User Guide

SyncServer S200, S250, S250i

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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 NETWORK - Ethernet page.
	Names of connectors, front panel menu options, and command line interface commands are also given in Special Bold.
Emphasis	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.

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C H A P T E R   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 learning about its features. Consult the **Installation Guide** section of the User Guide to install the SyncServer in a production environment.

Connecting the GPS Antenna

For the **S250i** model of the SyncServer, which doesn't have a GPS receiver, connect an IRIG signal to the **IRIG In** connector on the rear panel and skip to the next section.

For the **S200** and **S250** models, perform the following steps:

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. Avoid crimping or making sharp bends in the cable.

2 If mounting the GPS antenna outdoors isn't feasible, 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.

This 'window mode' delays (and sometimes prevents) the SyncServer from using GPS as a timing source, but is worth trying. For more information, see the "Operating in 'Window Mode'" topic in the **Tasks - Installation Guide** section of the User Guide.

3 If mounting the GPS antenna in a window isn't feasible, skip to the next section. Alternatives for synchronizing the SyncServer are given further along.

4 Connect the GPS antenna cable (supplied) 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. The GPS antenna supplied with the SyncServer is rated for 12 VDC.
>
> AVERTISSEMENT : Les antennes qui n'ont pas étés évalués pour un courant de 12 VDC peuvent être endommagées quand ils sont connectés au SyncServer.

Applying power to the SyncServer

1   Connect the SyncServer's LAN1 port on the rear panel to the network using the standard network cable (supplied).

2   Connect the SyncServer's 100-240 VAC Input on the rear panel to a power outlet, using the power cord (supplied). For 48VDC Operation (48 VDC Operation Model), refer to the Installation Guide Section of this Manual.

3   Turn the power switch on (located on the rear panel). After about one 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.

Interpreting the LEDs

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

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

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

Configuring the LAN1 network port

LAN1's factory default settings are as follows:

- IP Address: 192.168.0.100
- Mask: 255.255.255.0
- Gateway: 0.0.0.0

To configure new network settings:

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 as the URL,
     leaving off leading zeroes. 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, but strongly recommended!)
▪   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 GPS

If no local timing sources are available (e.g., a good GPS or IRIG input
signal), the SyncServer can synchronize to NTP peers or the user can set the
time manually.

To synchronize to NTP peers: The SyncServer's factory default configuration for the NTP - Associations page includes two publicly available NTP servers - ntp1.symmetricom.com and time.symmetricom.com. If the SyncServer has firewall access to the Internet, it will automatically synchronize with these two servers. If needed, other NTP peers can be added on the NTP - Associations page. When synchronized to another NTP server, the Sync LED turns orange and the SyncServer operates at the stratum level of the other NTP server minus one.

If no NTP servers are available, set the time manually:

1   On the TIMING - HW Clock page, set Forced Timing Source to Free Run.

2   Enter the UTC/GMT 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). SymmTime is also available as a free download from the Internet.

2   Run SymmTime.

3   Right click SymmTime and select "Sync Servers".

4   Click the Add Server button, add the SyncServer's LAN1 IP address, and close the window.

5   Right click SymmTime and select "Sync Status".

6   Click the Sync Now button. If SymmTime synchronizes with the SyncServer successfully, it displays a message similar to this example: "17:20:09 Apr 13: Offset +014ms (192.168.47.52, 192.168.47.52)". Otherwise, it states "Can't Connect".

NOTE: Right click SymmTime and select Help for assistance.

C H A P T E R   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.

Symmetricom 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

C H A P T E R 3

Web Interface

In This Chapter

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 stoplight 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 le 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 is 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 SyncServer or NTP daemon is started or restarted, the leap indicator is set to "11" the alarm condition. This alarm condition makes it possible for NTP clients to recognize that an NTP server (the SyncServer) is present, but that it has yet to validate its time base. Once the SyncServer finds a valid source of time and sets its clock, it sets the leap indicator to an appropriate value. The *NTP Leap Change Alarm* on the ADMIN - Alarms page can be configured to generate an alarm and send notifications each time the leap indicator changes state.

stratum: This is an eight-bit integer 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).
- DHCP : The network configuration is automatic via DHCP
- ? : Status unknown - usually when there are pending changes.
- 6 : 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.symmetricom.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.

