

Advance Program

Tuesday, 30 September 2008

ALL SESSIONS TO BE HELD IN COAST BALLROOM

8:00 AM - 10:00 AM

Session TuA: INTRODUCTION/OPENING
Session Co-Chairs: Thomas F. Dermis, *US Air Force Research Laboratory, WPAFB, OH, USA*
 Rick C. Stevens, *Lockheed Martin, Egan, MN, USA*

8:00 AM - 8:30 AM

ICE OVERVIEW/OPENING REMARKS

TuA1 8:30 AM - 9:00 AM (Invited)

DWDM Networking Technologies for Avionics Applications, H. Kobrinski, *Telcordia Technologies, Inc., Red Bank, NJ, USA*

DWDM is becoming the primary transport technology in telecom networks. Many of its advantages – primarily scalable capacity - can also be realized over aircraft platforms. This paper reviews DWDM technologies developed for telecom networks and their application for aviation platforms.

TuA2 9:00 AM - 9:30 AM (Invited)

Next-Generation Fiber-Optic Technology Enablers for Manned & Unmanned ISR Platforms, R. Pirich and P. Anumolu, *Northrop Grumman Corporation, Bethpage, NY, USA*

This presentation will address the selection and integration of next-generation fiber-optic technology enablers, such as High Density Fiber-Optic Sensors, Single Mode/Multi-Mode and High Power Fiber-Optic Rotary Connection Technology, Fiber-Optics to Excite, Receive and Control T/R Modules and Photonic Switched True Time Delay (TTD) Beam Forming Networks.

TuA3 9:30 AM - 10:00 AM (Invited)

Photonics for RF Systems, S. A. Pappert, R. Esman, *Defense Advanced Research Projects Agency, Arlington, VA, USA* and B. Krantz, *Booz Allen Hamilton, Arlington, VA, USA*

This paper provides an overview of state-of-art low noise figure and high dynamic range RF distribution links and delay lines, low phase noise RF oscillators, and fast tunable RF filters developed using photonic technologies.

10:00 AM - 10:30 AM

COFFEE BREAK

10:30 AM - 12:00 PM

Session TuB: APPLICATIONS/SECURITY
Session Co-Chairs: Mark W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA*
 Praveen Anumolu, *Northrop Grumman Corporation, Bethpage, NY, USA*

TuB1 10:30 AM - 11:00 AM (Invited)

Electrical, Optical, and Thermal Interconnect Networks for 3D Heterogeneous Integrated Systems, M. S. Bakir, C. King, D. Sekar and B. Dang, *Georgia Institute of Technology, Atlanta, GA, USA*

This paper reports, for the first time, a 3D integrated system that features wafer-level batch fabricated electrical, optical, and fluidic (or 'trimodal') chip I/O and through-silicon interconnects to enable ultimate performance 3D systems.

TuB2 11:00 AM - 11:15 AM

Applicability and Recommendation of Optical Reflectometer Technology on Naval Aircraft, E. Tegge, *Harris Corporation, USA*

Fault location identification within the fiber optic systems of naval aircraft currently requires maintenance personnel to break the optical link to insert test equipment. This procedure changes the configuration which often masks the failure and exposes the fiber link to additional contamination.

TuB3 11:15 AM - 11:30 AM

Cost Effective Fiber Optic Physical Layer For Aircraft Utility Networks, L. Bolton, *Ge Aviation, Cheltenham, Gloucestershire, UK*

This paper describes development work on a cost effective optical physical layer for a time-triggered, deterministic utility network aimed at civil transport and business jet aircraft.

TuB4 11:30 AM - 11:45 AM

Bidirectional Link Mock-Up for Avionics Applications, K. Ly, *Airbus France, Toulouse, France*, A. Rissons, *Institut Supérieur de L'Aéronautique et de L'Espace, Toulouse, France*, F. Quentel, M. Pez, *D-Lightsys, Marcoussis, France*, E. Gambardella, *Airbus France, Toulouse, France* and J.-C. Mollier, *Institut Nationale Supérieure de L'Aéronautique et de L'Espace, Toulouse, France*

This paper gives the performance of an Avionics Full Duplex link based on 850nm VCSEL technology. The experimental results of a 100m link representative of real aircraft-type application are validated according to the IEEE requirements.

