

DAPHNE

Developing aircraft photonic networks

Newsletter #3 Apr-2011

Welcome to the April 2011 DAPHNE newsletter!

This is the third of six newsletters to disseminate the objectives and results of the project. More information may be found on the project website (www.fp7daphne.eu) which is kept up-to-date with all the latest news, and has links to related technology and events. This newsletter is intended to provoke interest: please contact us if you have further questions. Contact info is given at the foot of the page.

DAPHNE is a project supported by the European Commission's Seventh Framework Programme to develop photonic networks and components for aircraft. The core of the project is to exploit photonic technology from terrestrial communications networks and to identify and address technology gaps in implementing photonics extensively throughout the aircraft industry. The project brings together avionic equipment and aircraft manufacturers with photonic industry members and academic network specialists.

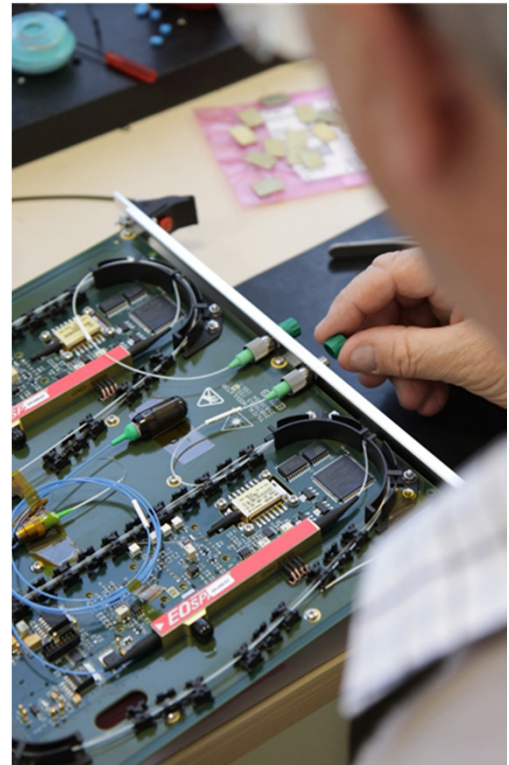


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- DAPHNE started in Sep-2009 and will run for three years
- The project has fifteen partners from seven nations
- Balance of academic & research organisations with large & small industrial partners
- Project lead organisation: Airbus.

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Consortium



Coordinator Admin Website

Airbus
 Vivid Components
www.fp7daphne.eu

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Join the DAPHNE Advisory Group!!!

The DAPHNE Advisory Group (DAG) has been established in order to encourage the exchange of information into and out of the DAPHNE project. The DAG should help to direct and strengthen the work-programme followed by the project partners and demonstrate the potential for future fibre optic business to the DAG members. The DAPHNE partners hope that this will help to make fibre optic communication networks on vehicles, and especially aircraft, more accessible and acceptable. The DAG will focus on key topics, including:

- Network architectures, topologies and their associated characteristics
- Network hardware building blocks
- Through-life support considerations
- Standardisation proposals.

The DAG consists of four working groups:

- DAG1 Network Architecture Group
- DAG2 Hardware Group
- DAG3 Through-Life Support Group
- DAG4 Inter-Project Liaison.



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As the technical work proceeds, these topics will be progressively introduced to DAG participants with increasing detail to gauge their acceptance and solicit their feedback. The far-reaching connections of the partners both on standards bodies, and in the wider avionics and photonics industries will be used to gather the necessary momentum to establish the DAPHNE network architecture.

There will be an opportunity to meet the DAG at FOHEC 2011: see page 5 for more info!

The DAG provides an opportunity for your organisation to benefit from the component and system developments in DAPHNE, influence the standards that the group promotes and accelerate the up-take of photonic technology on aircraft.

We hope to hear from you soon!

DAG Membership

DAG membership is informal in nature, is not covered by NDA, and is open to any organisation willing to contribute to the DAPHNE project.

If you are interested in finding out more, please contact:

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Project progress: identification of hardware requirements

DAPHNE has performed a COTS component maturity assessment providing a list of potential network building blocks (optical components) and their associated aircraft Technology and Industrial Readiness Levels (TRLs/ IRLs).

The study examined state-of-the-art photonic components that are in use in terrestrial applications or are under development. Many COTS components are now available over an extended temperature and environmental range so that they can be qualified for aircraft use. This information was used to identify a “wish list” of aerospace-qualified components required for the next generation of optical networks on aircraft.

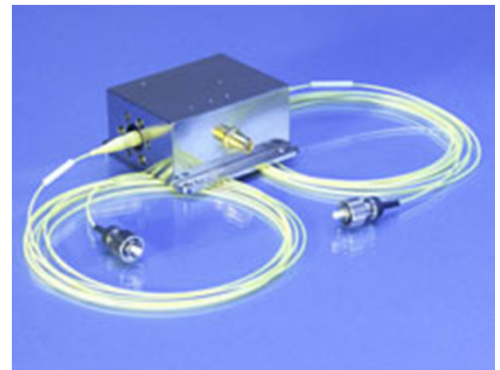


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DAPHNE hardware “wish list”

1. Optical fibre

- Simplex singlemode (SM) optical fibre cable
- Simplex multimode (MM) optical fibre cable to OM4 specs
- 12-way flat ribbon MM optical fibre cable to OM4 specs
- 12-way round ribbon MM fibre cable to OM4 specs
- Qualified for operation ≥ 150 °C
- Ruggedised to operate in aircraft environments

2. Connectors

- Blind-mate multi-fibre equipment connector for rear connection of LRUs
- Both single fibre ferrules and MT ribbon ferrules are required
- Blind-mate back-plane connectors for ribbon optical fibre

