

---

Users Guide

# SyncServer S200, S250, S250i

Rev. C, 1/19/2006  
Part Number: 997-01520-01

# Notices

## Copyright

Copyright © 2005 Symmetricom, Inc.  
All rights reserved.

Due to continued product development this information may change without notice. If you find any problems in the documentation, please report them to us in writing. Symmetricom, Inc. does not warrant that this document is error-free.

## Software Licenses

This product contains licensed third party software, including software available under the GPL licensing scheme. The text of each license is available in the "License" folder located on the Product Information CD-ROM that is supplied with the SyncServer. Additionally, these licenses and the source code for the related public software can be obtained by contacting Symmetricom Technical Support (<http://www.symmetricom.com/support>).

Additionally, the Apache, NTP, GNU General Public License, and UCD-SNMP licenses are available in the "Software Licenses" help topic at the end of this manual.

By using the SyncServer, the user agrees to the terms of these licenses.

## Intellectual Property

The software contains proprietary information of Symmetricom, Inc.; it is provided under a license agreement containing restrictions on use and disclosure and is also protected by copyright law. Reverse engineering of the software is prohibited.

## Limited Product Warranty

**Hardware and embedded software** – For a period of two (2) years from date of shipment by Symmetricom, Symmetricom warrants that all Products shall be free from defects in design, material, and workmanship; shall conform to and perform in accordance with Symmetricom's published specifications, if any; shall be free and clear of any liens and encumbrances; and shall have good and valid title. This warranty will survive inspection, acceptance, and payment by Buyer. Symmetricom does not warrant that the operation of such Product will be uninterrupted or error free. This warranty does not cover failures caused by acts of God, electrical or environmental conditions; abuse, negligence, accident, loss or damage in transit; or improper site preparation.

This warranty shall be null and void in the event (i) Buyer or any third party attempts repair of the goods without Symmetricom's advance written authorization, or (ii) defects are the result of improper or inadequate maintenance by Buyer or third party; (iii) of damage to said goods by Buyer or third party-supplied software, interfacing or supplies; (iv) of improper use (including termination of non-certified third party equipment on Symmetricom's proprietary interfaces and operation outside of the product's specifications) by Buyer or third party; or (v) the goods are shipped to any country other than that originally specified in the Buyer's purchase order.

Goods not meeting the foregoing warranty will be repaired or replaced, at Symmetricom's option, upon return to Symmetricom's factory freight prepaid; provided, however that Buyer has first obtained a return materials authorization number ("RMA Number") from Symmetricom authorizing such return. The RMA Number shall be placed on the exterior packaging of all returns. Symmetricom will pay shipping costs to return repaired or replacement goods to Buyer.

Symmetricom reserves the right to disallow a warranty claim following an inspection of returned product. When a warranty claim is questioned or disallowed, Symmetricom will contact Buyer by telephone or in writing to resolve the problem.

**Software** - Symmetricom warrants that for a period of ninety (90) days from date of shipment by Symmetricom the accompanying media will be free from defects in materials and workmanship under normal use. The physical media warranty does not apply to defects arising from misuse, theft, vandalism, fire, water, acts of God or other similar perils. Symmetricom will not be liable for any damages caused by the Buyer's failure to fulfill its responsibilities as stated above.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF TITLE, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE HOWSOEVER ARISING.

**Limitation of Liability** - The remedies provided herein are the Buyer's sole and exclusive remedies. In no event or circumstances will Symmetricom be liable to Buyer for indirect, special, incidental or consequential damages, including without limitation, loss of revenues or profits, business interruption costs, loss of data or software restoration, or damages relating to Buyer's procurement of substitute products or services. Except for liability for personal injury or property damage arising from Symmetricom's negligence or willful misconduct, in no event will Symmetricom's total cumulative liability in connection with any order hereunder or Symmetricom's Goods, from all causes of action of any kind, including tort, contract, negligence, strict liability and breach of warranty, exceed the total amount paid by Buyer hereunder. SOME JURISDICTIONS DO NOT ALLOW CERTAIN LIMITATIONS OR EXCLUSIONS OF LIABILITY, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO ALL BUYERS.

## **Trademark**

SyncServer® is a trademark of Symmetricom, Inc. Windows® is a trademark of Microsoft Corporation. All other trademarks are the property of their respective owners.

## Contact Information

Symmetricom, Inc.

Timing, Test & Measurement

3750 Westwind Blvd.

Santa Rosa, CA 95403

Main: +1 (707) 528-1230

## Technical Support

[support@symmetricom.com](mailto:support@symmetricom.com)

<http://www.symmetricom.com/support>

Worldwide (Main Number): 1-408-428-7907

USA, Canada, Latin America, Caribbean, Pacific Rim, Asia, Australia, New Zealand: 1-408-428-7907

USA toll-free: 1-888-367-7966 (1-888-FOR-SYMM)

Europe, Middle East & Africa: 49 700 32886435

## Typographic Conventions

The following kinds of formatting indicate special information.

Formatting convention	Type of Information
Special Bold	The names of pages in the web interface are given in Special Bold. For example, "Go to the <b>NETWORK - Ethernet</b> page.  Names of connectors, front panel menu options, and command line interface commands are also given in Special Bold.
<i>Emphasis</i>	Emphasis is used to draw the reader's attention to a specific word or phrase. Also designates a form element, label, or title on a web page.
CAPITALS	Names of buttons on the front panel and on the web interface, such as STATUS, MENU, APPLY.

---

# Contents

Notices	2
---------	---

---

Quick Start Guide	5
-------------------	---

---

Introduction	9
--------------	---

---

Hardware Features .....	11
Software Features .....	12

Web Interface	13
---------------	----

---

Login.....	14
STATUS - General .....	16
STATUS - Network .....	17
STATUS - Timing .....	18
STATUS - GPS.....	19
STATUS - NTP .....	21
STATUS - Alarms .....	25
NETWORK - Ethernet.....	26
NETWORK - SNMP .....	30
NETWORK - SNMP Traps .....	32
NETWORK - PING.....	33
NTP - Sysinfo .....	34
NTP - Assoc.....	39
NTP - Config .....	42
NTP - MD5 Keys.....	47
TIMING - GPS .....	48
TIMING - Time Zone .....	49
TIMING - IRIG-B .....	50
TIMING - Sysplex .....	51
TIMING - HW Clock .....	52
SYSTEM - General.....	56
SYSTEM - Upgrade .....	56
SYSTEM - Factory Reset .....	58
ADMIN - Web .....	59
ADMIN - Users .....	61
ADMIN - Alarms.....	62
ADMIN - Logs Config .....	67
SERVICES - Startup.....	70
SERVICES - HTTP .....	72
SERVICES - SSH.....	73
SERVICES - Email.....	73
LOGS.....	74
WIZARDS - 1st Setup .....	75
WIZARDS - NTP .....	75

WIZARDS - SNMP .....	76
WIZARDS - Backup.....	76
WIZARDS - Restore.....	77
WIZARDS - Upgrade .....	77

---

<b>Keypad/Display Interface</b>	<b>79</b>
---------------------------------	-----------

---

<b>Command Line Interface</b>	<b>83</b>
-------------------------------	-----------

---

<b>Specifications</b>	<b>87</b>
-----------------------	-----------

---

Status LEDs .....	88
Vacuum Fluorescent Display (VFD) .....	88
Keypad.....	89
USB .....	89
AC Power Supply .....	90
DC Power Supply .....	91
Chassis .....	91
Oscillators.....	92
Accuracy & Stability .....	92
GPS Receiver.....	93
Safety Standards .....	94
EMC Standards.....	94
Environmental.....	95
Reliability .....	95
Maintainability.....	96
Failure Detection and Reporting.....	96
WEEE/RoHS Compliance .....	97
Shock and Vibration .....	97
Console RS-232 .....	98
1PPS Output .....	99
1PPS Input .....	99
10MHz Output.....	100
10MHz Input.....	100
IRIG-B Output.....	101
IRIG-B Input.....	102
Sysplex Timer-Out.....	103
Network Ports .....	104
Network Protocols .....	105

---

<b>Tasks</b>	<b>107</b>
--------------	------------

---

Installation Guide.....	108
Unpacking .....	108
Rack Mounting .....	109
Connecting to VDC Power.....	110
Selecting a GPS antenna site .....	111
Installing the GPS Antenna .....	113
Configuring Network Settings.....	115
Upgrading System Software .....	116
Configuring the SyncServer .....	120

---

Troubleshooting.....	121
Backing Up/Restoring Configurations.....	122
Creating a Backup File .....	122
Restoring from a Backup File.....	123
Restoring the Factory Configuration .....	125
Configuring SNMP.....	127
Transferring Configurations .....	129
 <b>Software Licenses</b>	 <b>131</b>

---

Apache Software License .....	132
NTP Software License .....	142
GNU General Public License .....	146
UCD-SNMP Software License .....	153

---

<b>Certificates of Conformance</b>	<b>157</b>
------------------------------------	------------

---

<b>Certificate of Volatility</b>	<b>159</b>
----------------------------------	------------

---

<b>Maintenance</b>	<b>159</b>
--------------------	------------

---

<b>SNMP MIB</b>	<b>161</b>
-----------------	------------

---

<b>Change Log</b>	<b>171</b>
-------------------	------------

---

<b>Index</b>	<b>173</b>
--------------	------------

---





## CHAPTER 1

# Quick Start Guide

Use this guide to perform a *temporary* SyncServer installation. This is recommended for the technical person who receives the SyncServer and is interested in casually testing and learning about its features. Consult the **Installation Guide** section of the User Guide for detailed instructions on how to install the SyncServer in a production environment.

## Connecting the GPS Antenna

For the SyncServer 250i, which doesn't have a GPS receiver, attach the IRIG input to the IRIG In connector on the rear panel, and then skip to the next section.

- 1 Position the GPS antenna supplied with the SyncServer outdoors (recommended) with a wide-open view of the sky, away from RFI and EMI sources.

If an outdoor site isn't convenient, place the GPS antenna indoors in a sunny window with a good view. Point the antenna skyward at a 45-degree angle. Avoid metallic coatings, blinds, trees, and other GPS signal-blocking items. Doing this significantly increases the length of time it takes the SyncServer to acquire time from GPS. If GPS functionality isn't important for this temporary installation

- 2 Connect the GPS antenna (rated for 12 VDC) to the **GPS Ant** connector on the rear panel.

**Warning:** Antennas not rated for 12 VDC current may be damaged when connected to the SyncServer.

**Avertissement :** Les antennes qui n'ont pas été évalués pour un courant de 12 VDC peuvent être endommagées quand ils sont connectés au SyncServer.

## Applying power to the SyncServer and configuring LAN1

- 1 Connect the SyncServer's **LAN1** port on the rear panel to the network using the standard network cable (supplied).
- 2 Connect **100-240 VAC Input** on the rear panel to a power outlet, using the power cord (supplied).

---

**Note:** For 48VDC Operation (48 VDC Operation Model), refer to the **Installation Guide Section** of this Manual.

---

- 3** Turn on the power switch (located on the rear panel). After about a minute, the display and LEDs start showing the system time and status.
- 4** Press the **TIME** button once so you can see the time, the Reference, and the NTP Stratum simultaneously.

### A word about the LEDs and synchronization process

A few words about what you will observe as the SyncServer synchronizes over time.

- The Sync LED remains red while the SyncServer is unsynchronized to a reference and the stratum is 16. The LED turns orange when the Reference is a remote NTP server and Stratum is 2 through 15. The LED turns green when the Reference is the SyncServer's Hardware Clock (e.g., GPS, IRIG input) and the Stratum is 1. This process can take from 10 minutes to one hour.
- The Network LED turns orange when LAN2 or LAN3 are configured and then disconnected from the network. It turns red when the LAN1 port is disconnected from the network, regardless of how it is configured.
- The NTP LED remains unlit and flashes green when the NTP daemon sends or receives NTP packets. It flashes red when the NTP load exceeds 5000 packets per second (the SyncServer's rated load).
- The Alarm LED can remain red for the first 15 minutes after applying the power until the alarms auto-clear. Any alarm event, such as the "NTP Stratum Change Alarm", that is enabled (Severity = Major or Minor), will raise a new alarm. The LED is red for Alarms of Major severity; orange for Alarms of Minor severity; and green when there are no current alarms. See the **ADMIN - Alarms** page for more information.

### Configuring the LAN1 network port

- 1** Press the **MENU** button on the front panel.
- 2** Select **1) LAN1 Config.** (Press **1**)
- 3** Select **1) IPv4** and set the address using one of the following methods:
  - **1) Static Address:** Enter the IP Address, Mask, and Gateway manually.
  - **2) DHCP:** Automatically configures the network port.
- 4** Verify new LAN1 settings by pressing the **STATUS** button three times to get the LAN1 STATUS screen.

---

Note: Configuring LAN1 from the front panel erases all network settings for LAN1, LAN2, and LAN3. This approach is recommended for first time configurations and when moving the SyncServer to a new network.

---

### Logging in to the Web Interface and configuring the SyncServer

- 1 Open a browser and enter the SyncServer's IP address, without the leading zeroes, as the URL. For example, if the IP address is 192.168.047.025, enter 192.168.47.25 in the browser. This displays the login page.
- 2 Log in. The username is *admin*. The default password is *symmetricom*.
- 3 Under **WIZARDS**, go to the **1st Setup** page and complete the wizard.

The **1st Setup** wizard includes the following steps:

- Set a new password
- Configure Password Recovery (optional)
- Reconfigure LAN1 (optional)
- Set the Local Time Zone (optional)
- Apply the new settings

---

Note: Reconfiguring LAN1 in the **1st Setup** wizard erases all network settings for LAN1, LAN2, and LAN3.

---

### Running the SyncServer without Timing Sources

If timing sources such as a good GPS antenna, IRIG input signal, or other NTP servers aren't available, the user can set the time manually on the **TIMING - HW Clock** page. To do this:

- 1 Set Forced Timing Source to Free Run
- 2 Enter the UTC Time, if needed, and click the **APPLY** button.

The SyncServer will operate as an NTP Stratum 1 server.

**Warning:** Distributing non-UTC-synchronized time to NTP clients and peers on a production network can have serious ramifications. Symmetricom recommends using Free Run mode only in a closed test environment.

**Avertissement :** La distribution du temps non-UTC aux clients et " peers " de NTP sur un réseau de production peut avoir des ramifications sérieuses. Symmetricom recommande d'employer le mode de " Free Run " seulement dans un environnement d'essai fermé.

### Testing NTP

- 1** Log in to your workstation with administrator privileges and install SymmTime from the SymmTime CD (supplied).
- 2** Right click SymmTime and select "Sync Servers".
- 3** Add the LAN1 port's IP address as the primary NTP source and close the window.
- 4** Right click SymmTime and select "Sync Status".
- 5** Verify that SymmTime has synchronized to the LAN1 IP address.

---

Note: Right click SymmTime and select Help for assistance.

---

## CHAPTER 2

# Introduction

The SyncServer Network Time Server offers the following protocols for synchronizing equipment over a network:

- NTP
- SNTP
- Time (TCP and UDP versions)
- Daytime (TCP and UDP versions)

These protocols are capable of synchronizing computers, servers, and networking equipment on an enterprise-scale network to within milliseconds of official UTC time. This degree of synchronization is desirable for precise time-stamping of events and data correlation.

The SyncServer S200, S250, and S250i have different timing inputs and outputs.

Timing Input/Output	S200	S250	S250i
GPS Receiver	√	√	
IRIG In/Out		√	√
1 PPS In/Out		√	√
10 MHz In/Out		√	√

The SyncServer's web interface automatically reflects the availability of these inputs/outputs by displaying the appropriate pages and information for each model. The user should keep these differences in mind while reading the user guide and online help.

Symmetricon has designed the SyncServer to offer the best combination of quality, features, and price relative to competing products. In particular, we designed the SyncServer to be:

- Easy to set up and use.
- Upgradeable as new features and enhancements become available.

To set up the SyncServer quickly,

- First, log in and click **WIZARDS - 1st Setup**.
- The first time setup wizard guides you through a few basic and a few optional configuration choices.
- When you're done, click the **FINISH** button. The SyncServer applies the new settings.

To provide robust NTP services on your enterprise network:

- Put three SyncServers on your network.
- Using the **NETWORK - NTP Peers** page, just add the other two servers as peers (no config files to edit).
- Point your NTP clients to the three SyncServers and you're done.

To upgrade the SyncServer with the latest software:

- Get the upgrade file from Symmetricom's web site and save it to your computer.
- Using the **SYSTEM - Upgrade** wizard, upload the file to the SyncServer and install it.
- The system reboots and you're done.

---

## Hardware Features

### User Interface

- Multi-line Vacuum Fluorescent Display
- Numeric Front Panel Keypad
- Front Panel Status LEDs (Sync, Network, NTP, Alarms)
- Two front Panel USB 1.1 ports
- Front Panel Console RS-232 port
- Rear Panel Sysplex RS-232 port
- Three LAN ports (10/100)

### Oscillators

- TCXO
- OCXO (option)
- Rubidium (option)

### Power

- 100-240 VAC, 50/60 Hz
- 40-60 VDC (48 VDC Operation Model)

### Hardware Clock Timing Options

- 12-channel GPS receiver
- IRIG-B, IEEE 1344 Input/Output
- 1PPS Input/Output
- 10 MHz Input/Output

---

## Software Features

### Manageability

- Copy a SyncServer configuration to multiple units
- Web-based user interface
- Simple, intuitive, Keypad/Display and Command Line Interface
- Easy set up and configuration

### Security

- Encrypted username password
- Lock down LAN1 management port
- Lock down HTTPD



## CHAPTER 3

# Web Interface

## In This Chapter

Login .....	14
STATUS - General .....	16
STATUS - Network .....	17
STATUS - Timing .....	18
STATUS - GPS .....	19
STATUS - NTP .....	21
STATUS - Alarms .....	25
NETWORK - Ethernet .....	26
NETWORK - SNMP .....	30
NETWORK - SNMP Traps .....	32
NETWORK - PING .....	33
NTP - Sysinfo .....	34
NTP - Assoc .....	39
NTP - Config .....	42
NTP - MD5 Keys .....	47
TIMING - GPS .....	48
TIMING - Time Zone .....	49
TIMING - IRIG-B .....	50
TIMING - Sysplex .....	51
TIMING - HW Clock .....	52
SYSTEM - General .....	56
SYSTEM - Upgrade .....	56
SYSTEM - Factory Reset .....	58
ADMIN - Web .....	59
ADMIN - Users .....	61
ADMIN - Alarms .....	62
ADMIN - Logs Config .....	67
SERVICES - Startup .....	70
SERVICES - HTTP .....	72
SERVICES - SSH .....	73
SERVICES - Email .....	73
LOGS .....	74
WIZARDS - 1st Setup .....	75
WIZARDS - NTP .....	75
WIZARDS - SNMP .....	76
WIZARDS - Backup .....	76
WIZARDS - Restore .....	77
WIZARDS - Upgrade .....	77

---

# Login

Use the **Login** page to do the following:

- Gain authorized access to the Web Interface.
- Recover a lost password.
- View system status.

## Logging in

- Enter the **Username** and **Password** and click the **Login** button to gain authorized access to the SyncServer's web interface.
- The SyncServer has one username, *admin*, which cannot be modified. The default factory configuration password is *symmetricom*. Change the password using the **WIZARDS - 1st Setup Wizard** page or the **ADMIN - Users** page.
- The username and password are case sensitive.
- Select **Secure Login** to perform SSL encryption when sending the username and password over the network.

## Recovering the password

To recover a password, the admin user must have previously enabled/configured Password Recovery (see **ADMIN - User** or **WIZARD-1st Setup** pages).

Perform the following steps:

- 1** Enter the username, select the **Lost Password?** checkbox, and click the **APPLY** button.
- 2** When prompted, enter the answer (case sensitive) to the Recovery Question and click the **RESET** button. The SyncServer sends a message to the email address provided on the **ADMIN - User** page.
- 3** Log in using the new password provided in the email message.

If Password Recovery isn't enabled, or the password recovery message doesn't reach the email recipient, the only way to regain access to the web interface is to restore the default factory configuration through the SyncServer hardware.

The Recover Password feature can be enabled/disabled using the **ADMIN - Users** page. If the recover password link is not available, or doesn't work, see the "Backing Up/Transferring/Restoring..." help topic for instructions on using the hardware jumper to restore the factory configuration.

### Viewing status

- **Status:** review this information to see the operating status of the SyncServer. This optional element only appears if the user has set up the display status feature on the **ADMIN - Login Display** page.

The status spotlight has the following meaning:

- **Green:** the system is operating normally
- **Orange:** User intervention is required. Timing outputs aren't impaired.
- **Red:** User intervention is required. Timing outputs are impaired, or will be shortly.

---

## STATUS - General

This page displays general information about the SyncServer:

**Hostname:** The user-assigned hostname (See the **SYSTEM - General** page)

**Model:** The SyncServer model number.

**Serial Number:** The SyncServer's unique serial number.

**Local Time:** The local time (See the **TIMING - Time Zone** page)

**Release Version:** The system release version

**Software Version:** The software version

**Software Build Date:** The date and time the software was compiled

**File System Version:** The file system version

**Hardware Clock Version:** The version of the software on the SyncServer's Hardware Clock

**Up Time:** The elapsed time since the SyncServer was (re)booted

**Load Average:** The system load

**Memory Used (Mbyte):** The amount of memory occupied by the system

**Memory Free (Mbyte):** The amount of free memory remaining

---

## STATUS - Network

This page displays information for each of the SyncServer's network ports:

- The MAC address of the network port.
- The IPv4 Address, if used.
- One or more IPv6 Address, if used.
- The status of the network port device (not of the connection). Up Arrow = running. Down Arrow = Not running.

**LAN1 DNS Servers:** the *DHCP* and *user-assigned* DNS Servers from the **NETWORK - Ethernet** page.

---

Note: One or more DNS server addresses are required for the SyncServer to resolve domain names, which may be used in NTP associations, SMTP gateways (email). Without any DNS server specified, there may be problems with NTP synchronization, password recovery, and email notification.

---

---

## STATUS - Timing

This page displays information about the Hardware Clock.

See the **TIMING - HW Clock** help topic for an expanded description of the Hardware Clock and its behavior.

**Current Sync Source:** The time source currently in use by the Hardware Clock. The priority of reference signal use, if available on a particular SyncServer model, is GPS, IRIG-B, 1 PPS, 10 MHz.

**Hardware Clock Time:** The time according to the Hardware Clock.

**Hardware Clock Status:** "Locked" means one of the following is true:

- The Hardware Clock is synchronized to a reference; or,
- The reference has become unavailable, but the Hardware Clock is using its oscillator to "flywheel" until a source becomes available again. The "locked" state persists until the estimated drift of the oscillator exceeds the "Max Drift Error" setting on the **TIMING - HW Clock** page.

In both cases, the Hardware Clock is providing valid time to the SyncServer.

"Unlocked" means that a reference is unavailable, and the estimated Hardware Clock phase error has exceeded the "Max Drift Error".

**Oscillator Type:** The type of the oscillator used by the Hardware Clock for operation and holdover.

**GPS Input Status:** "Locked" means that the GPS receiver has valid time (including the UTC leap second offset) and may be used as a time reference.

**IRIG-B Input Status:** "Locked" means that the IRIG-B input code has been validated and may be used as a time reference.

**1 PPS Input Status:** "Locked" means that the 1PPS input has been validated and may be used as a time reference.

**10 MHz Input Status:** "Locked" means that the 10MHz input has been validated and may be used as a frequency reference.

**Leap Warning:** Indicates whether a UTC leap second adjustment will happen within the next 24 hours.

---

## STATUS - GPS

This page displays the status of the GPS Receiver:

**Receiver Description:** 12-channel GPS receiver with TRAIM (Time Receiver Autonomous Integrity Monitoring).

**Receiver Status:**

- No Signal
- Acquiring Signal: The receiver is tracking a GPS signal.
- 2D Solution: The receiver has tracked three GPS satellites.
- 3D Solution: The receiver has tracked four GPS satellites.
- Position Hold: The receiver has finished surveying and has established a fixed position.
- Time Valid: The receiver has valid timing information from GPS satellites (including current leap second information).

**Mode:**

- Survey: The receiver is surveying and averaging its position. When it has finished surveying, the receiver switches to Position Hold mode. Survey mode and Position Hold mode are appropriate for static applications, such as a typical server room environment. This is the default mode when the SyncServer starts.
- Dynamic: The GPS receiver surveys continuously to determine its position and doesn't switch to another mode. This mode must be initiated by a user, and is appropriate for mobile applications such as ships, land vehicles, and aircraft. The degree of accuracy this mode offers is fine for NTP time over networks, but is less than optimal for the IRIG-B, 1 PPS, 10 MHz outputs available on some SyncServer models.
- Position Hold: The GPS receiver has completed Survey mode and switched to this mode, or the user has manually entered a position and "forced" it into this mode. The accuracy and stability of the SyncServer's timing outputs are optimal when the receiver has its exact position and is in this mode.

**Antenna Cable Delay (nS):**

The amount of compensated delay from the GPS signal propagation through the antenna and antenna cable as defined on the **TIMING - GPS** page.

**Antenna Status:**

The GPS receiver supplies power to the GPS antenna through the antenna cable. It also monitors the current to that circuit to detect open or short circuits.

- Good: The current to the GPS antenna and cable is normal.
- Open: The current is too low. The GPS antenna or cable is probably disconnected or broken.
- Short: The current is too high. The GPS antenna or cable probably has a short circuit.

**Position:** The latitude and longitude of the GPS antenna in degrees, minutes, and fractional seconds. Referenced to WGS-84.

**Altitude:** The altitude of the antenna in meters. Referenced to WGS-84.

**Satellites:** The list of GPS satellites visible to the receiver:

- Sat Number: The GPS satellite's PRN, a unique identification number
- Signal: The relative strength of the GPS signal (dBW = decibels relative to 1 Watt).
- Status: "Current" means that the receiver is using the GPS signal in its timing solution. "Tracked" means the receiver is tracking the signal, but isn't using it in the timing solution.