NOTE: To use automatic IPv6 addressing, set a static IPv4 address first.
NOTE: 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 its network connection becomes unavailable or the device is not functioning. By default LAN2 is "Active".
- 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 then click 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 the bond 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 "244.0.1.1".

  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 manycasting. 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$r;x"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,

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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: 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.symmetricom.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.symmetricom.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, Symmetricom 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 (5º C delta).
- The optional Oven Controlled Oscillator (OCXO) has an estimated drift of 1 millisecond/day (5º C delta).
- The Rubidium oscillator has an estimated drift of 6-25 microseconds/day (5º 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 "symmetricom" 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.

NOTE: 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 from the LOGS - syslog page.

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: The SyncServer's current NTP synchronization peer has changed.

NTP Stratum Change Alarm: The NTP Stratum level has degraded. For example, the NTP Stratum has gone from 1 to 2.

NTP Leap Change Alarm: The SyncServer raises this alarm when the *leap indicator* changes state. See *STATUS - NTP* (on page 15).

This change of state has two potential causes: the first is 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. The pending event can be a Leap Second Insertion, Leap Second Deletion, or Clear Alarm, which indicates that the alarm has passed. See *STATUS - Timing* (on page 12) for more information.

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 Symmetricom 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 schedules 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 directly turned off 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 schedules 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

Symmetricom 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 Symmetricom 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*** (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.

C H A P T E R   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 the cursor is on.
- **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 information:

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.

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!

C H A P T E R   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 IPV4**GATEWAY** displays/sets the LAN1 IPv4 gateway address. For example:

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

C H A P T E R 6

Specifications

In This Chapter

Status LEDs

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

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

Ports: Two USB 1.1 ports are located on the front panel.

Functionality: 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:	Two three-position screw terminal blocks
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

NOTE: Negative voltages (-48 VDC) can be used by connecting the most positive voltage to the system Ground.

Chassis

Size inches:	1.75 in. high x 17.1 in. wide x 11.25 in. deep
Size in cm:	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

Temperature Compensated Crystal Oscillator (TCXO)

Feature: Standard

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

Oven Controlled Crystal Oscillator (OCXO)

Feature: Optional

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

Rubidium Oscillator

Feature: 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, ≥ 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

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

NOTE: In some cases, for FCC and CE EMC Radiated Emission
Compliance, a ferrite EMI suppressor (Fair Rite P/N 0444164951 or
equivalent) may need to be placed on the unit end of cables connected to the
BNC Connectors. Please contact Symmetricom Customer Assistance for
additional information.

VCCI Compliance Information

This is a Class A product based on the standard of the Voluntary Control
Council for Interference by Information Technology Equipment (VCCI). If
this equipment is used in a domestic environment, radio interference may
occur, in which case, the user may be required to take corrective actions.

この装置は、情報処理装置等電波障害自主規制協議会
（ＶＣＣＩ）の基準に基づくクラスA
情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。 この場合には使用者
が適切な対策を講ずるよう要求されることがあります。

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 Conformance

Waste Electrical and Electronic Equipment Directive (WEEE)

In 2003, the European Parliament passed the Waste Electrical and Electronic Equipment Directive (WEEE Directive 2002/95/EC) to encourage the reuse, recycling, and recovery of electrical and electronic equipment that is no longer needed.

The WEEE regulations apply to all electrical and electronic equipment placed on the European Union (EU) market that falls into any of ten (10) categories. The Symmetricom SyncServer S200, S250, and S250i Network Time Servers are considered Category 3, IT and Telecommunication Equipment, as defined by the WEEE Directive. Refer to Annex 1A of the WEEE Directive for more information.

