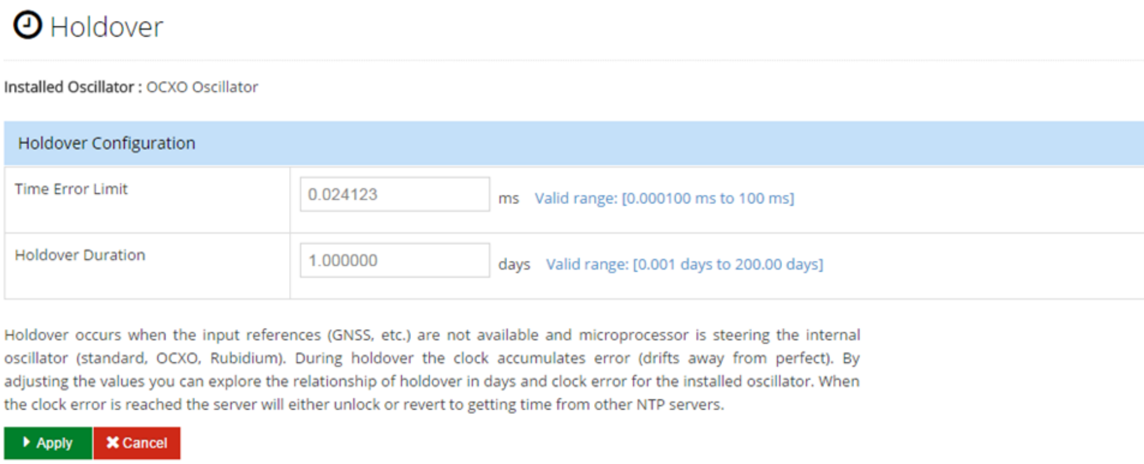


Timing - Holdover Configuration Window

Use this window to configure a duration in holdover (loss of stratum 0 reference) until the server either unlocks or attempts to get time from other NTP servers (if configured to do so). After this holdover period is exceeded, then the unit will attempt to lock to external NTP servers.

See Figure 4-28.

Figure 4-28. Timing - Holdover Window

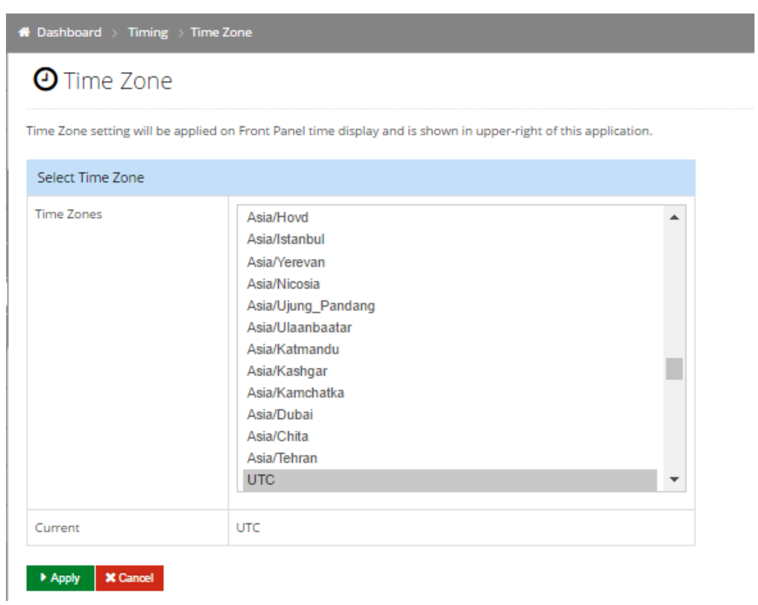


Holdover occurs when the input references (GNSS, etc.) are not available and microprocessor is steering the internal oscillator (standard, OCXO, Rubidium). During holdover the clock accumulates error (drifts away from perfect). By adjusting the values you can explore the relationship of holdover in days and clock error for the installed oscillator. When the clock error is reached the server will either unlock or revert to getting time from other NTP servers. The value obtained with this estimator is a conservative estimate of the performance of the unit. Actual performance may vary and will typically be better than this estimate.

Timing - Time Zone Configuration Window

Use this window to select the desired time zone for the SyncServer S6x0. See Figure 4-29 below. The time zone is only for the front panel display. NTP time will continue to be served in UTC.

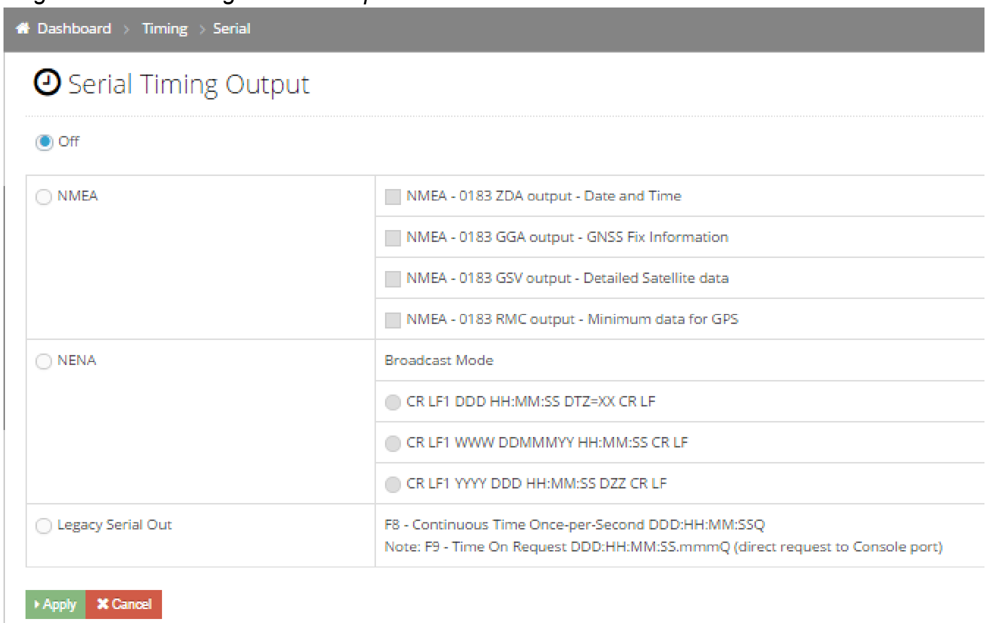
Figure 4-29. Timing - Time Zone Window



Timing - Serial Output Configuration Window

This window is used to select the format for the serial timing output for the SyncServer S6x0. See Figure 4-30 below.

Figure 4-30. Timing - Serial Output Window



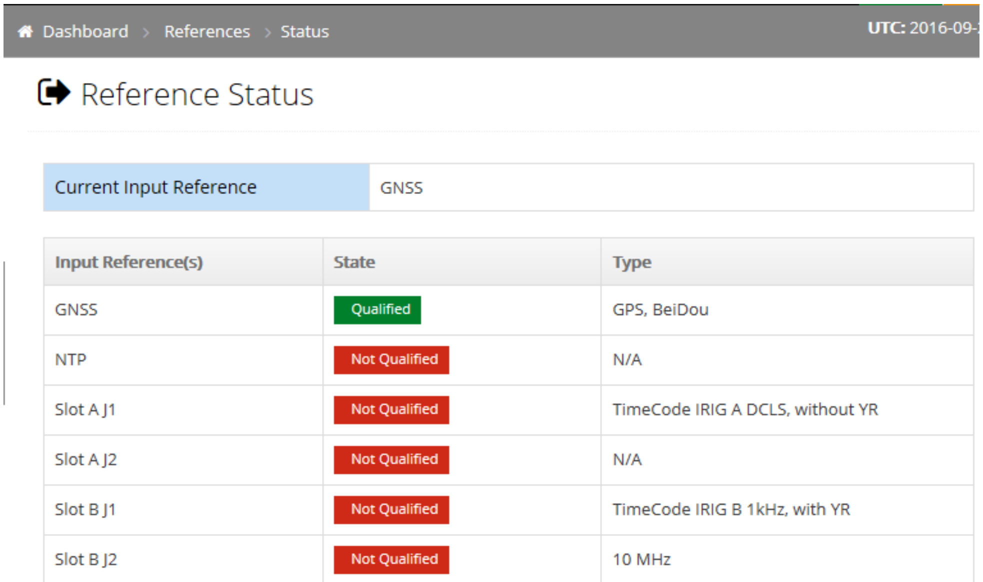
References Configuration Window

The References tab on the dashboard provides access to configure GNSS position and operating mode, as well as view Reference Status.

References - Reference Status Window

Use this window to view status information for system References. See Figure 4-31.

Figure 4-31. References - Status Window



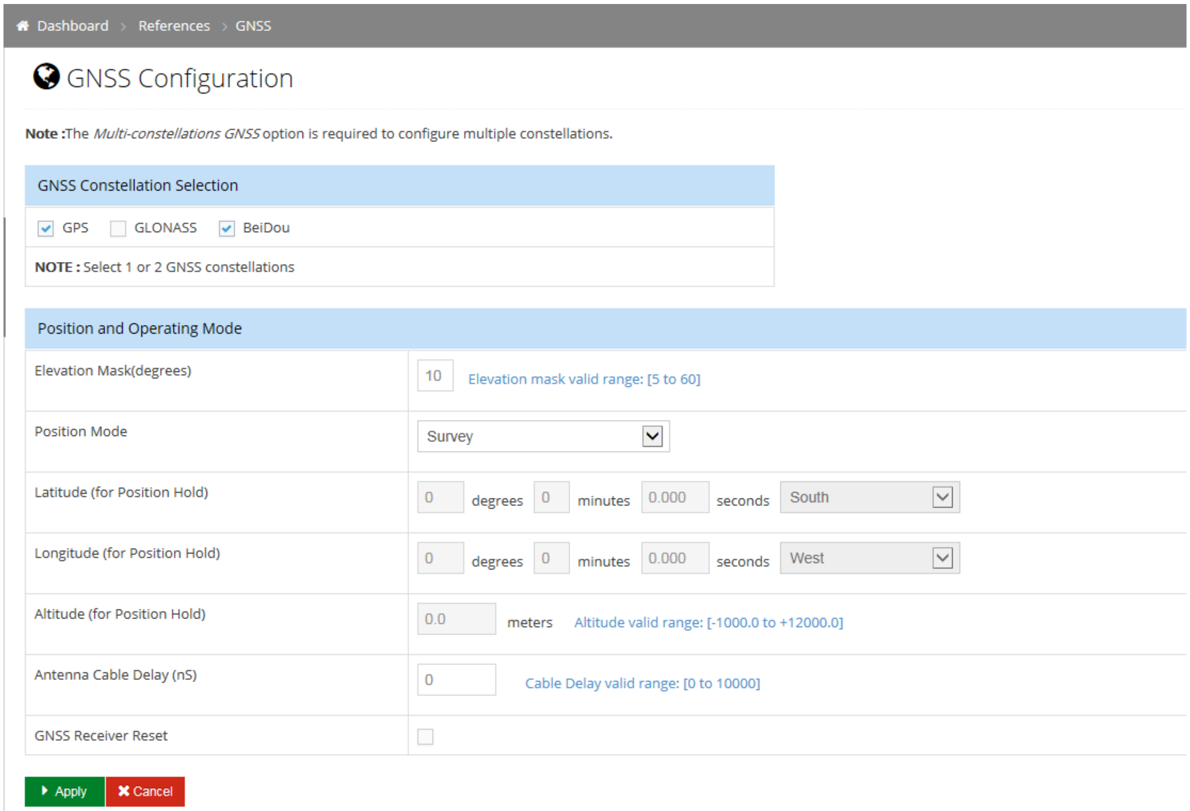
References - Reference GNSS Window

Use this window to configure GNSS position and operating mode. See Figure 4-32.

Note: For accurate timing, it is important to accurately enter the delay of the antenna and cable. If the system has already locked to a reference, then it is recommended that the user restart the SyncServer after changing the cable delay. Otherwise, it may take an extended period of time before the change is fully incorporated.

If the GNSS license is installed, then GLONASS and BeiDou can be selected. Only one or two of the constellations can be selected. It is not possible to select all three constellations.

Figure 4-32. References - GNSS Window



Security Configuration Windows

The Security tab on the dashboard provides access to configure security for Users, Access Control, Services & System Control, HTTPS, SSH, NTPd Symmetric Key, NTPd Autokey Server, NTPd Autokey Client, RADIUS, TACACS+, and LDAP.

Security - Users Window

Use this window to add or delete users, and for Password Maintenance. See Figure 4-33. All Users and Admin have the same privileges

Note: Only alphanumeric characters and underline are allowed for the User name.

- abcdefghijklmnopqrstuvwxyz
- ABCDEFGHIJKLMNOPQRSTUVWXYZ
- 0123456789
- _

Note: The following characters are not allowed for the password: (', ", <, >, &,), $

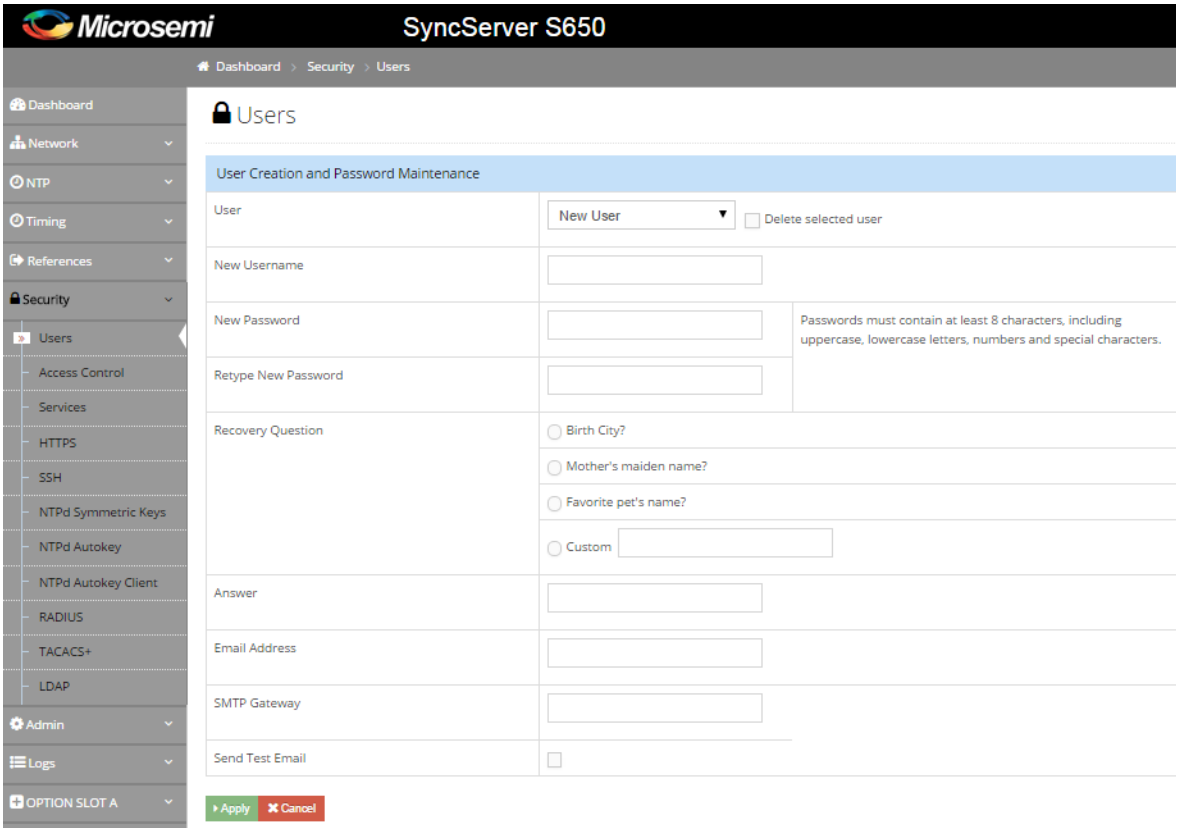
Note

Number of allowed characters:

- Username: 1-34 characters
- Password: 8-34 characters, must contain uppercase, lowercase, numbers, and special characters
- Recovery question: 1-34 characters
- Recovery answer: 1-34 characters
- Email address: 1-34 characters, "-" is not allowed in email address
- SMTP gateway: 1-34 characters

Note: The “admin” account cannot be deleted or renamed.

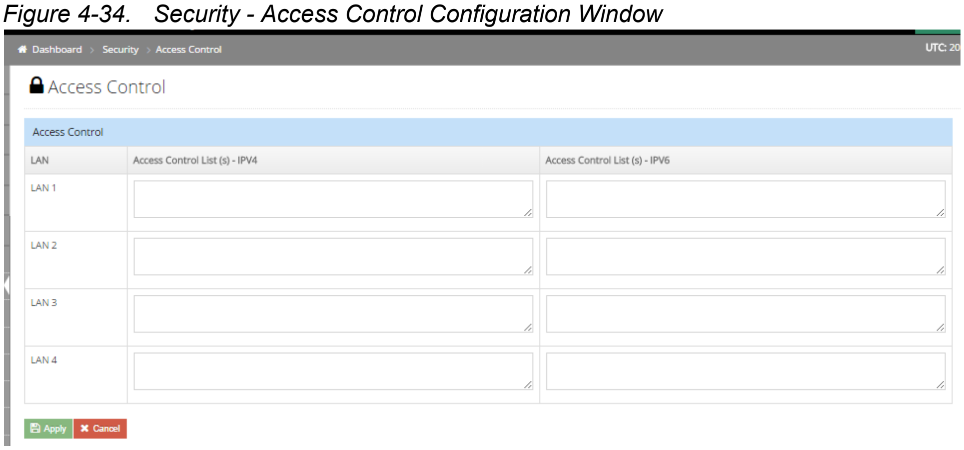
Figure 4-33. Security - Users Configuration Window



Security - Access Control Configuration Window

Use this window to configure access control for LAN1-LAN4 (whitelist). If nothing is configured, then the unit will accept data from all devices. If any addresses are configured, only packets from those devices will be accepted. See Figure 4-34.

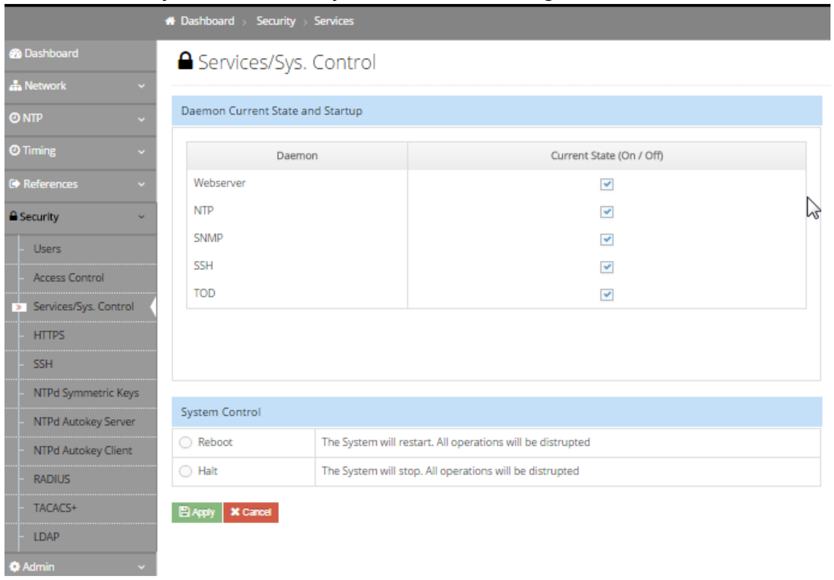
Figure 4-34. Security - Access Control Configuration Window



Security - Services & System Control Window

Use this window to configure the state for the Webserver, NTP, SNMP, SSH, and TOD, and to reboot or halt the system. See Figure 4-35.

Figure 4-35. Security - Services & System Control Configuration Window



Security - HTTPS Configuration Window

Use this window to configure the web server and self-signed certificate info. See Figure 4-36.

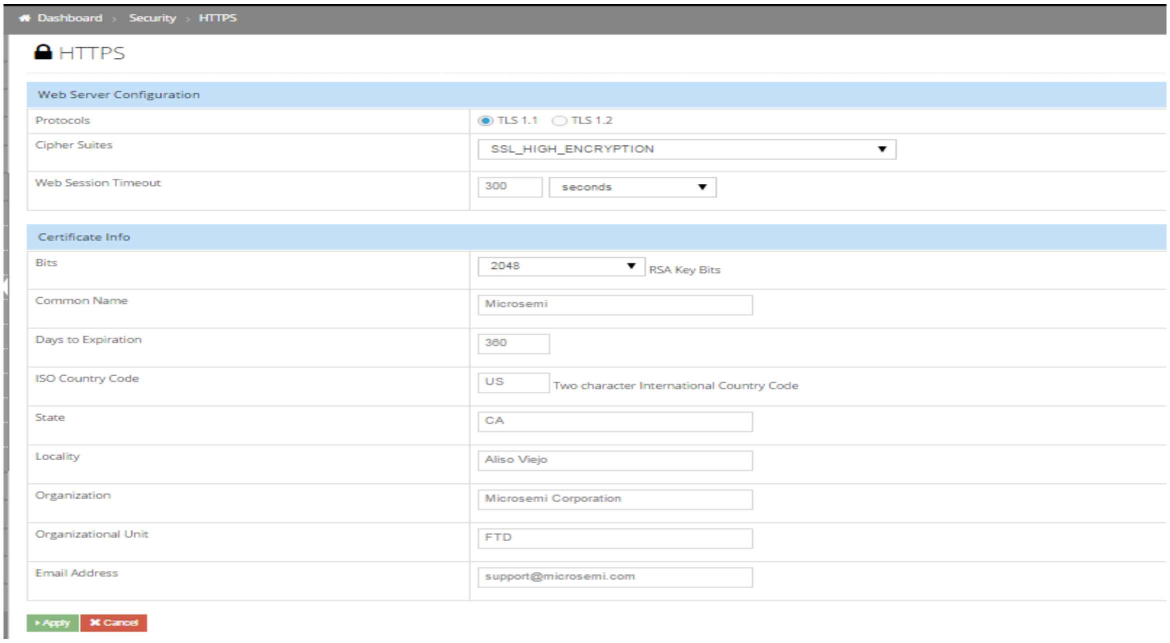
See Table 4-9 for details about supported HTTPS protocols.

Note

Number of allowed characters:

- Common name: 1-63 characters
- State: 1-63 characters
- Locality: 1-63 characters
- Organization: 1-63 characters

Figure 4-36. Security - HTTPS Configuration Window



Note: The https certificate will revert to self-signed certificate after importing configuration.

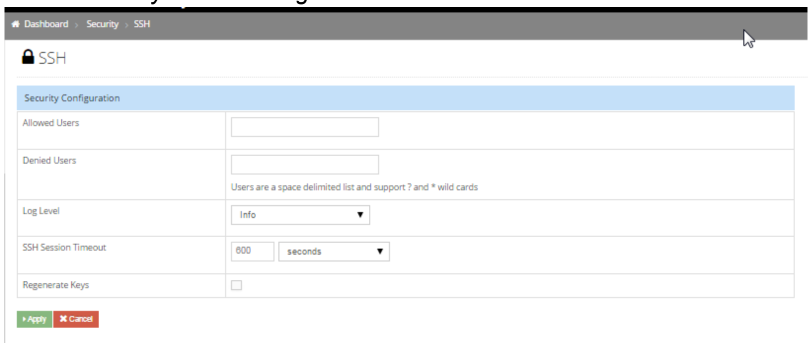
Table 4-10. Supported HTTPS Protocols

Model	TLS 1.0	TLS 1.1	TLS 1.2
SyncServer S600		x	x
SyncServer S650		x	x

Security - SSH Configuration Window

Use this window to configure SSH security. See Figure 4-37.

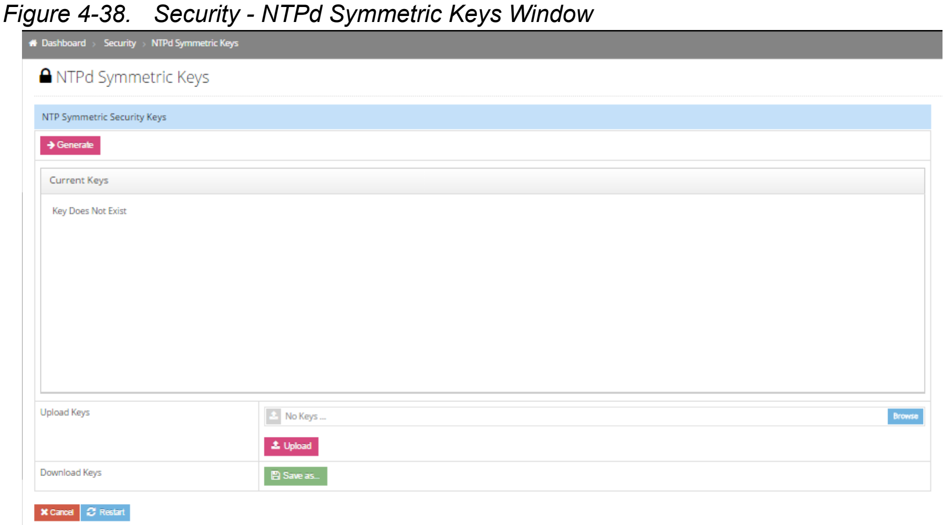
Figure 4-37. Security - SSH Configuration Window



Security - NTPd Symmetric Keys Configuration Window

Use this window to generate, upload and download NTP Symmetric Security Keys. See Figure 4-38.

Figure 4-38. Security - NTPd Symmetric Keys Window

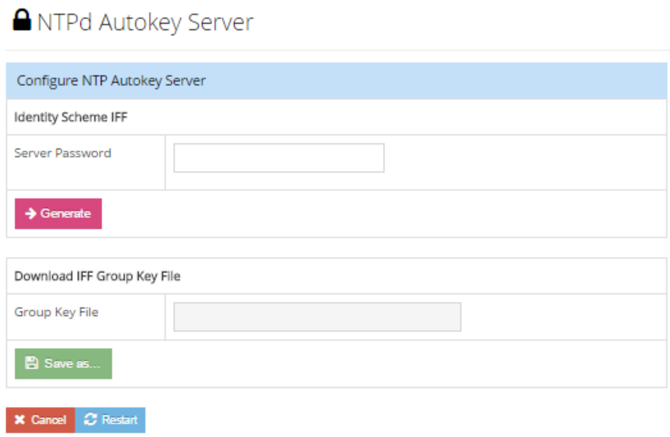


Security - NTPd Autokey Server Configuration Window

Use this window to configure the NTP Autokey Server and download the IFF Group Key file. See Figure 4-39.

Note: Autokey, LDAP, RADIUS, and TACACS+ require the optional security license.

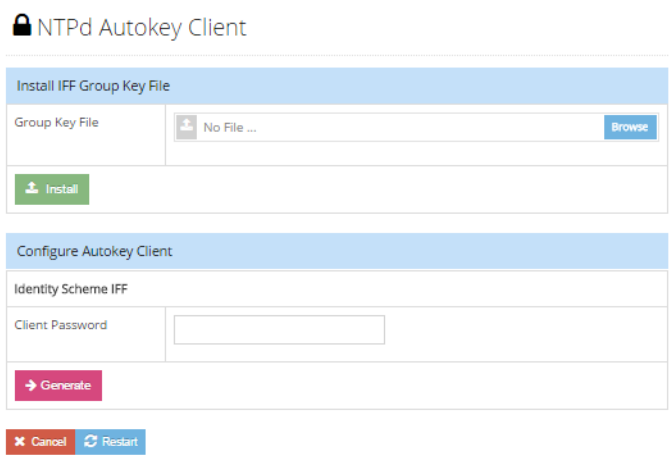
Figure 4-39. Security - NTPd Autokey Server Configuration Window



Security - NTPd Autokey Client Configuration Window

Use this window to configure the NTP Autokey Client and install the IFF Group Key file. See Figure 4-40.

Figure 4-40. Security - NTPd Autokey Client Configuration Window



Security - RADIUS Configuration Window

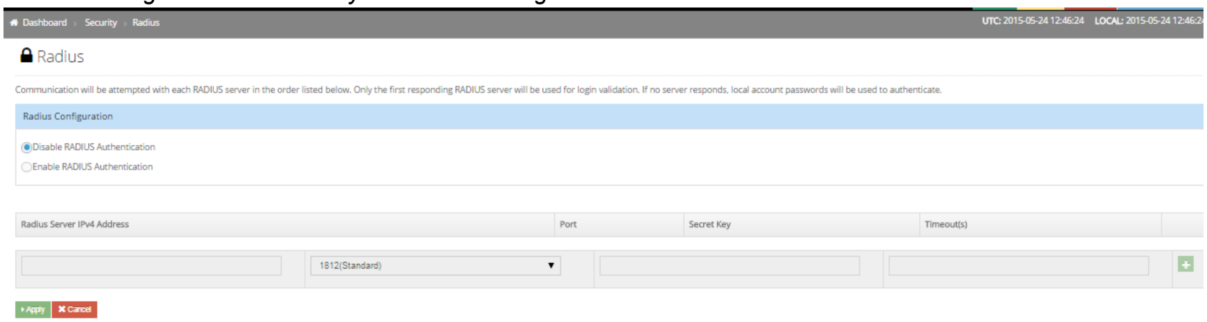
Use this window to enable and configure RADIUS authentication. Up to 5 RADIUS servers can be configured. See Figure 4-41. After entering the RADIUS information, click the green "+" icon to add the row. Then click the "save" icon to save the information.

Note:

- RADIUS key: 1-16 characters

Note: The SyncServer S600/S650 has only one level of management access of Authentication/Authorization and that is full control. There is no read-only management access. Therefore Authentication = Authorization when there is only one level of management access.

Figure 4-41. Security - RADIUS Configuration Window



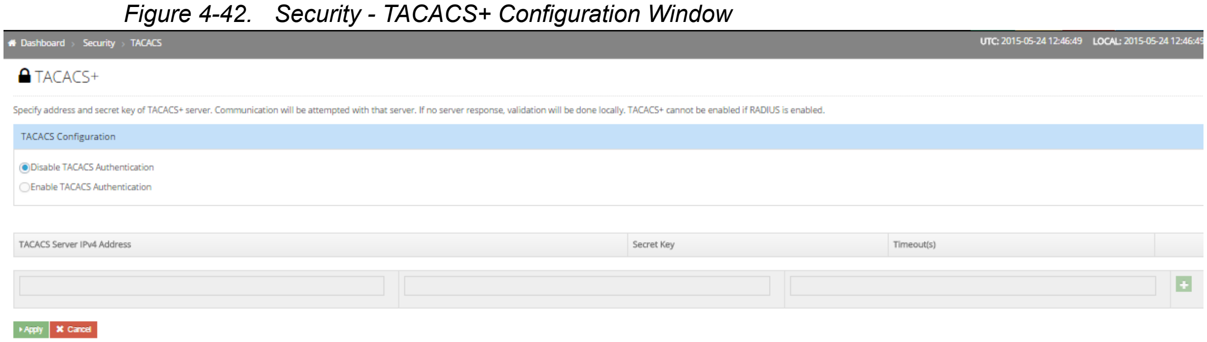
Security - TACACS+ Configuration Window

Use this window to enable and configure TACACS+ authentication. Up to 5 TACACS+ servers can be configured. See Figure 4-42. After entering the TACACS+ information, click the green "+" icon to add the row. Then click the "save" icon to save the information.

Note:

- TACACS+ key: 1-16 characters

Figure 4-42. Security - TACACS+ Configuration Window



Note: The SyncServer S600/S650 has only one level of management access of Authentication/Authorization and that is full control. There is no read-only management access. Therefore Authentication = Authorization when there is only one level of management access.

Security - LDAP Configuration Window

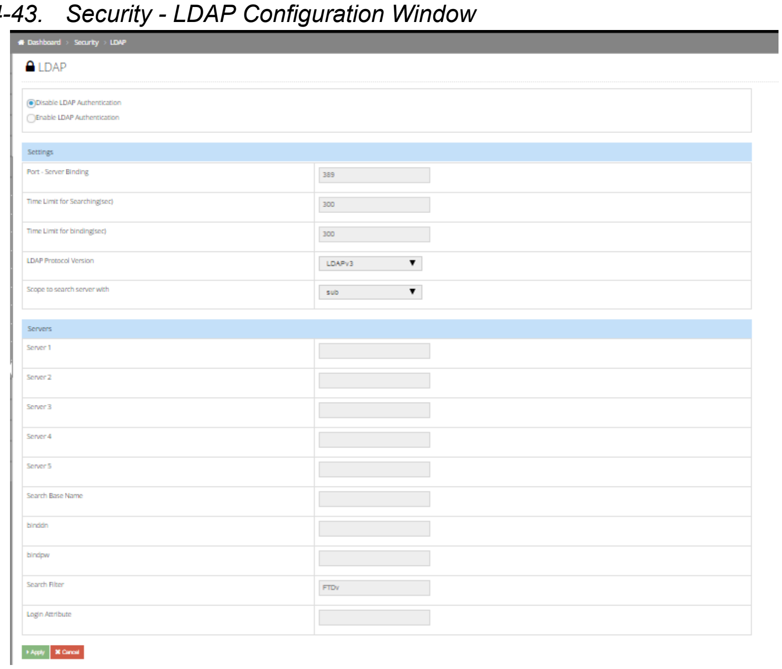
Use this window to enable LDAP, and configure LDAP settings and servers. Up to 5 LDAP servers can be configured.

Note:

- Search base name: 1-199 characters
- binddn: 1-63 characters
- bindpw: 1-63 characters
- Search filter: 1-199 characters
- Login attribute: 1-63 characters

See Figure 4-43.

Figure 4-43. Security - LDAP Configuration Window



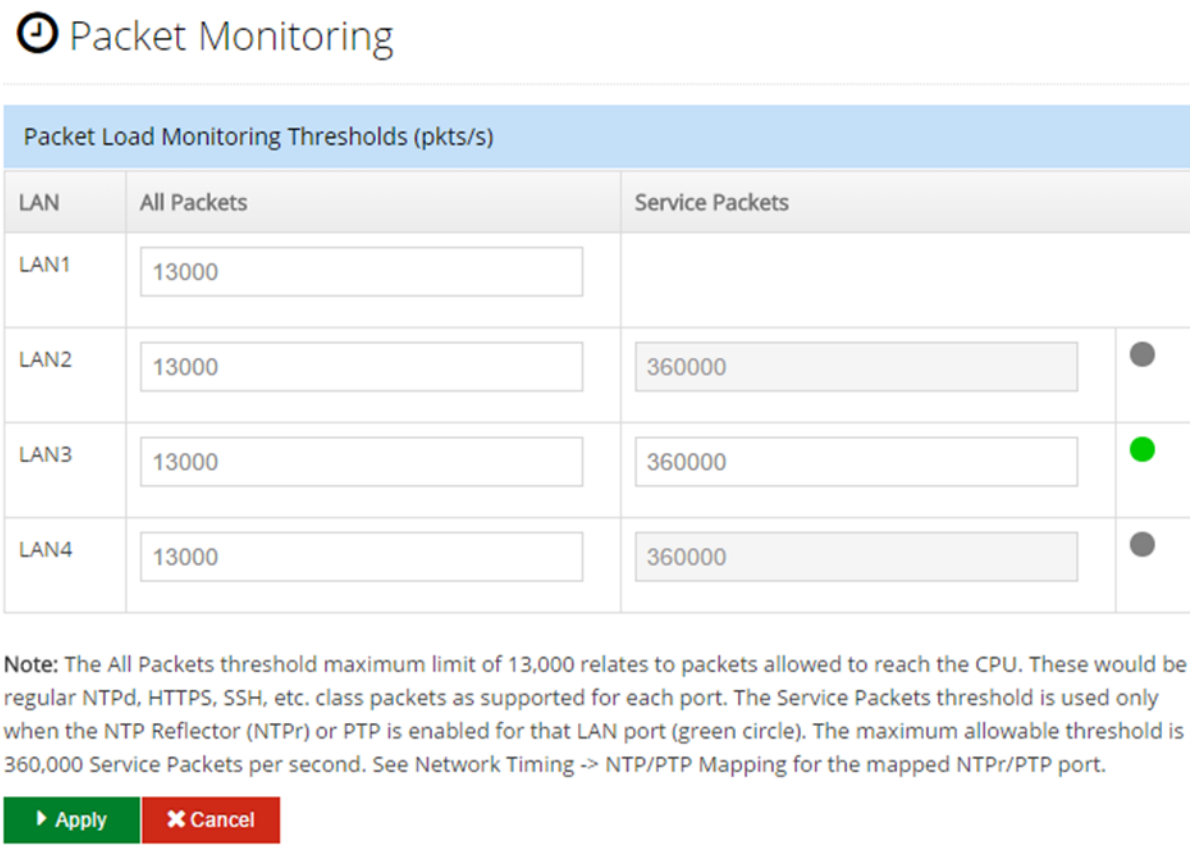
Note: The SyncServer S600/S650 has only one level of management access of Authentication/Authorization and that is full control. There is no read-only management access. Therefore Authentication = Authorization when there is only one level of management access.

Security - Packet Monitoring

Use this window to configure packet load monitoring thresholds. The All Packets threshold is used to limit the number of packets from each port that are sent to the processor. It will also generate the “Excessive traffic on port” alarm if the threshold is exceeded, and identify the impacted port. Packets that are handled by the NTP reflector or PTP are not counted toward this limit. The Service Packets limit sets a threshold to create an alarm when the packet rate exceeds the limit when using the NTP reflector or PTP. The service packets threshold does not limit the number of packets handled. When the service packet threshold is exceeded the "service load limit exceeded" alarm will set.

See Figure 4-43. If the reflector capability is enabled on a port it is identified by the green indicator on this form.