**Warning:** GPS position and altitude are for timing purposes only. They are not intended for navigation or other critical applications.

**Avertissement :** La position et l'altitude de GPS sont seulement pour la synchronisation. Elles ne sont pas prévues pour la navigation ou d'autres situations de la vie ou de la mort.



---

## STATUS - NTP

**system peer:** This is the connection selected by the server as most likely to provide the best timing information. Selection is based on stratum, distance, dispersion and confidence interval. Consult the current NTP documentation (available at <http://www.ntp.org>) for more information regarding the selection process.

The SyncServer's Hardware Clock is known to the NTP daemon as "SYMM\_TE(0)". When the Hardware Clock is synchronized to a timing source (e.g., GPS, IRIG, etc.), the system peer is "SYMM\_TE(0)". When the NTP daemon is synchronized to another network time server, the peer displays that device's hostname or IP address.

**system peer mode:** The SyncServer's relationship to the source of timing information. The server can obtain time synchronization information in a number of different ways. Each method, or mode, is defined in the NTP documentation. The most common mode of operation is client. Dependent upon the server's configuration, the mode may be one of the following:

- Symmetric Active (1): 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 (2): 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.
- Client (3): 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.

A host operating in client mode occasionally sends an NTP message to a host operating in server mode, perhaps right after rebooting and at periodic intervals thereafter. The server responds by simply interchanging addresses and ports, filling in the required 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.

**leap indicator (LI):** This field provides advance warning of an pending leap second to be inserted/deleted in the last minute 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. The normal value is 00, which indicates everything is operating as expected with no pending events.

LI	Value	Meaning
-----		
00	0	no warning
01	1	last minute has 61 seconds
10	2	last minute has 59 seconds)
11	3	alarm condition (clock not synchronized)

When the server is booted, or if the NTP daemon is restarted, the leap indicator is set to the alarm condition (3). This is to allow NTP clients to recognize that an NTP server is present, but that the server is unable to validate its time base. Once the server has found a valid source of time and set its clock, it will change the leap indicator to the appropriate value. If the NTP leap alarm is configured, an alarm will be generated to inform the administrator of the value change.

**stratum:** This is an eight-bit integer indicating the stratum level of the SyncServer, with values defined as follows:

Stratum	Meaning
-----	
1	primary reference (e.g., radio clock)
2-15	secondary reference (via NTP)
16	unsynchronized

This variable provides information about the location of the SyncServer in an NTP hierarchy. When the stratum is 1, the SyncServer is synchronized to a hardware timing source (i.e., GPS or IRIG). Information regarding what type of hardware source signal is being used is available via the reference id field described below. Conversely, when the stratum is 16, the SyncServer is unsynchronized, indicating that it is still searching for a valid source of timing information. For values ranging from 2 through 15, the SyncServer is being synchronized to a remote NTP server. The particular method of synchronization is available via the mode variable described above. The typical value for a SyncServer is 16 at boot time, transitioning to a 1 once synchronized.

**precision:** This is a measure of the number of significant bits in an NTP time stamp. This value can change and is dependent upon the precision of the selected peer. Lower bits in the time stamp are randomized for security. The value is expressed as a power of 2. 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.

**root distance:** 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. 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 provide information about the source modifying the system clock. 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 provide information about the selected peer. In the case of a SyncServer operating at stratum 1, the reference ID will display the source for the local timing information (i.e., GPS, IRIG, FREE). In the case where the selected peer is another NTP server, the reference ID will display the address of the server or a hash unique to the association between the SyncServer and the remote server.

**reference time:** This is the local time, in time stamp format, when the SyncServer last received an update from the selected peer. 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 (i.e., GPS, IRIG) and in an interval of 64-1024 seconds for a readily accessible remote NTP server.

**system flags:** These flags define the configured behavior of the SyncServer. While these flags do not change under normal use, a definition of the variables is provided.

- **kernel:** Enables the precision-time kernel support for the `ntp_adjtime()` system call. The default for this flag is enable.
- **monitor:** Enables the monitoring facility. This is for future use in the SyncServer.
- **ntp:** Enables the server to adjust its local clock by means of NTP. This is always enabled in the SyncServer.
- **stats:** Enables the statistics facility. This is for future use in the SyncServer.

**jitter:** Jitter (also called timing jitter) refers to short-term variations in frequency with components greater than 10 Hz.

**stability:** Stability refers to the systematic variation of frequency with time and is synonymous with aging, drift, trends, etc.

**broadcastdelay:** The broadcast and multicast modes require a special calibration to determine the network delay between the local and remote servers. Ordinarily, this is done automatically by the initial protocol exchanges between the client and server. In some cases, the calibration procedure may fail due to network or server access controls, for example. This command specifies the default delay to be used under these circumstances. Typically (for Ethernet), a number between 0.003 and 0.007 seconds is appropriate. The default when this command is not used is 0.004 seconds.

**authdelay:** 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.

---

## STATUS - Alarms

This page displays current major and minor alarms.

- Major alarms are displayed in red text.
- Minor alarms are displayed in orange text.

Alarms can be configured using the **ADMIN - Alarms** page.

**Time:** The local date and time at which the alarm was raised.

**Severity:** The severity of the alarm event (Major/Minor).

**Name:** The name of the alarm, from the list of alarms on the **ADMIN - Alarms** page.

---

## NETWORK - Ethernet

This page provides status and configuration for the Ethernet LAN ports and DNS servers.

### Ethernet Port Configuration

Edit the network port configuration and view network port status.






**EDIT:** Click the EDIT button to configure network port settings.

**Pending Changes:** A check mark indicates that settings have changed, reminding the user to click the APPLY button.

**Port:** The network port's name.

**IP Address:** The port's MAC, IPv4, and/or IPv6 network addresses.

**Usage:** These icons summarize information about the port:

- : The physical network port is up/running (independent from the network connection).
- : The network configuration is automatic via DHCP
- : Status unknown - usually when there are pending changes.
- : Uses IPv6
- : The port is bonded with another port in a redundant pair.

### DNS Servers

The DNS Server fields display the IP addresses of Domain Name Service (DNS) servers. The SyncServer requires a valid DNS server address to resolve domain names, such as the "ntp1.symmetricon.com" NTP association. If a DNS server isn't provided, NTP associations and the SMTP Gateway must be specified using an IP address. The SyncServer only allows DNS packets to be communicated through LAN1 port. The specified DNS servers must be reachable from the LAN1 port.

- **User DNS Servers:** Enter DNS Server IP addresses here manually.
- **DHCP DNS Servers:** These are the IP addresses provided by DHCP, if DHCP is enabled on one of the ports. These servers must be reachable from the LAN1 port in order to be used. These values are not user-editable.

---

**Note:** If the SMTP Gateway (which supports Password Recovery and Email Notification of Alarms) and NTP associations are addressed using domain names, a valid DNS server address must be supplied to the SyncServer.

---

## LAN Configuration

To apply configuration changes, click both the **APPLY** button in the configuration window **and** the **APPLY** button on the **NETWORK - Ethernet** page.

### Connection Mode:

- **Static:** A user must configure the network port manually.
- **DHCP:** A DHCP server will automatically configure the network port when changes are applied. Not available for IPv6.
- **Disabled:** This disables the network port.

---

**Note:** If the Connection Mode is DHCP and the lease expires or the SyncServer reboots, a DHCP server could assign a new IP address to the SyncServer's network port. If this occurs with the LAN1 port, use the **STATUS** button on the front panel to obtain the new IP address. Furthermore, if it occurs to a network port servicing NTP requests, NTP clients will no longer be able to get a response from that port. In that case, the NTP clients would have to use an alternate NTP source or become de-synchronized. For this reason, Symmetricom recommends avoiding DHCP, except for temporary installations.

---

### IP Version:

- **IPv4:** The port uses IPv4 exclusively. (Static or DHCP)
- **IPv6:** The port uses IPv6 exclusively. The user must enter a static IPv6 address.
- **IPv4 Auto IPv6:** The port uses IPv4 and IPv6 concurrently. The SyncServer automatically assigns an IPv6 address.

### Notes:

- To use automatic IPv6 addressing, set a static IPv4 address first.
  - When changing configuration from IPv6 or IPv4 Auto IPv6 to IPv4, the IPv6 addresses remain active until the SyncServer is restarted.
- 

**IP Address:** The port's IPv4 address (e.g., "192.168.0.100") or IPv6 address(es) with scope (e.g., fe80::2a0:6dff:fe00:10/64).

**Mask:** The port's IPv4 subnet mask (e.g., "255.255.255.0"). With IPv6, the mask is referred to as "scope" and is specified as part of the IP address itself (the /64 in the above example).

**Gateway:** The port's IPv4 or IPv6 gateway (e.g., "192.168.0.1"). This is an optional configuration parameter.

**Redundant:** Bonds LAN2 to LAN3, creating a single redundant Ethernet port.

- **Active:** The port handles network traffic until the connection becomes unavailable or the device stops functioning. LAN2 is "Active" by default.
- **Backup:** The backup port handles network traffic after the Active port's network connection becomes unavailable or is not functioning.

If the LAN2 connection fails, it will be set to backup, and LAN3 becomes active (to continue where LAN2 left off). When the cause of the failover has been fixed, reset LAN2 as the active port as follows:

- 1** In the "LAN2 Configuration" window, click "Active" and the APPLY button.
- 2** On the **NETWORK - Ethernet** page, click the APPLY button.

To release a redundant LAN2/LAN3 bond, deselect the "Redundant" checkbox and apply the changes. If it doesn't release, reboot the SyncServer.

**Allowed Access:** Use this field to restrict network connections to specific IP addresses or a range of IP addresses. If left blank, the port accepts connections from any address. Use a comma as the separator for specific IP addresses and address ranges. Use a dash to in the right-most portion of the IP address to specify a range (e.g., "192.168.47.32-55").

---

#### Note on IPv6

There are two ways of assigning an IPv6 address to a network port:

- If **IP Version** is **IPv4 Auto IPv6**, the SyncServer generates an IPv6 address for the network port automatically. This is an automatically configured IPv6 Link Local Address that IPv6 software derives from the network port's hardware MAC address.
- If the **IP Version** is **IPv6** and the **Connection Mode** is **Static**, a Link Local Address is automatically generated and the user must enter a static IPv6 address with scope.

When the network port already has an assigned (non-auto generated) static IPv6 address, the address and scope are displayed in the IP Address box of the LAN Configuration dialog. For example, if the network port has an assigned static link local address of fe80::2a0:6dff:fe00:10/64, the IP Address box shows fe80::2a0:6dff:fe00:10/64-link. The scope description (e.g. -link, -site, etc.) information is provided for convenience. The user must supply a scope when modifying the IPv6 address or assigning a new IPv6 address but does not need to supply the scope description. However, the SyncServer accepts either form of the input. For example, when inputting the IP address, both of the following IPv6 address inputs are valid:

fe80::2a0:6dff:fe00:10/64-link  
fe80::2a0:6dff:fe00:10/64

---



### Side effects of changing the Ethernet Port configuration:

Changing the IP settings restarts the NTP and xinetd daemons. While they are restarting, the user interfaces and NTP services will be unavailable for a short period. Additionally, the user may observe the following events:

- The Sync LED turns red.
- The NTP Stratum decreases to 16 and an NTP Stratum Change Alarm event occurs (doesn't recur when it increases later).
- The NTP daemon releases and then re-establishes its peers, generating two NTP System Peer Change alarm events.
- The NTP Leap Indicator changes to 3 (Alarm Condition) and then returns to a non-alarm value, generating two NTP Leap Change Alarm events.

---

**Note:** The configuration of the **ADMIN - Alarms** page determines whether the alarm events mentioned above can trigger a system alarm (Alarm LED turns red or orange). In the default factory configuration, the only alarm event that triggers an alarm is the NTP Stratum Change Alarm (severity = major). The others are disabled (severity = none).

---

---

## NETWORK - SNMP

This page provides configuration of basic SNMP settings and the creation of SNMPv3 users.

### Basic Configuration

Establish the identity and community membership of the device.

**sysLocation:** Identify the location of the SyncServer (e.g. Server Room A, Company Division B, etc). Used by network management consoles.

**sysName:** Provide the SyncServer with a unique name. (This is distinct and separate from "hostname" on the **SYSTEM - General** and **STATUS - General** pages.) Used by network management consoles.

**sysContact:** The name of the individual responsible for the SyncServer. Used by network management consoles.

**Read Community:** The SNMP read community string. The string must be provided on SNMP v1/v2c GETS/WALKS to gain access.

**Write Community:** The SNMP write community string.

---

**Note:** At this time, the SyncServer does not support any writable SNMP variables.

---

### V3 Users

This is the list of SNMP v3 users. To delete a user, select the checkbox for a user name and click the **DELETE** button. When prompted, enter the password specified when the user was created.

**User Name:** Name of v3 User.

**Mode:** Currently only rouser (read-only user) mode is supported.

**Level:** Shows the Min Priv level of the user (auth, priv or blank).

### Add v3 User

To create an SNMPv3 user, complete the form and click the **SAVE** button.

**Name:** Alphanumeric user name, with no spaces or special characters.

**Auth Phrase:** Create a unique authentication passphrase for the user. It must be at least eight characters long.

**Auth Crypt:** The encryption algorithm, MD5 or SHA1, used for the Auth Phrase.

**Priv Phrase:** Creates a unique encryption passphrase for messages exchanged between the user and the SyncServer. It must be at least eight characters long.

**Min Priv:** Establishes the minimum authentication level required for the user:

- Authentication: Auth Phrase is always required
- No Authentication: Auth Phrase is not required
- Auth and Privacy: Auth and Priv Phrase are always required

---

## NETWORK - SNMP Traps

Use this page to configure, add, or delete SNMP trap recipients. The page is divided into two sections. The first section displays the current recipients. The second section provides a form for adding recipients or modifying existing recipients. The first section only displays basic information for each recipient.

### Trap Recipients

**Destination:** The IP address to which traps are to be sent.

**Ver:** The SNMP version (v1, v2c or v3).

**(Send as Inform):** If trap is to be sent as inform, 'inform' is written, otherwise is blank.

**User/Community:** For SNMPv1/v2c traps, an optional community. For SNMPv3 traps, a required SNMP v3 user on the recipient system.

### Add/Edit Trap Recipient

**IP Address:** The IP address to which traps are to be sent.

**(Ver):** The SNMP version (v1, v2c, v3).

**User/Community:** For SNMPv1/v2c traps, an optional community. For SNMPv3 traps, a required SNMP v3 user on the recipient system.

**Send as Inform:** Sends an INFORM-PDU, otherwise a TRAP-PDU or TRAP2-PDU is sent.

**Auth Phrase:** For SNMPv3 traps, an optional Auth Phrase.

**(Auth Crypt):** The encryption algorithm used for the Auth Phrase, which is either MD5 or SHA1.

**Priv Phrase:** For SNMPv3 traps, an optional Priv Phrase.

To edit a trap recipient, select the checkbox of a specific recipient and click the **EDIT** button. Edit the values displayed in **Add/Edit Trap Recipient** and click the **SAVE** button. Similarly, use the **DELETE** button to remove trap recipients from the list.

---

## NETWORK - PING

Use this page to PING a network node from the LAN1 network port. This feature can be used to test and troubleshoot network connectivity issues.

To use PING, enter the **IP address** of the host (select the **Ping 6** checkbox if pinging an IPv6 address) and click the **APPLY** button. The SyncServer sends five ping requests, with a timeout allowance of five seconds each, and then displays the results.

---

Note: When a ping request is sent to the SyncServer, the port that receives the request also sends the response.

---

---

## NTP - Sysinfo

Use this page to:

- View the status of the NTP daemon
- Restart the NTP daemon

**system peer:** This is the connection selected by the server as most likely to provide the best timing information. Selection is based on stratum, distance, dispersion and confidence interval. Consult the current NTP documentation (available at <http://www.ntp.org>) for more information regarding the selection process.

The SyncServer's Hardware Clock is known to the NTP daemon as "SYMM\_TE(0)". When the Hardware Clock is synchronized to a timing source (GPS, IRIG, ...), the system peer is "SYMM\_TE(0)". When the NTP daemon is synchronized to another network time server, the system peer is shown as that device's hostname or IP address.

**system peer mode:** The SyncServer's relationship to the source of timing information. The server can obtain time synchronization information in a number of different ways. Each method, or mode, is defined in the NTP documentation. The most common mode of operation is client. Dependent upon the server's configuration, the mode may be one of the following:

- Symmetric Active (1): 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 (2): 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.
- Client (3): 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.

A host operating in client mode occasionally sends an NTP message to a host operating in server mode, perhaps right after rebooting and at periodic intervals thereafter. The server responds by simply interchanging addresses and ports, filling in the required 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.

**leap indicator (LI):** This field provides advance warning of an pending leap second to be inserted/deleted in the last minute 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. The normal value is 00, which indicates everything is operating as expected with no pending events.

LI	Value	Meaning
-----		
00	0	no warning
01	1	last minute has 61 seconds
10	2	last minute has 59 seconds)
11	3	alarm condition (clock not synchronized)

When the server is booted, or if the NTP daemon is restarted, the leap indicator is set to the alarm condition (3). This is to allow NTP clients to recognize that an NTP server is present, but that the server is unable to validate its time base. Once the server has found a valid source of time and set its clock, it will change the leap indicator to the appropriate value. If the NTP leap alarm is configured, an alarm will be generated to inform the administrator of the value change.

**stratum:** This is an eight-bit integer indicating the stratum level of the SyncServer, with values defined as follows:

Stratum	Meaning
1	primary reference (e.g., radio clock)
2-15	secondary reference (via NTP)
16	unsynchronized

This variable provides information about the location of the SyncServer in an NTP hierarchy. When the stratum is 1, the SyncServer is a synchronized to a hardware timing source (i.e., GPS or IRIG). Information regarding what type of hardware source signal is being used is available via the reference id field described below. Conversely, when the stratum is 16, the SyncServer is unsynchronized, indicating that it is still searching for a valid source of timing information. For values ranging from 2 through 15, the SyncServer is being synchronized to a remote NTP server. The particular method of synchronization is available via the mode variable described above. The typical value for a SyncServer is 16 at boot time, transitioning to a 1 once synchronized.

**precision:** This is a measure of the number of significant bits in an NTP time stamp. This value can change and is dependent upon the precision of the selected peer. Lower bits in the time stamp are randomized for security. The value is expressed as a power of 2. 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.

**root distance:** 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. 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 provide information about the source modifying the system clock. 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 provide information about the selected peer. In the case of a SyncServer operating at stratum 1, the reference ID will display the source for the local timing information (i.e., GPS, IRIG, FREE). In the case where the selected peer is another NTP server, the reference ID will display the address of the server or a hash unique to the association between the SyncServer and the remote server.

**reference time:** This is the local time, in time stamp format, when the SyncServer last received an update from the selected peer. If the local clock has never been synchronized, the value is zero. A time stamp of zero corresponds to a calendar time of Thu, Feb 7 2036 6:28:16.000. This value is typically updated every 16 seconds for a locally attached hardware reference (i.e., GPS, IRIG) and in an interval of 64-1024 seconds for a readily accessible remote NTP server.

**system flags:** These flags define the configured behavior of the SyncServer. While these flags do not change under normal use, a definition of the variables is provided.

- **kernel:** Enables the precision-time kernel support for the `ntp_adjtime()` system call. The default for this flag is enable.
- **monitor:** Enables the monitoring facility. This is for future use in the SyncServer.
- **ntp:** Enables the server to adjust its local clock by means of NTP. This is always enabled in the SyncServer.
- **stats:** Enables the statistics facility. This is for future use in the SyncServer.

**jitter:** Jitter (also called timing jitter) refers to short-term variations in frequency with components greater than 10 Hz.

**stability:** Stability refers to the systematic variation of frequency with time and is synonymous with aging, drift, trends, etc.

**broadcastdelay:** The broadcast and multicast modes require a special calibration to determine the network delay between the local and remote servers. Ordinarily, this is done automatically by the initial protocol exchanges between the client and server. In some cases, the calibration procedure may fail due to network or server access controls, for example. This command specifies the default delay to be used under these circumstances. Typically (for Ethernet), a number between 0.003 and 0.007 seconds is appropriate. The default when this command is not used is 0.004 seconds.

**authdelay:** 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.

#### Side effects of restarting the NTP daemon:

While the NTP daemon is restarting, NTP services will be unavailable for a short period. Additionally, the user may observe the following events:

- The Sync LED turns red.
- The NTP Stratum decreases to 16 and an NTP Stratum Change Alarm event occurs (doesn't recur when it increases later).
- The NTP daemon releases and then re-establishes its peers, generating two NTP System Peer Change alarm events.
- The NTP Leap Indicator changes to 3 (Alarm Condition) and then returns to a non-alarm value, generating two NTP Leap Change Alarm events.

---

**Note:** The configuration of the **ADMIN - Alarms** page determines whether the alarm events mentioned above can trigger a system alarm (Alarm LED turns red or orange). In the default factory configuration, the only alarm event that triggers an alarm is the NTP Stratum Change Alarm (severity = major). The others are disabled (severity = none).

---

---

## NTP - Assoc

This page displays information regarding NTP associations. An association is a connection between the SyncServer's NTP daemon and some other time source. Some associations are configured in the **NTP - Config** page and some associations are mobilized when a remote time server connects to the SyncServer. The only time a specifically configured association will not appear is if the remote NTP server is specified using DNS and the name lookup fails.

**Remote:** The name or IP address of the remote end of the NTP association. In the case of the local Hardware Clock, the name of the remote end is "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:

- \* (asterisk) marks the peer to which the server is currently synchronizing.
- + (plus) denotes symmetric active.
- - (minus) indicates symmetric passive.
- = (equals) means the remote server is being polled in client mode.
- ^ (caret) indicates that the server is broadcasting to this address.
- ~ (tilda) denotes that the remote peer is sending broadcasts.

**Local:** The IP address of the SyncServer's local end of the NTP association. In the case of the local Hardware Clock, the name of the local end will be the IP address of loopback port (127.0.0.1). In the case of a remote NTP connection, the IP address corresponds to the port that sends and receives the NTP traffic for this association.

**St:** The stratum level of the NTP association. The stratum level indicates the position of the remote clock in the NTP hierarchy. The values can range from 0-16. Lower values are given more emphasis. In the case of the local Hardware Clock, the stratum will be 0. This is a special value that indicates that the remote clock is not synchronized via NTP, but by some other method such as GPS or IRIG. Values in the range of 1 through 15 indicate the number of steps the remote NTP connection is removed from its timing root. The value 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, when synchronizing to its Hardware Clock (Stratum 0), the stratum of the SyncServer becomes one.

**Poll:** The interval at which the SyncServer is exchanging packets with the remote end of the association. The value is expressed in seconds. In the case of the local Hardware Clock, the polling interval is fixed at 16 seconds. In the case of a remote NTP connection, the polling interval will vary, beginning at 64 seconds and gradually increasing to a maximum of 1024 seconds under normal circumstances. Valid values range from 16 to 65535, increasing by powers of 2.

**Reach:** This is a 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 success or 0 for failure) and old bits fall off the left hand side. The value is represented in octal with a value of 377 indicating 8 successful polls and 0 indicating no successful polls in the last 8 attempts. The value of Reach should gradually increase to its maximum value, "377" and remain there. A value of 1 or more indicates that the remote end is reachable. If the value drops to 0 or changes significantly, there may be a problem polling the remote end of the association.

**Delay:** The total delay, in seconds, of the round trip to the remote end of the NTP association. In the case of the local Hardware Clock, the delay is 0, indicating that the time is available on demand. In the case of a remote NTP connection, typical values range from tens to hundreds of milliseconds. This value is used in the clock selection algorithm. Clocks with lower delay values are given a higher weight in the selection process.

**Offset:** The time offset, in seconds, of the last poll of the association. The offsets of all the associations are used by the NTP server to create confidence intervals that are used in the clock selection process. In the case of the local Hardware Clock, the offset will likely settle in to the microsecond range. In the case of a remote NTP connection, the offset will vary dependent upon the time base of the remote server and the characteristics of the network path separating the endpoints of the association. Values in the one to ten millisecond range are normal.

**Disp:** 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.

**Side effects of restarting the NTP daemon:**

While the NTP daemon is restarting, NTP services will be unavailable for a short period. Additionally, the user may observe the following events:

- The Sync LED turns red.
- The NTP Stratum decreases to 16 and an NTP Stratum Change Alarm event occurs (doesn't recur when it increases later).
- The NTP daemon releases and then re-establishes its peers, generating two NTP System Peer Change alarm events.
- The NTP Leap Indicator changes to 3 (Alarm Condition) and then returns to a non-alarm value, generating two NTP Leap Change Alarm events.

---

**Note:** The configuration of the **ADMIN - Alarms** page determines whether the alarm events mentioned above can trigger a system alarm (Alarm LED turns red or orange). In the default factory configuration, the only alarm event that triggers an alarm is the NTP Stratum Change Alarm (severity = major). The others are disabled (severity = none).

---

---

## NTP - Config

**Current NTP Associations** provides the following information about each NTP association. An association is a connection between the SyncServer's NTP daemon and some other time source.

**Role:** The type of NTP association to configure.

- **Server:** The SyncServer sends NTP requests to the IP address of this NTP Server and listens to it for responses. A server entry for the local Hardware Clock will always be the first entry in the associations list and will contain an address of the Hardware Clock. This entry may not be removed. For Class A, B or C IP Addresses, this command mobilizes a persistent client mode association with the specified remote server. In this mode the local clock can be synchronized to the remote server, but the remote server can never be synchronized to the local clock. This command should NOT be used for broadcast or multicast IP Addresses.
- **Peer:** For Class A, B or C IP Addresses (only), this command mobilizes a persistent symmetric-active mode association with the specified remote peer. In this mode the local clock can be synchronized to the remote peer or the remote peer can be synchronized to the local clock. This is useful in a network of servers where, depending on various failure scenarios, either the local or remote peer may be the better source of time. This command should NOT be used for broadcast or multicast addresses.
- **Broadcast:** For broadcast and multicast addresses (only), this command mobilizes a persistent broadcast mode association. Multiple commands can be used to specify multiple local broadcast interfaces (subnets) and/or multiple multicast groups. Local broadcast messages go only to the interface associated with the subnet specified. In contrast, multicast messages go to all interfaces.

