EndRun
TECHNOLOGIES
"Smarter Timing Solutions"

SONOMA *Network Time Server*
CDMA-*Synchronized, Dual Gigabit Ports*

While installing an antenna on the roof is a typical requirement for most other time servers, with the CDMA-Synchronized Sonoma you can easily mount the antenna inside your building. We've been designing network time servers since 2000 and Sonoma is the 3rd-generation in that standard-setting line. It can serve accurate time to any system running an NTP or SNTP client. With dual gigabit ports and a fast microprocessor for high-capacity throughput (7,500 NTP requests/second), the Sonoma can support hundreds of thousands of NTP clients on your network(s).

Time Synchronization to UTC via CDMA Cellular/PCS Signals

The Sonoma includes a proprietary CDMA receiver for synchronization to Coordinated Universal Time (UTC). It receives its timing information from the Global Positioning System (GPS) via the CDMA mobile telecommunications network used by many cellular/PCS telephones. (No subscriber fee required.) This means the antenna can be conveniently located inside buildings, anywhere a cell phone signal is available. This saves installation, labor and leasing costs inherent in GPS timing systems and eliminates any risk of damage to your equipment rack due to lightning strikes.

FEATURES

- CDMA-Synchronized.
- Dual gigabit ports.
- NTP server throughput of 7,500 requests per second.
- Optional PTP/IEEE-1588 with hardware timestamping.
- SNMP, SSH, HTTPS and more.
- IPv6 and IPv4 compliant.
- Secure Web Interface to monitor status via your Internet browser.
- Optional dual power supplies.
- Daily and weekly data charts: CPU, NTP and Oscillator Statistics.
- Serves NTP Stratum 1 time for 24 hours if CDMA signal is lost. Up to 140 days with Oscillator Upgrade Option.
- Optional Serial Time Output: Sysplex, NMEA, NENA, and more.
- Three-Year Warranty.
- 60-Day Money-Back Guarantee.
- Free technical support and software upgrades for life.

BENEFITS

- Indoor antenna - mount on top of your equipment rack.
- No costly antenna installation fees.
- No risk of lightning strike damage to your equipment rack.
- Hundreds of thousands of NTP clients can be reliably synchronized to within ½ - 2 milliseconds of each other.
- Easy to operate and maintain.
- Accurate and secure source of network time inside your firewall.

PTP/IEEE-1588 Grandmaster Clock Option

The Sonoma can be configured as a PTP Grandmaster Clock by enabling the PTP/IEEE-1588 option on one or both of the gigabit ports. Using both ports enables one Grandmaster to service two independent PTP sub-domains. For detailed information, see the PTP/IEEE-1588 datasheet at: www.endruntechnologies.com/pdf/PTP-IEEE-1588.pdf

Management - Status & Control

You can easily manage the Sonoma using either of the two network ports or the RS-232 serial port. A secure Web Interface (HTTPS) is provided for status monitoring using your Internet browser. With the Sonoma D12 model you can also use the vibrant display and keypad. (The Sonoma N12 model has no display/keypad.)

Reliable Hardware Design

The superior reliability of the Sonoma is the result of our very highly-integrated, efficient hardware design that is unique to our products. This design achieves an estimated MTBF of over 25 years (16 years with Rubidium). We do not use general-purpose CPU boards (sometimes referred to as single-board computers (SBC)). Instead, by using the latest semiconductor technologies found in tablet computers, we have achieved an optimal combination of reliability, performance and power consumption. The CPU is a highly-integrated System-on-Chip (SoC) and the circuitry around it is assembled with 100% soldered-down memory components rather than consumer-grade, plug-in, FLASH or DRAM memory modules. The chassis is sealed to keep air currents and dust off sensitive frequency control components. No fans are needed, due to the efficiency of the design. This built-in reliability is combined with a production process which integrates stringent quality assurance inspections and rigorous performance verification.
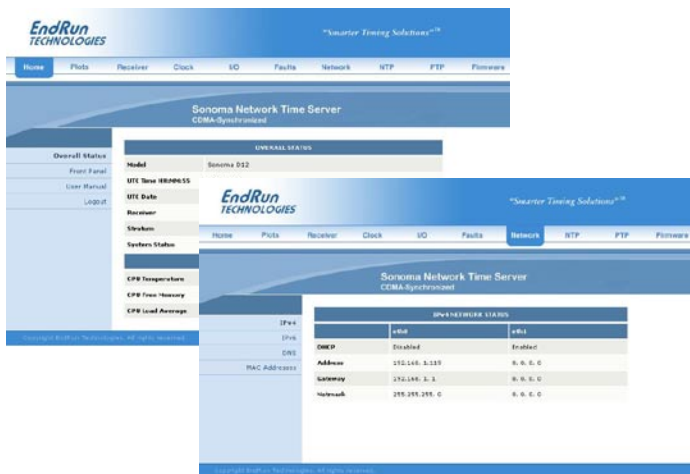
Web Interface (HTTPS)
for Status Monitoring & Firmware Upgrades

