# Aerospace | Integrated Avionics Architecture

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Aerospace & Aviation

Test Systems Engineering

# Integrated Avionics Architecture

AERTEC Solutions / **Test Systems Engineering (2011-Ongoing)**

The ATA 42 is the standard reference for aircraft documentation that defines the Integrated Avionics Architecture, and it is divided in two subchapters:

- **ATA 42-10**
  **Shared Avionics Resources - Integrated Modular Avionics (IMA)**
- **ATA 42-30**
  **Avionics Data Communication Network (ADCN)**

This ATA is the trend of the future, as based on an open architecture, using common software and centralized processing units, it makes upgrades and changes in avionics both cheaper and easier to accomplish.

A380 was the first aircraft from Airbus including ADCN and IMA, permitting the increase in the number of software controlled systems and maximizing the amount of information accessible from the cockpit display units (DUs).

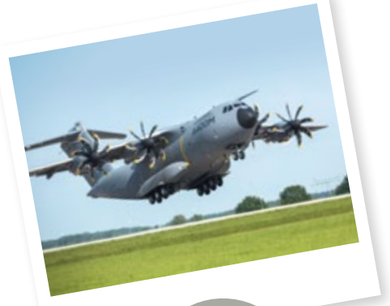

AERTEC Solutions has been very active in the research of modular/redundant hardware architecture focused on multiple boards managed by a set of applications MANAGER. Activities include:

- Support to A400M Manufacturing engineering ATA42: CPIOMs, IOMs and AFDX network. Including backup technologies such as A429 and MIL-1553.
- Engineering Service provided on-site at Airbus DS's premises
- Specification of the technical means needed for the functional testing.
- Identification and configuration of the required test means for the AFDX wiring (QUADRAX)
- Concurrent test engineering services with design office to improve systems testability and functionality.
- Development of new optimized and rationalized technologies and SW for automatic testing equipment based on Open IMA and DIMA (Distributed IMA) architectures.

AERTEC Solutions is aware of the number of advantages that the use of ADCN/IMA brings about:

- Easy storage and portability of applications from several suppliers on a single platform
- Multiple systems applications executed on the same computer
- Secure and reliable communications integrated onto a high speed multiplexed network
- Critical system information available in the global network and accessible from the cockpit DUs
- Flexibility for future developments of system architecture (configurable)
- Reduction in the maintenance cost and savings in A/C's weight and power consumption
- Reduction of the number of LRUs
- Segregation of HW and SW development process
- Easier SW developments (standardization of CPIOMs)
- Provides a better and easier HW-SW integration
- Upgrading of HW and SW are independent
- Less wiring and HW standardization

AERTEC Solutions has made a firm commitment to gain knowledge and capabilities in this technology, with the aim of significantly reducing both weight and costs in avionics



Avionics innovation

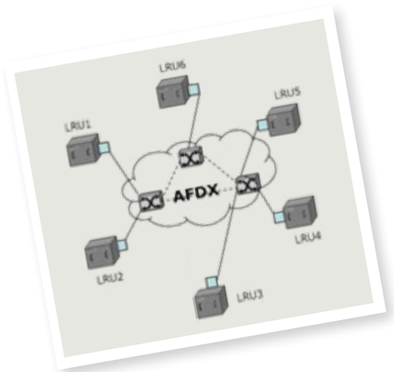

## Integrated Modular Avionics (IMA)

The underlying concept of IMA is to allow different SW applications to run in the same HW architecture.

The goal of IMA is to replace different LRUs with IMA modules.

IMA can be understood as a set of avionic computers, the 'modules', having the same hardware architecture which is not task-dependent. This hardware will support different functionalities which will be implemented via task-dependent SW applications, so each module can carry out different jobs, depending on the SW running over it. As each module can support many different applications, each IMA module can replace several LRUs.

For achieving the above listed goals, the standards ARINC 653 and 664 provide recommendations and globally define the IMA concept.

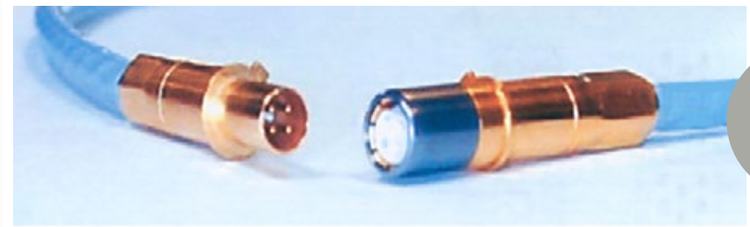



AERTEC Solutions is performing the following tasks:

- Edition and reviewing of Ground Test Instructions (ATAs 42).
- Wiring Diagrams modifications.
- Improving industrialization processes.
- Support to production for Ground Test Instructions execution (ATAs 42).
- Support to Test Means Engineering Specialists regarding AFDX and other backup technologies such as A429.
- Coordination with Design Office to debug Test requirements and restrictions.
- Impact analysis of non-conformities, remains to do, inflow, check process, SI on Ground Test Instructions.
- Non-conformities Management engineering assessment
- Collaboration in training for Test technical
- Specification of the technical test means needed for the functional testing

The goal of IMA is to replace different RLUs with IMA modules





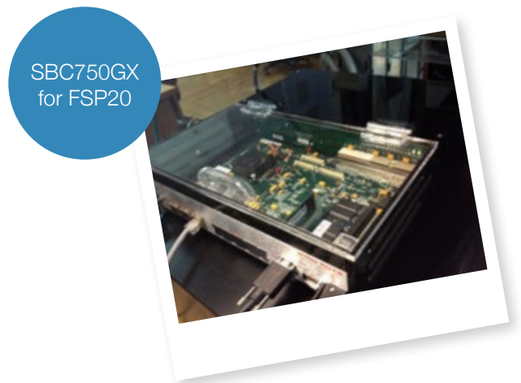

## Avionics Data Communication Network (ADCN)

The network technology implemented over ADCN is the AFDX, with specific capabilities.

AFDX link layer is based on Ethernet 802.3, but in addition it has the following capabilities, as defined in the ARINC 664 standard:

- Data integrity
- Network availability
- Network determinism
- End to end routing
- Bandwidth protection in switches
- Network maintainability

The goal is to achieve a safe, reliable and deterministic network. The central concept of AFDX is the Virtual Link, a logical traffic segregation. The Virtual Link can be viewed as a unidirectional pipe (unicast or multicast) that allows traffic processing in a different way for each VL.




AERTEC Solutions is carrying the following tasks:

- AFDX frames translator.
- Implementation of SW solution for the increase of the built-in test capabilities (BIT functions) for on-board systems, based on RTOS (VxWorks 653) and integrated both with the AFDX network and the CATS system used for the A400M FAL ground tests.
- Ground Test Instructions for A400M and adaptation to visual requirements.
- Production of the Repeat Test Instructions (RTIs) for manufacturing engineering.
- Collaboration with Design Offices to identify modifications needed in GTRs, taking into consideration lessons learned from previous A/Cs; and modifications to installations.
- Support to production for functional ground tests.
- Test-Means follow-up and validation.
- Analysis and follow up of HNCs and Sis.
- Reducing test lead time for ATA 42.

The goal is to achieve a safe, reliable and deterministic network

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