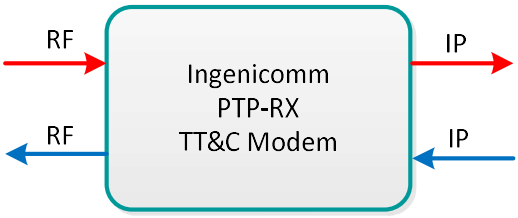
PTP-RF | TELEMETRY, TRACKING & COMMAND (TT&C) MODEM

Ingenicomm's PTP-RF Telemetry, Tracking & Command (TT&C) Modem represents the next generation of low-cost, highly scalable integrated modem solutions. The PTP-RF combines Ingenicomm's proven Programmable Telemetry Processor (PTP) software framework with state-of-the-art digital signal processing components to deliver a full range of uplink and downlink RF-to-IP processing capabilities at data rates up to 30 Mbps per channel.



Telemetry, Tracking & Command

The PTP-RF provides an optimized turn-key solution spacecraft telemetry, tracking and command applications, including dual-signal static/dynamic demodulation with integrated diversity combination, data/clock waveform recovery, uplink modulation, and single- and multi-session tracking/ranging measurement. The PTP-RF supports a wide range of modulation formats, symbol rates, analog bandwidths, and data encodings, and provides industry-leading performance within 1 dB of theory for typical waveform modes.

Integrated Data Processing

The capabilities of the PTP-RF go beyond simple signal processing. By integrating Ingenicomm's full PTP software processing suite, the PTP-RF enables users to take advantage of a full range of telemetry and command processing, decoding and de-encapsulation, data quality metric generation, test pattern verification, and link performance analysis capabilities.

The PTP-RF can be controlled either locally or remotely via a highly flexible graphical user interface. A full-featured remote interface API is also provided to allow easy scripting and automation.

Robust Platform Architecture

The PTP-RF is based on a robust, enterprise-grade server architecture to provide component-level redundancy and high resiliency against failure. The system is highly scalable, and can be expanded to include additional interfaces and increased storage capacity as required.

Key Features

- Wide range of supported modulation schemes and signal characteristics
- Integrated ranging/tracking measurement and calculation
- Performance within 1 dB of theory for typical waveform configurations
- Telemetry and command format decoding and processing
- Raw and processed data recording and configurable playback
- Test pattern and user data simulation and verification
- Integrated error/noise simulation and link quality measurement
- Expandable to include additional analog and digital interfaces

Ingenicomm, Inc. is a leading provider of ground and range equipment and enterprise engineering services for civil and commercial aerospace programs, as well as the defense and intelligence communities. To learn more about Ingenicomm's service and product offerings, visit **http://www.ingenicomm.net** or contact Ingenicomm at **sales@ingenicomm.net** or **+1-703-665-4333**.

System Capabilities

Modulator Specifications

Output Bandwidth	50-90 MHz (at -3dB points)
Output Level	0 to -90 dBm in 1 dB steps
Carrier Frequency	66 to 74 MHz
Subcarrier Frequency	Up to 2 MHz
Modulation	BPSK, QPSK, PM, PM/PCM, FM, FM-PSK, FM-PCM
External Analog Input	1 V peak-to-peak @ 50
External PCM Input	TTL, RS-232, TCP/IP and UDP/IP
Unwanted Emissions	<-60dBc, o to -20 dBm output
Phase Noise	<0.5o rms in 1 MHz bandwidth
Carrier Sweep Range	+1 kHz to +1 MHz
Carrier Sweep Rate	1 Hz/s to 175 Hz/s
Carrier Offset	0 to +1 MHz

Demodulator Specifications

Input Ports	2 (LHCP and RHCP)
Impedance	50
Input Bandwidth	50-90 MHz (at -3 dB points)
Input Level	0 to -70 dBm
VSWR	<1.25
Acquisition Range	+10 to +500 kHz
AGC Time Constant	0.1, 1, 10, 100 or 1000 ms
Carrier Loop Bandwidth	0.03, 0.1, 0.3, 1 and 3% of symbol rate
Doppler Rate	<10 kHz/s (for loop bandwidth = 3kHz)
Diversity Combiner	Post-detection
Demodulation	BPSK, QPSK, PM, PM/PSK, PM/PCM
Subcarrier Frequency	Up to 2 MHz
PCM Bit Rate	1 kbps to 30 Mbps
Acquisition Threshold	Eb/N0 <0 dB
Acquisition Time	1s (typical)
BER Degradation	<1 dB for the listed data rates
Time Tag Accuracy	<100 microseconds
PCM Decoding	NRZ-L/M/S, BiPhase-L/M/S
Bit Sync Acquisition Range	+3% of symbol rate

Encoding and Decoding

- Pseudo-randomization and de-randomization
- Reed-Solomon encoding and decoding
- Convolutional/Viterbi encoding and decoding
- LDPC and TPC encoding and decoding
- CRC checksum generation and verification

Telemetry Processing and Simulation

- CCSDS Conventional (version 1) and AOS (version 2) Transfer Frame processing
- CCSDS VCA and Bitstream service processing
- Fully configurable VCID and APID filtering and routing
- CCSDS, TDM, and ESA packet processing
- Database-driven telemetry decommutation and engineering unit conversion

Data Archiving and Playback

- Configurable multi-mode file playback
- Segmented and multi-file recording
- Automatic time-tagging and aging of recorded files

Test Data Generation

- Fully configurable PRBS generation and verification
- Fixed and user-provided pattern generation and verification
- Single- and multi-bit burst error simulation
- AWGN and user-provided noise simulation
- Bit and packet error rate calculation

Latency Analysis

- Integrated receive and transmit rate detection
- Single- and multi-path delay calculation
- Multi-channel phase delay calculation

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