

TimeProvider 1500

Packet Primary Reference Source (PRS)

Powered by Rubidium Atomic Clock and PackeTime

KEY FEATURES AND BENEFITS

- IEEE 1588 2008 (PTP) based Primary Reference Source compliant with:
 - ITU-T G.811 Stratum 1
 - Telcordia GR.2830 PRS
- Compliant with ITU-T G.8261 timing requirements for packet networks
- 1PPS, Time of the Day and 10MHz low noise outputs
- Powered by Rubidium Atomic Clock for 1×10^{-12} long term accuracy
- 1RU form factor that fits in standard 19" or 23" Telco Rack
- Managed via CLI and IEEE 1588-2008 node manager
- GPS level PRS without the need for an antenna installation
- Enables accurate and precise distribution of synchronization over packet networks

INTRODUCTION

Symmetricom® adds a new packet-based Primary Reference Source (PRS) to its portfolio of Cesium and GPS based PRSs. TimeProvider® 1500 can be deployed as a carrier-class Packet PRS system enabling easy migration to packet-based networks. Powered by a Symmetricom Rubidium Miniature Atomic clock and the state of the art Soft Clock algorithm, it has the ability to synchronize to another non co-located master clock over packet-based networks. It is ideally suited for locations where PRS is required, but there are antenna issues for GPS installation and where derived T1/E1 reference is lost due to network migration to packet-based networks.

Traditionally the synchronization reference frequency is generated by PRSs and distributed over the TDM network. The high availability requirement of SDH-based networks mandates the use of multiple site PRSs located in different geographical regions. The synchronization from a PRS site to the SSU/BITS is carried over SONET/SDH networks using derived T1/E1 signals from the optical line rate.

The migration of TDM networks to packet-based Ethernet or IP/MPLS networks can cause disruptions in the synchronization chain. Operators will be able to leverage packet-based

synchronization technologies such as IEEE 1588-2008, also referred to as Precision Time Protocol (PTP), to deliver reliable synchronization to distributed remote central offices and cellular base stations at the edge of the access network.

The TimeProvider 1500 accepts PTP V2 Multicast/Unicast/Hybrid messages to synchronize to a IEEE 1588-2008 grandmaster, like the TimeProvider 5000 or SSU 2000 PTP blade and provides E1/T1, 2048/1544 KHz as well as 1PPS and 10MHz sine wave outputs. In normal operation condition the TimeProvider 1500 output performance meets the PRS requirement as defined in Telcordia GR.2830 and ITU-T G.811, Stratum 1 clock. The outputs of the TimeProvider 1500 can be fed to a variety of distributed and geographically remote Synchronization Network Elements like the SSU/BITS.

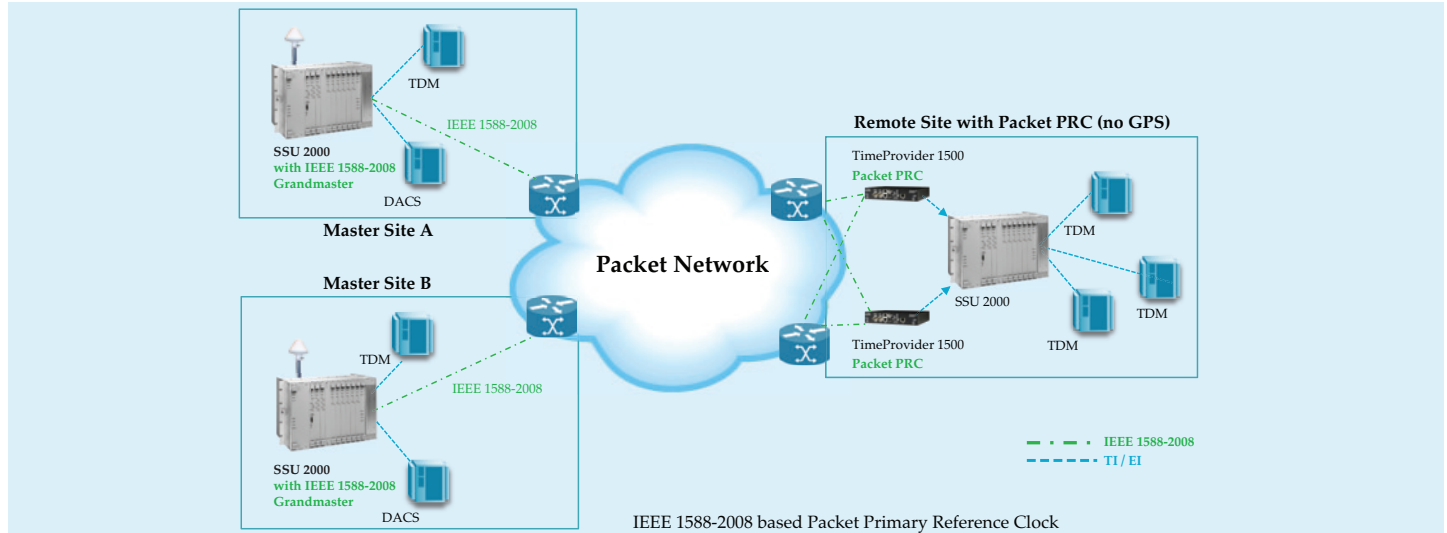
TimeProvider 1500 also supports time of day signal (TOD) in two formats namely T1 and NMS. Packaged in 1RU form factor for mounting in a standard 19" and 23" telco rack, it can be provisioned and managed locally over a serial port or remotely via telnet using CLI commands.

