

P6X Managed Timing Engine (MTE)

Board



APPLICATIONS

- Small cells, macro-cells eNodeBs etc.
- Carrier Ethernet EADs, switches and routers
- PTP Edge Grandmasters
- Power grid time synchronization server & client systems
- Internet of Things & industrial precise time synchronization

FEATURES

- Full IEEE 1588 -2008 Grandmaster and Slave functionality
- Support one-step and two- step clock
- Support both P2P and E2E modes
- Support multicast and unicast
- Support frequency recovery over SyncE
- 1PPS, 5/10/20/25 MHz frequency and ToD output
- Telecom, power and default profiles
- Fully transparent, low latency pass through traffic
- Industry leading algorithms for G.8261 test suite

BENEFITS

- Simple integration into host system
- Multiple holdover performance options
- Low power consumption (enables POE capability)
- Rapid time to market
- Low total cost of ownership



P64 Master/Slave
P62 Slave

Emerging applications in 4G LTE and LTE-Advanced infrastructure, and the migration of transmission and distribution substations towards the smart grid have been fuelling the need for higher precision time synchronization. Qulsar's Managed Timing Engine (MTE) board P6X, is a best of breed solution for network equipment vendors looking to implement a time synchronization system using IEEE 1588 PTP packet timing to deliver a full, high performance, robust timing solution.

The P6X comes in two configurations:

- P62 Slave : Uses industry leading algorithms to extract time from a PTP input stream and produces stable frequency and time outputs
- P64 Ordinary clock with Grandmaster capability: Generates frequency and phase outputs acting as the master. It is also capable of utilizing multi-sync inputs.

Design & Integration

The P6X board enables a simple path to quickly integrate a precision synchronization system into a host system.

The P62 can be integrated as a slave into an end-point where precision timing signals are required such as macro, micro or pico small cells (eNodeBs) in telecom applications; and into Intelligent Electronic Devices (IEDs), protection relay devices for the modernization of substations in power utility smart grids.

The P64 units can be integrated into systems that need to provide Grandmaster functionality such as Edgemaster clocks generating PTP streams (Primary Reference Timing Clocks).

The P6X has two Ethernet interfaces, one with 1000Base-T RJ-45 and one with SFP for full network connectivity. A 40-pin header connector contains (among other things) the tether to the host system. The P6X systems provide 'wire speed pass through' functionality which makes the P6x fully transparent both seen from the network and the host system.

The P64 can receive a 1PPS and ToD from a GNSS (GPS, GLONASS or BeiDou) timing engine as input (in addition to PTP) and produce accurate timing signals as output. In a scenario where fully integrated Grandmaster system is required – a fully integrated GNSS subsystem is also available (Q-series, MTE subsystems).

Two precise synchronized output signals are generated - 5/10/20/25 MHz frequency and a 1 PPS output signal. The "Time of Day" (ToD) information is available in NMEA, ASCII and 'China Mobile' format.

P6X MTE Board



Pass-Through Technology

One of the innovative features of the P6X is that it can be integrated into an existing communication path. It features a low latency, fully transparent data communication channel at gigabit speed. It also allows for daisy chaining architectures of host systems.

Multi-sync & Algorithms

The P6X board has industry leading algorithms that enable it to extract precise time signals from packets impeded over the network by traffic load, congestion and delay variation (PDV). In addition, the P6X has cutting edge patented technology that enables it to use multiple synchronization inputs. This is particularly powerful in today's applications, where a host system may need to be versatile and deployable in multiple environments.

System Features

- IEEE 1588-2008 Master and / or Slave clocks
- Fully compliant to telecom, power and defaults profile
- Transparent clock support
- Frequency accuracy better than 1ppb under ITU-T G.8261 test conditions¹
- Phase accuracy better than $\pm 1\mu\text{s}$ accuracy under G.8261 testing conditions¹
- Enhanced synchronization and network performance metrics

¹ITU-T G.8261 tests conducted at both Qulsar internal labs and 3rd party labs – details available on request and under NDA

²Full support planned for future release

Network Interface

- One Upstream/Downstream 1GbE RJ45
- One Upstream/Downstream 1GbE SFP
- Wire speed low latency pass-through
- Integrated TCP/IP stack
- IPv4 and IPv6²(PTP only)

Technical Specifications

Ethernet

- Wire speed 1GbE pass-through

PTP Master (P64 only)

- Accuracy +/- 25 ns
- Output sync rate: up to 128 Hz
- Number of slaves: up to 250
- Holdover (typical values at constant temperature)
OCXO : 120min, OCTCXO : 30min, TCXO : 15min

PTP Slave (either P64 or P62)

- Supports 1-step and 2-step masters
- Input sync rate: up to 128 Hz
- Accuracy: up to +/- 50 ns
- Holdover (typical values at constant temperature):
OCXO : 120min, OCTCXO : 30min, TCXO : 15min

Other Features

- DHCP client
- FTP server
- TELNET server
- SSH server
- Serial terminal
- Remote firmware upgrade
- Command line interface configuration (Telnet, SSH or serial port terminal)

Input Synchronization Interfaces

- 1 PPS³
- ToD in³: TTL, 4800/9600 bps, via dedicated pin port up to 115,200 bps via serial port
- PTP: Ethernet (L2) or UDP IPv4/IPv6 (L3)

Output Synchronization Interfaces

- Freq out: 5/10/20/25 MHz
- PPS out: up to 2 kHz with 1 μs resolution
- ToD out: TTL 4800/9600 bps on dedicated pin. Up to 115,200 bps on serial port.
- PTP: Ethernet (L2) or UDP IPv4 / IPv6 (L3)

ToD Format (input & output)

- ASCII: YYYY-MM-DD HH:MM:SS
- NMEA and China Mobile Binary format

Other Interfaces

- Input / output: 40 pin connector with serial interface
- ToD and PPS input/output & syntonized frequency also available on SMA coax
- One 10/100/1000 BaseT SFPs
- One 10/100/1000 BaseT RJ45

Operating Specifications

- Supply: 3.3V or 5V +/- 10%
- Power consumption: 1.1W w/o SFP and 2.2W w SFP
- Operating temperature 0°C to 70°C (-40°C to 85°C optional)
- RoHS compliant
- Size: 100mm X 60mm X 15/25mm

Ordering Information

- 85-230-00 Managed Timing Engine (MTE) P62 (Slave)
- 85-250-00 Managed Timing Engine (MTE) P62 (Slave) with h/o⁴
- 85-430-00 Managed Timing Engine (MTE) P64 (Master)
- 85-450-00 Managed Timing Engine (MTE) P64 (Master) with h/o⁴

³For P64 Master only

⁴Please check with your sales representative