3. Backplane interconnection technology:

- Methods for providing optical connection between circuit boards, such as reflective polymer waveguides, ribbon fibre or free space interconnection
- Compact branching devices such as couplers, ribbon break-outs and wavelength multiplexers
- Must operate from -15 °C to +95 °C (or greater)

4. Active components

- SM parallel transceivers operating at 1300 nm and 1550 nm.
- MM parallel transceivers operating at 850 nm
- CWDM transceivers at all CWDM wavelengths operating from -15 °C to +95 °C (or greater)
- 2x2 optical switch mounted with fail-safe mode for re-routing optical signals; requires >40 dB isolation and operation in harsh temperature and vibration environment

5. Modules

- Compact optical distribution box: based on PC104, VITA 73, VITA 74 or other compact form factors.
 - Connection to optical databuses using protocols such as Ethernet, AFDX, MIL-STD-1553
 - For encoding data on to sub-networks using protocols such as ARINC 429 or CANbus.
- Remote modules: Provide an interface between an optical fibre network and a sensor or an actuator
 - Should operate from -55 °C to +125 °C
 - Camera interfaces will need to operate at HD uncompressed video rates

6. Sensor technology

- Optical rotary joint: Required for connections to rotary parts e.g. helicopter rotors, turrets and under-carriages and will need to operate with SM optical fibre
- Strain monitoring: Optical sensors that can monitor the health of wings, struts and rotor blades
- RF optics: Components such as high bandwidth analogue transceivers and optical amplifiers for transmission of RF signals over optical fibres.

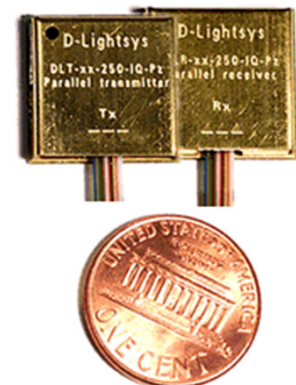


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Through-life support

A key area of the DAPHNE research is the investigation of practical aspects of through-life support for aircraft fibre optic networks, including:

- Repair & maintenance
- Test & measurement
- In-service experience (as users or support providers)

One of the key topics of the DAPHNE programme is to build on and share existing fibre optic experience, in particular with respect to practical issues related to installing and maintaining fibre optic networks on vehicles.

The following questionnaire has been prepared to compile this knowledge. If you are interested in participating and hearing the results, please contact:

Chris Stace; BAE Systems (BAES) chris.stace@baesystems.com

RFI! DAPHNE questionnaire on installation & through-life support

Fibre Optic Network Installation

- What types of optical network have you experience of?
- Do you have any comments on workforce training?
- What type of fibre optic cable have you experience of and were there any issues with its structure?
- How was the fibre optic harness built into the structure?
- What type of cable management was used on the vehicle?
- What was the design process behind the installation?
- How did through-life support affect the installation?
- What type of connectors, contacts and termini did you use and were there any issues with them?
- What type of cleaning procedures and tools did you use and were there issues with these?
- How was the fibre optic installation tested?

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Fibre Optic Network Through-Life Support

- Fault Finding: How is this done in your organisation? Does it work well? What equipment is used?
- Test and Measurement: What launch conditions do you use for multimode fibre? What test method do you use – Golden lead, substitution? Are there any issues with your current measurement methods?
- Termination and Tools: What tools are used for repairs? Do you have a stand-alone toolkit for fibre optics? What sort of problems have you experienced? What type of adhesive do you use and is its performance sufficient for your needs?
- Repair and maintenance: What maintenance philosophy is used? – repair, reroute, replace? Are there issues of ease of access to the optical fibre network? When is repair done?
 - What are your routine maintenance periods?

Meet DAPHNE at FOHEC 2011 (DAG Day!)


Fibre Optics in Harsh Environments Conference

STEAM, Swindon, UK; 18-19 May-2011; www.fohec.co.uk

FOHEC (Fibre Optics in Harsh Environments Conference) is an event intended to ensure that industries in this market sector stay up-to date with current practices and developments. This unique European conference has been organised since 2009 by DAPHNE member AVoptics and is growing each year. After the success of last year's event, the venue will once again be the Museum of the Great Western Railway, Swindon (STEAM).

The conference will cover topics including:

- Design tools
- Platform experiences
- Repair and maintenance
- Training
- Current applications
- Future technologies
- Testing and validation
- Systems integration
- Optical coatings
- Fibre sensing.

DAG day!

The second day of the conference will be open to existing DAPHNE Advisory Group members and anyone interested in joining the DAG. The results of the project to date will be presented, including identified hardware technology gaps and suggestions for standardisation. Feedback from relevant organisations will be sought: from airframers to component manufacturers and anyone in-between.

We hope to see you there!!



Upcoming DAPHNE-related events

- **AVFOP 2011** 04-06 Oct-2011; San Diego, USA

www.photonicsconferences.org/AVFOP2011

Geoff Proudley (BAES) is on the organising committee of this key conference and several DAPHNE papers are expected (e.g. G&H, INESC, DTU)

- **Paris Airshow 2011** 20-26 Jun-2011; Paris, France

www.paris-air-show.com

Draka to exhibit DAPHNE poster at its booth and distribute leaflets

- **ICT2011** 08-May-2011; Ayia Napa, Cyprus

www.ict2011.org

"Developing A Generic Optical Avionic Network" to be presented by DTU

- **SAE World Congress 2011** 12-14 Apr-2011; Detroit, USA

www.sae.org/congress

"Comparison of CAN, Flexray and Ethernet (AFDX) architectures for the design of ABS systems" MLD presentation with links to DAPHNE (TUI).



49th INTERNATIONAL
PARIS AIR SHOW
LE BOURGET

