

Advance Program

Tuesday, 21 September 2010

ALL SESSIONS WILL BE HELD IN EVERGREEN C

8:20 AM - 8:30 AM

OPENING REMARKS

8:30 AM - 9:45 AM

Session TuA: OVERVIEW PART I

Session Chair: Daniel N. Harres, *Boeing Company, Hazelwood, MO, USA*
Praveen Anumolu, *ASR International, Smithtown, NY, USA*

TuA1 8:30 AM - 8:45 AM

Beyond Interconnections, J. S. Mazurowski, *Penn State Electro-Optics Center, Freeport, PA, USA*

Use of wire for signal transmission has endured all of aviation history without major changes. Present investment in cable technology yields only minor improvements in performance. Emphasizing system level optical interconnects improves cost versus benefit.

TuA2 8:45 AM - 9:15 AM (Invited)

Space Flight Applications of Optical Fiber; 30 Years of Space Flight Success, M. Ott, *NASA, Greenbelt, MD, USA*

For over thirty years NASA has had success with space flight missions that utilize optical fiber component technology. Presented here is a brief historical summary of those space flight missions that include communications and science applications.

TuA3 9:15 AM - 9:45 AM (Invited)

SAE Aerospace and Avionic Systems Division Update, D. P. Zika and C. Winslow, *Boeing Company, St. Louis, MO, USA*

SAE Aerospace has been very busy lately with a wide cross-section of fiber optic and photonic projects. Everything from expanded beam interconnects, WDM LAN applications, to how to make a cable drawing.

9:45 AM - 10:15 AM

COFFEE BREAK

10:15 AM - 11:15 AM

Session TuB: OVERVIEW PART II

Session Chair: Daniel N. Harres, *Boeing Company, Hazelwood, MO, USA*
Praveen Anumolu, *ASR International, Smithtown, NY, USA*

TuB1 10:15 AM - 10:45 AM (Invited)

Open Architecture Technical and Legal Challenges, J. G. Mills and G. Wallis, *Naval Air Systems Command, Patuxent River, MD, USA*

ABSTRACT NOT AVAILABLE

TuB2 10:45 AM - 11:15 AM (Invited)

Optical Network Security, S. McNowan, *US Air Force Research Laboratory, Adelphi, MD, USA*

ABSTRACT NOT AVAILABLE

11:15 AM - 12:00 PM

Session TuC: FIBER OPTIC INTERCONNECTS/CABLING

Session Chair: Daniel N. Harres, *Boeing Company, Hazelwood, MO, USA*
Praveen Anumolu, *ASR International, Smithtown, NY, USA*

TuC1 11:15 AM - 11:30 AM

Optical Fibers with Mid and High Temperature Coatings for Harsh Environment Applications, V. Kozlov, *Corning, Inc., Corning, NY, USA*

New optical fibers have been developed for harsh environment applications including hydrogen rich atmospheres and elevated temperatures. Long-term temperature and hydrogen aging test data will be presented together with coating material lifetime models.

TuC2 11:30 AM - 11:45 AM

New Mechanical Splices for Single and Ribbon Fibres, G. Trouillard, R. Cerutti, *Phasoptx, Montreal, Canada*, X. Pruneau-Godmaire, F. Leblanc, *Phasoptx, Québec, Canada*, P. Zivojinovic and E. Weynant, *Phasoptx, Montreal, Canada*

New mechanical splicing devices for connection of optical fibres (single or ribbon) have been developed. They are very small, reusable, glueless, suitable for harsh environment and easy to use.

TuC3 11:45 AM - 12:00 PM

Integrating Polymer Optical Fibers in Civil Aircraft: Environmental Requirements and Challenges, S. Cherian, H. Spangenberg, *Deutschen Zentrum für Luft- und Raumfahrt, Braunschweig, Niedersachsen, Germany* and R. Caspary, *Technical University of Braunschweig, Braunschweig, Niedersachsen, Germany*

This paper discusses the challenges and options in integrating commercial POF link and its passive/active components to the critical as well as non critical data communication in commercial aircraft, particularly the relevant firm environmental requirements.

12:00 PM - 1:45 PM

LUNCH BREAK

1:45 PM - 2:45 PM

Session TuD: AVIONICS ARCHITECTURE AND NETWORKING I

Session Chair: Neal K. Bambha, *US Army Research Laboratory, Adelphi, MD, USA*
Rick C. Stevens, *Lockheed Martin, Eagan, MN, USA*

TuD1 1:45 PM - 2:15 PM (Invited)

Fiber Optics for Enabling IN-SITU Detection and Imaging Systems, R. G. Pirich, *Northrop Grumman Corporation, Bethpage, NY, USA*

Current generation fiber optic technology is making significant advances for use in a number of air and space in-situ detection and imaging systems, including fiber optic acoustic sensors, electro-optical distributed aperture systems and integrated diagnostics, prognostics, and health management.