Figure 4-44. Security - Packet Monitoring Window

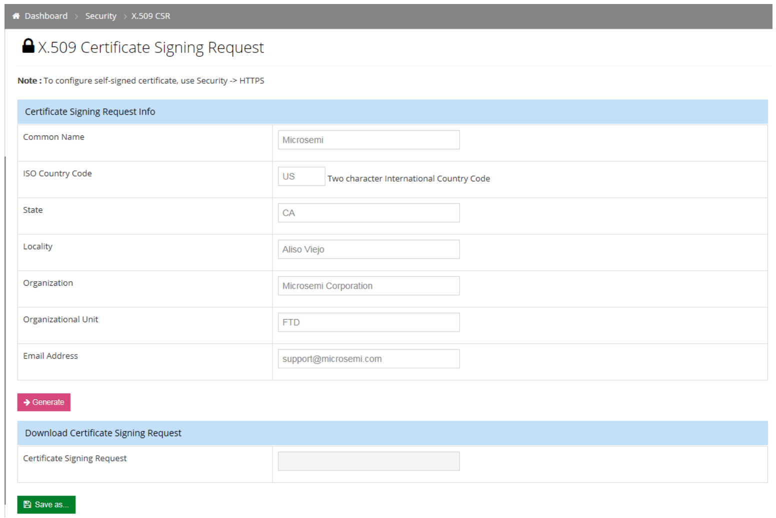


Security - X.509 Certificate Signing Request (CSR)

Use this window to generate and download a Certificate Signing Request.

See Figure 4-45.

Figure 4-45. Security - X.509 CSR Window

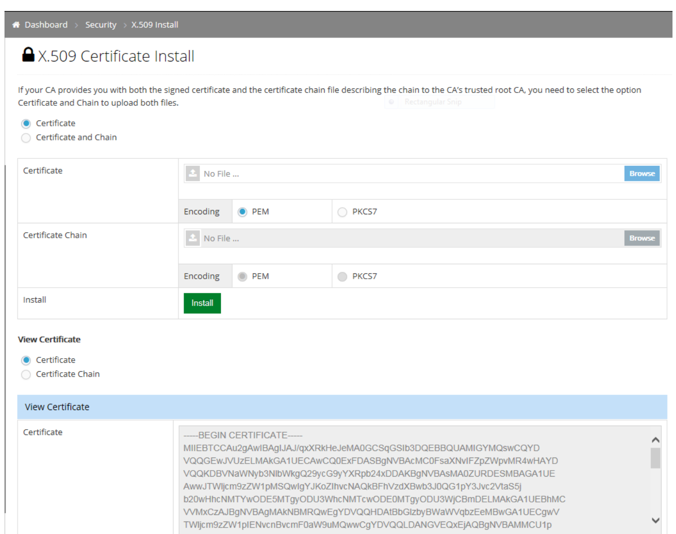


Security - X.509 Install

Use this window to install the certificate or certificate and chain. See Figure 4-46.

Note: If an HTTPS certificate was installed, the system will return to using the self-signed HTTPS certificate after a configuration restore.

Figure 4-46. Security - X.509 Install Window



Admin Configuration Windows

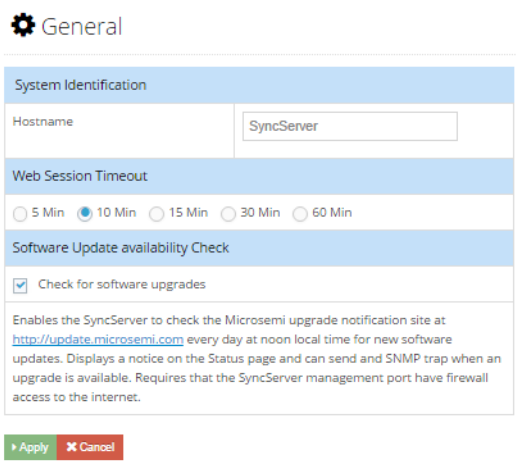
Admin - General Configuration Window

Use this window to configure system identification and to check for software updates. See Figure 4-47. Enables the SyncServer to check the Microsemi upgrade notification site at http://update.microsemi.com every day at noon local time for new software updates. Displays a notice on the Status page and can send and SNMP trap when an upgrade is available. Requires that the SyncServer management port have firewall access to the internet.

Note: Only alphanumeric characters, hyphen, and underline are allowed for the hostname. The hostname can be from 1 to 63 characters long.

- abcdefghijklmnopqrstuvwxyz
- ABCDEFGHIJKLMNOPQRSTUVWXYZ
- 0123456789
- -_

Figure 4-47. Admin - General Configuration Window

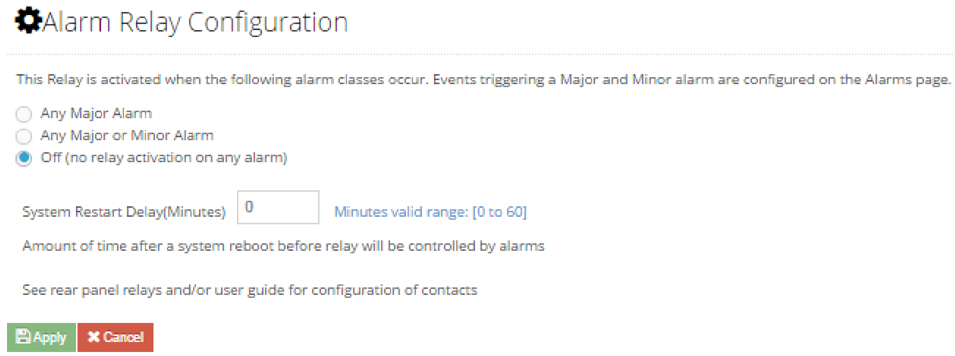


Note: The software update availability feature uses IPv4. An IPv4 address and DNS server must be configured on the Network->Ethernet page in order to use this feature.

Admin - Alarm Relay Configuration Window

Use this window to configure system alarm relay details. See Figure 4-48.

Figure 4-48. Admin - Alarm Relay Configuration Window



Admin - Alarm Configuration Window

Use this window to configure system alarms. Users can also see the current status of each alarm and clear individual alarms. Use the scroll control on this form to access additional alarms.See Figure 4-49. See Table 4-11 for descriptions of Alarm Configuration parameters.

Figure 4-49. Admin - Alarm Configuration Window

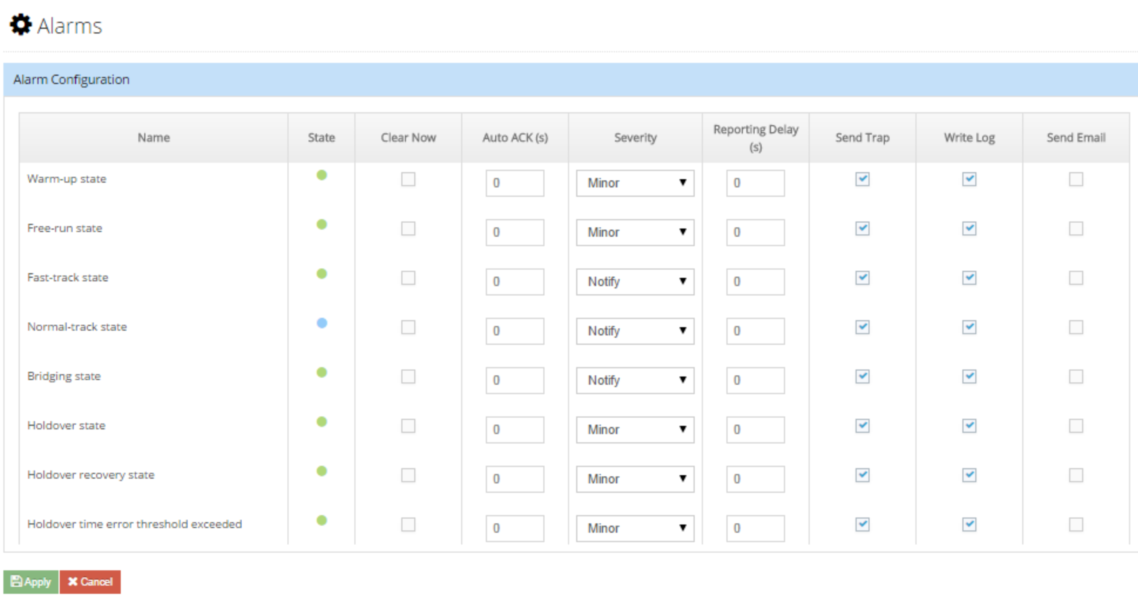


Table 4-11. Alarm Configuration Parameter Descriptions

Parameter	Description
Name	Name of the alarm. If there is an asterisk as first character it means it is a transient alarm. For alarms that have multiple secondary info (e.g. Excessive Traffic on Ethernet port has a secondary field that identifies which port), these settings are global to all of the secondary cases.
State	Indicates the current status of the alarm based on color ■ Always grey (unlit) if the event is transient. ■ Green if severity is Minor, Major, or Notify and the condition is not SET or if the user has cleared (acknowledged it) even if it is SET. ■ Blue if severity is Notify and the condition is SET and not user-cleared ■ Amber if severity is Minor and the condition is SET and not user-cleared ■ Red if severity is Major and the condition is SET and not user-cleared
Clear Now	This is a user-control to cause some of the alarm report mechanisms to extinguish that particular alarm indication. These include Dashboard > Alarms, Alarm summary at top of Web GUI, Physical alarm connector, front panel Alarm LED, and Alarm information on front-panel display.This is really just an acknowledgement of the alarm, but of course has no ability to impact the underlying condition.
Auto ACK	This is the same as Clear Now except it provides an automatic clearing action after a user-defined time period following SET of the alarm. Zero (default) means to never auto-clear it.
Severity	Controls the reported severity level of the alarm. Notify | Minor | Major The severity level “Notify” is not reported on Dashboard > Alarms, Alarm summary at top of Web GUI, Physical alarm connector, front panel Alarm LED, Alarm information on front-panel display. This also applies to transient alarms.
Reporting Delay	This value can be used to defer the time from when the condition becomes SET until it is actually reported. If the condition has cleared by the time the delay has elapsed then the alarm is never reported. Main purpose would be to avoid "chatter".
Send Trap	Provides "per alarm" user control of reporting the alarm via SNMP Trap. All severities are reported with Traps.

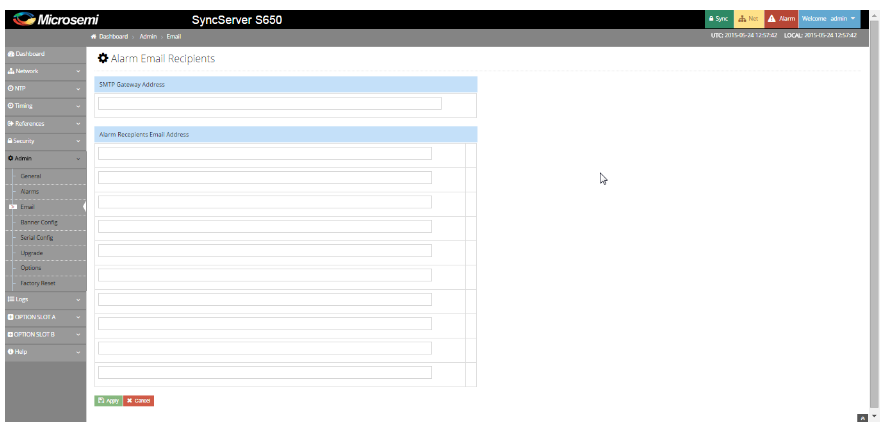
Table 4-11. Alarm Configuration Parameter Descriptions (Continued)

Parameter	Description
Write Log	Provides "per alarm" user control of reporting the alarm by writing an event entry in the Log. All severities and transients are reported into the message log.
Send Email	Provides "per alarm" user control of reporting the alarm by sending an Email. All severities and transients are reported with email.

Admin - Email Configuration Window

Use this window to set, modify or delete email addresses for alarm email recipients. See Figure 4-50.

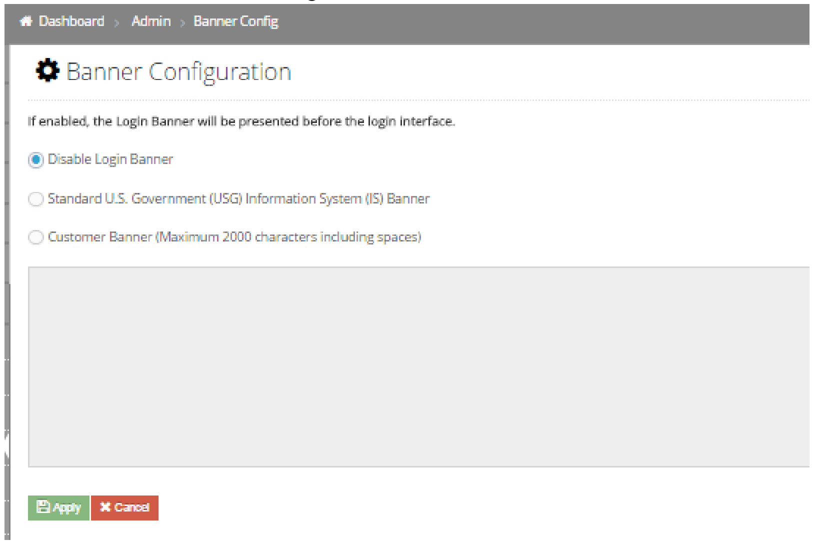
Figure 4-50. Admin - Email Configuration Window



Admin - Banner Configuration Window

Use this window to enable whether the login banner is displayed before the login interface. Users can create a custom banner or use a standard U.S. government banner. See Figure 4-51.

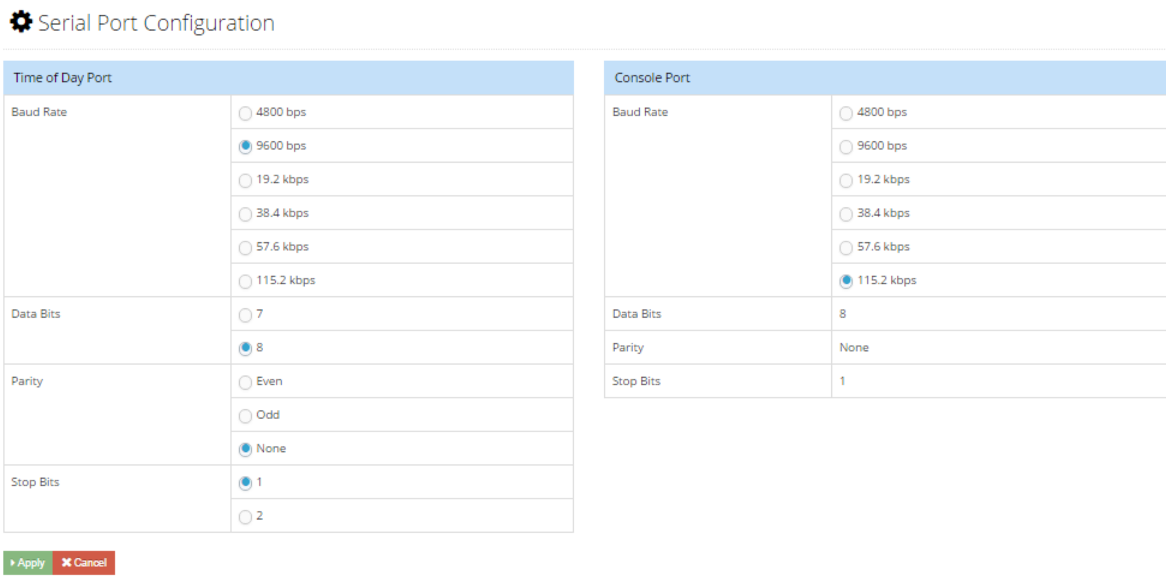
Figure 4-51. Admin - Banner Configuration Window



Admin - Serial Port Configuration Window

Use this window to configure the parameters for the Time of Day port and for the console Serial port. See Figure 4-52.

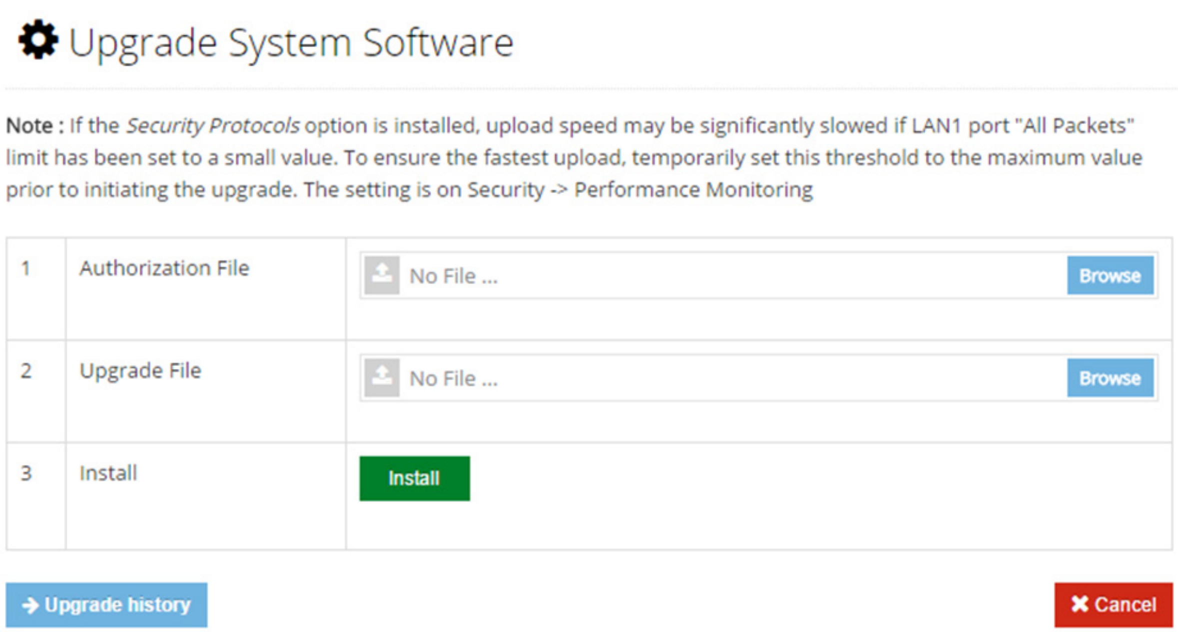
Figure 4-52. Admin - Serial Port Configuration Window



Admin - Upgrade System Software Window

Use this window to upgrade system software. Note that the system will reboot after the software is upgraded. See Figure 4-53.

Figure 4-53. Admin - Upgrade System Software Window



The authentication file is provided with the upgrade file and verifies that this SyncServer unit is authorized to upgrade with the specified upgrade file.

Note: You can check for the latest version number of SyncServer S600 and S650 software at these URLs:

http://update.microsemi.com/SyncServer_S600

http://update.microsemi.com/SyncServer_S650

The number of the most current version of the software will appear. You can compare this to the version number installed in the SyncServer by proceeding to the web GUI Dashboard and finding the version number in the About drop down on the right side. If you do not have the latest version installed consider contacting Technical Support.

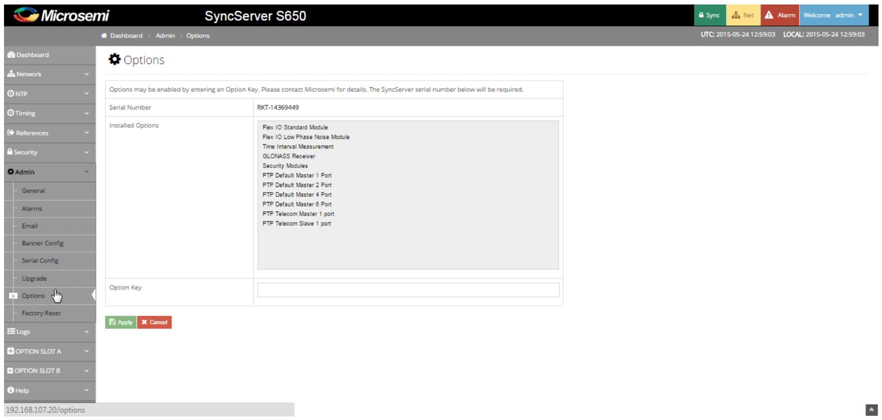
Note: For releases after 1.1, if the upgrade process is used to load a previous (older) version of the software, then the unit will reset the configuration to factory default values.

Note: If the all-packets limit on LAN1 has been reduced on the Security->Packet Monitoring page, then it is recommended that the limit be temporarily increased back to the default value of 13000 packets/second. Otherwise, the file upload will be very slow and may timeout.

Admin - Options Configuration Window

Use this window to enter option keys to enable SyncServer options. See Figure 4-54.

Figure 4-54. Admin - Options Configuration Window



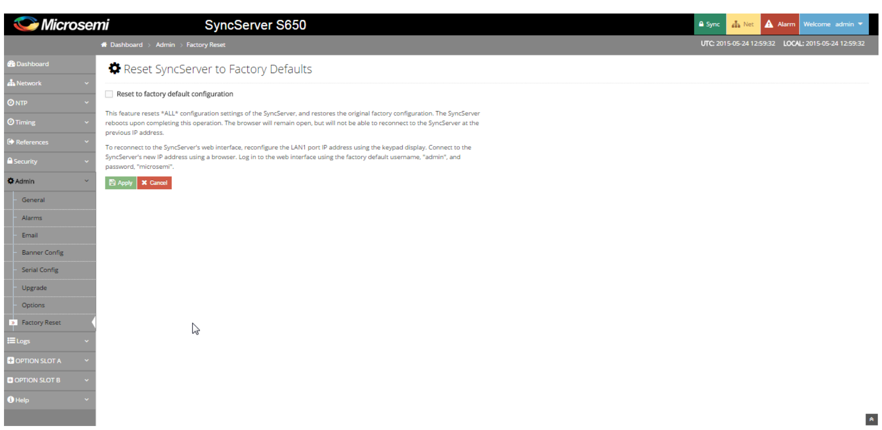
Admin - Configuration Backup / Restore / Reset

Use this window to back up, restore, or reset the SyncServer S6x0 to factory configuration. See Figure 4-55.

Note: For a configuration restore, the system will reject a configuration file that was generated from a unit running system software that is newer than the software currently running in the unit.

Note: If an HTTPS certificate was installed, the system will return to using the self-signed HTTPS certificate after a configuration restore.

Figure 4-55. Admin - Factory Reset Window

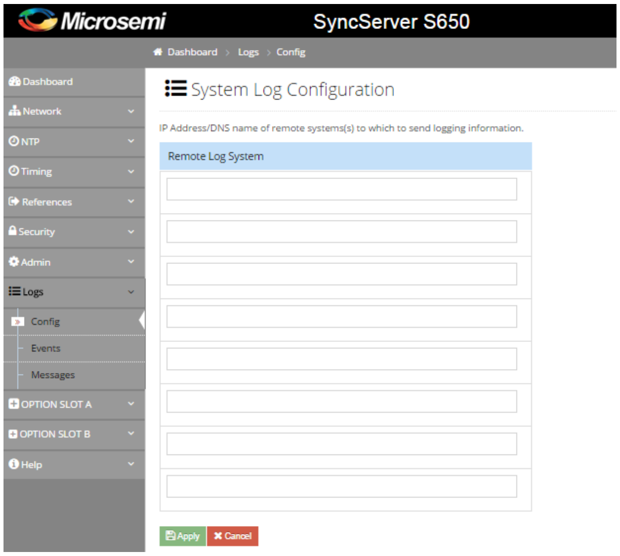


Logs Configuration Windows

Logs - System Log Configuration Window

Use this window to set, modify, or delete IP addresses / DNS names of remote systems to which to send log information. See Figure 4-56.

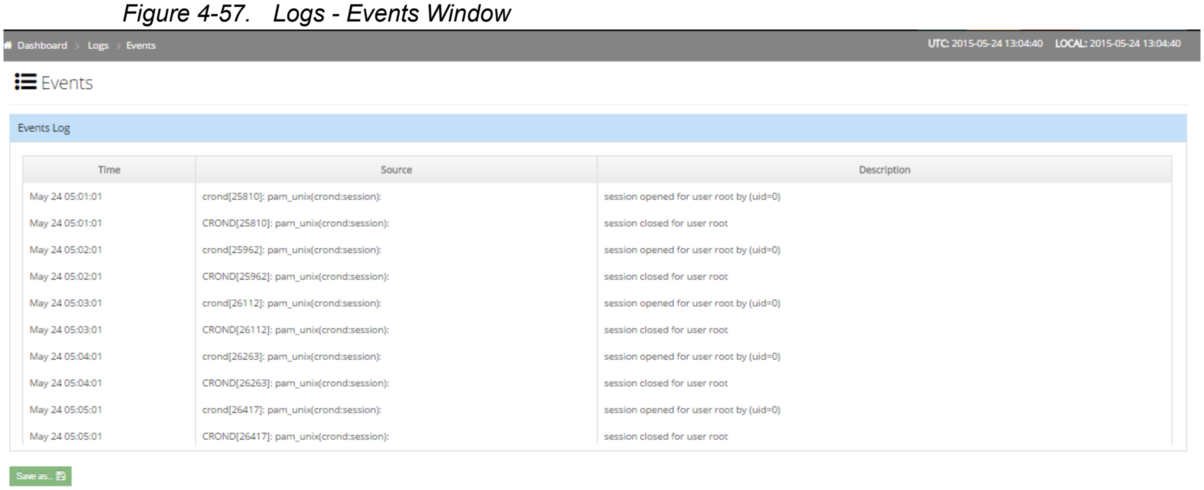
Figure 4-56. Logs - System Log Configuration Window



Logs - Events Log Configuration Window

Use this window to view and save the events log. See Figure 4-57.

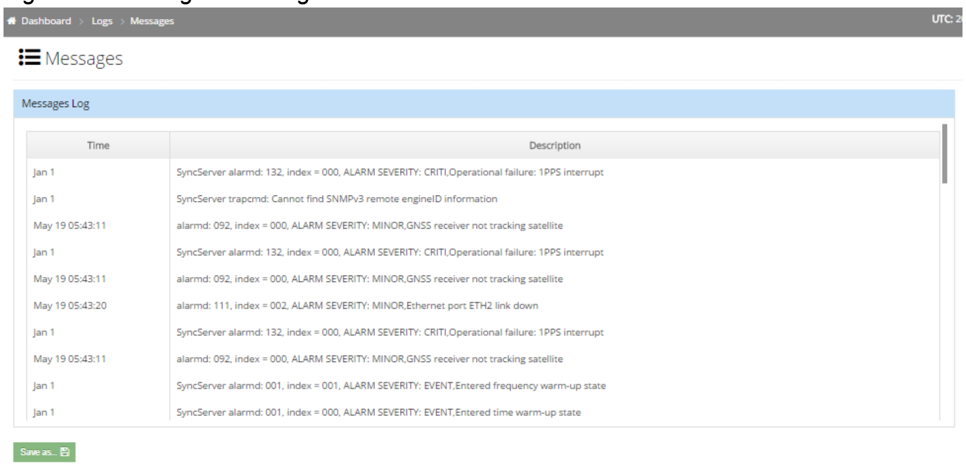
Figure 4-57. Logs - Events Window



Logs - Messages Window

Use this window to view and save the message log. Most recent entries appear at the end of the display (scroll to the end). See Figure 4-58.

Figure 4-58. Logs - Messages Window



Option Slot A/ Slot B Configuration Windows

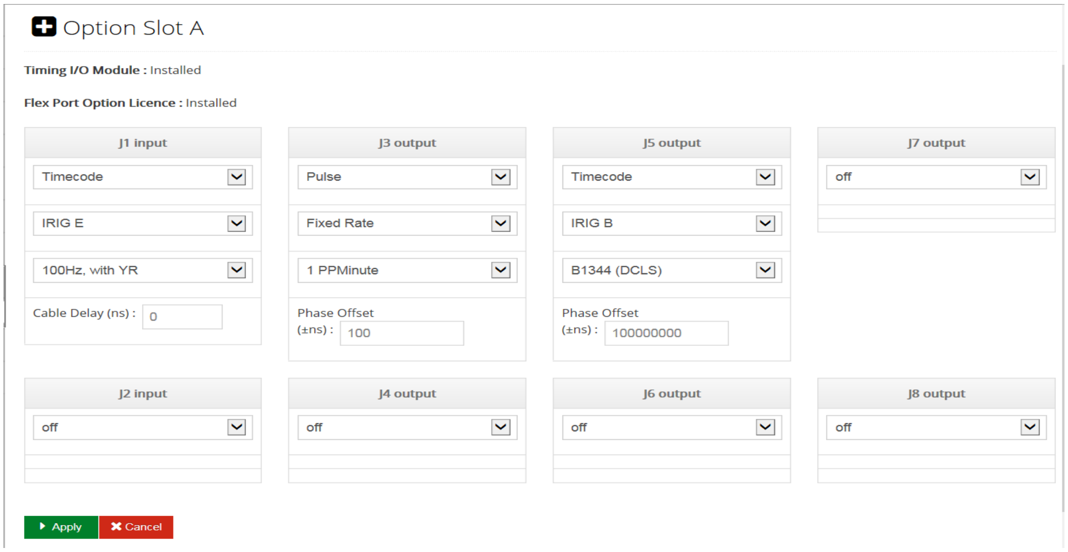
Options Slot A Configuration Window - Timing I/O Module

Use this window to configure the module in Options Slot A. The example shown in Figure 4-59 is for the Timing I/O module. See Provisioning IRIG Inputs on Timing I/O Module, on page 171. See Provisioning Sine Wave Inputs on Timing I/O Module, on page 173. See Provisioning Outputs on Timing I/O Module, on page 209.

Note: Option Slot A is only available with the SyncServer S650.

The configurations on the Timing I/O Module configuration page are fixed unless the optional flex timing license is installed.

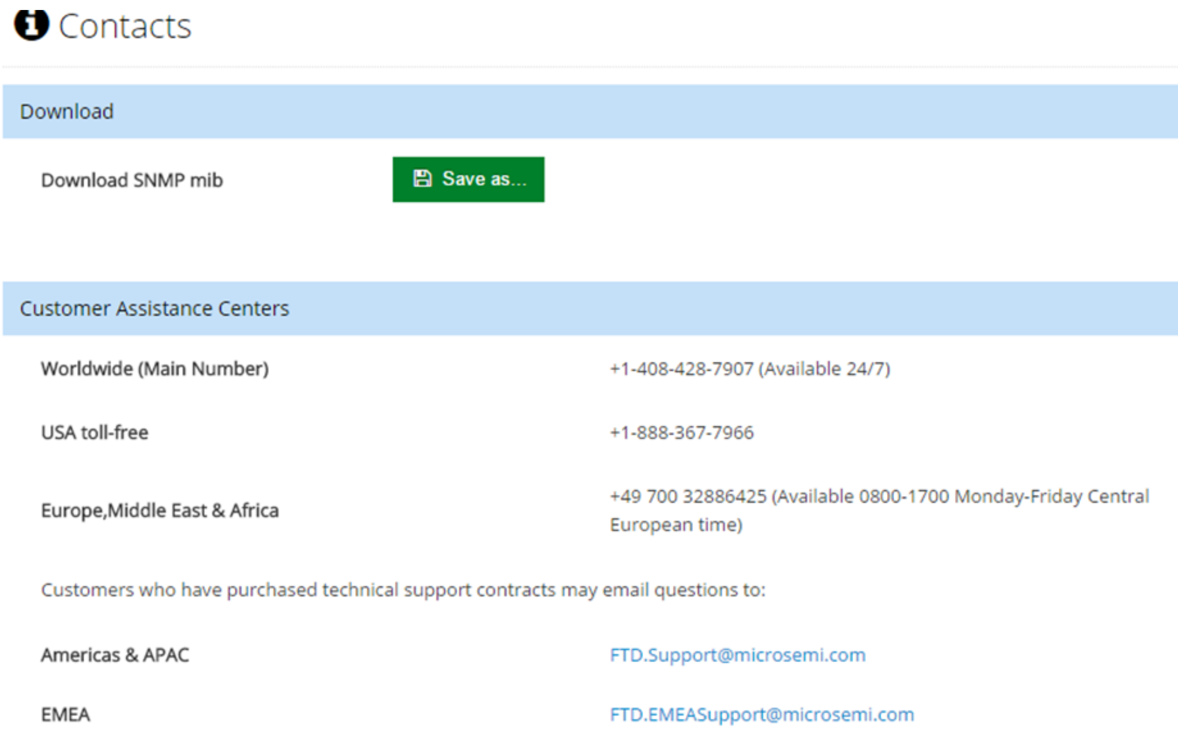
Figure 4-59. Options Slot A Configuration Window Showing Timing I/O Module



Help Windows

Use this window to view information about how to contact Customer Assistance Centers. See Figure 4-60.

Figure 4-60. Help - Contacts Window



Chapter 5 Command Line Interface (CLI)

This chapter describes the CLI command conventions, the prompts, line editing functions, and command syntax. The CLI command functions and features are listed alphabetically.

In This Chapter

- SyncServer S6x0 CLI Command Set

SyncServer S6x0 CLI Command Set

This section provides an alphabetical listing and details of all CLI commands. Both the serial CONSOLE CLI commands and telnet CLI commands should be identical.

Table 5-1. CLI Commands for SyncServer S6x0

Command	Similar Web Interface Location
set clock	Timing > Input Control
set configuration	Admin > Configuration Backup / Restore / Reset
Dashboard >Admin >Upgrade	See upper right corner of Dashboard screen
F50 - GPS Receiver LLA/XYZ Position	References > GNSS Config
F73 - Alarm Status	Click on the Arrow for the Alarm(s) tab to display Alarms status
show gnss status	Click on the Arrow for the GNSS tab to display GNSS status
halt system	Security > Services / Sys. Control
history	Logs > Events
show image	Dashboard > About > Release Version
set image	Admin > Configuration Backup / Restore / Reset

Table 5-1. CLI Commands for SyncServer S6x0

Command	Similar Web Interface Location
show ip	Network > Ethernet
set ip	Network > Ethernet
set nena active	Timing > Serial
set nena-format	Timing > Serial
show nena-format	Timing > Serial
reboot system	Security > Services / Sys. Control
set service	Security > Services / Sys. Control
show-session-timeout	Admin > General
set-session-timeout	Admin > General
show system	Click on the Arrow for the About tab on the dashboard to display system info

set clock

This command provides an ability to set the time.

Command Syntax:

```
set clock date-time <date-time>
```

where

<date-time> = YYYY-MM-DD,HH:MM:SS

The time is presumed to be UTC.

set configuration

Use this command to replaces the current configuration with the factory default configuration. On SyncServer, user is prompted with “Y” to confirm that they really want to do it.

```
set configuration factory
```

Returning the configuration to factory defaults also includes:

- Loss of configured user logins
- Loss of configured network settings (addresses, firewall, etc.)

Installed licenses remain installed.

The SyncServer S6x0 reboots as part of this process.

The behavior with this command is identical to using the WebGUI to reset to factory default (Dashboard > Admin> Configuration Backup/Restore/Reset).

F9 - Time on Request

The F9 command is used to record the time the SyncServer S6x0 receives a request from the user. The general behavior is covered in Table 5-2. This function is configurable through the command line interface only. It is not configurable from the keypad.

Table 5-2. F9 Syntax Basic Behavior

Syntax	Behavior
`F9<CR>`	Enables the connection for "time on request" operation. When enabled, the only inputs the connection will respond to are `ctrl-C` and `SHIFT-T` (see next 2 rows).
`ctrl - C`	Disables the connection for "time on request" operation
`SHIFT-T`	If "time on request" enabled, this triggers a time response on the connection. **Note**: The "T" does not appear (it is not echoed back by SyncServer S6x0).

Enter the command `F9<CR>` to prepare the SyncServer S6x0 for the user's request. At the desired moment, send the request to the SyncServer S6x0 by entering an upper case "T". The SyncServer S6x0 saves the current time-of-day, accurate to within 1 microsecond, to a buffer, and then outputs it to the command line interface. The SyncServer S6x0 continues to provide the time-of-day each time it receives a "T" until `F9` is cancelled. To cancel `F9`, enter `ctrl-C` on your keyboard. The command line disregards all input other than `SHIFT-T` and `ctrl-C` (hex 03).

The time-of-day output is only available on the network or serial port used to give the `F9` command.

The format of the default string returned with `SHIFT-T` is entered (assuming time on request is enabled) is as follows:

```
<SOH>DDD:HH:MM:SS.mmmQ<CR><LF>
```

where:

- <SOH>=ASCII Start-of-Heading character
- <CR>=ASCII Carriage Return character
- <LF>=ASCII Line Feed character
- YYYY=Year
- DDD=day-of-year.

- HH=hours.
- MM=minutes.
- SS=seconds.
- mmm=milliseconds.
- :=colon separator.
- Q=time quality character, as shown below

  SPACE = Time error is less than time quality flag 1's threshold

  . = Time error has exceeded time quality flag 1's threshold

  ***** = Time error has exceeded time quality flag 2's threshold

  # = Time error has exceeded time quality flag 3's threshold

  ? = Time error has exceeded time quality flag 4's threshold, or a reference source is unavailable

Example:

To prepare Time on Request, enter:

```
SyncServer> F9
```

Then, to request the current time, enter `SHIFT-T` on your keyboard. ("T" does not appear).

Response:

```
<SOH>128:20:30:04.357*<CR><LF>
```

To exit `F9`, press `Ctrl-C` on your keyboard.

F50 - GPS Receiver LLA/XYZ Position

GPS Receiver LLA/XYZ Position

Use function `F50` to display the current GPS position, as well as the following:

- Select the positional coordinate system, Latitude Longitude Altitude (LLA) or XYZ (Earth- Centered, Earth-Fixed XYZ coordinates).
- If LLA is selected, Altitude Mode shows the elevation in given meters.

Use the following format to display the current position of the GPS receiver in LLA coordinates:

```
F50<S>B<N><SEP>LLA<CR>
```

SyncServer S6x0 responds with the coordinate information in the following format:

```
F50<S>B<N><SIGN><S><DEG>d<MIN>'<SEC>"<S><SIGN><S><DEG>d<MIN>
'<SEC>"<S><ALT><UNITS><CR><LF>
```

where:

- F50 = Function 50
- <S> = ASCII space character one or more.
- B = ASCII letter to denote Option Bay number follows
- <N> = Option Bay Number, 1.
- <SEP> = Separator
- LLA = LLA mode
- <CR> = carriage return character.
- <SIGN> = N or S for latitude; E or W for longitude;
- \- for negative altitude and <S> or + for positive altitude.
- <DEG> = two-digit degrees for latitude or three-digit degrees for longitude.
- d = ASCII character d
- <MIN> = two-digit minutes.
- ' = ASCII character '
- <SEC> = two-digit seconds + 1 digit 10ths of seconds.
- " = ASCII character "
- <ALT> = altitude in meter
- <UNITS> = unit of altitude, ¡§m¡¦ for meters
- <LF> = line feed character.