In broadcast mode the local server sends periodic broadcast messages to a client population at the **address** specified, which is usually the broadcast address on (one of) the local network(s) or a multicast address assigned to NTP. The IANA has assigned the multicast group address 224.0.1.1 exclusively to NTP, but other non-conflicting addresses can be used to contain the messages within administrative boundaries. Ordinarily, this specification applies only to the local server operating as a sender; for operation as a broadcast client, see the **broadcastclient** or **multicastclient** commands below.

- **Manycast Client:** The SyncServer listens for manycast client requests on the manycast address, "224.0.1.1" and sends a unicasts response to "224.0.1.1".

A persistent manycast client association is configured using the **manycastclient** command, which is similar to the **server** command but with a multicast (IPv4 class D or IPv6 prefix FF) group address. The IANA has designated IPv4 address 224.1.1.1 and IPv6 address FF05::101 (site local) for NTP. When more servers are needed, it broadcasts manycast client messages to this address at the minimum feasible rate and minimum feasible time-to-live (TTL) hops, depending on how many servers have already been found. There can be as many manycast client associations as different group address, each one serving as a template for a future ephemeral unicast client/server association.

- **Broadcast Client:** This command enables reception of broadcast server messages to any local interface address. Upon receiving a message for the first time, the broadcast client measures the nominal server propagation delay using a brief client/server exchange with the server, then enters the broadcast client mode, in which it synchronizes to succeeding broadcast messages. In order to avoid accidental or malicious disruption in this mode, both the server and client should operate using symmetric-key authentication.
- **Manycast Server:** Manycast servers configured with the **manycastserver** command listen on the specified group address for manycast client messages. Note the distinction between manycast client, which actively broadcasts messages, and manycast server, which passively responds to them. If a manycast server is in scope of the current TTL and is itself synchronized to a valid source and operating at a stratum level equal to or lower than the manycast client, it replies to the manycast client message with an ordinary unicast server message.
- **Multicast Server:** A multicast server is configured using the **broadcast** command, but with a multicast group address instead of a broadcast address.
- **Multicast Client:** A multicast client is configured using the **multicastclient** command with a multicast group address. However, there is a subtle difference between IPv4 broadcasting and multicasting. IPv4 broadcasting is specific to each interface and local subnet address. If more than one interface is attached to a machine, a separate **broadcast** command applies to each one separately. This provides a way to limit exposure in a firewall, for example. For IPv6 the same distinction can be made using link-local prefix FF02 for each interface and site-local FF05 for all interfaces.

IP multicasting is a different paradigm. By design, multicast messages travel from the sender via a shortest-path or shared tree to the receivers, which may require these messages emit from one or all interfaces, but carry a common source address. However, it is possible to configure multiple multicast group addresses using multiple **broadcast** or **multicastclient** commands. Other than these particulars, multicast messages are processed just like broadcast messages. The calibration feature in broadcast mode is extremely important since IP multicast messages can travel far different paths through the IP routing fabric than ordinary IP unicast messages.



### About Multicasting

Multicasting can be used to extend the scope of a timekeeping subnet in two ways: multicasting and anycasting. A general discussion of IP multicast technology is beyond the scope of this document. In simple terms, a host or router sending to an IPv4 or IPv6 multicast group address expects all hosts or routers listening on this address to receive the message. There is no intrinsic limit on the number of senders or receivers and senders can be receivers and vice versa. The IANA has assigned multicast group address IPv4 224.0.1.1 and IPv6 FF05::101 (site local) to NTP, but these addresses should be used only where the multicast span can be reliably constrained to protect neighbor networks. In general, administratively scoped IPv4 group addresses should be used, as described in RFC-2365, or GLOP group addresses, as described in RFC-2770.

**Address:** The IP address or DNS name of the NTP association to configure.

**Prefer:** Marks the server as preferred. All other things being equal, this host will be chosen for synchronization among a set of correctly operating NTP servers.

#### 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 with the `server` command. This setting should only be used in agreement with the administrator of the remote NTP device as the traffic load may be onerous. This setting is not valid for reference clocks.
- **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. This setting is not valid for reference clocks.

**Version:** Specifies the version number to be used for outgoing NTP packets. Versions 1-4 are the choices, with version 4 the default.

**Minimum / Maximum Poll Interval:** These options specify the minimum and maximum poll intervals 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). The minimum poll interval defaults to 6 (64 s), but can be decreased to a lower limit of 4 (16 s).

**Key:** All packets sent to and received from the server or peer are to include authentication fields encrypted using the specified key identifier with values from 1 to 32768, inclusive. The user may specify values between 1 and 12. The default is to include no encryption field.

**Time to Live:** This option is used only with broadcast server and manycast client modes. It specifies the time-to-live on broadcast server and multicast server and the maximum time-to-live for the expanding ring search with manycast client packets. Selection of the proper value, which defaults to 127, is something of an art and should be coordinated with the network administrator.

### Adding and deleting associations

To edit or delete an association, select the checkbox for a specific association and click the **EDIT** or **DELETE** button.

To edit or add a new association, add or modify the information displayed in *Add/Edit NTP Association* and click the **SAVE** button.

### Side effects of restarting the NTP daemon:

While the NTP daemon is restarting, NTP services will be unavailable for a short period. Additionally, the user may observe the following events:

- The Sync LED turns red.
- The NTP Stratum decreases to 16 and an NTP Stratum Change Alarm event occurs (doesn't recur when it increases later).
- The NTP daemon releases and then re-establishes its peers, generating two NTP System Peer Change alarm events.
- The NTP Leap Indicator changes to 3 (Alarm Condition) and then returns to a non-alarm value, generating two NTP Leap Change Alarm events.

---

**Note:** The configuration of the **ADMIN - Alarms** page determines whether the alarm events mentioned above can trigger a system alarm (Alarm LED turns red or orange). In the default factory configuration, the only alarm event that triggers an alarm is the NTP Stratum Change Alarm (severity = major). The others are disabled (severity = none).

---

---

## NTP - MD5 Keys

Use this page to generate or manipulate keys to be used with the MD5 (Message Digest 5) authentication method. MD5 Keys are used to authenticate (not encrypt) NTP messages sent or received by the SyncServer, using a cryptochecksum.

Use this page to manage MD5 keys as follows:

- 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.

**Generate:** This button generates new random MD5 keys.

**Current Keys:** This window displays the current list of keys. The first line identifies the device (hostname) and the file time stamp of the creation date.

The second line shows the time and date the keys were generated.

The keys displayed in the Current Keys window cannot be edited directly.

Each row of key information provides the following information:

- The key number, 1 through 16
- The key type, "MD5".
- The key, an ASCII string containing only displayable characters. As an example, the random key generator may produce "\jdh.u\$rx"y:upH"
- A comment that identifies the key type. For example: "# MD5 key"

**Upload Keys:** Use this text field, with the BROWSE button, to enter the file path of the keys file. Then click the UPLOAD button to load the keys to the SyncServer.

---

**Note:** Generating or uploading new keys will NOT replace the previous set of keys until the Restart button is pressed or the unit is restarted,

---

**Download Keys:** Press the Save As... button to save the Current Keys to your PC as a file.

---

## TIMING - GPS

This page can be used in several ways:

- To view or set the GPS receiver's Position and Mode.
- To view or set the GPS Antenna Cable Delay.

**Position:** The position of the GPS antenna in Latitude, Longitude, in degrees, minutes, and seconds, and the cardinal points of the compass. The Altitude is given in Meters.

If needed, consult the “Latitude\_Longitude” folder on the product CD for the coordinates of a nearby city or location.

**Mode:**

- **Survey:** In this mode, the receiver averages its position and then switches to Position Hold mode in order to achieve the highest degree of timing accuracy. This is the default setting.
- **Dynamic:** In this mode, the receiver continuously updates its position to calculate the best timing solution for a mobile environment.
- **Position Hold:** In this mode, the receiver uses a static position to achieve the highest degree of timing precision and accuracy. The position may be automatically obtained by the receiver completing Survey mode, or may be entering manually by the user.

**Antenna Cable Delay:** The amount of time it takes the GPS signal to travel the length of the antenna cable in nanoseconds (nS). Setting this value is only required for the precise timing of the Hardware Clock; it doesn't have a material effect on NTP timing. Select the signal propagation rate from the table below and multiply it by the length of the cable to arrive at the cable delay:

RG-58	1.4 nS/foot	4.59 nS/meter
RG-59 (provided)	1.24 nS/foot	4.06 nS/meter

### Setting Position and Mode

The SyncServer's default settings assume that the SyncServer is being used in a stationary installation, such as a server room in a building. When the SyncServer is started, the GPS receiver enters Survey mode, determining and averaging its position. Upon completing the survey, the GPS receiver switches to Position Hold mode and remains in that mode.

Typically, changing the mode or entering the position *is not necessary or recommended*. However, the user should change the default settings under the following conditions:

- The SyncServer is being used on a mobile vehicle: Set the receiver to Dynamic mode. This forces the GPS receiver to update its position continuously. The receiver remains in Dynamic mode indefinitely.
- The GPS receiver is having trouble acquiring enough satellites to lock or remain locked. Troubleshoot the antenna site and cabling first. If this doesn't solve the problem, enter the best known GPS position (Latitude, Longitude, Altitude) manually, and put the receiver in Position Hold mode. This allows the GPS receiver to derive time from a limited number of satellites.

---

Note: The Hardware Clock's timing accuracy is degraded by any offset between the position entered and the GPS receiver's true position. A significant offset between the two positions could disqualify the Hardware Clock as a valid timing reference.

---

---

## TIMING - Time Zone

This page is used to determine the SyncServer's local time. Each time zone defines an offset from UTC and an optional daylight saving time set of rules. Select a Time Zone from the list and click the APPLY button.

About the Time Zones list:

- Most of the Time Zones are organized alphabetically by *continent* and *city name*.
- Island nations can be found under the *Atlantic* and *Pacific* categories.
- Some Time Zones are listed by *country* and *city name*.
- Some Time Zones are listed by their abbreviations (e.g., EST = Eastern Standard Time)

The Time Zone setting affects the time shown on the front panel display. Additionally, if the Output Type on the TIMING - IRIG-B page is set to "Local", the Time Zone setting affects the time encoded in the IRIG time code.

---

## TIMING - IRIG-B

Use this page to configure the **IRIG In** and **IRIG Out** connectors on the rear panel.

**Locked:** Indicates the presence of a valid IRIG input.

**Input Mode** (IRIG In connector) and **Output Mode** (IRIG Out connector):

- **IRIG-B:** Standard IRIG-B 123 time code.
- **IRIG-B (Legacy TrueTime):** Standard IRIG-B with four time-quality bits and a lock indicator encoded in the control bits.
- **IRIG-B with IEEE 1344 extension:** Standard IRIG-B with information encoded in the control bits per the IEEE 1344 standard. These include year, daylight saving time, leap second, time quality, and parity information.
- **Auto:** (Input Mode only) Automatically selects one of the modes above, based on the incoming signal.

---

**Note:** NOTE: IRIG-1344 only provides a leap warning during the last minute of the day of the event. In this case, while the SyncServer will propagate that information via NTP, most NTP clients will not query the SyncServer in time to be warned of the leap event.

---

**Output Type:** Set the type of time encoded in the IRIG-B time code output.

- **UTC:** Standard IRIG encodes UTC. This is the factory default setting.
- **Local:** *Non-standard* IRIG encoded with the local time offset instead of UTC. See the **TIMING - Time Zone** page for information on setting the local time.

**Cable Delay (nS):** Compensate for the time delay in the output cable. This adjustment is used to put the end of the output cable “on-time”. Select the signal propagation rate from the table below and multiply it by the length of the cable to arrive at the cable delay.

RG-58    1.4 nS/foot    4.59 nS/meter

RG-59    1.24 nS/foot    4.06 nS/meter

---

## TIMING - Sysplex

Use this page to configure the **Sysplex Timer-Out** connector on the rear panel.

**Autostart:** This selection starts the output of the Sysplex port's time once per second automatically. If Autostart is not selected or if manual control of the output is desired, the user can start the time once per second output by typing a 'C' or 'c' on the Sysplex port. An 'R' or 'r' character will halt the transmission.

**Parity:** The Sysplex parity setting (Odd, None, Even).

### Flywheel Quality Character:

A time quality character is always appended to the Sysplex output string. The valid time quality character is a space (" ") while the invalid time quality character is an "X". However, because the SyncServer's Hardware Clock has the ability to flywheel, the user has been given the option to select one of the following time quality characters to be appended during the 'flywheel' condition:

- **X:** Appends the invalid time quality character "X" to the Sysplex output string when the Hardware Clock is 'flywheeling'. This is the Sysplex standard.
- **None:** Appends the valid time quality character space to the Sysplex output string when the Hardware Clock is 'flywheeling'.
- **F:** Appends a special time quality character "F" to the Sysplex output string when the Hardware Clock is 'flywheeling'.

---

## TIMING - HW Clock

Use this page to configure the HW Clock.

The Hardware Clock (HW Clock) provides accurate time to the SyncServer from one of its timing references, allowing it to operate as a Stratum 1 Network Time Protocol server.

The SyncServer automatically detects and synchronizes the Hardware Clock to the highest available reference in the following order:

- GPS
- IRIG
- 1 PPS
- 10 MHz

If the reference becomes unavailable, the HW Clock uses the next highest available reference in the list.

If no other references are available, the HW Clock provides holdover by "flywheeling" on its oscillator until a reference becomes available again. During this time, "REF" on the front panel TIME screen (press the **TIME** button) is "None", while the "NTP Stratum" remains "1". "REF" on the front panel NTP Status screen (press the **STATUS** button) changes to "FLY".

If no references become available, and the oscillator's estimated drift exceeds the user-set **Max Drift Error**, the NTP daemon gets its time from other available NTP references (e.g., ntp1.symmetricon.com - an NTP Stratum 1 reference). At this time, "REF" on the TIME screen becomes "NTP" and "NTP Stratum" degrades from "1" to the stratum of the NTP reference plus one. For example, with ntp1.symmetricon.com as its primary reference, the SyncServer's "NTP Stratum" becomes "2". "REF" on the STATUS screen changes to the IP address of the synchronizing peer.

If references that **set the time** (GPS, IRIG, and NTP references) are not available, but a timing reference (1 PPS, 10 MHz) is, the user can set the time manually. See the "Setting the Time Manually" section below.

---

**Note:** When providing a **backup** reference source for the GPS or IRIG Input references, Symmetricon recommends **using the 10 MHz Input**. An unsynchronized 1 PPS Input may cause the NTP daemon to disqualify the HW Clock and rely on a lower-stratum NTP reference instead, if one is available.

---



**Oscillator Type:** The type of oscillator in use. Three different oscillator types are offered in the SyncServer.

- **TCXO** – This is the standard temperature compensated oscillator.
- **OCXO** – This optional oven oscillator is more stable and offers better holdover performance than the TCXO.
- **Rubidium** – This optional oscillator is more stable and has better holdover performance than the OCXO.

**Max Drift Error (millisec):** This value, in milliseconds, determines the estimated maximum time error that can accumulate before the HW Clock comes unlocked and the SyncServer disqualifies it as a timing input. If the HW Clock comes unlocked, and the SyncServer is configured to get time from other remote NTP servers, the SyncServer will switch peers, change to the appropriate stratum and continue serving NTP packets.

As noted in the web interface:

- The standard Temperature Controlled Oscillator (TCXO) has an estimated drift of 21 milliseconds/day (5° C delta).
- The optional Oven Controlled Oscillator (OCXO) has an estimated drift of 1 millisecond/day (5° C delta).
- The Rubidium oscillator has an estimated drift of 6-25 microseconds/day (5° C delta).

For example, if the user sets Max Drift Error to 1 millisecond, and the SyncServer is equipped with a Rubidium oscillator, the SyncServer can continue serving NTP Stratum 1 packets for approximately 40 days before the SyncServer is forced to search for an alternate reference.

---

**Note:** When "Max Drift Error" is set to 0, the SyncServer substitutes a value of 1 millisecond. This is also the default factory configuration.

---

**Forced Timing Source:** Forces the Hardware Clock to synchronize to a specific timing source.

- **Auto:** The SyncServer automatically detects and synchronizes the Hardware Clock to the timing reference(s) in the following order: GPS, IRIG-B, 1 PPS, 10 MHz. This is the factory default setting.
- **GPS:** Hardware Clock synchronizes to GPS only.
- **IRIG-B:** Hardware Clock synchronizes to IRIG-B only.
- **1 PPS:** Hardware Clock synchronizes to rising edge of the 1 PPS input only. The user should set the SyncServer's time while using this mode. The APPLY button operates as the on-time mark.

---

**Note:** There may be a significant lag between the submission of the page and the time set operation. The **SETTIMEOFYEAR** command is available from the command line interface for setting the Hardware Clock time with less latency.

---

- **Ext 10 MHz:** Hardware Clock synchronizes to the 10 MHz as a frequency reference only. The user should set the SyncServer's time while using this mode. Following the submission of this page, using the **APPLY** button operates as the on-time mark. Note that the 10 MHz input is normally used when the SyncServer's Hardware Clock is operated in Auto mode as a fail-over from a time reference. It is also assumed that the 10 MHz input has better holdover and stability specifications than the SyncServer's internal oscillator.
- **Free Run:** Forces the Hardware Clock to ignore all references. This puts the SyncServer oscillator into free running mode. If needed, the user can manually set the SyncServer's UTC time while using this mode. The SyncServer takes submission of this page using the **APPLY** button as the on-time mark.

**UTC Time:** Enter the UTC time here to set the Hardware Clock. Available when "Forced Timing Source" is set to 1 PPS, Ext 10MHz, or Free Run.

---

**Note:** Any time the Hardware Clock is set, the SyncServer's Software Clock and battery-backed RTC are synchronized as well. The SyncServer also **RESTARTS** the NTP daemon after any clock change.

---

## Setting the Time Manually

When Forced Timing Source is set to 1 PPS, Ext 10MHz, or Free Run, the user can set the time manually from the web interface or the command line interface. An adjust time command is also available from the command line interface.

**Using the Web Interface:** Enter the **UTC Time** on the **TIMING - HW Clock** page and click the **APPLY** button. The SyncServer applies the UTC Time at the next internal PPS rising edge after receiving the web page.

**Using the Command Line:** Open a command line session to the Console RS-232 port or the LAN1 network port and log in as "admin" followed by the password. Enter the **SETTIMEOFYEAR** command followed by the time in one of the following formats:

```
x.y  
mm/dd/yyyy hh:mm:ss.x  
yyyy ddd hh:mm:ss.x  
MON dd yyyy hh:mm:ss.x  
hh:mm:ss.x
```

In "x.y" format:

- x = UTC seconds
- y = fractions of a second

In the remaining formats:

- mm = month 01 through 12
- dd = day 01 through 31
- ddd = day of year 001 through 366
- yyyy = four-digit year
- MON = first three letters of the month (e.g., "JAN")
- hh = hours 00 through 23
- mm = minutes 00 through 59
- ss = seconds 00 through 59
- x = fractions of a second

---

## SYSTEM - General

Use this page to:

- Set the system hostname
- Configure the SyncServer to automatically check for software upgrades.

**Hostname:** The hostname is used to identify the system (default is "SyncServer").

**Software Update Availability Check:** Enables the SyncServer to check <http://update.symmetricom.com/upgrade.txt> for software upgrades shortly after noon local time, Monday through Friday.

When an upgrade is available, the SyncServer displays a notice on the **STATUS - General** page. This feature is enabled by default. In order to function, LAN1 must have:

- Firewall access to the Internet (port 80)
- One or more valid DNS server addresses

Additionally, the SyncServer can be configured to generate an alarm, SNMP trap, and/or email notification message when an upgrade becomes available. To do this, go to the **ADMIN - Alarms** page, set the "System Upgrade Alarm" severity to Major or Minor, and select the "Send Trap" and "Send Email" checkboxes. In the factory default configuration, "Send Trap" is enabled and "Send Email" is not.

To manually check if an update page is available, visit <http://update.symmetricom.com/upgrade.txt> and compare the version number ("Version=") with the "Release Version" on the **STATUS - General** page, or contact Symmetricom Customer Service.

---

## SYSTEM - Upgrade

Use this page to upgrade the SyncServer's software. See the help topic "Upgrading System Software" for more information.

### Upgrading System Software

- 1 Download the system upgrade file from ***www.symmetricom.com*** (see Symmetricom Web Site - <http://www.symmetricom.com>).
- 2 On the **SYSTEM - Upgrade** page, click the **BROWSE** button under *Upload Upgrade Package to SyncServer*. This opens a Choose File window.

- 3 In the **Choose File** window, locate and double-click the downloaded system upgrade file.
- 4 Click the **UPLOAD** button. The web interface displays "Uploading Upgrade File!" while the file is copied to the SyncServer. When the upload is complete, system upgrade file is visible under **Manage Files in SyncServer**.
- 5 Select the upgrade file in **Current Files** and click the **INSTALL** button. The SyncServer displays an install log while installing the software. The browser will keep refreshing until the SyncServer reboots and displays a new login screen.

If LAN1 changes IP address during the reboot (DHCP reassigns a new IP address), the browser will be unable to display the login page. If this happens, obtain the IP address by pressing the **STATUS** button on the front panel three times until the LAN1 STATUS screen is visible. Manually direct the browser to the new IP address. The browser should display the SyncServer's Login page.

**Optional Parameters:** This field can be used to supply optional installation parameters, if required. This field is not required for normal operation.

**Manage Files in SyncServer** can also be used to:

- Delete files uploaded to the SyncServer using the **DELETE** button.
- View upgrade history files automatically generated during the upgrade process using the **VIEW** button.

---

## SYSTEM - Factory Reset

Use this page to restore the SyncServer's original factory default configuration settings.

Before resetting the configuration to factory defaults, the user should consider saving a configuration backup file to their workstation or USB flash drive in case they decide to restore the current configuration at some point in the future. To perform a backup, use the **WIZARDS - Backup** page or the **MENU** button on the front panel and select "4) USB".

To reset the factory defaults, select **Reset to Factory Defaults** and click the **APPLY** button. This reboots the SyncServer and restores the factory default configuration.

This feature resets *\*ALL\** of the SyncServer's configuration settings, and restores the SyncServer's original factory configuration. Upon completing the restoration of the factory configuration, the SyncServer reboots. The browser will remain open, but will not be able to reconnect to the SyncServer at its previous IP address unless the SyncServer is using the default address.

To reconnect to the SyncServer's web interface, reconfigure the LAN1 port's IP address using the **STATUS** button and the keypad display. Connect to the SyncServer's new IP address using a browser. Log in to the web interface using the factory default "admin" user name, and "symmetricon" password.

Configuration data reset to defaults by this operation:

- LAN Configuration for all ports
- NTP Associations
- Hostname
- All settings defined on the **ADMIN** pages (Web, Users, Alarms, Logs Config), including the "admin" password, password recovery settings, etc.
- All services are reset to their default modes of operation
- Hardware Clock settings, including forced mode, Time Zone, Position and Max Drift Error, IRIG Input and Output, etc.
- All cryptographic materials (NTP keys, sshd keys, SNMP users and communities) deleted.
- Logs are erased

---

## ADMIN - Web

Use this page to:

- Configure the SyncServer status information displayed on the login page.
- Modify the behavior of the web interface.

### Configuring the Login Page

The user may choose to:

- Display a range of status information on the login page. This is convenient for status monitoring without logging in, particularly if the LAN1 port is on a private administrative network.
- Conceal information on the login page that identifies the SyncServer, thus making it more difficult for unauthorized users to recognize the SyncServer via its web interface.

The login page choices are:

- **Plain:** Generates a plain login page, without any system identification or graphics.
- **Graphic:** Generates a login page that includes a graphic image of the SyncServer and configurable system information.

The configurable system information includes the following choices:

- **Title:** A user-determined text string at the top of the login page.
- **Time, Hostname and LEDs:** The local time, the hostname, and the status LEDs.
- **NTP Status:** The NTP Stratum and Reference ID.
- **Hardware Clock Status:** The current sync source and whether the Hardware Clock is locked.
- **GPS Receiver Status and the Satellite Count:** GPS receiver is providing timing information and the number of satellites visible.
- **Highest Severity Alarm:** The name of the most recent and most severe pending alarm.
- **Version Information and Uptime:** The model number, software version, and uptime since the unit was started.
- **IP Addresses for all Configured LAN Ports:** The MAC, IPv4, and IPv6 addresses of the LAN ports.

## Modifying the Web Interface Behavior

Beyond the login page, the user can determine the behavior of the web pages.

### Warn when Navigating without saving Changes: (Enabled by default)

- When this feature is enabled, the SyncServer sends warnings messages if the user makes settings changes and navigates away from the page without clicking the APPLY button. This reduces the possibility of accidentally losing unsaved changes.
- When this feature is disabled, the SyncServer suppresses these warning messages.

### Save Configuration Changes when Submitted: (Enabled by default)

- When this feature is enabled, the SyncServer updates the configuration *backup file* in non-volatile memory when the user applies or saves changes to the configuration. This may slow the web interface's response time, but ensures that the current configuration is backed up and will be restored if the SyncServer is rebooted.
- When this feature is disabled, the SyncServer does not update the backup file when the user applies or saves changes to the configuration. This may improve the web interface's response time to applied changes but leaves the backup file unchanged. This option can be useful for keeping a "known good configuration" available while trying out experimental configurations. If the experimental configurations aren't satisfactory, use the **WIZARDS - Restore** page to restore the known good configuration. Once the desired configuration is reached, manually save the configuration backup file to non-volatile memory using the **WIZARDS - Backup** page.



---

## ADMIN - Users

Use this page to:

- Set a new password
- Enable and configure password recovery

The new password must contain six or more characters, including lower and upper case letters, or letters and at least one number.

