

A new voice

The Airbus A380 development initiates a dramatic change in aircraft communication technology. Most aircraft controllers will exchange data using the new Avionics Full-Duplex Switched Ethernet (AFDX) network, replacing the established ARINC 429 busses and their well-proven, but limited capabilities.

The AFDX's capabilities provide the basis for the development of more powerful and highly complex aircraft applications, but also represents a huge challenge with respect to analysis and test.

To this end, AIM GmbH and Verified Systems International GmbH have developed an integrated tool platform meeting the needs of AFDX communication test, analysis and simulation. At the core-level, AIM's AFDX test and analysis interface board offers (in addition to the standard communication functions) the possibility to monitor AFDX communication behaviour with a timing precision down to micro second level. Simulated data transmission profiles can be downloaded to the board and triggered or replayed with the same precision. Furthermore a wide range of communication faults

may be simulated for testing aircraft controllers with respect to AFDX communication robustness.

For hardware-in-the-loop simulation and testing of AFDX application scenarios, levels of monitoring, analysis and low-level simulation are complemented by high-level test equipment developed by Verified Systems. The AFDX board and its functionality are integrated into Verified's 'RT-Tester' real-time testing environment. Using script languages it is possible to program simulated application behaviour on the PC level and automatically check the AFDX data received against expected results. Graphical user interfaces support test case management and the development of test procedures.

Finally, hardware/software and system integration testing requires powerful test benches providing access to all interfaces of the system under test.

To this end, the AFDX analysis, simulation and test functionality described above has been integrated into Verified Systems' Test Engines, offering access to the other interfaces used within the aircraft domain, such as analogue, digital I/O, CAN, ARINC 429 and MIL-STD-1553.

A novel technology based on PC clusters allows scaling of the test engine processing and communication power by adding CPUs to single PCs or integrating additional PCs into the cluster. An extension of the

Linux operating system allows simulation and testing with a timing precision of 30ms or better.

The product development activities of AIM and Verified Systems International are based on extensive international research activities in the field of real-time systems and testing within the European VIC-TORIA project and in co-operation with the University of Bremen.

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