For example, to display the LLA coordinates of the antenna, enter:

```
F50 B1 LLA<CR>
```

SyncServer S6x0 responds:

```
F50 B1 N 38d23'51.3" W 122d42'53.2" 58m<CR><LF>
```

To display the present antenna position using ECEF XYZ coordinates in meters, use the following format:

```
F50<S>B<N><SEP>XYZ<CR>
```

SyncServer S6x0 responds using the following format:

```
F50B<N><S><SIGN><S><MX>m<S><SIGN><S><MY>m<S><SIGN><MZ>m<CR><
LF>
```

where:

- F = ASCII character F
- 50 = function number
- <S> = ASCII space character
- B = ASCII letter to denote Option Bay number follows
- <N> = Option Bay Number, SyncServer S6x0 only has 1
- <SIGN> = Either + or - for the position of the ECEF XYZ coordinates
- <MX> = Antenna X-position in meters to tenths of a meter
- <MY> = Antenna Y-position in meters to tenths of a meter
- <MZ> = Antenna Z-position in meters to tenths of a meter
- M = ASCII character m for Meters
- <ALT> = altitude in meters
- <CR> = carriage return character
- <LF> = line feed character

Example:

```
SynsServer> F50 B1 XYZ
```

Response:

```
: F50 B1 X 1334872.770000m Y 6073285.070000m Z 1418334.470000m
```

F73 - Alarm Status

Use function F73 to view alarm status. The SyncServer S6x0 will return a response in the follow format:

```
F73<SP>S<STATUS><SOURCE><SP><123456789ABCDEFGHIJ><CR><LF>
```

The alphanumeric characters 1-9 and A-J represent specific positions in the response string shown above. Table 5-3 describes F73's alarm indicators based on their position in the response string.

Table 5-3. F73 Alarm Indicators

Syntax	Alarm	Indicators	Description
F	n/a	n/a	ASCII character F
7	n/a	n/a	ASCII character 7
3	n/a	n/a	ASCII character 3
<SP>	n/a	n/a	ASCII space character, one or more
S	n/a	n/a	ASCII character S, Status delimiter
<STATUS>	Clock Status	"L" = Locked "U" = Unlocked	The Clock Status indicator reports "Locked" when the SyncServer S6x0 clock is locked to a reference source (e.g., GPS, IRIG, etc.). This is the normal operational state of the clock. While locked, the clock steers its internal oscillator to the reference source. The Clock Status indicator reports "Unlocked" when the SyncServer S6x0 clock is not locked to a reference source. This may be because the reference source is unlocked or unstable. While unlocked from a reference source, the SyncServer S6x0 uses its internal oscillator to keep time until a reference becomes available again.

Table 5-3. F73 Alarm Indicators

Syntax	Alarm	Indicators	Description
`<SOURCE>`	Clock Source	"A" = Clock to Timing I/O Slot A (J1A) "B" = Clock to Timing I/O Slot B (J1B) "P" = Clock to GNSS "R" = Clock to External Input Reference (J2A/B) "T" = Clock to NTP "F"= None	Same as WebGUI "Current Reference" row in Dashboard > Timing. This is also equivalent to the "Time input selected" notification. "A" and "B" encoding can also occur if the BNC is configured for 1PPS.
`<SP>`			ASCII space character, one or more
1	PLL Synthesizer	"–" = Locked "C" = Unlocked	The PLL Synthesizer indicator reports "Locked" during normal operation while the system clock's PLL is locked to the internal oscillator. The PLL indicator reports "Unlocked" if the SyncServer S6x0 clock's hardware PLL has failed. While the PLL indicator is "Unlocked", all SyncServer S6x0 clock timing parameters are unreliable and should not be used. Contact Microsemi FTD Services and Support.
2		"–" = Locked	Always "–" for initial release.
3	Primary	"–" = OK "P" = Fault	Indicates OK when GNSS input qualified for time, which is equivalent to Green indication for GNSS on Dashboard > Timing> Timing Reference row. Note that disabling of GNSS will also generate "P".
4	(For future use)	"–" = OK	Always "–" for initial release.

Table 5-3. F73 Alarm Indicators

Syntax	Alarm	Indicators	Description
5	IRIG - Slot A	"–" = OK "I" = Fault	Indicates OK when the Slot A-J1 input is qualified for time. This connector supports all IRIG inputs. ■ This is equivalent to Green indication for Slot A - J1 on Dashboard>Timing >Timing Reference row. ■ Note that disabling of AJ1 will also generate "I". ■ If this input is configured for PPS/10MPPS this alarm will react based on the condition of the input ■ This only applies to slot A.
6	External Input Reference - Slot B	"–" = OK "A" = Fault	Indicates OK when the Slot A - J2 input is qualified for frequency. This connector supports only frequency inputs (1/5/10MHz). This is equivalent to Green indication for Slot A - J2 in WebGUI Dashboard > Timing > Holdover References row. Note that: ■ Disabling of Slot A - J2 will also generate "A". ■ This only applies to slot A.
7	Primary Power	"–" = OK "W" = Fault	The Primary Power indicator reports "OK" when the power supply voltages are normal. It reports "Fault" when the power supply voltages exceed +/-10% of nominal supply regulation. While the Primary Power indicator reports a fault, all outputs from the SyncServer S6x0 are unreliable and should not be used unless a Secondary Power supply is available and operating normally. When seen from the rear of the SyncServer S6x0, the Primary Power indicator corresponds to the power supply module in the lowest, left-most bay.

Table 5-3. F73 Alarm Indicators

Syntax	Alarm	Indicators	Description
`8`	Secondary Power	<u>Dual AC version</u> "–" = OK "w" = Fault <u>Single AC version</u> "–" = OK	This alarm can only be set for the version that has Dual AC.
`9`	Rb Oscillator	<u>Unit with Rb</u> "–" = OK "R" = Fault <u>Unit without Rb</u> "–" = OK	The Rubidium Oscillator indicator reports "OK" when the Rubidium Oscillator is operating normally. It reports "Fault" when the Rubidium Oscillator is warming up or has a PLL fault. Faults that occur during the warm up period after the unit is started up are not significant. This is normal behavior as the oscillator must perform an initial transition from unlocked to locked. This alarm can only set on a unit that contains an Rb oscillator.
`A`	Excessive Frequency Adjustment	"–" = OK "X" = Fault	"X" is indicated when the "Excessive Frequency Adjustment" alarm is set.
`B`	Clock Status - First time lock	"–" = First time lock OK "A" = Clock Status has not locked since power on	"A"is indicated until the "First normal-track since power up" transient alarm has occurred. Thereafter it remains "–".
`C`	Time Error	"–" = OK "U" = Fault	"U" is indicated when the "Holdover time error threshold exceeded" condition is set. The severity setting has no impact. The condition for what will set this alarm is defined on the WebGUI Dashboard > Timing > Holdover form.
`D`	Timeout		Always "–"
`E`	NTP		Always "–"
`F`	IRIG - Slot B	"–" = OK	Always "–"
`G`	External Input Reference - Slot B	"–" = OK	Always "–"
`H`	(For future use)	"–" = OK	Always "–"
`I`	(For future use)	"–" = OK	Always "–"

Table 5-3. F73 Alarm Indicators

Syntax	Alarm	Indicators	Description
J	(For future use)	“–” = OK	Always “–”
<CR>	n/a		Carriage return
<LF>	n/a		Line feed

Example:

```
SyncServer> F73
```

Response:

```
F73 : SLP X---IA-w-----------
```

show gnss status

This command provides GPS satellite tracking information:

```
show gnss status
```

Example:

```
SyncServer> show gnss status
```

Response:

```
Gnss Status

Latitude : 12 21 06.39 N
Longitude : 76 35 05.17 E
HGT Val Ellipsoid : 712.4 m
HDOP : 0.970000
PDOP : 1.980000
Fix Quality : 1
Used Satellites : 8
Receiver Status : Tracking
Operation Mode : Survey
Antenna Status : OK
SBAS Constellation : Not Tracking

Current GNSS Satellite View:
```

```
+-----------------------------------------------------+
|Index |GnssID |SatID |SNR  |Azimuth |Elev    |PrRes     |
|------ |------ |----- |----- |------- |-------- |---------  |
|1     |GPS    |14    |25   |349     |50      | -10      |
|...... |...... |..... |..... |....... |........ |..........|
|2     |GPS    |18    |23   |65      |35      | 63       |
|...... |...... |..... |..... |....... |........ |.........  |
|3     |GPS    |21    |32   |146     |43      | -68      |
|...... |...... |..... |..... |....... |........ |.........  |
|4     |GPS    |22    |22   |13      |44      | 69       |
|...... |...... |..... |..... |....... |........ |.........  |
|5     |GPS    |25    |34   |108     |12      | 9        |
|...... |...... |..... |..... |....... |........ |.........  |
|6     |GPS    |26    |26   |191     |7       | -42      |
|...... |...... |..... |..... |....... |........ |.........  |
|7     |GPS    |27    |27   |255     |25      | 35       |
|...... |...... |..... |..... |....... |........ |.........  |
|8     |GPS    |31    |31   |185     |52      | 13       |
+-----------------------------------------------------+
```

halt system

Use this command to shut down the operating system as a preparatory step before power-off. This command does not reboot the system.

```
halt system
```

The behavior of this command is the same as using the Web GUI to perform a Halt (Dashboard>Security>Services).

Example 1:

If using via serial connection to console port:

```
SyncServer> halt system

The system is being HALTED NOW

.............................
```

<now numerious messages will be received as processes are stopped>

```
reboot: System halted
```

Example 2:

If using SSH session:

```
S650> halt system

The system is being shutdown now

The system can be powered off in 60 seconds

...........................................

SyncServer>
```

The connection is lost and on the front panel the following message appears:

```
System shutting down...
The system can be powered
off after 60 seconds.
```

At this point SyncServer S6x0 must be re-powered for further operation.

history

The command provides a listing of user entries during this session, regardless of their validity. If a configuration command provides the configuration value(s) on the same entry line as the command, then the configuration value(s) will be shown in the history.

Responses are not shown in the history list.

Command Syntax:

```
history
```

Example:

SyncServer> history

Response:

```
0 2015-11-19 18:49:28 set ip address-mode LAN3 ipv4 dhcp
1 2015-11-19 18:49:37 F73
2 2015-11-19 18:49:46 this is not a legal command
3 2015-11-19 18:50:08 show gnss status
4 2015-11-19 18:50:38 set-session-timeout
5 2015-11-19 18:50:47 show-session-timeout
6 2015-11-19 18:50:58 history
```

- The DHCP configuration (item 0) is shown in history because it is accomplished on the same line as the command.
- The configured session timeout value does not appear (item 4) because the CLI prompts for that value on a response line.
- Responses to `F73` (item 1) and show... requests (items 3,5) do not appear in history
- Anything entered, even if not valid syntax (item 2) will be maintained in the history.

show image

Use this command to display current version in active and backup locations, as well as which image will be used on boot.

Command Syntax:

```
show image
```

Example

```
SyncServer> show image
```

Response

```
SYSTEM IMAGE DETAILS

Active Image : 1
Backup Image : 2
Active Image Ver : 1.0.4
Backup Image Ver : 1.0.3.7
Next Boot Image : 1
```

This example tells us that:

- The active image (what is currently running in SyncServer S6x0) is 1.0.4. Note that this version is also displayed with the `show system` command.
- There is a backup image (2) and it contains software version 1.0.3.7.
- Next Boot Image identifies that if a reboot occurs it will load image 1, which we can deduce is the image we are currently running.

set image

This command provides the ability to control which software version will be loaded on next power-up (or reboot).

Command Syntax:

```
set image (1 | 2}
```

Example

To set the next reboot to use the image 2:

```
SyncServer> set image 2
```

show ip

Use this command to display the current IP settings for all LAN ports.

Command Syntax:

```
show ip config
```

The information displayed is consistent with the content shown in the Web Interface (Dashboard>Network>Ethernet).

Example:

```
SyncServer> show ip config
```

Response:

```
Eth port config

---------------------------------------------------------
|Port|Speed |IPVersion |IPv4Mode|IPv6Mode|AutoConfig|
|----|----------|----------|--------|--------|----------|
|LAN1|AUTO |ipv4 |DHCP |STATIC |enable |
|....|.........|.........|.......|.......|..........|
|LAN2|AUTO |ipv4 |STATIC |STATIC |enable |
|....|.........|.........|.......|.......|..........|
|LAN3|AUTO |ipv4_ipv6 |STATIC |STATIC |enable |
|....|.........|.........|.......|.......|..........|
|LAN4|AUTO |ipv4_ipv6 |DHCP |DHCP |disable |
---------------------------------------------------------

IPv4 config

---------------------------------------------------------
|Port|Address |Subnet Mask |Gateway |
|----|----------------|----------------|----------------|
|LAN1|192.168.1.100 |255.255.255.0 |192.168.1.1 |
|....|...............|...............|...............|
|LAN2|192.168.99.7 |255.255.255.0 |192.168.99.1 |
|....|...............|...............|...............|
|LAN3|192.168.1.99 |255.255.255.0 |192.168.1.1 |
|....|...............|...............|...............|
|LAN4|192.168.4.100 |255.255.255.0 |192.168.4.1 |
---------------------------------------------------------

IPv6 config

-------------------------------------------------------------------------------
|Port|Address |Pref|Gateway |
|----|--------------------------------|----|--------------------------------|
|LAN1| |0 | |
|....|..............................|....|...............................|
|LAN2| |0 | |
```

```
|....|..............................|....|...............................|
|LAN3|2001:db9:ac10:fe10::2 |64 |2002:0DB9:AC10:FE10::1 |
|....|..............................|....|...............................|
|LAN4| |0 | |
------------------------------------------------------------------------
```

Example 2:

```
SyncServer> show ip status
```

Response 2:

```
Ethernet MAC

-------------------------
|Port|MAC               |
|----|------------------|
|LAN1|00:B0:AE:00:36:0B |
|....|..................|
|LAN2|00:B0:AE:00:36:0C |
|....|..................|
|LAN3|00:B0:AE:00:36:0D |
|....|..................|
|LAN4|00:B0:AE:00:36:0E |
-------------------------


  Eth Status-IPv4

---------------------------------------------------------
|Port|Address          |Subnet Mask      |Gateway         |
|----|-----------------|-----------------|----------------|
|LAN1|192.168.107.122  |255.255.255.0    |192.168.107.1   |
---------------------------------------------------------


  Eth Status-IPv6

-----------------------------------------------------------
|Port|Address                          |Pref|Gateway |
|----|---------------------------------|----|---------------|
|LAN4|2001::120                        |64  | |
------------------------------------------------------------
```

set ip

Use this command to set the address mode to DHCP (IPv4 or IPv6) for the LAN1-LAN4 ports. Use this command to provision the Host, Mask, and Gateway for IPv4 static addresses.

Command Syntax:

- To provision the IPv4 or IPv6 address mode on the specified LAN port as DHCP:

```
set ip address-mode lan{1|2|3|4} {ipv4|ipv6} dhcp
```

  – For changes to take effect, the specified LAN port must be restarted.

- To set the IPv4 address, mask and gateway of the Ethernet interfaces for the specified port:

```
set ip ip-address lan{1|2|3|4} ipv4 address <addrv4_value>
netmask <maskv4_value> gateway <gatewayv4_value>
```

Note: Setting the IPv4 static address for a LAN port with this command automatically disables the DHCP address mode for that port.

Example 1:

To set the address-mode of the Port 1 Ethernet interface to DHCP:

```
SyncServer> set ip address-mode lan1 ipv4 dhcp
```

Example 2:

To set the static IPv4 address for LAN1 to 192.168.2.11, the mask to 255.255.255.0, and the gateway 0.0.0.0:

```
SyncServer> set ip ip-address lan1 ipv4 address 192.168.2.11
netmask 255.255.255.0 gateway 0.0.0.0
```

set nena active

Use this command to enable the NENA response mode on this connection.

Command Syntax:

```
set nena active
```

Example:

```
SyncServer>set nena active
```

Response:

```
NENA response active: CR to trigger, ctrl-c to deactivate

2016 349 07:40:19 S+00

2016 349 07:40:21 S+00

2016 349 07:40:22 S+00

2016 349 07:40:22 S+00

2016 349 07:40:23 S+00

SyncServer >
```

show nena-format

Use this command to display the current NENA format for the CLI connection.

Command Syntax:

```
show nena-format
```

Example:

```
s650>show nena-format
```

Response

```
NENA format : 8
```

set nena-format

Use this command to set the NENA format for the CLI connection.

Command Syntax:

```
set nena-format [0|1|8]
```

Example:

To set the NENA format to 8 for the serial timing output:

```
SyncServer>set nena-format 8
```

reboot system

This command halts current operation, then reboots the SyncServer S6x0. Except for no loss of power, this is functionally equivalent to power-up of the SyncServer S6x0.

```
reboot system
```

The behavior of this command is the same as using the Web GUI to perform a Reboot (Dashboard>Security>Services).

Example 1:

If using console port serial connection:

```
S650> reboot system
```

Response:

```
The system is going down for REBOOT NOW!

........................................

SyncServer login:
```

Example 2:

If using SSH session:

```
S650> reboot system
```

Response 2:

```
The system is going down for REBOOT NOW!

........................................
```

The connection will be lost after the REBOOT NOW! message.

set service

Use this command to enable or disable HTTP on the SyncServer S6x0. When disabled the Web interface will not be accessible. The only way to re-enable HTTP is using this CLI command.

Disabling HTTP provides a method to effectively eliminate the ability to remotely configure SyncServer S6x0.

Command Syntax:

```
set service http {enable | disable}
```

Example:

To enable HTTP:

```
set service http enable
```

set-session-timeout

Use this command to define a timeout for a CLI session. The session will auto-terminate if there is no session activity (i.e. user entries) for the configured duration. If the connection is remote SSH, the connection will terminate upon timeout. If the session is direct to the CONSOLE serial port, auto-logout will occur upon timeout.

Command Syntax:

```
set-session-timeout
```

– The system will prompt for the timeout value.

Example:

To set the session timeout to one hour (3600 seconds):

```
SyncServer> set-session-timeout
```

The system will prompt for the timeout value.

```
Timeout ( 0 - 86400 sec):
```

Enter the following, then press Enter.

```
3600
```

Response:

```
3600 sec timeout set succcessfuly
```

show-session-timeout

Use this command to display the session timeout value.

Command Syntax:

```
show-session-timeout
```

Example:

```
SyncServer> show-session-timeout
```

Response:

```
The current session timeout - 3600 sec
```

show system

Use this command to display basic facts about the SyncServer S6x0.

Command Syntax:

```
show system
```

Example

```
SyncServer> show system
```

Response

```
Host Name : SyncServer
Serial Num : MSK102
Model Num : S650
Build : 1.0.4
Uname : Linux SyncServer 3.13.0 #1 SMP Tue Nov 17 13:19:51
PST 2015 armv7l
Uptime : 0 day(s) 0 hour(s) 24 minute(s) 48 second(s)
Load Avg : 0.69 0.42 0.38
Free Mem : 87.83 %
CPU Model : ARMv7 Processor rev 0 (v7l)
CPU Identifier : Altera SOCFPGA
Total Mem : 1007 MB
Oscillator Type : Rubidium
Update Available : Up to date
```

Chapter 6 Provisioning

This chapter describes the procedures for provisioning the SyncServer S6x0. Use the procedures in this chapter after you have installed and powered up the SyncServer S6x0 (see Chapter 2, Installing).

In This Chapter

Establishing a Connection to the SyncServer S6x0

There are four ways to bring the SyncServer S6x0 on line:

1. The SyncServer S6x0 default IPv4 address for port LAN1 is 192.168.1.100, the subnet mask is 255.255.255.0, and the gateway address is 0.0.0.0 (no gateway). These may be suitable.

2. Use the front panel to input the IP address, subnet mask and gateway.

3. Use the front panel to turn on DHCP and review the assigned address.

4. Use the serial port

Communicating Through LAN1 Ethernet Port

The LAN1 Ethernet port must be set to an IP address that is compatible with your network to allow communication. If the default IPv4 address (indicated above) is not acceptable, you must first configure Ethernet LAN1 port through the EIA-232 serial port with CLI commands or with the front panel.

Once the LAN1 port has been configured, it can be used to access the SyncServer S6x0 web interface. Connect the LAN1 port to your network with a CAT5 Ethernet cable. Enter the LAN1 port IP address into a web browser. Enter your user name and password for the SyncServer S6x0 when prompted.

Note: The default user name is “admin”. The default password is: Microsemi.

HTTPS

A certificate is required with HTTPS. The SyncServer S6xx uses a self-signed certificate rather than a certificate generated by a known certificate authority. Browsers will therefore give warnings when attempting to connect to the SyncServer S6x0. Users will need to allow the browser to continue. The actual messages and screens will be different for different browsers. Certificates have an expiration date. After the built-in certificate expires, a new certificate can be generated on the Security->https page.

Figure 6-1 shows an example HTTPS message from the Google Chrome browser. Clicking the Advanced button brings up the message shown in Figure 6-2.

Figure 6-3 shows an example HTTPS message from the Mozilla Firefox browser. Clicking the Advanced button brings up the message shown in Figure 6-4.

Figure 6-1. Example - Chrome Browser HTTPS Warning

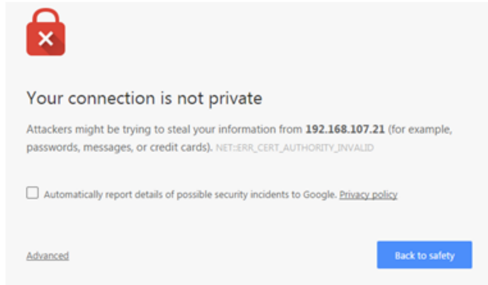


Figure 6-2. Example - Chrome Browser HTTPS Warning, Advanced

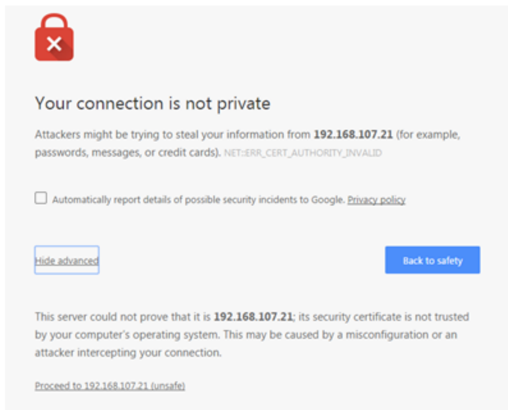


Figure 6-3. Example - Firefox Browser HTTPS Warning

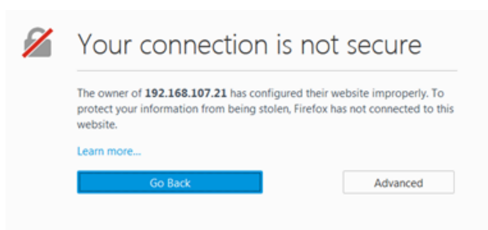


Figure 6-4. Example - Firefox Browser HTTPS Warning, Advanced

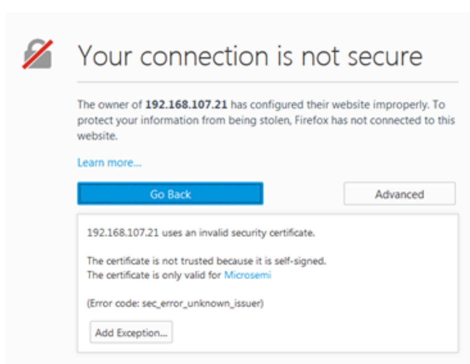


Table 6-1. Configuring the LAN1 Port

Method	Steps	Notes
Web Interface Path	Network > Ethernet	

CLI Command	`set ip ip-address lan1 ipv4 address <addrv4_value> netmask <maskv4_value> gateway <gatewayv4_value>`
	
	`set ip address-mode lan1 {ipv4|ipv6} dhcp`	

Front Panel	Menu button Select “1) LAN1” Select “1. Configure” Select “1) IPv4” or “2) IPv6 (DHCPv6) If IPv4, select Addressing Type “1) Static Addr” or “2) DHCP” If IPv4 Static Addr, ■ enter IPv4 address and press Enter button ■ enter netmask and press Enter button ■ enter gateway and press Enter button	This method can only be used to configure LAN1.

Communicating Through the Serial Port

An EIA-232 serial port is available on the rear panel for a direct serial connection to a terminal or a computer with terminal emulation. Use the following procedure to connect the SyncServer S6x0 to a terminal or a computer with terminal emulation via a straight through serial cable:

Note: For information on restricting user access, see Managing the User Access List, on page 163.

1. Connect one end of a straight through serial cable to the serial port on the computer or terminal and the other end to the EIA-232 connector labeled “Console” on the rear panel of the SyncServer S6x0.

2. Configure the emulation software for 8 data bits, 1 stop bit, no parity, 115.2 kbps baud rate, and no flow control.

3. Start the terminal emulation software and press **Enter**. The system prompt should appear. If it does not, recheck each step in this procedure.

4. Type your user name and press **Enter**. The system prompts for a password.

5. Type your password and press **Enter**. The system prompt appears.

Note: The default user name is “admin”. The default password is: Microsemi.

Managing the User Access List

When you are logged in with the Web GUI, you can add, edit, or delete user names in the user access list. The user list can contain up to 15 names (in addition to “admin”). Users are required to enter a user name and password to log in to the system. All Users and Admin have the same privileges.

Use the procedures in this section to manage user access to the SyncServer S6x0.

Logging In

Use the following procedure to log in to the system at the admin level.

Note: The default user name is “admin” and the default password is: Microsemi .

To avoid unauthorized access, you should change the default password.

Adding a User

Use the following methods to add a user to the system access list.

Table 6-2. Adding a New User

Method	Steps	Notes
Web Interface	Security > Users 1. Enter New Username 2. Enter New Password 3. Retype New Password 4. Use radio buttons to select the desired type of password recovery question 5. Enter Answer to password recovery question 6. Enter email address of user for password recovery communication 7. Enter SMTP gateway IPv4 address for SyncServer 8. Send Test Email. 9. Click the **Apply** button	
CLI	n/a	
Front Panel	n/a	

Note: The User name can only have alphanumeric characters, hyphen, and underline, with a maximum of 34 characters.

- abcdefghijklmnopqrstuvwxyz
- ABCDEFGHIJKLMNOPQRSTUVWXYZ
- 0123456789
- -_

There is a maximum of 16 users, including admin user.

Note:

- Passwords must be at least 8 characters (maximum of 34 characters), and need to include at least 1 upper-case, 1 lower-case, 1 number, and 1 special character.
- The following characters are not allowed: (', ", <, >, &,), $

Deleting A User

Use the following methods to delete a user from the system access list. Do not delete the default username and password.

Note: The “admin” account cannot be deleted or renamed.

Table 6-3. Deleting a User

Method	Steps	Notes
Web Interface	Security > Users 1. Select the user to be deleted with User dropdown box 2. Click the Delete Selected User box. 3. Click the **Apply** button.	
CLI	n/a	
Front Panel	n/a	

Changing a User’s Password

Use the following procedure to change a user’s password.

Note:

- Passwords must be at least 8 characters (maximum of 34 characters), and need to include at least 1 upper-case, 1 lower-case, 1 number, and 1 special character.
- The following characters are not allowed: & < > ' "

Table 6-4. Changing a User's Password

Method	Steps	Notes
Web Interface	Security > Users 1. Select the user with User dropdown box 2. Enter the new password in the New Password box 3. Enter the new password in the Retype New Password box 4. Click the **Apply** button.	
CLI	n/a	
Front Panel	n/a	

Provisioning the Ethernet Ports

Provisioning Ethernet Port

Ethernet Auto-Negotiation

The Ethernet ports LAN1-LAN4 ports can be configured to allow automatic negotiation of their connection speeds. When the Speed setting for a port is set to "Auto" (default), auto-negotiation is enabled and the SyncServer S6x0 will advertise connection speeds of 100/1000M. The user can also select a connection speed for a port of 100M or 1000M to configure the speed used by auto-negotiation.

IP Version

The Ethernet ports LAN1-LAN4 ports can be individually configured for either an IPv4 or IPv6 address. Use the dot-decimal notation format xxx.xxx.xxx.xxx to enter the IPv4 address parameter.

Configuration - DHCP or Static

The SyncServer S6x0 supports static as well as dynamically allocated IP addresses on the Ethernet ports LAN1 - LAN4. For a dynamically allocated address with the DHCP setting, a connection to a DHCP server is required. In Static mode, the user must configure the IP parameters (Host Address, Subnet Mask, and Gateway Address) for the Ethernet port.

Note: The LAN1 interface should not be configured with the same address as any of the other Ethernet ports. If this is done, then network access could be lost to the LAN1 management interface.

All Ethernet Interfaces (LAN1, LAN2, LAN3, and LAN4) must be configured to be in different subnets/networks. If any two or more IP interfaces have the same subnet, those interfaces will not function properly.

Note: If using a gateway, then all IP interfaces should be configured with the proper gateway IP address and subnet mask. If not using a gateway, then configure the SyncServer S6x0 to not use a gateway by setting the gateway address to 0.0.0.0. If a gateway address is programmed on LAN1, then the gateway/router must be present and reachable for the port to operate normally.

Table 6-5. Setting Ethernet Port Parameters

Method	Steps	Notes
Web Interface	Network > Ethernet 1. Select the speed with Speed dropdown box for the desired port 2. Select the IP address type by clicking on the IPv4 check box 3. Enter the IP address using the dot-decimal notation format xxx.xxx.xxx.xxx 4. Enter the Subnet mask using the dot-decimal notation format xxx.xxx.xxx.xxx. For IPv6, enter the prefix length. 5. Enter the Gateway address using the dot-decimal notation format xxx.xxx.xxx.xxx. 6. Click the **Apply** button.	
CLI	set ip ip-address lan {1|2|3|4} ipv4 address <addrv4_value> netmask <maskv4_value> gateway <gatewayv4_value> set ip address-mode lan{1|2|3|4} {ipv4|ipv6} dhcp	
Front Panel	Menu button Select “1) LAN1” Select “1. Configure” Select “1) IPv4” or “2) IPv6 (DHCPv6) If IPv4, select Addressing Type “1) Static Addr” or “2) DHCP” If IPv4 Static Addr, ■ enter IPv4 address and press Enter button ■ enter netmask and press Enter button enter gateway and press Enter button	Can only be used to set parameters for LAN1.

Provisioning Input References

When operating in normal (locked) mode, the SyncServer S6x0 uses an external reference, such as GNSS, to acquire the frequency and/or TOD alignment. Selection among multiple references inputs is based on priority.

The SyncServer 6x0 does not contain a battery-backed real time clock. Therefore, it will always boot up with a default value for the system time. This time will be updated when it obtains time from a time reference such as GNSS, IRIG, or NTP. The default value for the date is the software build date. This date will be used for the first log entries when booting up the unit. The time will change to local time during the boot-up process if a time zone has been configured.

Setting GNSS Parameters

When the GNSS reference is enabled, you can set the satellite position parameters either automatically with Survey mode, or manually with Position Hold mode. The GNSS reference input is enabled by default.

In Position Hold mode, you must specify the latitude, longitude, and height. Position Hold mode should not be used unless antenna location has been accurately surveyed.

You can specify the elevation mask which provides a method to filter out satellites used in the timing solution based on elevation (0 = horizon, 90 = direct overhead). The mask selection eliminates satellites smaller than the selected mask value.

You can also specify the cable delay.The effect of the entered value is to move the positioning of the rollover of the second (e.g. PPS) earlier by the value entered, thereby accounting for the delay associated with antenna and cable. See Table C-1 for cable-delay values for Microsemi GNSS antenna kits and accessories.

Note: It is important the cable delay be configured with the proper value. This can be determined from the cable length and the delay of the antenna.

Use the following methods to provision the GNSS port state and GNSS parameters for the SyncServer S6x0.

Table 6-6. Enable GNSS Port and Set GNSS Parameters

Method	Steps	Notes
Web Interface	Timing >Input Control 1. Select radio button for External Input Sources. 2. Click the GNSS check box. 3. Click the **Apply** button.	Enable GNSS Port.
	References > GNSS Configuration 1. In the GNSS Constellation Selection section, click the check box for GPS, GLONASS, or BEIDOU. 2. In the Space Based Augmentation System section, click the Enable check box to enable SBAS. 3. Click the Apply button.	Select GNSS Constellation GPS | GLONASS | BEIDOU | SBAS Multi-constellation license is required for BEIDOU and GLONASS access.
	References > GNSS 1. Enter Elevation Mask value. 2. Use drop-down box to select Mode of “Survey” or “Position Hold”. 3. Enter Latitude value if “Position Hold” mode.Use drop-down box to select North or South. 4. Enter Longitude value if “Position Hold” mode. Use drop-down box to select East or West. 5. Enter Altitude value if “Position Hold” mode. Use drop-down box to select dimensions. 6. Enter Cable Delay value. 7. Click the **Apply** button.	Set GNSS parameters.
CLI	n/a	
Front Panel	n/a	

Provisioning IRIG Inputs on Timing I/O Module

IRIG inputs are supported on Port J1 of the Timing I/O module with the SyncServer S650.

Note: A Flex Port Option license is required for full configurability of all BNC connectors on the Timing I/O module.

Note: The system will automatically detect and decode the modulation frequency of AM-modulated IRIG inputs, regardless of the configured AM modulation frequency. The clockAccuracy value will be based on the configured AM modulation frequency and not the actual input signal modulation frequency.

Table 6-7. Configure IRIG or Pulse Inputs on Timing I/O Module

Method	Steps	Notes
Web Interface	Option Slot A > Timing I/O Card 1. In the section of the form labeled "J1 Input", use dropdown box to select the input signal category of interest: Timecode, "Pulse", or Off. 2. For TimeCode, use the dropdown box to select the type of IRIG input: - DCLS, without YR - DCLS, with YR - 1kHz, without YR - 10kHz, with YR - 10kHz, without YR - 1kHz, with YR - B1344, DCLS - B1344, 1kHz - 100Hz, with YR - C37.118.1 (DCLS) 3. For Pulse, use the dropdown box to select 1PPS or 10MPPS. 4. Click the **Apply** button.	Configure IRIG Input on J1 For IRIG 1344, the code performs a subtraction using control bits 14 - 19 from the supplied IRIG time with the expectation that this will produce UTC time. This aligns with the C37.118.1-2011 definition.
Web Interface	Timing > Input Control 1. In the Manual IRIG Year Input section near the bottom of the window, enter the Year. 2. Click the **Apply** button.	Manually Configure Year for IRIG Input on J1
Web Interface	Option Slot A > Timing I/O Card 1. In the section of the form labeled "J2 Input", use dropdown box to select the input signal category of interest: SINE or Off. 2. For SINE, use the dropdown box to select the frequency - 1M - 5M - 10M 3. Click the **Apply** button.	Configure SINE Input on J2
CLI	n/a	n/a
Front Panel	n/a	n/a

Provisioning Sine Wave Inputs on Timing I/O Module

Sine wave inputs are available for Port J2 of the Timing I/O module with the SyncServer S650.

Note: A Flex Port Option license is required for full configurability of all BNC connectors on the Timing I/O module.

Table 6-8. Configure Sine Wave Inputs on Timing I/O Module

Method	Steps	Notes
Web Interface	Option Slot A > Timing I/O Card 1. For input J2, use dropdown box to select “Sine” or Off. 2. If sine is selected, use the dropdown box to select the frequency of the sine wave input: - 10 MHz - 5 MHz - 1 MHz 3. Click the **Apply** button.	
CLI	n/a	n/a
Front Panel	n/a	n/a

Provisioning Inputs with Manual Entry Controls

The common purpose for the manual entry controls at the bottom of the Timing > Input Control window, see Figure 6-5, is to provide a method to enable the S6xx to become aware of time-related status information in scenarios where ther currently is no timing input capable of providing that status. The value of this may be best understood by considering that the S6xx can simultaneously support a variety of time inputs and outputs. If a particular time input does not, on its own, provide information that is needed to fully support a different type of time output then, without the method described in this section, such an output would have to report degraded status. Each of these controls exists to "fill in a gap" that otherwise would exist and lead to degraded time output capability. Table 6-10 describes the manual entry controls. Table 6-9 summarizes all available timing inputs and any gaps they might have, identifies the manual controls that can remove any gaps, and finally outputs that utilize the specific information.

Note: This section is not about the use of the “Forced Manual Time Entry” control, which has a narrow use-mode that is described in that area of the web form..

Figure 6-5. Timing - Input Control Window - Lower Portion

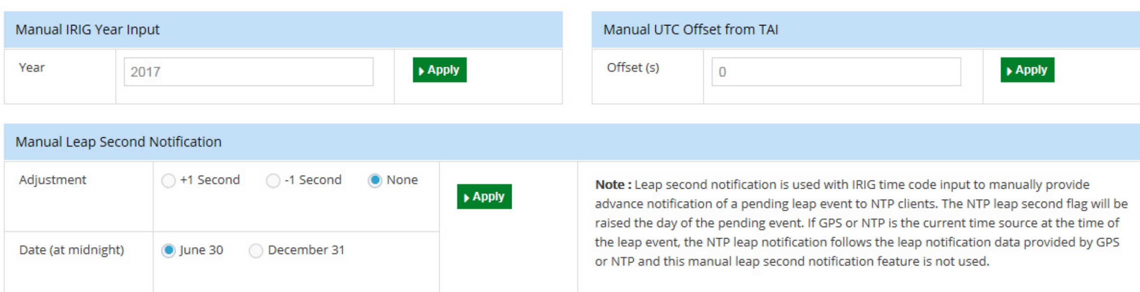


Table 6-9. Situations where use of manual time-information can allow for full capability on outputs

Input Time Reference	Information not provided by this timing reference category	Impact to outputs if not manually supplied (or provided by other qualified input)	Remedy	Notes
Any IRIG that includes current year, other than 1344 or C37.118	■ No UTC offset from TAI ■ No pending leap	PTP: ■ can't set TAI timescale ■ can't set UTCoffsetValid flag ■ can't indicate pending leap NTP: ■ can't indicate pending leap IRIG1344/C37.118: ■ can't indicate pending leap	Manually set: ■ utc offset ■ pending leap	IRIG is presumed to always supply UTC timescale.
IRIG "no year"	■ No UTC offset from TAI ■ No Current year ■ No pending leap	PTP: ■ can't set TAI timescale ■ can't set UTCoffsetValid flag ■ can't indicate pending leap NTP: ■ can't provide UTC time ■ can't indicate pending leap IRIG1344/C37.118: ■ can't provide UTC time ■ can't indicate pending leap	Manually set: ■ utc offset ■ pending leap ■ current year	These IRIG codes are a subset that do not provide the current year. For standard coding of IRIGs, the codes that lack year have last digit in the range 0 - 3. If range is 4 - 7 the year is provided. For example, B000 - B003 do not provide year, B004 - B007 provide year.

