

TelSim™

Real-time Dynamic Telemetry Simulation Appliance

Turnkey all-in-one telemetry simulator and modeling environment.

Major Features:

- Fully integrated simulation environment that can model the continuous or discrete time behavior of any external system
- Dynamic data is commutated into a telemetry transmission stream in real-time
- Mission scenarios are easy to define and organize
- Simple user-friendly operation makes TelSim ideal for supporting all phases of testing and training

Typical Applications:

- Verify ground systems configurations prior to mission operations
- Mission dress rehearsals
- Train and qualify operators
- Validate processing algorithms
- Test decision support and visualization software
- Verify range connectivity of decision support and ground systems.

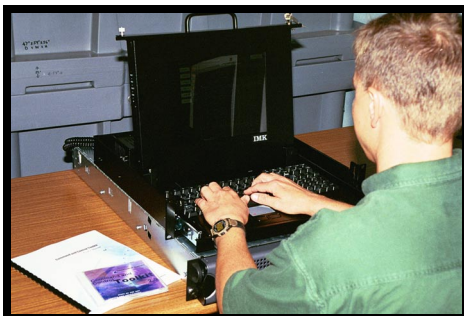
Configurations:

- PC/Linux Workstation
- Rack Mount Server
- Ruggedized Portable Computer
- Custom



Product Configuration Options:

- IRIG 106 Telemetry Acquisition & Processing
- IRIG Time Ingest / Export
- Mission Time Ingest/Export
- Command Uplink
- Remote Control
- Headless or Graphic User Interface
- Network Based Telemetry Simulation
- Radar and TSPI Simulation
- Developer's Environment



The TelSim All-in-one Telemetry simulation environment is designed to solve your mission simulation, telemetry ground system testing, and training needs in a turnkey package. It can be configured for anything from simple pattern generation to complex interactive modeling or real-time automated control sequences

Traditionally, telemetry "simulation" is performed using playback of previously recorded data or rudimentary pattern generation. Using this static telemetry strategy for testing is limited, and does not provide the range of data dynamics needed for thorough ground systems testing without expending significant effort to generate test data sets. The limitations of static telemetry simulation are even greater when applied to mission dress rehearsals and operator training and certification.

TelSim provides dynamic real-time telemetry simulation using automated reactive control or via simple user interaction.

Operational organizations need a capability to enhance personnel readiness without impacting availability of operational assets, one that can accommodate a full range of realistic nominal and non-nominal mission scenarios. Incorporation of TelSim's telemetry simulation capability will:

- Reduce time to achieve and maintain operator competency
- Improve operator performance
- Provide a means of measuring operator competence
- Provide an engineering analysis tool for refinement of ground systems technologies, processes, and methods of operation.

The TelSim provides real-time generation of IRIG 106 compliant telemetry, and is capable of fully independent operation that can be plugged-in to any telemetry ground station as a headless server, or with a fully interactive multi-user graphical user interface. The integrated simulation environment is user configurable to facilitate:

- Missing element models for test and integration
- Experimentation with ground operations approaches
- Interactive operations crew training (nominal & non-nominal dynamics)
- End-to-end mission simulations and dress rehearsals

The TelSim modeling engine allows a systems engineer to quickly create interactive models using a point and click GUI or high level scripting language. A programming library is also available that supports the integration of 3rd party modeling tools such as MATLAB, or custom developed software models. The environment allows simulations to be scalable in their fidelity so they can operate stand alone, or integrated with other models to create large-scale mission simulations. TelSim also supports telemetry acquisition, processing, and recording for mission playback and replay of post decom data with simulation models.

Specifications

Architecture

- Real-time IRIG 106 telemetry simulation appliance capable of fully independent operation that can be plugged-in to any telemetry ground station
- Supports simultaneous telemetry acquisition, processing, and recording for mission playback and replay of post decom data with simulation models
- Modular software architecture decouples telemetry-processing details from simulation environment.
- Built on top of generic real-time command and control middle ware that includes services for data processing, visualization, archive, data reduction and analysis, and network centric operation
- Configuration and telemetry description managed using validating XML. Can exchange format data with any database scheme.