Web Interface

The Sonoma web interface is designed with security in mind, so it is used for status information and firmware upgrades only – not for configuration and control. Firmware upgrades are enabled only after an authentication process. In addition, the web interface can be completely disabled for those who need the highest level of security.

The tabbed panels offer easy access to information about the Receiver, Clock, I/O, Faults, NTP, PTP and the Firmware. Firmware upgrades are easy with the point & click upgrade process. Also, a link to the resident User Manual is available on the Home page.

Charts available for NTP, Oscillator and CPU statistics

Measurement Statistics and Charting

Real-time charting of NTP, Oscillator and CPU statistics is available via the Web Interface. Measurements are continuously computed and displayed in real-time with daily and weekly charts. The charts are automatically archived into month and year directories that remain resident for up to ten years.

The Oscillator statistics chart shows the internal chassis temperature, oscillator electronic frequency control value and the offset of the receiver subsystem to the CDMA reference. It is useful for verifying that the unit was locked to the CDMA system at a certain time. The NTP statistics chart shows the NTP packets sent, packet rate and the accuracy of the NTP/System Time relative to UTC. The CPU statistics chart shows the free memory, processor load and CPU temperature.

Network Security Hardened

Extra care has been taken with Sonoma to "harden" it against network attacks. It was developed with the latest version of the Linux operating system and security protocols. The Linux distribution is based on Slackware, a distribution that is famed for its ease of configuration, stability and security.

In a purpose-built appliance like the Sonoma, there are only a few settings that need to be made, and they typically need to be set only once in the lifetime of the product. Since this is a set-it-and-forget-it box, we have eliminated all extraneous protocols/services in order to minimize exposure to security holes. You can change settings via SSH or Telnet, and monitor the alarm/status information using HTTPS, SNMP, SSH, or Telnet. Security-conscious users can disable any or all of the risky protocols such as HTTPS, Telnet, Time and Daytime or restrict access to specific hosts.

For those users who are familiar with Linux, we make it easy for you to customize various aspects of the operation to your requirements.

Full User Control

Configuration and control is accomplished through either the front-panel keypad/display or through the network or serial ports. A handful of simple commands and interactive question/answer utilities are all that is needed to configure and control this product. There is no need to be proficient at Linux. Online help for all of the Sonoma-specific commands is available, as well as the standard help (manual) files for all of the available Linux commands.

However, many Linux experts desire more control, and in the Sonoma you can have a very high level of control over the entire product. Since Linux systems are configured via human-readable ".conf" files located in the */etc* directory of the file system, the Sonoma allows you to modify these files and copy to a non-volatile area of the file system. At boot time, these files are copied over the factory defaults, allowing you to customize virtually all aspects of the operation. Should you need to revert back to the factory configuration, all you need to do is delete the modified files from the non-volatile area.
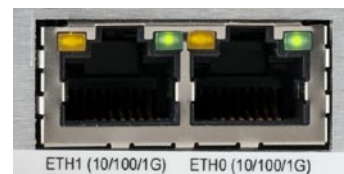
Dual Gigabit Ports

Dual Gigabit Ports

Two independent 10/100/1000 Base-T Ethernet ports are available. The ports are capable of supporting 7,500 NTP requests per second while maintaining a timestamp accuracy of better than 10 microseconds. For PTP/IEEE-1588 applications, you can purchase the option to run on one or both ports.

Sonoma rear panel with optional dual power supplies.
Antenna input TNC connector on upper left. Two spare BNC connectors on lower left. One RS-232 connector.
Two 10/100/1000 Base-T Ethernet ports.
Optional dual power supply connectors on right.