Table 6-9. Situations where use of manual time-information can allow for full capability on outputs (Continued)

Input Time Reference	Information not provided by this timing reference category	Impact to outputs if not manually supplied (or provided by other qualified input)	Remedy	Notes
IRIG 1344 or C37.118	No UTC offset from TAI	PTP: ■ can't set TAI timescale ■ can't set UTCoffsetValid flag	Manually set: ■ utc offset	As a practical matter, the pending leap is only for one minute, so this may not be useful for some applications - in which case manual use of pending leap can help.
NTP	■ No UTC offset from TAI	PTP: ■ can't set TAI timescale ■ can't set UTCoffsetValid flag	Manually set: ■ utc offset	
GNSS without GPS in the constellation configuration	■ No UTC offset from TAI ■ No Pending leap	PTP: ■ can't set TAI timescale ■ can't set UTCoffsetValid flag ■ can't indicated pending leap NTP: ■ can't indicate pending leap ■ IRIG1344/C37.118: ■ can't indicate pending leap	Manually set: ■ utc offset	

A simple example of this would be if the only available time input is an IRIG1344 and the S6xx is supporting a PTP (IEEE-1588) Master function. Since the IRIG input provides UTC timescale and PTP uses TAI timescale, the S6xx must convert from UTC time to get to TAI time. However, this conversion requires awareness of the current accumulated leapseconds, information the IRIG input does not supply. Without an auxiliary method for learning this value, the PTP output will encode the Announce message with the ptpTimescale flag set to false, which means that PTP clients using this S6xx PTP Master are unable to derive usable time. The remedy for this scenario is for the user to provide the current conversion value, which is easily known. By entering this in the “Manual Offset from TAI” field, the S6xx will now trust this to be the correct conversion and will apply it when it is needed to support an output. In the specific example, the time conversions are now performed (incorporating the user-supplied value), the PTP timestamps will encode TAI time, and the ptpTimescale flag is set to true.

Figure 6-10 provides a summary of the function supported by each of the manual entries on this form:

Table 6-10. Manual Time Control Functions

Control	Functionality	Notes
Manual IRIG Year Input	For IRIG inputs that do not supply year, this entry supplies the missing year information. This allows time outputs that include the year to provide a user-supplied correct year.	Once supplied and accepted, the year will progress forward based on this foundation. A quick way to check if the manually entered year is being used is to look on the time in upper right of web interface or front panel of S6xx.
Manual UTC Offset from TAI	Use this control to identify the current accumulated leapsecond difference between TAI and UTC time.	TAI time is the timescale used for PTP (1EEE-1588). Unlike UTC, TAI is not affected by leapseconds, so to convert between these timescales the accumulated difference due to leapseconds must be known.
Manual Leap Second Notification	Use this control to identify that a leapsecond is pending, the direction of the leapsecond, and the date of its occurrence.	■ Once supplied and accepted (and not set to "none") indication that a leap is pending (due to manual entry) will appear on the Dashboard'Timing form. ■ Leap pending notifications will be provided (in the timeframe appropriate for the specific output) for any output that is capable of reporting pending leap. ■ Historically, all leapseconds have occurred at either midnight June 30 or midnight December 31 ■ After the time of the leap has passed, the leap will no longer show as pending.

General Behavior Associated with Manual Entry

The following behaviors apply to all of the manual entries:

- If there is currently a qualified time reference that is capable of providing that particular information, then a manual entry supplying that information will NOT be used. In other words, the information from a qualified time reference is given preference over the manual information. A list of currently qualified time references can be seen on the Dashboard > Timing > Timing References row. Any references in this row that are green are qualified. These represent the pool from which that information may be provided.
- Similarly to the prior point, if a manual entry is being used (this happens when there is no qualified input that can provide that information) and an input becomes qualified that can provide it, then the manual value will be discarded in favor of what the input is supplying. This point may help orient the foundational purpose for these controls: they are not provided to correct errors from inputs (rare), they are provided to enable a method for these values to become known when there is no current input that can supply them.
- All manual entries are acted upon immediately or not at all. In other words, at the time the value is entered, if the situation at that moment is one that will actually allow use of the value (i.e. there is no qualified time input that is already providing it), then the value will be used (be applied on time outputs as needed).
- The S6xx features the capability to remember the last status that was in use for each of these manual controls. This way, there is a good chance the values will still be correct if power is cycled in a situation where some of these values are not being actively updated by a qualified time reference. This would be the case if only an IRIG (or NTP) was providing time input. On this point, it is important to realize that:
  - Even if using a manually entered year, the year will increment correctly at the end of the year. This means that on power-cycle the year that will be used won’t necessarily be the value that was entered but will also incorporate any year increments that had taken place while operational.
  - If using a manually entered pending leap, if the time when the leap is scheduled to occur has not yet occurred when power is cycled, upon power-up the S6xx will remember that a leap had been pending. However, upon discovery of the current time if it turns out that the time for the leap has passed, then the pending leap will be turned off. Of course, if on subsequent power-up a time reference is provided that can supply leap pending status, then the condition will entirely be based upon that status.
  - If using a manually entered UTC offset, this value will be updated in the appropriate direction if a leap event occurs (i.e. the time of a pending leap happens). In this way, the UTC offset can increment even when it was originally entered manually and is not being directly updated by any external time reference.

Manual Entry Example

The example below illustrates the “pooling” behavior that ALL qualified time inputs (not just the selected time reference) are used to learn current status for any of these manual entries. In this case, two IRIG inputs are initially enabled; the specific configurations shown in Figure 6-6 (access this form via References„³Status). Note that the IRIG input configured for slot A does NOT provide the year whereas the IRIG input configured for slot B does provide the year. Initially, only the no-year IRIG is actually supplied (this is why it is green and the slot B J1 input is red). Figure 6-7 shows the status from the Dashboard„³Timing form. Since the only qualified (and selected) reference does not provide the year (or pending leap or UTC offset) information, the user can provide this information. On the manual inputs portion of the Timing > Input Control form (Figure 6-8) an action is taken to provide all of these values. For this example, they are intentionally provided with wrong values in order to illustrate the behavior when inputs are added later that provide the correct information. Of course, in actual usage (where only the input shown is available) the correct information should be provided.

With only the IRIG no-year input qualified (Figure 6-7) the values shown in Figure 3 were entered. The effectiveness of each of these entries can be seen by the following methods:

- The manually entered year was accepted as can be seen in the upper right of the web application (see Figure 6-9). All time outputs that provide year information will now be providing this year.
- The manually entered pending leap was accepted as can be seen on the Leap Pending row in Figure 6-7. Outputs that supply pending leap information indicate pending (and direction of the leap) at the time appropriate for those outputs (see section titled Reporting of Leapsecond Pending).
- In release 2.0, the only output that is not based on UTC timescale is the PTP (IEEE-1588) master capability. If a PTP master is configured on one of the LAN ports (2-4), the current value of UTC to TAI conversion can be seen on the Network Timing„³NTPr/PTP Status form. For this example, LAN2 had been configured for PTP master function. Figure 6-10 shows a portion of the status. Note that the Current UTC offset value is shown to be 14 seconds, which is due to the manual entry (Figure 6-8). Note also that a pending leap is NOT shown even though it is indicated on Figure 6-7. This is behavior is illustrated in Figure 6-14.

Now connect the year-capable IRIG that is configured on the slot B J1 input(see Figure 6-6). Figure 6-11 shows that after this input becomes qualified, the correct year is extracted from this input, shown in the upper right of the web interface (and will be encoded onto any time outputs that provide year). Note that the time input that is currently driving the S6xx outputs is still the IRIG without year connected to slot A J1. This is because that input has higher priority. The example illustrates that ALL qualified inputs are used for extraction of the items shown on Figure 6-8. Even though the IRIG with year is not actually driving the precise synchronization output in this S6xx, it is now being used to extract the current year. Note that the year may not be immediately adjusted upon qualification of the IRIG that supplies the year, but it will happen within a few minutes. The message log will provide an entry when the timeline shift occurs. Here¡¦s an example:

```
Jan 30 18:46:28 SyncServer alarmd: id 152, index 000,
severity Notify ALARM SET: Timeline has been changed
```

Continuing with this example, the year is now derived from an external input but the pending leap and UTC offset values continue to be taken from the user-entry since the IRIG input on BJ1 does not provide these items either. Since GPS provides all the information, if we provide GPS as an input these remaining items will be driven by the status provided via GPS. Since the manual values were intentionally set incorrectly for this example, they should change to the correct values as GPS comes up. Figure 6-12 Shows that with GNSS now qualified (and it is also selected in this case) the leap pending status has been updated because there is actually no pending leap, which is what the S6xx learned from the addition of the GPS input. Similarly, Figure 6-13 shows that the UTC offset is now showing 37 seconds, which is the correct value. Keep in mind in the situation that is the purpose for these manual controls, such as one where only an IRIG is available as input, then of course the manual entry for leap would have been “none” and UTC offset set to “37”, thus allowing for correct information to be encoded on time outputs even though no active input is providing it.

When GPS was connected, we can see the actions in the message log: the leap pending event is cleared, GPS becomes selected as the S6xx reference for time and frequency, the timeline is changed (due to the change in offset).

```
Jan 30 23:29:40 SyncServer alarmd: id 173, index 000,
severity Notify, ALARM CLEAR: Leap event pending cleared

Jan 30 23:29:40 SyncServer alarmd: id 022, index 000,
severity Notify ALARM SET: GNSS input time qualified

Jan 30 23:29:42 SyncServer alarmd: id 025, index 000,
severity Notify ALARM SET: GNSS input selected as frequency
reference

Jan 30 23:29:44 SyncServer alarmd: id 024, index 000,
severity Notify ALARM SET: GNSS input selected as time
reference

Jan 30 23:33:32 SyncServer alarmd: id 152, index 000,
severity Notify ALARM SET: Timeline has been changed
```

Figure 6-6. Time-Related Information is extracted from all qualified inputs

Reference Status

Current Input Reference	SLOT A J1

Input Reference(s)	State	Type
GNSS	Disabled	N/A
NTP	Not Qualified	N/A
Slot A J1	Qualified	TimeCode IRIG B 1kHz, without YR
Slot A J2	Disabled	N/A
Slot B J1	Not Qualified	TimeCode IRIG B 1kHz, with YR
Slot B J2	Disabled	N/A

Figure 6-7. The qualified (and selected) input does not provide year (or leap) information.

Timing	
Time of Day Status	Locked
Current Reference	Slot A J1 (Timecode)
Timing References	Slot A J1 (Timecode) Slot B J1 (Timecode)
Frequency References	
Leap Pending	Deletion (Manual)

Figure 6-8. Example showing user-entry of all manual inputs

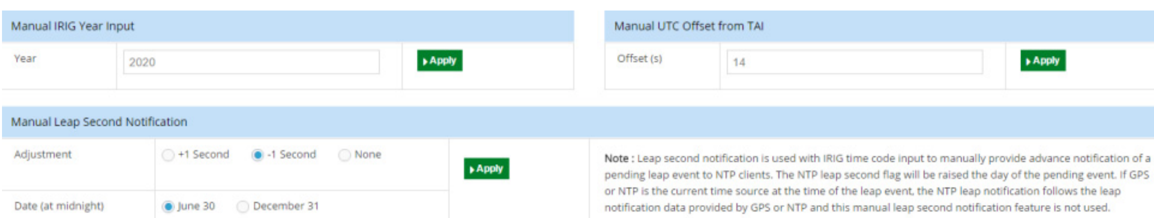


Figure 6-9. Manually entered year is being used

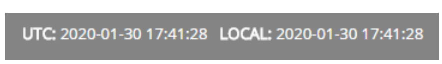


Figure 6-10. Portion of PTP Status

Announce Content

Port identity	00:b0:ae:ff:fe:03:7a:8d, Port:1
Clock class	6
Clock accuracy	within 10 us
Offset scaled log variance	0x3bea
Timescale	PTP
Timesource	Other
Time tracable	True
Frequency tracable	True
Current UTC offset valid	True
Current UTC offset	14 s
Leap 61	False
Leap 59	False
Steps removed	0

Figure 6-11. Qualified (non-selected) input provides year information

Timing	
Time of Day Status	Locked
Current Reference	Slot A J1 (Timecode)
Timing References	Slot A J1 (Timecode) Slot B J1 (Timecode)
Frequency References	
Leap Pending	Deletion (Manual)

UTC: 2017-01-30 18:49:58 LOCAL: 2017-01-30 18:49:58

Figure 6-12. Adding GPS cleared the pending leap

Timing	
Time of Day Status	Locked
Current Reference	GNSS
Timing References	GNSS Slot A J1 (Timecode) Slot B J1 (Timecode)
Frequency References	
Leap Pending	None

Figure 6-13. Adding GPS provided the correct UTC offset value

Announce Content

Port identity	00:b0:ae:ff:fe:03:7a:8d, Port:1
Clock class	6
Clock accuracy	within 100 ns
Offset scaled log variance	0x3bea
Timescale	PTP
Timesource	GPS
Time tracable	True
Frequency tracable	True
Current UTC offset valid	True
Current UTC offset	37 s
Leap 61	False
Leap 59	False
Steps removed	0

Reporting of Leapsecond Pending

The ability to provide manual entry of pending leapseconds (see Figure 3) provides benefits beyond the basic capability to inform S6xx of an upcoming leap in a circumstance where it has no way to learn of it from supplied timing inputs. The further benefit has to do with the varying rules (based on signal type) about when a pending leap should be declared in relation to the planned moment of the actual leap event. The concept is shown in Figure 6-14.

- The figure shows a timeline that terminates with the application of a leapsecond.
- The figure shows all time inputs/outputs supported in release 2.0 that are capable of providing indication of a pending leapsecond. Specifically:
  – GPS is always one of the first sources to encode the news that a leapsecond is forthcoming. Because this input is unique in the list in that it is not also an output, there is no need to report (via GPS) to downstream devices from the S6xx that there is a pending leapsecond. For this reason, there is no limitation on how early a leapsecond may be encoded in GPS or on how early the S6xx will indicate it. This gets at a basic point that whenever the S6xx is aware of a pending leapsecond (from any source, including manual entry) this condition will be shown on the Dashboard„³Timing form. For example, in Figure 6-11 a pending leap is indicated because it was entered manually (and accepted).

    There is a side-note here: release 2.0 supports multiple satellite constellation configuration. Any GNSS input whose configuration does

NOT include GPS will not be capable of learning about pending leapseconds or the current UTC offset, so the discussion above is applicable only to combinations that included the GPS constellation. When GPS is not included, the manual methods for indicating pending leapseconds or setting the correct UTC offset are available.

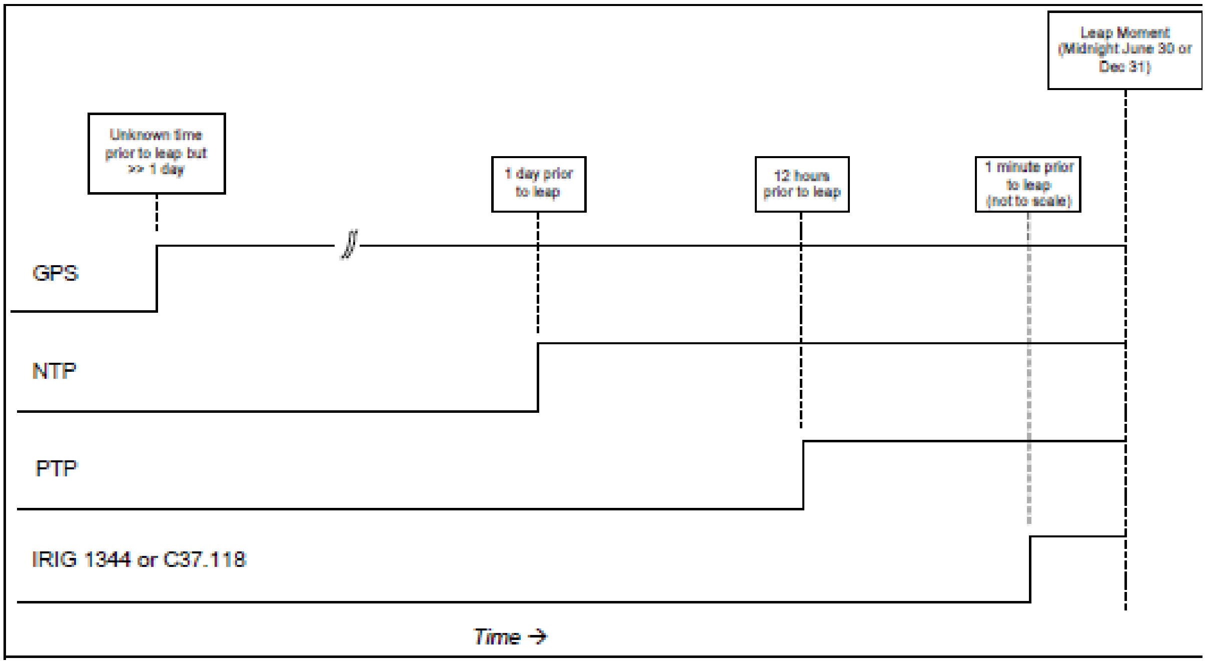
- The other inputs (NTP, PTP (not available as an input in release 2.0), and the IRIG codes shown) have expected notification timeframes (with respect to the leap moment) as shown. What these mean is that, even if there is knowledge of a leap pending in advance of these timeframes (such as would certainly occur with a GPS time reference), the indication on an output of each type should be “held off” until within that timeframe. As shown, with an NTP output the pending leap should not be indicated any sooner than 1 day prior to the event. With PTP, the leap is held off until ½ day prior to the leap event, and finally these special IRIG codes do not announce the pending leap until the final minute before the leap event.

  You can think about how these timeframes impact each of these signal types both as an input and as an output, there are some interesting consequences:

  – When the leap pending is taken from any of these signals, it will not be detected at the S6xx (at best) until within the appropriate timeframe.

  – The S6xx will always do its best on its outputs to fulfill the complete timeframe for that output. However, what happens when the input providing the pending leap has a shorter pre-notification period than an output that is configured? For example, if the incoming signal that provides the leap notification is an IRIG 1344 and the S6xx is configured to function as an NTP Primary Server, the prenotification of the pending leap on NTP will be (at best) one minute because the IRIG 1344 won’t inform the S6xx earlier than one minute before and therefore this status cannot be conveyed on any output sooner than that.

Figure 6-14. Expected Pre-notification Times for Pending Leap Events



With the prior discussion as background the added utility of the manual leapsecond setting can be understood. First, a nuance is added to the basic behavior described for all manual entries in the section titled General Behavior Associated with Manual Entry which stated:

- If there is currently a qualified time reference that is capable of providing that particular information, then a manual entry supplying that information will NOT be used.

In the case of a manual pending leap entry, we amend this to:

- If there is currently a qualified time reference that is capable of providing leap pending information AND the time until the pending leap is within the expected timeframe for that particular input, then a manual leap pending entry will not be used.
- On the other hand, if a manual leap entry is applied before the expected timeframe for all qualified inputs in the pool, then the manual entry will be accepted. In such a case, once the time until the leap moment falls within the timeframe of any qualified input, the information supplied by that input will overrule (if needed) the manual setting.

Examples:

- If GPS is a qualified reference, manual leap pending input will never be accepted since GPS is expected to provide leap pending status (typically) many months prior to the leap moment. There is no formal definition for the timeframe but for sure there will be plenty of notice and hence there is no reason to accept a manual entry.

- If GPS is not a qualified reference, then manual control of leap will be allowed at any time except when the remaining time until leap is within the timeframe of the qualified time input shown in Figure 9 that has the longest timeframe. In this region, the inputs are expected to provide the leap pending status.
- An example where the manual input can help to provide maximum notification to all outputs occurs if IRIG 1344 is the only time input and the S6xx is operating as a PTP GrandMaster. Since the manual input is allowed all the way up to the minute prior to the leap moment, the user can manually enter the pending leap days (even weeks) prior to the leap event. Since the S6xx knows that the IRIG input won¡¦t provide any information until the last minute, the manual input is accepted. There is no problem providing the manual notification early because the S6xx knows to hold off based on the appropriate timeframe for the signal type. In this case with PTP output, the notification will appear in the PTP Announce messages . day prior to the event, just as it would have done if the input had been GPS (or even NTP).

Provisioning NTP Associations

The SyncServer can have multiple associations, each with a different Role. NTP associations with non-valid IP addresses and domain names are not shown in the Associations list. (If a known good domain name does not appear on this list, there may be a problem with the DNS server configuration or with the DNS service itself.)

Table 6-11 describes the method to add a new NTP association.
Table 6-12 describes the method to modify an existing NTP association.
Table 6-11 provides descriptions of NTP Association configuration parameters.

The list of Current NTP Associations always includes the local Hardware Clock, which:

- Cannot be deleted or edited.
- Is configured as a preferred server
("server 127.127.45.0 prefer # pseudoaddress for the timing engine" in ntp.conf).
- Is displayed at the top of the list.

Note: The NTP hardware reference clock is by default marked with the NTP "prefer" setting. If the user wants to mark a different association as preferred, then the hardware clock should have the "prefer" unselected. The system will not prevent the user from setting multiple associations as "prefer", although this is usually not useful.

The user should consider adding NTP servers available on the local network to the list of Current NTP Associations.

NTP Prefer Selection

By default the SyncServer S600 Series has the NTP Prefer selected for the local hardware reference clock. In most operating scenarios the local hardware reference clock (which more often than not will be tracking GNSS) will be the only reference being used. With the Prefer being selected, and no statistically better reference available, the time server will achieve Stratum 1 status on startup or restart as rapidly as possible. If the Prefer is not selected for the hardware reference clock then the NTP daemon will go through a standard validation procedure for a reference clock. This procedure will take several minutes and should happen by the time the reach indicates 377 on the reference clock association. For optimal operation, Microsemi recommends the local hardware reference remain selected as a Prefer in the configuration.

.

Table 6-11. Add a New NTP Association

Method	Steps
Web Interface	NTP > NTPd Config 1. Select the Role with dropdown box as either Server, Peer, or Broadcast. 2. Enter the IP address or DNS name of the NTP association. 3. Select the Port with dropdown box, LAN1, LAN2, LAN3 or LAN4. 4. Click the “Pref” checkbox to set this as a prefer association. 5. Select the Burst setting with the drowndown box as N/A, Burst, iBurst, or Both. 6. Select the MinPoll value with the drowndown box. 7. Select the MaxPoll value with the drowndown box. 8. Click the **+** button in the right side column to add the association. 9. Click the **Apply** button to save changes. 10. Click the **Restart** button to make any changes take effect.
CLI	n/a
Front Panel	n/a

Table 6-12. Modify Existing NTP Association

Method	Steps
Web Interface	NTP > NTPd Config 1. Select the NTP Association that is to be modified from the list. 2. Change the Role, if desired, with dropdown box as either Server, Peer, or Broadcast. 3. Change the IP address or DNS name, if desired, of the NTP association. 4. Change the Port with dropdown box, if desired, LAN1, LAN2, LAN3 or LAN4. 5. Click the “Pref” checkbox, if desired, to select or deselect this as a prefer association. 6. Change the Burst setting, if desired, with the drowndown box as N/A, Burst, iBurst, or Both. 7. Change the MinPoll value, if desired, with the drowndown box. 8. Change the MaxPoll value, if desired, with the drowndown box. 9. Click the **Apply** button to save changes. 10. Click the **Restart** button to make any changes take effect.
CLI	n/a
Front Panel	n/a

Provisioning NTP Security

NTPd Symmetric Keys

- View and copy the current keys.
- Upload a file containing keys from a local PC drive to the SyncServer.
- Download the SyncServer's current key file to a local PC drive.

Use the DELETE button to clear previous keys and certificates. This is a required step before generating new ones.

Table 6-13. Configure NTP Autokey Server

Method	Steps	Notes
Web Interface	Security > NTPd Autokey Server 1. In the Identity Scheme IFF section, enter the Server Password. This is equivalent to the "crypto pw <server-password>" line in ntp.conf on a generic NTP device. 2. Click the **Generate** button to create the key file and/or certificate file. 3. Click the **Restart** button to make any changes take effect.	Configure NTP Autokey Server While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.
	Security > NTPd Autokey Server 1. Enter the Group Key File name that is to be downloaded to the SyncServer. 2. Click the **Save As** button to save the Group Key File to the SyncServer. 3. Click the **Restart** button to make any changes take effect.	Download IFF Group Key File. While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.
CLI	n/a	n/a
Front Panel	n/a	n/a

NTP Autokey Client

Use the Security > NTP - Autokey Client page to manage (add or remove) Autokey keys for NTP associations where the SyncServer is an NTP client..

Table 6-14. Configure NTP Autokey Client

Method	Steps	Notes
Web Interface	Security > NTPd Autokey Client 1. Browse to locate the Group Key File from a secure location. 2. Click the **Install** button to save the AutoKey Client File to the SyncServer. 3. Click the **Restart** button to make any changes take effect. 4.	Install IFF Group Key File While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.
	Security > NTPd Autokey Client 1. In the Identity Scheme IFF section, enter the client Password. 2. Click the **Generate** button to create the key file and/or certificate file. 3. Click the **Restart** button to make the key active on the SyncServer. Upon making the added keys active, the SyncServer will be able to authenticate NTP packets from NTP servers that use those keys.	Configure Autokey Client. While the NTP daemon restarts, its services are temporarily unavailable, and it generates the following alarm events: NTP Stratum Change, NTP System Peer Change, NTP Leap Change.
CLI	n/a	n/a
Front Panel	n/a	n/a

Provisioning Outputs

Configuring Network Timing Services

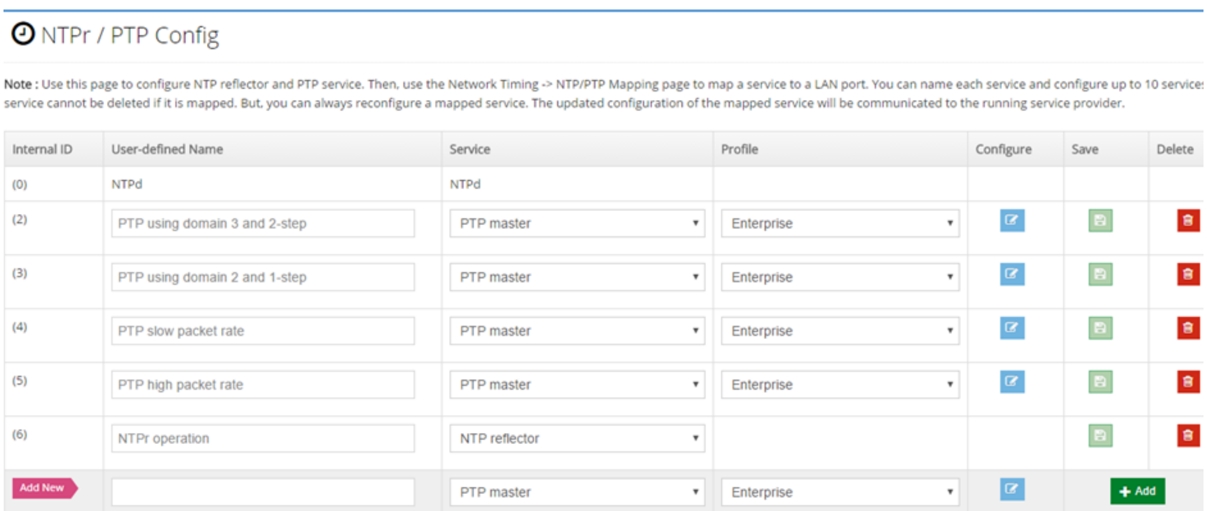
The form Network Timing„> NTPr/PTP Config) supports generalized configuration of network timing services. The concept is that the ability to create and retain definitions for specific services, independently of the connection method, provides a useful way to aggregate within the S6x0 all network timing services that are of interest for that particular unit. As added services are provided in future releases, this form will evolve to support extended service capabilities. Up to 10 services (rows) can be created.

To use any of the services defined on this form, map that service to the specific physical network port where it should run. This is accomplished on the Network Timing „> NTP/PTP Mapping form.

Example - Creating a Network Timing Service

Figure 6-15 shows the timing services configuration form. Five services have previously been configured for this example. See Table 4-7 for descriptions of the parameters (columns) in this form.

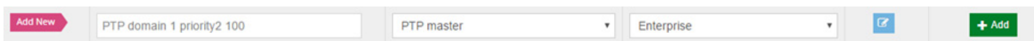
Figure 6-15. Configuration of Network Timing Services



To illustrate the process we walk through creating one more row, starting with Figure 6-15.

Suppose we want to use the S6x0 as a 1588 (PTP) GrandMaster. As part of an overall network plan, we want this one at a higher priority than another S6x0 that is providing PTP Grandmaster services in this same network. Our intent for doing this is so that if the clock quality being reported by both grandmasters is the same, then the BMCA (Best Master Clock Algorithm) executing at the downstream PTP clients will choose this S6x0 because of its better priority. Here are the steps:

- Using the Add New row, type in a helpful name for this service. This name reminds us that this service has the priority2 setting set to 100 and the PTP domain set to 1. Both of these will be accomplished later in this example.

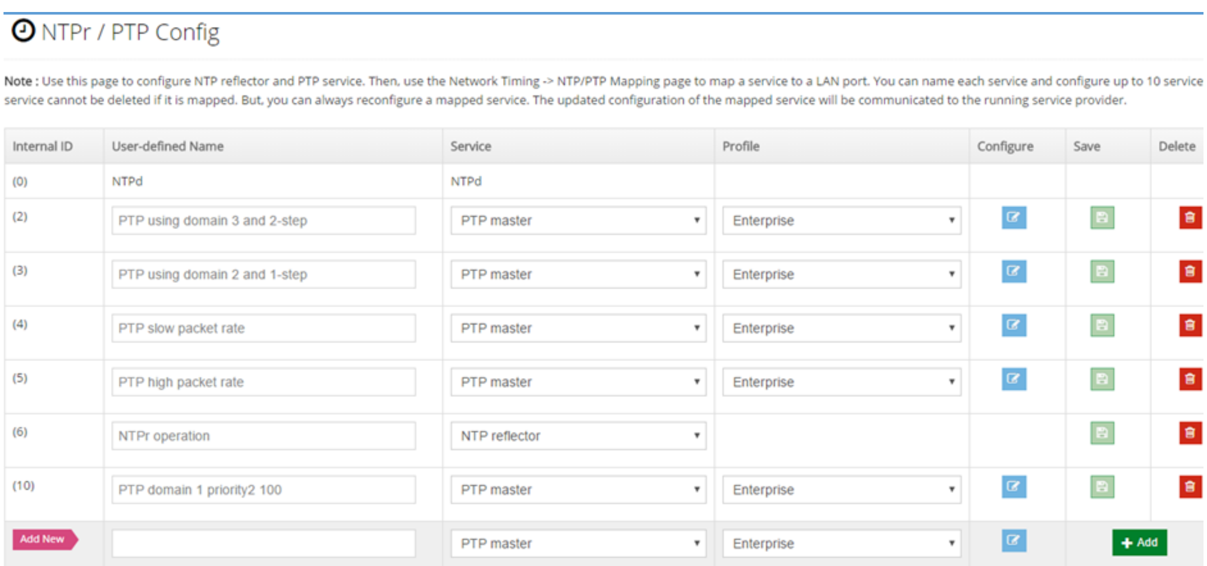


- At this point there are 2 ways to proceed, both essentially equivalent:
  - Select the +Add control, which will create a new row in the table. From there we can further edit to the desired specific settings. This illustrates a general feature that any row in the table can be edited, so it is not always necessary to create a new one if it is preferred to alter an existing one.
  - Alternatively, continue editing to the final configuration prior to selection of +Add. Doing it this way will result in the new row being saved to the desired settings when it is created (this will be evident since the Save control will be grayed out).

Both of these methods get to the same outcome, there is no clear advantage for either one.

For this example, the +Add control is selected now, resulting in Figure 6-16.

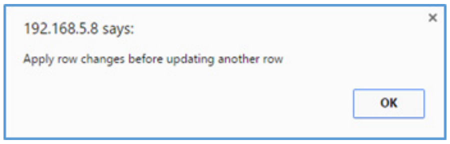
Figure 6-16. Example - New Timing Service Configuration



The new timing service is shown on the bottom row. Note that it was auto-assigned ID = 10, the actual value is not important. S6x0 assures that it is unique. Note also that the Save control is grayed out, indicating that there is nothing to save. However, since we haven't yet completed all of the desired configuration there is still work to do.

- Since the default values for Service and Profile columns happen to be what we want for this service, there is no need to change them. In general, if these did need to be changed they should done in left-to-right (Service, then Profile, then Configure) order since the columns to the right will adapt based on selections to the left.
- Select the Configure control, which brings up Figure 6-17, which always begins with default values the first time a new service is created. For this example we need to change the Domain and the Priority2 values. Set Domain = 1 and Priority2 = 100, then OK. Figure 6-17 shows the configuration with these changes, just before selecting OK. This action returns back to Figure 6-16 but now the detailed configuration matches the desired setup, as described in the User-Defined Name.
- To complete the configuration, select the Save button for this row. The appearance of the form just before this save action is shown in Figure 6-18. Compare this with Figure 6-16 for the following notes:
- Figure 6-18 shows the Save button is ready to be used (it is not grayed out) and the entire row associated with the new service is highlighted. These are clues that the full configuration has not been completed. Why is that? It's because we made a change on the configuration form (and saved it with the OK) but we have not saved it at the top level (the entire timing service).

  Contrast this with Figure 6-16. Here the Save is grayed out because there are no pending changes (this was before the changes were made on the configuration form).
- If pending (unsaved) changes have been made to any row and an action is taken to make changes on a different row, a box will appear indicating that there are unsaved changes.



Similarly, if there are pending changes and a new form is selected, this form will appear to make sure the action is intended.

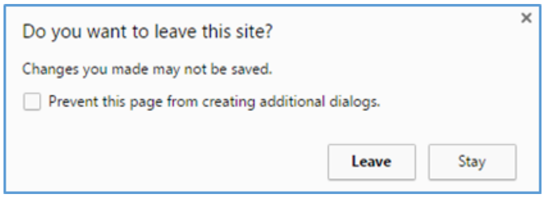


Figure 6-17. Modified configuration for "PTP domain 1 priority2 100" just before OK selected

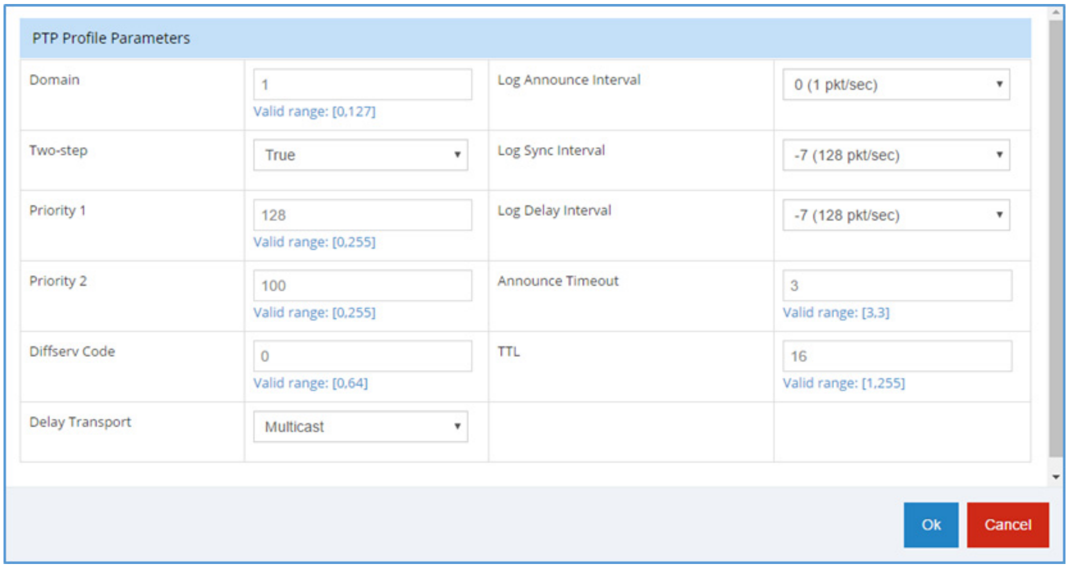
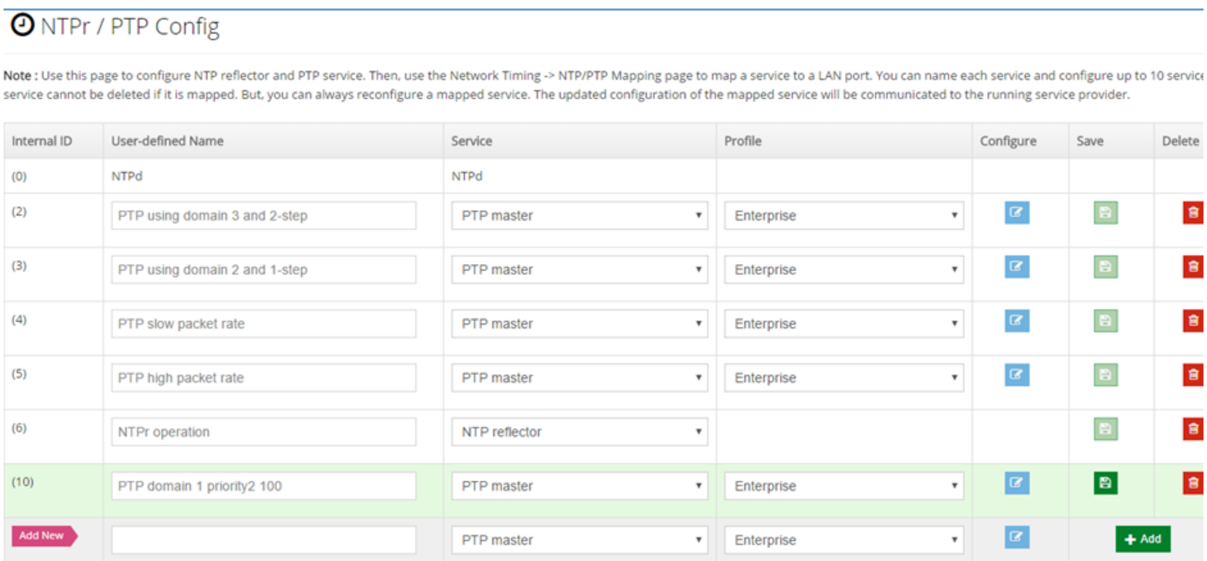


Figure 6-18. New timing service just before final save



Once a timing service has been created its configuration can be changed as desired, including the name. In other words, an existing service can be re-purposed or modified as needed.