The Symmetricom SyncServer S200, S250, and S250i Network Time Servers are compliant with the WEEE Directive. Please visit Symmetricom's WEEE/RoHS website (*http://www.symmetricom.com/About_Us/WEEE_RoHS_Initiatives.htm* http://www.symmetricom.com/About_Us/WEEE_RoHS_Initiatives.htm) for WEEE recycle information or contact Symmetricom for any additional WEEE specific information.

Restriction of the Use of Certain Hazardous Substances Directive (RoHS)

In 2004, the European Parliament and the Council of the European Union passed the Restriction of the Use of Certain Hazardous Substances Directive (RoHS Directive 2002/95/EC) to "protect human health and the environment by restricting the use of certain hazardous substances in new equipment".

The RoHS Directive covers most of the same electrical and electronic equipment that are under the WEEE Directive, including the Symmetricom SyncServer S200, S250, and S250i Network Time Servers.

Symmetricom SyncServer Network Time Server Models S200, S250, and S250i that have an "R" after the model number designation conform to the RoHS directive.

Example: 1520R-S250-XX-XX

NOTE: The SyncServer S200, S250, and S250i products are manufactured using the RoHS Directive exemption allowing the use of lead in "solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications". Refer to RoHS Directive Annex Point 7 as amended by 2005/747/EC for details.

For more information concerning Symmetricom's RoHS compliance, please visit Symmetricom's WEEE/RoHS website (*http://www.symmetricom.com/About_Us/WEEE_RoHS_Initiatives.ht* http://www.symmetricom.com/About_Us/WEEE_RoHS_Initiatives.htmm) or contact Symmetricom for any additional RoHS specific information.

The following Declaration of Conformity is available in the Certificates folder on the Product Information CD:

Declaration of Conformity

In accordance with ISO/IEC GUIDE 22 and EN 45014

Symmetricom, Inc.

3750 Westwind Blvd.

Santa Rosa, Ca. 95403 USA

Declares under our sole legal responsibility that the following SyncServer Network 1520R-SXXX Network Time Server (Both AC and DC Models):

- MODEL 1520R-S200, MODEL 1520R-S200-DC
- MODEL 1520R-S250i, MODEL 1520R-S250-DC
- MODEL 1520R-S250, MODEL 1520R-S250-DC

CONFORMS TO THE FOLLOWING EUROPEAN UNION DIRECTIVES:

Safety

73/23/EEC Low Voltage Safety as amended by 93/68/EEC

- IEC 60950-1:2001 (1st Edition)
- EN 60950-1:2001

Electromagnetic Compatibility

2004/108/EC Electromagnetic Compatibility

- EN55022 (1998) wA1:2000 and A2:2003 EMC Emissions for ITE, Class A
- EN55024 (1998) wA1:2001 and A2:2003 EMC Immunity for ITE
- EN61000-3-2 (2000) Harmonic Current Emissions
- EN61000-3-3 (1995) w/A1:2001 Voltage Fluctuation and Flicker Emissions

WEEE

Waste Electrical and Electronic Equipment Directive (WEEE) 2002/95/EC

The SyncServer Model 1520R_SXXX is considered WEEE Category 3 (IT and Telecommunication Equipment) as defined by the WEEE Directive and therefore falls within the scope of the WEEE Directive.

For more information about Symmetricom's WEEE compliance and recycle program, please visit the Symmetricom's WEEE/RoHS website at http://www.symmetricom.com/About_Us/WEEE_RoHS_Initiatives.htm

RoHS

Restriction of the Use of Certain Hazardous Substances Directive 2002/95/EC

The SyncServer Model 1520R_SXXX is considered WEEE Category 3 (IT and Telecommunications Equipment as defined by the WEEE Directive and therefore falls within the scope of the RoHS Directive.

