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LANTIME/SHS/BGT: NTP Time Server with Integrated Highly Secure Hybrid Receiver Technology (GPS/DCF77) in 3U housing

Meinberg LANTIME time servers are used around the world to provide accurate time to networks of any size. The SHS model synchronizes all systems either NTP- or SNTP-compatible and uses a built-in Meinberg integrated GPS radio clock as its reference time source and additionally includes an independent secondary clock for enhanced plausibility checks, in order to ensure the correctness of the reference time and date.

If either the difference between the time telegrams of both radio clocks or the difference between the PPS signals exceeds a limit of a few milliseconds (configurable), or if one of the clocks stops generating a time telegram, then the hybrid radio clock stops generating any output signals, preventing the NTP time server from spreading bogus time information on the network.

Both the primary and the secondary clock include their own high quality crystal oscillators which let the clocks provide accurate time even if they are running free for a few days. Both clocks generate their own time telegrams and high accuracy pulse-per-second (PPS) signals which are continuously compared against each other. During normal operation the difference between the timing information of both clocks is very small, so the verified timing signals are passed to the integrated NTP time server which makes that reference time available on network.

Important Note

This product is no longer available and may have been replaced by a newer product. We will, of course, continue to provide support for units that have already been purchased and are still in use. Please contact our [1]Sales Department for further details.

This product has been discontinued and has been replaced with: [2]

Key Features

- Synchronization of NTP and SNTP compatible clients
- Web-based status and configuration interface and console-based graphical configuration utility
- Supported net protocols: IPv4, IPv6, NTP, (S)NTP, DAYTIME, DHCP, HTTP, HTTPS, FTP, SFTP, SSH, SCP, SYSLOG, SNMP, TIME, TELNET
- Alert-Notification system of status change by Email, WinMail, SNMP or an external connected display
- Full support for SNMP v1, v2c und v3 with dedicated SNMP daemon for configuring/status monitoring of system using SNMP traps

- USB Port for installing firmware updates, locking frontpanel menu access and backup/restore of configuration and log files
- Pulse Per Second (PPS) and Pulse Per Minute (PPM)
- Included GPSANTv2 antenna uses downconverter technology to enable long transmission routes of up to 1100 m (1200 yards)

Description

The **LANTIME/SHS/BGT** takes full advantage of the integrated PZF module. The high-precision long wave receiver includes an independent antenna for DCF77, so the time string and the PPS signal are derived from a totally independent time source, DCF77. Of course, this device requires that the signal from the German long wave transmitter DCF77 can be received at the location where the device is installed.

The clock modules are assembled in a 19" modular case (3U) which also includes a single board computer, and a power supply unit. Configurable settings can be modified via menus on the LC display and the four buttons in the front panel. A failure output can be used to generate an alarm signal if any malfunction is detected.

If it is necessary to provide redundancy against hardware failure then it's also possible to install several LANTIME NTP servers in the same network.

LANTIME/SHS/BGT Modes Of Operation

* **Normal mode of operation:** Both the clocks are synchronized, the difference between the clock's timing output signals is below the configured limit. The NTP server receives the time information including the status "synchronized", so it acts as stratum-1 server and makes the reference time available to the network.

* **One of the clocks falls out of sync e.g. due to an antenna failure or other reception problems:** The clock changes its status to "not synchronized" and continues counting time based on its built-in high-accuracy chrystal oscillator. Depending on the configuation, it takes some days up to several weeks until the difference between the time signals exceeds the limit. Since one of the radio clocks is still synchronized, the timing information is passed to the NTP server with status "synchronized" until the limit is exceeded.

* **Both the clocks are not synchronized to their primary time sources although at least one of them has been synchronized before:** As long as the time difference doesn't exceed the limit, the time information is passed to the NTP server, but the status included is set to "not synchronized". The NTP server keeps accepting the time information for a given trust time, after the trust time it discards the time information.

* **Both the clocks are not synchronized to their primary time sources and both have not been synchronized after the last power-up:** The hybrid clock does not pass any time information to the NTP server until at least one of the independent clocks is synchronized and the time difference between the clocks is below the configured limit.

* **The clocks generate time information with a difference which exceeds the configured limit, or one of the radio clocks doesn't output any time information at all:**
One of the following circumstances can be the reason why:

* An intended external fake

* Failure or malfunction of one of the primary time transmitters

* Failure or malfunction of one of the clocks

* Persistent reception problems

In all the cases listed above the plausibility checks on the timing information fail, so the hybrid radio clock stops passing any timing information on to the NTP server. The NTP server's stratum changes to a worse value to let the clients know that the server's reference time source fails. The hybrid radio clock continues supplying time to the NTP server after all error conditions have been removed and the error has been acknowledged by an operator.

If one or more additional LANTIME NTP servers are available on the network then clients which have been configured to use all of them will automatically discard the LANTIME with the bad stratum and synchronize to another NTP server which is operating correctly at a better stratum. If no redundant LANTIME is available, however, the clients will continue to synchronize to the LANTIME with worse stratum. This way it is guaranteed that all the client devices on the network operate using the same system time.

All changes of the reception status of one of the radio clocks, and also failure of the hybrid clock's plausibility check are logged by the local Linux system and optionally reported across the network. If the hybrid receiver passes the status "not synchronized" to the NTP server, or it has disabled time information output at all, then the alarm signal output of the LANTIME/SHS/BGT is activated.

The GNU/Linux operating system of the LANTIMEs SBC (Single Board Computer) has been optimized to ensure a high level of network security and reliability. A large display shows the state of the internal SHS receiver and the NTP subsystem.