Extended Stratum 1 Operation if Signal Lost

The Sonoma will continue to serve NTP Stratum 1 time for some period if the CDMA reference signal is lost. This is called the holdover period and it is dependent upon the quality of the oscillator and the software control algorithms. The basic Sonoma is provided with a TCXO (drift rate is 10 milliseconds/day), and it will continue to serve accurate Stratum 1 time for a full 24 hours of continuous signal loss. For even better holdover performance you may want to consider an oscillator upgrade.

The holdover period is important for NTP users but for PTP users it is even more important. When the CDMA reference signal is lost, the Sonoma begins to drift away from "perfect time", accumulating timing errors the longer it operates without a signal. This means your PTP timestamps become less and less accurate while Sonoma is in holdover. We recommend an OCXO upgrade for PTP customers.

Why would Sonoma lose its lock on the CDMA signal? CDMA antennas can be installed inside buildings. Occasionally the antenna will be installed in a location where CDMA signal reception is very sporadic (such as in a basement data center). In these cases the time server might go hours or days without a signal. We recommend an OCXO oscillator in situations with very sporadic signal reception.

Again, the factors that determine drift rate and holdover period are the quality of the oscillator and the quality of the software control algorithms. Our experience in precision frequency control and OCXO technologies makes the Sonoma performance the best in the market.

Easy Installation

In most cases, you can install the CDMA antenna on top of your equipment rack. What could be easier? The rackmount unit is readily installed and the 10/100/1000 Base-T Ethernet ports smoothly integrate with existing network equipment. The unit is up and running in a few minutes on networks supporting DHCP. Or, without DHCP, the unit can be configured with a few front-panel keystrokes or a simple serial port command.

Three-Year Warranty and
Free Technical Support for Life

The Sonoma has a 3-year parts and labor warranty. Free technical support is available via phone or email for as long you own this product. No support contracts required. Our technicians at the EndRun Technologies facility are highly-trained to help you, and your phone call will be answered by a person, not by an answering machine. Software upgrades are also available free on the EndRun website.

Risk-Free Guarantee

If you are not satisfied with the Sonoma for ANY reason, simply return it within 60 days for a full refund less shipping fees. For details see:

www.endruntechnologies.com/guarantee.htm

Oscillator	Holdover Drift Rate	Holdover Period*
TCXO	10 milliseconds per first day	24 hours
Premium OCXO**	80 microseconds per first day	35 days
Rubidium	5 microseconds per first day	140 days

*Time to accummulate 10 milliseconds of error if GPS signal is lost.
**EndRun designed and manufactures this specialized OCXO.

CDMA antenna with 12 feet of cable
easily installs on top of your equipment rack.

SONOMA Network Time Server Specifications
CDMA-Synchronized

CDMA RECEIVER:
– Digital Cellular Mobile Receive Band - 869-894 MHz.
– PCS Mobile Receive Band - 1930-1990 MHz.
– Japanese Cellular Mobile Receive Band - 860-875 MHz (optional configuration).
– TIA/EIA IS-95 CDMA Pilot and Sync Channels.
– TNC connector (female) on rear panel, $Z_{in} = 50\Omega$.

ANTENNA:
– Dual Band, 824-896 MHz/1850-1990 MHz, magnetic-base with integral 12 ft. RG-58/U cable with TNC (male) connector. Extension cables and preamplifiers are available as options.

TIME TO LOCK:
– < 5 minutes, typical (TCXO - standard configuration).
– < 10 minutes, typical (OCXO/Rb).

HOLDOVER ACCURACY:
– TCXO (standard): 10 millisecs/day. Serves Stratum 1 time for 24 hours after signal loss.
– Premium OCXO: 80 microsecs/day. Serves Stratum 1 time for 35 days after signal loss.
– Rubidium: 5 microsecs/day. Serves Stratum 1 time for 140 days after signal loss.

SYNCHRONIZATION ACCURACY:
– CDMA Receiver Accuracy: < 10 microseconds to UTC(USNO) when locked, typical.
– NTP Timestamp Accuracy: < 10 microseconds @ 7,500 requests/second.
– NTP Client Synchronization Accuracy: Network factors can often limit LAN synchronization accuracy to ½ - 2 milliseconds, typical.

SUPPORTED PROTOCOLS:
– SNTP, NTP v2, v3, v4, SHA/MD5 authentication, broadcast/multicast mode and autokey.
– SSH client/server with "secure copy" utility, SCP.
– SNMP v1, v2c, v3 with Enterprise MIB.
– HTTPS (Web Interface).
– TIME and DAYTIME server.
– TELNET client/server.
– FTP and DHCP clients.
– SYSLOG.
– IPv4/IPv6.
– Optional PTP/IEEE-1588-2008 (v2) Grandmaster. 8 ns hardware timestamping.