These units are RoHS Compliant except that they will be manufactured using the RoHS Directive exemption allowing the use of lead in "solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications". Reference RoHS Directive Annex Point 7 as amended by 2005/747/EC.

NOTE: This certification applies to all standard options and accessories supplied with the SyncServer System

Initial Certification Issued: 31 August 2005 Certification Updated: 02 October 2006

First Date of Marketing with CE Mark: 31 August 2005

I declare that the equipment specified above conforms to the above Directives and Standards.

Signed

Date: 02 October 2006

Name: Robert Mengelberg

Title: Compliance Program Manager

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 (Pinout):

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

1PPS Output

Description:	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

Description:	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: If the inbound signal is too noisy, the Hardware Clock may not lock to it.

10MHz Output

Description:	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 Vp-p and < 6 Vp-p into 50 Ohms
Frequency:	10 MHz
Wave Shape:	Sine Wave

10MHz Input

Description:	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 Vp-p to 6 Vp-p
Frequency:	10 MHz
Wave Shape:	Sine Wave or Square Wave
Impedance:	> 10 kOhms

Input Signal Accuracy:

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

NOTE: If the inbound signal is too noisy, the Hardware Clock may not lock to it.

IRIG-B Output

Description:	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 ±10% into 50 Ohms
Format:	IRIG-B 123 (AM) standard, with IEEE 1344 Extensions, or Legacy True Time.
Ratio:	3:1 ±10%
Impedance:	100 kOhms

IRIG-B Input

Description:	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: If the inbound signal is too noisy, the Hardware Clock may not lock to it.

Sysplex Timer-Out

Description:	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:

- 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

The SyncServer supports the following protocols:

- NTP (v2 - RFC1119, v3 - RFC1305, v4 - No RFC)
- NTP Unicast, Broadcast, Multicast
- SNTP v4 for IPv4, IPv6 and 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

C H A P T E R   7

Tasks

In This Chapter

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^2) 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. Because of diode switching, the polarity can be plus-plus, plus-minus, minus-plus, or minus-minus.

Selecting a Site for the GPS Antenna

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 the following disadvantages:

- Overhanging foliage
- Blocked views
- Tall neighboring structures
- Strong EMI RFI interference

The user may decide not to mount the antenna on a radio tower if the services of a specialist are not readily available.

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.

AVERTISSEMENT :
- Evitez et 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 exécute l'installation.
- Observez des codes et des règlements locaux. Utilisez un "arrestor" d'éclair quand nécessaire.

Installing the GPS Antenna

WARNING - AVERTISSMMENT

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 a la terre du mât et de la structure, le rattachement à une mise a 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 a fin 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.

Operating in "Window Mode"

With an accurate position and visibility of at least one GPS satellite for the majority of the time, the SyncServer can provide excellent accuracy to UTC. This makes it possible to operate the SyncServer with the antenna mounted in locations that have limited GPS visibility or signal strength, such as:

- An office window (indoors - limited view)
- The railing of a balcony (outdoors - limited view)
- A rooftop surrounded by tall buildings (outdoors - limited view)

For Best Results

- Position the GPS antenna with good visibility toward the equator. For example, in the northern hemisphere, position the antenna with a view to the south, east, or west. Avoid polar-facing sites that have limited GPS visibility. Rule of Thumb: Choose a sunny spot.
- Given the choice between multiple sites, choose the one with the *widest* view of the sky. Tilt the antenna toward the "opening".
- Purchase the SyncServer with an optional high-stability Rubidium oscillator. This enables it to continue providing precise time for extended periods while GPS is unavailable.
- Secure the antenna to a stationary object so it doesn't get knocked out of position.
- Improve signal strength (visible on the STATUS - GPS page) by trying different window locations, shortening antenna cable length, and avoiding unnecessary connectors.
- Avoid windows with metallic film coatings, window blinds, and overhead obstructions or foliage, all of which can block GPS signals.