Simulation

- Real-time and user configurable variable time engine
- Simulation modules: measurements (sensors/data waveforms), commands, events
- Built-in simulation **waveforms modules**
 - Constant
 - Jitter
 - Sine
 - Square
 - Saw Tooth
 - Complex expression
 - Random
 - Ramp
 - Data file
 - User defined
- Waveform module control: sample rate, amplitude, offset, period, bias, delay, etc. are user configurable
- Simulation module operations: create, update, query, delete
- Command module: evaluates a procedure, script, or function upon command receipt
- Event module: initiated by asynch trigger or condition: time, commands, or other groups behaviors
- External time sync or internal simulated time generation
- Open interface for integration of MATLAB and other third party analysis tools.
- User defined modules: based on Tcl, C, or C++ returns a simulated value based on user defined algorithm
- Delimited modules: allows non-linear data or previously recorded data to be played from a file (**Ideal for TSPI simulation**)
- Raw Playback of recorded data
- Simulation Development Environment
 - Point and click Graphical User Interface
 - TCL Scripting

- C/C++
- Optional MATLAB integration

Telemetry Simulation I/O

- Outputs: Data, 0o & 90 o clocks, and minor frame strobe
- Output Levels: Single-ended TTL and RS-422
- Supports data stream at rates up to 20 Mbps (NRZ)
- PCM Codes: NRZ-L/M/S, BIΦ-L/M/S, DM-M/S, M2, RNRZ-L (211-1 & 215-1)
- Word Length: Variable (3 to 16 bits) word-by-word basis
- Minor Frame Length: 2 to 4,095 words per minor frame
- Major Frame Length: Up to 256 minor frames per major frame
- Bit order: MSB/LSB-first on a word-by-word basis
- Frame sync pattern: Up to 64 bits
- Subframe synch: FCC (FAC), SFID or UR

Telemetry Decommuation I/O

- Inputs: NRZ-L data & 0o clock
- Input Levels: Single-ended TTL and RS-422
- Supports data stream at rates up to 20 Mbps
- Word Length: Variable (3 to 16 bits) word-by-word basis
- Minor Frame Length: 2 to 8,191 words per minor frame
- Major Frame Length: Up to 256 minor frames per major frame
- Bit order: MSB/LSB-first on a word-by-word basis
- Frame sync pattern: Up to 64 bits
- Frame sync location: leading or trailing the frame
- Sync error tolerance: 0 to 15 bits (selectable)
- Sync slip window: 1 or 3 bits wide (selectable)
- Data polarity: Normal, inverted, or automatic (detection)
- Subframe synch: FCC (FAC), SFID or URC

Time Code I/O

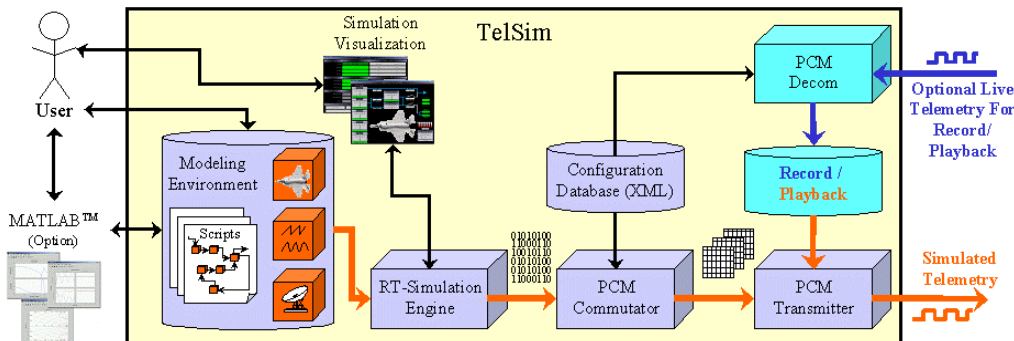
- IRIG (A or B) time code reader
- Network Time Protocol, Ver 4
- Mission Elapsed Time / Countdown Time – Various Formats

Mission Configuration

- XML DTD
- Common Decom and Simulation database

Platforms

- Unix SGI, VME
- PC Linux, PCI



COMMAND AND CONTROL TECHNOLOGIES CORPORATION

Spaceport Business Park
1425 Chaffee Drive, Suite 1
Titusville, Florida 32780
TEL 321.264.1193
FAX 321.383.5096
WEB www.cctcorp.com