TuD2 2:15 PM - 2:30 PM

Rugged Optical Data Distribution Network for Avionics, M. Gross and A. Husain, *Ziva Corp, San Diego, CA, USA*

A passive optical network concept based on FTTH devices is proposed for avionics. The scheme is low cost, rugged, scalable in data rate and number of channels by exploiting non-resonant devices and coarse wavelength division multiplexing.

TuD3 2:30 PM - 2:45 PM

Power Requirements and Operation of Amplified Optical Networks for Future Aerospace Applications, A. D. Proudfoot, *BAE Systems, Filton, Bristol, UK*, C. Michie, W. Johnstone, *University of Strathclyde, Glasgow, Scotland, UK* and H. J. White, *BAE Systems, Filton, Bristol, UK*

This paper reviews the suitability of semiconductor optical amplifiers for avionic networks. Analysis of power consumption to maintain amplification over an extended temperature range has been undertaken, along with a discussion of the operational performance.

2:45 PM - 3:15 PM

COFFEE BREAK

3:15 PM - 4:45 PM

Session TuE: ANALOG/RF PHOTONICS I

Session Chair: Mark W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA*
William L. Stewart, *Information Gatekeepers Inc., Benbrook, TX, USA*

TuE1 3:15 PM - 3:45 PM (Invited)

Photonic Microwave-to-Digital Subsystems: When, Why and How, T. R. Clark, *Pharad, LLC, Glen Burnie, MD, USA*, P. Callahan, *Johns Hopkins University, Laurel, MD, USA*, S. O'Connor, D. Novak, *Pharad, LLC, Glen Burnie, MD, USA* and M. L. Dennis, *Johns Hopkins University, Laurel, MD, USA*

We classify analog waveforms representing the key classes of modern avionic microwave system inputs and describe recently demonstrated photonic microwave-to-digital architectures suitable for achieving critical digitized output information.

TuE2 3:45 PM - 4:15 PM (Invited)

System Implementation of Coherent Analog Optical Links, C. Middleton and R. DeSalvo, *Harris Corporation, Melbourne, FL, USA*

We describe an analog optical link using coherent detection and amplitude modulation for high SFDR, gain, and low noise figure. We then address the dominant performance-limiting parameters and discuss several approaches to overcome these limitations.

TuE3 4:15 PM - 4:30 PM

The Performance of Unbiased Balanced Photodiodes for Optical Calibration of Radio-Frequency Antenna Arrays, V. J. Urick, J. Diehl, C. S. McDermitt, F. Bucholtz and K. J. Williams, *US Naval Research Laboratory, Washington, DC, USA*

Unbiased balanced photodiode pairs for optical calibration of RF antenna arrays are considered. We have previously demonstrated that reversed-biased balanced photodiodes will suppress photodiode-induced distortion for RF-over-fiber applications. Here we demonstrate a 26-dB increase in second-order output intercept point in unbiased photodiodes for array calibration.

TuE4 4:30 PM - 4:45 PM

Enhancing Mach-Zehnder Modulator Linearity, W. S. Fegadolli, V. R. Almeida, O. L. Coutinho and J. E. B. Oliveira, *Instituto Tecnológico de Aeronáutica, São José dos Campos, Brazil*

A configuration of electro-optic modulator is theoretically presented in this work, the results reveal that the insertion of one ring resonator on a Mach-Zehnder modulator's arm can enable an enhancement of, approximately, 18 dB at the spurious free dynamic range of an analog optical link.

5:00 PM - 7:00 PM

WELCOME RECEPTION IN THE ATRIUM

Wednesday, 22 September 2010

8:30 AM - 10:30 AM

Session WA: INSTALLATION SUPPORT

Session Chair: Ronald G. Pirich, *Northrop Grumman Corporation, Bethpage, NY, USA*
Richard C. Jones, *Lockheed Martin, Fort Worth, TX, USA*

WA1 8:30 AM - 9:00 AM (Invited)

Optical Performance Monitoring, A. E. Willner, *University of Southern California, Los Angeles, CA, USA*

ABSTRACT NOT AVAILABLE

WA2 9:00 AM - 9:30 AM (Invited)

Fiber Optic Test in the Life Cycle of Commercial Aircraft, L. Paterson, *Boeing Company, Seattle, WA, USA*

The recent expansion of fiber optic based systems in commercial aircraft brings new opportunities and challenges to manufacturing and airline operations. Commonality in design, training and test methods drives simplicity in the aircraft life cycle.