NOTE: Make sure the SyncServer has alternate time sources, such as valid NTP Associations (see NTP - Associations) that it can synchronize with if GPS is unavailable for an extended period.

Setup

1   On the TIMING - HW Clock page, set the Max Drift Error (milliseconds) to the highest acceptable value for absolute timing error (to UTC). Symmetricom recommends a value greater than or equal to 4 milliseconds.

2   Obtain the position of the GPS antenna from one of the following sources listed in the next section, "Determining Latitude and Longitude".

3   Enter the latitude, longitude, and altitude using the TIMING - GPS page, and set the GPS receiver mode to 'Position Hold'.

4   Monitor the *Current Sync Source* and the *Hardware Clock Status* on the STATUS - Timing page, as well as the the number of GPS satellites on the STATUS - GPS page, to ensure that the setup meets your requirements.

Determining Latitude and Longitude

Determine the position of the GPS antenna using one of the following methods or resources (sorted by degree of accuracy):

- Use a handheld GPS unit outdoors or temporarily run the SyncServer and/or the GPS antenna outdoors.
- http://jan.ucc.nau.edu/~cvm/latlon_find_location.html
- http://www.maporama.com/share/
- http://geonames.usgs.gov/pls/gnispublic
- The "Latitude and Longitude" folder on the SyncServer Product CD

When the GPS Receiver is not Tracking Satellites

Depending on obstructions and the latitude of the mounted antenna, there may be periods throughout the day where no satellite signals can reach the antenna. During these outages, the system must flywheel (free run) on its internal oscillator until satellites come back into view and the GPS receiver can provide valid time once again. For this reason, Symmetricom highly recommends purchasing the Rubidium oscillator option, to minimize the accumulated time error during each outage.

A SyncServer equipped with a Rubidium oscillator can maintain time to better than one millisecond accuracy to UTC with GPS satellite outages of one month. Generally, for outages longer than several hours, the GPS receiver needs to track a satellite contiguously for several hours to acquire time and remove the accumulated time error.

One can estimate the worst case accuracy of the clock by running the following script from the command line interface for 1 day and logging the data using a terminal emulator like Hyperterminal:

```
gpsstrength pause 1000 repeat 100000
```

Press enter to terminate the script. Now plot the first field in each line (total satellites tracked) and find the largest contiguous section of all zeros. Count the number of zeroes in a row, divide by 3600 (sec/hr) and multiply by the drift rate of your oscillator (ms/hr).

For example: if your max number of contiguous 'zero' data points is 10,800 this is equivalent to an outage of 10,800/3600 or 3 hours. If your SyncServer has a TCXO oscillator, the time error would be 0.875ms/hr * 3 hrs or 2.625 milliseconds. If your SyncServer has a Rubidium oscillator, the time error would be 0.001ms/hr * 3 hrs or 0.003 milliseconds.

NOTE: Due to a known software issue, in order for the SyncServer to accept the position entered, it must be different from the position displayed on the page. In some cases the user may need to enter and apply a slightly invalid position before entering the desired position.

Specifications

Surveyed Position < 50m, GPS Receiver has Valid Time: < 0.005 ms

Entered Position < 1km, GPS Receiver has Valid Time: < 0.1 ms

Entered Position < 10km, GPS Receiver has Valid Time: < 1.0 ms

Holdover while the GPS receiver is not tracking (< 5 °C temperature change):

- TCXO < 0.875 ms/hr
- OCXO < 0.042 ms/hr
- Rubidium < 0.001 ms/hr

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* (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. Symmetricom 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 To clear site-specific information from the SyncServer, also disconnect all network 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 Insert the power cable and turn the SyncServer's power on. The SyncServer restores the factory configuration.

8 After 100 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.

Keywords: lost password recovery restore factory default configuration

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.

C H A P T E R   8

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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).

