SyncServer® S100

GPS Network Time Server

KEY FEATURES

- High-Bandwidth NTP Time Server
- Stratum 1 Operation Via GPS Satellites
- IPv6 and IPv4 Compliant
- Secure Web-Based Management
- SSH, SSL, SCP, SNMP v3, Custom MIB, HTTPS, Telnet, and More
- Stratum 2 Operation via NTP Servers
- Nanosecond Time Accuracy to UTC
- Single Satellite Timing
- Dual USB Ports
- Two-Year Warranty
- Rubidium & OCXO Oscillator Upgrades

KEY BENEFITS

- Synchronize Thousands of Client, Server & Workstation Clocks
- Very Reliable Source of Time for Your Network
- Extremely Accurate Time Source for Network Synchronization
- Improve Network Log File Accuracy to Speed Network Fault Diagnosis and Forensics
- Intuitive Web Interface for Easy Control & Maintenance
- IPv6 Compliance Futureproofs Your Network

The SyncServer® S100 GPS Network Time Server synchronizes clocks on servers for small and medium sized enterprises. Accurately synchronized clocks are critical for network log file accuracy, security, billing systems, electronic transactions, database integrity, VoIP, and many other essential applications.

The S100 is an easy to configure and maintain network time server. Configuration of the server is via the intuitive web interface. This very popular and state-of-the-art user interface offers the network administrator ease-of-use and remote access, with intuitive web pages and full control of the server via a standard browser interface.

Once online, the S100 provides reliable network synchronization technology by combining high capacity NTP

responsiveness and versatile GPS timing receiver technology. It supports a wide range of network protocols including IPv4 and IPv6 for easy management and seamless integration into your existing and future network.

The Stratum 1 level S100 derives its time directly from the atomic clocks aboard the GPS satellite system. By using the integrated, 12-channel GPS receiver, every visible satellite can be tracked and used to maintain extremely accurate and reliable time.

If the GPS reference signal is ever lost, the S100 can automatically revert to a Stratum 2 mode and retrieve time from other user designated time servers. Another option is that the S100 can be upgraded to an internal Rubidium atomic oscillator that keeps the S100 accurate to 25 microseconds per day.

S100 NETWORKING EXCELLENCE

NTP Performance

The S100 10/100Base-T Ethernet port is connected to a high-speed microprocessor and a 50 nanosecond accurate clock to assure high bandwidth NTP performance. This more than meets the need of servicing 3200 NTP requests per second while maintaining microsecond caliber timestamp accuracy.

Extensive Protocol Support for Easy Network Integration and Management

All of the expected network management and monitoring protocols are standard in the S100. Secure access protocols such as SSH, SSL, HTTPS, along with legacy protocols such as DHCP and Telnet are included to provide you a choice in server man-agement. SNMP v3 with a custom MIB allows you to automatically monitor the S100 and be advised of any important status changes. Any of these protocols can be quickly and easily disabled via the web based management interface.

Futureproof Your Network

The S100 supports both IPv4 and IPv6 works whether you are using IPv4, IPv4/IPv6 mixed-mode, or the IPv6 environment. This means your S100 can scale with your network operations and provide value for many years to come.

Automatic Software Upgrade Availability Notification

The S100 can periodically check the Symmetricom® web site for newer versions of firmware. If a newer version is available, an informational SNMP trap is sent along with a status message in the web interface.

Point & Click Software Upgrades

Upgrading the firmware in the S100 is easy. Just browse to identify the firmware file and click the upload button. It is just as simple to backup and restore the server configuration files. This intuitive approach simplifies server management.
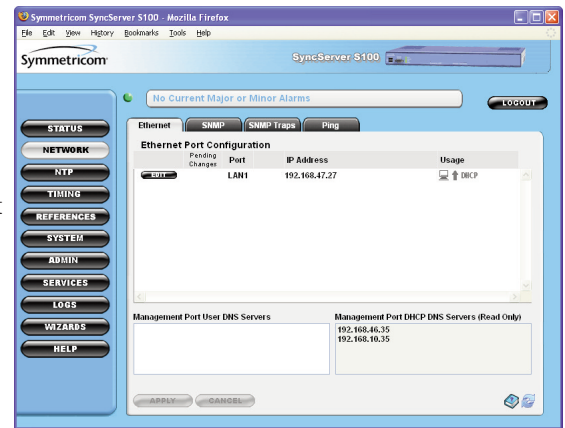
Time Server Log Files

A running log of activity and server configuration changes is maintained for later reference.