TuB5 11:45 AM - 12:00 PM

Incoherent Optical Frequency Domain Reflectometry for Health Monitoring of Avionics Fiber Optics Networks, G. Ryu, *University of Maryland, College Park, MD, USA* and M. Dagenais, *New Integration Photonics, Chevy Chase, MD, USA*

We present a sensitive, linear and high spatial resolution approach for the detection of reflections in avionic optical fiber links. A 2 mm spatial resolution combined with a 70 dB optical dynamic range was demonstrated.

12:00 PM - 1:30 PM**LUNCH BREAK****1:30 PM - 2:45 PM****Session TuC:****CABLING AND INTERCONNECT****Session Co-Chairs:**

Vincent J. Urick, *US Naval Research Laboratory, Washington, DC, USA*

Rick C. Jones, *Lockheed Martin, Fort Worth, TX, USA*

TuC1 1:30 PM - 1:45 PM

Air Vehicle Fiber Optic Cable Infrastructure, B. C. McDermott, M. W. Beranek and M. J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*

This paper provides the reader with reasoning for re-evaluating the physical and logical importance of viewing an air vehicle's fiber optic cabling infrastructure as a standalone system.

TuC2 1:45 PM - 2:00 PM

Broken Aerospace Fiber Optic Cable Characterization, M. W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA*, J. Ahadian, C. B. Kuznia, *Ultra Communications Inc., Vista, CA, USA* and B. Pregger, *US Naval Air Systems Command, Patuxent River, MD, USA*

The fracture morphology of a kinked aerospace fiber optic cable is consistent with a test fiber fractured in bending. The fracture was detected by both optical time and coherent optical frequency domain reflectometry methods.

TuC3 2:00 PM - 2:15 PM

Development of an Optical Fiber Cable Plant for Sixth Generation Avionics Networks, M. J. Hackert, M. W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA* and B. C. McDermott, *US Naval Air Warfare Center, Patuxent River, MD, USA*

This paper describes the development and current standardization of an optically transparent, future-proofed cable plant that can support the aerospace industry's transition to high speed, high connectivity optical networking that can survive the 25-100 year life of the airframe.

TuC4 2:15 PM - 2:30 PM

Hermetic Fiber Optic Connectors and Feedthrus, M. Evrard, *Pacific Aerospace and Electronics, Versailles, France, France* and A. E. Meade, *Pacific Aerospace and Electronics, Wenatchee, WA, USA*

Thanks to their specific Kryoflex® ceramic formulation, PA&E has developed a unique way of providing hermetic fiber optic-to-ferrule contact with a leak rate = 10^{-9} atm.cm³.s⁻¹.

TuC5 2:30 PM - 2:45 PM

Optical Wireless Links for Aerospace Applications, D. N. Harres, *Boeing Company, Belleville, IL, USA*

The potential use for optical wireless is quite high and is largely untapped in the aerospace industry. Contrary to experience with consumer use, such as TV remotes, this technology is extremely powerful when properly implemented.

2:45 PM - 3:15 PM**COFFEE BREAK****3:15 PM - 4:45 PM****Session TuD:****ANALOG PHOTONICS****Session Co-Chairs:**

Everett W. Jacobs, *SPAWAR Systems Center - San Diego, San Diego, CA, USA*

John Gallo, *Xadair Technologies, Jacksonville, FL USA*

TuD1 3:15 PM - 3:30 PM

Laser and Photodiode Requirements for Analog Photonics, V. J. Urick, *US Naval Research Laboratory, Washington, DC, USA*, J. Diehl, *SFA, Inc., Crofton, MD, USA*, A. S. Hastings and P. S. Devgan, *US Naval Research Laboratory, Washington, DC, USA*

This paper briefly reviews the laser and photodiode requirements for high-performance intensity-modulation, direct-detection photonic links. As it is relevant to ongoing avionic programs, we also report on the performance of an erbium-glass microchip laser and a high-power partially-depleted-absorber photodiode for analog applications.

