HS1760/MIL-STD-1760E
Product Overview

AIT's complete and customizable family of high-speed HS1760/MIL-STD-1760E solutions are built on our field-proven *Simulyzer*™ technology combined with the FC-AE-1553 application software as profiled under SAE AS5653.

AIT's *Simulyzer*™ hardware technology enables the product to simulate HS1760 Network Controller (NC) and Network Terminal (NT) functions while simultaneously monitoring on the same physical board. The hardware utilizes multiple processors with large onboard RAM. A PowerPC processor runs the driver software onboard, minimizing host CPU interaction, enabling autonomous operation during time-critical test and simulation applications. All our HS1760 products are compliant with AS5653 Physical FC-0 layer with the use of AIT's Soft Form Pluggable (SFP). The SFP (called the XCVR-AS5653 and available as an option) supports 2-5 volt transmission and is capable of driving data up to 100 feet with 75-ohm single ended coax.

AIT's HS1760 products can simulate the NC of the HS1760 high speed weapon systems bus. An optional test suite of software scripts is available to perform verification of the NC's AS5653 specification compliance. They can also simulate the NT of the HS1760 high-speed weapon systems bus. An optional test suite of software scripts is available to perform verification of the NT's AS5653 specification compliance. AIT's HS1760 cards support all of the standard FC-AE-1553 frame formats for command, control, and other data communications, as profiled in AS5653. In addition, fast fabric initialization extended link services are implemented as defined in the Fibre Channel standard FC-SW4 Annex D. Each of our solutions include full-function device driver software for the most popular operating systems, an application interface, as well as a comprehensive set of source code examples.

XCVR-AS5653 FC-0 PHYSICAL LAYER COMPLIANT TRANSCEIVERS
- 2-5 Volt operation at 1Gbps
- 75-ohm coaxial

NETWORK CONTROLLER (NC)
- Autonomous operation including sequencing of commands
- Acyclic command insertion/deletion
- Full error injection down to transmission word level
- Application interface functions managing NC exchanges

NETWORK TERMINAL (NT)
- Simulate multiple NTs simultaneously
- Programmable response time for each RT
- Full error injection down to transmission word level
- Application interface functions managing NT exchanges

CHRONOLOGICAL BUS MONITOR (BM)
- Full monitoring of all bus traffic
- Response and gap time measurements down to eight nanosecond resolution
- Full error detection down to transmission word level
- Complex triggering
- Message filter and selective capture

IRIG-B TIME CODE ENCODER/DECODER
- All boards include IRIG-B input for synchronization to a common time source
- IRIG-B encoder with sinusoidal output and freewheeling mode

NC AND NT COMMAND APPLICATION SOURCE EXAMPLE
- Sample NC and NT end-node simulation
- Fully operational exchange management of NC and NT commands and responses
- Command-line application user interface for operation without programming

HS1760 PROTOCOL COMPLIANCE TESTING SOLUTION

- Test as a non-intrusive in-line analyzer
- Simulate NCs and/or NTs simultaneously
- Analyze and decode HS1760 messages
- Corrupt the data traffic between two devices in-line
- Automated validation and verification NC or NT Tester

The HS1760 Protocol Compliant Testing Solution is a complete HS1760 Protocol test suite as profiled under AS5653. It has been demonstrated to the SAE working group for HS1760 and is currently under review as the test standard by SAE. It contains the entire HS1760 protocol test suite as profiled under AS5653. This solution consists of the fullfunction *Simulyzer*™ APG-HS1760 that can emulate any NC or NT end-system as well as communicate to the switch fabricsing FFI extended link services. In addition, there is a complete suite of software scripts to fully test protocol compliance for NC and NT according to FC-AE-1553 as profiled by SAE AS5653 paragraph by paragraph. It includes a fully operational GUI that details a compliance report for NC or NT operation.

An upgrade from the first presented single function analyzer to the HS1760 Simulation and Switch Solution or to the HS1760 Protocol/Compliance Tester can be made without purchasing a new board. The same APG-HS1760 *Simulyzer*™ accommodates all the tests. A different set of firmware/software is used to implement the upgrade.

HS1760 IN-LINE ANALYZER SOLUTION

- Test as a non-intrusive in-line analyzer
- Analyze and decode HS1760 messages
- Simulate a 1760 NC or NT(one at a time)

This solution consists of a single function Fibre Channel Analyzer HS1760SF which can also emulate NC or NT functions (one at a time). When simulating an NC or NT, it runs the Upper Layer Protocol (ULP) FC-AE-1553 command set. The simulator can also analyze the Fibre Channel link, including providing information on FC-1 link initialization information, and FC-2 protocol frame information.