S100 FULL-FEATURED WEB INTERFACE

Intuitive, Easy-to-Use and Secure

The S100 is designed to have the web interface be the primary status and control console. It is organized in to logical groupings such as Status, Network, Timing, etc. The tabbed


panels offer easy exploration of features and easy configuration of the server. Typical web interface conventions are followed so that operation is quickly mastered. Server access is password protected, with optional SSL encryption for added security.

Built-in Help System

The complete S100 manual is built into the web interface. The manual opens in a separate browser window. It is organized to match the control buttons and tabs so that information is quickly and easily found. On most pages there is link directly to the manual page for that panel. In addition there are context sensitive rollover descriptors of various features and tabs on any given panel.

BEST PRACTICES

• Two time servers provide redundant time source protection for time clients.

• Peering between time servers assures time continuity to time clients if GPS is not available.

• Always configure time clients to reference at least two time servers.
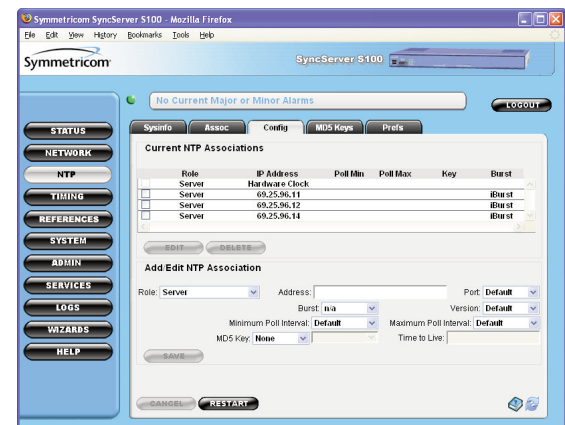
S100 PERFECT TIMING

Unprecedented NTP Accuracy
The Stratum 1 level S100 derives nanosecond accurate time directly from the atomic clocks aboard the GPS satellite system. By using an integrated, 12-channel GPS receiver, every visible satellite can be tracked and used to maintain accurate and reliable time. Even in urban canyon environments where satellite visibility can be limited, single satellite tracking provides accurate time from as few as one intermittent satellite. If needed, the S100 can also track satellites using a window mounted antenna.

The S100 can support hundreds of thousands of network clients while maintaining microsecond caliber NTP timestamp accuracy. NTP request throughput rates exceed 3200 requests/second while maintaining NTP timestamp accuracy. This easily translates into 0.5-2 ms typical client synchronization accuracy on a LAN.

BEST PRACTICES

• Remember that accurate synchronization is directly related to how often the time clients update their time from the time server.

• Peering with other time servers is easy and provides a redundant source of time as a fallback.

• The optional Rubidium oscillator keeps the S100 extremely accurate while serving NTP in the event GPS service is interrupted.

Peering or Holdover, You Choose
If the GPS reference signal is lost entirely, the S100 can automatically revert to a Stratum 2 mode and retrieve time from other user designated internal or external network time servers (called "peering"). This prevents disruption of time service to the network and the network administrator is notified immediately via SNMP of the change in time reference status. A popular alternative to peering is letting the time server operate in holdover (also called "free run" or "flywheel") where the clock in the time server is allowed to drift if GPS is lost. The user can specify how far to let the clock drift in terms of estimated time accuracy before reverting to peering. If the optional Rubidium oscillator is installed, the S100 can flywheel for weeks and still be accurate to less than a millisecond.

Time Cross-Checking for Peace of Mind Reliability
The S100 can time cross-check the on-board GPS receiver against at least two other time servers. This protects against an improperly operating GPS receiver that can subtly corrupt the time.

Oscillator Upgrades Improve Holdover Accuracy and Save You Valuable Time
The standard S100 is equipped with a temperature compensated crystal oscillator (TCXO), that keeps the S100 accurate to nanoseconds when tracking GPS. However, if the GPS signal is lost, thereby placing the server in holdover, the TCXO will soon drift away from perfect. Upgrading the oscillator improves the holdover accuracy significantly. For example, consider the drift rates below:

Oscillator	Holdover Drift
TCXO	21 milliseconds per day
OCXO	1 millisecond per day
Rubidium	25 microseconds per day

The value of the upgraded oscillator is that if the GPS signal is lost the S100 can continue to serve very accurate NTP time. This provides the IT staff plenty of time to correct the problem with no degradation or disruption in network time synchronization accuracy.

Accumulated Drift Error by Oscillator Type
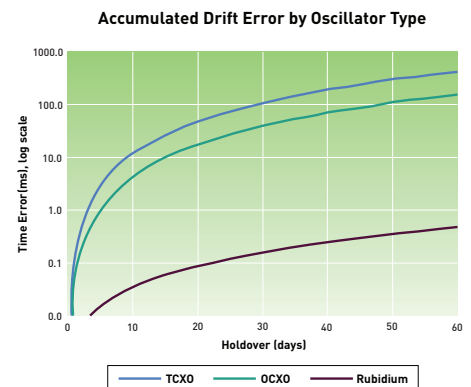
Plot of time error in milliseconds accumulated during holdover for different oscillator types. Note log scale of Y-axis.

