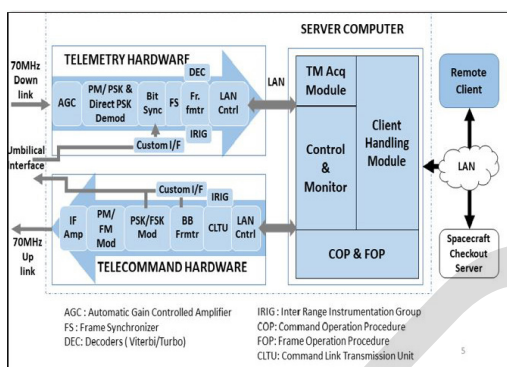## CCSDS Compliant Telemetry and Telecommand Processing (TTCP)

U R Rao Satellite Centre (URSC) of Indian Space Research Organisation (ISRO) has indigenously developed CCSDS (Consultative Committee for Space Data Systems) compliant Telemetry and Telecommand Processor (TTCP) System to meet Telecommand uplink and Telemetry downlink requirements for Integrated Spacecraft Testing (IST).

Salient Features

✦ Cost effective, low turnaround time, ease of maintenance.

✦ Replaces imported expensive system.

✦ Telemetry reception (CCSDS compliant) Telecommand transmission (CCSDS compliant), Telemetry simulator and BER analyzer, selectable data rates, VCID processing and supports multiple client access.

Technologies and Tools

Hardware and Firmware

Devices: FPGA, ADC, DAC, MMIC Amplifier

IP Cores: NCO, PLL, Viterbi & Turbo decoder

Media Access Controller, Soft-core processor

Languages: VHDL / Verilog, C

Real time operating system: μCOS-II

Tools: Quarters-II, Eclipse, MATLAB

Software

Operating System: Linux version RHEL 6

Languages: Java, JavaFX, Visual Basic

Tools: NetBeans, Scene builder, Wireshark

Major Specifications

Telemetry
- PM/PSK, Direct PSK, PCM
- 40 dB dynamic range
- Viterbi, Turbo
- Configurable Frame Sync.
- De-randomizer, CRC
- VCID processing

Telecommand
- PM/FM carrier
- PSK/FSK subcarrier
- COP-BD, BC & AD
- Carrier Sweep

Interface
- TCP/IP, 16 Clients
- IRIG time stamp
- Rich Client UI

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Technology Transfer

URSC-ISRO offers to transfer this technology of CCSDS compliant Telemetry and Telecommand Processing (TTCP) System developed by URSC to industries in India with adequate experience and facilities. Industries interested in obtaining knowhow may write giving details of their present activities, infrastructure and facilities.

Technology Transfer & Industry Coordination Division (TTID),

Programme Planning and Evaluation Group (PPEG),

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🌐 https://www.ursc.gov.in/industry/index.jsp