iSAFT Simulator / Recorder
## SPACEWIRE / MIL-STD-1553 / CAN

iSAFT is an advanced, integrated powerful HW/SW environment for the simulation, validation & monitoring of satellite/spacecraft on-board data networks supporting simultaneously a wide range of protocols (RMAP, CPTP, ECSS 1553, ECSS CAN, CANopen, TM/TC management etc.) & network interfaces (SpaceWire, MIL-STD-1553, CAN).

It is based on over 20 years of experience in the area of protocol validation in the telecommunications and aeronautical sectors, and it has been fully re-engineered in cooperation with ESA & Space Primes, to comply with EGSE SCOE requirements.

iSAFT is highly modular, thus easily expandable to support new network interfaces & protocols and it is based on the iSAFT powerful graphical tool chain (Protocol Analyser / Recorder, TestRunner, Device Simulator, Traffic Generator, etc.).

Areas of Use

- Protocol Analysis / Recording
- Device Simulation
- Rapid Prototyping / Evaluation
- Functional / Conformance Testing
- Traffic Generation

Simulation	Recording	Testing	Prototyping	Traffic Generation

SpaceWire	ECSS MIL-STD-1553	ECSS CAN
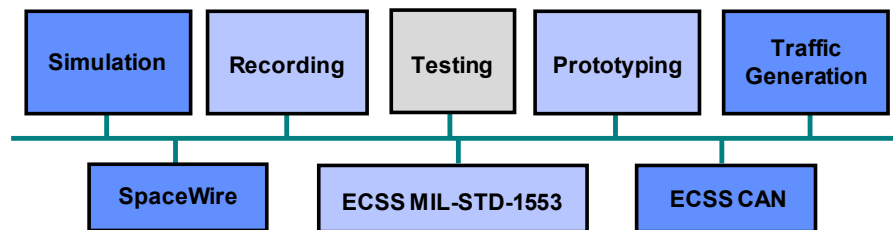
Competitive Advantages

- Simultaneous support of different operations including Traffic Recording, Interfaces Simulation, Instrument Emulation, Execution of Test Scenarios, Stress Testing/Traffic Generation, Interworking Testing, etc.
- Simultaneous support of various networks (and protocols) including SpaceWire, ECSS MIL-STD-1553, ECSS CAN (and TTEthernet is short term).
- All-in-one solution, replaces the need of multiple boxes in your testbed.
- Common, modern Graphical User Interface.
- Offered in multiple HW platforms including Site Rackmount System (2U / 3U) or as Portable System.
- IRIG support for time synchronization with other components in a testbed.
- Easily expandable/dimensioned with additional physical interfaces and operations.
- Web Services & TCP/IP based APIs to 3rd party applications (C/C++, C#, Python available. LabVIEW, Java coming soon.).
- EDEN / C&C CCSDS protocol support for communication with the Central Checkout System (CCS).
- Fully certified for connection to flight equipment (FMEA, hazard/safety analysis, CE).
- Installed and validated in mission EGSE testbeds around Europe (SOLAR ORBITER, GAIA, MTG etc.).

Hardware Platforms

Server Based Site Rackmount System (2U)   Portable System   Site Rackmount System (3U)

