SOPHOS EGSE

SOPHOS designs and implements enabling technology for high-end data products produced on-board spacecraft via the implementation of more power efficient high performance space processing chains for various Low-Earth Orbit (LEO) missions, with a focus on Synthetic Aperture Radar (SAR), which is one of the most data intensive space applications currently used. SOPHOS combines state-of-the-art industrial computing technologies (COTS) including high-end FPGAs and GPU equipped SoCs, along with advanced and scalable processing capabilities.

In the context of the SOPHOS project, TELETEL implements a **new generation satellite test system / EGSE** to address the **New Space market for LEO Earth Observation** satellite constellations.

The EGSE supports high-speed on-board data interfaces (10Gbps Ethernet, SpaceWire) and will be used to validate the SOPHOS high performance space processing chain for data intensive Low-Earth Orbit (LEO) missions.
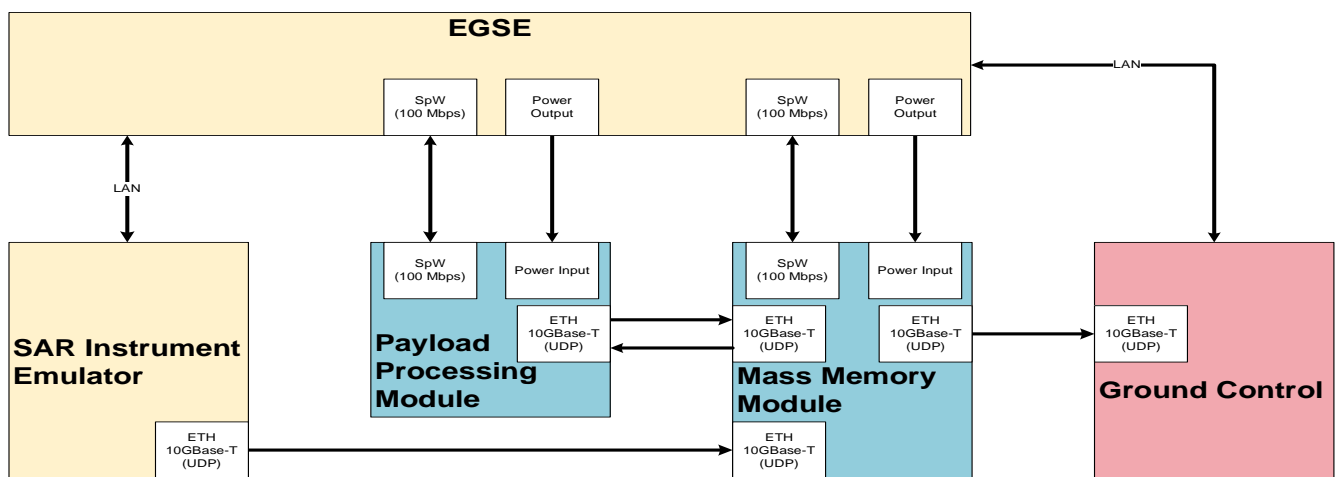
The SOPHOS EGSE validates the new Payload Processing Module by Unibap and the new Mass Memory Module by DSI by using TELETEL's Data Front-Ends for Spacewire and high-speed Ethernet interfaces complemented by simulation of the Ground Control and a high performance SAR Instrument.

EGSE for Mass Memory and Payload Processing units

Specifically the SOPHOS EGSE:

- Commands and controls the Mass Memory Module and the Payload Processing Module (SpaceWire TM/TC)
- Simulates a SAR instrument by transmitting synthetic science data to the Mass Memory Module (Ethernet 10Gbps optic links)
- Simulates a downlink receiver by receiving and archiving downlink packets from the Mass Memory Module (Ethernet 10Gbps optic links)
- Controls the different elements of the test bench to support test and activities (Test Controller)
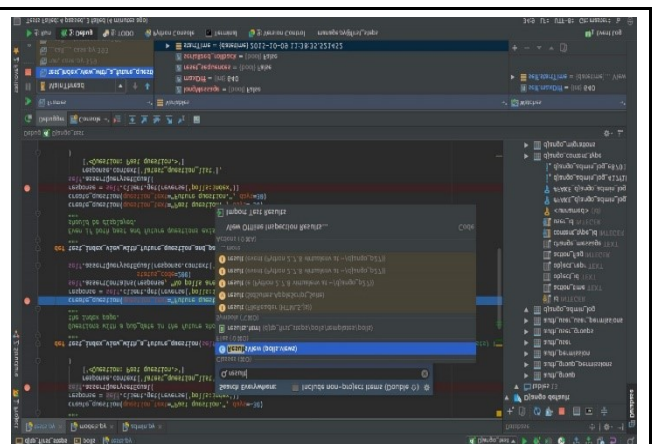
teletel
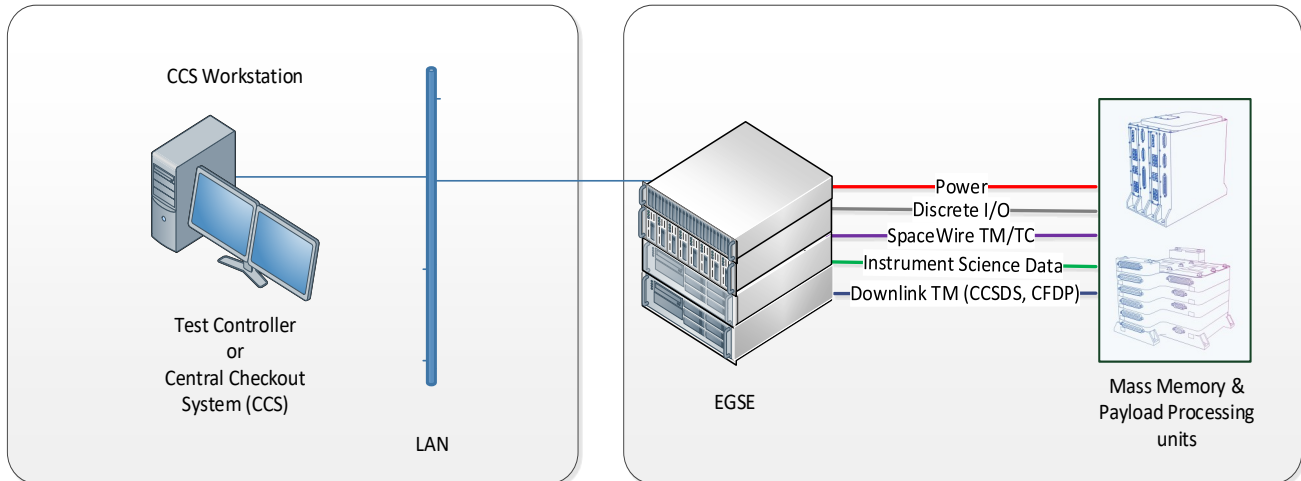
SOPHOS Test Setup

The EGSE Front-End is composed of the following units and interfaces:

- **SpaceWire / MIL-STD-1553 / CAN/CANopen** Front Ends for Tx of Telecommands and Rx of Telemetry (CCSDS TC/TM) to command and control the units, support monitoring and analysis of traffic, time synchronization, error injection, etc.

- **Ethernet / WizardLink / SpaceFibre** Front Ends for simulation of instruments, (science data Tx to the units) and reception and processing of downlink Telemetry packets (CCSDS / CFDP) from the units

- **Power Front End**, provide power to the units with over-voltage, over-current protection

- **Optional Discrete I/O Front End**, for generation and acquisition of spacecraft electrical I/O interfaces (HPC commands, BSM, TSM, PPS, LVDS, timing and synchronization signals etc.)

- Supports remote command and control from **Central Checkout System (CCS)** or Test Controller (EDEN / C&C CCSDS protocols & S2K MIB support) and **Remote Access APIs** in C++, Python, Java (Windows, Linux) for integration with user applications and test environment
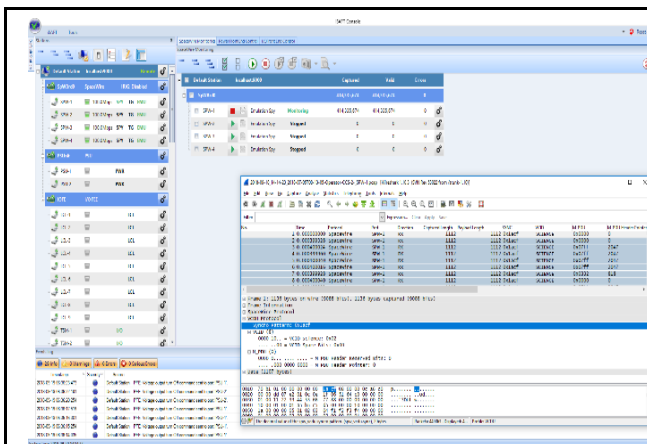
EGSE Console   *Test Controller*

New Generation Satellite Test System for Earth Observation satellites