WA3 9:30 AM - 10:00 AM (Invited)

Practical Hands-On Fiber Optic Testing & Troubleshooting for Commercial Airplanes, D. Haskell, *Boeing Company, Seattle, WA, USA*

ABSTRACT NOT AVAILABLE

WA4 10:00 AM - 10:15 AM

Fiber Optic Test & Qualification Standarda for Ruggedized Environments, C. Tabbert, *Ultra Communications Inc., Vista, CA, USA*

This paper outlines worldwide efforts underway to standardize the testing and qualification of fiber optic components for ruggedized applications

WA5 10:15 AM - 10:30 AM

Troubleshooting Tools for Fiber Optics Cables, B. Huttner, *Luciol Instruments, Mies, Switzerland*

With ever increasing applications of fiber optics in harsh environment, suitable test tools for characterization, maintenance and troubleshooting of fiber assemblies are required. We discuss various alternatives, with emphasis on reflectometry.

10:30 AM - 10:45 AM

COFFEE BREAK

10:45 AM - 12:15 PM

Session WB: INTEGRATED PHOTONICS

Session Chair: Wayne C. Chang, *US Army Research Laboratory, Adelphi, MD, USA*
Christopher Middlebrook, *Michigan Technological University, Houghton, MI, USA*

WB1 10:45 AM - 11:15 AM (Invited)

Photonic Integrated Circuits for Broadband Analog Signal Processing: Progress and Challenges, M. W. Haney, *Defense Advanced Research Projects Agency, Arlington, VA, USA*

DARPA's programs in photonic integrated circuits for high dynamic range, high bandwidth analog signal processing are reviewed. The focus is on "unit cells" as building blocks from which programmable complex analog filters can be formed.

WB2 11:15 AM - 11:45 AM (Invited)

Silicon Based Photonics, C. B. Poitras, *Cornell University, Ithaca, NY, USA*

ABSTRACT NOT AVAILABLE

WB3 11:45 AM - 12:00 PM

Effects of Lithographic Roughness and Sidewall Slope on the Optical Performance of Polymer Rectangular Waveguides: Modeling, N. Riegel, C. Middlebrook, *Michigan Technological University, Houghton, MI, USA*, W. Buller, *Michigan Tech Research Institute, Ann Arbor, MI, USA* and M. Roggemann, *Michigan Technological University, Houghton, MI, USA*

Fabrication of polymer waveguides are subject to insertion losses from fabrication defects (i.e. sidewall roughness and slope). Modeling these defects allows for tolerance specifications, which will allow the channel to operate within the link budget.

WB4 12:00 PM - 12:15 PM

Methods for Modeling Multimode Waveguides with Abrupt Changes in Propagation Axis, W. Buller, *Michigan Tech Research Institute, Ann Arbor, MI, USA*, C. Middlebrook, N. Riegel and M. Roggemann, *Michigan Technological University, Houghton, MI, USA*

The computational complexity of FDTD simulations of waveguide components that abruptly modify the propagation axis may be greatly reduced by replacing those components with field monitors and convolving the field with the component's transfer function.

12:15 PM - 1:45 PM

LUNCH BREAK

1:45 PM - 3:15 PM

Session WC: AVIONICS ARCHITECTURE AND NETWORKING II

Session Chair: Michael J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*
William P. Krug, *Boeing Company, Seattle, WA, USA*

WC1 1:45 PM - 2:15 PM (Invited)

Channel Separation Using WDM Technology in Military Applications, B. L. Uhlhorn, *Lockheed Martin, Eagan, MN, USA*

Military applications require high bandwidth interconnects that maintain the separation between data channels of different security levels. The typical approaches of physical separation and encryption are compared to using wavelength division multiplexing technology.

WC2 2:15 PM - 2:30 PM

Multi-Channel DWDM Transmitter Using Agile Electronics, C. B. Kuznia, *Ultra Communications Inc., Vista, CA, USA* and B. E. Lemoff, *West Virginia High Tech Consortium, Fairmont, WV, USA*

We present a strategy for integrating 'agile electronics' within optical network devices to create low power, low latency, and compact WDM LAN components suitable for avionics applications.

WC3 2:30 PM - 2:45 PM

Dual Laser Fast Wavelength Switched Optical Transmitter, L. A. Johansson, M. Mashanovitch and J. S. Barton, *Freedom Photonics, LLC, Santa Barbara, CA, USA*

The switching behaviour of SGDBR lasers is investigated. Both fast carrier effects and slow thermal effects are considered. To meet packet switching requirements (<10ns switching time) a dual laser transmitter with gating SOAs is required. 2 ns wavelength switching time is demonstrated.