With password recovery enabled, the user can reset the password to a random string from the Login page by correctly answering the password recovery question. The SyncServer then sends an email message containing the new password to the email address supplied on the **ADMIN - Users** page.

The SyncServer must have a valid SMTP Gateway addresses for password recovery to work. If a DNS server is not available to LAN1, the SMTP gateway must be entered as an IP address, not as a DNS name. If needed, contact the system administrator to obtain this information.

### Changing the Password and Enabling Password Recovery

- 1** Enter the **Old Password**.
- 2** Enter the **New Password** and **Retype New Password**.
- 3** Select the **Password Recovery** checkbox.
- 4** Select a **Recovery Question** and enter the **Answer**.
- 5** Enter an **Email Address** and the **SMTP Gateway's** IP address or DNS name (if DNS is configured for LAN1).
- 6** Click the **APPLY** button.

---

Notes:

- Once applied, test question, answer, and email address data will not remain visible on the page.
  - The SMTP Gateway entered here is also used for email notification of alarms. However, email addresses for alarm notification are entered on the **SERVICES - Email** page. Email notification of alarms is configured on the **ADMIN - Alarms** page.
-

---

## ADMIN - Alarms

Use this page to:

- Configure which system events raise an alarm.
- Control the alarm state and behavior.
- Enable or disable logging and notification by email and SNMP.

The Alarm LED on the front panel indicates major and minor alarms from this page:

- The Alarm LED is red if the highest severity pending alarm is Major.
- The Alarm LED is orange if the highest severity pending alarm is Minor.
- The Alarm LED is green if there are no pending Major or Minor alarms.

### Alarms Configuration and Notification

**Name:** The name of the alarm.

**State:** A graphic LED indicating the *severity* of alarm event at the time the page was generated:

- Grey LED: Alarm is disabled (Severity is set to *None*).
- Green LED: Alarm is enabled (Severity is set to *Major* or *Minor*) and there is no pending alarm event (or it has cleared).
- Orange LED: Alarm is enabled (Severity is set to *Minor*), and an alarm event has raised an alarm.
- Red LED: Alarm is enabled (Severity is set to *Major*), and an alarm event has raised an alarm.

---

**Note:** To check the current state of the alarms, click the refresh icon (rotating arrows) at the lower right corner of the page.

---

**Clear Now:** Returns pending Major or Minor alarms to a "No Alarm" state, regardless of the alarm input's state.

---

**Note:** If the alarm input is in the alarm state, the alarm may immediately become pending again. This function is most useful for alarms that are "edge" triggered (e.g., System Health, NTP Stratum Change, NTP Peer Change, etc).

---

**Auto Clear:** Automatically clears the alarm after 15 minutes, regardless of the alarm event's state.

---

**Note:** If the alarm input is in the alarm state, the alarm may immediately become pending again. This function is most useful for alarms that are “edge” triggered. (e.g., System Health, NTP Stratum Change, NTP Peer Change, etc).

---

**Severity:** Determines the severity of the alarm event. All alarm events, regardless of severity, can be logged and can generate both SNMP traps and email notification:

- None: Does not raise an alarm (No change to Alarm LED color).
- Minor: Raises a minor system alarm (Alarm LED = Orange).
- Major: Raises a major system alarm (Alarm LED = Red).

**Send Trap:** The alarm event generates an SNMP trap when it occurs, and if/when it ends or self-clears. SNMP must be configured correctly on the **NETWORK - SNMP** and **NETWORK - SNMP Traps** pages for this to work.

**Write Log:** The alarm event generates a log entry in syslog when it occurs, and if/when it ends or self-clears. The log can be viewed under **LOGS - syslog**.

**Send Email:** The alarm event generates a descriptive entry in an email message when it occurs and if/when it ends or self-clears. The SyncServer checks for outgoing mail at five-minute intervals so the email alert may contain more than 1 alarm event. For Send Email to work, the **SERVICES - Email** page must be configured with a valid SMTP Gateway and email address. If the SMTP gateway is a DNS name, the LAN1 port on **NETWORK - Ethernet** must be configured with a valid DNS server address.

---

**Note:** All alarm events, regardless of Severity (including "None"), can generate SNMP traps, log entries, and email messages if these selections are enabled.

---

## Explanation of Alarms

The SyncServer monitors the following events, which can be configured to raise Major and Minor alarms. The factory default settings include selected list of events that can generate traps and produce log entries. The user can customize which events raise alarms and generate traps, log entries and email alerts.

**NTP System Peer Change Alarm:** This alarm will be raised any time the SyncServer's current NTP synchronization peer changes.

**NTP Leap Change Alarm:** The NTP Leap Indicator has changed state (see the **Status - NTP** page). This alarm typically occurs because the SyncServer was reconfigured, causing the NTP daemon to be restarted. More rarely, this can occur when the SyncServer is within 24 hours of a leap event.

**System Network Alarm:** A configured network port has lost its connection. The SyncServer constantly monitors the link state of configured network devices. If the link is lost, an alarm will be generated if this alarm source is configured.

**System Upgrade Alarm:** The SyncServer checks for software upgrades and raises this alarm if a software upgrade is available. Symmetricom recommends leaving this alarm enabled.

---

**Note:** In order to detect upgrades, the SyncServer must be correctly configured with a DNS server and must have http access to the Internet through port 80. This feature is enabled by default, but can be disabled on the **SYSTEM - General** page.

---

**System Config Change Alarm:** Generates an alarm if the system configuration has been changed. If the Auto Clear is not selected, this alarm will remain pending until cleared by the administrator.

**System Health Alarm:** The web interface has been unable to automatically save user configuration changes to the backup file. The user might need to perform a manual backup using the **WIZARDS - Backup** page.

**System Up/Down Alarm:** The SyncServer has been restarted.

**System Authentication Alarm:** The SyncServer detected a failed login attempt on the web interface.

**Timing No Source Alarm:** The Hardware Clock does not have a valid timing reference.

**Timing GPS Source Alarm:** (Displayed on GPS-equipped SyncServers only)  
The GPS time reference is not providing valid timing information. This may be caused by:

- An insufficient number of visible GPS satellites.
- The GPS satellite signals may be blocked from reaching the antenna, or are too weak to be detected by the receiver.
- The GPS antenna cable may be disconnected, broken, shorted, or too long.

**Timing IRIG Source Alarm:** (not displayed on the SyncServer 200)The Hardware Clock is not detecting a valid input signal on the IRIG In connector.

**Timing PPS Source Alarm:** The Hardware Clock is not detecting a valid input signal on the 1PPS In connector.

**Timing 10 MHz Source Alarm:** The Hardware Clock is not detecting a valid input signal on the 10 MHz In connector

**Timing GPS Antenna Short Alarm:** (Displayed on GPS-equipped SyncServers only) The GPS receiver detects an overcurrent condition on the GPS antenna cable. The likely cause is a short circuit.

**Timing GPS Antenna Open Alarm:** (Displayed on GPS-equipped SyncServers only) The GPS receiver detects too little current in the power supplied to the GPS antenna. The likely cause is a disconnected or broken GPS antenna cable. A GPS splitter may also cause this condition.

**Timing Oscillator DAC Range Alarm:** The SyncServer is applying the maximum or minimum DAC value to steer the oscillator. If this recurs frequently or over a sustained period of time, there may be a problem with the oscillator.

**Timing Rubidium Lock Alarm:** The optional Rubidium oscillator, if installed, has not stabilized its frequency output. After power up, this alarm may be raised for up to several minutes until the Rubidium warms up and stabilizes its frequency output.

**Timing Oscillator Unlock Alarm:** The Hardware Clock's oscillator frequency is not locked to the reference source.

**Timing Source Change:** The Hardware Clock has switched timing references.

**Timing Source Change Lower Accuracy Input:** The Hardware Clock has switched to a lower-accuracy timing source. The priority list is as follows (some may not be present in your model): GPS, IRIG, 1PPS, 10MHz.

**Timing PLL Unlock Alarm:** The Hardware Clock oscillator's PLL unlocked.

**Timing Time Quality 1e-6 Alarm:** The Hardware Clock's estimated time error has exceeded 1e-6 seconds (1 microsecond).

**Timing Time Quality 1e-5 Alarm:** The Hardware Clock's estimated time error has exceeded 1e-5 seconds (10 microseconds).

**Timing Time Quality 1e-4 Alarm:** The Hardware Clock's estimated time error has exceeded 1e-4 seconds (100 microseconds).

**Timing Time Quality 1e-3 Alarm:** The Hardware Clock's estimated time error has exceeded 1e-3 seconds (1 millisecond).

**Timing Leap Event Alarm:** The leap indicator from the Hardware Clock's GPS or IRIG 1344 timing references, indicates that a leap event is pending (see the **STATUS - TIMING** page). The pending event can be a Leap Second Insertion, Leap Second Deletion, or Clear Alarm, which indicates that the alarm has passed.

---

Note: IRIG-1344 only provides a leap warning during the last minute of the day of the event. In this case, while the SyncServer will propagate that information via NTP, most NTP clients will not query the SyncServer in time to be warned of the leap event.

---

**LAN1 Link Alarm:** A network connection is not available on LAN1. Note that if LAN1 is down, SNMP and Email notification do not work and the web interface is not available.

**LAN2 Link Alarm:** LAN2 has lost its network connection.

**LAN3 Link Alarm:** LAN3 has lost its network connection.

---

## ADMIN - Logs Config

Use this page to configure the SyncServers logging subsystem. The SyncServer uses klogd and syslogd, the standard logging facilities. What is logged and where it is logged is based on the options selected in this page. A default set of options is preconfigured that should provide a level of detail sufficient for the majority of applications. Each entry is broken down into facility and priority, where facility is the part of the system such as the kernel or the application daemons and priority indicates the severity of the message. The priority ranges from "Emerg", which represents only very significant events like kernel panics to "Debug", where even debug messages are logged. Messages are generally logged to different files to allow easier parsing. The messages file is unique however in that its default configuration captures all messages flowing through the logging daemons. But, due to the high volume of traffic, it is cleared at each power cycle or reboot.

Most users should leave the logs configured in the default manner unless directed to make changes by Symmetricon technical support.

### Log Types

**syslog:** syslog holds messages about system level events. Examples of system events are privilege changes (i.e., sudo) and messages about regularly scheduled events such as cron.

**auth.log:** The authentication log contains entries regarding authentication events from login or PAM (Pluggable Authentication Module).

**kern.log:** The kernel log contains entries submitted by the kernel. Examples of kernel events are network errors or hardware changes.

**daemon.log:** The daemon log contains entries submitted by the daemon processes that provide the services in the SyncServer. Examples of daemon log entries are NTP changes, SNMP events, and xinetd events.

**messages:** The messages file is something of a catchall file. By selecting various priorities, it is possible to capture large amounts of data regarding system operation. However, the volume of data becomes impractical to manage quickly. As such, this file is cleared at each power cycle or reboot.

**events:** The events log is not configurable. This log is maintained outside syslogd and contains configuration and event data related to operations performed in the web interface.

## Log Priorities

In the case of kernel, syslog, auth and daemon logs, the priority specified will cause all messages greater than or equal to the selected priority to be logged. The priorities are defined in ascending order.

In the case of the messages log, only the selected priorities are logged. As such, up to four priority levels are supported.

**debug:** This priority level captures debug output from applications designed to produce this type of output. This level generates a large volume of traffic and is not recommended unless it is done under the direction of technical support personnel. An example may be a signal handler called.

**info:** This level captures informational output. This level typically provides information regarding successful operations. An example may be a successful file save or a normal application startup.

**notice:** This level captures transactional information. An example of this could be a network connection or login.

**warning:** This level captures information that is not expected by the application or system. This could be something the system is not configured to handle. An example might be a malformed network packet or a drive change caused by inserting a thumb drive into a USB slot.

**err (deprecated):** The use of this level is deprecated.

**crit:** This level captures critical information. This data can often be used to debug the failure of a system or application under abnormal conditions. An example of this may be a memory error.

**alert:** The level captures information about which the administrator should be made aware. An example of this could be a failed login attempt.

**emerg:** This level captures messages of the highest priority. These are typically last resort messages before an abnormal exit of the calling application or the system itself. An example of this would be a hardware error or memory exhausted message.



## Remote Log System

It is possible to send a copy of all messages to a remote system running syslogd. This allows centralized management of alarm messages. As the system logs are written to a RAM based volume, messages may be lost if the system is rebooted or power cycled or experiences an unexpected failure. Specifying the DNS name or IP address of a remote server will configure the SyncServer to send a copy of each message received by the syslog and kernel log daemons to the remote address, if it is reachable. The remote server can then be configured to filter the messages using its configuration file.

A complete definition of how Syslog is configured may be obtained by consulting the standard syslog.conf man pages that are widely available on the Internet.

The SyncServer web interface provides user access to 5 standard Syslog "facilities" or log files. The amount of information in auth, daemon, kern, and syslog may be configured individually by specifying a Syslog "priority" for each "facility". The priorities are, in ascending order of verbosity, "Debug", "Info", "Notice", "Warning", "Err", "Crit", "Alarm" and "Emerg". A fifth log file, messages, may be configured as a general repository for all other logging information at or above a list of up to four priorities.

Logs messages may also be re-directed to a remote system.

Most users should leave the logs configured in the default configuration unless directed to make changes by Symmetricom technical support.

---

## SERVICES - Startup

The SyncServer uses a number services that run continuously to support its functions.

Use this page to:

- Turn services on or off.
- Enable or disable services from running automatically when the SyncServer is started.
- Reboot, or halt the SyncServer's operating system.

### Daemon

A list of the user controllable daemons supported by the SyncServer:

**Web Server:** The web server provides the SyncServer's web interface. If Auto Startup is deselected and the SyncServer reboots, the web interface will not be available.

To re-start the web server, open a command line session through the Console RS-232 port on the SyncServer front panel, or through a Telnet (if available) session with the LAN1 port. Once logged in as "admin", restart the web server by typing "HTTP on".

**NTP:** Network Time Protocol daemon. Supports NTP associations and responds to NTP requests.

**SNMP:** Simple Network Management Protocol daemon. Responds to SNMP requests and sends SNMP traps.

**SSH:** Secure Shell daemon.

**Sysplex:** Sysplex timing information on the Sysplex Timer-Out connector.

**Time:** Time Protocol requests per RFC 868 over TCP.

**Time - UDP:** Time Protocol requests per RFC 868 over UDP.

**Daytime:** Daytime Protocol per RFC 867 over TCP.

**Daytime - UDP:** Daytime Protocol per RFC 867 over UDP.

**Telnet:** Telnet protocol service for remote access to the command line interface on the network ports.

### Current State/Startup

Shows the current state of the service. To change the state, select the desired state and click the APPLY button.

**On:** The service is running.

**Off:** The service is stopped.

**Auto:** When selected, the service starts automatically when the SyncServer reboots.

---

**Note:** Services that cannot be turned off directly display grayed out On and Off radio buttons. These services can only be controlled by selecting or deselecting Auto Startup. Applying the change will then stop or start the service as appropriate.

---

### System Control

**Run:** The SyncServer continues to operate normally. This is the default setting.

**Reboot:** Reboots the SyncServer. During this process, the browser displays "This browser will attempt to reconnect..." When the SyncServer finishes rebooting, the browser displays the login screen (provided DHCP hasn't changed the IP address).

**Halt:** Halts the operating system after about 15 seconds, typically. The browser displays "Halting System - This browser session cannot continue..." and the display states "Shutting down. Please wait..." while the SyncServer is halting. After at least 15 seconds, disregard the message and shut the power switch off.

---

## SERVICES - HTTP

The SyncServer's web interface allows both standard and secure network access. Standard access is provided by default. If a user wishes to utilize secure access, a secure certificate must be created. The SyncServer can only use self-signed certificates.

Creating a new certificate overrides a previous certificate. The certificate values used are not significant to the SyncServer. They are provided to any user utilizing the certificate. All fields must be provided with values.

A user may select secure or standard communication for the login page. The entire session uses them selected communication method.

### Security

**Standard (Port 80) Only:** The web interface is available using a standard non-encrypted http connection.

**Secure (Port 443) and Standard (Port 80):** The web interface is available using either type of connection.

**Secure (Port 443) Only:** The web interface is available using an SSL-encrypted connection.

### Certificate Info:

**Common Name:** SyncServer's hostname, as entered on the **SYSTEM - General** page.

**Bits:** Number of RSA Key Bits, 1024 or 2056 bits.

**Days to Expiration:** The number of days before the certificate expires.

**ISO Country Code:** The Two-Character International Country Code.

**State:** The state where the SyncServer is located.

**Locality:** The locality where the SyncServer is located.

**Organization:** The organization or company the SyncServer belongs to.

**Organizational Unit:** The organizational unit or division that uses or is responsible for the SyncServer.

**Email Address:** The email address of the administrator responsible for the SyncServer.

---

## SERVICES - SSH

The SyncServer supports SSH. Secure keys are generated by default on the first system boot.

To regenerate SSH secure keys, select the "Regenerate SSH Secure Keys" checkbox and click the APPLY button.

---

## SERVICES - Email

### SMTP Gateway and Alarm Email Recipients

This page establishes the SMTP gateway and email addresses used by the SyncServer for email notification of alarms and password recovery emails. This page must be configured correctly for "Send Email" notification on the **ADMIN - Alarms** page to work.

**Gateway:** Enter the DNS name or IP address of a valid SMTP server reachable from LAN1 to be used when sending alarm or password recovery emails from the SyncServer

**User 1-10:** Enter the email address of the individuals who should receive email notifications of alarms.

---

## LOGS

The Logs page provides access to system activity and messages that are generated by the various subsystems in the SyncServer. The logs are separated by function. The logging behavior can be configured using the **ADMIN - Logs Config** page. Each of the logs records a series of time-stamped events.

In the case of the system, auth, daemon, kern and messages logs, the entries take the standard form defined by the syslog daemon. These entries are:

**date time system facility message:** Here "system" is the hostname that generated the message. The "facility" is a component of the system generating the message. This could be anything like the kernel itself, system daemons and even applications. Finally, there is the text of the message itself. Here are two messages on the system SyncServer. One is from daemon.log and the other from the kernel:

```
Sep 19 19:20:26 SyncServer ntpd[3577]: ntpd
4.2.0b@1.1396-o Tue Aug 9 01:05:42 UTC 2005 (7)
Sep 10 00:06:18 SyncServer kernel: Jida-Driver installed
```

In the case of the event log, the entries take the form of:

Date time user source description

Here user is the user logged into the web interface, source is the IP address of the remote system using the web interface and description provides information regarding the nature of the event. Here is a message showing a successful remote login along with the user id and IP address of the contact.

```
10/01/2005 22:36:28 admin      192.168.7.16      Successful
login
```

**Events:** The events log is not configurable. This log is maintained outside syslogd and contains configuration and event data related to operations performed in the web interface.

**syslog:** syslog holds messages about system level events. Examples of system events are privilege changes (i.e., sudo) and messages about regularly scheduled events such as cron.

**auth.log:** The authentication log contains entries regarding authentication events from login or PAM (Pluggable Authentication Module).

**kern.log:** The kernel log contains entries submitted by the kernel. Examples of kernel events are network errors or hardware changes.

**daemon.log:** The daemon log contains entries submitted by the daemon processes that provide the services in the SyncServer. Examples of daemon log entries are NTP changes, SNMP events, and xinetd events.

**messages:** The messages file is something of a catchall file. By selecting various priorities, it is possible to capture large amounts of data regarding system operation. However, the volume of data becomes impractical to manage quickly. As such, this file is cleared at each power cycle or reboot.

Every 20 minutes, if no new messages were logged, the Syslog daemon logs a -- MARK -- message to indicate that it is alive and well.

---

## WIZARDS - 1st Setup

Symmetricon strongly recommends using the 1st Setup wizard to perform the initial configuration of the SyncServer.

The 1st Setup wizard guides the operator through the following configurations:

- Setting a new password
- Enabling Password Recovery (optional)
- Configuring the LAN1 network port's IP address, hostname, and DNS
- Setting the local time zone (optional)

---

## WIZARDS - NTP

The NTP wizard guides the operator through the following procedures:

- Adding or changing the NTP associations
- Generating NTP MD5 security keys (optional)

The Wizard automatically includes the DNS name of two Symmetricon NTP servers publicly available on the Internet. The user can replace them if desired. Upon completing the Wizard, the new NTP configuration replaces the previous one and the NTP daemon restarts.

Use the **NTP - Config** page to configure advanced NTP settings.

---

## WIZARDS - SNMP

Use the SNMP wizard to add or change the following SNMP v1/v2c settings:

- Set SysLocation, SysContact and SysName
- Set the Read and Write Community Strings
- Add up to four v1/v2c Trap Destinations

Advanced SNMP configuration (e.g., SNMP v3) is performed on the **NETWORK - SNMP** and **NETWORK - Traps** pages. Upon completing the Wizard, the new SNMP settings replace the previous ones and the SNMP daemon restarts.

---

## WIZARDS - Backup

The Backup wizard guides the operator through saving the SyncServer's current configuration to nonvolatile memory, and optionally transfers the backup configuration to a remote location. The backup file can be used to:

- 'Clone' the configuration to other SyncServers.
- Restore the SyncServer's configuration if it is lost or becomes unusable.

To back up the SyncServer's configuration, perform the following steps:

- 1** To save the SyncServer's current configuration to nonvolatile memory, click the **BACKUP** button.
- 2** Click the **NEXT** button.
- 3** On the next screen, use one of the following:
  - The **SAVE AS** button to copy the backup configuration file to a local or network drive that's accessible to the browser.
  - The **COPY** button to copy the backup file to a USB flash drive in either USB port on the front panel.



---

## WIZARDS - Restore

Use the **WIZARDS - Restore** page to restore a saved configuration from a backup file, or to restore the factory default configuration.

**Reset to Factory Defaults:** Returns the SyncServer to its original factory configuration, removing ALL user-entered and operational information including password, IP addressing, GPS position, and time zone. See also **SYSTEM – Factory Reset**.

**Restore Last Backup from SyncServer:** Restores the most recently saved configuration from the SyncServer's nonvolatile memory.

**Restore From USB flash drive:** Restores the configuration from a backup file from a USB drive attached to the front panel.

**Restore backup from workstation hard-drive or network directory:** Restores the configuration from any backup file located on local or network drive accessible to the browser.

---

**Note:** Restoring a configuration causes the SyncServer to reboot, and may change LAN1's IP address. When the SyncServer has finished rebooting, check for a new IP address using the **MENU** button on the front panel. Enter the IP address in the web browser to connect to the SyncServer's web interface.

---

---

## WIZARDS - Upgrade

Use **WIZARDS - Upgrade** to update the SyncServer software.

SyncServer upgrade packages are available to registered users at **[www.symmetricom.com](http://www.symmetricom.com)** (see Symmetricom Web Site - <http://www.symmetricom.com>).

To upgrade the software, download the upgrade package file to:

- A file area that is accessible to the web browser.
- To a USB flash drive, or to an area where it can be copied to a USB flash drive.

Then use **WIZARDS - Upgrade** to copy the upgrade file to the SyncServer and perform the upgrade.



## CHAPTER 4

# Keypad/Display Interface

## Overview

The display shows the Symmetricom logo and some other system messages for about a minute after power-on, after which it displays the default time screen.

Pressing the following buttons performs the actions described:

- **TIME:** Changes how time is displayed (see TIME section below).
- **STATUS:** Displays network and system status (see STATUS section below).
- **MENU:** Presents a tree-structured list of configuration options (see MENU section below).
- **ENTER:** Saves changes and displays the next screen.
- **CLR:** When using the MENU button, CLR abandons changes jump back to the previous screen.
- **Left/Right Arrow Buttons:** Moves the cursor to the left or right. Scrolls a screen horizontally when "<previous:next>" is displayed.
- **Up/Down Arrow Buttons:** Increments/decrements the value at the cursor.
- **Number Buttons:** Enters that number at the cursor's position. Selects a numbered option in MENU.

## TIME Button

Pressing the TIME button rotates between the following screens:

- Large numeric time display on full screen. Hours:Minutes:Seconds AM/PM (if time zone set) or UTC
- Medium numeric time display on left screen with small status for current Reference (REF) and NTP Stratum on right screen.
- Small written time display on upper screen with small status for current Reference and NTP Stratum on lower screen.

## STATUS Button

Pressing the STATUS button rotates between the following screens:

- NTP STATUS
- ALARM STATUS
- LAN1 STATUS
- LAN2 STATUS
- LAN3 STATUS
- HARDWARE CLOCK STATUS

- GPS RECEIVER STATUS
- SyncServer STATUS

The upper right corner of all status screens show the current local time (as displayed on the TIME screens).

## NTP Status Screen

The Network Time Protocol (NTP) Status page displays the following:

**Stratum:** The Stratum number of the SyncServer. Stratum 1 means it is locked to the onboard Hardware Clock (which is locked to GPS, IRIG-B, 1PPS or External 10 MHz). Stratum 2-15 means the SyncServer is locked to another NTP time source. Stratum 16 means that the SyncServer is unlocked.

**REF:** This field used to provide information about the source modifying the system clock. At initialization, 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 source for the local timing information (i.e., GPS, IRIG, FREE). If the selected peer is another NTP server, the reference ID displays the address of the server or a hash unique to the association between the SyncServer and the remote server.

**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

Displays the current alarms of the SyncServer.

**Current:** The total number of active alarms. Use the left/right arrows for search through the list of alarms.

**Major:** List of current major alarms

**Minor:** List of current minor alarms

## LAN1-3 Status Screens

Network port status displays the following information for each active port:

**State:** Shows "Up" if the port is enabled and "Down" if the port is disabled.

**IPv4 Addr (or IPv6 Addr):** Shows the address of the port.

**SM:** Shows the subnet mask (IPv4) or scope (IPv6).

**GW:** Gateway address.

**IPv6 Link:** (optional) When the port is configured for Ipv4 Auto Ipv6 mode, this field shows the IPv6 Link local address for this port.

