Avionics Interface Technologies

HS1760/ MIL-STD-1760E Product Overview

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GENERAL FEATURES

The Avionics Interface Technologies family of high-speed MIL-STD-1760E/HS1760 products (as profiled under SAE AS5653) are used in applications ranging from analyzers and simulators to verification and validation tools. AIT's HS1760 products consists of our APG *Simulyzer*™ technology combined with the FC-AE-1553 application software as profiled under AS5653.

The AIT *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.

The 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.

The 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.

The HS1760 products 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.

The APG-HS1760 supports 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.

The AIT HS1760 products 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.

APPLICATION INTERFACE

- Supplied as standard C interface library
- Supports multiple development environments, including:
  - MSVC 6.0
  - MSVS 2005/2008/2010 C++
  - MSVS C#
  - LabVIEW
- Source code examples

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

XCVR-AS5653 FC-0 PHYSICAL LAYER COMPLIANT TRANSCEIVERS

- 2-5 Volt operation at 1Gbps
- 75-ohm coaxial

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 free-wheeling 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

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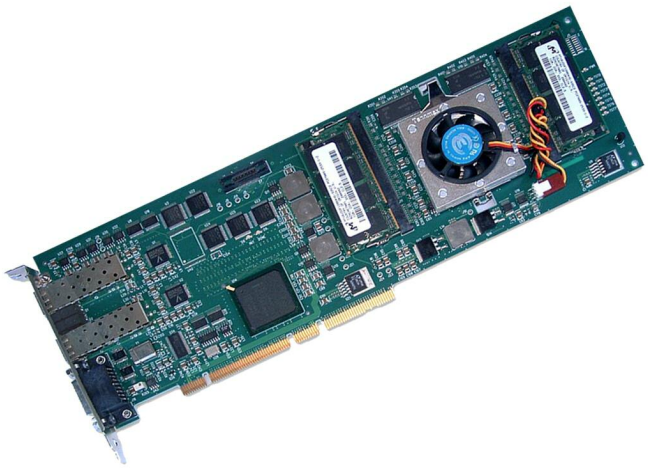
HS1760 PROTOCOL COMPLIANCE TESTING SOLUTION

- 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 full-function *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 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 in-line

This solution uses the full function *Simulyzer*™ APG-HS1760 that can emulate any NC or NT end-system as well as communicate to the switch fabricsing 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 APG-HS1760 ports. The command-line application is delivered as source code and will simulate the following functions:

- Network Controller to Network Terminal
- Network Terminal to Network Controller

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 APG-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.

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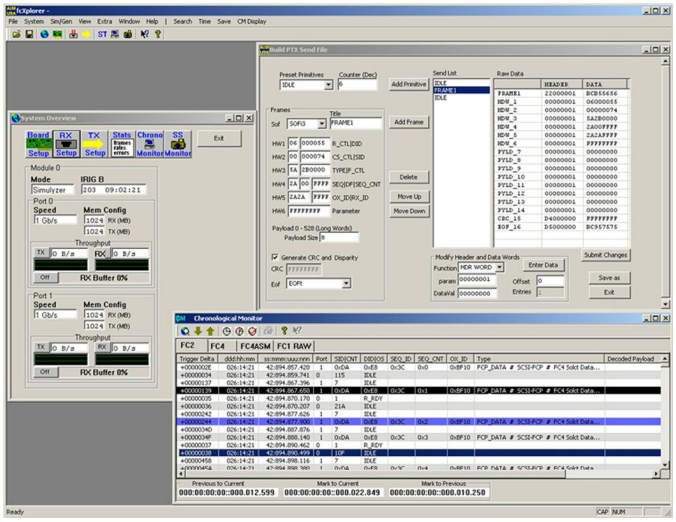
fcXplorer

- 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 2000/XP, 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.

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