Notice that there is a predefined row with internal ID = (0) at the top of the row portion of Figure 6-15, named NTPd. The NTPd service has always been available on S6x0 and is supported on all physical network ports. NTPd configuration is accomplished on the Network Timing'NTPd Config form. Rather than create a new method for its configuration, the existing method remains. However, as is seen in Mapping a Network Timing Service to a LAN Port, the method for mapping use of NTPd to physical network ports is consistent with all network timing services, which is why this row (non-deletable and non-configurable) appears on this form.

Mapping a Network Timing Service to a LAN Port

Creation of network timing services Figure 6-15 provides a customizable method for configuring specific services for use on a given S6x0. Selecting Network Timing > NTP/PTP Mapping provides the method to associate a service with the physical network port where is should operate. Figure 14 shows this form as it will appear on first power-up (factory preset).

The form lists all physical ports that support multiple timing services. This is currently LAN 2, 3, and 4). LAN1 currently supports only NTPd and is always mapped to that service, so it does not appear here. As the S6x0 capability evolves, the set of choices and assignment rules will be evolve on this form. The service choices and allowed mapping rules are as described in Table 6-15. The behavior described in Table 6-15 is enforced by the form controls.

Figure 6-19. Factory Preset Mapping Form

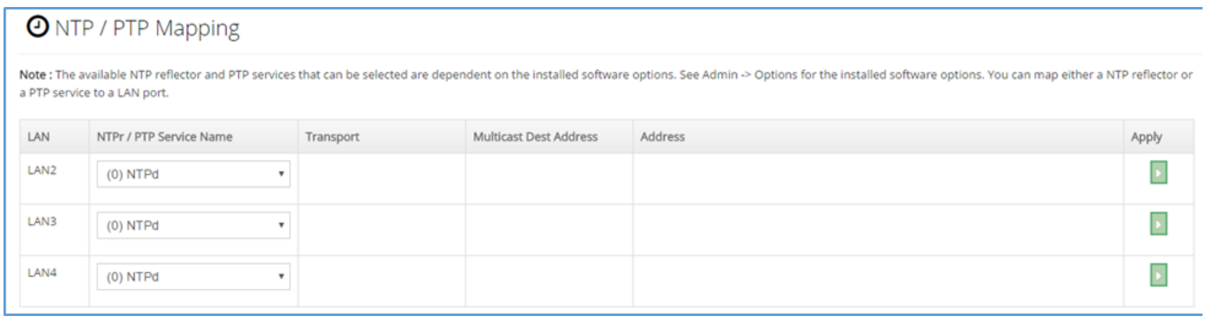


Table 6-15. Network Timing Service Mapping

Network Timing Service	Individual Mapping Rules	Combined Mapping Rules
NTPd	Supported on LAN1, LAN2, LAN3, LAN4	Always mapped to LAN1. Can be mapped to any combination of other ports as long as no other timing service is mapped to that port.
PTP Master	Can be mapped to at most one of these physical ports: LAN2, LAN3, LAN4	Can be mapped to an allowed physical port if NTPr is not mapped to a port.
NTPr	Can be mapped to at most one of these physical ports: LAN2, LAN3, LAN4	Can be mapped to an allowed physical port if PTP Master is not mapped to a port.

Example - Mapping a Network Timing Service

Suppose that the goal is to provide the PTP Master service that was created (prior example Figure 6-18) on LAN4.

The first step (if not already done) is to configure LAN4 with a network configuration. This is accomplished on the Network > Ethernet form. Figure 6-20 shows an example where LAN4 has been configured to IPv4 address 192.168.100.99. Attempting to complete a service mapping to a LAN that has not been configured will result in this message:

Next, the desired service is selected from the list box in the Service Name column. Since this example maps the service to LAN4, the list box from that row is used. Figure 16 shows the selection set. This list will always show the first two columns of whatever has been configured on Figure 6-18. As will be seen, the list does not filter out selections that may not actually be allowed per the combined mapping rules column of Table 6-15; the list always shows all services that could possibly be assigned to that port.

Selection of the service associated with internal ID (10), results in Figure 6-22. Note that this row is highlighted as indication that this assignment is not actually complete. The apply button on the right of this row is now available as indication that something needs to be saved.

Selection of apply will attempt to complete the mapping. This action causes any specific mapping rules (see Table 6-15) to be enforced, which could lead to non-acceptance of the candidate entry (more about this later). In this case the mapping meets all requirements and is accepted, the form after acceptance is shown in Figure 6-23. This service is now active on LAN4.

The current mapping of network timing services to LAN ports can also be observed on the Dashboard >Timing Services form. Figure 6-24 shows how this looks with the example just shown. As can be seen this form also shows LAN1 which in 2.0 release is always mapped to NTPd.

Figure 6-20. Example configuration on Network > Ethernet form

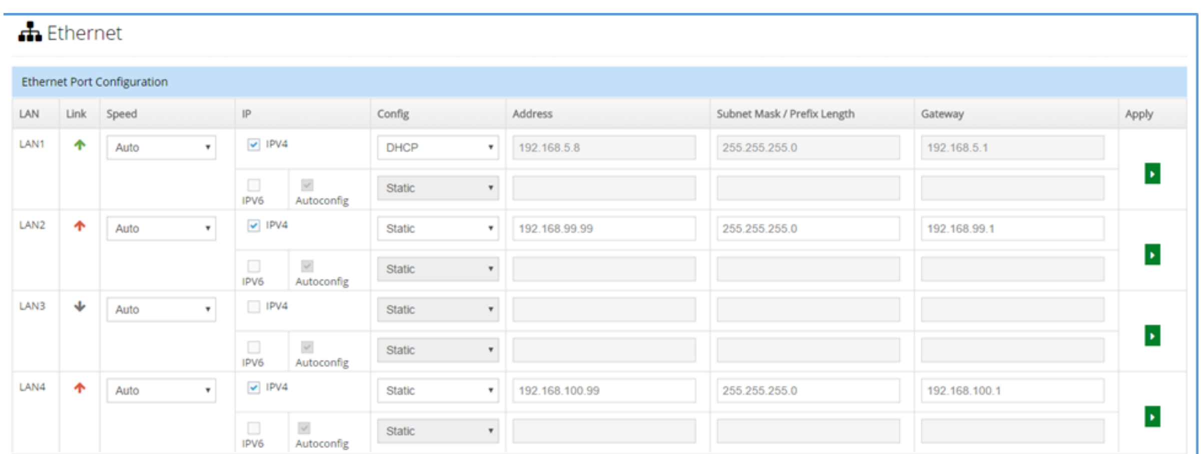


Figure 6-21. Timing Services choices appear in list box

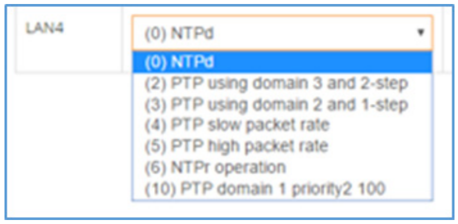


Figure 6-22. PTP Master timing service is in process of being mapped to LAN4

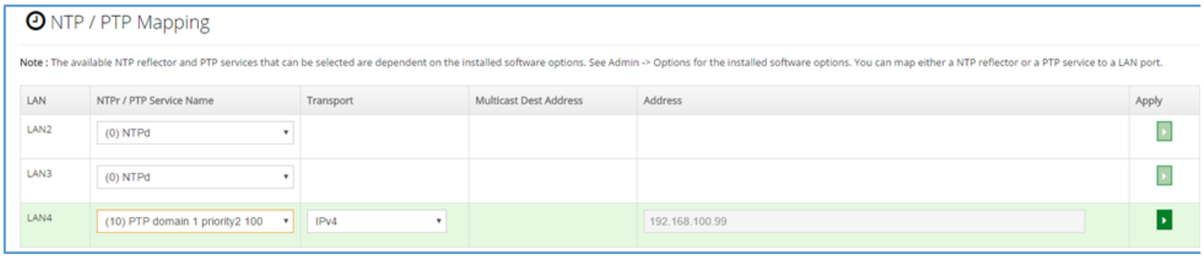


Figure 6-23. Successful completion of mapping new timing service to LAN4

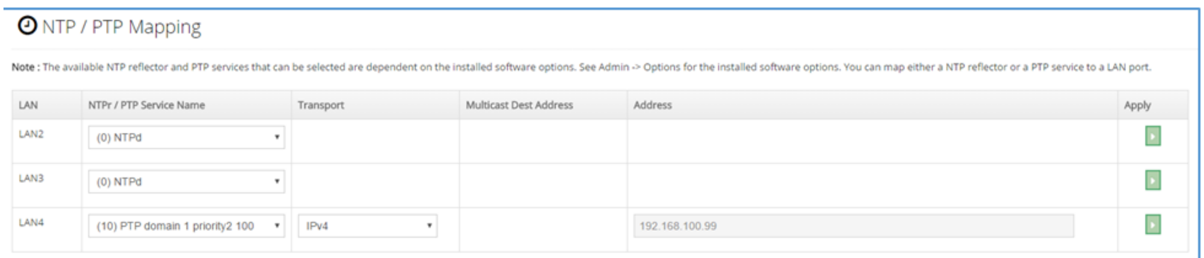
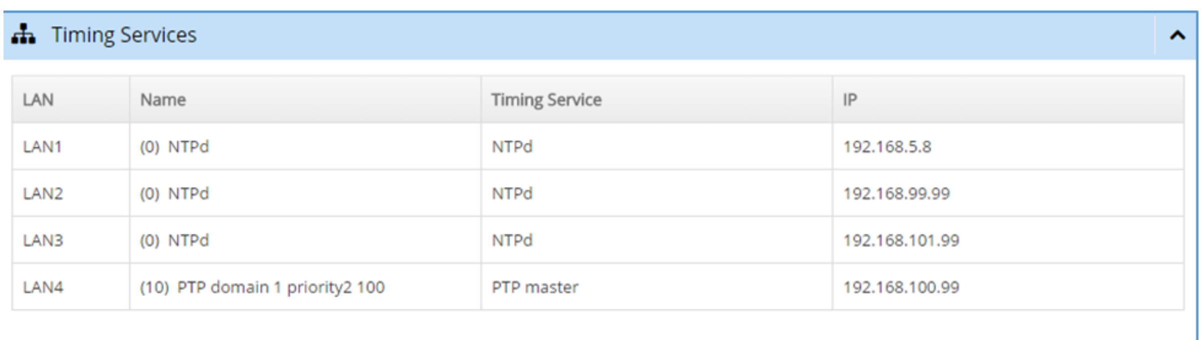


Figure 6-24. Dashboard'Timing Services shows current mapping



Enforcement of Mapping Rules

Table 6-15 identifies all rules for supported mappings of timing services to physical LAN ports. These rules are evaluated when the Apply selection is made for a row on the mapping form. Before looking at examples of response when a rule disallows the selection it is important to understand that any mapping that can be setup on any row always has a context where it is allowed. The reason why it could be disallowed is that another row is already configured such that the attempted mapping is not supported in that specific overall context. Hence, if it is important to ultimately successfully configure a mapping that was disallowed upon Apply, is it always possible to find a way to successfully accomplish it. This will be clearly shown in the remainder of this section.

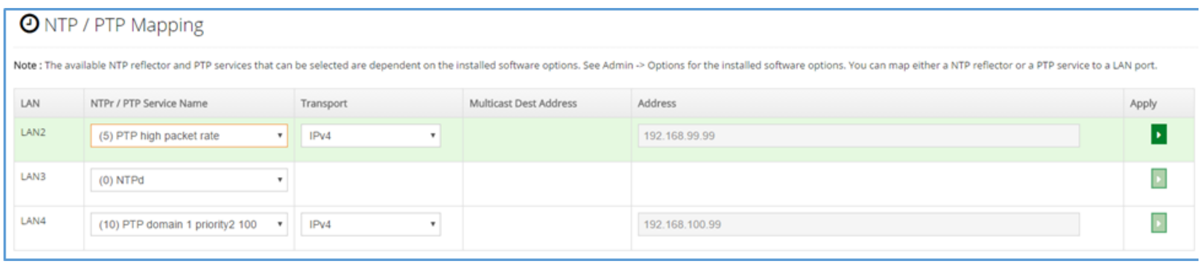
One Timing Service per physical port

This form inherently supports this rule. The list box in the Service Name column allows for a single service selection. Hence there is no possibility of conflicting with this rule.

PTP Master can be mapped to only one physical port at a time

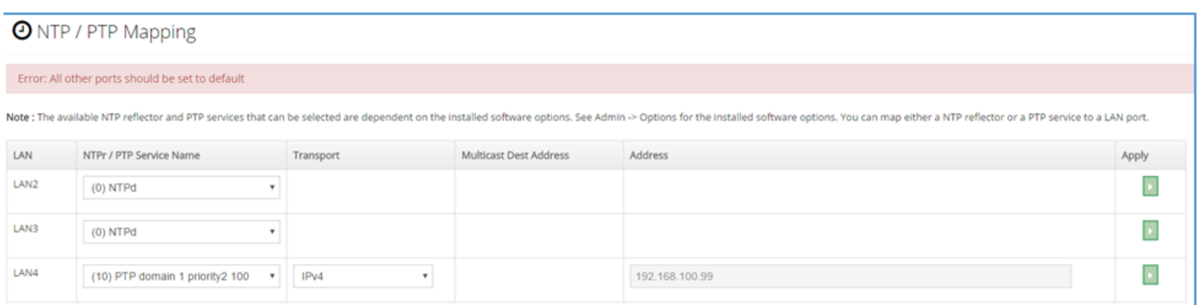
As Table 6-15 indicates, only LAN2, 3, or 4 can be used for this mapping. This is inherent in the form since there is no LAN1 row. If one of the LAN ports is already mapped to PTP Master, an attempt to configure a 2nd one will fail. Using the mapping from Figure 6-23, suppose we try to map another PTP master onto LAN2.

In Step 1 the desired timing service is selected from the list box, in this case the timing service named PTP high packet rate was selected (see Configuring Network Timing Services for how to customize a timing service).



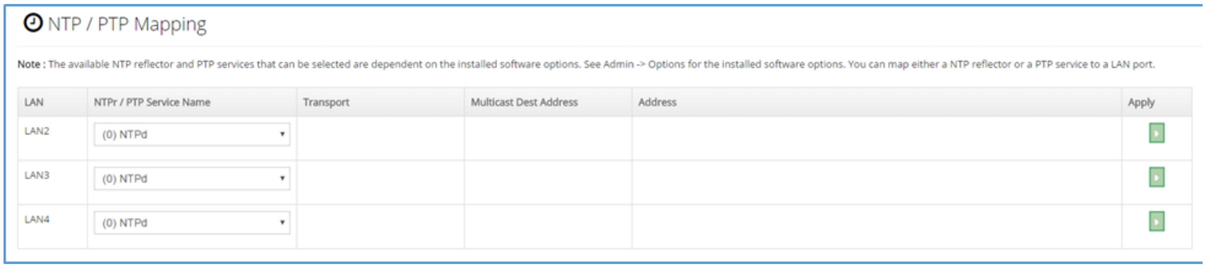
Next select Apply for LAN2 row. This results in the following error appearing on the form, and the row configuration reverts to its current mapping. The error message is generic. In this case the issue is that we are attempting to map PTP master to more than one LAN (it is already successfully mapped to LAN4).

Figure 6-25. Response when Apply is not accepted



If the priority is to succeed with the attempted mapping on LAN2, then the following sequence will get it done.

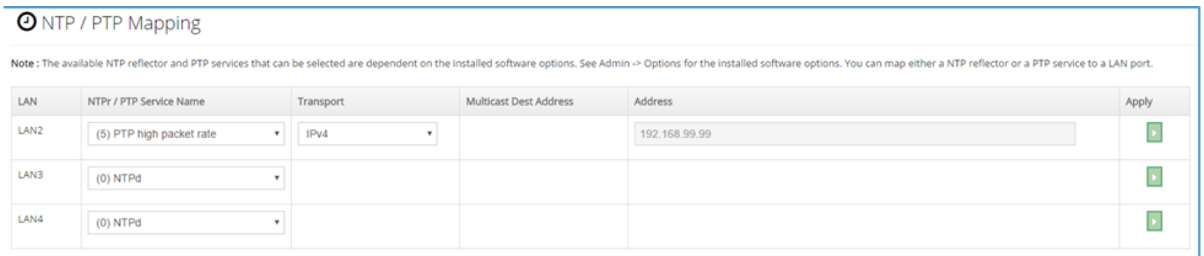
First, select NTPd on LAN4 row and Apply. This results in the form below. Per Table 4 NTPd can be simultaneously mapped to all LAN ports, so there no restriction here.


NTP / PTP Mapping

Note : The available NTP reflector and PTP services that can be selected are dependent on the installed software options. See Admin -> Options for the installed software options. You can map either a NTP reflector or a PTP service to a LAN port.

LAN	NTPr / PTP Service Name	Transport	Multicast Dest Address	Address	Apply
LAN2	(0) NTPd				
LAN3	(0) NTPd				
LAN4	(0) NTPd				

This clears a path to assign the desired PTP Master service to LAN2. The process used before will now succeed and results in this form. This service is now active on LAN2.

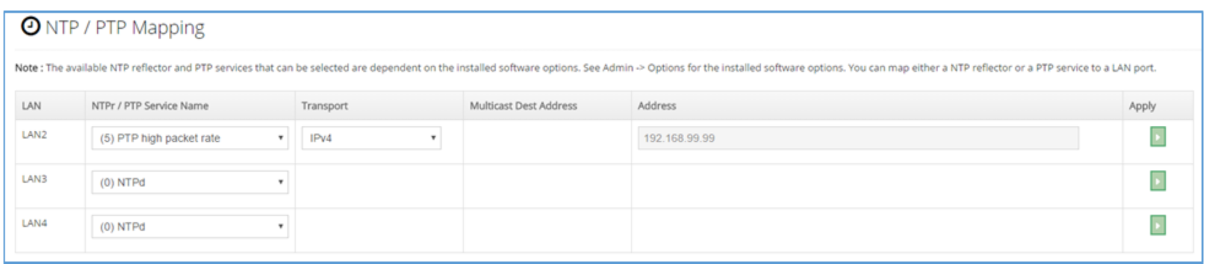

NTP / PTP Mapping

Note : The available NTP reflector and PTP services that can be selected are dependent on the installed software options. See Admin -> Options for the installed software options. You can map either a NTP reflector or a PTP service to a LAN port.

LAN	NTPr / PTP Service Name	Transport	Multicast Dest Address	Address	Apply
LAN2	(5) PTP high packet rate	IPv4		192.168.99.99	
LAN3	(0) NTPd				
LAN4	(0) NTPd				

As shown in Table 6-15 the mapping of PTP Master and NTPr are under the same common restriction: at most a total of one of these services can be mapped at a time. Hence the impact of attempting to map more than one of either type of service will lead to the same type of restriction shown in the prior example. To illustrate, suppose we want to use NTPr on LAN3, starting from the prior mapping. Here's the attempted mapping prior to using apply on the LAN3 row.

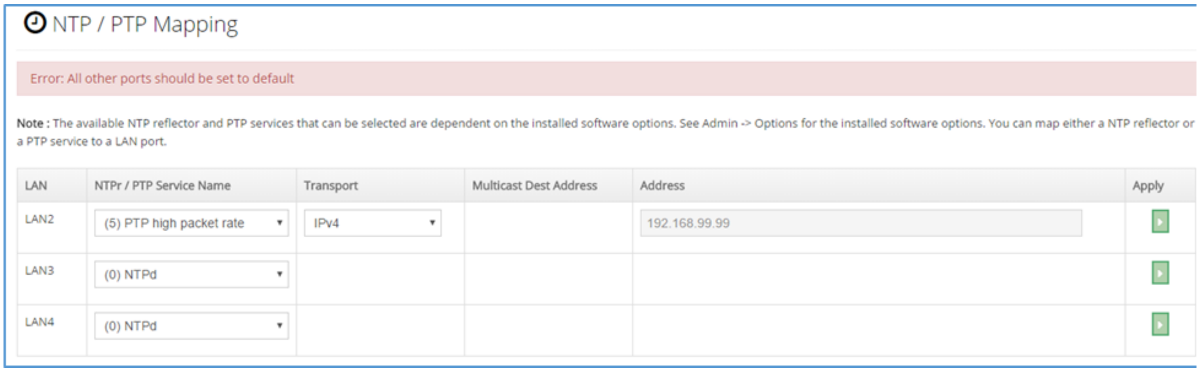
Figure 6-26. Mapping an NTPr service


NTP / PTP Mapping

Note : The available NTP reflector and PTP services that can be selected are dependent on the installed software options. See Admin -> Options for the installed software options. You can map either a NTP reflector or a PTP service to a LAN port.

LAN	NTPr / PTP Service Name	Transport	Multicast Dest Address	Address	Apply
LAN2	(5) PTP high packet rate	IPv4		192.168.99.99	
LAN3	(0) NTPd				
LAN4	(0) NTPd				

Following apply the response is similar to Table 6-25 and the remedy is similar. To get LAN3 mapped as desired first set LAN2 to NTPd and apply. This will then allow the LAN3 NTPr mapping to be completed successfully.



Future releases may provide support for more flexible mappings.

Observing Status of Network Timing Services

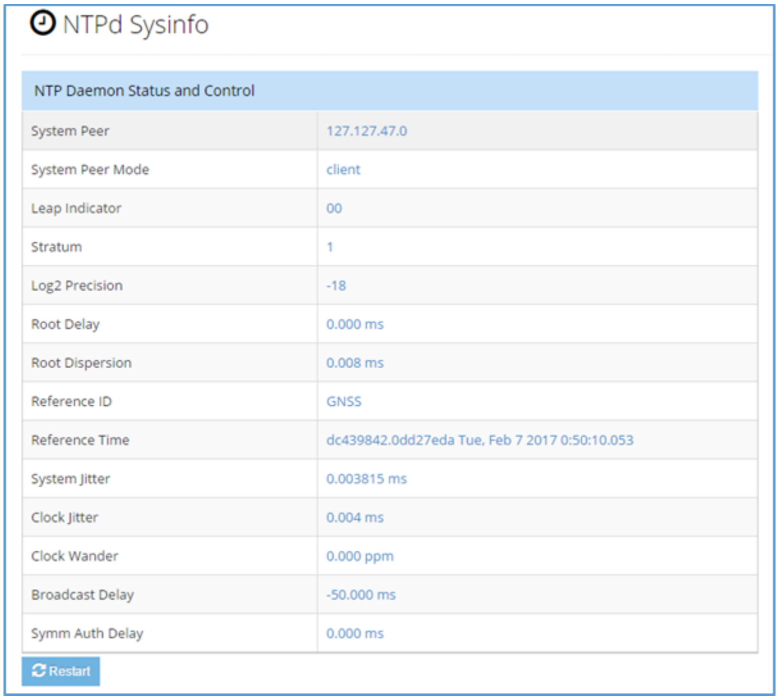
Previous sections have covered Creating a Network Timing Service and Using a Network Timing Service. This section discusses how to observe the status of a timing service. To start with, keep in mind that a network timing service (defined on Figure 6-15) is only actually in use when it is mapped to a physical network port, accomplished on Figure 6-19. Hence the set of services that will have status are those that have been mapped to a LAN port.

There are two areas on the web interface where timing service status can be observed. For NTPd:

1. Network Timing > Sysinfo provides complete status, showing standard NTP parameter values. The example below shows a typical status when the hardware

clock is GNSS. This status is applicable to all LAN ports that are mapped to NTPd.

Figure 6-27. NTPd status example

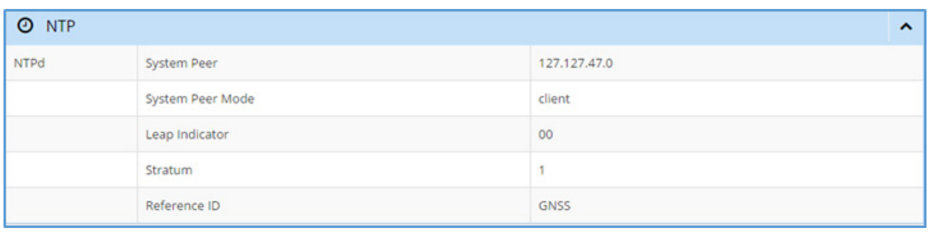


NTPd Sysinfo

NTP Daemon Status and Control	
System Peer	127.127.47.0
System Peer Mode	client
Leap Indicator	00
Stratum	1
Log2 Precision	-18
Root Delay	0.000 ms
Root Dispersion	0.008 ms
Reference ID	GNSS
Reference Time	dc439842.0dd27eda Tue, Feb 7 2017 0:50:10.053
System Jitter	0.003815 ms
Clock Jitter	0.004 ms
Clock Wander	0.000 ppm
Broadcast Delay	-50.000 ms
Symm Auth Delay	0.000 ms

Restart

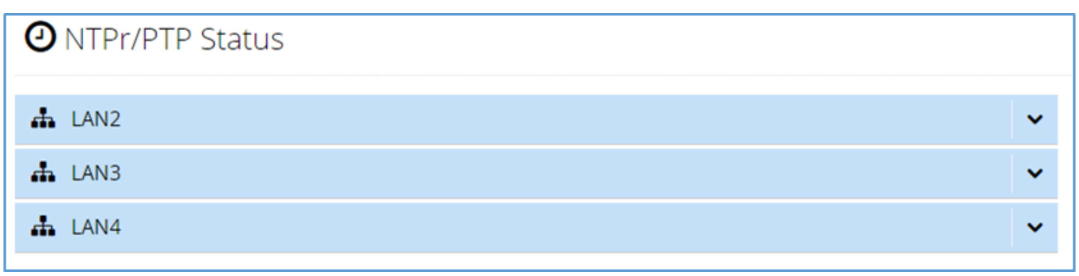
2. A summarized status is also available on Dashboard > NTP.



NTP

NTPd	System Peer	127.127.47.0
	System Peer Mode	client
	Leap Indicator	00
	Stratum	1
	Reference ID	GNSS

All other timing services status appears at Network Timing'NTPr/PTP Status, which provides the ability to first select the LAN to which a given service is mapped (mapping accomplished on Figure 6-23). In release 2.0 due to the rules described in Table 6-15, only one of the LANs will contain status. This form prepares for expanded capability.



Using the setup from Figure 6-23 where we have mapped a PTP Master onto LAN4, select LAN4 to observe its status. As can be seen in Figure 6-28 the specific service in use is identified (fully configured on Figure 6-18) along with general status, including details about content being transmitted in the PTP Announce messages.

A reduced set of status can be seen at Dashboard > Timing Services Status as shown in Figure 6-29.

When the mapped service is NTPr, the status provided is similar to what is seen for NTPd (see Figure 6-27). Using the example from Figure 6-26, where an NTPr service is mapped to LAN2, the status examples are shown in Figure 6-30 and Figure 6-31.

Figure 6-28. Example status on Network Timing > NTPr/PTP Status form (PTP Master)

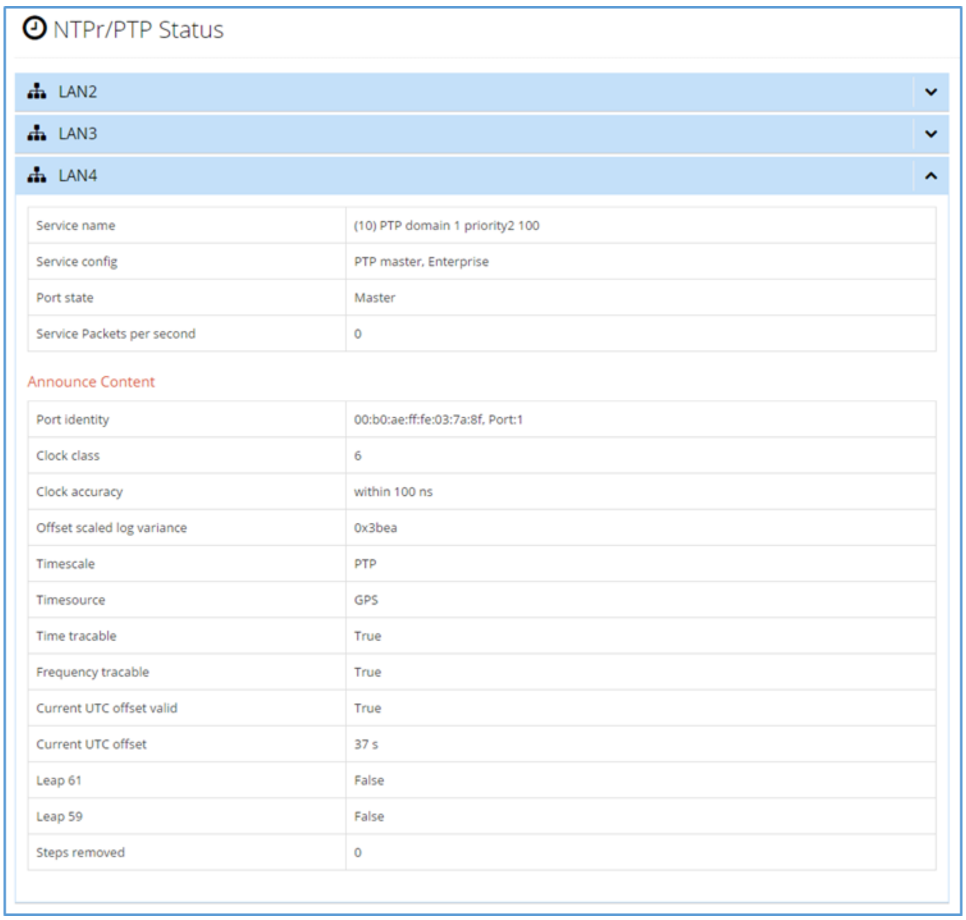


Figure 6-29. Timing Service Status on Dashboard > Timing Services Status (PTP Master)

Timing Services Status

Attached to	LAN4
Service	PTP master, Enterprise
Port identity	00:b0:ae:ff:fe:03:7a:8f, Port:1
Clock class	6
Clock accuracy	within 100 ns
Rx Packets/second	0

Figure 6-30. Example status on Network Timing'NTPr/PTP Status form (NTPr)

NTPr/PTP Status

LAN2

LAN3

Service	NTP Reflector
Leap Indicator	00
Stratum	1
Log2 Precision	-23
Root Delay	0.000 ms
Root Dispersion	0.000 ms
Reference ID	GNSS
Reference Time	dc447c81.f00eb293 Tue, Feb 7 2017 17:04:01.937
System Jitter	0.003815 ms
Clock Jitter	0.004 ms
Clock Wander	0.000 ppm
Broadcast Delay	-50.000 ms
Symm Auth Delay	0.000 ms
Rx Packets/second	0

LAN4

Figure 6-31. Timing Service Status on Dashboard'Timing Services Status (NTPr)

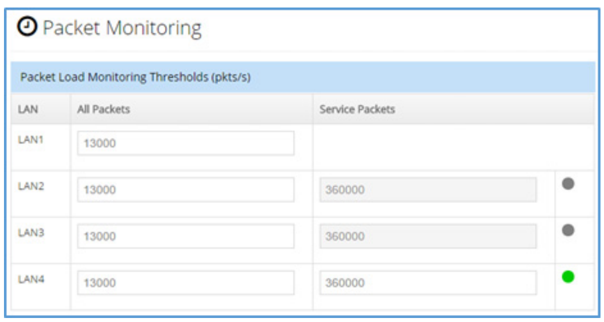
Timing Services Status

Attached to	LAN3
Service	NTP Reflector
Leap Indicator	00
Stratum	1
Reference ID	GNSS
Rx Packets/second	0

Monitoring Network Packets

The S6x0 provides capability to monitor and limit incoming packets on each of its LAN ports. The capability is covered in Security - Packet Monitoring. The relationship between the packet thresholds configured there and the mapped network timing services is as follows:

- For any LAN that has NTPd mapped (LAN1, 2, and 3 in Figure 6-24) those incoming timing service packets are only included in the All Packets column thresholds (not Service Packets column).
- For any LAN that has PTP Master or NTPr mapped (LAN4 in Figure 6-24) those incoming timing service packets are only included in the Service Packets column threshold (not All Packets column). Additionally, if a LAN has one of these services mapped to it, that is only LAN where the Service Packets column threshold value will be used. If such a mapping exists, it is indicated with a green dot and the threshold value in that row is allowed to be modified. The form below shows the Packet Monitoring form when the mapping is from example in Figure 6-24. The green dot is lit for LAN4 because NTPr is mapped to LAN4.



Provisioning the PTP Server Output

Table 6-16. Configure New PTP Server Output

Method	Steps	Notes
Web Interface	Network Timing > NTPr/PTP Config 1. Use the Service dropdown box to select PTP master in the “Add New” row at the bottom of the window. 2. Use the Profile dropdown box to select the desired profile in the “Add New” row. 3. Click the blue Configure icon in the “Add New” row. The Configurable Parameters widow will open. 4. Change the parameter settings to the desired values. Click OK. 5. Click the green +Add button	
	Network Timing > NTP/PTP Mapping 1. Use the NTPr/PTP Service Name dropdown box to select the PTP service name for the desired port. 2. Click the Apply button.	Map PTP master to the desired LAN port.
CLI	n/a	n/a
Front Panel	n/a	n/a

Table 6-17. Editing Existing PTP Server Output

Method	Steps	Notes
Web Interface	Network Timing > NTPr/PTP Config 1. Use the Service dropdown box to select PTP master in the desired row. 2. Click the blue Configure icon in the Configure column of that row. 3. Change the parameter settings to the desired values. Click OK. 4. Click the Apply button.	
	Network Timing > NTP/PTP Mapping 1. Use the NTPr/PTP Service Name dropdown box to select the PTP service name for the desired port. 2. Click the Apply button.	Map PTP master to the desired LAN port.
CLI	n/a	n/a
Front Panel	n/a	n/a

The SyncServer only support TAI timescale. The ARB timescale is not used.

Per the enterprise profile specification, the PTP output will not be enabled until the UTC offset is known. This must be manually entered on the Timing - Input Control Window page if the system has not obtained this information from the reference. For example, the UTC offset must be manually entered for IRIG references.

Provisioning the Serial Timing Output

The serial timing outputs (on port labeled "DATA/TIMING") can be configured for NMEA, NENA, or serial legacy output format.

Table 6-18. Configure Serial Timing Output

Method	Steps	Notes
Web Interface	Timing > Serial 1. Select the NMEA radio button. 2. Click the check box or combination of check boxes for the desired type(s) of NMEA output format: - NMEA - 0183 ZDA Output - NMEA - 0183 GGA output - NMEA - 0183 GSV output - NMEA - 0183 RMC output 3. Click the **Apply** button.	Select NMEA output format. See Table 6-20 below for details about NMEA output formats.
	Timing > Serial 1. Select the NENA radio button. 2. Click the check box for the desired type of NENA output format. - DDD HH:MM:SS DTZ=XX - WWW DDMMMYY HH:MM:SS - YYYY DDD HH:MM:SS DZZ 3. Click the **Apply** button.	Select NENA output format. NENA ASCII time code is sent in **broadcast mode**, in which the code is sent once per second at the beginning of the second (Data/timing serial port).
	Timing > Serial 1. Select the Legacy Serial Output radio button. 2. Click the **Apply** button.	F8 - Continuous Time Once-per-Second DDD:HH:MM:SSQ Note: F9 - Time On Request DDD:HH:MM:SS.mmmQ (direct request to Console port)
	Timing > Serial 1. Click the **Off** radio button at the top of the dialog box. 2. Click the **Apply** button.	Turn Serial Timing Output off.
CLI	n/a	n/a
Front Panel	n/a	n/a

Table 6-19. NMEA183 Output Format Details

Format	Description
ZDA	All fields are updated except for timezone fields, which are always 00. $GP, $GL, and $GB are used to indicate GPS, Glonass and Beidou respectively. Example: `*$GPZDA,235626,29,11,2016,00,00*40`
GGA	All fields are updated except for the 2 DGPS fields, which are NULLed. $GP, $GL, and $GB are used to indicate GPS, Glonass and Beidou respectively. Example: `$GPGGA,235626,3724.7719,N,12156.8643,W,1,14,0.8,14.3,M,-29.8,M,,*41`

GSV	All fields are updated.
	$GP, $GL, and $GB are used to indicate GPS, Glonass and Beidou respectively.
	Example:
	`$GPGSV,4,1,23,1,46,231,45,3,58,319,46,4,165,0,0,9,2,265,0*74`
	`$GPGSV,4,2,23,11,21,219,38,14,35,58,43,16,9,151,39,22,77,321,47*77`
	`$GPGSV,4,3,23,23,35,277,47,25,7,39,33,26,24,125,50,31,52,54,43*41`
	`$GPGSV,4,4,23,32,10,72,36*78`
	`$GLGSV,3,1,23,2,20,99,23,3,58,46,49,4,35,322,44,12,21,31,0*55`
	`$GLGSV,3,2,23,13,63,78,46,14,38,174,41,15,2,192,35,18,5,228,43*5F`
	`$GLGSV,3,3,23,19,19,277,48,20,10,330,32*68`

RMC	All fields are updated except for speed and course, the 2 magnetic variation field, which are all NULLed. $GP, $GL, and $GB are used to indicate GPS, Glonass and Beidou respectively. Example: `$GPRMC,235626,V,3724.7719,N,12156.8643,W,,,291116,,,A*7D`

Provisioning Outputs on Timing I/O Module

The standard configuration offers a broad yet fixed selection of signal I/O. J1 is dedicated to time code and rate inputs, J2 to sine wave inputs, and J3-J8 to mixed signal outputs. See Table 1-1 for the standard Timing I/O Module configuration.

