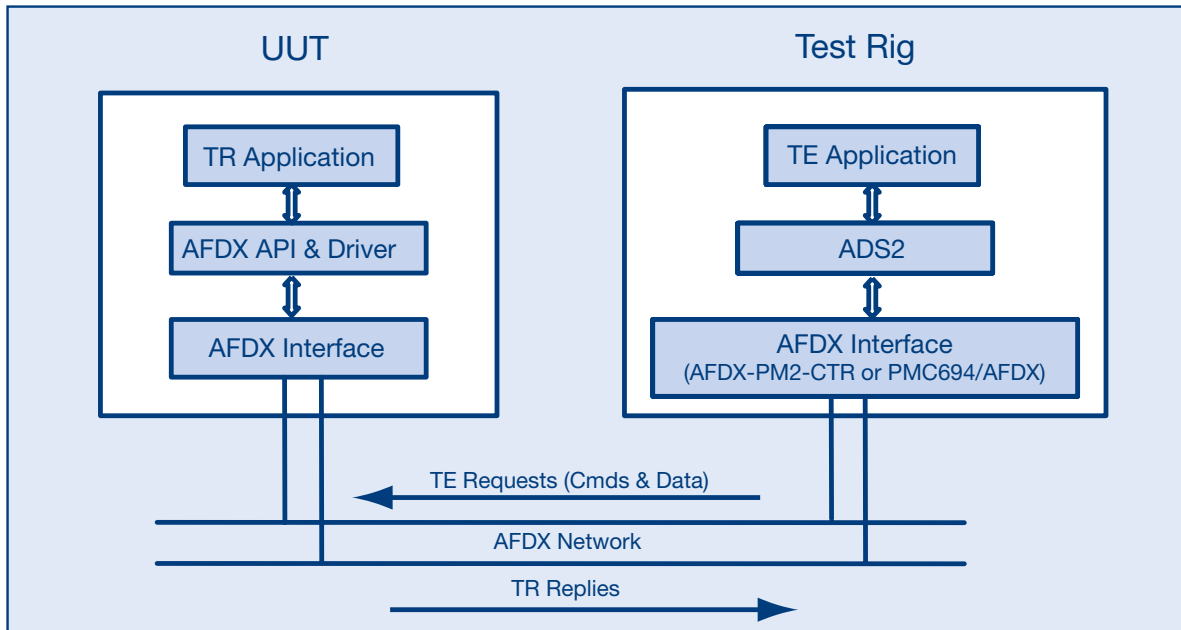


# AFDX® TR/TE

## AFDX® Interface Verification Test Tool



- Test Responder (TR) software pre-implemented for TechSAT's AFDX® boards for modeling and demonstration purposes
- Quick and easy adaptation of Test Responder (TR) to AFDX® interface of 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 End System Detailed Functional Specification (DFS)»
- Optional custom user Test Cases
- Automatic test report with detailed TE/TR communication log for post-analysis





mastering  
integration  
complexity

## AFDX® TR/TE AFDX® Interface Verification Test Tool

### Application Scope

The AFDX® TR/TE test tool consists of two software applications: the **Test Responder (TR)**, which runs on the Unit Under Test (UUT), and the **Test Equipment (TE)**, which runs on the test rig. The diagram on the front page shows the architecture of the UUT and the test rig as well as their interconnection.

TE offers a number of interoperability test cases, based on the «Airbus End System Detailed Functional Specification (DFS)», to stimulate TR. The resulting AFDX® communication is recorded and compared with the expected behavior of the UUT's AFDX® interface to verify its conformity with the Airbus DFS.

The test report generated by TE supplies the following information:

- > Type of test cases executed
- > Time of test run
- > Test result (successful/failed)
- > In case of errors, an analysis of the communication between test rig and UUT

The AFDX® TR/TE test tool is specifically designed for suppliers of controllers/LRUs to verify AFDX® compliance.

### Test Equipment (TE) Application

In total 27 interoperability test cases are available from the TE GUI to test the various aspects of the AFDX® protocol. Either the complete set or a user-defined subset of the test cases can be run continuously.

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

The following interoperability test cases are available:

- > 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

- > 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

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

TE commands are always received on the same UUT port (the command port), which has unique MAC, IP, and UDP addresses. Depending on the command received, TR responds in one of three ways:

- > It retransmits the received command
- > It resets the UUT
- > It reads from a port and replies with the data read

### Hardware/Software Requirements

As shown in the diagram (see front page), TE runs on top of ADS2, which must be preinstalled on the test rig. Additionally, TE requires the AFDX® hardware from TechSAT.

The TR application is also implemented for TechSAT's AFDX® hardware. With a second AFDX®-PMC card it is possible to simulate the AFDX® interface of the UUT. For the real UUT, the TR application must be adapted to the AFDX® hardware of the UUT with a well specified and small amount of hardware-dependent TR code. This effort is held to a minimum.

#### Technical Data

##### Hardware Requirements

- AFDX®/ARINC 664 PMC module (PN 700008 or PN 702348-02)

##### Software Requirements

- ADS2 - Avionics Development System 2G

##### Operating System Options

- Windows® 7 32 bit
- Linux

##### Part Number

- 202052

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