

TimeProvider® 5000 for Financial Services

IEEE 1588-2008 PTP Grandmaster Clock

High Performance GigE Configuration for High-Speed,
Low-Latency Trading Systems



Key Features

- Gigabit Ethernet, dual port, PTP grandmaster
- Redundant PTP hardware outputs and power supplies
- PTP and NTP hardware-based packet processing
- PTP default profile support including hybrid mode
- Up to 128,000 delay_request messages per second
- GPS referenced, optional dual GPS
- Optical and electrical SFP ports
- SNMP and CLI management
- OCXO oscillator standard, Rubidium upgrade

Key Benefits

- GigE with SFP support for network interoperability and time accuracy
- Highly scalable PTP grandmaster supports 4000 multicast PTP clients at 32 messages per second rate
- High packet rate support can assist PTP slaves in overcoming timing packet jitter problems
- Fully interoperable with standards-based clients
- No performance degradation as client capacity grows
- Simultaneously supports both PTP and NTP elements in your network

Applications

- Trading server synchronization
- Market data archival
- Latency monitoring systems

The Symmetricom® TimeProvider® 5000 is an IEEE 1588-2008 PTP compliant Grandmaster Clock with a robust telecom carrier grade design that provides high client capacity, hardware-based packet processing and redundant hardware to deliver scalable and unsurpassed PTP grandmaster performance. This level of performance is exactly what is required in leading edge high-speed, low-latency trading systems deploying the very latest in networking technology.

Dual GigE SFP ports can be configured as independent PTP grandmasters to service different networks, or bonded for failover redundancy. For additional redundancy in critical trading systems, a second, dual port PTP module can be installed and kept in standby mode as an automatic failover should the primary module go offline. The flexibility of the dual SFP ports operating at GigE speeds provides for easy interoperability with existing network switching infrastructure.

TimeProvider 5000, with precise hardware-based time stamping and packet processing, supports very high client capacity at full rates. The number of clients operating in default profile mode can range from tens of thousands at low rates to 4000 clients

at a request rate of 32 packets per second per client. There is no performance degradation as the number of clients increases. Both 1-step or 2-step clock modes are supported, and to keep multicast traffic at a minimum hybrid mode is also a choice.

The high packet exchange rates supported by TimeProvider 5000 can facilitate more sophisticated filtering and steering algorithms deployed by PTP slaves to help overcome time transfer errors caused by PTP packet arrival time jitter.

TimeProvider 5000 can also be upgraded to an internal Rubidium atomic oscillator that keeps the clock accurate to microseconds per day in the event connection to GPS is lost.

With optional NTP server capability, TimeProvider 5000 supports both PTP and NTP protocols simultaneously. The two ports of the GigE IOC card can be separately configured, one for PTP and one for NTP. NTP capacity is up to 20,000 transactions per second and it also uses the high accuracy hardware stamping engine.

TimeProvider 5000 can be managed remotely and locally via CLI or by SNMP.

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Specifications

GNSS INPUT OPTIONS

- 1 x GPS
- 2 x GPS
- All use antenna type: L1 band

I/O OUTPUTS

- 2 x GigE output per IOC (optical and electrical)
- 1 x 1 PPS option

PHYSICAL SPECIFICATIONS

- Dimensions: 44mm H x 483mm W x 435mm D (1.75" H x 19" W x 17" D)
- Weight: 4.4 kg (9.6 lbs)

POWER REQUIREMENTS

- - 38.4 VDC to -75 VDC (dual redundant) @ 43W typical

ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -5°C to +45°C
- Storage temperature: -40°C to +70°C
- Humidity: 5% to 100% w/condensation

TIME STAMP PRECISION

- <10 ns rms typical

HARDWARE MODULES

- I/O Module (includes 4 x I/O ports)
- IMC Module
- IOC (Quartz) Module
- IOC (Rubidium) Module

CLIENT CAPACITY

- PTP:
 - Default profile multicast
 - Hybrid mode: multicast Sync packets out, respond to unicast delay_request packets in, with no unicast negotiation
 - Up to 128,000 delay_request messages per second total between both IOC card ports
 - Up to 2000 default/hybrid clients per port, 4000 default/hybrid clients per IOC card, at 32 delay_request packets per second.
- PTP with NTP option (hybrid mode or default profile multicast):
 - One port with PTP: up to 4000 multicast/hybrid clients at a maximum of 32 delay_request packets per second
 - One port with NTP: up to 20,000 transactions per second

