

SPECIFICATION FOR A HIGH RATE TELEMETRY PROCESSING SYSTEM.

1.0 GENERAL

The Naval Research Laboratory has a requirement for a **High Rate Telemetry Processing System**.

GENERAL PERFORMANCE; The equipment or system will be used to ingest high rate telemetry, demodulate, frame synchronize, decode, encapsulate data into CCSDS-compatible frames, and store them as electronic data files. See Figure 1 for block diagram.

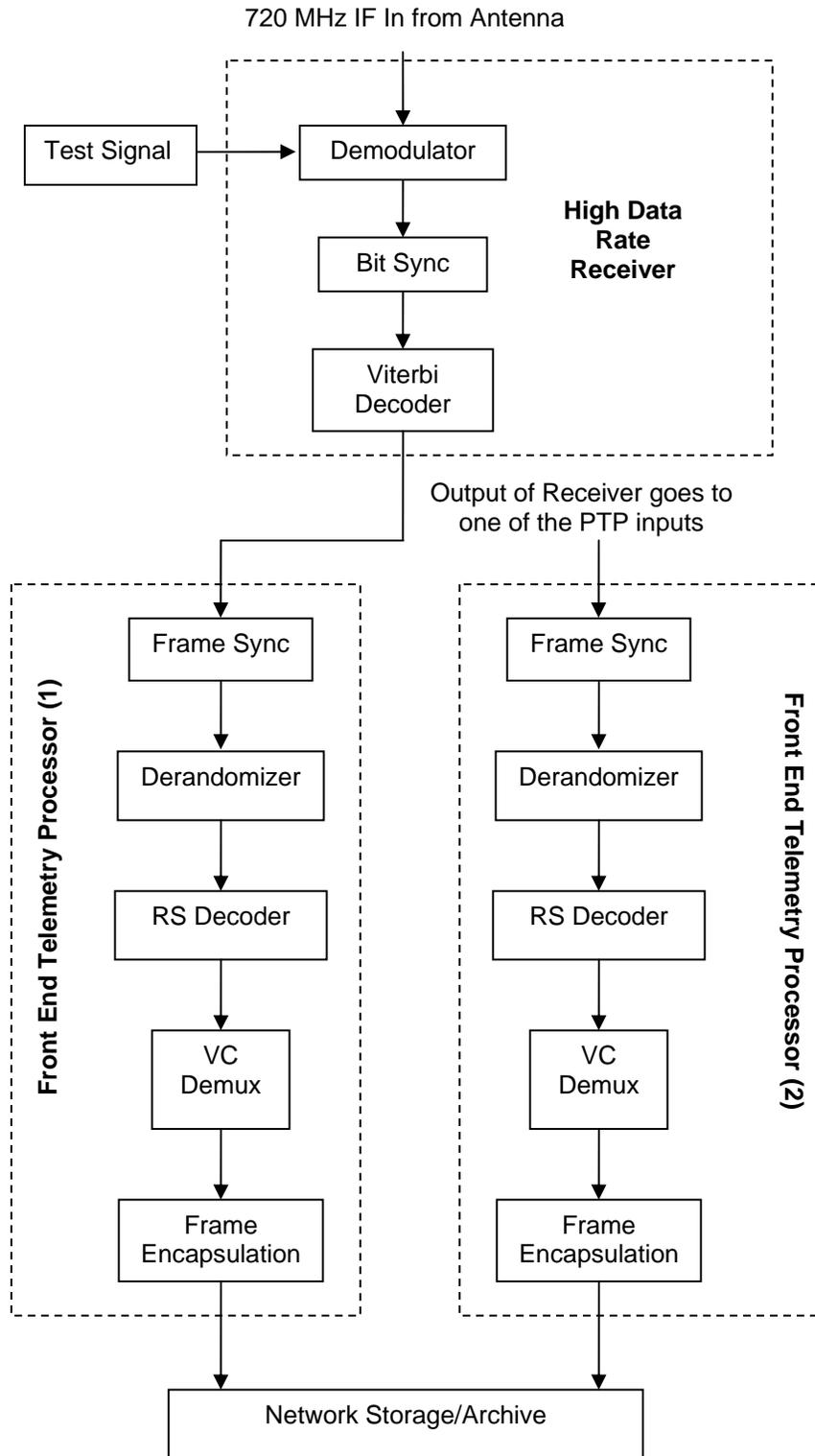


Figure 1: High Rate Telemetry Processor

GENERAL CAPABILITIES; The High Rate Telemetry Processor consists of three sub-units: 1) High Data Rate Receiver; 2) Programmable Telemetry Processors (2 redundant units); and 3) Network Storage.