### Hardware Clock Status Screen

This page shows the status of various time and frequency sources that are available to the Hardware Clock from its GPS Ant, IRIG In, 1PPS In, and 10MHz In inputs (not available on all models).

**Source:** This field contains two fields. The first field is the name of the time reference the Hardware Clock is using to get time and steer the oscillator. The second field indicates whether the Hardware Clock has valid time.

**H/W:** The number preceding "H/W" is the Hardware Clock's UTC time.

**GPS In:** Indicates "Locked" if the GPS receiver is a valid source of time.

**1PPS In:** Indicates "Locked" if 1PPS In is a valid source of phase (but not time of day).

**IRIG-B In:** Indicates "Locked" if IRIG In connector has a valid source of time.

**10MHz In:** Indicates "Locked" if 10MHz In is a valid source of frequency.

### GPS Receiver Status Screen

This page contains the status of the GPS receiver.

**Status:** Either "Locked" when it has valid GPS time information, or "Unlocked".

**Satellites:** The number of satellites being used by the GPS receiver for timing and position calculations.

**Antenna:** Shows the electrical state of the GPS Antenna. It can be either "Good" for a normal antenna load current, "Open" for electrical open circuit in the antenna, or "Short" for an electrical short.

---

**Note:** If you use a GPS antenna splitter, the status can become Open while the GPS receiver is still able to operate normally.

---

**Lat:** The latitude of the SyncServer.

**Mode:** Mode the receiver is operating in. It can be Survey (GPS receiver is determining its position), Dynamic (Operating in a mobile application) or Hold (the GPS receiver has surveyed its location).

**Lon:** The longitude of the SyncServer.

## SyncServer Status Screen

Contains version and serial number information of the SyncServer.

**Model:** The model number of the SyncServer.

**S.N.:** The serial number of the SyncServer.

**Version:** The SyncServer software's Release Version number.

**Upgrade Available:** Shows "Yes" if the SyncServer detects that more recent version of software is available at [www.symmetricom.com](http://www.symmetricom.com).

## MENU Button

Pressing MENU presents the following a tree-structured list of configuration options:

- 1) LAN1 Config (Configures the LAN1 network port)
  - 1) IPv4
    - 1) STATIC ADDR (ENTER) IP Address (ENTER) Mask (ENTER) Gateway (ENTER).
    - 2) DHCP
  - 2) IPv6 (sets to IPv6 only mode with auto generated Link Local address)
- 2) Brightness (Sets the brightness of the front panel display)
  - 1) Low
  - 2) Medium
  - 3) High
- 3) LAN1 On/Off (Enables or disables LAN1, including access to the web interface).
  - 1) Enable
  - 2) Disable
- 4) USB (Backs up or restores the configuration to/from a USB flash drive)
  - 1) Backup
  - 2) Restore

---

**Note:** Use 1) LAN1 Config only when performing an initial configuration of LAN1. Doing so clears all settings for LAN1, LAN2, and LAN3!

---

## CHAPTER 5

# Command Line Interface

The Command Line Interface (CLI) is available from the LAN1 network port using either SSH or TELNET and from the Console RS-232 port. By default, the TELNET service is turned off. Use the **SERVICES - Startup** page to turn on the TELNET service.

---

Note: Physical access to the console port on the SyncServer should be controlled. The interactive bootloader could allow a malicious user to override boot parameters and gain restricted access to the device. Contact Symmetricom Technical Support if more information is required.

---

The CLI command structure has two levels: a top-level command set of system commands and an intrinsic help command set. Commands are entered as ASCII strings typed at the command prompt. The specific commands available at the particular tree level can be displayed by entering a "?" ("?" followed by "Enter" on the keyboard).

The CLI interface interprets the input on a character by character basis. As a result, only enough characters to uniquely identify the command need to be entered for the CLI to recognize which command you want to invoke. The CLI also accepts multiple commands on a single line when they are separated by spaces, so you don't have to press Enter after each command.

It is suggested that commands marked "Use all caps" be entered in all caps. This helps prevent accidental entry of those commands.

The following commands are available from the CLI. Refer to the Command Description section for the syntax of each command.

## Top-level Commands

**GPSSTRENGTH**: Displays the GPS satellite tracking information. The output is:

`N, X1, Y1, Z1, ..., XN, YN, ZN`

Where "N" indicates the number of satellites. If one or more satellites are available, Xi,Yi,Zi follows "N".

Xi,Yi,Zi: Xi is the satellite vehicle number. Yi is the satellite signal strength in dBW. Zi can be either T or C. T(racking) means the SyncServer receives the information from the satellite but the information is not used in its timing solution. C(urrent) means the SyncServer currently uses satellite information in its timing solution. Query only command.

**HALT:** Halts the operating system. After entering the command, it prompts "Enter 'Y' to confirm". Halt the SyncServer before turning the power off. Action only command.

**REBOOT:** Halts and reboots the operating system. After entering the command, it prompts you . Enter “Y” to confirm. Action only command.

**DEFAULTS:** Replaces the current configuration of the SyncServer with the factory default configuration. After entering the command, it prompts ‘Enter “Y” to confirm’. The command also halts and reboots the SyncServer. Action only command.

**IPV4ADDRESS <aaa.bbb.ccc.ddd>:** Displays or sets the LAN1 port's IPv4 address. Without input, the command displays the current LAN1 port IPv4 address. With input, the command sets the LAN1 port IPv4 address to be the input value. Query and action command.

**IPV4MASK <aaa.bbb.ccc.ddd>:** Displays or sets the LAN1 port IPv4 subnet mask. Without input, the command displays the current LAN1 port IPv4 subnet mask. With input, the command sets the LAN1 port IPv4 subnet mask to be the input value. Query and action command.

**IPV4GATEWAY <aaa.bbb.ccc.ddd>:** Displays or sets the LAN1 port IPv4 gateway. Without input, the command displays the current LAN1 port IPv4 gateway. With input, the command sets the LAN1 port IPv4 gateway to be the input value. Query and action command.

**IPV4DHCP:** Sets the LAN1 port to use IPv4 DHCP. Action only command.

**IPV6AUTO:** Sets the LAN1 port to use automatically generated IPv6 link local address. Action only command.

**HTTP <on|off>:** Without input, the command returns the current status of the SyncServer http daemon (running or stopped). Use input “on” or “off” to start or stop the SyncServer http daemon. Query and action command.

**SETTIMEOFYEAR <time>:** Sets the current time in UTC. The <time> input format can be any one of the following

```
mm/dd/yyyy hh:mm:ss.x
yyyy ddd hh:mm:ss.x
mm dd yyyy hh:mm:ss.x
hh:mm:ss.x
```

Enter the command without any input, it displays the allowable input time format. Action only command.

**ADJUSTTIMEOFYEAR <seconds>:** Adjust the current time by a user determined number of seconds. The input can be a positive or a negative integer. If the input is negative, the time is adjusted backward. Action only command.



**INTRINSIC HELP:** Traverse to the intrinsic command tree.

### Intrinsic Help Commands

Intrinsic help commands are commands that can be used in any tree level as a basic shell command tool. Below is the list of available intrinsic commands.

**pop:** Moves the command shell to the previous level. When issued from the main shell directory (i.e. the root) this disconnects the session.

**root:** Moves the command shell to point to the main shell directory. This is a convenience command for navigating the command shell. The command “root pop <Enter>” disconnects the session.

**exit:** Exits the Telnet client session while it is active. This command has no effect if it is executed from a serial session.

**version:** This command is not supported in the current release.

**trace:** Displays the current contents of the trace buffers. Most of the commands currently do not use the trace buffer facility. It is normal that the trace buffers are empty.

**clear:** Clears the trace buffers.

**stamp:** Queries the time stamp of the internal operating system clock, which is set to zero when the SyncServer is powered on. The time stamp of the internal operating system clock is in milliseconds.

**history:** Displays the last fifteen commands that have been executed.

**pause <milliseconds>:** Waits for user specified number of milliseconds and then executes the next command if it is provided in the same command line following the number. For example, the “pause 5000 history” command would wait for five seconds and then execute the history command. Input any integer number as the number of milliseconds to pause.

**repeat <count>:** This commands repeats execution user specified number of times of a command specified before it. For example, the “GPSSTRENGTH repeat 5” executes GPSSTRENGTH five times.

**# :** (pound sign followed by a space) Creates a comment from the space to the end-of-line character. This is useful for adding a comment to a command being recorded in a logfile. For example, “GPSSTRENGTH pause 1000 repeat 1000 # monitor GPS sats <enter>”. Also, the command could be used to simply have the system ignore the remaining part of a long string of commands. For example, “ipv4address 192.168.2.2 ipv4mask 255.255.255.0 # gateway 192.168.2.1 <enter>” will set the IP address and subnet mask but not the gateway.

?: (question mark) Displays commands available at the current tree level.

## Command Examples

Below are a few select examples of commands.

### DEFAULTS example

Entering **DEFAULTS** replaces the current configuration of the SyncServer with the factory configuration. Enter "Y" to confirm. For example:

```
1 ? DEFAULTS
Restore SyncServer default factory configuration? Enter
"Y" to confirm: Y
```

### REBOOT example

Entering **REBOOT** halts and reboots the SyncServer's operating system. Enter "Y" to confirm. For example:

```
1 ? REBOOT
Reboot SyncServer operating system? Enter "Y" to confirm:
Y
```

### HALT example

Entering **HALT** halts the operating system. Do this before turning the power switch off. Enter "Y" to confirm. Enter "Y" to confirm. For example:

```
> HALT
Halt SyncServer operating system? Enter "Y" to confirm: Y
```

### IPV4ADDRESS example

Entering **IPV4ADDRESS** displays/sets the LAN1 IPv4 address. For example:

```
1 ? IPV4ADDRESS
192.168.47.150
2 ? IPV4ADDRESS 192.168.46.144
```

### IPV4MASK example

Entering **IPV4MASK** displays/sets the LAN1 IPv4 subnet mask. For example:

```
3 ? IPV4MASK
255.255.255.0
4 ? IPV4MASK 255.255.0.0
```

### IPV4GATEWAY example

Entering **IPV4GATEWAY** displays/sets the LAN1 IPv4 gateway address. For example:

```
5 ? IPV4GATEWAY
192.168.47.1
6 ? IPV4GATEWAY 192.168.46.1
```

## CHAPTER 6

# Specifications

## In This Chapter

Status LEDs.....	87
Vacuum Fluorescent Display (VFD).....	88
Keypad .....	89
USB.....	89
AC Power Supply.....	90
DC Power Supply.....	91
Chassis .....	91
Oscillators .....	92
Accuracy & Stability.....	92
GPS Receiver .....	93
Safety Standards.....	94
EMC Standards .....	94
Environmental .....	95
Reliability .....	95
Maintainability .....	96
Equipment Failure Detection and Reporting.....	96
WEEE/RoHS Compliance .....	97
Shock and Vibration.....	97
Console RS-232 .....	98
1PPS Output.....	99
1PPS Input.....	99
10MHz Output .....	100
10MHz Input .....	100
IRIG-B Output .....	101
IRIG-B Input .....	102
Sysplex Timer-Out .....	103
Network Ports .....	104
Network Protocols.....	105

---

## Status LEDs

The following table describes the four Status LEDs on the front panel:

	RED	GREEN	ORANGE
<b>SYNC</b>	SyncServer is NTP Stratum 16.  The SyncServer has not synchronized to a reference.	SyncServer is NTP Stratum 1.  The SyncServer's reference is the Hardware Clock (e.g., GPS).	SyncServer is NTP Stratum 2-15.  The SyncServer's reference is a remote NTP server.
<b>NETWORK</b>	Link failure on LAN1	All configured LAN ports operational.	Link failure on configured LAN2 or LAN3
<b>ALARM</b>	Major Alarm	No Current Alarms	Minor Alarm
<b>NTP</b> (task runs at 10 Hz)	>5000 NTP packets per second	NTP activity.	Not Used

---

Note: The NTP LED remains off when there is no NTP activity.

---

---

## Vacuum Fluorescent Display (VFD)

Resolution: 256 x 32 pixels

User configurable brightness settings:

- 1) Low
- 2) Medium
- 3) High

---

## Keypad

Arrow keys: Left, Right, Up, Down

Numeric keys: 0-9

Command keys:

- ENTER - Apply changes, go to the next MENU screen
- CLR - (clear) Abandon changes, return to the previous MENU screen
- TIME - Displays the time, toggles time screens
- STATUS - Displays the status, toggles status screens
- MENU - Displays the menu selections

---

## USB

Two USB 1.1 ports are located on the front panel.

User has the ability to back up, restore, transfer the SyncServer configuration, and upgrade the SyncServer software using a USB memory device connected to the USB ports.

---

Note: Not all USB flash drives are compatible with the SyncServer's USB ports. Symmetricom recommends using SanDisk cruzer micro USB devices.

---

---

## AC Power Supply

Description: Universal type AC power supply.

Connector Type: IEC 320

Input Voltage range: 90-264 VAC

Input Frequency range: 47-63 Hz

Power - Initial Power On:

- With Rb Osc - 45 watts max
- Without Rb Osc - 25 watts max

Power - Steady State:

- With Rb Osc - 35 watts max
- Without Rb Osc - 21 watts max

---

**Caution:** The above AC Power Supply specification reflects the overall Power Supply ratings. For UL and CE compliance the Power Supply must only be operated at 100 – 240 VAC, 50-60 Hz.

**Attention :** Les spécifications d'approvisionnement de courant alternatif ci-dessus reflètent les estimations globales d'alimentation d'énergie. Pour la conformité d'UL et de CE l'alimentation d'énergie doit être seulement opérée à 100 - 240 VCA, 50-60 hertz.

---

**Warning:** The SyncServer should only be plugged into a grounded receptacle. Symmetricom recommends that the chassis external ground be connected to a reliable earth ground.

**Avertissement :** Relier cet appareil à une prise de courant avec contact adéquat de mise à la terre. Symmetricom recommande que le châssis soit relié à une terre fiable.

---

## DC Power Supply

Description:	DC Power Supply (48 VDC Operation Model)
Connector type:	Three position screw terminal block
Input Voltage Range:	40-60 VDC, 50 watts maximum, 1.5 amps
Isolation, Ground:	Input is fully floating. Either input polarity may be strapped to chassis ground at the input terminal block.
Isolation:	Input to output 1,000 VAC minimum

---

## Chassis

Size:	1.75 in. high x 17.1 in. wide x 11.25 in. deep 4.5 cm high x 43.2 cm wide x 28.6 cm deep
Weight:	8 lbs., 3.6 kg
Mounting:	Standard 19 in. (48.2 cm) EIA Rack System, rack mount ears, tapped holes for Telco mid-mounts and all necessary mounting hardware included.
Standards:	NEBS (Network Equipment Building System) compatible. Chassis depth <12 inches (30.5 cm) with an allowance for attached cable radius.

---

## Oscillators

### TCXO Oscillator (Standard)

Temperature Compensated Crystal Oscillator (TCXO)

Drift rate: 21 milliseconds/day typical after having been locked to a stable reference for at least 30 minutes. (5°C delta)

### OCXO Oscillator (Optional)

Oven Controlled Crystal Oscillator

Drift Rate: 1 millisecond/day typical after having been locked to a stable reference for at least 1 hour. (5°C delta)

### Rubidium Oscillator (Optional)

Drift Rate: 6-25 microseconds/day typical after having been locked to a stable reference for at least 1 hour. (5°C delta)

---

## Accuracy & Stability

Synchronization Source	Timing Accuracy to Reference	Comments
GPS, $\geq 4$ Satellites tracked	50 nS RMS, 150 nS peak	
GPS, 1 Satellite, position known within 200m	1 uS peak	Position from satellite fix or entered by the user.
NTP Client Mode, Local server	2 mS peak	Local server means on same subnet
IRIG-B	10 uS peak	Relative to input signal
1PPS	100 nS peak	Relative to input signal



The stability of the 1PPS, 10MHz, and IRIG-B outputs depend on the optional oscillator installed.

Allan Deviation when locked to GPS:

- 1E-12 at 1 day      All oscillators
- 5E-11 at 1 sec      Rb Only
- 4E-12 at 1000 sec   Rb Only

---

## GPS Receiver

The SyncServer's internal GPS Receiver provides time to the SyncServer's Hardware Clock. When available, this input is the preferred reference for the Hardware Clock. The GPS receiver must be connected to a 12-VDC capable antenna using the **GPS Ant** connector on the back panel.

Frequency:      1575.42 MHz (L1 signal)

Code:            Coarse Acquisition (C/A) code

Tracking:        Up to 12 satellites

Position:        Typically <10m w. four satellites. Available from web interface.

1PPS Accuracy: 50 nS RMS, 150 nS Peak to UTC-USNO

Time standard: UTC

Connector:      BNC female (**GPS Ant**), 12 VDC antenna power feed, detects Open and Shorted conditions

Signal strength: 1 sat  $\geq$  -166 dBW to acquire, and  $\geq$  -171 dBW to track.

Cabling options:

- $\leq$  150 ft. of Belden 9104 (RG-59 type)
- 300 ft. with inline amplifier
- Compatible with down/up converter

---

## Safety Standards

Meets the following safety standards:

- 73/23 EEC CE Low Voltage Safety Directive
- EN 60950-1:2001
- UL 60950-1:2003
- CSA 22.2 60950-1:2003
- IEC 60950-1:2001
- AS/NZ 60950-1:2003
- PSE Japan

---

## EMC Standards

Meets the following EMC standards:

- FCC Part 15 Subpart B
- 2004/108/EC CE EMC Directive
- EN61000-3-2:2000 Harmonic Current
- EN61000-3-3:1995 Voltage Fluctuations and Flicker
- EN55022:1998 Conducted and Radiated Emissions Standard
- EN55024:1998 Immunity Standard
- VCCI:April 2000 Japan EMC Standard
- ICES-003 Canada EMC Standard
- AS/NZS CISPR 22:2002 Australia/New Zealand EMC Standard

---

## Environmental

Operating Temp:	0° to +50° C (+32° F to +122° F)
Operating Temp. w. Rb Osc:	0° to +45° C (+32° F to +113° F)
Storage Temp:	-10° to +70° C ( 14° F to +158° F)
Humidity:	0 - 95%, non-condensing
Altitude:	0 - 4000 meters AMSL

**Warning:** Install the SyncServer to allow adequate air flow through and around the unit. Symmetricom recommends leaving 1.4 Inches (3.6 cm) above and below the SyncServer or enough space to allow 5 CFM.

**Avertissement :** Installez le SyncServer pour permettre un flux d'air autour et a travers l'unité. Symmetricom recommande de laisser 1.4 inches (3.6 cm) au-dessus et au-dessous du SyncServer ou assez d'espace pour permettre 5 CFM.

---

## Reliability

MTBF: >50,000 hours (5.7 years) for all supported display intensity settings.

Calculated per Telcordia (Bellcore) SR332, Issue 1.

---

## Maintainability

The SyncServer functions without user adjustments throughout its life-span.

Line Replaceable Units (LRUs).

Lithium battery (CR2032) on the main board is mounted in a battery holder.

**Caution:** The SyncServer Network Time Server contains a Lithium Battery that maintains system configuration information. There is a danger of explosion if the battery is incorrectly replaced. Replace the Lithium Battery only with the same or equivalent type recommended by the manufacturer. Do not dispose of the Lithium Battery in a fire or incinerator or the battery may explode. Dispose of the used Lithium Battery according to the manufacturers instructions. Follow disposal regulations in your area for Lithium Battery disposal.

**Attention :** Le SyncServer Network Time Server contient une batterie de lithium qui maintient l'information de configuration du système. Il y a un danger d'explosion si la batterie est inexactement remplacée. Remplacez la batterie de lithium seulement avec une batterie similaire ou de type équivalent recommandée par le fabricant. Ne vous débarrassez pas de la batterie de lithium dans un feu ou un incinérateur, où la batterie pourrait exploser. Débarrassez-vous de la batterie usagée de lithium selon les instructions du fabricant. Observez les règlements de disposition de votre région.

---

## Failure Detection and Reporting

The SyncServer is self-monitoring during normal operation. To the extent possible, any failures in the unit are isolated, to differentiate them from input signal failures, and reported. The SyncServer provides debug and troubleshooting variables of the current status of the unit at the request of an administrator.

---

## WEEE/RoHS Compliance

The SyncServer is WEEE compliant.

The SyncServer is currently not RoHS compliant.

For current WEEE recycling and RoHS information, please visit the Symmetricom web site, [www.symmetricom.com](http://www.symmetricom.com) (see Symmetricom Web Site - <http://www.symmetricom.com>).

---

## Shock and Vibration

The SyncServer has been designed and tested to withstand the following shock and vibration per Telcordia GR-63 Specifications:

Packaged Equipment Shock (Drop): Packaged for shipment, Drop from 29.5 inches - Surface, edge and corner drops

Unpackaged Equipment Shock (Drop): Unpackaged. Drop from 3.9 inches - Surface, edge and corner drops

Office Vibration Environment: Locked to 0.1 g - In equipment rack

Transportation Vibration: To 1.5 g - Packaged for shipment

---

## Console RS-232

Description: A bi-directional EIA standard RS-232C serial port is located on the front panel provides limited configuration control and status reporting of the SyncServer via a command line interface. Configured as DCE (Data Communications Equipment) so a null modem crossover cable is NOT required.

Data Rates: 9600 baud

Parity: none

Data Bits: 8

Stop Bits: 1

Connector: Female 9 pin D subminiature

Pin Assignment:

- 1 N/C
- 2 Tx
- 3 Rx
- 4 N/C
- 5 GND
- 6 N/C
- 7 CTS
- 8 RTS
- 9 N/C

---

## 1PPS Output

A BNC female connector, **1PPS Out**, mounted on the rear chassis transmits a once per second pulse that is synchronous with the SyncServer's Hardware Clock ticks.

Connector: BNC female (1PPS Out)

Amplitude: TTL Levels into 50 Ohms

Duty Cycle: 50% nominal

On Time Edge: Rising

---

## 1PPS Input

A BNC female connector, **1PPS In**, mounted on the rear chassis accepts a once per second pulse from an external timing reference into the SyncServer's Hardware Clock.

Connector: BNC female (1PPS In)

Amplitude: TTL Levels

Pulse Width 100 nS minimum

On Time Edge: Rising

Impedance: > 10 kOhms

---

Note: The Hardware Clock may not be able to lock to noisy input signals.

---

---

## 10MHz Output

A BNC female connector, **10 MHz Out**, mounted on the rear chassis transmits a 10 MHz signal from the SyncServer's Hardware Clock.

Connector: BNC female (10 MHz Out)

Amplitude:  $> 3 \text{ Vp-p}$  and  $< 6 \text{ Vp-p}$  into 50 Ohms

Frequency: 10 MHz

Wave Shape: Sine Wave

---

## 10MHz Input

A BNC female connector, **10MHz In**, mounted on the rear chassis accepts a 10 MHz signal from an external frequency reference into the SyncServer's Hardware Clock.

Connector: BNC female (10MHz In)

Amplitude:  $1 \text{ Vp-p}$  to  $6 \text{ Vp-p}$

Frequency: 10 MHz

Wave Shape: Sine Wave or Square Wave

Impedance:  $> 10 \text{ kOhms}$

Input Signal Accuracy:

- TCXO  $< 1\text{E-}6$  (1 ppm)
- OCXO  $< 5\text{E-}7$  (0.5 ppm)
- Rubidium  $< 1\text{E-}9$  (1 ppb)

---

Note: The Hardware Clock may not be able to lock to noisy input signals.

---



---

## IRIG-B Output

A BNC female connector, **IRIG Out**, mounted on the rear chassis transmits an IRIG-B signal from the SyncServer's Hardware Clock. Configurable via the Web interface.

Connector: BNC female (IRIG Out)

Amplitude: 3.8 Vp-p  $\pm 10\%$  into 50 Ohms

Format: IRIG-B 123 (AM) standard, with IEEE 1344 Extensions, or Legacy True Time.

Ratio: 3:1  $\pm 10\%$

Impedance: 100 kOhms

---

## IRIG-B Input

A BNC female connector, **IRIG In**, mounted on the rear chassis accepts an IRIG-B signal from an external timing reference into the SyncServer's Hardware Clock.

Connector: BNC female (IRIG In)

Amplitude: 0.5 Vp-p to 8 Vp-p

Format: IRIG-B 122, 123 (AM) standard, with IEEE 1344 Extensions, or Legacy True Time

Ratio: 3:1 to 5:1

Impedance: 100 kOhms

Input Carrier Range:

- TCXO < 1E-6 (1 ppm)
- OCXO < 5E-7 (0.5 ppm)
- Rubidium < 1E-9 (1 ppb)

---

Note: The Hardware Clock may not be able to lock to noisy input signals.

---

---

## Sysplex Timer-Out

A male 9-pin D connector, **Sysplex Timer-Out** mounted on the rear chassis that transmits Time of Day (TOD) with carriage return on time to an attached Sysplex-compatible device. Configured as DTE (Data Terminal Equipment). Configurable via the Web interface.

Sysplex typically uses a "null-modem" serial cable (not supplied) for interconnection with other Sysplex equipment.

Data Rates: 9600 bps

Parity: Even, Odd, or None

Data Bits: 8

Stop Bits: 1

Connector: male 9-pin (Sysplex Timer-Out)

Pin Assignment:

Pin#	Signal
1	N/C
2	Rx
3	Tx
4	N/C
5	GND
6	N/C
7	RTS
8	CTS
9	N/C

Format: IBM 9037 Sysplex Timer (First Protocol)

Level: RS-232

Accuracy: <10 mS RMS

Phasing: Carriage return on time

Control:

- Manually start (enter "C") or stop (enter "R") Sysplex time output once per second.
- Automatically start Sysplex time output once per second using "Auto" on the **TIMING – Sysplex** web page.

---

## Network Ports

Description: Three standard RJ-45 8-pin connectors

Frame Format:

- IEEE 802.3 (10Base-T at 10 Mbps)
- IEEE 802.3u (Fast Ethernet at 100 Mbps)

About specific ports:

- LAN1 provides user interfaces for managing and communicating with the SyncServer. Additionally, LAN1 responds to NTP requests and is the sole port through which the SyncServer performs NTP peering functions.
- LAN2 and LAN3 respond to NTP requests only.