The FlexPort™ Technology option enables the 6 output BNCs (J3-J8) to output any supported signal (time codes, sine waves, programmable rates, etc.) on all configurable ports via the secure web interface.

Note: The SyncServer S6x0 uses IRIG 1344 version C37.118.1-2011. Control bits 14 - 19 will always be zero, and the encoded IRIG time will be UTC (if using an input 1344 IRIG as the reference the 2011 rules are applied to get that value). Hence, any code receiving S6x0 IRIG 1344 output should work regardless of which version they are decoding (since there is nothing to add or subtract).

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Table 6-20. Configure IRIG and Other Outputs on Timing I/O Module

Method	Steps	Notes
Web Interface	Option Slot A > Timing I/O Card 1. For desired output J3-J8, use dropdown box to select the general signal output type of “Pulse”, “Timecode” “Sine” or Off. 2. For TimeCode, use the dropdown box to select the type of IRIG: 3. For Pulse, use the dropdown box to select Fixed Rate or Programmable Period. 4. For Pulse, use the dropdown box to select the rate or period. 5. For Sine, use the dropdown box to select the frequency, 1M, 5M or 10M. 6. Enter phase offset value (for fixed-rate pulses or timecode outputs) It has a range of -0.5 to 0.5 s. 7. Click the **Apply** button.	Timecode Choices: - A004 (DCLS, YR, CF, SBS) - A134 (10Khz, YR, CF, SBS) - B000 (DCLS, CF, SBS) - B001 (DCLS, CF) - B002 (DCLS) - B003 (DCLS, SBS) - B004 (DCLS, YR, CF, SBS) - B005 (DCLS, YR, CF) - B006 (DCLS, YR) - B007 (DCLS, YR, SBS) - B120 (1kHZ, CF, SBS) - B121 (1kHZ, CF) - B122 (1kHZ) - B123 (1kHZ, SBS) - B124 (1kHZ, YR, CF, SBS) - B125 (1kHZ, YR, CF) - B126 (1kHZ, YR) - B127 (1kHZ, YR, SBS) - B1344 (DCLS) - B1344 (1kHZ) - E115 (100Hz, YR, CF) - E125 (1KHz, YR, CF) - G005 (DCLS, YR, CF) - G145 (100kHz, YR, CF) - C37.118.1 - NASA 36 (DCLS) - NASA 36 (1kHz) - XR3 (250Hz) - 2137 (1kHz) - 2137 (DCLS)
CLI	n/a	n/a
Front Panel	n/a	n/a

Provisioning Alarms

This section describes the controls used to provision and manage alarms in the SyncServer S6x0. For a list of all alarms, see Appendix A, System Messages.

The Web GUI allows you to perform the following:

- Provision the severity level
- Show current alarm settings
- Show current alarms
- Display alarm status

Alarms are also indicated by an LED on the front panel.

Table 6-21. Configuring Alarm Settings

Method	Steps	Notes
Web Interface	Admin > Alarms **Configure Alarm** 1. Enter the "Auto ACK" value (Auto Acknowledgement) for the alarm. 2. Use the drop-down box for "Severity" to set the alarm to "Major", "Minor", or "Notify". 3. Enter the "Reporting Delay" value (in seconds) for the alarm. 4. Use the check box for "Send Trap" to enable/disable an SNMP trap for the alarm. 5. Use the check box for "Write Log" to enable/disable recording in the log when the alarm is triggered. 6. Use the check box for "Send Email" to enable/disable email notification for the alarm. 7. Click the **Apply** button. **Clear Alarm** 1. Use the check box for "Clear Now" for the alarm to be cleared. 2. Click the **Apply** button.	Auto-Acknowledge has the has same effect as a manual "Clear Now" (described below). It just does it automatically after the specified number of seconds. Setting this value to zero causes Auto-Acknowledge to be disabled. Information about Transient events is shown indicating that they are not configurable This causes some of the alarm report mechanisms to extinguish that particular alarm indication. These include Dashboard > Alarms, Alarm summary at top of Web GUI, Physical alarm connector, front panel Alarm LED, and Alarm information on front-panel display.This is just an acknowledgement of the alarm, but of course has no ability to impact the underlying condition.
CLI	n/a	
Front Panel	n/a	

Saving and Restoring Provisioning Data

Backing up Provisioning Data

Table 6-22. Backing Up Provisioning Data

Method	Steps	Notes
Web Interface	Admin > Config Backup/Restore/Reset 1. Enter a password for Backup and Restore. 2. Use the radio button to select “Backup”. 3. Click the “Save As” button. Enter the desired file name and navigate to the desired location to store the file. 4. Click the **Apply** button.	
CLI	n/a	
Front Panel	n/a	

Restoring Provisioning Data

Table 6-23. Backing Up Provisioning Data

Method	Steps	Notes
Web Interface	Admin > Config Backup/Restore/Reset 1. Enter a password for Backup and Restore. 1. Use the radio button to select “Restore”. 2. Navigate to the location of the backup file and select it. 3. Click the **Apply** button.	Password for Backup and Restore should be the same.
CLI	n/a	
Front Panel	n/a	

Provisioning for SNMP

The Simple Network Management Protocol (SNMP) is an application layer protocol that allows you to manage network devices. SNMP is based on a client-server query-response mode that requires an Ethernet connection. A manager application (software installed on a computer) is the client generating the queries, and an agent (software on the SyncServer S6x0) is the server generating responses. The SyncServer S6x0 SNMP supports traps and the MIB-II system MIB.

SyncServer S6x0 supports SNMPv2c and SNMPv3. SNMPv3 provides additional security features not available in SNMPv2c. In addition to the functions of SNMPv2c, SNMPv3 allows user and trapuser levels that are based on authentication and privacy settings. The authentication algorithm is either HMAC-SHA-1-96 or MD5, with a 20-character key. The privacy settings are based on the AES128 encryption standard.

Port 161 is the port of standard SNMP interactive communications and port 162 is the trap port.

SNMP functionality is provisioned on the SyncServer S6x0 using the web interface.

Each alarm trap OID from the SyncServer S6x0 represents a unique alarm.

Each container contains the following sub-info in its own OID:

- Alarm/Event ID
- Date&Time
- Severity
- Alarm/Event Description
- Index
- Alarm Action
- Sequence Number

The alarm OIDs are under 1.3.6.1.4.1.9070.1.2.5.7.4.1.

The Alarm/Event ID element should be used to determine which alarm or event was generated. Alarm and Event IDs are listed in Appendix A, System Messages.

Note: The SNMP MIB can be downloaded from the SyncServer S6x0 on the Help web page. The LAST-UPDATED and REVISION fields in the MIB can be used to determine the revision of the MIB. The S650ALARM MIB description will also list which firmware the MIB was made for. Older versions of the S650ALARM MIB will be compatible with newer versions of firmware, but will not support newer features.

Provisioning to Generate v2 Traps

Use the `set snmp trapversion` command to provision the trap version to v2.

By default, the SyncServer S6x0 will generate v2 traps.

Table 6-24. Provisioning to Generate v2 Traps

Method	Steps	Notes
Web Interface	Network > SNMP Traps 1. Enter IP address for SNMP manager 2. Select SNMPv2c 3. Enter community name 4. Click “Save"	
CLI	n/a	
Front Panel	n/a	

Provisioning to Generate v3 Traps

Table 6-25. Provisioning to Generate v3 Traps

Method	Steps	Notes
Web Interface	Network > SNMP Traps 1. Enter IP address of SNMP manager 2. Select SNMPv3 3. Enter SNMPv3 user name 4. Enter auth password 5. Select MD5 or SHA for auth 6. Enter privacy phrase 7. Click "Save"	For SNMPv3 traps, both a user and a trapuser need to be configured identically, depending on the SNMP trap manager. In addition, the SNMP manager should use the specified user/trapuser to connect to the SyncServer S6x0. This will ensure that a SNMPv3 trap will be successfully received by the manager using the corresponding trapuser username.
CLI	n/a	
Front Panel	n/a	

Updating v2 Communities

Table 6-26. Adding / Removing v2 Communities

Method	Steps	Notes
Web Interface	Network > SNMP 1. Update user / community names 2. Click "Save"	All character except (<), (&), (>), ("), (') are accepted for SNMPv2 community names.
CLI	n/a	
Front Panel	n/a	

Adding and Removing SNMP v3 Users

SNMPv3 provides additional security features not available in SNMPv2c. In addition to the functions of SNMPv2c, SNMPv3 allows user and trapuser levels that are based on authentication and privacy settings. The authentication algorithm is either HMAC-SHA-1-96 or MD5, with a key of up to 32 characters in length. The privacy settings are based on the AES encryption standard, with a key of up to 32 characters in length. All keys are uppercase.

Table 6-27. Adding/Removing SNMP v3 Trap Users

Method	Steps	Notes
Web Interface	Network > SNMP 1. Enter user name 2. Enter privacy phrase if required 3. Enter authentication phrase 4. Select authentication or "authentication & privacy" 5. Select MD5 or SHA 6. Click "Save"	
CLI	n/a	
Front Panel	n/a	

Note: All character except (<), (&), (>), ("), (') are accepted for SNMP usernames, authentication or privacy keys.

Provisioning HTTPS Certificate

NEEDS INFO

Table 6-28. Provisioning a Self Signed HTTPS Certificate

Method	Steps	Notes
Web Interface	Security > HTTPS > Self Signed Certificate 1. Use the dropdown box to select the RSA Key bit. 2. Enter the Common Name. 3. Enter the Days to Expiration. 4. Enter the ISO Country Code. 5. Enter the State. 6. Enter the Locality. 7. Enter the Organization name. 8. Enter the Organizational Unit. 9. Enter the Email Address. 10. Click "Apply"	
CLI	n/a	
Front Panel	n/a	

Chapter 7 Maintenance, Troubleshooting & Part Numbers

This chapter describes maintenance and troubleshooting procedures for the SyncServer S6x0.

In This Chapter

Preventive Maintenance

The SyncServer S6x0 requires minimal preventive maintenance. Ensure the unit is not exposed to hazards such as direct sunlight, open windows, water, or extreme heat. See Environmental Requirements, on page 44, for electromagnetic compatibility conditions that may cause damage.

Caution: To avoid electromagnetic discharge damage to the circuitry, never attempt to vacuum the SyncServer S6x0.

Table 7-1 lists preventive maintenance measures to be performed periodically. Do not disassemble components just for the purpose of inspection.

Table 7-1. Preventive Maintenance

Item	Inspection	Corrective Action	Interval
Chassis	Inspect for dirt or foreign material	Clean the exterior of chassis with a soft dry cloth	Periodically
Cables	Inspect for pinched, worn or damaged cable	Replace pinched, worn or damaged cable at the first opportunity	Periodically
Connectors	Inspect for loose or damaged connector	Tighten loose connectors. If damaged, replace the connector and/or cable at the first opportunity	Periodically

Safety Considerations

Follow your company's safety guidelines and policies when working on or around live equipment.

ESD Considerations

Maintenance personnel should wear ESD wrist straps when installing or working on all SyncServer S6x0 equipment. Plug the user-supplied wrist strap into the SyncServer S6x0.

Troubleshooting

LEDs, and System Messages can all be very helpful in troubleshooting the SyncServer S6x0. Use the Alarms page of the Web GUI to view system messages or use SNMP trap messages.

Note: The SyncServer S6x0 incorporates a system reboot function (watchdog) if any of the system's software become unresponsive. If the system's software is unresponsive for 15 minutes, then the watchdog timer will report an event in the event log (add the actual event here), and the system will reboot.

Diagnosing the SyncServer S6x0 – Reading LED Conditions

Table 7-2 shows the function of the LED indicators on the front panel of the unit.

Table 7-2. LED Conditions

Indicator	Label	Description	Corrective Action
Clock Status	SYNC	Green - Time or Frequency clock in Normal or Bridging state	n/a
		Amber - Time or Frequency clock in Freerun or Holdover state	Use the Web GUI to view alarm IDs and descriptions, Admin > Alarms, or expand the “Alarm(s)” tab to see a summary of active alarms. See Table A-1 in Appendix A, System Messages for corrective actions.

Table 7-2. LED Conditions (Continued)

Indicator	Label	Description	Corrective Action
Alarm/fault indicator	NETWO RK	Green - All configured ports are up	n/a
		Amber - Some configured ports are down (LAN2 to LAN4)	Use the Web GUI to view the configuration and status of ports, Network > Ethernet or expand the “Network” tab to see the configuration of each port. See Table A-1 in Appendix A, System Messages for corrective actions.
		Red - Management port (LAN1) is not configured or is down	Use the Web GUI to view the configuration and status of ports, Network > Ethernet or expand the “Network” tab to see the configuration of each port. See Table A-1 in Appendix A, System Messages for corrective actions.

Table 7-2. LED Conditions (Continued)

Indicator	Label	Description	Corrective Action
Ethernet RJ45 Port LEDs link/activity indicator	1 2 3 4	Left LED Amber - 100BT link Left LED Green - 1000BT link Right LED Green blinking - Activity	n/a
		Left LED Off - No link Right LED Off - No link	Use the Web GUI to view alarm IDs and descriptions, Admin > Alarms , or expand the “Alarm(s)” tab on the Dashboard to see a summary of active alarms. ■ Check the cable connections. ■ Verify that interface is enabled by using Web GUI page: Network > Ethernet. ■ Check that either Ethernet Auto Negotiation is enabled or that speed has been set to a compatible level with the connecting network element by using Web GUI page: Network > Ethernet. ■ Make sure that only full-duplex network devices are used. The SyncServer S6x0 does not support half-duplex devices, such as hubs, for NTP connections.

Repairing the SyncServer S6x0

The SyncServer S6x0 cannot be repaired in the field.

There are no field-serviceable fuses in the TimeProvider 2700. If a fuse blows in a TimeProvider 2700, the unit must be returned to the factory for repair.

Upgrading the Firmware

You can upgrade the firmware using the SyncServer S6x0's web interface and software available from Microsemi. When the SyncServer S6x0 is in the firmware download mode, it prevents all other sessions from making changes to the configuration. During the upgrade process, no new sessions are allowed. Refer to SyncServer S6x0 Upgrade below for details on the upgrade process. For releases after 1.1, if the upgrade process is used to load a previous (older) version of the software, then the unit will reset the configuration to factory default values.

The current firmware version can be found in the Dashboard > About window.

Upon receipt of any new/repaired equipment, perform the relevant software upgrade procedure below prior to putting the shelf into service.

Caution: To avoid a possible service call, do not issue a command to the SyncServer S6x0 during an upgrade and do not remove power from the SyncServer S6x0 during an upgrade. Doing so could corrupt the flash memory, disabling the SyncServer S6x0.

SyncServer S6x0 Upgrade

The upgrade process is simple, but there will be Loss of Service (LOS) at reboot. The upgrade will take approximately 7 minutes to complete. The upgrade process requires an authorization file in order to proceed. This file verifies that this SyncServer unit is authorized to upgrade the selected upgrade file.

The SyncServer 6x0 does not contain a battery-backed real time clock. Therefore, it will always boot up with a default value for the system time. This time will be updated when it obtains time from a time reference such as GNSS, IRIG, or NTP. The default value for the date is the software build date. This date will be used for the first log entries when booting up the unit. The time will change to local time during the boot-up process if a time zone has been configured.

Table 7-3. Upgrading Firmware

Method	Steps	Notes
Web Interface	Admin > Upgrade 1. Navigate to the location of the authorization file and select it. 2. Navigate to the location of the upgrade file and select it. 3. Click the **Install** button.	
CLI	n/a	n/a
Front Panel	n/a	n/a

Note: If "upgrading" from revision 2.0 or higher to releases 1.0 or 1.1, then the system will set configuration to factory default values.

Note: Configuration changes made after the upgrade but before the reboot will not be available after the reboot.

Note: If the all-packets limit on LAN1 has been reduced on the Security > Packet Monitoring page, then it is recommended that the limit be temporarily increased back to the default value of 13000 packets/second. Otherwise, the file upload will be very slow and may timeout.

SyncServer S6x0 Part Numbers

The following sections provide part numbers for the system, accessories, and GNSS antenna kits.

System and Accessory Part Numbers

This section provides part numbers and descriptions for the system and accessories available for the SyncServer S6x0. See Table 7-4 for Quickship part numbers. See Table 7-5 for S600 Build to Order part numbers. See Table 7-6 for S600 Build to Order part numbers. See Table 7-7 for accessories.

Table 7-4. SyncServer S6x0 Quickship Part Numbers

Item	Part Number
S600 Quickship Models	
SyncServer S600	090-15200-601
SyncServer S600 + OCXO	090-15200-602
SyncServer S600 + Rubidium	090-15200-603
S650 Quickship Models	
SyncServer S650+Timing I/O Module	090-15200-651
SyncServer S650+Timing I/O Module + Rubidium	090-15200-652
S650i Quickship Models	
SyncServer S650i+Timing I/O Module	090-15200-653
Quickship Options	
Security Protocols License Option	920-15201-002
Flex Timing Option for Timing I/O Module	920-15201-009
GNSS Antenna Option	920-15201-001
PTP Output Option	920-15201-003

Note: The GNSS Antenna option is NOT available with the S650i.

Table 7-5. SyncServer S600 Build to Order Part Numbers

Item	Part Number
S600 Build to Order	
SyncServer S600 Base Config, NO Power Supply	090-15200-600
S600 Power Supplies	
Single Power Supply	090-15201-001
Dual Power Supplies	090-15201-002

Table 7-5. SyncServer S600 Build to Order Part Numbers (Continued)

Item	Part Number
S600 Oscillator Upgrades	
SyncServer OCXO Upgrade	090-15201-003
SyncServer Rubidium Upgrade	090-15201-004
S600 Software Enabled Options	
Security Protocols License Option	920-15201-102

Table 7-6. SyncServer S650 Build to Order Part Numbers

Item	Part Number
S650 Build to Order	
SyncServer S650 Base Config, NO Power Supply	090-15200-650
S650 Power Supplies	
Single Power Supply	090-15201-001
Dual Power Supplies	090-15201-002
S650 Oscillator Upgrades	
SyncServer OCXO Upgrade	090-15201-003
SyncServer Rubidium Upgrade	090-15201-004
S650 Modules / Hardware	
SyncServer Timing I/O Module	090-15201-006
S650 Software Enabled Options	
Security Protocols License Option	920-15201-102
Flex Timing Option for Timing I/O Module	920-15201-109
PTP License Option	920-15201-103
GLONASS/BEIDOU Antenna Option	920-15201-101

GNSS Antenna Kits

Antenna cables and accessories enable versatile solutions that are easy to achieve. Inline GNSS amplifiers installed at the antenna are an easy way to extend cable runs from 225 feet to up to 900 feet, depending on cable type. Lightning arrestors provide valuable electrical protection to the SyncServer. Antenna cable splitters leverage a single antenna and cable for up to four GNSS receivers.

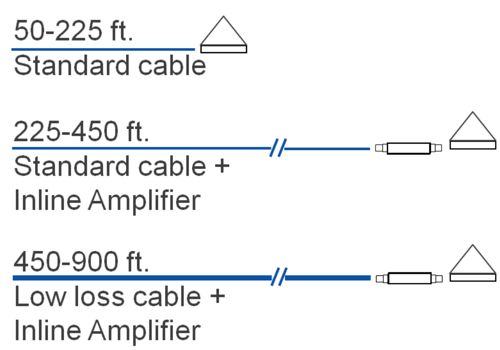
Ordering antenna components is a simple task. The most important thing the user needs to have is a rough idea of the total cable length needed between the SyncServer and the mounting location of the antenna. Any extra cable can be coiled to the side.

Preconfigured kits that include cable, antenna, and related mounting accessories are available, as shown in Table 7-7. These kits vary by total cable length, and based on whether a lightning arrestor is required or not. For long cable runs (>225 ft.), the components are assembled individually. See Figure 7-1.

To assist and simplify configuration, Microsemi has an Excel-based antenna configurator that helps the user determine the exact part numbers they need for the desired cable length and accessories. See Microsemi's website for the configurator:

http://www.microsemi.com/products/timing-synchronization-systems/time-frequency-distribution/network-appliances-servers/syncserver/syncserver-s650#documents.

Figure 7-1. Antenna Kits for Long Cable Runs



The antenna kit (part number 093-15202-001) includes a short SyncServer adapter cable (part number 060-00039-000) with BNC(m)-N(f) connectors. All primary antenna cables use N(m) connectors on either end. A single cable must be used between the adapter cable and the next accessory (lightning arrestor, inline amplifier, or antenna). Lightning arrestors include a 25 ft. cable to connect to the next accessory (inline amplifier or antenna).

Note: Lightning Arrest Kit includes 25 ft. cable. Total length includes the additional cable that is part of the Lightning Arrestor if selected.

Note: To receive GLONASS or BeiDou signals, the antenna system should be made of GLONASS and/or BeiDou compatible components.

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Table 7-7. GNSS Antenna Kits & Accessories

Antenna Kit	Part Number
Kit: Total length: 50 ft, Cable: 50 ft; antenna kit (093-15202-001)	990-15202-050
Kit: Total length: 75 ft, Cable: 50 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-075
Kit: Total length: 100 ft, Cable: 100 ft; antenna kit (093-15202-001)	990-15202-100
Kit: Total length: 125 ft, Cable: 100 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-125
Kit: Total length: 150 ft, Cable: 150 ft; antenna kit (093-15202-001)	990-15202-150
Kit: Total length: 175 ft, Cable: 150 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-175

Table 7-7. GNSS Antenna Kits & Accessories

Antenna Kit	Part Number
Kit: Total length: 200 ft, Cable: 200 ft; antenna kit (093-15202-001)	990-15202-200
Kit: Total length: 225 ft, Cable: 200 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-225
250 ft. Antenna Cable	060-15202-250
350 ft. Antenna Cable	060-15202-350
450 ft. Antenna Cable	060-15202-450
500 ft. Low Loss Antenna Cable	060-15202-500
750 ft. Low Loss Antenna Cable	060-15202-750
900 ft. Low Loss Antenna Cable	060-15202-900
Kit: ■ GPS/GLONASS Antenna (112-00079-000) ■ Mounting Bracket (193-00044-000) ■ Adapter cable for chassis (060-15202-004)	093-15202-001
Kit: Lightning Arrestor (112-43400-00-3) with 25 ft. cable	093-15202-002
Kit: Lightning Arrestor (112-43400-00-3) with 25 ft. low loss cable	093-15202-003
Kit: 1:4 GPS Only Splitter (58536A) With Two (2) x 3 ft. cables	093-15202-004
Inline Amplifier (112-15202-001) with adapter	093-15202-005
Kit: ■ GPS/GLONASS/BeiDou Antenna (112-15202-003) ■ Mounting Bracket (193-00044-000) ■ Adapter cable for chassis (060-15202-004)	093-15202-006
Kit: GPS/GLONASS/BeiDou 1:4 splitter with Two (2) x 3 ft. cables	093-15202-007

Note: The required antenna is TALLYSMAN 32-3372-14-01, 40dB GNSS Antenna, N connector. Standard cable is LMR-240 or equivalent. Low loss cable is LMR-400 or equivalent.

Returning the SyncServer S6x0

You should return the equipment to Microsemi only after you have exhausted the troubleshooting procedures described earlier in this chapter, or if Microsemi FTD Services and Support has advised you to return the unit.

Note: Please retain the original packaging for re-shipping the product. If the original packaging is not available, contact Microsemi FTD Services and Support for assistance.

Repacking the Unit

Return all units in the original packaging. If the original packaging is not available, contact Microsemi FTD Services and Support. Use standard packing procedures for products being returned for repair to protect the equipment during shipment. Connectors should be protected with connector covers or the equipment should be wrapped in plastic before packaging. Ensure that the display and connectivity panels are protected when packaged.

Equipment Return Procedure

To return equipment to Microsemi for repair:

1. Call Microsemi FTD Services and Support at 888-367-7966 (toll-free in USA only), 408-428-7907, or +49 700 3288 6435 in Europe, Middle East, or Africa to obtain a return material authorization number (RMA) before returning the product for service.

   You can request an RMA on the internet at
   www.microsemi.com/ftdsupport

   Retain the assigned RMA number for future reference.

2. Provide a description of the problem, product item number, serial number, and warranty expiration date.

3. Provide the return shipping information (customer field contact, address, telephone number, and so forth.)

4. Ship the product to Microsemi, transportation prepaid and insured, with the Return Material Authorization (RMA) number and item numbers or part numbers clearly marked on the outside of the container to the address given with the RMA.

   Repaired equipment is returned to you with shipping costs prepaid by Microsemi.

User's Guide Updates

When this manual is updated the updated version will be available for downloading from Microsemi's internet web site. Manuals are provided in PDF format for ease of use. After downloading, you can view the manual on a computer or print it using Adobe Acrobat Reader.

Manual updates are available at:

www.microsemi.com/ftdsupport

Note: If you are downloading a product manual for the first time, you will need to register with Microsemi for a username and password. If you are currently registered, login and download the manual update.

Contacting Technical Support

To order any accessory, contact the Microsemi Sales Department. See www.microsemi.com/sales-contacts/0 for sales support contact information. If you encounter any difficulties installing or using the product, contact Microsemi Frequency and Time Division (FTD) Services and Support:

U.S.A. Call Center:
including Americas, Asia and Pacific Rim
Frequency and Time Division (FTD)
3870 N 1st St.
San Jose, CA 95134

Toll-free in North America: 1-888-367-7966
Telephone: 408-428-7907
Fax: 408-428-7998
email: ftd.support@microsemi.com
Internet: www.microsemi.com/ftdsupport

Europe, Middle East, and Africa (EMEA)
Microsemi FTD Services and Support EMEA
Altlaufstrasse 42
85635 Hoehenkirchen-Siegertsbrunn
Germany

Telephone: +49 700 3288 6435
Fax: +49 8102 8961 533

E-mail: ftd.emeasupport@microsemi.com
ftd.emea_sales@microsemi.com

Appendix A System Messages

This section provides information about the system messages that are displayed in response to a provisioning event or to an alarm that occurs when an associated threshold or timer is outside of the provisioned setting.

In This Appendix

Message Provisioning

The SyncServer S6x0 supports logging of events using syslog defined facility and severity codes and system defined facility codes as follows:

Facility codes

4 Security/authorization messages

20 SyncServer S6x0 Messages (events and alarms)

21 SyncServer S6x0 Command History

22 SyncServer S6x0 Messages (events and alarms)

Severity codes

2 (critical) Critical: critical conditions

3 (major) Error: error conditions

4 (minor) Warning: warning conditions

5 (event) Notice: normal but significant condition

6 Info: Informational

Notes: Severity codes 2, 3, and 4, are also indicated by the Alarm LED(s) on the front panel.

The syslog message format is as follows:

```
Mmm dd  hh:mm:ss
host_name Process-name AlarmID,Index,Severity, MsgText
```

Where:

- Mmm = Month; dd = date; hh:mm:ss = system time
- host_name = hostname
- process-name = alarmd
- AlarmID = 000 thru Max_AlarmID
- Index = 0 thru 155

- Severity = Notify | Minor | Major | Critical (defined by severity code)
- MsgText = (see tables)

System Notification Messages

Table A-1 provides a list of system notification messages. These messages are logged and sent to a remote syslog server if configured. These messages can also be sent via email . Alarms can also generate an SNMP trap.

Notes: Transitory Events represent transitions that have no "Set and Clear" behavior, such as when the first lock occurs after power-up (see "first normal-track since powerup" alarm).

Table A-1. System Notification Messages

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Enter/exit time/freq warmup	1	Minor	No	Entered time/frequency warm-up state	No action required
				Transitioned out of time/frequency warm-up state	No action required
Enter/exit time/freq freerun	2	Minor	No	Entered time/frequency free-run state	No action required
				Transitioned out of time/frequency free-run state	No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Enter/exit time/freq fast-track	3	Notify	No	Entered time/frequency fast-track state Transitioned out of time/frequency fast-track state	No action required No action required
Enter/exit time/freq normal	4	Notify	No	Entered time/frequency normal state Transitioned out of time/frequency normal state	No action required No action required
Enter/exit time/freq bridging	5	Notify	No	Entered time/frequency bridging state Transitioned out of time/frequency bridging state	No action required No action required
Entered time/frequency holdover	6	Minor	No	Entered time/frequency holdover state Transitioned out of holdover state	■ Check input references ■ Check configuration for correct reference selection ■ Check reference status ■ Check ref configuration for Priority values. No action required
Entered time/frequency holdover recovery	7	Minor	No	Entered time/frequency holdover recovery state Transitioned out of holdover recovery state	No action required No action required
First normal-track since power-up	9	Notify	Yes	First normal-track since Power-Up	No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Input ref poor quality	21	Minor	No	GNSS | NTP | J1A | J2A | J2A | J2B Input Poor Quality GNSS | NTP | J1A | J2A | J2A | J2B Input poor quality cleared	■ If this persists for > 1hr check input reference. ■ For GNSS check signal quality. ■ For T1/E1 check T1 or E1 status No action required
Time input selected	24	Notify	Yes	GNSS | NTP | J1A | J2A | J2A | J2B input selected as time reference	No action required
Freq input selected	25	Notify	Yes	GNSS | NTP | J1A | J2A | J2A | J2B input selected as frequency reference	No action required
GNSS Time Qualified	33	Notify	No	GNSS input time qualified Exit Input Time qualified cleared	No action required No action required
NTP Time Qualified	34	Notify	No	NTP input time qualified Exit NTP Input Time qualified cleared	No action required No action required
RESERVED	35				■
J1A Time Qualified	36	Notify	No	J1A input time qualified Exit J1A Input Time qualified cleared	No action required No action required
J1B Time Qualified	37	Notify	No	J1B input time qualified Exit J1B Input Time qualified cleared	No action required No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
GNSS Freq Qualified	40	Notify	No	GNSS input freq qualified Exit Input Freq qualified cleared	No action required No action required
NTP Freq Qualified	41	Notify	No	NTP input freq qualified Exit NTP Input Freq qualified cleared	No action required No action required
RESERVED	42				■
J1A Freq Qualified	43	Notify	No	J1A input freq qualified Exit J1A Input Freq qualified cleared	No action required No action required
J1B Freq Qualified	44	Notify	No	J1B input freq qualified Exit J1B Input Freq qualified cleared	No action required No action required
J2A Freq Qualified	45	Notify	No	J2A input freq qualified Exit J2A Input Freq qualified cleared	No action required No action required
J2B Freq Qualified	46	Notify	No	J2B input freq qualified Exit J2B Input Freq qualified cleared	No action required No action required
RESERVED	53				■
RESERVED	54				■
RESERVED	55				■
RESERVED	56				■
RESERVED	57				■
RESERVED	71				■
RESERVED	72				■
RESERVED	73				■
RESERVED	74				■
RESERVED	75				■

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
RESERVED	76				■
RESERVED	77				■
RESERVED	78				■
GNSS receiver comms failed	91	Major	No	GNSS receiver communications failed GNSS receiver communications failure cleared	■ Reboot ■ If problem persists call SGS for support. No action required
GNSS receiver not tracking satellites	92	Minor	No	GNSS receiver not tracking satellites GNSS receiver not tracking satellites cleared	■ Check Antenna installation ■ Check if Antenna cable is connected properly. ■ Installation should conform to the guidelines as described in Appendix C. No action required
GNSS ant short-circuit	96	Minor	No	GNSS antenna short-circuit GNSS antenna short-circuit cleared	Check for short circuit in the antenna cable. If shorted antenna, then out-of-range and short-circuit alarms will be generated. No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
GNSS ant open-circuit	97	Minor	No	GNSS antenna open-circuit	Check for Antenna not connected or AC coupled splitter. If using a splitter you must at least draw 10mA of current from the SyncServer S6x0. This can be achieved by adding a 50 ohm termination. If no antenna, then open-circuit and out-of-range alarms both will be generated
				GNSS antenna open-circuit cleared	No action required
J1A Input LOS (LOSS OF SIGNAL)	99	Minor	No	J1A Input LOS	■ Check if cable is securely connected. ■ Check signal source is present and configured properly.
				J1A Input LOS cleared	No action required
J1B Input LOS (LOSS OF SIGNAL)	100	Minor	No	J1B Input LOS	■ Check if cable is securely connected. ■ Check signal source is present and configured properly.
				J1B Input LOS cleared	No action required
J2A Input LOS (LOSS OF SIGNAL)	101	Minor	No	J2A Input LOS	■ Check if cable is securely connected. ■ Check signal source is present and configured properly.
				J2A Input LOS cleared	No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
J2B Input LOS (LOSS OF SIGNAL)	102	Minor	No	J2B Input LOS	■ Check if cable is securely connected. ■ Check signal source is present and configured properly.
				J2B Input LOS cleared	No action required
Excessive traffic on port	112	Minor	No	Excessive traffic on PORT [1 | 2 | 3 | 4 | 5 6]	■ Check traffic level on network ■ Check for intrusion attempts. ■ Check broadcast traffic. (See Footnote 1)
				Excessive traffic on PORT [1 | 2 | 3 | 4 | 5 6]	No action required
RESERVED	113				■
Ethernet Port1 link down	115	Minor	No	LAN1 port link down	■ Check cable. ■ Check the box the interface is connected to. ■ Check Auto-negotiation.
				LAN1 port link down cleared	No action required
Ethernet Port2 Port link down	116	Minor	No	LAN2 port link down	■ Check cable. ■ Check the box the interface is connected to. ■ Check Auto-negotiation.
				LAN2 port link down cleared	No action required

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Ethernet Port3 Port link down	117	Minor	No	LAN3 port link down	■ Check cable. ■ Check the box the interface is connected to. ■ Check Auto-negotiation.
				LAN3 port link down cleared	No action required
Ethernet Port4 Port link down	118	Minor	No	LAN4 port link down	■ Check cable. ■ Check the box the interface is connected to. ■ Check Auto-negotiation.
				LAN4 port link down cleared	No action required
RESERVED	119				■
RESERVED	120				■
Operational Failure:	132	Major	No	Operational failure: 1PPS interrupt. GNSS upgrade failure after the 1PPS interrupt.	■ If alarm persists power cycle/reboot ■ Call SGS support if it persists after reboot/power cycle.
				Operational failure cleared	No action required
Power Out of Range	131	Major	No	`[ +13.2 | +5 | OSC +% | +3.3 | +2.5 | +1.5 | +1.1 | +1.0]` out of range	■ If alarm persists power cycle/reboot ■ Call SGS support if it persists after reboot/power cycle.
				____ out of range cleared	n/a

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Synth unlock	137	Major	No	Synth unlock	■ If alarm persists power cycle/reboot ■ Call SGS support if it persists after reboot/power cycle.
				Synth unlock cleared	No action required
Rubidium unlock	138	Major	No	Rubidium unlock	■ If alarm persists power cycle/reboot ■ Call SGS support if it persists after reboot/power cycle.
				Rubidium unlock cleared	No action required
Temperature out of range	139	Minor	No	Temperature out of range	Check your operating environment.
				Temperature out of range cleared	No action required
Fan Failure	140	Minor	No	Fan failed - [A | B]	■ If alarm persists power cycle/reboot ■ Call SGS support if it persists after reboot/power cycle.
				Fan failure cleared	No action required
Timeline has been changed	152	Notify	Yes	Timeline has been changed	
				n/a	n/a
Phase has been aligned	153	Notify	Yes	Phase has been aligned	
				n/a	n/a

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
System Reboot	155	Notify	No	System reboot n/a	No action required. n/a
RESERVED	156				
Timing Quality > $1e^{-6}$	157	Minor	No	Timing Quality> $1e^{-6}$ set Timing Quality > $1e^{-6}$ cleared	 n/a
Timing Quality > $1e^{-5}$	158	Minor	No	Timing Quality> $1e^{-5}$ set Timing Quality > $1e^{-5}$ cleared	 n/a
Timing Quality > $1e^{-4}$	159	Minor	No	Timing Quality> $1e^{-4}$ set Timing Quality > $1e^{-4}$ cleared	 n/a
Timing Quality > $1e^{-3}$	160	Minor	No	Timing Quality> $1e^{-3}$ set Timing Quality > $1e^{-3}$ cleared	 n/a
NTP System Peer Changed	161	Notify	No	NTP System Peer Changed to < > n/a	No action required. n/a
NTP Stratum Changed	162	Notify	No	NTP System Peer Changed to < > n/a	No action required. n/a

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
NTP Leap Indicator Changed	163	Notify	No	NTP Leap Indicator Changed	No action required.
				n/a	n/a
System Upgrade Available	164	Notify	No	System upgrade available	Upgrade unit software.
				n/a	n/a
J1A IRIG Input Protocol Fault	170	Minor	No	J1A IRIG Input protocol fault	Verify IRIG configuration matches source configuration.
				J1A IRIG Input protocol fault cleared	No action required
J1B IRIG Input Protocol Fault	171	Minor	No	J1B IRIG Input protocol fault	Verify IRIG configuration matches source configuration.
				J1B IRIG Input protocol fault cleared	No action required
Leap event pending	173	Notify	No	Leap event pending	
				Leap event pending cleared	No action required
Excessive Frequency Adjustment	174	Major	No	Excessive frequency adjustment	
				Excessive frequency adjustment cleared	n/a

Table A-1. System Notification Messages (Continued)

Description	Event ID	Msg Level	Trans-itory	MsgText	Corrective Action
Input power not present	175	Minor	No	No power detected on [AC1 | AC2] No power detected on [AC1 | AC2] cleared	Connect other power input to AC power (if dual power version) Verify backup supply is operational n/a
Full system configuration occurred	176	Notify	Yes	Full system configuration occurred n/a	 n/a
Configuration Change	177	Notify	Yes	Configuration changed n/a	No action required. n/a
RESERVED	179				
Manual Time Entry Mode Enabled	180	Minor	No	Entered Manual Time Entry Mode Transitioned out of Manual Time Entry Mode	 No action required
GNSS signal low		Minor	No		
PTP state changed to disabled		Notify	Yes		
PTP state changed to listening		Notify	Yes		
PTP state changed to master		Notify	Yes		
PTP state changed to passiv		Notify	Yes		

1. The excessive traffic alarm is set if the count of Ethernet packets received in one second exceeds the user-settable threshold on the Security > Packet Monitoring form (license required). With no license the detection level is a fixed 13000 packets per second. All traffic received by the SyncServer S6x0 Ethernet ports is counted, such as ARP, ICMP, IGMP.