Case Study: iSAFT SpaceWire Simulator

The iSAFT SpaceWire Simulator can be used for early validation of SpaceWire devices / instruments in a testbed. It provides a GUI for complete local operation (iSAFT graphical toolchain). Remote control & operation is also possible through CCS and Customer Software using the iSAFT Client API.
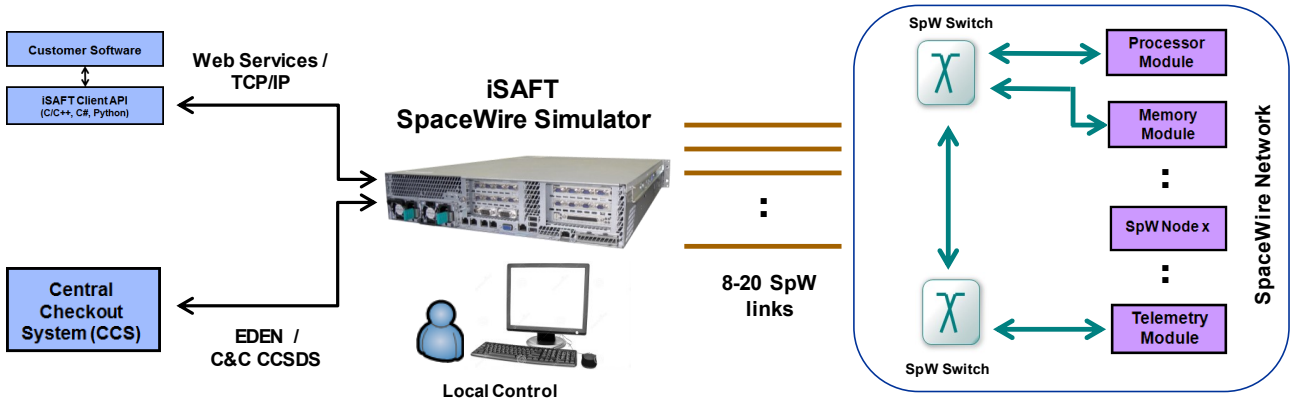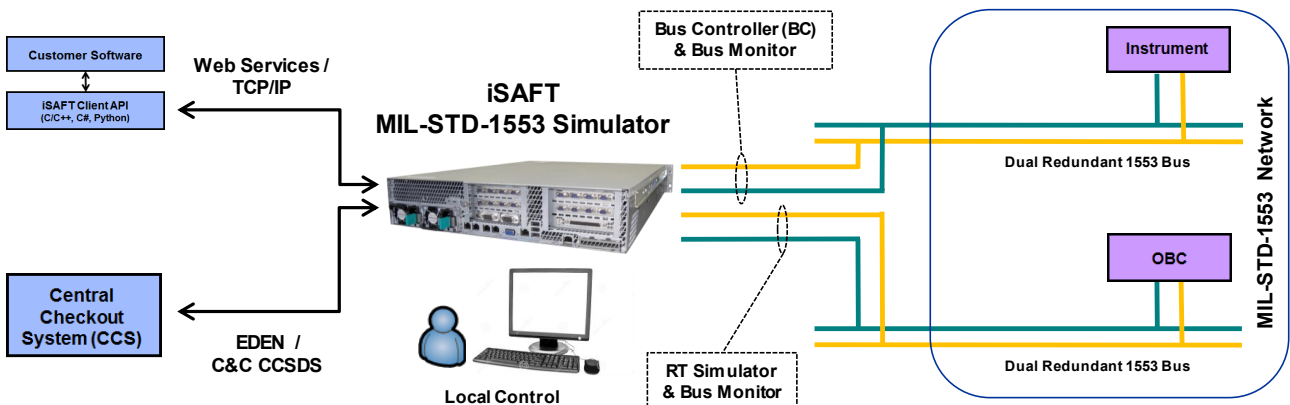

Main Features

- SpW simulation support for eight (8) SpW ports (expandable to 20 SpW ports) in one system.
- Link speed from 1-400Mbps, independently programmable per port.
- RMAP simulation support (initiator / target).
- CPTP simulation support.
- Built-in recording function for received / transmitted packets.
- GUI for complete local operation.

- Advanced traffic generation and asynchronous transmission capabilities.
- Transmission triggers and statistics support.
- IRIG support for synchronization.
- Customer Software integration through client API (C/ C++, C#, Python available. LabVIEW, Java coming soon.).
- Support of interfaces with CCS (EDEN / C&C CCSDS) for remote control and operation.

Case study: iSAFT MIL-STD-1553 Simulator

The iSAFT MIL-STD-1553 Simulator can be used for early validation of MIL-STD-1553 devices / instruments in a testbed. It provides a GUI for complete local operation (iSAFT graphical toolchain). Remote control & operation is also possible through CCS and Customer Software using the iSAFT Client API.
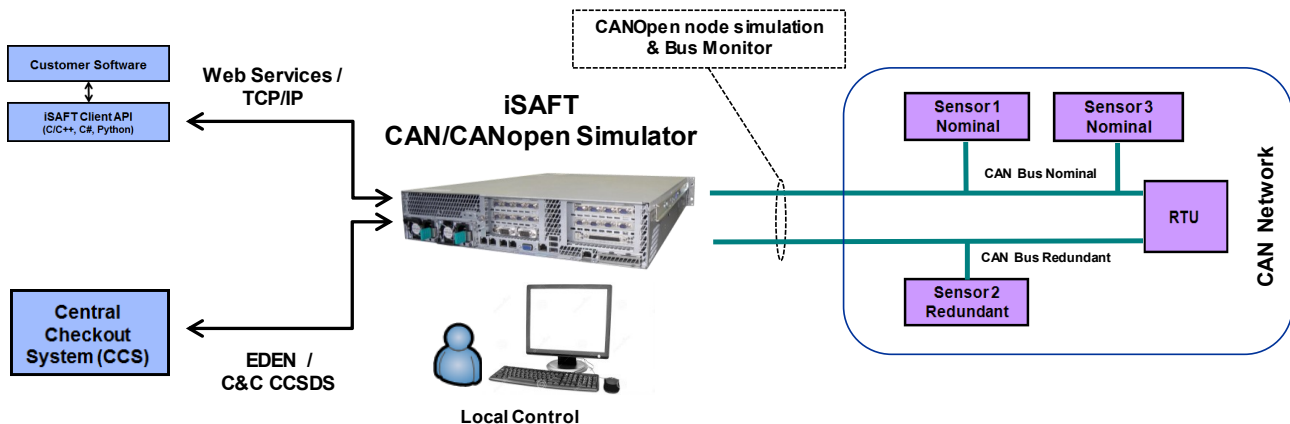