---

Note: The SyncServer's 10/100 Mbps network ports require Category 5 (or better) network cable.

---

---

## Network Protocols

- NTP (v2 - RFC1119, v3 - RFC1305, v4 - No RFC)
- NTP Unicast, Broadcast, Multicast
- SNTP v4 for IPv4, IPv6 & OSI (RFC 2030)
- TIME (RFC868)
- DAYTIME (RFC867)
- HTTP/SSL/HTTPS (RFC2616)
- DHCP (RFC2131)
- SSH/SCP (Internet Draft)
- SNMP v1/v2/v3 (RFC3584)
- MIB II (RFC1213)
- Telnet (RFC854)
- MD5 Authentication (RFC1321)
- SMTP Forwarding
- IPv4
- IPv6, and IPv4/v6 Hybrid



## CHAPTER 7

# Tasks

## In This Chapter

Installation Guide .....	107
Backing Up/Restoring Configurations .....	122
Configuring SNMP .....	127
Transferring Configurations .....	129

---

# Installation Guide

## Unpacking

Open the box carefully to avoid damaging its contents.

Verify that the box contains the following items:

- Printed Quick Start Guide
- SyncServer Network Time Server
- GPS antenna kit (not shipped with the *S250i* model)
  - 12V GPS antenna
  - PVC antenna-mounting tube
  - 50 ft. Belden 9104 coaxial cable
  - 2 pipe clamps
- Product CD (contains the User Guide and other supporting documentation)
- SymmTime CD (contains NTP client software)
- Standard serial cable
- Standard 6 ft. network cable

If the box is missing any of these items, please contact Symmetricom Customer Assistance at ***www.symmetricom.com*** (see Symmetricom Web Site - <http://www.symmetricom.com>).



## Rack Mounting

The SyncServer is designed for mounting in a standard 19-inch (48.26 cm) rack. Follow the rack manufacturer's instructions for mounting the SyncServer while observing the following guidelines:

- **Elevated Operating Temperature:** If the SyncServer is installed in a closed or multi-unit rack assembly, the ambient temperature of the rack environment may be greater than the SyncServer's Maximum Operating Temperature of 50°C/122°F. Install the SyncServer in an environment that is compatible with the SyncServer's operating temperature range, which is 0 °C to 50 °C, or 32 °F to 122 °F
- **Reduced Air Flow:** Position the SyncServer with enough space above, below, and adjacent to the chassis to allow an adequate flow of air so that it may operate safely. Symmetricom recommends leaving 1.4 Inches (3.6 cm) above and below the SyncServer or enough space to allow 5 CFM.
- **Mechanical Loading:** Mount the equipment so as to avoid uneven mechanical loading that could cause hazardous conditions.
- **Circuit Overloading:** Observe the power ratings on the SyncServer's nameplate and the additional load the SyncServer may place on the supply circuit. Overloading the supply circuit may adversely affect the supply wiring and over-current protection.
- **Reliable Earthing:** Maintain reliable earthing (grounding) of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

## Connecting to VDC Power

Warning: Ensure that a disconnect device, such as a switch, with the appropriate voltage/current rating is provided when connecting a DC power source to the 48 VDC Operation Model.

Avertissement : S'Assurer qu'un débrancher l'appareil, tel qu'un commutateur, avec le classement de tension/courant approprié est fourni en connectant une source de pouvoir de DC au 48 Modèle de Configuration de VDC.

Warning: Prior to servicing the interior of a unit, remove any power connections.

Avertissement : Avant entretenir l'intérieur d'une unité, enlever n'importe quelles connexions de pouvoir.

### Connecting the 48 VDC Operation Unit to DC power:

- Use a 15-ampere DC circuit breaker in series with the DC power source.
- Do not connect the unit directly to a DC power source without the breaker.
- 14 AWG (1.5 mm<sup>2</sup>) gage wire is the minimum gage recommended for DC power source hookup.
- The 48 VDC Configuration Unit is only to be used in a restricted access area.
- The screw torque on the Power Terminal Block is 4.5 to 5.3 inch pounds.
- When connecting to a DC power source, first connect the positive power cable to “+” on the power supply, then connect the negative power supply cable to “-”.
- The Unit Chassis must be grounded for proper safety.

---

**Note:** The 48 VDC Operation Model is supplied with two 48 VDC inputs to accommodate input from an alternate DC Power Source.

---

## Selecting a GPS antenna site

### Selecting the best site for a GPS antenna

The best site for a GPS antenna is on an antenna mast mounted in a high outdoor location with a full 360 degree view of the horizon. Generally, look for antenna sites with the following qualities:

- Good views of the horizon
- Low EMI and RFI, away from high power lines and communications/radar antennas.
- Convenient for running an antenna cable to the SyncServer

Avoid sites that have overhanging foliage, blocked views, tall neighboring structures, lots of EMI RFI interference.

#### Warnings:

- Avoid electrical and RF safety hazards such as power lines and high-energy radio transmission antennas.
- Where potential hazards exist, have a qualified technician perform the installation.
- Observe local codes and regulations. Use a lightning arrestor when needed.

#### Avertissements :

- Evitez les dangers de sûreté électriques et RF, tels que les lignes à haute tension et les antennes de transmission de radio de haute énergie.
- Où les dangers potentiels existent, ayez un technicien qualifié exécuter l'installation.
- Observez des codes et des règlements locaux. Utilisez un "arrestor" d'éclair quand nécessaire.

### Operating with sub-optimal conditions

The SyncServer's GPS receiver can operate in sites where nearby structures or geographic features limit the number of visible GPS satellites. These conditions may delay when the GPS receiver starts providing valid time to the SyncServer, and increase the likelihood of "gaps" in the GPS timing source's availability.

To mitigate some of the issues caused by sub-optimal sites:

- Position the antenna with good visibility toward the equator. For example, in the northern hemisphere, position the antenna on the south side of the structure. If that view is blocked, place it with a view to the east or west. A good rule of thumb is to place the antenna in whichever location gets the most sun. Avoid placing the antenna on the polar-facing side of a structure where fewer GPS satellites are visible.
- Purchase a SyncServer model that includes the optional high-stability Rubidium oscillator. This enables the SyncServer's Hardware Clock to continue providing valid time for extended periods while GPS is unavailable.
- Configure the SyncServer with alternate timing references, such as NTP peers, that it can refer to when GPS is unavailable.
- Give the GPS receiver 12 to 24 hours to survey its position and enter Position Hold mode. Or, on the **TIMING - GPS** page, enter the SyncServer's Latitude and Longitude, select Position Hold mode, and click the **APPLY** button. This helps the GPS receiver determine its position and get the time with fewer GPS satellites. The Product Information CD contains an extensive directory of the Latitude and Longitude for cities around the world. Discrepancies between the actual position and the entered position may cause incremental degrees or time error relative to UTC.
- Verify the SyncServer's locked status over an extended period to ensure that it meets your application's requirements.

## Installing the GPS Antenna

### WARNING - AVERTISSEMENT

#### Safe Antenna and Cable Connection

An outside antenna or cable system must be properly grounded to provide some protection against built up static charges and voltage. Section 810 of the National Electrical Code, ANSI/NFPA 70 (In Canada, part 1 of the Canadian Electrical Code) provides information regarding proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

#### Jonction Sûre d'Antenne et de Câble

Relier ce système d'antenne ou de câble extérieur avec un contact adéquat de mise à la terre pour assurer une protection contre l'accumulation des charges statiques et du voltage. La section 810 du code électrique national, ANSI/NFPA 70 (au Canada, partie 1 du code électrique canadien) fournit des informations concernant le rattachement à une mise à la terre du mât et de la structure, le rattachement à une mise à la terre du fil d'entrée à une unité de décharge d'antenne, la taille des conducteurs pour la mise à la terre, le placement de l'unité de décharge d'antenne, le reliment aux électrodes de la mise à la terre, et les conditions requises pour l'électrode de la mise à la terre.

#### Keep Antenna Clear of High Voltage Power Lines or Circuits

Locate an outside antenna system well away from power lines and electric light or power circuits so it will never touch these power sources should it ever fail. When installing an antenna, absolutely never touch power lines, circuits, or other power sources as this could be fatal.

#### Gardez l'Espace Libre d'Antenne des Lignes Electriques ou des Circuits à Haute Tension.

Localisez un puits extérieur de système d'antenne loin des lignes électriques et des circuits de lumière électrique ou de puissance afin qu'il ne touche jamais ces sources d'énergie s'il devait faillir. En installant une antenne, ne touchez jamais les lignes électriques ou d'autres sources d'énergie, sous peine de danger d'électrocution mortelle.

- 1 Mount the GPS antenna at the selected site. Clamp the GPS antenna's PVC pipe extension to a structure, such as an antenna mast, using the pipe clamps provided with the antenna kit.
- 2 Run the antenna cable or cables to the SyncServer. Use a lightning arrestor, if needed.
- 3 Connect the antenna cable to the **GPS Ant** connector on the rear panel.

## Using a Window Antenna

When an outdoor installation is not practical, the GPS antenna can be placed indoors in a sunny window pointing outward. Avoid metallic window coatings, blinds, trees, and other obstructions. All the guidelines for operating in sub-optimal conditions apply here as well. Depending on conditions, the performance of "window GPS" as a timing reference varies widely.

If signal strength is an issue, try different window locations, shorten the antenna cable length, and avoid unnecessary connectors.

If the position of the GPS antenna is known with good accuracy, enter the latitude, longitude, and altitude using the **TIMING - GPS** page, and set the GPS receiver mode to 'Position Hold'. This will allow the GPS receiver to provide reasonably accurate time with as few as one viewable satellite.

---

Note: If a substantially inaccurate position is entered (e.g., North instead of South) the time provided by the GPS receiver may be ignored by the SyncServer. Use this option with caution, and only if the other approaches don't work.

---

If a suitable location for the GPS antenna is not available, the Quick Start help topic provides instructions for setting up alternate time sources such as NTP peers.

- 1 Install and connect the antenna.
- 2 Boot the SyncServer and enter an estimated position, if known, but leave system in survey mode.
- 3 Allow device up to 24 hrs to survey and determine its position and/or go into position hold mode.
- 4 If device does NOT enter position hold mode, enter the position from a previous survey, as determined by the GPS receiver, or a best guess at the position (extrapolated from the `Latitude_Longitude_*.htm` or online sources), and put the unit in position hold mode. In this case, the offset in the entered position from the actual position will generate a time offset of 3.28ns/meter of Lat/Lon error, and 3.33ns/meter of Altitude error. For example, a 2 degree Lat/Lon offset (222KM), translates to a worst case time offset of 728us.

---

**Note:** Due to a known software issue, the value of the position entered must be different than the value of the position displayed on the page, in order for it to be accepted. In some cases, the user may need to enter and apply an invalid position before entering the desired position.

---

## Configuring Network Settings

To configure network settings, connect to the LAN1 network port using a web browser and then use the web interface to configure the remaining network ports.

To view the LAN1 address on the front panel display, press the **STATUS** button on the front panel three times to get the LAN1 STATUS screen.

If the IP address isn't valid on your network, set a new one using the front panel's **MENU** button. Press **MENU** and then select 1) **LAN1 Config** to reconfigure the port as needed.

Log in the SyncServer's login page. The default username is "admin" and the password is "symmetricom", unless they've been changed.

Go to the **NETWORK - Ethernet** page and edit the settings as needed.

---

**Note:** In order to change the network configuration, be sure to click *both* **APPLY** buttons in the following locations:

- the **APPLY** button on the *LAN Configuration* dialog box
  - the **APPLY** button at the bottom of the **NETWORK - Ethernet** page
-

## Upgrading System Software

### Overview of the upgrade process

The SyncServer Network Time Server has a built-in feature to check for available software updates. *In its default factory configuration state*, The SyncServer automatically checks the Symmetricom web site for upgrades every weekday shortly after noon local time. If an upgrade is available, the SyncServer generates a minor "System Upgrade Alarm" and performs the following actions:

- Turns the front panel Alarm LED orange
- Generates and SNMP trap
- Writes a message to the log

The admin user responds to the alarm and logs into the SyncServer's web interface. The status bar at the top of the window shows that an alarm has been triggered, and on the **STATUS - General** page, "Release Version" states that an upgrade is available.

The admin user downloads the software upgrade file(s) from the Symmetricom web site to their local machine and then follows the steps given below for upgrading the software on the SyncServer.

While upgrading the software, the SyncServer automatically transfers all of the configuration settings. However, should a power failure interrupt this process, the user may want to have a back up file containing the configuration in order to restore the SyncServer to its original configuration. This backup file can be created using the **WIZARDS - Backup** page.

### Troubleshooting upgrade alarms and notification

These are the upgrade-related settings in the factory default configuration:

- On the **SYSTEM - General** page, "Check for software upgrades" is enabled.
- On the **ADMIN - Alarms** page, for "System Upgrade Alarm":
  - "Auto Clear" is disabled - the alarm remains raised until the user intervenes
  - "Severity" is "Minor" - the alarm generates a minor alarm/orange LED
  - "Send Trap" is enabled the alarm generates a SNMP trap.
  - "Write Log" is enabled.
  - "Send Email" is disabled.



These are some configuration settings to consider when setting up or troubleshooting upgrade alarm notifications:

- Check and modify the settings described above.
- To receive SNMP traps, verify that the **NETWORK - SNMP** and **NETWORK - SNMP Traps** pages are configured correctly.
- To receive email notification, verify that the **SERVICES - Email** page is configured correctly.
- Verify that the SyncServer's LAN1 port has access, using HTTP over port 80, to the Internet so it can check the Symmetricom web site for upgrades. Most proxy servers and firewall devices allow this type of traffic, but some may be configured to block it.
- Verify that LAN1 is configured with a valid DNS server address.

## How to Upgrade

The SyncServer provides two equivalent web pages for upgrading the software:

- **WIZARDS - Upgrade** - simpler, more user-guidance
- **SYSTEM - Upgrade** - more options and status information

## Checking for upgrades:

- 1** Check the "System Upgrade Alarm" on the **ADMIN - Alarms** page to see if a software upgrade is available.

If the SyncServer doesn't have direct access to the Internet, compare the Software Version on the **STATUS - General** page with the version available at [www.symmetricom.com](http://www.symmetricom.com) (see Symmetricom Web Site - <http://www.symmetricom.com>).

- 2** If an updated package is available, download it to your workstation.
- 3** As a precaution, back up the SyncServer's configuration to your workstation or USB flash drive using **WIZARDS - Backup**.\*

\*The SyncServer automatically saves its current configuration and reapplies it to the new software. The backup is only needed in case the upgrade fails and the SyncServer's configuration file becomes unrecoverable.

## Upgrading with the WIZARDS - Upgrade page:

- 1** Click the **BROWSE** button (*STEP 1: Transfer Upgrade File to SyncServer*).
- 2** In the **Choose file** window, locate and double-click the upgrade file.
- 3** Click the **NEXT** button (*STEP 1: Transfer Upgrade File to SyncServer*).
- 4** Click the **FINISH** button. (*STEP 2: Perform Upgrade*).

The SyncServer reports "Downloading Upgrade File!".

The SyncServer starts upgrading the software. The browser reports "Upgrading System!".

When the upgrade is complete, the SyncServer shuts down and reboots. The browser reports "Rebooting System!" while the Front Panel Display reports "Shutting down, please wait..."

#### Upgrading with the SYSTEM - Upgrade page:

- 1 On the **SYSTEM - Upgrade** page, click the **BROWSE** button.
- 2 In the **Choose file** window, locate and double-click the upgrade file.
- 3 On the **SYSTEM - Upgrade** page, click the **UPLOAD** button.

The SyncServer reports "Downloading Upgrade File!".

- 4 Select the upgrade file in the *Current Files* window and click the **INSTALL** button.

The SyncServer starts upgrading the software. The browser polls the SyncServer every few seconds, displaying the upgrade progress in the *Script Output* window.

When the upgrade is complete, the SyncServer shuts down and reboots. The browser reports "Rebooting System!" while the Front Panel Display reports "Shutting down, please wait..."

#### After the upgrade (optional):

When the SyncServer is finished rebooting, the browser shows the login page, while the Front Panel Display shows the model, time and date.

- Log in to the web interface and check the Release Version on the **STATUS - General** page to ensure that it matches the desired version
- Check that the configuration settings transferred correctly.
- On **SYSTEM - Upgrade**, select the **upgradehist.txt** in *Current Files* and click the **VIEW** button.

#### Troubleshooting

- The browser 'loses' the SyncServer web page during the upgrade and displays an error message:

Wait until the SyncServer display has finished reporting "Shutting Down, please wait..." and is showing the default time screen. Try the browser refresh button. If that doesn't work...

The SyncServer may be configured to use DHCP and DHCP may have assigned a new address to LAN1 during the reboot. Get LAN1's IP address using the **STATUS** button on the front panel and enter it in the browser's address window. Try to reload the SyncServer login page again.

- The unit 'loses' its configuration during the upgrade process.  
Use **WIZARDS - Restore** to re-apply the configuration file (e.g., syncServer.bkp) that was created prior to the upgrade using **WIZARDS - Backup**.
- The unit hangs during the upgrade.  
Turn the SyncServer's power off and on. The upgrade may have completed successfully. However, as a precaution, repeat the upgrade process. If the SyncServer will not boot up and show the model, time and date on the Front Panel Display...
- Connect a standard serial cable from the console port to an available COM port on your workstation. Now start a terminal session with the SyncServer at 9600 Baud, 8 Bits, No Parity, and 1 Stop Bit. Power the SyncServer OFF for 60 seconds and then ON again. After several seconds a menu will appear. Use the arrow keys on your workstation keyboard to select the 'fallback' image and press enter. This will have the system boot up on its fallback partition. Follow the Quick Start Guide to bring the system up, repeat the upgrade process, and then restore your last saved configuration from your workstation or a USB flash drive.
- Contact Symmetricom Technical Support.

## Configuring the SyncServer

Perform a basic configuration of the SyncServer using **WIZARDS - 1st Setup**.

The following pages recommended for configuring other aspects of the SyncServer. The wizards provide the simplest configuration solution, while the other pages provide advanced options.

### NTP

- **WIZARDS - NTP** - Configure the NTP associations.
- **NTP - NTP Peers** - Add to or modify the NTP associations.
- **NTP - NTP Keys** - Generate MD5 keys or upload certificates.

### Networking

- **NETWORK - Ethernet** - Configure the network ports.

### SNMP

- **WIZARDS - SNMP** - Configure basic SNMP settings.
- **NETWORK - SNMP** - Configure SNMPv3, encryption, and authorization.
- **NETWORK - SNMP Traps** - Configure SNMP traps.
- **ADMIN - Alarms** - Configure which alarms generate SNMP traps.

### Timing

- **TIMING - GPS** - Configure GPS options.
- **TIMING - IRIG** - Configure IRIG inputs and outputs.
- **TIMING - Sysplex** - Configure Sysplex outputs.

### Admin

- **ADMIN - Login Display** - Configure how much status information to display on the login page.
- **ADMIN - Alarms** - Configure alarm severity and notification options, including SNMP, Logs, and Email.

## Troubleshooting

The following troubleshooting scenarios provide high level guidance on how to solve a range of potential problems with the SyncServer.

- A bullet is a proposed a solution. The user tries each solution in turn until the problem is solved.
- A numbered step is a procedure. The user completes the procedure to solve the problem.

### Password doesn't work

You've tried logging in and the password doesn't work.

- In the Web Interface, check that **Caps Lock** isn't on. Enter *admin* in lower case. Enter the password using the correct case.
- Use the **Recover Password** link, if it is visible on the Login page.

### Recover Password doesn't work

- To regain authorized access to the Web Interface, reset the password *as described above*.
- If one has authorized access to the web interface, but are having trouble contact Symmetricom Technical Support.

### No Web Interface

- Check that LAN1 is physically connected to the network.
- Ping the IP Address of LAN1. If needed, check that the IP Address, Mask, and Gateway are valid using the Keypad/Display by pressing the **STATUS** button three times.
- The LAN1 Ethernet port may be disabled. If needed, turn LAN1 on using the Keypad/Display as follows:
  1. Press **MENU**.
  2. Select **3) LAN1 On/Off**
  3. Select **1) Enable**
- The HTTPD may be turned off. If needed, turn HTTPD on as follows:
  - If HTTPD was stopped with **Auto** selected (on the **SERVICES - Startup** page), type "HTTP On" at the command line interface (CLI). After the SyncServer finishes rebooting, try to log on.

---

## Backing Up/Restoring Configurations

- About the Backup and Restore Features

SyncServer's configuration settings can be saved to a "backup" file, which is useful in the following scenarios:

- The user is testing multiple SyncServer configurations. The user saves the "original" configuration before testing, and then saves some of the more promising test configurations. When the testing is complete, the user selects and restores the best configuration.
- The user has purchased several new SyncServers. The user configures the first SyncServer and then transfers the configuration to the remaining SyncServers using the restore feature.

---

Note: The SyncServer saves information regarding IP addressing. If using this method of configuration, be sure to set a unique IP address if attaching multiple devices to the same network.

---

The SyncServer's backup and restore features are available from two locations:

- From the web interface, using the **WIZARDS - Backup** and the **WIZARDS - Restore** pages.
- From the front panel keypad, using the **MENU** button and the **4) USB** menu item.

The backup/restore features can use a variety of media:

- A USB flash drive plugged into either of the USB ports on the front panel.
- Any directory that is accessible to a browser.

---

Note: Not all USB flash drives are compatible with the SyncServer's USB ports. Symmetricon recommends using SanDisk cruzer micro USB devices.

---

## Creating a Backup File

The user can back up the SyncServer's configuration from the front panel or from the web interface.

### From the front panel keypad:

- 1 Plug a compatible USB flash drive in either USB port on the front panel.

- 2 Press the **MENU** button.
- 3 Select 4) **USB** and then select 1) **Save**.

Make sure the USB flash drive is plugged in before initiating the save operation.

#### From the web interface:

Use the **WIZARDS - Backup** web page. This is a two steps process. During the backup step, the current configuration is saved to the SyncServer's local file system. In the download file step, you can save the backup file to a specified location or the USB device.

Please note that after the completion of the backup step, the current configuration is saved to the SyncServer's local file system. This configuration will be rewritten if the user performs any operation that changes the configuration data. For example, changing the IP address in the network configuration page overwrites the configuration file. Only after the download file step, the user saves the current configuration permanently to the user specified location. For this reason, Symmetricom strongly recommends the user to **ALWAYS** perform the two-step backup using the **WIZARD - Backup** web page.

The user initiates the backup by clicking the **BACKUP** button.

When the initial backup is complete, the user clicks the **NEXT** button to save the backup file to any location that is accessible to their browser using the **SAVE AS** button. For saving the backup file to a compatible USB flash device, the user plugs the USB device and specifies the file name and then clicks the **COPY** button.

## Restoring from a Backup File

Restore a saved configuration using the front panel or the web interface.

#### From the front panel keypad:

- 1 Plug a compatible USB flash drive in one of the USB ports on the front panel.
- 2 Press the **MENU** button.
- 3 Select 4) **USB** and then select 1) **Restore**.
- 4 When the SyncServer is finished restoring the configuration, it displays "Shutting down, please wait...", reboots, and then comes up with the restored configuration.

**From the web interface:**

Use the **WIZARDS - Restore** web page.

The user selects the location of the backup file:

- **Reset to Factory Defaults:** This restores the original factory configuration from a file on the SyncServer.
- **Use Last Backup:** This restores the most recently saved configuration. If "Update the configuration backup file when configuration changes are applied" on the **ADMIN - Web** page is enabled (the default setting), the most recently saved configuration is the last time the user clicked a **SAVE** or **APPLY** button. If it is disabled, the most recently saved configuration is the last time the user ran the Backup wizard.
- **Copy File From USB Drive and Overwrite Last Backup:** This restores a backup file, SyncServer.bkp, from the USB drive.
- **Upload File From Browser and Overwrite Last Backup:** This restores the configuration from a backup file at a location that is accessible from the browser, such as the local drive on one's workstation or network drive.



## Restoring the Factory Configuration

The user may wish to restore the default factory configuration in a variety of circumstances:

- The user has lost the password and the password recovery feature is disabled.
- To have a "clean slate" for reconfiguring the SyncServer.
- To remove site-specific information from the SyncServer, such as the IP addresses and GPS position, prior to sending the SyncServer off-site.

If needed, save the current SyncServer configuration prior to restoring the default factory configuration. See "Creating a Backup File".

Resetting the default factory configuration removes the current network settings, which may need to be reconfigured if the user intends to use the web interface from the LAN1 port.

### Restoring the Factory Configuration Using the Hardware Jumper

This hardware jumper method is appropriate for all of the scenarios above. It is the only appropriate method for the lost password scenario.

---

Note: Observe static protection measures while working inside the SyncServer.

---

This procedure requires:

- Size 0 Philips-head screwdriver
- Needle-nosed pliers for handling the jumper.

To restore the factory configuration:

- 1** Turn off the SyncServer power and disconnect the power cable.
- 2** If clearing site specific information from the SyncServer, disconnect all input network cables and GPS antenna cables from the rear of the SyncServer.
- 3** Unscrew the lid and remove it from the SyncServer.
- 4** Locate the jumper pins marked JP4 next to the circular battery.
- 5** Position a jumper (not supplied) across both of JP4's pins.
- 6** Replace the cover temporarily.
- 7** Re-install the power cable and turn the SyncServer's power on. The SyncServer restores the factory configuration.

- 8** After 10 seconds, turn the SyncServer's power off and disconnect the power cable.
- 9** Remove the lid and remove the jumper across JP4's pins.
- 10** Secure the SyncServer lid with the screws.
- 11** Re-install the power cable and turn the SyncServer's power on. The default factory configuration has been restored.

### Restoring the Factory Configuration Using the Web Interface

To restore the factory configuration use the one of the following pages:

- **SYSTEM - Factory Reset**
- **WIZARDS - Restore** (select *Reset to Factory Defaults*).

