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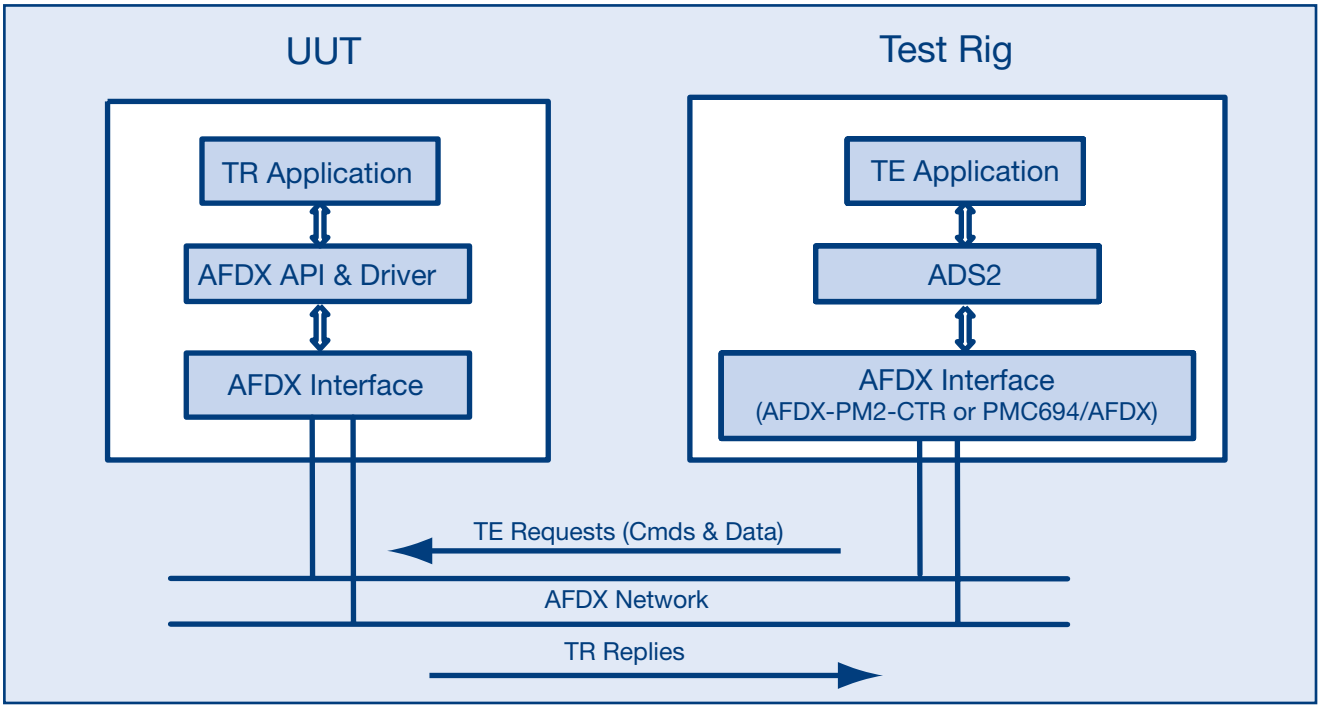
AFDX® TR/TE
AFDX® Interface Verification Test Tool



- Test Responder (TR) software pre-implemented for TechSAT's AFDX® boards for model and demonstration purposes
- Quick and easy Test Responder (TR) adaptation to the AFDX® interface of the Unit Under Test (UUT)
- Intuitive and easy to operate Test Equipment (TE) software
- 27 Interoperability Test Cases (TC) covering all aspects of AFDX® interface verification according to the Airbus Detailed Functional Specification (DFS)
- Option to add additional TCs for user customization
- Automatically generated test report with detailed TE - TR communication logs for analysis purposes

Data Sheet

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Abstract

The AFDX® TR/TE Test Tool consists of the Test Responder (TR) software application running on a unit under test (UUT) and the Test Equipment (TE) software application running on a test rig equipped with TechSAT's AFDX®-PM-2CTR or PMC694/AFDX® AFDX® PMC card.

