WizardLink Front-End

The WizardLink Front-End (WFE) provides multi-channel data reception and generation capabilities with data rates as high as 2.16Gbps per channel (2.7Gbps link rate). The WFE provides up to four bi-directional WizardLink channels (reception and generation). The WLFE is part of the suite of latest generation EGSE products from Celestia Satellite Test & Simulation (C-STS).

The WFE operates as the electrical interface towards flight equipment and can be used on all AIT levels (module, unit, instrument, panel and satellite). The WFE provides all electrical (TLK2711A chipset), data extraction, protocol handling and status annotation functions . The recovered data (or data to be generated) is offloaded from the WFE using a 10Gbit TCP/IP streaming interface (SFP+, optical or copper) to a commercial server platform for data storage (or replay) to local disk (SSD or HDD).

The standard 2U/19" enclosure provides a small footprint and can be used in a table top setup (with feet) or integrated into a 19" rack (feet removed).

The WFE supports up to four (4) WizardLink channels in parallel (TLK2711A). The channels can operate in either bi– or uni-directional mode, depending on the application. Each WizardLink channel supports optional LVDS flow-control signals (in/out) to provide handshaking functions if/where required. The WizardLink chipsets are clocked from a local low-jitter oscillator (see specification table) that is user programmable between 80 and 135MHz in 1Hz steps.

The WFE can be programmed with custom protocols to support the needs of the program/project, such as CADU/SP extraction using low-weight K-code driven protocols. In addition the WFE can be upgraded with the next generation SpaceFibre onboard network technology standard (compliant to the upcoming ECSS standard ECSS-E-ST-50-11C), using the WizardLink chipsets as SERDES.

Using the available time synchronisation inputs (PPS and IRIG), the WFE maintains an accurate hardware time (CUC) that is used to timestamp all recorded data, or to release data for transmission.

The back-end interface is implemented using a low-latency 10G TCP/IP and MAC implementation directly within the hardware, capable of providing >9Gbps sustained data streaming . This provides back-end independence, allowing commercial servers with standard 10G ethernet cards to be used. The WFE can be delivered with back-end software (Windows Server 2012/2016) for data storage and replay.

All VML and LVDS in– and outputs toward the S/C are fully isolated (with respect to the chassis/safety ground) and provide satellite level fault voltage emissions and tolerances. The unit is provided with an FMEA report.

The heart of the WizardLink Front-End is based on a C-STS designed and developed hardware carrier module. This module offers the combination of high I/O count interfacing, galvanic isolation and FPGA based data routing & processing. Next to the FPGA technology, the module includes an multi-core ARM9 embedded processor running Linux and multiple 1G and 10G ethernet ports supporting TCP/IP.

The Parallel LVDS Front-End is part of the suite of latest generation EGSE products from C-STS that provides a wide range of onboard interface front-ends, such as Discretes, Power (LCL), RS-422 (SDI), CAN, MIL-STD-1553, SpaceWire, Parallel LVDS and many more.

Technical Specifications

General

- Modular Implementation
- Gigabit LAN for Control and Monitoring via TCP/IP (using RJ45)
- 10Gbit LAN for Data Streaming via TCP/IP (using SFP+)
- External Time/Reference inputs, such as 10MHz, PPS and IRIG
- PPS output for synchronisation of external equipment
- FMEA Report Available

WizardLink Channels

- Up to 4 WizardLink Channels in Parallel
- WizardLink Channels implemented using TI TLK2711A Chipset
- TLK Chipset Clocking:
  - Programmable between 80 and 135MHz in 1Hz steps
  - Stability ±20 ppm (typ.)
  - Total Jitter 30ps PP (typ.)
- SMA-F Connectors for all WizardLink VML In/Outputs
- All VML I/O's are Electrically Isolated from Chassis/Safety Ground
- All VML I/O provide fail-safe in– and outputs protecting transceivers (local and remote) in their power-off state
- Data-Only or RAW (K– and D-Codes) recording modes supported
- Hardware timestamping of received data blocks
- LVDS Flow Control (TIA/EIA-644-A Compliant) for all WizardLink channels supported on D9 female connectors

Project Specific Customisations (upon request)

- Custom protocols and data processing can be supported in FW
- Support for SpaceFibre protocol (compliant to ECSS-E-ST-50-11C) using WizardLink as SERDES Front-End

Environmental and Physical Specifications

Dimensions H x W x D	88.9 x 435 x 400 mm
Weight	5.3kg
Input Power Range	100-240VAC 50-60Hz
Operating Temperature Range	+10°C to +40°C
Operating Humidity	30% to 85% (non-condensing)
Storage Temperature	-20°C to +60°C
Storage Humidity	Up to 85 % (non-condensing)

Experience

Building on over 30 years of experience in spacecraft EGSE systems; C-STS provides innovative high-tech solutions for ground-based systems in the domains of spacecraft simulation and testing as well as modem (spacecraft communication) and data processing systems. Supporting all phases of the spacecrafts lifetime, from integration to flight and all phases in between.

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