# iSAFT SpaceWire EGSE

The **iSAFT SpaceWire EGSE** is a powerful extension of the **iSAFT SpaceWire Front-End / Link Analyzer** product with a rich set of features required for its use as a SpaceWire Data Front-End embedded in integrated EGSEs for satellite AIT/AIV operations.

The **iSAFT SpaceWire EGSE** is a plug-n-play EGSE component ready to operate with CCS and other SCOE, removing the need to develop custom HW or SW interfaces. The iSAFT SpaceWire EGSE can also be extended with additional interfaces, such as 1553, WizardLink, SpaceFibre, CAN/CANOpen, etc. It is a proven solution in several space missions over the last 10 years and can be used in several EGSEs such as

- Payload/Instrument EGSEs
- Satellite Interface Simulators (SIS)
- Platform EGSEs (CDMS EGSE, MMU EGSE)
- Simulator Front-Ends

It supports all the features of the iSAFT SpaceWire Front-End / Link Analyzer product, with the additional selectable features as presented in the next sections.

## Main Features

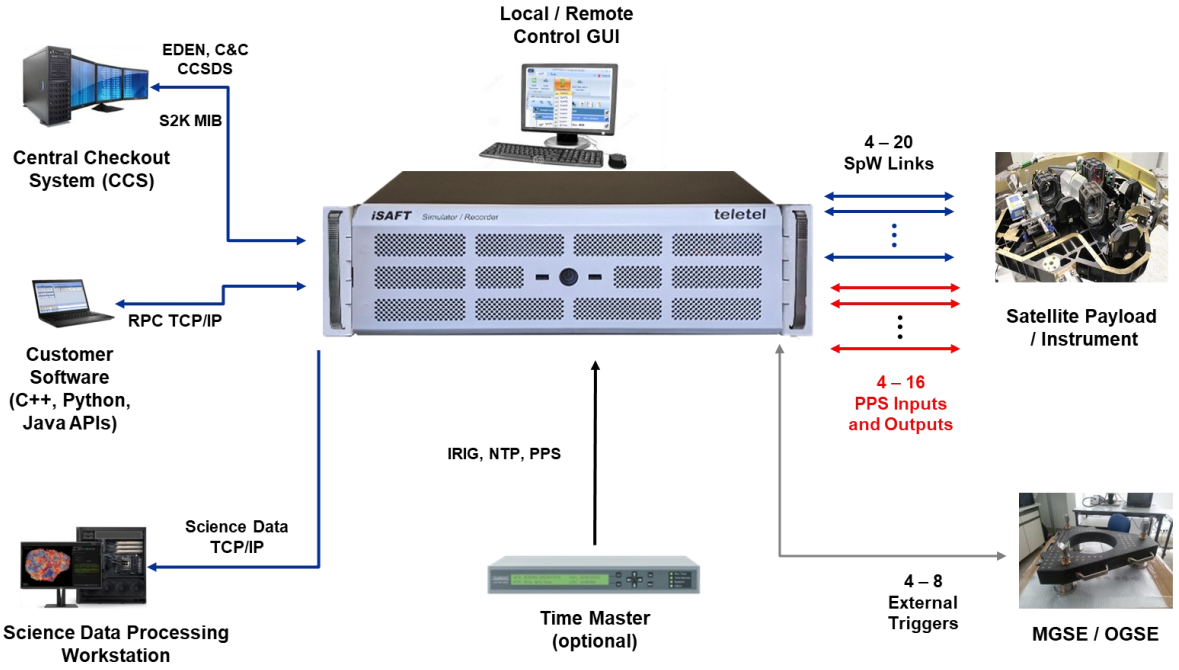
- EDEN / C&C CCSDS protocol support for communication with a Central Checkout System (CCS)
- Provision of SCOS2K compatible MIB (in text format) for direct integration to CCS
- Provision of several PPS input / output synchronization interfaces (LVDS, RS-422, TTL) (e.g. PPS acquisition and synchronization, PPS generation synchronized with external source, PPS electrical level conversion e.g. TTL input to LVDS outputs, etc.)
- Provision of several input / output multipurpose interfaces (LVDS, RS-422, TTL) (e.g. generation of bi-level discrete commands/ acquisition of status, general purpose trigger in/out signals for start of capture stimulation, generation of events, synchronization with external equipment, etc.)
- Full command and control using SCOE TCs and TMs
- Support of routing and forwarding of S/C TCs from CCS to user defined SpaceWire ports based on APIDs, addition of user defined headers (e.g. logical address, PTP, etc.) per APID
- Support reception and distribution of user selected S/C TMs from selected SpaceWire ports directly to CCS, removal of packet headers (e.g. logical address, PTP) to extract CCSDS packet before distribution to CCS.
- Simple and multi-gigabit high performance protocol over TCP for reception of user selected Science Data from external application(s) for real time science data processing; where the iSAFT EGSE operates as server and forwards packets to connected clients in real-time
- Expandable with additional interfaces (MIL-STD-1553, CAN/CANOpen, SpaceFibre, WizardLink)
- Fully certified for connection to space flight equipment (FMEA)
- Proven solution in multiple EGSE test benches across Europe, Japan, South Korea

*The iSAFT SpaceWire EGSE is fully modular and can be configured according to mission needs (number of SpaceWire interfaces, number of PPS/triggers, selected protocols, etc.) In case of bulky numbers of interfaces stackable devices are also supported. The system is also fully expandable in terms of features, no of interfaces, etc. by adding the required hardware and software modules.*

*The iSAFT SpaceWire EGSE builds on the heritage of the iSAFT product line (with more than 200 installations worldwide), it is developed according to ECSS standards for AIT/AIV operations and is fully compliant to general EGSE requirements from various European Space Missions.*

# Specifications

## Use Case Example - Operating as a Satellite Interface Simulator (Platform Simulator)




The iSAFT SpaceWire EGSE has contributed to the success of more than 15 Space missions including EUCLID, PLATO, IASI-NG, MICROCARB, Galileo 2G, Copernicus LSTM / CIMR, ARIEL, etc.

It has been extensively used to simulate the OBC and/or missing peripheral units. References include SIIS OBC simulation (ARIEL SIIS, LSTM SIIS, CARIOQA ICPU simulation, etc.), Units Simulation (PLATO CDMS MMU, DHS and FGS units simulation), etc.

## Built-in OBC Simulation

- Transmission of S/C TCs from CCS to SpaceWire end devices
- Reception of selected S/C TMs from SpaceWire end devices and forwarding to CCS
- Time synchronization of connected SpaceWire end devices, via periodic transmission of Time Codes (and/or PPS) and Set or Update Time TCs

## Units Simulation

- Fully customizable and configurable by end users
- Provided Framework in Python or other programming languages that utilizes the iSAFT Remote Access APIs
- Handling of received TCs and response with TMs (e.g. TM(1,X))
- Periodic transmission of TMs (e.g. HK and / or science data)
- Asynchronous on demand transmission of TMs on CCS command
- Default and on demand runtime configuration of the unit using configuration files
- CCS commands to start, stop, pause and continue unit or model simulation
- CCS commands to retrieve and change simulation configuration and perform asynchronous operations (e.g. transmission of selected TMs, change mode and HK parameters, etc.)
- OBT Time synchronization via reception of Time Codes (and/or PPS) and Set or Update Time TCs
- Several simulation models available such as MMU, DHS, FGS, etc.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