By means of a number of interoperability test cases, based on the Airbus End System Detailed Functional Description (DFS), the TR is stimulated by the TE and the resulting AFDX® communication is recorded and compared with the expected behavior of the UUT AFDX® interface. In this manner the UUT's AFDX® interface conformity with the Airbus DFS is put to the test. The figure up front shows the UUT and test rig interconnection and their respective architectures.

Test Equipment (TE) Application

In total there are 27 interoperability test cases that test various aspects of the AFDX® protocol.

The test cases are all incorporated into the TE GUI from where it's possible to let the entire suite of test cases or just a subset of these be executed cyclically to expose the UUT to a continuous load.

Each test case generates a command or a series of commands that instruct the TR to configure the UUT AFDX® interface with respect to number of VLs, ports etc. and subsequently reply to the TE request. Based on the TR reply, the TE can determine whether the test case was executed successfully.

The following lists the available interoperability tests cases:

- MAC Addressing / VL Isolation
- IP Header Compatibility
- UDP Header Verification
- Transmission Ordering
- BAG Control
- Sub VL Management / IP Addressing
- VL FIFO Queue Transmission Rate
- VL FIFO Queue Operation with IP Fragmentation
- Integrity Checking of Received Sequence Numbers
- Receive Sequence Numbers at Startup
- Port Operation with Integrity Checking Off
- AFDX® Sampling Port Operation
- AFDX® Queuing Port Operation
- Fragmentation on Transmission in the Presence of Typical MTUs
- Presentation after Fragmentation Reassembly
- Response to Buffer Overflow
- Trivial File Transfer Protocol (TFTP) Functionality
- SAP Transmission of 8KB Message
- SAP Operation to Real World IP Services
- Ability to Reject Frames with Errors
- Reassembly of Fragments Received in Order
- Reassembly in the Presence of a New Frame
- Concurrent Reassembly of Multiple Datagrams
- ICMP Echo Messages
- Sequence Number Verification
- Network Time Skew Effects on Redundancy Operation in Reception
- Redundancy Operation in Transmission

Test Responder (TR) Application

The TR handles requests from the TE transmitted on the AFDX® network, processes the command(s)/data and transmits a reply on the AFDX® network to the TE.

Commands from the TE are always received on the same UUT port (the command port), which has unique MAC, IP and UDP addresses. Depending on the command received, the TR will respond in one of three different manners: Either it retransmits the received command, performs an internal control, i.e. resets the UUT, or reads from a port and replies with the data read.

Hardware/Software Requirements

As depicted in the diagram [internal link to diagram above], the TE application runs on top of ADS2, thus a preinstalled ADS2 license must be present in the test rig. In addition the TE relies on the presence of either the AFDX®-PM-2CTR or the PMC694/AFDX® TechSAT AFDX® PMC card.

The TR application is implemented for the TechSAT AFDX® hardware, and with a second TechSAT AFDX® card it is possible to simulate the AFDX® interface of the UUT and thereby demonstrate the AFDX® TR/TE Test Tool. For the real UUT, however, the TR application must be adapted to the AFDX® hardware of the UUT, but with a well specified and small amount of hardware-dependent TR code. This effort is held to a minimum.

Application Scope

The interoperability test cases view the UUT as a black box. This means that the test results give information on the UUT AFDX® interface behavior, but give no information (and are not supposed to) on the UUT implementation.

For convenient UUT evaluation, the TE application generates a test report which summarizes the test cases executed, at what time, the result (successful/not successful), and in case of errors an analysis of the communication between the test rig and the UUT.

The AFDX® TR/TE Test Tool is especially intended for suppliers of controllers/LRUs with AFDX® interfaces. In principle however, any supplier with a system that needs to interface to an AFDX® network needs the AFDX® TR/TE to test for AFDX® compliance.

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