NTP CLIENT AND PTP SLAVE SOFTWARE:
– NTP client software is freely available. Refer to www.endruntechnologies.com/ntp-client.htm.
– For information about PTP slave software see www.endruntechnologies.com/ptp-slave.htm.

OPERATING SYSTEM:
– Linux Kernel 3.2.2.

NETWORK I/O:
– Two rear-panel RJ-45 jacks.
– Two 10/100/1000 Base-T Ethernet.

MAINTENANCE CONSOLE:
– RS-232 serial I/O on rear panel DB9M jack for secure, local terminal access.
– Parameters fixed at 19200 baud, 8 data bits, no parity, 1 stop bit.

SYSTEM STATUS INDICATORS:
– Sync LED: Amber LED pulses to indicate lock status.
– Alarm LED: Red LED indicates a serious fault condition.

ALPHANUMERIC DISPLAY/KEYPAD:
– Display: Brilliant 16x280 graphical, dot-matrix, vacuum-fluorescent.
– Keypad: Enter, Back, Edit, Right, Left, Up, Down, Help.
– Display/keypad is provided with the Sonoma D12 model. Sonoma N12 has no display/keypad.
– NOTE: The only difference between Sonoma D12 and Sonoma N12 is the display/keypad.

FIRMWARE UPGRADES:
– Software is field-upgradeable and provided free-of-charge.

POWER:
– 10 watts with TCXO (standard configuration). 11-13 watts with OCXO. 16-23 watts with Rb.
– 90-264 VAC, 47-63 Hz, 1.0A maximum.
– 3-Pin IEC 320 on rear panel, 2-meter cord included.

SIZE:
– Chassis: 1.75"H x 17"W x 10.75"D (19" rackmount).
– Weight: < 5 pounds.
– Antenna: 14"H x 2" diameter at base.

ENVIRONMENTAL:
– Operating Temperature/Humidity: 0° to +50° C / 5% to 90% RH, non-condensing.
– Storage Temperature/Humidity: -40° to +85° C / 5% to 95% RH, non-condensing.

COMPLIANCE:
– CE, FCC, RoHS, WEEE.

OPTIONS:
– Premium OCXO, Rubidium, IEEE-1588v2 (PTP), Time Code Output, 1 PPS Output, -48 Vdc Input, Dual Power Supplies, Open-Collector Alarm Output, Sysplex Timer Output, 10 MPPS, Programmable Pulse Output. More options available - email or call us.

PTP/IEEE-1588 (Grandmaster) - (option):
– IEEE-1588–2008 (v2) with hardware timestamping.
– Parameters: Default Profile. Multicast or Hybrid (mixed Unicast/Multicast). Two-Step Clock. Delay Mechanism: E2E or P2P. Delay Interval: 32 seconds. Transport: UDP/IPv4. Sync Interval: 1, 2, 4, 8, 16, 32, 64 or 128 packets / 1 second. Announce Interval: 1 packet per 1, 2, 4, 8 or 16 seconds.
– PTP Timestamp Resolution: 8 nanoseconds.
– For more information see: www.endruntechnologies.com/pdf/PTP-IEEE-1588.pdf

1 PPS OUTPUT - (option):
– 1 PPS: Positive on-time TTL pulse @ 50Ω or RS-422 levels.
– User-Selectable Width: 20 us, 1ms, 100 ms, 500 ms.
– Stability: TDEV < 20 ns, $\tau < 10^5$ seconds.

DUAL POWER SUPPLIES - (option):
– Dual-Redundant Power Supplies with alarm indication in case of failure.
– AC/AC, AC/DC, or DC/DC is available.

TIME CODE OUTPUT - (option):
– Signal: Amplitude-Modulated (1 Vrms into 50Ω, 1 kHz carrier) or DC-Level Shift (3V into 50Ω).
– User-Selectable Format: IRIG-B120 (IEEE-1344), IRIG-B122, IRIG-B123, NASA-36, or 2137.

SERIAL ONCE-PER-SECOND TIME OUTPUT - (option):
– RS-232 output only port - transmits ASCII characters indicating current time.
– 9600 baud, 8 data bits, 1 stop bit, odd parity.
– IBM Sysplex Timer compatibility. Other formats available including NMEA, NENA - call us.