TuD2 3:30 PM - 4:00 PM (Invited)

Increased Dynamic Range for Microwave Photonic Links, A. Karim and J. Devenport, *L-3 Photonics, Carlsbad, CA, USA*

A microwave photonic link was demonstrated with a spur-free dynamic range (SFDR) of 71 dB in a 500 MHz bandwidth. A down-converting link was demonstrated with an SFDR of 64 dB in 500 MHz.

TuD3 4:00 PM - 4:30 PM (Invited)

Wideband RF Photonic Pre-Selector for Dynamic Co-Site Interference Mitigation, M. Borbath, *Harris Corporation, Palm Bay, FL, USA*, C. Middleton, J. Wyatt and R. DeSalvo, *Harris Corporation, Melbourne, FL, USA*

Antennas in congested RF environments are susceptible to co-site interference. We present an all-optical technique to mitigate the interfering signal by generating nulls at specific frequencies. We demonstrate the nulling of an interfering signal by over 50 dB without attenuating the signal of interest.

TuD4 4:30 PM - 4:45 PM

A Single-Sideband Suppressed-Carrier Ring Laser Transmitter for Coherent Analog Optical Links, R. Forber, *IPITEK, Carlsbad, CA, USA*, G. Zhu, *University of California - Los Angeles, Los Angeles, CA, USA*, W. C. Wang, *IPITEK, Carlsbad, CA, USA*, B. J. Bortnik, W. Liu and H. R. Fetterman, *University of California - Los Angeles, Los Angeles, CA, USA*

We report progress on a single-sideband suppressed-carrier photonic RF transceiver for high dynamic range coherent analog optical links. This COTS-based RF link had a measured spurious-free dynamic range of $121 \text{ dB-Hz}^{2/3}$ at 11 GHz.

5:00 PM - 7:00 PM

WELCOME RECEPTION

5:00 PM - 7:00 PM

Session P: POSTER SESSION

Session Chair: Mark W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA*

Milan L. Masanovic, *University of California - Santa Barbara, Santa Barbara, CA, USA*

P1 A Pressure Sensing System using Fiber Optic Sensors and Artificial Neural Networks, X. Jin, X.-H. Yu, S. Zargar, R. H. Patel and S. Wards, *Cal Poly State University, San Luis Obispo, CA, USA*

A smart pressure-sensing system which can test dynamic pressure up to 200 psi is developed. Based on the measurement data from fiber sensors, artificial neural network is successfully applied for modeling and estimation.

P2 Design and Implementation of Mobile Free Space Optical Communication System, X. Jin, X. Wang and C. Y. Hsu, *Cal Poly State University, San Luis Obispo, CA, USA*

The paper presents a mobile, low power, light weight and low cost 10MHz free-space optical communication system, which has 50m range. Laser-diodes and tracking systems are used. The optical link is simulated and tested.

P3 Design and Fabrication of Piezo-Optical Fabry-Perot Voltage Sensor, M. Mozafari, *Niroy Research Institute, Tehran, Iran*

We have designed and fabricated a piezo-optical voltage sensor based on Fabry-Perot interferometer, which can measure AC voltages from 1 to 400 V rms with linear response. It can be used in Optical Voltage Transducers.

P4 Eliminating Dispersion and ISI in Optical Wireless Environment using Optical DFT OFDM System, M. Khedr, M. Hussien and M. Tamazin, *Arab Academy for Science and Technology, Alexandria, Egypt*

All optical orthogonal frequency division multiplexing is used to achieve high bit rate and eliminate intersymbol interference in optical wireless communications. Overall architecture is enlightened and analytical evaluation is presented for direct and diffused environment.

P5 Bidirectional Video Transmission for Avionics Applications, M. Pez and C. Hartmann, *D-Lightsys, Marcoussis, France*

A Single wavelength bi-directional and full-duplex optical links is demonstrated through a full-duplex video multiplexing transmission. The system, main performances and limitations are described and compared with avionics requirements and standards.