The configuration of the system can be done by using a standard web browser to access the extensive but straightforward html interface. Alternatively a text based and menu driven setup utility can be started from the shell prompt after logging into the unit via Telnet or SSH.

The security-related features of LANTIME time servers satisfy highest demands. The time synchronization data can be reliably signed and secured by symmetric keys (MD5) and the NTP autokey procedures. This protects the clients against manipulated time and man-in-the-middle attacks and allows them to verify that the NTP packets they received were send by the LANTIME. Additionally the whole LANTIME configuration can be done by using encrypted channels (e.g. SSH, HTTPS or SNMPv3). Every unused/unneeded protocol can be disabled in order to reduce possible points of attack.

In order to support network management systems the LANTIME time servers offer an extensive SNMP interface, which can be accessed by SNMP V1, V2.c and V3. It allows the monitoring of all relevant system parameters (including operating system parameters, network interface statistics, detailed GPS and NTP status information as well as the complete system configuration) and can be used to alter the LANTIME configuration via SNMP set commands, too.

LANTIME time servers are designed to be deployed in IPv6 networks, the NTP time synchronization as well as the configuration interfaces (Web-based, SSH and SNMP) comes with IPv6 support. You can assign several IPv6 addresses and the system supports automatic configuration by IPv6 autoconf.

Because of its modular system architecture it is possible to equip a LANTIME time server with up to three additional ethernet ports and a number of different reference time sources. Optionally several additional frequency-, serial string- and pulse outputs are available and by combining two (even different) time sources and redundant power supplies, high-availability systems are no problem. Besides that a collection of oscillators, from the reliable temperature controlled base model (TCXO), the three excellent oven controlled variants (OCXO-LQ, -MQ and -HQ) to the high-end rubidium based top model, offers a wide selection of holdover characteristics (e.g. when the GPS signal is disturbed or jammed).

Characteristics

Receiver Type	6 channel GPS CA-Code Receiver and DCF77-Correlation Receiver
Status Indicators	Fail-LED shows that the internal timing has not been synchronized or that a system error occurred Lock-LED shows that the calculation of the position has been achieved after reset
Type of Antenna	Included [3]GPSANTv2 antenna with innovative downconverter technology that allows transmission routes of up to 300 m using RG58 cable, 700 m using RG213 cable, and 1100 m using H2010 Ultraflex cable
Display	LC-Display, 2 x 40 Characters, with Backlight
Control Elements	Four front buttons (MENU, CLR/ACK, NEXT, INC) to set up basic network parameters and to change receiver settings
Network Interface	10/100 MBit with RJ-45 Optionally up to 3 independant ethernet ports
Universal Serial Bus (USB) Ports	1x USB port on front panel for: - installing firmware upgrades - performing backups and restoration of configuration files - copying security keys - locking & unlocking front buttons
Operating Voltage	85-264VAC (50/60Hz)
Form Factor	Rackmount 3U chassis for standard 19" racks
CPU	i386 compatible 266Mhz CPU, 64 MB RAM, CF-Card drive
Operating System of the SBC	Linux with nano kernel (incl. PPSkit)
Network Protocols OSI Layer 4 (Transport Layer)	TCP, UDP
Network Protocols OSI Layer 7 (Application Layer)	Telnet, FTP, SSH (including SFTP, SCP), HTTP, HTTPS, syslog, SNMP
Internet Protocol (IP)	IPv4, IPv6
Network Autoconfiguration Support	IPv4: Dynamic Host Configuration Protocol - DHCP (RFC 2131) IPv6: Dynamic Host Configuration Protocol - DHCPv6 (RFC 3315) and Autoconfiguration Networking - AUTOCONF (RFC 2462)
Network Time Protocol (NTP)	NTP v2 (RFC 1119), NTP v3 (RFC 1305), NTP v4 (RFC 5905) SNTP v3 (RFC 1769), SNTP v4 (RFC 4330) MD5 Authentication and Autokey Key Management

Time Protocol (TIME)	Time Protocol (RFC 868)
Hypertext Transfer Protocol (HTTP)	HTTP/HTTPS (RC 2616)
Secure Shell (SSH)	SSH v1.3, SSH v1.5, SSH v2 (OpenSSH)
Telnet	Telnet (RFC 854-RFC 861)
Simple Network Management Protocol (SNMP)	SNMPv1 (RFC 1157), SNMPv2c (RFC 1901-1908), SNMP v3 (RFC 3411-3418)
Supported Temperature	Operational: 0 - 50 °C (32 - 122 °F) Storage: -20 - 70 °C (-4 - 158 °F)
Supported Humidity	Max. 85 % (non-condensing) at 40 °C
Contents of Shipment	GPS- and DCF77 antennas, printed manual and power cord
Technical Support	Meinberg offers free lifetime technical support via telephone or e-mail.
Warranty	Three-year warranty
Firmware Updates	Firmware is field-upgradeable, updates can be installed directly from the unit or via a remote network connection. Software updates are provided free of charge for the lifetime of your Meinberg product.
RoHS Status of Product	This product is fully RoHS-compliant.
WEEE Status of Product	This product is handled as a B2B (Business to Business) category product. To ensure that the product is disposed of in a WEEE-compliant fashion, it can be returned to the manufacturer. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will bear the costs for the waste disposal itself.
Additional Information	Additional information about the Meinberg LANTIME family of NTP time servers and other LANTIME models can be found on the [4]LANTIME overview page .

Manual

The English manual is available as a PDF file: [5]Download (PDF)

Links:

[1] mailto:sales@meinberg.de
[2] https://www.meinbergglobal.com/english/products/lantime-m900.htm
[3] https://www.meinbergglobal.com/english/products/gps-antenna-converter.htm
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