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TELEMETRY, TRACKING AND COMMAND MODEM

The Telemetry, Tracking and Command Integrated Modem and Baseband Modem (TTC-IMBU) is a stand-alone TTC Modem for use in operational ground stations and EGSE configurations.

The modem uses FPGA based signal processing to provide real time modulation, demodulation and radiometric processing in association with software that allows the system to be used locally via the system GUI or remotely via LAN.

TT&C Modem

The system is highly configurable allowing use as a pure modulation/demodulation system (e.g. for RF SCOE use, connected to an external TM/TC DFE) or as an integrated system including TM/TC transmission and reception. PRBS generators/BER Checkers also allow closed loop transponder/RF Subsystem testing.

Suppressed and remnant carrier modulation schemes + radiometric processing (ranging, Doppler measurement, Doppler simulation). Standard timing interfaces (10MHz external reference, PPS and IRIG-B/G). Isolated RS422/LVDS interfaces are available for connections to spacecraft equipment and/or external EGSE such as TM/TC Front Ends.

The TTC-IMBU supports a number of remote interfaces protocols, including SLE, EDEN, C&C and more. C-STS Control and Monitor Software (CMS) provide local GUI, logging, archiving, and stand -alone use or integration within an RF SCOE or with CCS.

KEY FEATURES

General
- 2* IF (70MHz) inputs & 2* IF (70MHz) Outputs
- Suppressed carrier schemes—BPSK, QPSK, OQPSK, GMSK
- Remnant carrier schemes— SPL/PM, BPSK/PM (sine/square)
- CCSDS/ESA Ranging (Standard, Tone and PN)
- Radiometric measurements & Doppler Simulation
- Typical data rates 10Mbps down to 7.8125bps
- Customised Modulation/ Demodulation modes + data processing / coding (defined on request)

Applications
- TTC Ground Stations, ESGE (e.g. RF SCOEs), RF Suitcases, RF Subsystem testing

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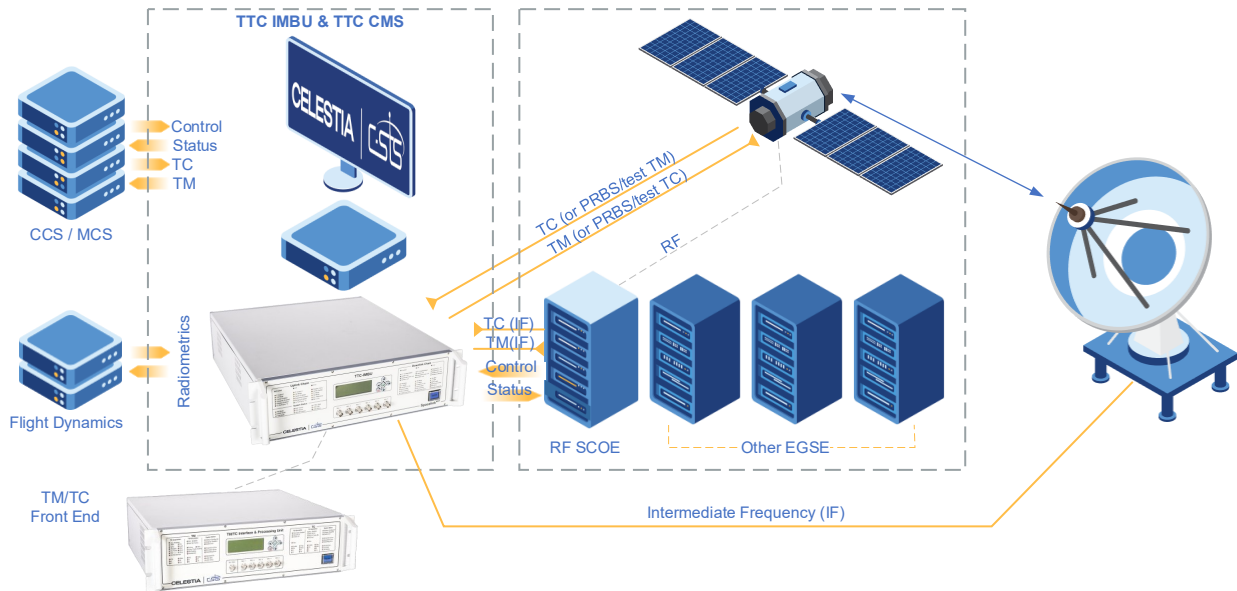
The internal processing allows the modulation to be fed by external signals (e.g. via RS422) or internal sources such as an ITU compatible PRBS generator, Telecommand generator or Telemetry Simulator with or without ranging uplink signals. Likewise the Demodulation output can be output to external equipment (e.g. via RS422) or further processed within the TTC IMBU including Telemetry data acquisition, frame synchronization, Viterbi/ Reed-Solomon error correction etc.)

Standard functions include BER transmission/reception, Doppler simulation, uplink sweeps, Radiometric processing (ranging and Doppler measurements). Custom functions can also be incorporated e.g. interfaces to third-party encryption/decryption units.

The TTC-IMBU is provided in a 3U/19" enclosure and can be used in a tabletop setup or integrated into a 19" rack. The system is typically accompanied by a 1U industrial PC.

	Characteristics	Standard/Option
Dual IF outputs / Dual IF Inputs	70MHz 50 Ohm (via SMA)	Standard
Demodulator	Single or Dual demodulator available	Dual = Option
Suppressed Carrier Schemes	BPSK, QPSK, OQPSK, GMSK[1]	Standard[2]
Remnant Carrier Schemes	SP-L/PM, BPSK/PM (sine/square)	Standard[2]
Ranging	ESA Standard, ESA Tone, PN	Standard[2]
TM/TC Baseband Processing	CLTU/Frame Processing (BCH, RS, Viterbi)	Option
PRBS Generator /BER Checker	Up to 3 independent generators/checkers	Option

Note 1: GMSK demodulation using OQPSK demodulator

Note 2: Modulation, Demodulation modes configured by C-STS on project basis.

Scan the QR code to access the C-STS website for all data sheets and more information

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Datasheet version 3.0