All equipment to include the standard commercial operation and maintenance manuals.

2.0 DETAILED SPECIFICATIONS

2.1 High Data Rate Receiver (1 unit)

2.1.1 Receiver

Single mission (one modulation and data rate) software-defined receiver with Low Voltage Differential Signaling output. Tunable software defined radio, tunable from 75 Mbps to 400 Mbps. Modulations of BPSK, QPSK, SQPSK, 8PSK. Modulator Exciter Board with 720 MHz IF. VSWR of 1.3:1. Time tagging and data quality annotation.

2.1.2 Implementation Loss & Dynamic Range

Implementation loss of less than 1 dB. Dynamic range of greater than 50 dB.

2.1.3 Acquisition Time

Acquisition time for low Es/No of 1000 symbols at 3dB Es/No

Acquisition time for high Es/No of 100 symbols at 15 dB Es/No

2.1.4 Tracking

Signal tracking down to less than 1dB Es/No. Doppler tracking of 10 MHz.

2.1.5 Interfaces

Gigabit Ethernet for data transfer, control, and monitoring

2.1.6 Viterbi Decoding

Viterbi Decoding with rate = $\frac{1}{2}$, constraint length K=7 per CCSDS.

2.1.7 Power

120-220 VAC at 50 to 60 Hz

2.1.8 Size

4U rack-mounted chassis.

2.2 Front End Telemetry Processor (2 redundant units included)

Up to 400 Mbps data rate. Frame synchronization, derandomization, Reed-Solomon decoding, CRC decoding. Time tagging and data quality annotation. Rice decompression. Real-time disk logging and high-speed network transfer. Dual Xeon SBC with 1024 KB RAM. Provide for I and Q channel ambiguity resolution.

2.2.1 Communications

Gigabit Ethernet for data transfer, control, and monitor. Real-time network data transfer via UDP, IP multicast, or TCP client/server. Network protocol conversion.

2.2.2 Serial Input/Output

Serial ECL input/output.

2.2.3 Frame Synchronization

Frame sync pattern up to 32 bits. Frame synch mask up to 32 bits. Sync bit error threshold up to 15 bit errors. Adaptive sync with 0-7 check frames and 0-7 flywheel frames. Bit slip window from -3 to +3 bits. BPSK or QPSK automatic ambiguity resolution and correction. Frame length up to 4096 bytes/frame. Time tagging and time stamping.

2.2.4 Reed-Solomon Error Correction Decoding

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

2.2.5 CRC Error Detection Decoder

Computed frame error control field from received data using: $G(x) = x^{16} + x^7 + x^5 + x^3 + 1$. Programmable offset from 0 to 8 bytes.

2.2.6 Physical

6U rack-mounted chassis.

2.2.7 Interface

Local/remote control via graphical user interface. Remote controllable via OS/COMET. 10/100 Ethernet for monitor and control. DVD+-RW for program load and data storage.

2.2.8 Simulation & Testing

CCSDS and TDM data simulations up to 400 Mbps. CRC encoding, RS encoding, randomization, and convolutional coding. Data quality monitoring and bit/packet error rate testing. Data logging and playback.

2.2.9 Derandomizer

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 from 0 to 8 bytes.

2.2.10 Virtual Channel Processing

Perform CCSDS packet processing, using Virtual Channel Identifier or Application Process Identifier to route data to networked processing center and concurrently log to disk.

2.3 Network Storage (1 unit)

Network attached storage with GB Ethernet switch. RAID with twelve 500 GB drives. 3TB of actual usable storage.

3.0 DELIVERY REQUIREMENTS: Delivery to be no longer than 120 days ARO. To be delivered to NRL's Blossom Point Satellite Tracking Facility, 10050 Blossom Point Road, Welcome, MD, 20693.

4.0 TRAINING REQUIREMENTS: No training is requested or required.

5.0 WARRANTY REQUIREMENTS: Standard commercial warranty.

6.0 INSPECTION AND ACCEPTANCE: After delivery, NRL will conduct equipment inspection and acceptance at the Blossom Point Satellite Tracking Facility.