Appendix B Specifications and Factory Defaults

This appendix provides mechanical and electrical specifications and factory defaults for the SyncServer S6x0.

In This Appendix

Specifications

This section provides the specifications for the SyncServer S6x0 input and output signals.

Mechanical

Table B-1. SyncServer S6x0 Mechanical Specifications

Parameter	Description
Mounting	19 in. or 23 in. Rack
Rack Mounting	See Figure 2-2 for drawings with detailed chassis dimensions.
Width	17.24 in. / 438 mm
Height	1.73 in. / 44 mm; 1 RU
Depth	15.00 in. / 381 mm 15.88 in. / 403 mm - including connectors on rear panel
Weight Unit Shipping Package	 12.5 lb. / 5.7 kg 16.3 lb. / 7.4 kg

Environmental

Table B-2. SyncServer S6x0 Environmental Specifications

Parameter	Description
Operating Temperature	-20° to 65° C, -4° to 149° F – Standard or OCXO [startup > -20°C (-4°F)] -5° to 55° C, 23° to 131° F – Rubidium oscillator
Storage Temperature	-40° to 85° C, -40° to 185° F
Operating Humidity	5% to 95% RH, maximum, non-condensing

Power

SyncServer S6x0 Power Specifications

Parameter	Description
Input Voltage Range	110/220 VAC, 50/60 Hz
AC Power - Standard Oscillator Operating	65 W, 542 mA @ 120V
AC Power - OCXO Operating	65 W, 542 mA @ 120V
AC Power - Rubidium Operating	65 W, 542 mA @ 120V

Compliance & Certifications

Table B-3. SyncServer S6x0 Compliance Specifications

Parameter	Description
Safety Certifications	■ UL1950 ■ UL60950-1/CSA C22.2 No. 60950-1, Second Edition
EMC Immunity	
Radiated Emissions	■ FCC Part 15, Class A ■ EN 55011 ■ CISPR 22, Class A ■ EN55014
Conducted Emissions	■ FCC Part 15, Class A ■ EN 55011 ■ CISPR 22, Class A ■ EN55014
Immunity Radiated	ENV50140 RF immunity, 10V/m, 80 – 1000MHz, 80% modulation; 900 MHz pulsed at 200 Hz
Immunity Conducted	■ ENV50140 RF common mode immunity, 0.15 - 80 MHz, 10V, 80% modulation ■ EN61000-4-8 Magnetic Field immunity, 50Hz, 40A/m continuous, 1000A/m for 1 sec
Environmental & Physical	
Environmental Compliance	■ FCC Part 15, Class A, ■ CISPR 22, Class A, ■ UL/CSA ■ 60950-1 ■ IEC 60950-1 ■ EN 60950-1 ■ PSE ■ VCCI ■ RoHS (6 of 6)
Shock and Vibration	
Operational	ETSI EN-300 019-2-3, Mil-STD-810G
Storage	IEC 60068-2-6 Fc (sinusoidal vib), Mil-Std-810G, figure 514.6C-3
Transportation - Bounce	IEC 60068-2-27Ea (shock 18g)
Transportation - Vibration	IEC 60068-2-64Fh (random vib)
Transportation - Package Drop	IEC 60068-2-31 Ec
Seismic	EN300 019-2-3, NEBS GR-63-CORE

Table B-3. SyncServer S6x0 Compliance Specifications (Continued)

Parameter	Description
Storage Temperature and Humidity Criteria	IEC 60068-2-1Ab (low temp soak), IEC 60068-2-2Bb (hi-temp soak) IEC 60068-2-14Nb (change of temp) IEC 60068-2-78Cb (humidity storage), IEC 60068-2-30Db (humidity condensation)
Operational Humidity Criteria	IEC 60068-2-78Cb, IEC 60068-2-30Db
General	
	■ NTP (v3 - RFC1305, v4 - RFC5905) ■ NTP Unicast, Autokey, ■ MD5 (RFC1321) ■ SNTP (RFC4330) ■ SNMP v2c (RFC1441-1452), v3 (RFC3411-3418) ■ Custom MIB ■ DHCP (RFC2131) ■ DHCPv6 (RFC3315) ■ TACACS+ (RFC1492) ■ LDAPv3 (RFC4510-4521) ■ RADIUS (RFC2865) ■ HTTPS/SSL (RFC2616),high encryption cipher suite ■ SMTP Forwarding ■ SSHv2 ■ IPv4/IPv6 ■ Syslog 1 to 8 servers ■ Key management protocols can be individually disabled. ■ PORT 1: Management & Time protocols ■ PORT 2, 3 & 4: Time protocols only.

Serial Port

Table B-4. SyncServer S6x0 Console Serial Port Specifications

Item	Description
Connector Type	9-pin, female D connector
Connector Label	CONSOLE
Interface	RS-232, data terminal equipment (DTE)

Table B-4. SyncServer S6x0 Console Serial Port Specifications (Continued)

Item	Description
Baud Rate	57.6 Kbps
Data Bits	8
Parity Bit	None
Stop Bits	1
Flow Control	None

Input Signals

GNSS

Table B-5. SyncServer S6x0 GNSS Input Signal Specifications

Parameter	Specification
Signal Type	GNSS L1
Gain	Between 15 dB and 30 dB including gain of antenna and loss of cable
Frequency	GPS: 1575.42 MHz center frequency
Impedance	50 ohms
Coupling	DC (center pin provides DC power to the GNSS antenna or in-line amplifier)
Output to Antenna voltage current	 9.7 VDC 100 mA (max)
Connector Type	BNC connector, female
Connector Label	GNSS

IRIG Input

IRIG inputs are available with the Optional Timing I/O Module.

Table B-6. SyncServer S6x0 IRIG Input Signal Specifications

Parameter	Specification
Impedance	50 Ω
Connector Type	BNC
Connector Label	J1
Signal Level	AM: Ratio 2:1 to 3.5:1 Amp: 1 V to 8 V p-p, into 50 Ω DCLS: <0.8 V for logic 0, >2 V for logic 1

NTP Input

Table B-7. SyncServer S6x0 NTP Input Signal Specifications

Parameter	Specification
Connector Type	RJ45
Connector Label	1, 2, 3, 4

PPS Input

Table B-8. SyncServer S6x0 PPS Input Signal Specifications

Parameter	Specification
Signal Type	TTL, rising edge active
Impedance	50 Ω
Connector Type	BNC
Connector Label	J1

10M PPS Input

10M PPS input is available with the Optional Timing I/O Module.

Table B-9. SyncServer S6x0 PPS Input Signal Specifications

Parameter	Specification
Signal Type	< 0.8 V for logic 0, > 2 V for logic 1
Impedance	50 Ω
Connector Type	BNC
Connector Label	J1

10MHz, 5MHz, 1MHz Input

The 10MHz, 5MHz, and 1MHz inputs are available with the Optional Timing I/O Module.

Table B-10. SyncServer S6x0 10/5/1 MHz Input Signal Specifications

Parameter	Specification
Signal Type	Sine Wave
Amplitude	1 Vpp to 8 Vpp
Impedance	50 Ω
Connector Type	BNC
Connector Label	J2

Output Signals

NTP Output

Table B-11. SyncServer S6x0 NTPOutput Signal Specifications

Parameter	Specification
Connector Type	RJ45
Connector Label	Ports 1, 2, 3, 4

The timestamps have been compensated for 1000BT. For 100BT, the NTP packets will have a bias of up to 1 microsecond.

PTP Master Output

PTP outputs are available with the PTP License option.

Table B-12. SyncServer S6x0 PTP Output Signal Specifications

Parameter	Specification
Connector Type	RJ45, 100/1000 Base-T
Connector Label	Ports 1, 2, 3, 4
PTP Profile	Enterprise

IRIG Output

IRIG outputs are available with the Timing Input/Output Module.

Table B-13. SyncServer S6x0 IRIG Output Signal Specifications

Parameter	Specification
Signal Type	IRIG B
Connector Type	BNC
Connector Label	J3, J4, J5, J6, J7, J8
Impedance	50 Ω
Signal Level	AM: Ratio 10:3 ± 10% Amp: 3.5 ± 0.5 Vpp, DCLS: <0.8 V for logic 0, >2.4 V for logic 1

TOD Output

Table B-14. SyncServer S6x0 1PPS+TOD Output Signal Specifications

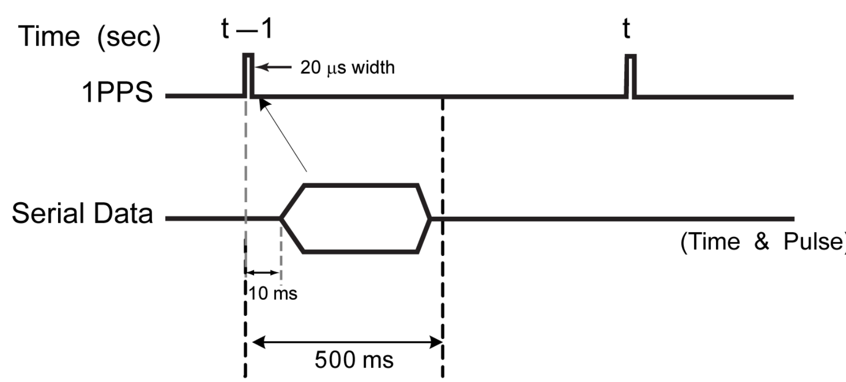
Parameter	Specification
Connector Type	9-pin, female D connector
Connector Label	DATA/TIMING
Signal Level	RS-232
Timing Relationship between 1PPS and TOD	Transmission of a TOD message starts 10 ms (default) after the rising edge of 1PPS signal, and the transmission is completed within 500 ms, as shown in Figure B-1. This TOD message indicates the time of the current 1 PPS rising edge, and is sent at a rate of once per second.
TOD Frame	TOD messages use whole 8-bit bytes for transmission, with check sum protection. Message type and message ID are used to clarify messages. Follows Big Endian convention when a field is longer than one byte, where bit 0 represents the least significant bit (LSB), and bit 0 of each byte is transmitted first.
TOD Transmission ParametersTable B-15. SyncServer S6x0 1PPS+TOD Output Signal Specifications	Baud Rate: 9600 Parity Check: None Start Bit: 1 (low level) Stop Bit: 1 (high level) Idle Frame: High level Data Bits: 8
TOD Message Encoding	Binary

PPS Output

Table B-15. Table B-15. SyncServer S6x0 1PPS+TOD Output Signal Specifications

Parameter	Specification
Connector Type	BNC female connector
Connector Label	1PPS
Impedence	50
Signal Level	3.25V, typical
Timing Relationship between 1PPS and TOD	Transmission of a TOD message starts 10 ms (default) after the rising edge of 1PPS signal, and the transmission is completed within 20 us, as shown in Figure B-1. This TOD message indicates the time of the current 1 PPS rising edge, and is sent at a rate of once per second.
Rise Time - 1PPS Pulse	1.5 ns, typical
Pulse Width	20 μs
Active Edge	Rising

Figure B-1.   Timing Relationship Between 1PPS and TOD for 1 PPS+TOD Outputs



10 / 5 / 1 MHz Output

The 10/5/1 MHz outputs are available with the Optional Timing I/O Module.

Table B-16. SyncServer S6x0 10 MHz Output Signal Specifications

Parameter	Specification
Signal type	Sine wave
Connector type	BNC male
Connector Label	J3 - J8
Impedance	50 Ω
Signal Level	2 - 3 Vpp

1PPS x N Output Signal Specifications

The 1PPS x N outputs are available with the Optional Timing I/O Module.

Table B-17. SyncServer S6x0 1PPS Output Signal Specifications

Parameter	Specification
Signal type	Rising edge on-time TTL
Settings - Fixed Rate	■ 10/5/1MPPS ■ 100/10/1/kPPS ■ 100/10/1/0.5PPS ■ 1PPM
Settings - Programmable Period	100 ns to 2 sec, step size of 10 ns
Pulse Width	■ 50% for programmable pulse ■ 20μs for fixed-rate pulse periods of PPM, PP2S, and PPS ■ 50% for other periods of fixed-rate pulse
Connector type	BNC male
Connector Label	J3 - J8
Impedance	50 Ω

Table B-18. Holdover Performance

Oscillator	Holdover - 24 Hour (µsec)
Standard	400
OCXO	25
Rubidium	<1

Note: Holdover values are approximate and assume operation at constant temperature, no initial frequency or phase offset, and that the unit has been powered on for 2 weeks and locked to GNSS for three consecutive days.

GNSS Antenna Kits Specifications

The basic antenna kit (093-15202-001) consists of the following

- GNSS Antenna (112-00079-000) with internal LNA
- Mounting Bracket (193-00044-000)
- Adapter cable for chassis (060-15202-004). This cable has an N-connector on one end and a BNC-connector on the other end.

Other components available in kits or separately include the following:

- Lightning arrestor (112-43400-00-3)
- Inline Amplifier (112-15202-001)
- GPS L1 4:1 Active Splitter (58536A)

See Table 7-7 for antenna kit part numbers.

GNSS Antennas with Internal LNA Specifications

Table B-19 provides specifications for the GNSS antenna with internal LNA.

Table B-19. GNSS Antenna with Internal Low-Noise Amplifier Specifications

Characteristic	Specification
Mechanical	
Diameter	66.5 mm
Height	21 mm
Weight	150 grams
Environmental	
Operating Temperature	-40 to +85 °C
Environmental	IP67, CE, REACH, and RoHS compliant
Salt Fog / Spray	MIL-STD-810F Section 509.4
Electrical	
1 dB Bandwidth	31 MHz
10 dB Return Loss Bandwidth	45 MHz
Antenna Gain	4.5 dBic
Axial Ratio	<4 dB @ 1590 MHz, 8 dB typical at band-edges
Filtered LNA Frequency	1575 to 1606 MHz
Gain	40 dB minimum
Gain	flatness ± 2 dB, 1575 to 1606 MHz
Out-of-Band Rejection <1550 MHz >1640 MHz	 >50 dB >70 dB
VSWR (at LNA output)	<1.5:1
Noise Figure	2.5 dB typical
Supply Voltage Range	+2.5 to 16 VDC nominal (12 VDC recommended maximum)
Supply Current	20 mA maximum at 85°C

Wideband GNSS Antennas with Internal LNA Specifications

Table B-20 provides specifications for the GNSS antenna with internal LNA

This wide-band antenna is a precision high gain GNSS antenna covering the BeiDou B1, Galileo E1, GPS L1, GLONASS L1, and SBAS (WAAS, EGNOS, QZSS, and MSAS) frequency band (1557 MHz to 1606 MHz). It provides very circular polarized signal reception through the entire bandwidth of the antenna, thereby providing superior multipath signal rejection. The antenna has a three stage low noise amplifier, comprised of one input LNA per feed, a mid section SAW to filter the combined output, and a final output gain stage. An additional pre-filter provides extra strong protection from near frequency and strong harmonic signals. An L-bracket for pole mounting and 3-foot BNC(m) to N(f) cable is also included.

Table B-20. Wideband GNSS Antenna with Internal Low-Noise Amplifier Specifications

Characteristic	Specification
Mechanical	
Diameter	66.5 mm
Height	21 mm
Weight	150 grams
Environmental	
Operating Temperature	-40 to +85 °C
Environmental	IP67, CE, REACH, and RoHS compliant
Salt Fog / Spray	MIL-STD-810F Section 509.4
Electrical	
2 dB Bandwidth	47 MHz
Antenna Gain (with 100 mm ground plane)	4.25 dBic
Axial Ratio	<2 dB typical, 3 dB max
Filtered LNA Frequency	1559 to 1606 MHz
Gain	40 dB minimum
Out-of-Band Rejection <1500 MHz >1640 MHz	 >50 dB >70 dB
VSWR (at LNA output)	<1.5:1
Noise Figure	3 dB typical

Table B-20. Wideband GNSS Antenna with Internal Low-Noise Amplifier Specifications (Continued)

Characteristic	Specification
Supply Voltage Range	+2.5 to 16 VDC nominal (12 VDC recommended maximum)
Supply Current	19 mA maximum at 85°C

GNSS Lightning Arrestor Specifications

Table B-21. Lightning Arrestor Specifications

Characteristic	Specification
Type	DC Pass
Mount Type	Bulkhead Mount
PIM Rated	N
Standards	CE Compliant, RoHS Compliant
Connector	N
Surge Side Connector	Bi-Directional N
Protected Side Connector	Bi-Directional N
Frequency Range	dc to 5 GHz
Turn On Voltage	150 Vdc (spark over)
RF Power	25 W
VSWR	<1.2 dB to 1
Insertion Loss	<0.1 dB
Protocol/Application	Gas tube, DC pass RF coaxial protection for dc to 5 GHz

GNSS L1 Inline Amplifier Specifications

The GNSS L1 Inline Amplifier (112-00076-000) option boosts the signal from the antenna. Use this amplifier on longer cable runs to maintain sufficient gain; it receives power from the GNSS radio receiver through the antenna coaxial cable connections. Table B-22 provides mechanical and electrical specifications for the amplifier.

Table B-22. GNSS L1 Inline Amplifier Specifications

Characteristic	Specification
Mechanical	
Connectors, (In/Out)	N-Type
Dimensions, includes connectors	Length: 2.32 in (59 mm)
Operating Temp.	-40 to +85 °C
Environmental	RoHS, REACH, and IP67
Electrical	
Nominal Gain	25 dB +4/-0 dB typical
Pass Band Ripple	± 2 dB
Impedance	50 Ohms
Noise Figure	2 dB typical
Bandwidth	1.2 to 1.8 GHz
Input VSWR	1.5 typical / 2 maximum
Output VSWR	1.5 typical / 2 maximum
Reverse Isolation	>35 dB
Output 1 dB	-10 dB
Output 3 dB	+5 dBm

GPS L1 1:4 Active Splitter Specifications

The GPS L1 1:4 active splitter (58536A) option splits the signal from the antenna. Table B-23 provides mechanical and electrical specifications for the high isolation active splitter. Complete specifications for this Microsemi Model 58536A GPS Splitter can be found on the Microsemi web site.

Table B-23. GPS L1 1:4 Active Splitter Specifications

Characteristic	Specification
Number of Output Ports	4
Input/output impedance	50 ohms
VSWR (typical)	Input and output 1.6 at L1
Bandwidth (-3 dB)	L1 (1575.42 MHz) ±20 MHz
Gain (antenna input to any output at L1)	0 dB ±3 dB
Noise Figure	5 dB typical, at 25°C
Port-to-port isolation L1 +/-40 MHz	50 dB typical
DC power	+4.5 to +13 V DC
Damage threshold	18 V DC either polarity
Operating current	23 to 48 mA depending on voltage
Pass through current	450 mA
Group delay	40 ns typical
RF connectors	Female N-type

GPS/GLONASS/BeiDou 1:4 Active Splitter Specifications

The GPS/GLONASS/BeiDou 1:4 active splitter option splits the signal from the antenna. Table B-23 provides mechanical and electrical specifications for the high isolation active splitter.

This L band frequency, RoHS compliant 4:1 active splitter makes it possible to use a single GPS referencing antenna and cable arrangement for multiple synchronization systems. The antenna DC bias select circuit allows for the active antenna DC input to be applied to any or all RF outputs. One DC voltage will be chosen to power the antenna while other inputs will be switched to DC loads. If the selected DC bias input should fail, the DC bias will automatically switch to another DC input to ensure an uninterrupted supply to the active antenna.

Complete specifications for this Microsemi Model 58536A GPS Splitter can be found on the Microsemi web site.

Table B-24. GPS L1 1:4 Active Splitter Specifications

Characteristic	Specification
Number of Output Ports	4
Input/output impedance	50 ohms
Frequency Range	1 GHz to 2 GHz
Noise Figure	2 dB max
Port-to-port isolation	30 - 40 dB
DC power	+3.3 to +12 V DC
Operating current	18 to 20 mA
Pass through current	250 mA
Group delay, L1	5 ns
RF connectors	Female N-type
RoHS 6/6	Compliant

GPS Antenna Coaxial Cable Specifications

Other cable types are available. Table B-25 provides antenna cable specifications. Before using additional cables, verify that the total antenna system gain is acceptable.

Table B-25. Antenna Cable Specifications

Cable Type	Loss (@1.575 GHz dB per foot)	DC Resistance (Ω per foot)	Type Center Conductor	Flammability
RG213/U (Belden 8267)	0.093 dB	0.0030	Stranded 13 AWG	U/L CSA
RG213/U (Belden 8267)	0.093 dB	0.0030	Stranded 2.62 mm^2	U/L CSA
UHF/VHF (Belden 9913)	0.058 dB	0.0027	Solid 10 AWG	
UHF/VHF (Belden 9913)	0.058 dB	0.0027	5.26 mm^2	
UHF/VHF (Belden 89913)	0.089 dB	0.0027	Solid 10 AWG	Plenum U/L CSA
UHF/VHF (Belden 89913)	0.089 dB	0.0027	5.26 mm^2	Plenum U/L CSA
LMR-400	0.051 dB	Shield – 0.00165 Center – 0.00139	0.109 inch Solid	
LMR-400	0.051 dB	Shield – 0.00165 Center – 0.00139	0.27686 cm^2 Solid	
LMR/CNT 240	0.101 dB	Inner Conductor – 0.0032 Outer Conductor – 0.00389	.056 inch diameter Solid BC	
LMR/CNT 600	0.034 dB	Inner Conductor – 0.00053 Outer Conductor – 0.0012	.176 inch diameter Solid BCCAI	

Factory Defaults

Network

Table B-26. Network > Ethernet Parameters

Description	Default Value	Value Range
Speed	Auto	Auto | Full_100 | Full_1000
IPv4	IPv4 uncheck/static	IPv4 uncheck | IPv4 check/DHCP | IPv4 check/Static
IP6v	IPv6 uncheck/ autoconfig /static	IPv6 uncheck | IPv6 check/ Autoconfig uncheck/static | IPv6 check/Autoconfig uncheck /DHCP | IPv6 check/Autoconfig check/static | IPv6 check/Autoconfig check/DHCP
Address (IPv4)	Blank (no value)	[<ipv4_address>]
Subnet (IPv4)	Blank (no value)	[<ipv4_address>]
Gateway (IPv4)	Blank (no value)	[<ipv4_address>]
Address (IPv6)	Blank (no value)	[<ipv6_address>]
Subnet (IPv6)	Blank (no value)	[<ipv6_address>]
Gateway (IPv6)	Blank (no value)	[<ipv6_address>]

Table B-27. Network > SNMP Parameters

Description	Default Value	Value Range
sysLocation	unknown	[<printable ASCII>], 1 - 49 chars
Read Community	comm	[<printable ASCII>], 1 - 49 chars
SysName	SyncServer	[<printable ASCII>], 1 - 49 chars
Write Community	Comm1	[<printable ASCII>], 1 - 49 chars
sysContact	admin@ localhost	[<printable ASCII>], 1 - 49 chars
Name (v3 User)	Blank (no val	[<printable ASCII>], 1 - 49 chars

Table B-27. Network > SNMP Parameters (Continued)

Description	Default Value	Value Range
Priv Phrase (v3 User)	Blank (no val	[<printable ASCII>], 1 - 49 chars
Auth Phrase (v3 User)	Blank (no val	[<printable ASCII>], 1 - 49 chars
Min Priv (v3 User)	Authentication	Authentication | Authentication & Privacy
Auth Crypt (v3 User)	Blank (no value)	MD5 | SHA

Table B-28. Network > SNMP Traps Parameters

Description	Default Value	Value Range
IP Address	Blank (no value)	<IPv4_address> | <IPv6_address>
v2c and v3	No Select	No Select | v2c | v3
User / Community	Blank (no value)	[<printable ASCII>], 1 - 32 chars
Send as Inform	uncheck	uncheck | check
Auth Phrase (v3)	Blank (no value)	[<printable ASCII>], 1 - 99 chars
MD5 / SHA (v3)	No check	If v3 check then [<MD5 check> | <SHA check>]
Priv Phrase (v3)	Blank (no value)	[<printable ASCII>], 1 - 99 chars

NTP

Table B-29. NTP > NTP Configuration Parameters

Description	Default Value	Value Range
Role	Server	Server | Peer | Broadcast
Address	Blank (no value)	[<IPv4_address> | <IPv6_address> | <dns_ name>]
Port	Default	LAN1 | LAN2 | LAN3 | LAN4
Prefer	uncheck	uncheck | check
Burst	N/A	N/A | Burst | iBurst | Both
MinPoll	Default	Power-of-2 times in seconds range: default | 16 | 32 | 64 | … | 65536 MinPoll cannot be > MaxPoll
MaxPoll	Default	Power-of-2 times in seconds range: default | 16 | 32 | 64 | … | 65536 MaxPoll cannot be < MinPoll
Symmeteric	None	None | Auto | 1 | 2 | … | 17 | 18 | 19 | 20

PTP

Table B-30. PTP > PTP Configuration Parameters

Description	Default Value	Value Range
Domain	0	0 to 127
Two-Step	0 (Disabled)	0 to 1
Priority 1	128	0 to 255
Priority 2	128	0 to 255
Announce Interval	0	0 (fixed)
Sync Interval	0	-7 to 7
Delay Interval	3	-7 to 7
Announce Tijmeout	3	3 (fixed)
Diffserv Code	0	0 to 64

Timing

Table B-31. Timing > Holdover Configuration Parameters

Description	Default Value	Value Range
Time Error Limit	Computed from Holdover Duration default, result depends on oscillator type.	0.000100 ms to 100 ms
Holdover Duration	1 day	0.001 days to 200.00 days

Table B-32. Timing > Serial Parameters

Description	Default Value	Value Range
Output	Off	Off | NMEA | NENA | Legacy
NMEA Detail	All Off	Any combination of the following allowed: ZDA on/off, GGA on/off, GSV on/off, RMV on/off
NENA Detail	DDD…	DDD… | WWW … | YYYY …

References

Table B-33. References > GNSS Configuration Parameters

Description	Default Value	Value Range
Elevation Mask	5	5 to 60 degrees Step size is 1 deg
Mode	Survey	Survey | Position Hold
Latitude (for Position Hold)	N 0:0:0.000	Ndd:mm:ss.ss or Sdd:mm:ss.sss 0 to 90 degrees
Longitude (for Position Hold)	W 0:0:0.000	Eddd:mm:ss.ss or Wddd:mm:ss.sss 0 to 180 degrees
Altitude (for Position Hold)	0.0 m	-1000.0 to +12000.0 m
Antenna Cable Delay	0	0 to 10000 ns
GNSS Receiver Reset	unchecked	checked | unchecked

Security

Table B-34. Security > Users Parameters

Description	Default Value	Value Range
User	new user	new user | admin
Delete Selected User	checked	not checked | checked
New Username	Blank (no value) Only admin user is retained.	a-z,A-Z,0-9, _, 1 – 34 chars
New Password	Blank (no value)	[<printable ASCII>, 1 – 34 chars Passwords must contain at least 8 characters, including uppercase, lowercase letters, numbers and special characters. The following characters are not allowed for the password: (', ", <, >, &,), $

Table B-34. Security > Users Parameters (Continued)

Description	Default Value	Value Range
Retype New Password	Blank (no value)	This is same as “New Password”
Recovery Question	No selection	[Birth City? | Mother’s Maiden Name? | Favorite pet’s name? | Custom] <printable ASCII> , 1 – 34 chars
Answer	Blank (no value)	<printable ASCII>, 1 – 34 chars
Email Address	Blank (no value)	<printable ASCII>, 1 – 34 chars
SMTP Gateway	Blank (no value)	<printable ASCII>, 1 – 34 chars
Send Test Email	not checked	not checked | checked

Admin

Table B-35. Admin > General Parameters

Description	Default Value	Value Range
Hostname	SyncServer	
Web Session Timeout	10 min	5 | 10 | 15 | 30 | 60 minutes
Check for Software Upgrades	checked	not checked | checked

Table B-36. Admin > Alarm Relay Parameters

Description	Default Value	Value Range
Top Selection	Off	Any Major Alarm | Any Major or Minor Alarm | Off
System Restart Delay	0	0, 1, 2,..., 60 minutes

Table B-37. Admin > Alarms Parameters

Description	Default Value	Value Range
Name	N/A	Cannot be set by user. See Table A-1 for name of each alarm
State	Strictly condition driven	■ Green = condition not set or has been acknowledged ■ Blue = condition set at Notify severity (and has not been user cleared or acknowledged) ■ Orange = condition set at Minor severity (and has not been user cleared or acknowledged) ■ Red = condition set at Major severity (and has not been user cleared or acknowledged) ■ Gray = this is a transient alarm
Clear Now	not checked (all rows)	not checked | checked
Auto ACK (s)	0 (all rows)	0, 1, ..., 999, 1000
Severity	See Table A-1 for default severity for each alarm	Notify | Minor | Major
Reporting Delay (s)	0 (all rows)	0, 1, ..., 999, 1000
Send Trap	checked (all rows)	not checked | checked
Write Log	checked (all rows)	not checked | checked
Send Email	not checked (all rows)	not checked | checked

Table B-38. Admin > Serial Port Config Parameters - Serial/Data Port

Description	Default Value	Value Range
Baud Rate	9600	4800 | 9600 | 19.2k | 38.4k | 57.6k | 115.2k
Data Bits	8	7 | 8
Parity	none	none | even | odd
Stop Bits	1	1 | 2

Table B-39. Admin > Serial Port Config Parameters - Console Port

Description	Default Value	Value Range
Baud Rate	115.2k	4800 | 9600 | 19.2k | 38.4k | 57.6k | 115.2k
Data Bits	8	8 (fixed)
Parity	none	none (fixed)
Stop Bits	1	1 (fixed)

Appendix C Installing GNSS Antennas

The GNSS L1 Reference Antenna is one component of a complete line of GNSS accessories for your GNSS antenna system provided by Microsemi. These accessories are designed to deliver precise GNSS signals over a wide temperature range and in harsh environmental conditions.

In This Chapter

Antenna Kits Overview

When deciding on which of the available antenna kits meets your needs, the key factor is the distance between the GNSS antenna and the SyncServer S6x0. There are several coaxial cable lengths available to assist in receiving proper gains from the GNSS antenna. Microsemi offers eight antenna kits for the SyncServer S6x0, plus separate GNSS antenna accessory parts including the antenna, cable, amplifier, lightning arrestor, and splitter.

Considerations for Antenna Installation

The GNSS engine requires a net gain at the antenna connector input of the chassis to be between 15 to 30 dB.

All antenna kits include the GNSS L1 antenna, mounting bracket and a BNC cable adapter. The antennas, in-line amplifiers and the lightning arrestor have N connectors.

All antenna kits supplied use a LMR-240 or LMR-400, or equivalent, low-loss coaxial cable. The L1 signal loss of LMR-400 is 0.167 dB/meter. The L1 signal loss of LMR-240 is 0.43 dB/meter. The L1 signal loss of a 90 V lightning arrestor is typically less than 0.25 dB. See Antenna Coaxial Cable, on page 280.

GNSS Antennas with Low Noise Amplifiers

The antenna used with the SyncServer S600/S650 is a high-gain (40dB) GNSS antenna covering the GPS L1, GLONASS L1, and SBAS (WAAS, EGNOS and MSAS) frequency band (1575 to 1606 MHz). The antenna has a three stage low-noise amplifier, with a mid-section SAW with a tight pre-filter to protect against saturation by high level sub-harmonics and L-Band signals making it excellent for timing applications. An L-bracket for pole mounting and 3-foot BNC(m) to N(f) cable is also included.

Figure C-1. GNSS Antenna

Accuracy of the antenna position determined using receiver survey depends on providing RF gain to the GNSS receiver within a required range of 15 to 30 dB and locating the antenna with an unobstructed field of view in a low multipath environment. If these conditions are not met, the receiver survey will either require longer than 20 minutes to complete or will not complete, preventing the GNSS input from being used by the system as a reference. Also, timing stability will not be optimized if these conditions are not met.

Table C-1. GNSS Antenna Kits & Accessories

Antenna Kit	Part Number	Total Delay (ns)
Kit: Total length: 50 ft, Cable: 50 ft; antenna kit (093-15202-001)	990-15202-050	107
Kit: Total length: 75 ft, Cable: 50 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-075	137
Kit: Total length: 100 ft, Cable: 100 ft; antenna kit (093-15202-001)	990-15202-100	167
Kit: Total length: 125 ft, Cable: 100 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-125	198
Kit: Total length: 150 ft, Cable: 150 ft; antenna kit (093-15202-001)	990-15202-150	228
Kit: Total length: 175 ft, Cable: 150 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-175	258
Kit: Total length: 200 ft, Cable: 200 ft; antenna kit (093-15202-001)	990-15202-200	288
Kit: Total length: 225 ft, Cable: 200 ft; lightning arrestor (112-43400-00-3); Cable: 25 ft; antenna kit (093-15202-001)	990-15202-225	319
250 ft. Antenna Cable	060-15202-250	303
350 ft. Antenna Cable	060-15202-350	424

Table C-1. GNSS Antenna Kits & Accessories

Antenna Kit	Part Number	Total Delay (ns)
450 ft. Antenna Cable	060-15202-450	545
500 ft. Low Loss Antenna Cable	060-15202-500	600
750 ft. Low Loss Antenna Cable	060-15202-750	900
900 ft. Low Loss Antenna Cable	060-15202-900	1080
Kit: ■ GPS/GLONASS Antenna (112-00079-000) ■ Mounting Bracket (193-00044-000) ■ Adapter cable for chassis (060-15202-004)	093-15202-001	46
Kit: Lightning Arrestor (112-43400-00-3) with 25 ft. cable	093-15202-002	31
Kit: Lightning Arrestor (112-43400-00-3) with 25 ft. low loss cable	093-15202-003	30
Kit: 1:4 GPS Splitter With Two (2) x 3 ft. cables	093-15202-004	44
Inline Amplifier (112-15202-001) with adapter	093-15202-005	1
Kit: ■ GPS/GLONASS/BeiDou Antenna (112-15202-003) ■ Mounting Bracket (193-00044-000) ■ Adapter cable for chassis (060-15202-004)	093-15202-006	34[1] (28 ns for antenna only)
Kit: GPS/GLONASS/BeiDou 1:4 splitter (112-00118-000) with Two (2) x 3 ft. cables	093-15202-007	6 (2 ns for splitter only)

Note:

[1] 16 ns additional delay for BeiDou

Antenna Kits Accessories

Lightning Arrestor

Microsemi offers the lightning arrestor for installations that require antenna coaxial lead-in protection. The lightning arrestor passes DC power and frequencies in the 1.5 GHz range with L1 GNSS antennas. In most installations, the lightning arrestor mounts near the point at which the antenna lead enters the facility. See the GNSS Lightning Arrestor Specifications, on page 262 for specifications.

Lightning does not have to strike the antenna to significantly damage the antenna or the GNSS receiver. Damage is often due to the effects of a lightning strike on a nearby structure, not a direct strike on the antenna itself. Since lightning strikes may induce damaging voltages in the antenna system when striking nearby objects, attempt to locate the antenna away from lightning rods, towers, and other structures that attract lightning. Also, locate the GNSS antenna lower than any nearby structures that are likely to attract a strike. See Figure C-2.

Figure C-2.   GNSS Lightning Arrestor

GNSS L1 In-line Amplifier

The GNSS L1 in-line amplifier (093-15202-005) option boosts the signal from the antenna with total cable lengths of 150 and 230 meters. See the GNSS L1 Inline Amplifier Specifications, on page 263 for specifications.

Cable length is a common cause for signal loss between the GNSS antenna and the GNSS receiver. As with any electromagnetic radio wave, GNSS signals become attenuated as they pass through an electrical cable. The amount of signal loss depends on the length and type of cable used. The inline amplifier attaches inline between the antenna and the antenna cable. It uses the same power as the antenna and does not require extra wiring. The inline amplifier supports a total cable length up to 900 feet depending on the cable type. See Figure C-3.

Figure C-3.   Inline Amplifier

GPS L1 1:4 Active Splitter

The active splitter features four output ports, as shown in Figure C-4. See the GPS L1 1:4 Active Splitter Specifications, on page 264 for specifications.This high isolation device can be cascaded without adding separate amplifiers and bias-tees between splitters. The splitter delivers precise GPS signals over a wide temperature range and in harsh environmental conditions. It eliminates feedback and interaction between any GPS system connected to it.

Figure C-4.   GPS L1 1:4 Active Splitter

GPS/GLONASS/BeiDou Splitter

This L band frequency, RoHS compliant 4:1 active splitter makes it possible to use a single GPS referencing antenna and cable arrangement for multiple synchronization systems. The antenna DC bias select circuit allows for the active antenna DC input to be applied to any or all RF outputs. One DC voltage will be chosen to power the antenna while other inputs will be switched to DC loads. If the selected DC bias input should fail, the DC bias will automatically switch to another DC input to ensure an uninterrupted supply to the active antenna.