If clearing site-specific information from the SyncServer, disconnect all input network cables and GPS antenna cables from the rear of the SyncServer shortly after clicking the APPLY button.

---

## Configuring SNMP

Use the following pages to manage SNMP on the SyncServer:

- **WIZARDS - SNMP:** Configure SNMP quickly (SNMP v1 and v2c only).
- **NETWORK - SNMP** and **NETWORK - Traps:** Perform SNMP configuration.
- **ADMIN - Alarms:** Select which events generate SNMP traps.
- **SERVICES - Startup:** Stop or start the SNMP daemon, and enable/disable it from starting automatically when the SyncServer reboots.

### SyncServer SNMP Features

The SyncServer supports SNMP v1, v2c and v3. On the SyncServer, SNMP may be used to retrieve configuration and operational information. The SyncServer may also be configured to send traps when alarm events are either raised or cleared. The SyncServer's configuration may not be changed using SNMP. All SNMP operations are read-only.

### Configuring the SyncServer for SNMP queries

For SNMP v1/v2c queries it is necessary to specify a read community string on the SyncServer. The community string is specified on the **NETWORK - SNMP** page.

For SNMP v3 queries it is necessary to create SNMP users. SNMP users may be created with both Auth and Priv Phrases. Users are created on the **NETWORK - SNMP** page.

Additional standard SNMP values, such as sysLocation and sysContact are also specified on the **NETWORK - SNMP** page.

The SyncServer Product CD includes a copy of the SyncServer custom MIB file that can be loaded into SNMP management stations.

### Configuring the SyncServer to send SNMP Traps

For the SyncServer to send SNMP traps, it is necessary to specify trap recipients and to specify which events generate SNMP traps.

Trap recipients are specified on the **NETWORK - Traps** page. Traps may be sent in v1, v2c or v3 format. For v1 and v2c traps it is permitted to specify a community string to be include in the trap PDU. For v3 traps it is required to specify a v3 user for the destination management console. For v3 users is it also possible to specify both and Auth and Priv phrases.

Which SyncServer events generate SNMP traps is specified on the **ADMIN - Alarms** page. If a event is configured to generate a trap, it is sent when the event is either raised or cleared.

---

## Transferring Configurations

The user can save effort and prevent errors by configuring one SyncServer and then using the backup/restore features to transfer the configuration to other SyncServers.

The backup file is transferable across different models of the SyncServer (e.g., from the S250 to the S200), provided they are running the same Software Version.

### Transferring Using the Keypad and a USB Flash Drive

If you have physical access to the SyncServers, the easiest method for transferring the configuration is to use a USB flash drive and the front panel keypad. Perform these steps:

- Plug a compatible USB flash drive into either of the USB ports on the 'original' configured SyncServer.
- Press the **MENU** button, select **4) USB**, and select **1) Save**.
- Plug the USB flash drive into the 'target' SyncServer.
- Press the **MENU** button, select **4) USB**, and select **1) Restore**.

### Transferring Using the Web Interface

To do this process remotely, one can also use the web interface to do the same: Save the configuration using the **WIZARDS - Backup** on the configured SyncServer, and **WIZARDS - Restore** pages on the 'target' SyncServer.

### After Transferring the Configuration

---

**Note:** Prevent network address collisions and other problems when transferring a configuration to a second SyncServer. Perform additional configuration steps, described below, on the 'target' SyncServer on a separate test network before putting it onto the production network with the 'original' SyncServer.

---

After transferring a configuration, the following settings must be updated before placing the unit on a production network:

- On the **NETWORK - Ethernet** page, update the **IP Addresses** for each of LAN ports, plus any other network settings, as needed.
- On the **SYSTEM - General** page, update the **Hostname**.

The following items may also deserve some attention:

- On **NTP - Config**, you may want to update the **Current NTP Associations** so the SyncServers peer with each other.
- On **NTP - SNMP**, update the **sysLocation** and **sysName**.
- On **TIMING - GPS**, force a Survey if the 'target' SyncServer is in a different location from the 'original' one.
- Update **TIMING - Time Zone** if the 'target' and 'original' SyncServers are in different time zones.
- On **ADMIN - Users**, update the SMTP Gateway if needed.

## CHAPTER 8

# Software Licenses

This product contains licensed third party software, including software available under the GPL licensing scheme. The text of each license is available in the "License" folder located on the Product Information CD-ROM that is supplied with the SyncServer. Additionally, these licenses and the source code for the related public software, can be obtained by contacting Symmetricom Technical Support (<http://www.symmetricom.com/support>).

By using the SyncServer, the user agrees to the terms of these licenses.

## In This Chapter

Apache Software License.....	132
NTP Software License .....	142
GNU General Public License.....	146
UCD-SNMP Software License .....	153

---

# Apache Software License

```
/* =====
 * The Apache Software License, Version 1.1
 *
 * Copyright (c) 2000-2003 The Apache Software Foundation. All rights
 * reserved.
 *
 * Redistribution and use in source and binary forms, with or without
 * modification, are permitted provided that the following conditions
 * are met:
 *
 * 1. Redistributions of source code must retain the above copyright
 *    notice, this list of conditions and the following disclaimer.
 *
 * 2. Redistributions in binary form must reproduce the above copyright
 *    notice, this list of conditions and the following disclaimer in
 *    the documentation and/or other materials provided with the
 *    distribution.
 *
 * 3. The end-user documentation included with the redistribution,
 *    if any, must include the following acknowledgment:
 *
 *       "This product includes software developed by the
 *        Apache Software Foundation (http://www.apache.org/)."


Alternately, this acknowledgment may appear in the software itself,
if and wherever such third-party acknowledgments normally appear.


 *
 * 4. The names "Apache" and "Apache Software Foundation" must
 *    not be used to endorse or promote products derived from this
 *    software without prior written permission. For written
 *    permission, please contact apache@apache.org.
 *
 * 5. Products derived from this software may not be called "Apache",
 *    nor may "Apache" appear in their name, without prior written
 *    permission of the Apache Software Foundation.
 *
 * THIS SOFTWARE IS PROVIDED ``AS IS'' AND ANY EXPRESSED OR IMPLIED
 * WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES
 * OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE
 * DISCLAIMED. IN NO EVENT SHALL THE APACHE SOFTWARE FOUNDATION OR
 * ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
 * SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
 * LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF
 * USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND
 * ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY,
 * OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT
 * OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
 * SUCH DAMAGE.
 * =====
 *
 * This software consists of voluntary contributions made by many
 * individuals on behalf of the Apache Software Foundation. For more
 * information on the Apache Software Foundation, please see
```



```
* <http://www.apache.org/>.
*
* Portions of this software are based upon public domain software
* originally written at the National Center for Supercomputing Applications,
* University of Illinois, Urbana-Champaign.
*/
```

#### APACHE HTTP SERVER SUBCOMPONENTS:

The Apache HTTP Server includes a number of subcomponents with separate copyright notices and license terms. Your use of the source code for these subcomponents is subject to the terms and conditions of the following licenses.

For the mod\_mime\_magic component:

```
/*
* mod_mime_magic: MIME type lookup via file magic numbers
* Copyright (c) 1996-1997 Cisco Systems, Inc.
*
* This software was submitted by Cisco Systems to the Apache Group in July
* 1997. Future revisions and derivatives of this source code must
* acknowledge Cisco Systems as the original contributor of this module.
* All other licensing and usage conditions are those of the Apache Group.
*
* Some of this code is derived from the free version of the file command
* originally posted to comp.sources.unix. Copyright info for that program
* is included below as required.
* -----
* - Copyright (c) Ian F. Darwin, 1987. Written by Ian F. Darwin.
*
* This software is not subject to any license of the American Telephone and
* Telegraph Company or of the Regents of the University of California.
*
* Permission is granted to anyone to use this software for any purpose on any
* computer system, and to alter it and redistribute it freely, subject to
* the following restrictions:
*
* 1. The author is not responsible for the consequences of use of this
* software, no matter how awful, even if they arise from flaws in it.
*
* 2. The origin of this software must not be misrepresented, either by
* explicit claim or by omission. Since few users ever read sources, credits
* must appear in the documentation.
*
* 3. Altered versions must be plainly marked as such, and must not be
* misrepresented as being the original software. Since few users ever read
* sources, credits must appear in the documentation.
*
* 4. This notice may not be removed or altered.
* -----
*/
```

For the modules\mappers\mod\_imap.c component:

"macmartinized" polygon code copyright 1992 by Eric Haines, erich@eye.com

For the server\util\_md5.c component:

```
/*
*****
* NCSA HTTPd Server
* Software Development Group
* National Center for Supercomputing Applications
* University of Illinois at Urbana-Champaign
* 605 E. Springfield, Champaign, IL 61820
* httpd@ncsa.uiuc.edu
*
* Copyright (C) 1995, Board of Trustees of the University of Illinois
*
*****
*
* md5.c: NCSA HTTPd code which uses the md5c.c RSA Code
*
* Original Code Copyright (C) 1994, Jeff Hostetler, Spyglass, Inc.
* Portions of Content-MD5 code Copyright (C) 1993, 1994 by Carnegie Mellon
* University (see Copyright below).
* Portions of Content-MD5 code Copyright (C) 1991 Bell Communications
* Research, Inc. (Bellcore) (see Copyright below).
* Portions extracted from mpack, John G. Myers - jgm+@cmu.edu
* Content-MD5 Code contributed by Martin Hamilton (martin@net.lut.ac.uk)
*
*/

/* these portions extracted from mpack, John G. Myers - jgm+@cmu.edu */
/* (C) Copyright 1993,1994 by Carnegie Mellon University
* All Rights Reserved.
*
* Permission to use, copy, modify, distribute, and sell this software
* and its documentation for any purpose is hereby granted without
* fee, provided that the above copyright notice appear in all copies
* and that both that copyright notice and this permission notice
* appear in supporting documentation, and that the name of Carnegie
* Mellon University not be used in advertising or publicity
* pertaining to distribution of the software without specific,
* written prior permission. Carnegie Mellon University makes no
* representations about the suitability of this software for any
* purpose. It is provided "as is" without express or implied
* warranty.
*
* CARNEGIE MELLON UNIVERSITY DISCLAIMS ALL WARRANTIES WITH REGARD TO
* THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY
* AND FITNESS, IN NO EVENT SHALL CARNEGIE MELLON UNIVERSITY BE LIABLE
* FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES
* WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN
* AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING
* OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS
* SOFTWARE.
```

\*/

/\*

\* Copyright (c) 1991 Bell Communications Research, Inc. (Bellcore)  
 \*  
 \* Permission to use, copy, modify, and distribute this material  
 \* for any purpose and without fee is hereby granted, provided  
 \* that the above copyright notice and this permission notice  
 \* appear in all copies, and that the name of Bellcore not be  
 \* used in advertising or publicity pertaining to this  
 \* material without the specific, prior written permission  
 \* of an authorized representative of Bellcore. BELLCORE  
 \* MAKES NO REPRESENTATIONS ABOUT THE ACCURACY OR SUITABILITY  
 \* OF THIS MATERIAL FOR ANY PURPOSE. IT IS PROVIDED "AS IS",  
 \* WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES.  
 \*/

For the srclib\apr\include\apr\_md5.h component:

/\*

\* This work is derived from material Copyright RSA Data Security, Inc.  
 \*  
 \* The RSA copyright statement and Licence for that original material is  
 \* included below. This is followed by the Apache copyright statement and  
 \* licence for the modifications made to that material.  
 \*/

/\* Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All  
 rights reserved.

License to copy and use this software is granted provided that it  
 is identified as the "RSA Data Security, Inc. MD5 Message-Digest  
 Algorithm" in all material mentioning or referencing this software  
 or this function.

License is also granted to make and use derivative works provided  
 that such works are identified as "derived from the RSA Data  
 Security, Inc. MD5 Message-Digest Algorithm" in all material  
 mentioning or referencing the derived work.

RSA Data Security, Inc. makes no representations concerning either  
 the merchantability of this software or the suitability of this  
 software for any particular purpose. It is provided "as is"  
 without express or implied warranty of any kind.

These notices must be retained in any copies of any part of this  
 documentation and/or software.

\*/

For the srclib\apr\passwd\apr\_md5.c component:

/\*

\* This work is derived from material Copyright RSA Data Security, Inc.  
 \*  
 \* The RSA copyright statement and Licence for that original material is  
 \* included below. This is followed by the Apache copyright statement and

```
* licence for the modifications made to that material.
*/

/* MD5C.C - RSA Data Security, Inc., MD5 message-digest algorithm
*/

/* Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All
   rights reserved.

License to copy and use this software is granted provided that it
is identified as the "RSA Data Security, Inc. MD5 Message-Digest
Algorithm" in all material mentioning or referencing this software
or this function.

License is also granted to make and use derivative works provided
that such works are identified as "derived from the RSA Data
Security, Inc. MD5 Message-Digest Algorithm" in all material
mentioning or referencing the derived work.

RSA Data Security, Inc. makes no representations concerning either
the merchantability of this software or the suitability of this
software for any particular purpose. It is provided "as is"
without express or implied warranty of any kind.

These notices must be retained in any copies of any part of this
documentation and/or software.
*/
/*
* The apr_md5_encode() routine uses much code obtained from the FreeBSD 3.0
* MD5 crypt() function, which is licenced as follows:
* -----
-
* "THE BEER-WARE LICENSE" (Revision 42):
* <phk@login.dknet.dk> wrote this file.  As long as you retain this notice
you
* can do whatever you want with this stuff.  If we meet some day, and you
think
* this stuff is worth it, you can buy me a beer in return.  Poul-Henning Kamp
* -----
-
*/
```

For the srclib\apr-util\crypto\apr\_md4.c component:

```
* This is derived from material copyright RSA Data Security, Inc.
* Their notice is reproduced below in its entirety.
*
* Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All
* rights reserved.
*
* License to copy and use this software is granted provided that it
* is identified as the "RSA Data Security, Inc. MD4 Message-Digest
* Algorithm" in all material mentioning or referencing this software
* or this function.
*
* License is also granted to make and use derivative works provided
```

```

* that such works are identified as "derived from the RSA Data
* Security, Inc. MD4 Message-Digest Algorithm" in all material
* mentioning or referencing the derived work.
*
* RSA Data Security, Inc. makes no representations concerning either
* the merchantability of this software or the suitability of this
* software for any particular purpose. It is provided "as is"
* without express or implied warranty of any kind.
*
* These notices must be retained in any copies of any part of this
* documentation and/or software.
*/

```

For the `srclib\apr-util\include\apr_md4.h` component:

```

*
* This is derived from material copyright RSA Data Security, Inc.
* Their notice is reproduced below in its entirety.
*
* Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All
* rights reserved.
*
* License to copy and use this software is granted provided that it
* is identified as the "RSA Data Security, Inc. MD4 Message-Digest
* Algorithm" in all material mentioning or referencing this software
* or this function.
*
* License is also granted to make and use derivative works provided
* that such works are identified as "derived from the RSA Data
* Security, Inc. MD4 Message-Digest Algorithm" in all material
* mentioning or referencing the derived work.
*
* RSA Data Security, Inc. makes no representations concerning either
* the merchantability of this software or the suitability of this
* software for any particular purpose. It is provided "as is"
* without express or implied warranty of any kind.
*
* These notices must be retained in any copies of any part of this
* documentation and/or software.
*/

```

For the `srclib\apr-util\test\testdbm.c` component:

```

/* =====
* The Apache Software License, Version 1.1
*
* Copyright (c) 2000-2002 The Apache Software Foundation. All rights
* reserved.
*
* Redistribution and use in source and binary forms, with or without
* modification, are permitted provided that the following conditions
* are met:
*
* 1. Redistributions of source code must retain the above copyright

```

```
*      notice, this list of conditions and the following disclaimer.
*
* 2. Redistributions in binary form must reproduce the above copyright
*      notice, this list of conditions and the following disclaimer in
*      the documentation and/or other materials provided with the
*      distribution.
*
* 3. The end-user documentation included with the redistribution,
*      if any, must include the following acknowledgment:
*          "This product includes software developed by the
*           Apache Software Foundation (http://www.apache.org/)."
*      Alternately, this acknowledgment may appear in the software itself,
*      if and wherever such third-party acknowledgments normally appear.
*
* 4. The names "Apache" and "Apache Software Foundation" must
*      not be used to endorse or promote products derived from this
*      software without prior written permission. For written
*      permission, please contact apache@apache.org.
*
* 5. Products derived from this software may not be called "Apache",
*      nor may "Apache" appear in their name, without prior written
*      permission of the Apache Software Foundation.
*
* THIS SOFTWARE IS PROVIDED ``AS IS'' AND ANY EXPRESSED OR IMPLIED
* WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES
* OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE
* DISCLAIMED.  IN NO EVENT SHALL THE APACHE SOFTWARE FOUNDATION OR
* ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL,
* SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT
* LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF
* USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND
* ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY,
* OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT
* OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
* SUCH DAMAGE.
* =====
*
* This software consists of voluntary contributions made by many
* individuals on behalf of the Apache Software Foundation.  For more
* information on the Apache Software Foundation, please see
* <http://www.apache.org/>.
*
* This file came from the SDBM package (written by oz@nexus.yorku.ca).
* That package was under public domain. This file has been ported to
* APR, updated to ANSI C and other, newer idioms, and added to the Apache
* codebase under the above copyright and license.
*/
```

For the `srclib\apr-util\test\testmd4.c` component:

```
*
* This is derived from material copyright RSA Data Security, Inc.
* Their notice is reproduced below in its entirety.
*
* Copyright (C) 1990-2, RSA Data Security, Inc. Created 1990. All
```

```

* rights reserved.
*
* RSA Data Security, Inc. makes no representations concerning either
* the merchantability of this software or the suitability of this
* software for any particular purpose. It is provided "as is"
* without express or implied warranty of any kind.
*
* These notices must be retained in any copies of any part of this
* documentation and/or software.
*/

```

For the srclib\apr-util\xml\expat\conf\tools\install-sh component:

```

#
# install - install a program, script, or datafile
# This comes from X11R5 (mit/util/scripts/install.sh).
#
# Copyright 1991 by the Massachusetts Institute of Technology
#
# Permission to use, copy, modify, distribute, and sell this software and its
# documentation for any purpose is hereby granted without fee, provided that
# the above copyright notice appear in all copies and that both that
# copyright notice and this permission notice appear in supporting
# documentation, and that the name of M.I.T. not be used in advertising or
# publicity pertaining to distribution of the software without specific,
# written prior permission. M.I.T. makes no representations about the
# suitability of this software for any purpose. It is provided "as is"
# without express or implied warranty.
#

```

For the srclib\pcre\install-sh component:

```

#
# Copyright 1991 by the Massachusetts Institute of Technology
#
# Permission to use, copy, modify, distribute, and sell this software and its
# documentation for any purpose is hereby granted without fee, provided that
# the above copyright notice appear in all copies and that both that
# copyright notice and this permission notice appear in supporting
# documentation, and that the name of M.I.T. not be used in advertising or
# publicity pertaining to distribution of the software without specific,
# written prior permission. M.I.T. makes no representations about the
# suitability of this software for any purpose. It is provided "as is"
# without express or implied warranty.

```

For the pcre component:

PCRE LICENCE  
-----

PCRE is a library of functions to support regular expressions whose syntax and semantics are as close as possible to those of the Perl 5 language.

Written by: Philip Hazel <ph10@cam.ac.uk>

University of Cambridge Computing Service,  
Cambridge, England. Phone: +44 1223 334714.

Copyright (c) 1997-2001 University of Cambridge

Permission is granted to anyone to use this software for any purpose on any computer system, and to redistribute it freely, subject to the following restrictions:

1. This software is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
2. The origin of this software must not be misrepresented, either by explicit claim or by omission. In practice, this means that if you use PCRE in software which you distribute to others, commercially or otherwise, you must put a sentence like this

Regular expression support is provided by the PCRE library package, which is open source software, written by Philip Hazel, and copyright by the University of Cambridge, England.

somewhere reasonably visible in your documentation and in any relevant files or online help data or similar. A reference to the ftp site for the source, that is, to

<ftp://ftp.csx.cam.ac.uk/pub/software/programming/pcre/>

should also be given in the documentation.

3. Altered versions must be plainly marked as such, and must not be misrepresented as being the original software.
4. If PCRE is embedded in any software that is released under the GNU General Purpose Licence (GPL), or Lesser General Purpose Licence (LGPL), then the terms of that licence shall supersede any condition above with which it is incompatible.

The documentation for PCRE, supplied in the "doc" directory, is distributed under the same terms as the software itself.

End PCRE LICENCE

For the test\zb.c component:

```
/*                      Zeusbench V1.01
=====
```

This program is Copyright (C) Zeus Technology Limited 1996.

This program may be used and copied freely providing this copyright notice is not removed.

This software is provided "as is" and any express or implied warranties, including but not limited to, the implied warranties of merchantability and



fitness for a particular purpose are disclaimed. In no event shall Zeus Technology Ltd. be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute good or services; loss of use, data, or profits; or business interruption) however caused and on theory of liability. Whether in contract, strict liability or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

Written by Adam Twiss (adam@zeus.co.uk). March 1996

Thanks to the following people for their input:

Mike Belshe (mbelshe@netscape.com)

Michael Campanella (campanella@stevms.enet.dec.com)

\*/

For the expat xml parser component:

Copyright (c) 1998, 1999, 2000 Thai Open Source Software Center Ltd  
and Clark Cooper

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

=====

---

# NTP Software License

This file is automatically generated from `html/copyright.htm`

## Copyright Notice

[sheepb.jpg] "Clone me," says Dolly sheepishly

---

The following copyright notice applies to all files collectively called the Network Time Protocol Version 4 Distribution. Unless specifically declared otherwise in an individual file, this notice applies as if the text was explicitly included in the file.

```
*****
*                                                                 *
* Copyright (c) David L. Mills 1992-2001                        *
*                                                                 *
* Permission to use, copy, modify, and distribute this software and *
* its documentation for any purpose and without fee is hereby    *
* granted, provided that the above copyright notice appears in all *
* copies and that both the copyright notice and this permission  *
* notice appear in supporting documentation, and that the name   *
* University of Delaware not be used in advertising or publicity *
* pertaining to distribution of the software without specific,   *
* written prior permission. The University of Delaware makes no *
* representations about the suitability this software for any    *
* purpose. It is provided "as is" without express or implied    *
* warranty.                                                       *
*                                                                 *
*****
```

The following individuals contributed in part to the Network Time Protocol Distribution Version 4 and are acknowledged as authors of this work.

1. [1]Mark Andrews <marka@syd.dms.csiro.au> Leitch atomic clock controller
2. [2]Bernd Altmeier <altmeier@atlsoft.de> hopf Elektronik serial line and PCI-bus devices
3. [3]Viraj Bais <vbais@mailman1.intel.com> and [4]Clayton Kirkwood <kirkwood@striderfm.intel.com> port to WindowsNT 3.5
4. [5]Michael Barone <michael,barone@lmco.com> GPSVME fixes
5. [6]Karl Berry <karl@owl.HQ.ileaf.com> syslog to file option
6. [7]Greg Brackley <greg.brackley@bigfoot.com> Major rework of WINNT port. Clean up recvbuf and iosignal code into separate modules.
7. [8]Marc Brett <Marc.Brett@westgeo.com> Magnavox GPS clock driver
8. [9]Piete Brooks <Piete.Brooks@cl.cam.ac.uk> MSF clock driver, Trimble PARSE support
9. [10]Reg Clemens <reg@dwf.com> Oncore driver (Current maintainer)
10. [11]Steve Clift <clift@ml.csiro.au> OMEGA clock driver
11. [12]Casey Crellin <casey@csc.co.za> vxWorks (Tornado) port and help with target configuration
12. [13]Sven Dietrich <sven\_dietrich@trimble.com> Palisade reference clock driver, NT adj. residuals, integrated Greg's Winnt port.