Main Features

- 1553 simulation support for 1-4 independent, dual redundant channels in one system.
- Support for BC / BM and/or multiple RTs / BM.
- Capturing and recording of large volumes of traffic from multiple MIL-STD-1553 channels.
- Support of ECSS-E-ST-50-13C services for both simulation and recording.
- GUI for complete local operation.

- Full error injection and detection capabilities (at MIL-STD-1553B or ECSS-E-ST-50-13C services level).
- Transmission triggers and statistics support.
- IRIG support for synchronization.
- Customer Software integration through client API (C/ C++, C#, Python available. LabVIEW, Java coming soon.).
- Support of interfaces with CCS (EDEN / C&C CCSDS) for remote control and operation.

iSAFT

The iSAFT CAN/CANopen Simulator can be used for early validation of CAN/CANopen devices / instruments in a testbed. It provides a GUI for complete local operation (iSAFT graphical toolchain). Remote control & operation is also possible through CCS and Customer Software using the iSAFT Client API.

Main Features

- CAN/CANopen simulation support for 1-4 channels, in CAN bus standard or dual redundant mode (based on ECSS-E-50-15C) in one system.
- Capturing and recording of large volumes of traffic from multiple CAN channels.
- GUI for complete local operation.
- Full error injection (at physical & protocol level) and error detection capabilities.

Recording Features

- Recording and decoding of standard CAN / CANopen messages over CAN Buses.
- Continuous real-time capture of 1 - 4 channels.
- Down to 8 ns Timestamp Accuracy.
- ECSS-E-50-15C TIME messages monitoring and decoding.
- DCF files import enabling decoding and automatic interpretation of CANopen messages and generation of detailed CANopen statistics.

Filters & Triggers

- CAN frame type.
- Specific errors.
- Specific CAN Ids / COB-Ids.

Example Configuration

- Heavy duty 2U HW platform with high processing power.
- Dual channel CAN interface for simulation / recording.
- iSAFT Run-Time Environment (RTE).
- iSAFT Console (control & operation GUI).

- Transmission triggers and statistics support (CAN bus statistics, CANopen statistics).
- IRIG support for synchronization.
- Customer Software integration through client API (C/C++, C#, Python available. LabVIEW, Java coming soon.).
- Support of interfaces with CCS (EDEN / C&C CCSDS) for remote control and operation.

Statistics

- CAN bus statistics
  - ✓ Bus load.
  - ✓ Total number of received messages.
  - ✓ Remote frames Error frames statistics.
- CANopen statistics
  - ✓ SDO response times.
  - ✓ TPDO cycle / response times.
  - ✓ Heartbeat event times.
  - ✓ SYNC period.
  - ✓ Node Guarding response times.
  - ✓ Bootup time statistics).

- iSAFT CAN/CANopen simulation engine.
- iSAFT CAN/CANopen protocol analysis & recording engine.
- iSAFT Client API for integration with Customer Software (optional).
- iSAFT Remote Control Server for communication with the CCS (optional).