The IEEE 1588-2008 specification also provides for a "management node" capability within a PTP network (domain) for performing in-band configuration and monitoring functions.



TimeProvider 1500

Network Topology



TimeProvider 1500 Specifications

INPUTS

- IEEE 1588-2008 (PTP)
- RJ-45 100BaseT Ethernet

OUTPUTS

- 2048 kHz - G.703/13 compliant
- 1544 kHz - Square wave 3.2VP-P
- E1/DS1 framer output Line Code: E1: HDB3, AMI DS1: B8ZS or AMI Frame Format E1: Double-frame or Multi-frame, DS1: D4 (F12), ESF (F24) or Alarm indication signal: AIS CRC: Yes Signaling mechanism: CAS, CCS Compliance: G.703/9
- G.811/G.823/G.824 and GR2830 compliant sync interfaces
- 10MHz/1PPS
- TOD messaging via serial port

MAINTENANCE AND DIAGNOSTICS

- LED indicators for alarms
- CLI based local management via RS232 craft port
- Remote management via RJ45 ethernet port
- Logging
 1. Configuration log
 2. Event log
- In band management via PTP node manager
- Firmware remotely upgradable
- Configuration save/restore - non volatile configuration
- Factory default reset
- System administrator password protection
- Hardware and firmware version query
- LEDs and system status
- IEEE 1588-2008 V2 PTP client status
- IEEE 1588-2008 V2 PTP network status and performance statistics

PTP OVER PACKET SUPPORT

- IEEE 1588-2008
- ITU submission 'IEEE 1588-2008v2 Telecom Profile for Constrained Networks'
- Unicast/Multicast (Hybrid)
- ITU-T G.8261 compliant

POWER REQUIREMENTS

- -48VDC Dual

CONNECTORS

- E1/T1/1PPS outputs
- 2 BNC (co-axial)
- 2 RJ-48C (differential)
- 1 RS-232
- 1 RJ45 100 BaseT Ethernet
- BNC for sinusoidal 10 MHZ
- Redundant - 48DC power connectors

LEDs

- Power On
- Sync status
- Outputs active
- Power A and B
- Alarm

ENVIRONMENTAL SPECIFICATIONS

- Operating temperature: -5°C to +55°C
- Storage temperature: -40°C to +70°C
- Operating humidity: 5% to 95% RH

PROTOCOL

- IEEE 1588-2008
- T1 (1.544 Mbps and 1.544 MHZ)
- E1 (2.048 Mbps and 2.048 MHZ)
- DHCP
- TELNET

PHYSICAL SPECIFICATIONS

- Weight: NA
- Size:
 - 482.6mm(19") W x 233.9mm(9.21") D x 43.9mm(1.73")H

REGULATORY

- UL
- cUL
- CB scheme
- CE Mark

EMISSIONS/IMMUNITY

- FCC Part 15 Class B
- ICES-003 Class B
- VCCI Class A
- AS/NVS CISPR Class B
- ETSI 300 386 Class B
- EN 55022/24 Class B
- KN 55022/24 Class B
- EMC Immunity meets following criteria from EN61000
 - 4-2 ESD
 - 4-3 Radiated Immunity
 - 4-4 Electrical Fast Transient
 - 4-5 Surge
 - 4-6 Conducted Immunity

MANAGEMENT

- CLI via serial port and Remote Telnet
- PTP Nodemanagement

NORMAL OPERATING PERFORMANCE

- G.8261 Appendix VI Test Cases 12 to 17 over 1Gbps or higher transport
- Meet PRS performance
 - G.811 MTIE
 - GR.2830 Normal MTIE
 - ANSI T1.101 PRC MTIE
- Long Term Accuracy Fractional Frequency Offset: 1×10^{-12}
- 1PPS Output (compared with Grandmaster 1PPS):
 - < ± 1 usec

BRIDGING PERFORMANCE

- Meets and exceeds GR2830 requirement Section 6.4.2 - Upon losing reference, output shall maintain PRS performance for at least 6 hours and unacceptable region should not be entered for the first 48 hours after the allowed impairment.