Figure C-5.   GPS/GLONASS/BeiDou Splitter

Antenna Coaxial Cable

Microsemi provides coaxial cables with N-type connectors on both ends. Table C-2 lists the part numbers for the cables and its crimp kit. Also see GPS Antenna Coaxial Cable Specifications, on page 266.

Table C-2. LMR-400 Antenna Coaxial Cable Accessories

Part Number	Description
121-32212-00-2	Type N (male) connector for LMR-400 cable
12813080-000-0	Crimp Kit for LMR-400 or equivalent (10 ea. N-Type connector, crimp tool, weatherproof tape)

Contact your sales office for available cable lengths and specific cable item number.

GNSS Antenna Installation

This section provides information about planning and installing a GNSS antenna.

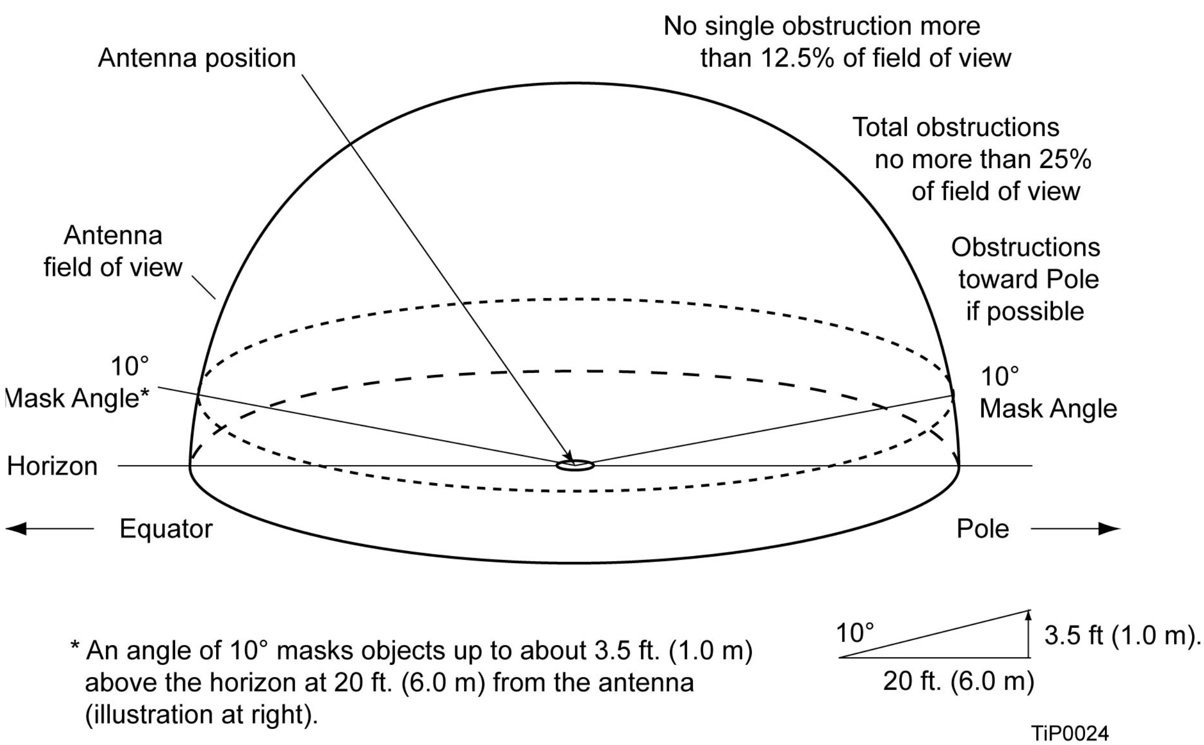
Planning the Antenna Location

Prior to installing the antenna, you should plan the site, antenna location, grounding scheme, cable route, and all other details.

Locating the Antenna

Use Figure C-6 as a guide to locate the antenna.

Figure C-6.   Locating the GNSS Antenna



Warning: The SyncServer S6x0 GNSS interface uses the electrical current it supplies to power a GNSS antenna to determine whether or not the antenna is properly connected and functional. If the SyncServer S6x0 does not detect any current, it will assume a failed GNSS antenna and will consequently generate an alarm and switch to another timing (non-GNSS) source.

Some GNSS splitters can block the DC current, and if used with SyncServer S6x0, will cause the alarm condition described above. Usage of such GNSS splitters with the SyncServer S6x0 will require the installation of a 50 OHM load so that the SyncServer S6x0 GNSS interface is able to detect current and operate normally.

Caution: To avoid damage to the GNSS antenna, *do not* place the antenna where high-power radio signals are beamed directly at the unit. Such signals can damage the preamplifier of the GNSS antenna.

Warning: To avoid serious injury to personnel or damage to equipment, exercise caution when working near high voltage lines. In particular:

- Use extreme caution when installing the GNSS antenna near, under, or around high voltage lines.
- Follow local building electrical codes for grounding using the frame ground lugs on the shelf.
- The in-line amplifier receives DC power from the GNSS receiver, and is supplied on the center conductor of the coaxial cable.
- Microsemi does not recommend cutting the antenna cables provided in the GNSS Antenna Kit.

Recommendation: Microsemi recommends that you consider the following location and environment influences before installing the GNSS antenna:

- If possible, provide the antenna with an unobstructed 360-degree view of the sky from the horizon.
- In general, do not allow obstructions that obscure the horizon (as viewed from the antenna) by more than 10 degrees, as shown in Figure C-6.
- Locate the antenna well away from, and preferably in a plane above electrical equipment such as elevators, air conditioners, or other machinery.
- To reduce the risk of lightning damage, *do not* place the antenna at the highest point of the building.
- Locate the GNSS antenna at least 3.7 m (12 ft.) from metallic objects, if possible.
- Locate the antenna high enough to avoid drifted snow.
- Locate the lightning arrestor in a protected area to avoid contact with standing water.
- Locate the antenna within 9.1 m (30 ft.) of the point at which the antenna cable enters the building.
- Allow at least 3.0 m (10 ft.) of separation distance between GNSS antennas.
- Surfaces above the plane of the unit that are between the antenna and the horizon can produce reflected (multi-path) signals, which can degrade the performance of the GNSS receiver.

Developing a Grounding Scheme

In addition to determining where to locate and mount the antenna and cabling, you should develop a grounding scheme. The purpose of the grounding scheme is to provide some protection against voltage surges and static discharge. If lightning arrestors are used, they also need to be connected to the perimeter ground system or to the bulkhead entrance panel that is connected to the perimeter ground system.

Caution: To ensure proper grounding, observe these precautions when installing the antenna:

- Allow no sharp bends in the ground conductors. The ground conductor must have a 9.1 m (30-ft.) radius for any bends made.
- Ensure that no painted surface insulates the lightning arrestor or grounding clamps.
- Ensure that ground conductors are bonded to the metal enclosure box (if used) and do not enter through an access hole.
- Do not use soldered connections for grounding purposes.
- Secure all grounding connections with mechanical clamp type connectors.

- In general, follow local building codes when selecting a grounding scheme, wire size, and installation.

  Use #6 AWG (16 mm^2) copper ground wire or larger, depending on the distance to the earth ground electrode. Refer to your local electrical codes for specific details. In most cases, #1/0 AWG (50 mm^2) ground wire will maintain 1/10 the resistance of the coaxial shield.

Note: Larger ground conductors provide better transient elimination; that is, the larger the ground conductor, the less likely the chance of transients.

- Connect lightning arrestors, if part of the grounding scheme, to earth ground through a conductor.

Note: *Do not* connect the outside lightning arrestor ground to the inside equipment rack ground. Doing so can defeat the protection afforded by the lightning arrestor.

- Never connect antenna systems to the same earth ground connector as heating and cooling systems, elevator or pump motors, or other motors or machinery which can induce noise in the antenna system.

Antenna Installation Tools and Materials

These standard tools and materials are not supplied in the antenna kit, but may be required for installing the GNSS antenna.

- Extra cable ties or acceptable cable clamps
- #6 AWG (16 mm^2) copper ground wire (minimum)
- Eight-foot (2.9 m) ground electrode
- Custom mounting plates, U-bolts, PVC pipes, masonry bolt, etc. as needed for mounting to a tower, roof, or wall of a building
- A cable puller may be required for installing the antenna coaxial cable
- Digital multivoltmeter (DVM)

Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the coaxial cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the coaxial cable through conduit or a weather head.

Cutting Antenna Cables

Microsemi recommends that you coil excess cable to avoid gain mismatch between the GNSS antenna and the GNSS receiver. Coiling the excess cable also allows you to use the factory-installed crimped connector.

Microsemi *does not* recommend cutting the antenna cables provided in the GNSS Antenna Kits. If you must cut the cables, please ensure that the following requirements are met.

Cable Requirements – The total cable length from the GNSS receiver to the antenna must not be shorter than the minimum cable lengths indicated in the GNSS Antenna Kits (see Table C-1).

Connector Requirements – The cables provided with the GNSS antenna kit have factory installed crimped connectors. If you cut these cables, you must supply and add a connector. Microsemi recommends that you use only crimp-style N-type connectors.

Installing the Antenna

This section provides procedures for installing the GNSS antenna (see Figure C-7).

1. Insert the antenna into the right-angle mounting bracket and tighten it using the antenna nuts.

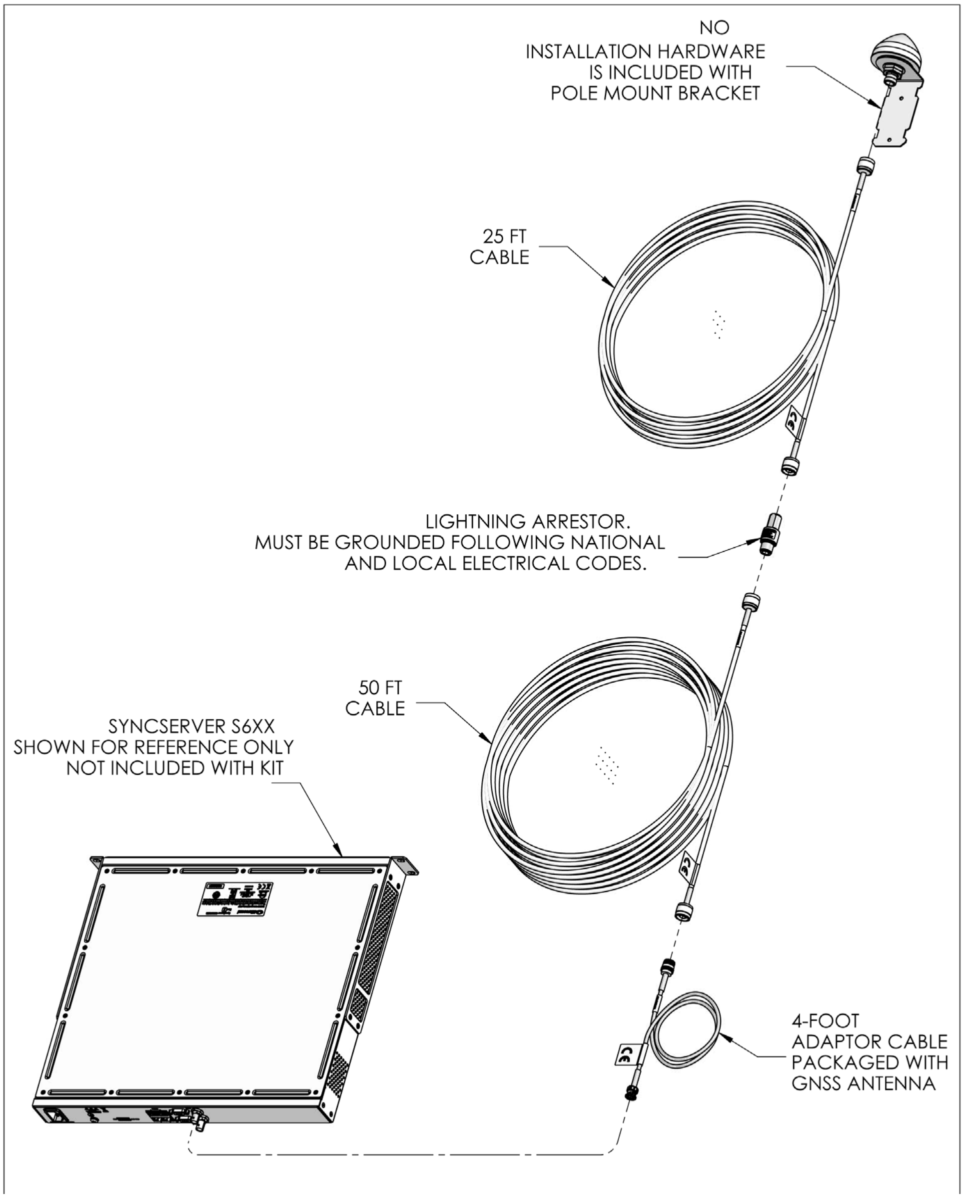
2. Mount the right-angle bracket to the mast using for example, U-bolts.

3. To secure the coaxial cable to the mast, use 8-inch cable ties or appropriate cable clamps.

4. Adhere to local building codes to determine the type and number of fasteners, screws, bolts, etc. that may be required.

Note: Follow local building electrical codes when installing the GNSS antenna.

Figure C-7.   GNSS Antenna Installation



Connecting the Cable to the Antenna

This section describes how to connect the coaxial cable to the mounted antenna. See Figure C-7.

1. Connect the 25 ft. cable to the antenna..

Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the coaxial cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the coaxial cable through conduit or a weather head.

2. Connect the other end of the 25 ft. cable to the lightning arrestor.

3. Connect the lightning arrestor to the long cable.

4. Connect the other end of the long cable with the 4 ft. BNC-N adapter cable.

Caution: To avoid damage to internal solder connections, do not over-tighten the connector.

Installing the Lightning Arrestor

Lightning arrestors should be installed in accordance with your antenna system grounding scheme. To install a lightning arrestor, follow these steps:

1. Mount the lightning arrestor within 30 ft. (9 m) of the GNSS antenna.

2. Connect the ground wire between the lightning arrestor and the proper grounding zone (building ground, master ground bar, or other) for the mounting location.

Recommendation: Microsemi does not recommend soldered connections for grounding purposes. All grounding connections should be secured with mechanical clamp connectors.

3. Wrap the connectors with weatherproof tape for added protection.

4. Verify that the antenna coaxial cable center conductor is not shorted to the shield of the cable.

Connecting the GNSS Antenna

You should install the antenna cable from the lightning arrestor to the SyncServer S6x0 using the shortest route possible. Follow all applicable building and electrical codes to ensure a water-tight and fire-resistant installation.

Caution: To avoid damage to the connectors, do not use the connectors to pull the cable. If at all possible, avoid bundling the cable with other cables (and possible noise sources). Use appropriate cable-pulling devices when pulling the cable through conduit or a weather head.

To connect the GNSS antenna, perform the following steps:

1. Using a DVM, Verify that the center conductor is not shorted to the shield.

   If the reading shows a short or open, you may have a shorted or open cable or lightning arrestor. Therefore, apply the same measurements directly to the GNSS antenna. This requires disconnecting the antenna cable at the antenna.

Note: The open-circuit range of an individual ohmmeter can cause readings to vary among meters.

2. Secure the free end of the antenna cable to the BNC (f) antenna connector on the rear panel of the SyncServer S6x0.

Recommendation: Microsemi recommends coiling excess cable to avoid gain mismatch between the GNSS antenna and the SyncServer S6x0. Coiling the excess cable also allows you to use the factory-installed crimped connector.

Antenna Installation Completeness Checklist

To verify that antenna installation is complete:

- Verify that all power and ground wires are installed correctly and securely fastened.
- Verify that all input and output cables are properly installed.
- Verify that all antenna connectors are secure, tight, and weatherproofed.
- Microsemi does not generally recommend the use of GNSS splitters. However, if one is used, Microsemi recommends the use of GPS L1 1:4 Active Splitter.

Appendix D Software Licenses

This product contains licensed third party software, including software available under the GPL licensing scheme. You can obtain these licenses and the open-source software by contacting Microsemi Technical support at the following numbers:

- Worldwide (Main Number): 1-408-428-7907
- USA, Canada, Latin America including Caribbean, Pacific Rim including Asia, Australia and New Zealand: 1-408-428-7907
- USA toll-free: 1-888-367-7966
- Europe, Middle East & Africa: 49 700 32886435

An administrative fee may be charged to obtain the source code.

By using the SyncServer S6x0, the user agrees to the terms of these licenses.

The licenses can be obtained using the following URL:

- www.gnu.org/licenses
- www.apache.org/licenses
- www.boost.org/users/license.html
- opensource.org/licenses/BSD-3-Clause
- opensource.org/licenses/BSD-2-Clause
- opensource.org/licenses/MIT
- opensource.org/licenses/Python-2.0
- spdx.org/licenses/bzip2-1.0.6.html
- spdx.org/licenses/AFL-2.1.html
- www.opensource.org/licenses/ISC
- www.openssl.org/source/license.html
- www.openldap.org/software/release/license.html
- www.opensource.org/licenses/Artistic-1.0
- www.zlib.net/zlib_license.html
- opensource.org/licenses/PHP-3.0

Third-Party Software

The following is a list of third-party software applications provided with the SyncServer S6x0.

- PACKAGE NAME: apache2
  PACKAGE VERSION: 2.4.6
  RECIPE NAME: apache2
  LICENSE: Apache-2.0
- PACKAGE NAME: attr
  PACKAGE VERSION: 2.4.47
  RECIPE NAME: attr
  LICENSE: LGPLv2.1+ GPLv2+
- PACKAGE NAME: autoconf
  PACKAGE VERSION: 2.69
  RECIPE NAME: autoconf
  LICENSE: GPLv2 GPLv3
- PACKAGE NAME: base-files
  PACKAGE VERSION: 3.0.14
  RECIPE NAME: base-files
  LICENSE: GPLv2
- PACKAGE NAME: base-passwd
  PACKAGE VERSION: 3.5.29
  RECIPE NAME: base-passwd
  LICENSE: GPLv2+
- PACKAGE NAME: bash
  PACKAGE VERSION: 4.3
  RECIPE NAME: bash
  LICENSE: GPLv3+
- PACKAGE NAME: binutils
  PACKAGE VERSION: 2.24
  RECIPE NAME: binutils
  LICENSE: GPLv3
- PACKAGE NAME: bison
  PACKAGE VERSION: 2.3
  RECIPE NAME: bison
  LICENSE: GPLv2
- PACKAGE NAME: boost
  PACKAGE VERSION: 1.55.0
  RECIPE NAME: boost
  LICENSE: BSL-1.0 MIT Python-2.0
- PACKAGE NAME: Bootstrap
  PACKAGE VERSION: 2.x
  LICENSE: Apache v2

- PACKAGE NAME: busybox
  PACKAGE VERSION: 1.22.1
  RECIPE NAME: busybox
  LICENSE: GPLv2 bzip2
- PACKAGE NAME: conntrack-tools
  PACKAGE VERSION: 1.4.0
  RECIPE NAME: conntrack-tools
  LICENSE: GPLv2+
- PACKAGE NAME: CodeIgniter
  PACKAGE VERSION: 2.1.4
  LICENSE: MIT
- PACKAGE NAME: coreutils
  PACKAGE VERSION: 8.22
  RECIPE NAME: coreutils
  LICENSE: GPLv3+
- PACKAGE NAME: cracklib
  PACKAGE VERSION: 2.9.1
  RECIPE NAME: cracklib
  LICENSE: LGPLv2.1+
- PACKAGE NAME: cronie
  PACKAGE VERSION: 1.4.11
  RECIPE NAME: cronie
  LICENSE: ISC BSD
- PACKAGE NAME: dbus-1
  PACKAGE VERSION: 1.6.18
  RECIPE NAME: dbus
  LICENSE: AFL-2 GPLv2+
- PACKAGE NAME: dhcp-client
  PACKAGE VERSION: 4.3.0
  RECIPE NAME: dhcp
  LICENSE: ISC
- PACKAGE NAME: diffutils
  PACKAGE VERSION: 3.3
  RECIPE NAME: diffutils
  LICENSE: GPLv3+
- PACKAGE NAME: directc
  PACKAGE VERSION: 0.1
  RECIPE NAME: directc
  LICENSE: GPLv2
- PACKAGE NAME: drivertestprogs
  PACKAGE VERSION: 0.1
  RECIPE NAME: drivertestprogs
  LICENSE: GPLv2

- PACKAGE NAME: dtc
PACKAGE VERSION: 1.4.0+gitAUTOINC+65cc4d2748
RECIPE NAME: dtc
LICENSE: GPLv2 BSD
- PACKAGE NAME: e2fsprogs
PACKAGE VERSION: 1.42.9
RECIPE NAME: e2fsprogs
LICENSE: GPLv2 LGPLv2 BSD MIT
- PACKAGE NAME: ebtables
PACKAGE VERSION: 2.0.10-4
RECIPE NAME: ebtables
LICENSE: GPLv2
- PACKAGE NAME: eglibc-extra-nss
PACKAGE VERSION: 2.19
RECIPE NAME: eglibc
LICENSE: GPLv2 LGPLv2.1
- PACKAGE NAME: elfutils
PACKAGE VERSION: 0.148
RECIPE NAME: elfutils
LICENSE: GPL-2+ Elfutils-Exception
- PACKAGE NAME: ethtool
PACKAGE VERSION: 3.13
RECIPE NAME: ethtool
LICENSE: GPLv2+
- PACKAGE NAME: expect
PACKAGE VERSION: 5.45
RECIPE NAME: expect
LICENSE: PD
- PACKAGE NAME: factorycfg
PACKAGE VERSION: 1.0
RECIPE NAME: factorycfg
LICENSE: BSD
- PACKAGE NAME: flex
PACKAGE VERSION: 2.5.38
RECIPE NAME: flex
LICENSE: BSD
- PACKAGE NAME: gator
PACKAGE VERSION: 1.0
RECIPE NAME: gator
LICENSE: GPLv2
- PACKAGE NAME: gawk
PACKAGE VERSION: 4.0.2
RECIPE NAME: gawk
LICENSE: GPLv3

- PACKAGE NAME: gdb
  PACKAGE VERSION: linaro-7.6.1
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- PACKAGE NAME: gnu-config
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- PACKAGE NAME: grep
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- PACKAGE NAME: initscripts
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- PACKAGE NAME: initscripts-microsemi
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  LICENSE: BSD
- PACKAGE NAME: ipdynaddrd
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- PACKAGE NAME: iperf
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- PACKAGE NAME: iproute2
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- PACKAGE NAME: iptables
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- PACKAGE NAME: iputils
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  LICENSE: BSD GPLv2+
- PACKAGE NAME: JQuery
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- PACKAGE NAME: jqBarGraph
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- PACKAGE NAME: libpci
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  RECIPE NAME: pciutils
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- PACKAGE NAME: libpcre1
  PACKAGE VERSION: 8.34
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  LICENSE: BSD

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  PACKAGE VERSION: 5.14.3
  RECIPE NAME: perl
  LICENSE: Artistic-1.0 GPL-1.0
- PACKAGE NAME: libpopt0
  PACKAGE VERSION: 1.16
  RECIPE NAME: popt
  LICENSE: MIT
- PACKAGE NAME: libpq5
  PACKAGE VERSION: 9.2.4
  RECIPE NAME: postgresql
  LICENSE: BSD
- PACKAGE NAME: libreadline
  PACKAGE VERSION: 6.3
  RECIPE NAME: readline
  LICENSE: GPLv3+
- PACKAGE NAME: libss2
  PACKAGE VERSION: 1.42.9
  RECIPE NAME: e2fsprogs
  LICENSE: GPLv2 LGPLv2 BSD MIT
- PACKAGE NAME: libssl1.0.0
  PACKAGE VERSION: 1.0.1g
  RECIPE NAME: openssl
  LICENSE: openssl
- PACKAGE NAME: libstdc++
  PACKAGE VERSION: linaro-4.8
  RECIPE NAME: gcc-runtime
  LICENSE: GPL-3.0-with-GCC-exception GPLv3
- PACKAGE NAME: libsysfs2
  PACKAGE VERSION: 2.1.0
  RECIPE NAME: sysfsutils
  LICENSE: LGPLv2.1
- PACKAGE NAME: libsystemd0
  PACKAGE VERSION: 211+gitAUTOINC+3a450ec5c6
  RECIPE NAME: systemd
  LICENSE: GPLv2 LGPLv2.1 MIT
- PACKAGE NAME: libtasn1
  PACKAGE VERSION: 3.4
  RECIPE NAME: libtasn1
  LICENSE: GPLv3+ LGPLv2.1+
- PACKAGE NAME: libtcl8.6-0
  PACKAGE VERSION: 8.6.1
  RECIPE NAME: tcl
  LICENSE: BSD-3-Clause

- PACKAGE NAME: libthread-db1
PACKAGE VERSION: 2.19
RECIPE NAME: eglibc
LICENSE: GPLv2 LGPLv2.1
- PACKAGE NAME: libtic
PACKAGE VERSION: 5.9
RECIPE NAME: ncurses
LICENSE: MIT
- PACKAGE NAME: libtirpc1
PACKAGE VERSION: 0.2.4
RECIPE NAME: libtirpc
LICENSE: BSD
- PACKAGE NAME: libtool
PACKAGE VERSION: 2.4.2
RECIPE NAME: libtool
LICENSE: GPLv2 LGPLv2.1
- PACKAGE NAME: libusb-1.0-0
PACKAGE VERSION: 1.0.9
RECIPE NAME: libusb1
LICENSE: LGPLv2.1+
- PACKAGE NAME: libuuid1
PACKAGE VERSION: 2.24.1
RECIPE NAME: util-linux
LICENSE: GPLv2+ LGPLv2.1+ BSD
- PACKAGE NAME: libwrap0
PACKAGE VERSION: 7.6
RECIPE NAME: tcp-wrappers
LICENSE: BSD
- PACKAGE NAME: libx11-6
PACKAGE VERSION: 1.6.2
RECIPE NAME: libx11
LICENSE: MIT MIT-style BSD
- PACKAGE NAME: libxau6
PACKAGE VERSION: 1.0.8
RECIPE NAME: libxau
LICENSE: MIT-style
- PACKAGE NAME: libxcb1
PACKAGE VERSION: 1.10
RECIPE NAME: libxcb
LICENSE: MIT
- PACKAGE NAME: libxdmcp6
PACKAGE VERSION: 1.1.1
RECIPE NAME: libxdmcp
LICENSE: MIT-style

- PACKAGE NAME: libxml2
PACKAGE VERSION: 2.9.1
RECIPE NAME: libxml2
LICENSE: MIT
- PACKAGE NAME: libz
PACKAGE VERSION: 1.2.8
RECIPE NAME: zlib
LICENSE: Zlib
- PACKAGE NAME: linux-libc-headers-dev
PACKAGE VERSION: 3.14
RECIPE NAME: linux-libc-headers
LICENSE: GPLv2
- PACKAGE NAME: logrotate
PACKAGE VERSION: 3.8.7
RECIPE NAME: logrotate
LICENSE: GPLv2
- PACKAGE NAME: ltrace
PACKAGE VERSION: 0.5.3
RECIPE NAME: ltrace
LICENSE: GPLv2
- PACKAGE NAME: m4
PACKAGE VERSION: 1.4.17
RECIPE NAME: m4
LICENSE: GPLv3
- PACKAGE NAME: make
PACKAGE VERSION: 4.0
RECIPE NAME: make
LICENSE: GPLv3 LGPLv2
- PACKAGE NAME: microsemi-app
PACKAGE VERSION: 1.0
RECIPE NAME: microsemi-app
LICENSE: BSD
- PACKAGE NAME: microsemi-misc
PACKAGE VERSION: 1.0
RECIPE NAME: microsemi-misc
LICENSE: GPLv2
- PACKAGE NAME: minicom
PACKAGE VERSION: 2.7
RECIPE NAME: minicom
LICENSE: GPLv2+
- PACKAGE NAME: msmtp
PACKAGE VERSION: 1.4.33
LICENSE: GPL v3

- PACKAGE NAME: mtd-utils
  PACKAGE VERSION: 1.5.0+gitAUTOINC+dcea43eba9
  RECIPE NAME: mtd-utils
  LICENSE: GPLv2+
- PACKAGE NAME: ncurses
  PACKAGE VERSION: 5.9
  RECIPE NAME: ncurses
  LICENSE: MIT
- PACKAGE NAME: net-snmp
  PACKAGE VERSION: 5.7.1
  LICENSE: BSD
- PACKAGE NAME: net-tools
  PACKAGE VERSION: 1.60-25
  RECIPE NAME: net-tools
  LICENSE: GPLv2+
- PACKAGE NAME: netbase
  PACKAGE VERSION: 5.2
  RECIPE NAME: netbase
  LICENSE: GPLv2
- PACKAGE NAME: network-scripts
  PACKAGE VERSION: 1.0
  RECIPE NAME: network-scripts
  LICENSE: BSD
- PACKAGE NAME: nfs-utils
  PACKAGE VERSION: 1.2.9
  RECIPE NAME: nfs-utils
  LICENSE: MIT GPLv2+ BSD
- PACKAGE NAME: NTP
  PACKAGE VERSION: 4.2.8p8
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- PACKAGE NAME: nscd
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  RECIPE NAME: eglibc
  LICENSE: GPLv2 LGPLv2.1
- PACKAGE NAME: openssh
  PACKAGE VERSION: 6.5p1
  RECIPE NAME: openssh
  LICENSE: BSD
- PACKAGE NAME: openssl
  PACKAGE VERSION: 1.0.1g
  RECIPE NAME: openssl
  LICENSE: openssl

- PACKAGE NAME: oprofile
  PACKAGE VERSION: 0.9.8
  RECIPE NAME: oprofile
  LICENSE: LGPLv2.1+ GPLv2
- PACKAGE NAME: packagegroup-core-boot
  PACKAGE VERSION: 1.0
  RECIPE NAME: packagegroup-core-boot
  LICENSE: MIT
- PACKAGE NAME: pam-plugin
  PACKAGE VERSION: 1.1.6
  RECIPE NAME: libpam
  LICENSE: GPLv2+ BSD
- PACKAGE NAME: pam_ldap
  PACKAGE VERSION: 1.217
  LICENSE: GPL v2
- PACKAGE NAME: pam_radius
  PACKAGE VERSION: 1.3.17
  LICENSE: GPL v2
- PACKAGE NAME: pam_tacplus
  PACKAGE VERSION: 1.3.8
  LICENSE: GPL v2
- PACKAGE NAME: parted
  PACKAGE VERSION: 3.1
  RECIPE NAME: parted
  LICENSE: GPLv3+
- PACKAGE NAME: pciutils
  PACKAGE VERSION: 3.2.1
  RECIPE NAME: pciutils
  LICENSE: GPLv2+
- PACKAGE NAME: perl
  PACKAGE VERSION: 5.14.3
  RECIPE NAME: perl
  LICENSE: Artistic-1.0 GPL-1.0
- PACKAGE NAME: php
  PACKAGE VERSION: 5.4.14
  RECIPE NAME: php
  LICENSE: PHP-3.0
- PACKAGE NAME: portmap
  PACKAGE VERSION: 6.0
  RECIPE NAME: portmap
  LICENSE: BSD

- PACKAGE NAME: postgresql
  PACKAGE VERSION: 9.2.4
  RECIPE NAME: postgresql
  LICENSE: BSD
- PACKAGE NAME: procps
  PACKAGE VERSION: 3.2.8
  RECIPE NAME: procps
  LICENSE: GPLv2+ LGPLv2+
- PACKAGE NAME: rpcbind
  PACKAGE VERSION: 0.2.1
  RECIPE NAME: rpcbind
  LICENSE: BSD
- PACKAGE NAME: run-postinsts
  PACKAGE VERSION: 1.0
  RECIPE NAME: run-postinsts
  LICENSE: MIT
- PACKAGE NAME: rwi-mod
  PACKAGE VERSION: 0.1
  RECIPE NAME: rwi-mod
  LICENSE: GPLv2
- PACKAGE NAME: sed
  PACKAGE VERSION: 4.2.2
  RECIPE NAME: sed
  LICENSE: GPLv3+
- PACKAGE NAME: setserial
  PACKAGE VERSION: 2.17
  RECIPE NAME: setserial
  LICENSE: GPLv2.0
- PACKAGE NAME: shadow
  PACKAGE VERSION: 4.1.4.3
  RECIPE NAME: shadow
  LICENSE: BSD Artistic-1.0
- PACKAGE NAME: sipcalc
  PACKAGE VERSION: 1.1.6
  RECIPE NAME: sipcalc
  LICENSE: BSD
- PACKAGE NAME: smarty
  PACKAGE VERSION: 3.1.17
  RECIPE NAME: smarty
  LICENSE: GPL
- PACKAGE NAME: sqlite3
  PACKAGE VERSION: 3.13.0
  RECIPE NAME: sqlite3
  LICENSE: PD

- PACKAGE NAME: sshfs-fuse
  PACKAGE VERSION: 2.4
  RECIPE NAME: sshfs-fuse
  LICENSE: GPLv2
- PACKAGE NAME: strace
  PACKAGE VERSION: 4.8
  RECIPE NAME: strace
  LICENSE: BSD
- PACKAGE NAME: sudo
  PACKAGE VERSION: 1.8.9p5
  RECIPE NAME: sudo
  LICENSE: ISC BSD Zlib
- PACKAGE NAME: sysfsutils
  PACKAGE VERSION: 2.1.0
  RECIPE NAME: sysfsutils
  LICENSE: GPLv2
- PACKAGE NAME: sysklogd
  PACKAGE VERSION: 1.5
  RECIPE NAME: sysklogd
  LICENSE: GPLv2+ BSD
- PACKAGE NAME: systemd
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  RECIPE NAME: systemd
  LICENSE: GPLv2 LGPLv2.1 MIT
- PACKAGE NAME: systemd-compat-units
  PACKAGE VERSION: 1.0
  RECIPE NAME: systemd-compat-units
  LICENSE: MIT
- PACKAGE NAME: systemd-serialgetty
  PACKAGE VERSION: 1.0
  RECIPE NAME: systemd-serialgetty
  LICENSE: GPLv2+
- PACKAGE NAME: tar
  PACKAGE VERSION: 1.27.1
  RECIPE NAME: tar
  LICENSE: GPLv3
- PACKAGE NAME: tcl
  PACKAGE VERSION: 8.6.1
  RECIPE NAME: tcl
  LICENSE: BSD-3-Clause
- PACKAGE NAME: tcpdump
  PACKAGE VERSION: 4.3.0
  RECIPE NAME: tcpdump
  LICENSE: BSD

- PACKAGE NAME: tzcode
PACKAGE VERSION: 2015a
RECIPE NAME: tzcode
LICENSE: PD BSD
- PACKAGE NAME: tzdata
PACKAGE VERSION: 2015a
RECIPE NAME: tzdata
LICENSE: PD BSD
- PACKAGE NAME: udev
PACKAGE VERSION: 211+gitAUTOINC+3a450ec5c6
RECIPE NAME: systemd
LICENSE: GPLv2 LGPLv2.1 MIT
- PACKAGE NAME: update-alternatives-opkg
PACKAGE VERSION: 0.1.8+gitAUTOINC+c33b217016
RECIPE NAME: opkg-utils
LICENSE: GPLv2+
- PACKAGE NAME: update-rc.d
PACKAGE VERSION: 0.7
RECIPE NAME: update-rc.d
LICENSE: GPLv2+
- PACKAGE NAME: usbutils
PACKAGE VERSION: 007
RECIPE NAME: usbutils
LICENSE: GPLv2+
- PACKAGE NAME: util-linux
PACKAGE VERSION: 2.24.1
RECIPE NAME: util-linux
LICENSE: GPLv2+ LGPLv2.1+ BSD
- PACKAGE NAME: valgrind
PACKAGE VERSION: 3.9.0
RECIPE NAME: valgrind
LICENSE: GPLv2 GPLv2+ BSD
- PACKAGE NAME: wget
PACKAGE VERSION: 1.14
RECIPE NAME: wget
LICENSE: GPLv3
- PACKAGE NAME: xerces-c
PACKAGE VERSION: 2.8.0
RECIPE NAME: xerces-c
LICENSE: MIT
- PACKAGE NAME: yp-tools
PACKAGE VERSION: 2.14
RECIPE NAME: yp-tools
LICENSE: GPL-2.0

- PACKAGE NAME: ypbind-mt
  PACKAGE VERSION: 1.38
  RECIPE NAME: ypbind-mt
  LICENSE: GPL-2.0

Appendix E IP Port Details

In This Appendix

Ethernet Port Isolation

The SyncServer S600 Series Network Time Servers have four Ethernet ports. These independent ports allow the SyncServer to connect to distinct Ethernet subnets. There is only one CPU in the SyncServer, so all of the Ethernet traffic, with the exception of the NTP Reflector, is ultimately handled by the protocol stack of the operating system.

The SyncServer uses the operating system IP packet filtering facilities to secure the SyncServer from unwanted access. The SyncServer also creates rules to filter IP packets based on the pre-assigned role of each Ethernet port. The SyncServer assigns different roles to the Ethernet ports. The LAN1 port serves the distinction of being the management port. The other ports serve as timing ports only. Each role is defined as the set of supported protocols allowed for that Ethernet port. By default, the SyncServer is configured to reject all TCP/UDP IP packets.

Management Port Rules

The management port allows the following types of IP packets:

- HTTP: inbound and outbound TCP packets on port 80
- HTTPS: inbound and outbound TCP packets on port 443
- SNMP: inbound and outbound UDP packets on port 161
- SSH: inbound packets TCP on port 22
- NTP: inbound and outbound UDP packets on port 123

The management port uses the following types of IP packets, but the ports do not show as open on a port scanner:

- SMTP: inbound and outbound TCP packets on port 25
- DNS: inbound and outbound UDP and TCP packets on port 53
- DHCP: inbound and outbound UDP packets on port 67 and 68
- SNMPTRAP: inbound and outbound UDP packets on port 162

Note that the rules allow inbound packets only, outbound packets that are part of the session are allowed to go out of the port.

Timing Port Rules

The three timing ports allow the following types of IP packets.

- NTP: inbound and outbound UDP packets on port 123

The timing ports use the following types of IP packets, but the ports do not show as open on a port scanner:

- DHCP: inbound and outbound UDP packets on port 67 and 68