iSAFT

Case Study: iSAFT SpaceWire Simulator & Recorder

iSAFT can be simultaneously used as Simulator and Recorder for SpaceWire data links. It provides a GUI for complete local operation (iSAFT graphical toolchain). Remote control & operation is also possible through CCS and Customer Software using the iSAFT Client API.
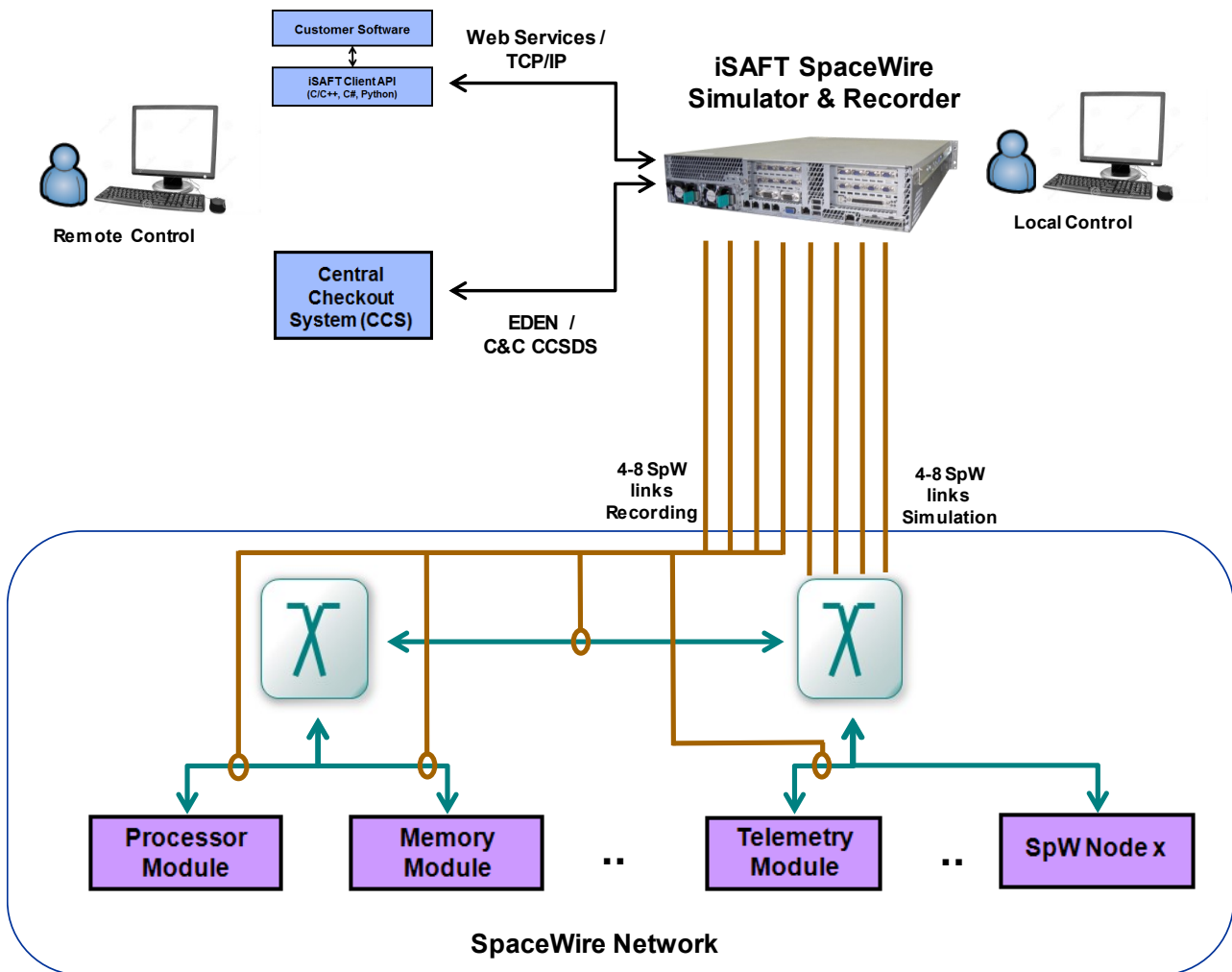
Main Features

- SpW simulation support for 4-8 SpW links.
- Unobtrusive link monitoring up to 8 SpW links.
- SpW link speed from 1-400Mbps for simulation.
- Continuous real-time capture and recording from 2 to 250 Mbps.
- Support of SpW, RMAP, CPTP protocols for both simulation and recording.
- GUI for complete local operation.
- IRIG interface down to 8 ns accuracy resolution for synchronization & common time-stamping.

- Asynchronous SpaceWire transmission, bulk/periodic traffic generation, per packet programmable parity error injection.
- Event-trace trigger & selective tracing (filtering support).
- Real time statistics per port.
- Customer Software integration through client API (C/C++, C#, Python available. LabVIEW, Java coming soon.).
- Support of interfaces with CCS (EDEN / C&C CCSDS) for remote control and operation.

Example Configuration

- Heavy duty 2U HW platform with high processing power.
- 8-port SpaceWire interface for simulation.
- 8-port SpaceWire interface for recording.
- iSAFT Run-Time Environment (RTE).
- iSAFT Console (control & operation GUI).

- iSAFT SpW simulation engine.
- iSAFT SpW protocol analysis & recording engine.
- iSAFT Client API for integration with Customer Software (optional).
- iSAFT Remote Control Server for communication with the CCS (optional).