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In This Chapter

Apache Software License

```
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```
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 * httpd@ncsa.uiuc.edu
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# install - install a program, script, or datafile
```

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For the pcre component:

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Written by: Philip Hazel <ph10@cam.ac.uk>

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     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)

*/
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    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
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   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,
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   9. [10]Reg Clemens <reg@dwf.com> Oncore driver (Current maintainer)
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      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
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  15. [16]Dennis Ferguson <dennis@mrbill.canet.ca> foundation code for
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  16. [17]Glenn Hollinger <glenn@herald.usask.ca> GOES clock driver
  17. [18]Mike Iglesias <iglesias@uci.edu> DEC Alpha port
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  19. [20]Jeff Johnson <jbj@chatham.usdesign.com> massive prototyping
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  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, HPUX 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
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  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;
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  30. [33]Wolfgang Moeller <moeller@gwdgv1.dnet.gwdg.de> VMS port
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  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
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  38. [42]Nick Sayer <mrapple@quack.kfu.com> SunOS streams modules
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  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
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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

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[53]gif

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References

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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
```

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```
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                Linus Torvalds

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C H A P T E R 1 0

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 "1002061200Z"
        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 "1002061200Z"
        DESCRIPTION "jflory - updated NTP, tyming, and etc descriptions"
        ::= {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 }

symmSnmpManagement 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}
tyming       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
                "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
                "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 SyncServer:
                  ==============================================
                  GPS           GPS satellite)
                  IRIG          IRIG B timecode
                  1PPS          Ext. 1 PPS input
                  E10M           Ext. 10 MHz input
                  FREE          Internal Clock
                  FLY           Internal Clock after the Hardware
                                Clock reference is lost
                  ==============================================="
         ::= {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
                  "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
              "Current synchronization source.  In stratum > 1 this
              variable returns the decimal representation of the
              IPv4 address of its current peer. In stratum = 1 this
              variable returns the decimal representation of the
              hardware clock which is 2981759."
::= {ntpSystem 9}

ntpSysPhase OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..40))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "System clock offset from the selected source."
::= {ntpSystem 10}

ntpSysFreq OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..40))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "System clock frequency correction from ntpd."
::= {ntpSystem 11}

ntpSysError OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..40))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "Current system error from ntpd."
::= {ntpSystem 12}

ntpSysClock OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..40))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "Current system time from ntpd. This is usually
              derived from the hardware clock but could be
              from any other ntp source."
::= {ntpSystem 13}

ntpSysSystem OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..80))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "Description of the current system."
::= {ntpSystem 14}

ntpSysProcessor OBJECT-TYPE
       SYNTAX          DisplayString (SIZE(1..40))
       MAX-ACCESS    read-only
       STATUS          current
       DESCRIPTION
              "Type of 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 (0),
                    symactive (1),
                    sympassive (2),
                    client (3),
                    server (4),
                    broadcast (5),
                    reservedctl (6),
                    reservedpriv (7)}
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "An integer indicating the NTP association mode
            and are 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..80))
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION   "The version of the NTP daemon on the system."
    ::= {ntpSystem 19}

tymingStatus OBJECT-TYPE
        SYNTAX        DisplayString (SIZE(1..80))
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION
            "Indicates what status the Hardware Clock considers
            itself to be as a timing source defined as follows:
            ============================================
```

```
                Good     HW Clock has a valid time reference.
                Bad      HW Clock has no valid time reference.
                ========================================="
::= {tyming 1}

tymingSource OBJECT-TYPE
        SYNTAX              DisplayString (SIZE(1..40))
        MAX-ACCESS    read-only
        STATUS              current
        DESCRIPTION
                "The time or frequency source currently in use
                by the Hardware Clock defined as follows:
                =========================================
                 0       None
                        1       GPS
                        4       NTP
                        8       IRIG
                16      External 1PPS
                24      External 10 MHz
