Teradyne Fibre Channel HSSub Apps

Multiple Fibre Channel Solutions Utilize the Power of HSSub Reconfigurability

Teradyne Fibre Channel HSSub Apps configure High-Speed Subsystem (HSSub) instruments, providing test solutions for Defense & Aerospace ATE that address the full range of Fibre Channel bus protocol types. Combining the proven capabilities of Teradyne and Aviation Interface Technologies, these products serve current & future test requirements, while minimizing TPS development and maintenance costs.
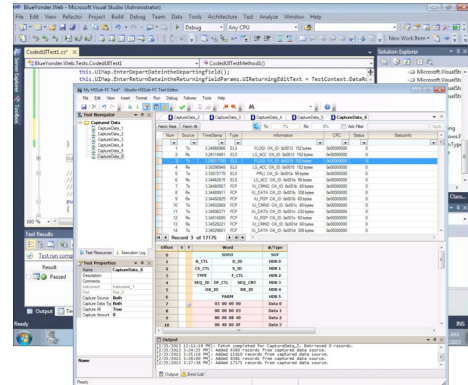

Background

Defense & Aerospace assemblies (WRA/LRU/LRM/ SRA/SRU) commonly use Fibre Channel as a primary high-speed serial data bus to address demanding bandwidth, low latency, determinism, and reliability requirements. These new platforms use Fibre Channel to interconnect a distributed array of sensors, transducers, displays, and processing units. Upgrades such as the Distributed Targeting System and Head-Up Displays (HUD) bring Fibre Channel technology to mature platforms. Current factory, field, and depot test systems need additional capabilities to properly address the requirements of Fibre Channel, as well as other new and legacy buses.

HSSub Architecture

The combination of the HSSub Apps and instruments directly addresses these needs through flexible, reconfigurable, high performance run-defined instruments. The HSSub App downloads the instrument Configuration Data and provides an App Interface for conventional C/C++/C# program access in the same manner as a driver for a conventional single-purpose instrument. A variety of HSSub Apps allows a single instrument to address multiple Fibre Channel requirements, bus interfaces and high-level protocols.

The Fibre Channel HSSub Apps take full advantage of the HSSub Three Tier Architecture and they all share common test-specific FPGA code. They support all interconnect topologies; point-to-point, arbitrated loop, and switched fabric. While most platforms use 1 Gb/s today, speeds up to 4 Gb/s are supported in anticipation of future requirements, avoiding the risk of hardware obsolescence. Test related features include fault injection, frame counts, and error counting.

Features

- Configure HSSub Instruments to test current and emerging Defense & Aerospace Fibre Channel requirements

    -Serial Core Instrument

    -12G Serial Instrument

- Combine proven capabilities of Teradyne and Aviation Interface Technologies (a division of Teradyne)

- Provide high-level and low-level TPS programming capability for the full range of Fibre Channel requirements

Benefits

- Reconfigurable instruments minimize hardware acquisition, integration, and support costs

- Available HSSub Apps avoid development costs

    -FC-2 Layer
    -FC-RDMA
    -FC-AV
    -ARINC 818

- HSSub Apps minimize TPS development and support costs

- Obsolescence avoidance and proven Teradyne long-term support minimize logistics costs

HSSub Apps support both low-level FC-2 or Frame programming, as well as high-level video and data exchange. The selection is generally dictated by UUT capabilities and overall test requirements.

TPS Programming

Some UUT test requirements demand low-level access at the Fibre Channel FC-2 Layer, and are best programmed with the FC-2 Layer HSSub App. While the TPS developer must understand the details of frame organization and interchange, this approach provides precise and detailed control over the bus interactions. Script-based control over frame content and interchange timing executes in FPGA-based real-time processing capability within each channel.

Many UUT test requirements target the overall operation of the assembly, and are best addressed using a test methodology standard for video or data exchange. Sending and receiving bulk video or data is greatly simplified by this high-level of abstraction, relieving the TPS developer from the details of assembling thousands of Fibre Channel frames employed in a single transfer.

The FC-AV HSSub App and ARINC 818 HSSub App focus on video transfer and test, while the FC-RDMA HSSub App performs data exchange and test. New HSSub Apps that build on the proven Teradyne Fibre Channel infrastructure can address additional protocols.

TPS Debugging and Analysis

Each HSSub App is accompanied by powerful development, graphical analysis, and debugging tools. At the lower levels, tools allow observation, editing, and execution of Fibre Channel frames. Upper level video HSSub Apps provide a Video Data Editor providing capture, analysis, editing and execution of a sequence of video images.

Instrument Support

The HSSub Apps that provide Upper Level Protocol video and data protocol support use the Serial Core Instrument that combines the Test Defined FPGA and Real-Time Processor into a single instrument.

The FC-2 Layer HSSub App supports both the Serial Core Instrument to 3 Gb/s, and the 12G Serial IO Expansion Instrument to 4 Gb/s. The 12G instrument includes integrated SFP/

SFP+/QSFP+ optical capability, and speeds to 12.5 Gb/s when configured for other bus protocols.

Obsolescence Avoidance and Long Term Support

The flexibility of HSSub Apps decreases long-term logistics costs by avoiding both ATE and TPS obsolescence. Unlike single-purpose, inflexible instrumentation, HSSub and the associated HSSub Apps that configure it can adapt to requirement changes over time. HSSub Apps API's act as a hardware abstraction layer isolating the TPS from maintenance actions due to hardware obsolescence.

As an additional countermeasure to obsolescence, HSSub App development is very open. Teradyne, third-party developers, system integrators, and end users may perform augmentation or maintenance of HSSub Apps. Teradyne has a more than four-decade history of long term support for hardware, software, and technical assistance, all of which applies to the Fibre Channel HSSub Apps and related instrumentation.

Fibre Channel HSSub App Summary					
HSSub App	Part Numbers	Description	Serial Core Instrument[2]	12G Serial Instrument[3]	Speeds
FC-2 Layer	658-499-00	General Purpose Fibre Channel Frame Level Programming	■	■	1G, 2G, 4G
FC-RDMA[1]	SW-511-16	Data transfer (SCSI)	■		1G, 2G
FC-AV[1]	SW-511-16	Mil Standard Video & Audio	■		1G, 2G
ARINC 818	652-597-05	Industry standard Video & Audio	■		1G, 2G, 3G

1. FC-RDMA and FC-AV HSSub Apps are supplied under U. S. ITAR Export-control
2. Serial Core Instruments support electrical (copper) I/O and optical I/O via additional conversion options
3. 12G Serial Instrument directly supports optical I/O via (4) SFP/SFP+ and (1) QSFP+ transceivers
4. 4G Fibre Channel requires the 12G Serial Instrument

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