NTP SERVER OPTION

- Stratum 1 sever via GPS
- Up to maximum 20,000 transactions per second

FREQUENCY ACCURACY

- Tracking to GPS: PRS/PRC quality
- Holdover (over constant temperature):
 - Rubidium (G.812 type II) <1x10⁻¹¹/day
 - Quartz (G.812 type I) <1x10⁻¹⁰/day

TIME ACCURACY

- Tracking to GPS : <100ns when locked to GPS
- Holdover (over constant temperature):
 - Rubidium (G.812 type II): 10 µsec over 5 days
 - Quartz (G.812 type I): 10 µsec over 1 day

INDUSTRY STANDARDS/REQUIREMENTS

- ITU G.811, G.812, G.823, G.8261
- G.703, G.704, ETSI 300/Class 3.1

PROTOCOLS

- IEEE 1588-2008 (PTP v2)
- NTPv4
- IPv4
- DHCP
- SFTP, FTP
- DiffServ/DSCP
- TELNET
- SYSLOG
- RADIUS
- SSH

MANAGEMENT

- TimePictra
- SNMP v2c, v3
- CLI

CERTIFICATIONS

- CE certified - CISPR22 - Safety - CB Scheme 60950-1 2nd edition
- EMC - FCC part 15 AS/NZS Class B, EN300 386, EN55022/24, CISPR22, KN55022/24 - NEBS GR-1089 section 2 and 3
- Environmental - ETSI (EN55022/EN55024) EN300019, Class T3.2 - NEBS W/Exclusion of GR-63 4.2, 4.5
- Safety - UL/cUL 60950-1, IEC 60950-1 CB, EN60950-1 2nd edition
- RoHS- 6 of 6 RoHS

	Configuration Instructions	Description	Part Number
Required		TimeProvider 5000 Shelf	990-50301-02
		License for multicast & 2-step clock	920-50380-01
		Pre-configured unit	995-50300-99
Slot 1	Required if no PPS card selected for Slot 1 (see below)	Blank I/O panel	090-50312-99
	Optional, choose one	1 PPS output (include E1 I/O)	090-50312-01
		1 PPS output (include T1 I/O)	090-50314-01
Slot 2	Required, choose one	IOC- Qz; 2 SFP bays	090-50321-01
		IOC - Rb; 2 SFP bays	090-50322-01
	Required, choose one or two for above IOC card	Single mode optical SFP	121-20621-10-2
		Multi mode optical SFP	121-20621-11-2
Slot 3	Required, choose one	100/1000 baseT electrical SFP	121-20621-12-2
		IMC w/integrated GPS	090-50331-01
	Required, choose one	IMC w/GPS & GPS, DTI	090-50331-05
Slot 4	Required if no IOC card selected for Slot 4 (see below)	Blank IOC	090-50321-99
	Optional, choose one	IOC- Qz; 2 SFP bays	090-50321-01
		IOC - Rb; 2 SFP bays	090-50322-01
	This IOC is for redundancy only and active only if IOC in slot 2 fails.		
Required for Slot 4 IOC card if option selected above, choose one or two	Required for Slot 4 IOC card if option selected above, choose one or two	Single mode optical SFP	121-20621-10-2
		Multi mode optical SFP	121-20621-11-2
	Required for Slot 4 IOC card if option selected above, choose one or two	100/1000 baseT electrical SFP	121-20621-12-2
Optional	Optional	SNMP license	920-50370-01
		NTP w/20,000 TPS capacity license	920-50370-05

For AC power

TimeProvider 5000 is DC powered. For AC power, Symmetricom recommends Astrodyne model SPU131-111(S) 48 Volts DC, 2.70 Amps. Purchased independently.

The two connectors supplied with the TimeProvider 5000 are a Phoenix Block supplied with the shelf. The connector on the power supply should be removed, and then replaced with the Phoenix Block on the end of the wires for input to the TimeProvider 5000. Use the 48 volt version. The minus line is to connect to the -48VDC input and the positive side of the power supply is to connect to the Return line input. The TimeProvider 5000 shelf is diode protected and will not be damaged by connecting the power supply backwards.