                31      Freerun mode.
                ========================================="
::= {tyming 2}

tymingTime OBJECT-TYPE
        SYNTAX              DisplayString (SIZE(1..40))
        MAX-ACCESS    read-only
        STATUS              current
        DESCRIPTION
                "The time according to the Hardware Clock in
                the format of:

                WWW MMM dd hh:mm:ss yyyy

                defined as follows:
                        =========================================
                        WWW              weekday
                        MMM              character month
                        dd               day of month
                        hh:mm:ss         time
                        yyyy             year

                Example          Thu Sep 21 23:46:09 2006
                ========================================="
::= {tyming 3}

tymingVersion OBJECT-TYPE
        SYNTAX              DisplayString (SIZE(1..40))
        MAX-ACCESS    read-only
        STATUS              current
        DESCRIPTION
                "The version of the software on the SyncServer's
                Hardware Clock."
::= {tyming 4}

tymingFlyPeriod OBJECT-TYPE
        SYNTAX              INTEGER
        MAX-ACCESS    read-only
        STATUS              current
        DESCRIPTION
                "This variable is not currently used and returns zero."
        ::= {tyming 5}
```

```
gpsPosition OBJECT-TYPE
      SYNTAX        DisplayString (SIZE(1..80))
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
            "Returns the current position in the format of:

            A BB CC DD EEE F GGG HH II JJJ KK

            defined as follows:
                  ===============================================
            A           sign of the latitude
                        (1 = North, -1 = South)
            BB          degrees of the latitude
            CC          minutes of the latitude
            DD          seconds of the latitude
            EEE         milliseconds of the latitude
            F           sign of the longitude
                        (1 = East, -1 = West)
            GGG         degrees of the longitude
            HH          minutes of the longitude
            II          seconds of the longitude
            JJJ         milliseconds of the longitude
            KK          altitude in meters
                  ==============================================="
 ::= {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 a Syncserver with GPS."
 ::= {gps 2}

gpsHealth OBJECT-TYPE
      SYNTAX        DisplayString (SIZE(1..80))
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
            "This is the GPS' receiver health status defined as
            follows:
            ======================================================
            0 = Receiver Down       The Hardware Clock can't
                                    communicate with the receiver.

            1 = No Signal

            2 = Acquiring Signal    The receiver is tracking a GPS
                                    signal.

            3 = 2d Position mode    The receiver is able to perform
                                    position fixes for latitude and
                                    longitude but does not have
                                    enough satellites for altitude.

            4 = 3d Position mode    The receiver is now able to
```

```
                                        perform position fixes for
                                        latitude, longitude and altitude.

              5 = Position Hold mode   Position fixes are no longer
                                        attempted, and the user entered
                                        or surveyed position is used.

              6 = Time Valid mode      The receiver has valid timing
                                        information from GPS satellites
                                        (including current leap second
                                        information).  This is the final
                                        state for all configured GPS modes.
              ====================================================="
::= {gps 3}

gpsSatlist OBJECT-TYPE
       SYNTAX        DisplayString (SIZE(1..128))
       MAX-ACCESS    read-only
       STATUS        current
       DESCRIPTION
              "Displays the GPS satellite tracking information in the
              format of:

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

              defined as follows:
              =====================================================
              N         Number of satellites. If one or more satellites
                        are available, Xi,Yi,Zi follows N.

              Xi        Satellite vehicle number.

              Yi        Satellite signal strength in dBW where less
                        than -200 dBW means no signal.

              Zi        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.

              Examples

              For no satellites:
              0

              For one satellite with vehicle number 16:
              1,16,C,-158

              For six satellites:
              6,12,C,-156,14,C,-155,8,T,-162,24,C,-158,18,C,161,6,C,-160
              ====================================================="
::= {gps 4}

gpsMode OBJECT-TYPE
       SYNTAX        DisplayString (SIZE(1..80))
       MAX-ACCESS    read-only
       STATUS        current
       DESCRIPTION
              "The mode of the GPS receiver defined as follows:
```

```
                ======================================================
                Receiver 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.

                Receiver Mode: 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.

                Receiver Mode: 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.
                ======================================================"
    ::= {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
                    "Describes whether or not an upgrade is available from
                    the upgrade server described as follows:
                    ======================================================
```

```
            0        No upgrade is available.
            1        An upgrade is available.
            ====================================================="
::= {etc 4}

etcUpgradeServer OBJECT-TYPE
      SYNTAX       DisplayString (SIZE(1..1024))
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
            "Address of the server where new upgrades can be
            downloaded."
::= {etc 5}

etcAlarmString OBJECT-TYPE
      SYNTAX       DisplayString (SIZE(0..1024))
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
            "Defines the format for the system alarm traps.  This is
            only valid embedded in a trap message."
::= {etc 6}

etcAlarm TRAP-TYPE
      ENTERPRISE   symmetricom
      VARIABLES    {etcAlarmString}
      DESCRIPTION
            "The trap provides notification of Hardware Clock, NTP,
            system, and network alarms events.  The user can configure
            which alarms send traps on the ADMIN - Alarms page."
::= 0
```