SyncServer S100 SPECIFICATIONS

NETWORK PROTOCOLS

NTP (v2 - RFC1119, v3 - RFC1305, v4 - RFC5905)
NTP Unicast, Multicast, Broadcast
SNTP Simple Network Time Protocol (RFC4330)
TIME (RFC868)
DAYTIME (RFC867)
HTTP/SSL/HTTPS (RFC2616)
SSH/SCP (Internet Draft)
SNMPv3 (RFC3584)
Custom MIB
DHCP (RFC2131)
Telnet (RFC854)
MD5 Authentication (RFC1321)
IPv4
IPv6 and IPv4/IPv6 Hybrid

Key management protocols can be individually disabled.

SERVER PERFORMANCE

- Stratum 1: 3200 NTP requests per second while maintaining an overall time stamp accuracy of 14 microseconds to UTC with a variation of less than 33 microseconds typical. This accuracy is inclusive of all NTP packet delays in and out of the SyncServer as measured at the network interface. Client synchronization accuracy to server on a LAN is 0.5 - 2 milliseconds (typical). The SyncServer easily supports many hundreds of thousands of NTP clients.

- Stratum 2: Peering can be used as the primary mode of operation or as a back up mode in case the GPS reference signal is lost. Time stamp accuracy depends on NTP peer server(s). NTP request handling capacity remains the same regardless of stratum level.

- Holdover Accuracy

TCXO (standard):	21 milliseconds/day
OCXO (optional):	1 milliseconds/day
Rubidium (optional):	25 microseconds/day

GPS RECEIVER/ANTENNA

- 12 channel parallel receiver
- Minimum number of satellites for time: 1 intermittently
- GPS time traceable to UTC (USNO)
- Accuracy: <50 ns RMS, 150 ns peak to peak to UTC, ≥4 satellites tracked. Network factors can reduce client synchronization accuracy to 0.5-2 ms (typical).
- Maximum Belden 9104 cable length: 150' (45 m). For longer cable runs see Options.

MECHANICAL/ENVIRONMENTAL

- Size: 1.75" x 17" x 11.25"
  (4.5 cm x 43.2 cm x 28.6 cm) 1U rack mount
- Power: 100-240 VAC, 50-60 Hz, 25 watts (45 watts with Rb osc.), IEC 60320 C14 connector, power switch.
- Operating temperature: 0°C to +50°C
  0°C to +45°C with Rubidium option
- Storage temperature: -10°C to +70°C
- Humidity: To 95%, noncondensing
- Certifications: FCC, CE (RoHS), UL, PSE, China RoHS
- Server weight alone: 6.7 lbs (3.0 kgs)
- Shipping package weight: 15 lbs (6.8 kgs)

Front Panel

LEDs (tri-color green/red/orange)

Sync:	Time reference status
Network:	Network connection status
NTP:	NTP activity
Alarm:	Fault condition
Serial:	DB9-F 9600, N, 8, 1
USB:	(2x) ports for back up, restore, and upgrade operations via the front panel.

Rear Panel

Network (1x):	RJ-45	10Base-T/100Base-TX Ethernet
GPS:	BNC	L1, 1575 MHz

CLIENT SOFTWARE

An NTP client is required for client-side synchronization with any network time server, including the S100. Included with the S100 is Symmetricom's SymmTime NTP client for Windows. Comprehensive time client, server & management software for easy distribution, management and monitoring of time across the network is also available.

PRODUCT INCLUDES

S100 Network Time Server, L1 GPS antenna, 50' (15 m) Belden 9104 coaxial cable, 1 ft. antenna mounting mast (30 cm) with two clamps, category 5 patch cable, DB9-M to DB9-F RS-232 extension cable, manual, SymmTime NTP client for Windows, Enterprise MIB software, power cord, and rack mount ear kit. Two-year warranty.

OPTIONS

(To see Options datasheet please click here)

- Rubidium or OCXO oscillator upgrade for extended holdover
- Window mounted antenna
- GPS antenna in-line amplifier for cable runs to 300' (90 m)
- GPS antenna down/up converter for cable runs to 1500' (457 m)
- Lightning arrestor
- Comprehensive time client, server & management software for easy distribution, management and monitoring of time across the network is also available.
- NTP Network Time Displays, 2" or 4" (5 cm or 10 cm), 6 digit, red LEDs
- IEEE 1588 / PTP see SyncServer S300 or S350

Rear View

Front View