EndRun
TECHNOLOGIES

"Smarter Timing Solutions"

MERIDIAN/TYCHO II, RTM3205 *PTP Grandmaster*

PTP/IEEE-1588 Grandmaster Option

The Meridian II, Tycho II, and RTM3205 Precision Time Protocol (PTP) Grandmaster Clocks deliver the level of performance that is required in high-speed, low-latency systems. EndRun makes it easy to add the optional PTP/IEEE-1588 protocol to one or both of the dual gigabit ports. This 2nd-generation PTP Grandmaster option is a perfect choice for PTP or mixed PTP/NTP networks. The highly-integrated solid-state design is very reliable, and you can easily manage it via one of the network ports or the RS-232 serial port. A web interface (HTTPS) is also provided for status monitoring.

FEATURES

- PTP/IEEE-1588 Grandmaster Clock.
- Dual gigabit ports.
- Nanosecond-resolution hardware timestamping.
- The most widely deployed PTP Default Profile.
- Security-hardened network and management interface.
- Free technical support and software upgrades.
- 60-day money-back guarantee.

KEY BENEFITS

- Over 1000 times more accurate than the Network Time Protocol (NTP).
- Easy to operate and maintain.

Dual Gigabit Ports

Meridian II, Tycho II, and RTM3205 have two 10/100/1000 Base-T Ethernet ports. The PTP protocol can be enabled on one or both of these ports to service two independent PTP sub-domains. Both ports are security hardened to meet the highest Information Assurance (IA) requirements.

Hardware Timestamping

These products are shipped from the factory ready for hardware-based PTP timestamping. Hardware timestamping enables the nanosecond accuracy and performance that is required for today's low-latency systems.

Easy PTP Configuration

You can easily configure all PTP parameters via the network console port or the front-panel keypad/display (Meridian II). The PTP configuration can be viewed by both methods and also via the built-in web interface. Once the PTP Grandmaster configuration is saved, it is broadcast to all PTP slaves who then configure themselves accordingly. If multiple Grandmasters are installed on your network, the PTP Best Master Clock (BMC) algorithm automatically decides which one becomes the active Grandmaster.

Oscillator Options for Improved Timestamp Accuracy if Signal Lost

Reference oscillator upgrades are available to improve timestamp accuracy in the case of GPS signal loss. The drift rate of the oscillator is what causes the Grandmaster to gradually move away from "perfect time" if the signal is lost. The slower the drift rate, then the more accurate your PTP timestamps will be during periods of signal loss.

The basic Meridian/Tycho II is provided with a TCXO (drift is 10 milliseconds for the first day). An upgraded OCXO or rubidium oscillator is recommended for the PTP Grandmaster. The RTM3205 offers three OCXO options. Specifications for the oscillator options are shown below. For PTP purposes, the most important specification is the accumulated time error for the 1st day after signal loss.

Oscillator Options - Summary Performance Data

	TCXO	MS-OCXO	HS-OCXO	US-OCXO	Rubidium	HS-Rubid.
Accumulated Time Error 1st Day*	10 msecs	80 usecs	15 usecs	10 usecs	5 usecs	1 usecs
Temperature Stability	2.5×10^{-6}	4×10^{-9}	1×10^{-9}	5×10^{-10}	1×10^{-9}	1×10^{-10}
Temperature Range °C	-20 to +70	0 to +70	0 to +70	0 to +70	-20 to +70	-20 to +70
Ageing Rate/Year	1×10^{-6}	3×10^{-8}	3×10^{-8}	3×10^{-8}	1×10^{-9}	5×10^{-10}
Allan Deviation @ 1 sec	6×10^{-10}	3×10^{-12}	1×10^{-12}	5.1×10^{-13}	2×10^{-11}	1.2×10^{-11}

*   Typical, 5° C Max Delta, 7.5° C/Hr Max Slew Rate

MERIDIAN/TYCHO II, RTM3205
PTP/IEEE-1588 Grandmaster Specifications

RTM3205 Front Panel with Optional 10 MHz and 1PPS Outputs.

Meridian/Tycho II Rear Panel with Five Option Modules Installed.

COMPLIANCE:
– PTP/IEEE-1588-2008 (Version 2).
– Grandmaster.
– Default profile.
– Two-step clock.
– Multicast.
- UDP/IPv4.

CONFIGURABLE PTP PARAMETERS:

– Delay Mechanism:	E2E or P2P.
- Delay Interval:	32 seconds (fixed).
– 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.
– Priority 1 & 2:	0-255.
– Domain:	0-255.
– Packet TTL:	1-255.
– Time Mode:	UTC or PTP.

GPS-SYNCHRONIZED GRANDMASTER ACCURACY:
– GPS Receiver Reference Clock Accuracy:
  Meridian II, RTM3205: < 10 nanoseconds RMS to UTC(USNO) when locked*
  Tycho II: < 25 nanoseconds RMS to UTC(USNO) when locked*
– PTP Timestamp Accuracy to Reference Clock: 8 nanoseconds.
* See GPS-UTC Timing Specifications for details.

PTP SLAVE SYNCHRONIZATION ACCURACY:
– A hardware-based PTP Slave can typically synchronize to the master to within 100 nanoseconds using a crossover cable or PTP-enabled switch (i.e. Transparent clock). (This is measured from the PTP Grandmaster 1PPS output to the PTP Slave 1PPS output).
– A software-only PTP Slave can synchronize to the master to within 10 microseconds typically. (This data is collected from the PTP Slave statistically gathered Offset From Master (OFM) in a logfile).

PTP SLAVE:
– For information about PTP Slave software and hardware see
  www.endruntechnologies.com/ptp-slave.htm

NETWORK I/O:
– Two rear-panel RJ-45 jacks.
– Two 10/100/1000Base-T Ethernet.
– PTP hardware timestamping can be enabled on eth0, eth1 or both ports.

PTP/IEEE-1588 OPTION CHOICES:
– New Orders: Any new order for a Meridian/Tycho II, RTM3205 can include the PTP Option so it will ship to you ready to go.
– Field Upgrades: If you already have a Meridian/Tycho II, RTM3205, then you can purchase the PTP Option and a license key will be sent to you with instructions to enable PTP on your unit.

OTHER SUPPORTED PROTOCOLS:
– SNTP, NTP v2, v3, v4, SHA/MD5 authentication, and 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.