MIB FAQ

```
END
```

The following MIB definitions are provided in response to some frequently asked questions given to Symmetricom Customer Assistance:

ntpSysPhase

The offset of the System clock relative to the currently selected NTP peer. This is the "Offset" value shown on the NTP - Assoc page for the *system peer*.

ntpSysFreq

NTP Correction for local clock frequency.

ntpSysError

Always returned as "no error". This value is a placeholder for future development.

tymingStatus

Shows current status of the timing engine - "Good" or "Bad".

tymingSource

Integer showing source of time currently being used by timing engine

- 0=None
- 1=GPS
- 2=Not used
- 3=Not used
- 4=X86
- 8=IrigB
- 9=Not used
- 10=Not used
- 11=Not used
- 16=1PPS
- 24=External 10Mhz
- 31=Free Run

gpsPosition

Comma separated list of position and altitude as returned from timing engine.

1 or -1 for sign of latitude (+ = north), latitude degrees, latitude minutes, latitude seconds, latitude milliseconds

1 or -1 for sign of longitude (- = west), longitude degrees, longitude minutes, longitude seconds, longitude milliseconds

Altitude in feet

Example: "1 38 30 37 49 -1 122 47 43 134 19"

38-30-47 North 122-47-43 West at 19 feet - Symmetricom Santa Rosa

gpsHealth

String constant plus Integer describing GPS receiver state.

- 0= can't communicate with GPS receiver
- 1= no signals from receiver - we can do nothing.

- 2=acquiring signal
- 3=2d position solution
- 4=3d position solution
- 5 =position hold, site survey is done
- 6=time Valid, locked

gpsSatlist

Comma separated list of numbers of satellites tracked followed by satellite number, satellite strength and state (C=used in current solution, T=tracked)

Example: "9,10,-155,C,22,-156,C,7,-153,C,21,-155,C,6,-154,C,15,-154,C,18,-154,C,29,-155,C,16,-155,C"

9 satellites visible, numbers 10,22,7,21,6,15,18,29 and 16 all used in current solution

ntpSysRefTime

Time that the software clock was last updated from its current reference source in Time stamp format.

ntpSysClock

Current software clock time adjusted for local offset.

tymingTime

Current hardware clock time adjusted for local offset.

9070.1.2.3.1.5.1.3.3.0

Current leap second offset from GPS. Currently incorrectly returned as -13.

9070.1.2.3.1.5.1.3.4.0

Receiver Health, explained above under gpsHealth.

NtpSysRefID

Same value as displayed on NTP sysinfo under reference ID.

tymingSource

Explained above.

gpsUTCOffset bug

There is a bug and it has not been fixed. The MIB doc does not conform to the implementation.

gpsUTCOffset is really at .1.3.6.1.4.19070.1.2.3.1.5.1.3.3.0. 3.2.0 is blank. All other values are off by one - gpsHealth is at 3.4.0, etc.

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