13. [14]John A. Dundas III <dundas@salt.jpl.nasa.gov> Apple A/UX port
14. [15]Torsten Duwe <duwe@immd4.informatik.uni-erlangen.de> Linux port
15. [16]Dennis Ferguson <dennis@mrbill.canet.ca> foundation code for NTP Version 2 as specified in RFC-1119
16. [17]Glenn Hollinger <glenn@herald.usask.ca> GOES clock driver
17. [18]Mike Iglesias <iglesias@uci.edu> DEC Alpha port
18. [19]Jim Jagielski <jim@jagubox.gsfc.nasa.gov> A/UX port
19. [20]Jeff Johnson <jbj@chatham.usdesign.com> massive prototyping overhaul
20. [21]Hans Lambermont <Hans.Lambermont@nl.origin-it.com> or [22]<H.Lambermont@chello.nl> ntpswEEP
21. [23]Poul-Henning Kamp <phk@FreeBSD.ORG> Oncore driver (Original author)
22. [24]Frank Kardel [25]<Frank.Kardel@informatik.uni-erlangen.de> PARSE <GENERIC> driver (14 reference clocks), STREAMS modules for PARSE, support scripts, syslog cleanup
23. [26]William L. Jones <jones@hermes.chpc.utexas.edu> RS/6000 AIX modifications, HP/UX modifications
24. [27]Dave Katz <dkatz@cisco.com> RS/6000 AIX port
25. [28]Craig Leres <leres@ee.lbl.gov> 4.4BSD port, ppsclock, Magnavox GPS clock driver
26. [29]George Lindholm <lindholm@ucs.ubc.ca> SunOS 5.1 port
27. [30]Louis A. Mamakos <louie@ni.umd.edu> MD5-based authentication
28. [31]Lars H. Mathiesen <thorinn@diku.dk> adaptation of foundation code for Version 3 as specified in RFC-1305
29. [32]David L. Mills <mills@udel.edu> Version 4 foundation: clock discipline, authentication, precision kernel; clock drivers: Spectracom, Austron, Arbiter, Heath, ATOM, ACTS, KSI/Odetics; audio clock drivers: CHU, WWV/H, IRIG
30. [33]Wolfgang Moeller <moeller@gwdgvl.dnet.gwdg.de> VMS port
31. [34]Jeffrey Mogul <mogul@pa.dec.com> ntptrace utility
32. [35]Tom Moore <tmoore@fielvel.daytonoh.ncr.com> i386 svr4 port
33. [36]Kamal A Mostafa <kamal@whence.com> SCO OpenServer port
34. [37]Derek Mulcahy <derek@toybox.demon.co.uk> and [38]Damon Hart-Davis <d@hd.org> ARCRON MSF clock driver
35. [39]Rainer Pruy <Rainer.Pruy@informatik.uni-erlangen.de> monitoring/trap scripts, statistics file handling
36. [40]Dirce Richards <dirce@zk3.dec.com> Digital UNIX V4.0 port
37. [41]Wilfredo Sánchez <wsanchez@apple.com> added support for NetInfo
38. [42]Nick Sayer <mrapple@quack.kfu.com> SunOS streams modules
39. [43]Jack Sasportas <jack@innovativeInternet.com> Saved a Lot of space on the stuff in the html/pic/ subdirectory
40. [44]Ray Schnitzler <schnitz@unipress.com> Unixware1 port
41. [45]Michael Shields <shields@tembel.org> USNO clock driver
42. [46]Jeff Steinman <jss@pebbles.jpl.nasa.gov> Datum PTS clock driver
43. [47]Harlan Stenn <harlan@pfcs.com> GNU automake/autoconfigure makeover, various other bits (see the ChangeLog)
44. [48]Kenneth Stone <ken@sdd.hp.com> HP-UX port
45. [49]Ajit Thyagarajan <ajit@ee.udel.edu> IP multicast/anycast support
46. [50]Tomoaki TSURUOKA <tsuruoka@nc.fukuoka-u.ac.jp> TRAK clock driver

- 47. [51]Paul A Vixie <vixie@vix.com> TrueTime GPS driver, generic TrueTime clock driver
  - 48. [52]Ulrich Windl <Ulrich.Windl@rz.uni-regensburg.de> corrected and validated HTML documents according to the HTML DTD
- 

[53]gif

[54]David L. Mills <mills@udel.edu>

## References

- 1. mailto:marka@syd.dms.csiro.au
- 2. mailto:altmeier@atlsoft.de
- 3. mailto:vbais@mailman1.intel.co
- 4. mailto:kirkwood@striderfm.intel.com
- 5. mailto:michael.barone@lmco.com
- 6. mailto:karl@owl.HQ.ileaf.com
- 7. mailto:greg.brackley@bigfoot.com
- 8. mailto:Marc.Brett@westgeo.com
- 9. mailto:Piete.Brooks@cl.cam.ac.uk
- 10. mailto:reg@dwf.com
- 11. mailto:clift@ml.csiro.au
- 12. mailto:casey@csc.co.za
- 13. mailto:Sven\_Dietrich@trimble.COM
- 14. mailto:dundas@salt.jpl.nasa.gov
- 15. mailto:duwe@immd4.informatik.uni-erlangen.de
- 16. mailto:dennis@mrbill.canet.ca
- 17. mailto:glenn@herald.usask.ca
- 18. mailto:iglesias@uci.edu
- 19. mailto:jagubox.gsfc.nasa.gov
- 20. mailto:jbj@chatham.usdesign.com
- 21. mailto:Hans.Lambermont@nl.origin-it.com
- 22. mailto:H.Lambermont@chello.nl
- 23. mailto:phk@FreeBSD.ORG
- 24. http://www4.informatik.uni-erlangen.de/~kardel
- 25. mailto:Frank.Kardel@informatik.uni-erlangen.de
- 26. mailto:jones@hermes.chpc.utexas.edu
- 27. mailto:dkatz@cisco.com
- 28. mailto:leres@ee.lbl.gov
- 29. mailto:lindholm@ucs.ubc.ca
- 30. mailto:louie@ni.umd.edu
- 31. mailto:thorinn@diku.dk
- 32. mailto:mills@udel.edu
- 33. mailto:moeller@gwdgv1.dnet.gwdg.de
- 34. mailto:mogul@pa.dec.com
- 35. mailto:tmoore@fievel.daytonoh.ncr.com
- 36. mailto:kamal@whence.com
- 37. mailto:derek@toybox.demon.co.uk
- 38. mailto:d@hd.org
- 39. mailto:Rainer.Pruy@informatik.uni-erlangen.de
- 40. mailto:dirce@zk3.dec.com
- 41. mailto:wsanchez@apple.com
- 42. mailto:mrapple@quack.kfu.com
- 43. mailto:jack@innovativeInternet.com

- 44. `mailto:schnitz@unipress.com`
- 45. `mailto:shields@tembel.org`
- 46. `mailto:pebbles.jpl.nasa.gov`
- 47. `mailto:harlan@pfcs.com`
- 48. `mailto:ken@sdd.hp.com`
- 49. `mailto:ajit@ee.udel.edu`
- 50. `mailto:tsuruoka@nc.fukuoka-u.ac.jp`
- 51. `mailto:vixie@vix.com`
- 52. `mailto:Ulrich.Windl@rz.uni-regensburg.de`
- 53. `file://localhost/backroom/ntp-stable/html/index.htm`
- 54. `mailto:mills@udel.edu`

---

# GNU General Public License

NOTE! This copyright does *\*not\** cover user programs that use kernel services by normal system calls - this is merely considered normal use of the kernel, and does *\*not\** fall under the heading of "derived work". Also note that the GPL below is copyrighted by the Free Software Foundation, but the instance of code that it refers to (the Linux kernel) is copyrighted by me and others who actually wrote it.

Also note that the only valid version of the GPL as far as the kernel is concerned is `_this_` particular version of the license (ie v2, not v2.2 or v3.x or whatever), unless explicitly otherwise stated.

Linus Torvalds

-----

## GNU GENERAL PUBLIC LICENSE Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.

59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

### Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the

source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE  
TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion

of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

- a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium



customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot

distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

## NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

## END OF TERMS AND CONDITIONS

## How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year>  <name of author>
```

```
This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.
```

```
This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
GNU General Public License for more details.
```

```
You should have received a copy of the GNU General Public License
along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307  USA
```

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

---

## UCD-SNMP Software License

Various copyrights apply to this package, listed in 3 separate parts below. Please make sure that you all the parts. Up until 2001, the project was based at UC Davis, and the first part covers all code written during this time. From 2001 onwards, the project has been based at SourceForge, and Networks Associates Technology, Inc hold the copyright on behalf of the wider Net-SNMP community, covering all derivative work done since then. An additional copyright section has been added as Part 3 below also under a BSD license for the work contributed by Cambridge Broadband Ltd. to the project since 2001.

Code has been contributed to this project by many people over the years it has been in development, and a full list of contributors can be found in the README file under the THANKS section.

----- Part 1: CMU/UCD copyright notice: (BSD like) -----

Copyright 1989, 1991, 1992 by Carnegie Mellon University

Derivative Work - 1996, 1998-2000

Copyright 1996, 1998-2000 The Regents of the University of California

All Rights Reserved

Permission to use, copy, modify and distribute this software and its documentation for any purpose and without fee is hereby granted, provided that the above copyright notice appears in all copies and that both that copyright notice and this permission notice appear in supporting documentation, and that the name of CMU and The Regents of the University of California not be used in advertising or publicity pertaining to distribution of the software without specific written permission.

CMU AND THE REGENTS OF THE UNIVERSITY OF CALIFORNIA DISCLAIM ALL WARRANTIES WITH REGARD TO THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL CMU OR THE REGENTS OF THE UNIVERSITY OF CALIFORNIA BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM THE LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

----- Part 2: Networks Associates Technology, Inc copyright notice (BSD) -----

Copyright (c) 2001-2002, Networks Associates Technology, Inc  
All rights reserved.

Redistribution and use in source and binary forms, with or without

modification, are permitted provided that the following conditions are met:

- \* Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- \* Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- \* Neither the name of the Networks Associates Technology, Inc nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDERS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

---- Part 3: Cambridge Broadband Ltd. copyright notice (BSD) ----

Portions of this code are copyright (c) 2001-2002, Cambridge Broadband Ltd. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- \* Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- \* Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- \* The name of Cambridge Broadband Ltd. may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDER ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.







## CHAPTER 9

# Certificates of Conformance

Certificates of Conformance are available on the Product CD in the folder called "Certificates".



## CHAPTER 10

# Certificate of Volatility

A Certificate of Volatility is available on the Product CD-ROM in the folder called "Certificates".

## Maintenance

This unit contains no user-serviceable parts. Please return to Symmetricom for servicing.



## CHAPTER 11

## SNMP MIB

The following text is the SyncServer's Custom MIB, which is also available from the *symm-smi.txt* file on the Product Information CD:

```
SYMM-SMI DEFINITIONS ::= BEGIN

IMPORTS
    OBJECT-TYPE,
    MODULE-IDENTITY,
    OBJECT-IDENTITY
FROM RFC-1212
DisplayString
FROM RFC1213-MIB
TRAP-TYPE
FROM RFC-1215
enterprises,
Integer32, Unsigned32
FROM RFC1155-SMI;

symmetricom MODULE-IDENTITY
    LAST-UPDATED "0507051200Z"
    ORGANIZATION "Symmetricom, Inc."
    CONTACT-INFO
        "
            Symmetricom, Inc.
            2300 Orchard Parkway
            San Jose, CA 95131"
    DESCRIPTION
        "This is the MIB Module for Symmetricom's enterprise specific
parameters"
    REVISION "0507051200Z"
    DESCRIPTION "gdowd - Updated to add SymmTTM node"
    ::= {enterprises 9070 } --assigned by IANA

symmNetworkManagement OBJECT-IDENTITY
    STATUS current
    DESCRIPTION
        "This is the root object identifier for all MIBS under the
Symmetricom tree."
    ::= { symmetricom 1 }

symmCmipManagement OBJECT-IDENTITY
    STATUS current
    DESCRIPTION
        "This is the root object identifier for CMIP based objects"
    ::= { symmNetworkManagement 1 }

symmSnmipManagement OBJECT-IDENTITY
```

```
STATUS          current
DESCRIPTION
    "This is the root object identifier for SNMP based objects"
 ::= { symmNetworkManagement 2 }

symmTimePictra OBJECT-IDENTITY
STATUS          current
DESCRIPTION
    "This is reserved for objects related to Symmetricom's
TimePictra
products."
 ::= { symmSnmpManagement 1 }

symmBroadband OBJECT-IDENTITY
STATUS          current
DESCRIPTION
    "The subtree that contains objects related to Symmetricom's
GoWide
products. "
 ::= { symmSnmpManagement 2 }

symmTTM OBJECT-IDENTITY
STATUS          current
DESCRIPTION
    "The subtree that contains objects related to Symmetricom's
Timing, Test and Measurement products."
 ::= { symmSnmpManagement 3 }

products        OBJECT IDENTIFIER ::= {symmTTM 1}
experiment      OBJECT IDENTIFIER ::= {symmTTM 99}

ts2000          OBJECT IDENTIFIER ::= {products 1}
nts             OBJECT IDENTIFIER ::= {products 2}
ts2100          OBJECT IDENTIFIER ::= {products 3}
s100            OBJECT IDENTIFIER ::= {products 4}
syncserver      OBJECT IDENTIFIER ::= {products 5}
xli             OBJECT IDENTIFIER ::= {products 6}

version         OBJECT IDENTIFIER ::= {syncserver 1}

ntpSystem       OBJECT IDENTIFIER ::= {version 1}
tyiming         OBJECT IDENTIFIER ::= {version 2}
gps             OBJECT IDENTIFIER ::= {version 3}
dialup          OBJECT IDENTIFIER ::= {version 4}
net             OBJECT IDENTIFIER ::= {version 5}
etc             OBJECT IDENTIFIER ::= {version 6}

ntpSysLeap OBJECT-TYPE
SYNTAX INTEGER {
    noWarning(0),
    addSecond(1),
    subtractSecond(2),
    alarm(3)}
ACCESS read-only
STATUS current
DESCRIPTION
```

"NTP Leap Indicator. This is a two-bit code warning of an impending leap second to be inserted into the NTP timescale. The bits are set before 23:59 on the day of insertion and reset after 00:00 on the following day. This causes the number of seconds (rollover interval) in the day of insertion to be increased or decreased by one. In the case of primary servers the bits are set by operator intervention, while in the case of secondary servers the bits are set by the protocol. The two bits, bit 0 and bit 1, respectively, are coded as follows:

```
=====
00      no warning
01      last minute has 61 seconds
10      last minute has 59 seconds
11      alarm condition(clock not synchronized)
=====
```

In all except the alarm condition(11), NTP itself does nothing with these bits, except pass them on to the time-conversion routines that are not part of NTP. The alarm condition occurs when, for whatever reason, the local clock is not synchronized, such as when first coming up or after an extended period when no primary reference source is available."

```
::= {ntpSystem 1}
```

ntpSysStratum OBJECT-TYPE

```
SYNTAX          Integer32 (0..255)
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
```

"Current NTP stratum level. This is an integer indicating the stratum of the local clock with values defined as follows:

```
=====
0      unspecified
1      primary reference (e.g., calibrated atomic
           clock, radio clock)
2-255  secondary reference (via NTP)
=====
```

```
::= {ntpSystem 2}
```

ntpSysPrecision OBJECT-TYPE

```
SYNTAX          Integer32
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
```

"Current NTP precision value. This is a signed integer indicating the precision of the various clocks, in seconds to the nearest power of two. The value must be rounded to the next larger power of two; for instance, a 50-Hz (20ms) or 60-Hz (16.17ms) power-frequency clock would be assigned the value -5 (31.25ms), while a 1000-Hz (1ms) crystal-controlled clock would be assigned the value -9 (1.95ms)."

```
::= {ntpSystem 3}

ntpSysRootDelay OBJECT-TYPE
    SYNTAX          OCTET STRING
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "the total roundtrip delay to the primary
                    reference source at the root of the synchronization
                    subnet, in seconds"
 ::= {ntpSystem 4}

ntpSysRootDispersion OBJECT-TYPE
    SYNTAX          OCTET STRING
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "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"
 ::= {ntpSystem 5}

ntpSysRefID OBJECT-TYPE
    SYNTAX          DisplayString (SIZE (1..40))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "NTP Reference Clock Identifier. This is a
                    32 bit code identifying the particular reference
                    clock. In the case of stratum 0 (unspecified) or
                    stratum 1 (primary reference), this is a four-
                    octet, left-justified, zero-padded ASCII string.
                    While not enumerated as part of the NTP spec, the
                    following are suggested ASCII identifiers:
                    =====
                    DCN          DCN routing protocol
                    NIST         NIST public modem
                    TSP          TSP time protocol
                    DTS          Digital Time Service
                    ATOM         Atomic clock (calibrated)
                    VLF          VLF radio (OMEGA,etc.)
                    callsign     Generic radio
                    LORC         LORAN-C radionavigation
                    GOES         GOES UHF environment satellite
                    GPS          GPS UHF satellite positioning
                    =====
                    The following ref ids are used by the TS2100:
                    GPS          (GPS satellite)
                    IRIG         (IRIG B timecode)
                    NIST         (NIST ACTS service)
                    1PPS         (Ext. 1 PPS input)
                    FREE         (INTERNAL CLOCK)"
 ::= {ntpSystem 6}

ntpSysRefTime OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
```



```

        STATUS          current
        DESCRIPTION
            "NTP Reference Timestamp. This is the time,
            in timestamp format (converted to DisplayString),
            when the local clock was last updated. If the
            local clock has never been synchronized, the value
            is zero."
 ::= {ntpSystem 7}

ntpSysPoll OBJECT-TYPE
    SYNTAX          Integer32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " the minimum interval between transmitted
                    messages, in seconds as a power of two. For instance,
                    a value of six indicates a minimum interval of 64 seconds."
 ::= {ntpSystem 8}

ntpSysPeer OBJECT-TYPE
    SYNTAX          Unsigned32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " the current synchronization source. This
                    variable is not currently used and returns 0."
 ::= {ntpSystem 9}

ntpSysPhase OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " system clock offset per selected source."
 ::= {ntpSystem 10}

ntpSysFreq OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " system clock frequency correction per ntpd"
 ::= {ntpSystem 11}

ntpSysError OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " current system error per ntpd?"
 ::= {ntpSystem 12}

ntpSysClock OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     " the current local time. Local time is derived
                    from the hardware clock of the particular machine and
increments
                    at intervals depending on the designed used."

```

```
::= {ntpSystem 13}

ntpSysSystem OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     " the type of the local Operating System"
 ::= {ntpSystem 14}

ntpSysProcessor OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     " the type of the local processor"
 ::= {ntpSystem 15}

ntpSysNotrust OBJECT-TYPE
    SYNTAX INTEGER (0..1)
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "Force authentication."
 ::= {ntpSystem 16}

ntpSysPktsReceived OBJECT-TYPE
    SYNTAX INTEGER (0..32768)
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION "This variable is a rollover counter which
        reflects the number of ntp packets received
        by the SyncServer. It is valid for all versions
        of the SyncServer. "
 ::= {ntpSystem 17}

ntpSysMode OBJECT-TYPE
    SYNTAX INTEGER {
        unspecified (1),
        symactive (2),
        sympassive (3),
        client (4),
        server (5),
        broadcast (6),
        reservedctl (7),
        reservedpriv (8)}
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "NTP association mode. This is an integer
        indicating the association mode, with values
        coded as follows:
        =====
        0      unspecified
        1      symmetric active
        2      symmetric passive
        3      client
        4      server
```

```

        5      broadcast
        6      reserved for NTP control messages
        7      reserved for private use
        =====
 ::= {ntpSystem 18}

ntpSysVersion OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..40))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  " the type of the local processor"
 ::= {ntpSystem 19}

tyimingStatus OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..80))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Current timing engine status in human readable form."
 ::= {tyiming 1}

tyimingSource OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..40))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Currently selected timing reference source."
 ::= {tyiming 2}

tyimingTime OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..40))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Time as returned from the timing engine registers."
 ::= {tyiming 3}

tyimingVersion OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..40))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Firmware version of timing engine."
 ::= {tyiming 4}

tyimingFlyPeriod OBJECT-TYPE
    SYNTAX      INTEGER
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Period in seconds of allowable flywheeling before
                  the tyimingFlywheel trap will be sent.  If the value is
                  set to 0, the trap will never be generated."
 ::= {tyiming 5}

gpsPosition OBJECT-TYPE
    SYNTAX      DisplayString (SIZE(1..80))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION  "Returns a position fix."

```

```
::= {gps 1}

gpsUTCOffset OBJECT-TYPE
    SYNTAX          INTEGER (0..127)
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "This variable returns the current offset
        between the monotonic time maintained by the
        GPS satellite constellation and UTC time.
        This value is commonly referred to as the leap
        second count.  It is only valid on the Syncserver with GPS."
 ::= {gps 2}

gpsHealth OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..80))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "Health information from GPS receiver."
 ::= {gps 3}

gpsSatlist OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..80))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "GPS Satellites in View List."
 ::= {gps 4}

gpsMode OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..80))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "GPS Receiver Operating Mode."
 ::= {gps 5}

etcVersion OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..80))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "Version info for SyncServer system."
 ::= {etc 1}

etcSerialNbr OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "Unique serial number factory programmed into each unit."
 ::= {etc 2}

etcModel OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..40))
    MAX-ACCESS      read-only
    STATUS           current
    DESCRIPTION     "Model type factory programmed into each unit."
 ::= {etc 3}

etcUpgrade OBJECT-TYPE
```

```
        SYNTAX          DisplayString (SIZE(1..1024))
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION     "Upgrade notification from Symmetricon web site."
 ::= {etc 4}

etcUpgradeServer OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..1024))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     "Upgrade notification server."
 ::= {etc 5}

etcAlarmString OBJECT-TYPE
    SYNTAX          DisplayString (SIZE(1..1024))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     "Only valid embedded in a trap message."
 ::= {etc 6}

etcAlarm TRAP-TYPE
    ENTERPRISE      symmetricon
    VARIABLES       {etcAlarmString}
    DESCRIPTION     "The trap provides notification of timing engine
                    alarm events. The user programmable mask provides filtering
                    of the trap."
 ::= 0
END
```



## CHAPTER 12

# Change Log

10-6-05

- Modified "Statement of Volatility" topic: Changed "Statement" to "Certificate". Updated file location to "Certificates" folder on the Product Information CD.
- Added "Change Log" topic.
- Converted non-critical warnings into notes.
- Translated all warnings into French.
- Updated WEEE/RoHS statement "The SyncServer is WEEE compliant. The SyncServer is not RoHS compliant."

Preliminary Rev.B Version

10-20-05

- Added Antenna Safety information to "Installing the GPS Antenna"
- Added new specifications to the "AC Power Supply" specifications.

10-21-05

- Added the "Rack Mounting" topic and text.

10-26-05

- Added the following topics: 1PPS Output, 1PPS Input, 10MHz Output, 10MHz Input, IRIG-B Output, IRIG-B Input
- Made minor corrections and additions to many topics based on team review and feedback.

10-28-05

- Added "SNMP MIB" topic. Updated SNMP MIB on CD ROM.
- Additional tweaks and edits to correct issues with greater than/less than or equal symbols and ohms symbol.

Preliminary Rev. C Version

11-2-05

- Added Operating Temperature Specification w. Rb Osc to "Environmental" topic.
- Removed redundant Operating Temperature Specification from "AC Power Supply" topic.
- Expanded an explanation of the timing inputs/outputs on the different models in "Product Overview".

11-4-05

- Updated warnings in French.

11-18-05

- Redlines/Updates from Justin
- NCRS 17708, 17676, 17674

Milestone 3 (11-23-2005)

12-8-05

- "Accuracy & Stability" topic, updated 1 Satellite position known spec
- Edited "Installing the GPS Antenna" topic and added "Using a Window Antenna".
- D provided as online help for SyncServer
- Edited "Upgrading System Software" topic and added "Overview of the upgrade process".
- Minor edits to notes on IPv6 in "NETWORK - Ethernet" topic.
- Added a note to the "NETWORK - Ping" topic.

Rev. "B+" online released (12-8-2005)

- 12-14-2005 Updated "SYSTEM - General" topic: "Checks for updates on Monday-Friday."
- 12-19-2006 Added 48 VDC Operation information to the "Quick Start" and "Hardware Features" topics.
- 12-20-2005 Added "Connecting to VDC power" topic under Installation Guide section.
- 12-20-2005 Added "DC Power Supply" topic under Specifications section.
- 12-20-2005 Added "Maintenance" topic.
- 1-9-2006 Updated "Network Protocols" to show RFC 2030
- 1-19-2006 Updated "Connecting to VDC Power" topic: "15 Amp"



# Index

## 1

10MHz Input • 100  
10MHz Output • 100  
1PPS Input • 99  
1PPS Output • 99

## A

AC Power Supply • 90  
Accuracy & Stability • 92  
ADMIN - Alarms • 62  
ADMIN - Logs Config • 67  
ADMIN - Users • 61  
ADMIN - Web • 59  
Apache Software License • 132

## B

Backing Up/Restoring Configurations • 122

## C

Certificate of Volatility • 159  
Certificates of Conformance • 157  
Change Log • 171  
Chassis • 91  
Command Line Interface • 83  
Configuring Network Settings • 115  
Configuring SNMP • 127  
Configuring the SyncServer • 120  
Connecting to VDC Power • 110  
Console RS-232 • 98  
Creating a Backup File • 122

## D

DC Power Supply • 91

## E

EMC Standards • 94  
Environmental • 95  
Equipment Failure Detection and Reporting • 96

## G

GNU General Public License • 146

GPS Receiver • 93

## H

Hardware Features • 11

## I

Installation Guide • 108  
Installing the GPS Antenna • 113  
Introduction • 9  
IRIG-B Input • 102  
IRIG-B Output • 101

## K

Keypad • 89  
Keypad/Display Interface • 79

## L

Login • 14  
LOGS • 74

## M

Maintainability • 96  
Maintenance • 159

## N

NETWORK - Ethernet • 26  
NETWORK - PING • 33  
NETWORK - SNMP • 30  
NETWORK - SNMP Traps • 32  
Network Ports • 104  
Network Protocols • 105  
Notices • 2  
NTP - Assoc • 39  
NTP - Config • 42  
NTP - MD5 Keys • 47  
NTP - Sysinfo • 34  
NTP Software License • 142

## O

Oscillators • 92

**Q**

Quick Start Guide • 5

**R**

Rack Mounting • 109

Reliability • 95

Restoring from a Backup File • 123

Restoring the Factory Configuration • 125

**S**

Safety Standards • 94

Selecting a GPS antenna site • 111

SERVICES - Email • 73

SERVICES - HTTP • 72

SERVICES - SSH • 73

SERVICES - Startup • 70

Shock and Vibration • 97

SNMP MIB • 161

Software Features • 12

Software Licenses • 131

Specifications • 87

STATUS - Alarms • 25

STATUS - General • 16

STATUS - GPS • 19

STATUS - Network • 17

STATUS - NTP • 21

STATUS - Timing • 18

Status LEDs • 88

Sysplex Timer-Out • 103

SYSTEM - Factory Reset • 58

SYSTEM - General • 56

SYSTEM - Upgrade • 56

**T**

Tasks • 107

TIMING - GPS • 48

TIMING - HW Clock • 52

TIMING - IRIG-B • 50

TIMING - Sysplex • 51

TIMING - Time Zone • 49

Transferring Configurations • 129

Troubleshooting • 121

**U**

UCD-SNMP Software License • 153

Unpacking • 108

Upgrading System Software • 116

USB • 89

Using a Window Antenna • 114

**V**

Vacuum Fluorescent Display (VFD) • 88

**W**

Web Interface • 13

WEEE/RoHS Compliance • 97

WIZARDS - 1st Setup • 75

WIZARDS - Backup • 76

WIZARDS - NTP • 75

WIZARDS - Restore • 77

WIZARDS - SNMP • 76

WIZARDS - Upgrade • 77