



PTP-EX | HIGH-RATE PROGRAMMABLE TELEMETRY PROCESSOR

The PTP-EX is a high-rate satellite data processing and simulation system that supports both CCSDS (for Conventional and Advanced Orbiting Systems) and Time-Division Multiplexed (TDM) formats, performing data ingest, processing, distribution and archiving functions at rates up to 1.6 Gbps. It is most commonly deployed within a satellite ground station, but is also ideal for satellite integration and test applications.

Applications

- High-rate remote sensing ground stations
- Satellite/Payload integration and test
- Transport of wideband isochronous data over a WAN
- High-rate bit error rate test system
- High-rate digital record/playback system
- Satellite link emulation, testing, and monitoring



High-Rate Ingest, Processing, Forwarding & Archiving

The PTP-EX accepts single or dual downlink data streams, performing frame synchronization, derandomization, Reed-Solomon error correction, CRC decoding, time tagging and logging at rates up to 1.6 Gbps. It also integrates real-time CCSDS packet processing and logging capabilities at data rates beyond 800 Mbps. The system performs CCSDS packet processing, using Virtual Channel Identifier or Application Process Identifier to route data to networked processing centers and concurrently log to disk. Data files can be stored locally, or forwarded to processing centers post-pass.

Encrypted Downlink Support

The PTP-EX can be used to transport wideband isochronous data over IP or ATM networks for missions with bulk encrypted downlink. In addition to standard CCSDS service processing, it optionally supports AES decryption and Rice decompression.

Mission-Grade Hardware

The PTP-EX is based on a high-performance, high-reliability server architecture with Intel Quad Core Xeon processors, mirrored hot-swap system drives and data drives, hot-swap fans, and redundant power supplies. It provides a dual Gigabit Ethernet interface for monitor and control as well as high speed network data transfer. Each system incorporates a high performance 4 drive strip RAID array providing 1TB of data storage. Alternate size arrays can be ordered on a custom basis.

Easy Local and Remote Configuration

The PTP can be controlled locally or remotely via an intuitive, straightforward graphical user interface. A remote control library is also provided for integration with satellite control systems such as OS/COMET and EPOCH 2000, and a Simple Network Management Protocol (SNMP) agent is available to facilitate integration with management platforms such as HP OpenView.

Key Features

- 1.6 Gbps serial throughput for CCSDS and TDM frame processing and archiving
- 800 Mbps disk logging of Reed-Solomon corrected CCSDS frames and simultaneous processing of real-time data
- CCSDS and TDM data simulation with 800 Gbps serial output
- 400 Mbps real-time network transfer
- Intuitive graphical user interface

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Physical Specifications

- 4U rack-mount chassis
- Quad Core Xeon @ 2.33GHz, 4 GB RAM
- Mirrored, hot-swap 2x250GB System
- Striped, hot-swap 4x250GB Data
- Dual Gigabit Ethernet
- DVD+-RW for program load & data storage

Front-End Processing

- Data rates up to 1.6 Gbps
- Frame synchronization, derandomization, Reed-Solomon decoding, and CRC decoding
- Time tagging and data quality annotation
- CCSDS virtual channel sorting and packet processing
- Advanced Encryption Standard (AES) decryption
- Rice decompression
- Real-time disk logging and high-speed network transfer

Simulation & Testing

- CCSDS and TDM data simulation at rates up to
- 1.6 Gbps
- CRC encoding, Reed-Solomon encoding, randomization, and convolutional coding
- Data quality monitoring (CCSDS and TDM) and bit/packet error rate testing
- Data logging and playback

Communication Links

- High-performance Gigabit Ethernet and ATM for data transfer, control and monitoring
- Real-time network data transfer (UDP, IP multicast, TCP client/server)
- Support for user encapsulation formats including NASCOM RTP, IPDU, SFDU, LEO-T, EDOS
- Network protocol conversion

Serial I/O

- Data rate from 100 bps to 1.6 Gbps
- Differential ECL with 50-Ohm termination to -2V utilizing SMB female connectors

Parallel I/O

- Dual Channels with data rates up to 800 Mbps each
- Configurable as 4-, 8-, 32-bit input

Frame Synchronizer

- Frame sync pattern up to 32 bits
- Frame sync mask up to 32 bits
- Sync bit error threshold up to 15 bit errors
- Adaptive sync strategy with 0 to 7 check frames and 0 to 7 flywheel frames]
- Bit slip window from 0 to +/-3 bits
- BPSK or QPSK automatic ambiguity resolution and correction
- Frame length up to 4096 bytes/frame
- Time tagging: 5 μ sec accuracy with IRIG, 10 MHz & 1 PPS input (IRIG input only, 100 μ sec)
- Time stamp using internal or external 10 MHz reference and 1 PPS

Reed-Solomon Error Correction Encoding/Decoding

- CCSDS Reed-Solomon (RS) (255,223) error correction
- Support for interleave depth up to 16
- CCSDS Reed-Solomon (10,6) header error correction
- Shortened codeword support using "virtual fill"
- Real-time quality generation and annotation for each VCDU

CRC Error Detection Decoder / Encoder

- Compute frame error control field from received data using the polynomial $g(x) = x^{16} + x^{12} + x^5 + 1$
- Programmable offset from 0 to 8 bytes

Derandomizer / Pseudo-Randomizer

- Exclusive OR received from data following sync pattern with pattern given by $h(x) = x^8 + x^7 + x^5 + x^3 + 1$
- Programmable start offset frame 0 to 8 bytes

Data Simulator

- Onboard memory for high-speed simulation
- Hardware sync marker, ID counter, and time stamp insertion
- Programmable clock and data polarity
- Frame length up to 4096 bytes/frame
- Programmable output frequency from 100 Hz to 800 MHz

Convolutional Encoder

- CCSDS rate=1/2, constraint length K=7
- Programmable G1, G2 order
- Programmable inversion of G1 and G2

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