LOADNET
Low Cost Optical Avionics Data Networks

Funding: European (5th RTD Framework Programme)
Duration: Apr 2000 - Dec 2003
Status: Complete with results

Background & policy context:
The introduction of photonic technologies into airborne applications is seen as advantageous for operational performance and environmental robustness. Fibre-optic harnesses have been successfully implemented in production, mainly on military aircraft (in Europe and the US) but also on some civil aircraft in the US.

However, there have been only limited applications to date with unique technical solutions for each relatively simple application. These are seen as significant steps forward, but they have highlighted the lack of supporting infrastructure and standards for aerospace photonics, which has inhibited the wider adoption of the technology. Thus, although these systems have in the main proved to be very reliable (much more so than equivalent electrical interconnects), they are prohibitively expensive to procure and maintain over their life-cycle.

The LOADNET project focuses on the realisation of cost-effective European photonic network technology for next generation, aircraft data communication systems and the exploitation of the huge investment made by the commercial telecomms and datacomms sectors in fibre-optic technology.

Objectives:
The objective of the LOADNET project has been the identification, adaptation and installation of commercial off-the-shelf (COTS) networking components for optical avionics data networks. The aim of this project is to recommend the use of the telecommunication layered approach to analyze and design future aerospace fibre-optic networks. This approach can also be applied to other platforms, given their respective requirements, which can be disseminated into sufficient detail and mapped into the layers. A correlation between the requirements and the capability of the COTS protocol can be made to assess its suitability and any modifications that may be required. From part of the initial work done on the project, we have selected three prominent COTS network technologies for illustrative purposes. Multiple protocols were necessary in the network and, as a result, multiple protocols over LOADNET (MPOL) is currently under investigation.

Methodology:
The methodolodogy of the LOADNET was a suite of optical network components (that meet definitive functional, environmental and economic criteria defined by airframe manufacturers); through-life tools and procedures (that have been verified by extensive testing on the optical physical layer elements and prototype systems); an optical physical layer modelling tool (for avionics networks that have been validated by real experimental measurements) and culminating in draft international standards for the components and processes developed within the project.

The LOADNET strategy is:
- to identify as wide a range of applications as possible;
- understand through-life cost implications for an optical physical layer;
- reduce optical network performance uncertainly by use of enhanced modelling tools;
- target data communications market development for aerospace use;
- promote the introduction of International Standards.

Parent Programmes:
Institute type: Public institution
Institute name: European Commission, Directorate-General for Research (DG Research)
Funding type: Public (EU)

Partners:
Belgium:
Nexans Harnesses
France:
EADS Airbus SA; ONERA-DOTA
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Key Results:
Identified suitable:
- Fibre-optic cables
- Connector components

Construction of a test rig, to be operational to subject the components to aerospace environmental conditions.
In particular, the fibre-optics need to survive the extreme temperature ranges found in aerospace applications. Fibre-optics would be suitable for use in any aircraft system involving data transfer - the most obvious application being in-flight entertainment systems.

Technical Implications

Construction of a test rig, which is operational to subject the components to aerospace environmental conditions.

Policy implications

Standardisation of fibre-optic components, standardising them for use in aerospace and addressing through-life support issues. Promoting of the introduction of International Standards.

STRIA Roadmaps: Vehicle design and manufacturing
Transport mode: Air transport
Transport sectors: Passenger transport
Transport policies: Digitalisation
Geo-spatial type: Other