WC4 2:45 PM - 3:15 PM (Invited)

Architecting the WDM LAN Ecosystem, D. Flynn, *Accipiter Systems, Wexford, PA, USA*

The development of a new networking paradigm such as WDM LAN involves risk and requires substantial investment. This paper describes the creation of a WDM LAN Ecosystem for Government and member benefit.

3:15 PM - 3:30 PM

COFFEE BREAK

3:30 PM - 5:00 PM

Panel Session: PROGRESS TOWARDS A WDM LAN STANDARD: THE NEXT STEPS FORWARD

Moderator: Michael J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*

More Information still to come!

Thursday, 23 September 2010

8:30 AM - 10:15 AM

Session ThA: ANALOG/RF PHOTONICS II

Session Chair: Gregory L. Abbas, *EOSpace Incorporated, Redmond, WA, USA*
Milan Mashanovitch, *Freedom Photonics, LLC, Santa Barbara, CA, USA*

ThA1 8:30 AM - 9:00 AM (Invited)

RF Photonic Links, M. C. Wu, *University of California - Berkeley, Berkeley, CA, USA*

ABSTRACT NOT AVAILABLE

ThA2 9:00 AM - 9:30 AM (Invited)

Sampled Analog Links, J. D. McKinney, *US Naval Research Laboratory, Washington, DC, USA*

Sampled analog optical links offer several unique capabilities by virtue of a pulsed optical carrier. This talk will detail sampled link operation and discuss selected applications. Particular attention will be given to sampled links in long-haul systems where stimulated Brillouin scattering typically limits link performance.

ThA3 9:30 AM - 10:00 AM (Invited)

A Photonic Neuromorphic Computational Primitive for Complex High Bandwidth Signal Processing, D. Rosenbluth, M. Olivieri, *Lockheed Martin, Cherry Hill, NJ, USA*, K. S. Kravtsov, M. P. Fok and P. R. Prucnal, *Princeton University, Princeton, NJ, USA*

This paper presents an all optical fiber based implementation of a hybrid analog-digital computational primitive that provides a basis for complex processing on high bandwidth signals. This neuromorphic computational primitive is the first all optical implementation of a spiking Leaky-integrate-and-fire neuron.

ThA4 10:00 AM - 10:15 AM

Performance and Simulation for Transmission of RF and Digital Signals over Optical Fibers, A. Brunsting and K. Koch, *Nuwaves Engineering, Middletown, OH, USA*

This communication system transmits RF and digital signals over optical fibers, resulting in low cross coupling, immunity to inter-board EMI/RFI, high isolation of adjacent circuitry, low power, and a miniature form factor.

10:15 AM - 10:45 AM

COFFEE BREAK

10:45 AM - 12:45 PM

Session ThB: ADVANCED PHOTONIC TECHNOLOGIES

Session Chair: Michael J. Hayduk, *US Air Force Research Laboratory, Rome, NY, USA*
Richard DeSalvo, *Harris Corporation, Melbourne, FL, USA*

ThB1 10:45 AM - 11:15 AM (Invited)

Defining Capabilities of Si and InP Photonics, G. Vawter, *Sandia National Laboratories, Albuquerque, NM, USA*

This talk will review the three classes of photonic circuit and highlight the unique strengths, and weaknesses, of circuits based on Silicon and InP substrates. Examples will be provided from recent R&D activity.

ThB2 11:15 AM - 11:45 AM (Invited)

Field Repair Options for Fiber Optic Cable: Fusion Splicing, Mechanical Splicing, and Field Termination, L. Wesson, *Aurora Optics, Broad Ax, PA, USA*

Field termination enables replacement of damaged connectors in-situ. Mechanical splicing can make expedient repairs relatively quickly, and fusion splicing can return broken cables to near-new condition, though at somewhat greater expense.

ThB3 11:45 AM - 12:15 PM (Invited)

Pulse Position Modulation (PPM) Fiber Optic Architectures, A. J. Mendez, *Mendez R&D Associates, El Segundo, CA, USA*

Design rules are described for architecting PPM transmitters and receivers where optical processing (based on fiber optic or planar lightwave circuits) is required. The concept of map-coding for designing a direct translating receiver is described.

ThB4 12:15 PM - 12:45 PM (Invited)

Reliability & Failure Analysis Methodology of Optoelectronics and its Extendibility for Future Technologies, J.-S. Huang, *Emcore Corp., Alhambra, CA, USA*

We review the state-of-the-art reliability and failure analysis methodology of the optoelectronic devices. We will discuss the feasibility and extendibility of applying those established techniques to the future technologies such as nanotechnologies and renewable energies.

END OF PROGRAM