This solution includes an application interface with the FC-AE-1553 command set. AIT has developed the low-level application interface functions that are delivered with the hardware that enable the board to perform the emulation required on the HS1760 link. In addition, the *fcXplorer*™ software enables setting up and controlling the hardware analyzer interface. *fcXplorer*™ will monitor, decode, and display the data collected for post-processing. The AS5653 compliant 75-ohm Soft Form Pluggables (SFP) are optional. These special SFP are "non-standard" Fibre Channel, unique to HS1760 because the operating voltage was raised to account for multiple drops and distance.
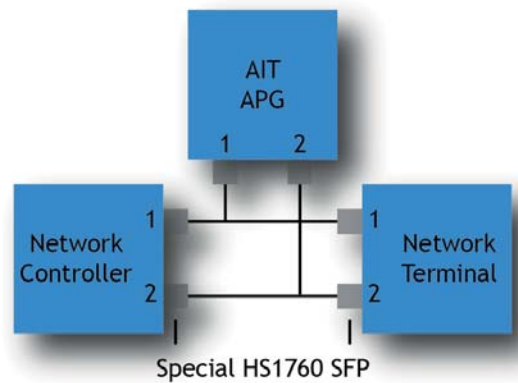
HS1760 SIMULATION SOLUTION

- Test as a non-intrusive in-line analyzer
- Simulate NCs and/or NTs simultaneously
- Analyze and decode HS1760 messages
- Corrupt the data traffic between two devices inline

This solution uses the full function Simulyzer™ that can emulate any NC or NT end-system as well as communicate to the fabric FFI extended link services. The product runs the FC-AE-1553 upper layer protocol as profiled in the AS5653 specification for NC and NT simulation. The simulator can also analyze the HS1760 link including providing information on FC-1 link initialization information, FC-2 protocol frame information, and HS1760 upper layer protocol information. Included is a command-line application that enables the user to perform HS1760 exchanges, including loopback between the two HS1760 ports. The command-line application is delivered as source code and will simulate Network Controller to Network Terminal and Network Terminal to Network Controller functions.

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AIT HS1760/MIL-STD-1760E HARDWARE MODEL GUIDE

| MODEL	FORM FACTOR	KEY FEATURES
XMC-1760	XMC	• Supports Point-to-Point, Switched Fabric, and Arbitrated Loop Topologies • Two independent Fibre Channel ports, each support up to 4 Gbps • Extended temperature supports -40 to 80° C operation
PXIe-C1760	PXI Express	• Supports Point-to-Point, Switched Fabric, and Arbitrated Loop Topologies • Two independent Fibre Channel ports, each support up to 4 Gbps
PCI-C1760	5V PCI	• Supports Point-to-Point, Switched Fabric, and Arbitrated Loop Topologies • Two independent Fibre Channel ports, each support up to 4 Gbps
PCIe-C1760	PCI Express	• Supports Point-to-Point, Switched Fabric, and Arbitrated Loop Topologies • Two independent Fibre Channel ports, each support up to 4 Gbps
PCI-X-C1760	PCI-X	• Supports Point-to-Point, Switched Fabric, and Arbitrated Loop Topologies • Two independent Fibre Channel ports, each support up to 4 Gbps
cPCI-1760	Compact PCI	• Four port non-blocking Fibre Channel Switch • Integration of Up Fibre Channel and Down Fibre Channel interfaces • Embedded Network Controller (NC) with four priority levels
XMC-HS1760 NCNT NIC	XMC	• AS5653 Compliant FC-AE-1553 Network Interface Controller • Three configurations available: one NC and one NT (-NCNT); two NC Nodes (-NCNC); two NT Nodes (-NTNT) • 64 MB onboard buffering per channel

FCXPLORER

- Optional Analyzer Software
- Graphical User Interface (GUI) (Windows) to capture traffic and control boards without programming
- Setup configuration of the link
- ACSII file used to control the generation of customized frames
- Decoding of frames in FC-1, FC-2, FC-4, and customized decodes
- HS1760 specific display of frames
- Optional Data Corruptor™ feature

fcXplorer™, AIT's simulator and analyzer test software for Windows XP/7, provides a "Best-of-Class" intuitive GUI for AIT's *Simulyzer*™ interface modules. *fcXplorer*™ helps to troubleshoot, optimize, plan, and configure traffic loading. Low and High level priority protocol analysis features provide capture, filter, time stamp, and interpretation of traffic, as well as generation of advanced statistics. *fcXplorer*™ can alert engineers to potential performance and configuration problems, allowing users to quickly identify and remedy any anomalous network condition.

APPLICATION INTERFACE

The application interface for AIT's HS1760 *Simulyzer*™ boards is supplied as a standard C interface library. The application interface simplifies software development with its intuitive functions and supplorts multiple development environments, including:

- MSVS 2005/2008 C++
- MSVS C#
- LabVIEW
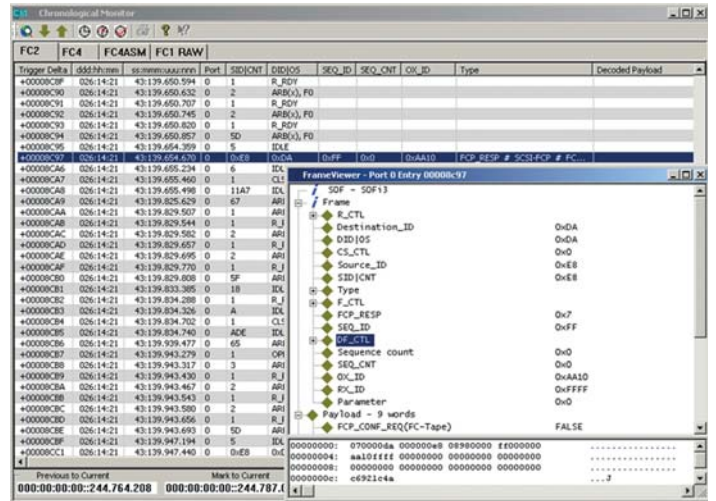
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