Wednesday, 01 October 2008**8:30 AM - 10:00 AM****Session WA: OPTICAL COMPONENTS I****Session Co-Chairs:** Michael J. Hayduk, *US Air Force Research Laboratory, Rome, NY, USA*
Milan L. Masanovic, *University of California - Santa Barbara, Santa Barbara, CA, USA***WA1 8:30 AM - 9:00 AM (Invited)****Wafer Bonded Silicon Photonics**, D. Liang, A. W. Fang, H.-W. Chen and J. E. Bowers, *University of California - Santa Barbara, Santa Barbara, CA, USA*

We review the most recent progress in the hybrid silicon evanescent platform, including CMOS-compatible, high-yield, high-efficiency InP-to-Si direct wafer bonding and the demonstration of distributed feedback lasers and phase modulators in this platform.

WA2 9:00 AM - 9:30 AM (Invited)**Fiber Optic Requirements for Advanced Platform Integration**, R. Pirich, T. Innes and P. Anumolu, *Northrop Grumman Corporation, Bethpage, NY, USA*

This presentation will address the need for fiber-optic integration process and maintainability improvement. For example, the importance of proper endface preparation will not only optimize optical transmittance, but will increase the in-service life of the terminus interconnect.

WA3 9:30 AM - 9:45 AM**Photonic Component and Subsystem Reliability Modeling**, D. Nicholls, *Quanterion Solutions, Utica, NY, USA*, A. Avak, *US Naval Air Warfare Center, Patuxent River, MD, USA* and J. S. Mazurowski, *Penn State Electro-Optics Center, Freeport, PA, USA*

The use of photonics is becoming a commonplace in the design of modern avionic systems. Advantages of these systems are that they have high data transfer rates, are light weight, are small and are immune to electromagnetic interference.

WA4 9:45 AM - 10:00 AM**Comparing Polymer Optical Fiber (POF), Fiber Bragg Gratings and Traditional Strain Gauge for Aircraft Structural Health Monitoring**, J. Gómez Alonso, J. Zubia Zaballa, G. Aranguren Aramendia, G. Durana Apaolaza, *University of the Basque Country, Bilbao, Spain*, J. A. Illaro, I. Sáez de Ocáriz, *Aeronautical Technologies Center, Vitoria, Spain*, M. Kirchhof, H. Poisel and E. Hartl, *University of Applied Sciences, Nuremberg, Germany*

This work analyzes if Polymer Optical Fibers (POF) could substitute the traditional strain gauges that are commonly used in Structural Health Monitoring (SHM) tests, or the quite recent sensors based on fiber Bragg gratings.

10:00 AM - 10:30 AM**COFFEE BREAK****10:30 AM - 12:30 PM****Session WB: OPTICAL COMPONENTS II****Session Co-Chairs:** Neal K. Bambha, *US Army Research Laboratory, Adelphi, MD, USA*
Andrew S. Glišta, *Liteboard Technology, Annemdale, VA, USA***WB1 10:30 AM - 11:00 AM (Invited)****Miniature Laser Rangefinders and Laser Altimeters**, J. Geske, M. H. MacDougal, R. P. Stahl, *Aerius Photonics, Ventura, CA, USA*, J. Wagener, *US Air Force Research Laboratory, Eglin AFB, FL, USA* and D. R. Snyder, *US Air Force, Crestview, FL, USA*

A miniature laser rangefinder/altimeter with a system weight of only 26 grams will be presented. Performance and new flight modalities enabled for small unmanned aerial vehicles (UAVs) will be discussed.

WB2 11:00 AM - 11:30 AM (Invited)**Ultra-low Voltage GaAs/AlGaAs Mach-Zehnder Intensity Modulators**, J. H. Shin and N. Dagli, *University of California - Santa Barbara, Santa Barbara, CA, USA*

Mach-Zehnder intensity modulators in substrate removed very compact GaAs/AlGaAs optical waveguides having buried electrodes are described. 0.3 V drive voltage was realized at 1.55 micrometer for 7 mm long electrodes under push-pull operation.

WB3 11:30 AM - 12:00 PM (Invited)**Mach-Zehnder Quantum Well Modulators for Aerospace Applications**, E. T. Kunkee, R. Davis and A. D. Smith, *Northrop Grumman Space Technology, Manhattan Beach, CA, USA*We provide experimental benchmark data and identify aerospace applications for which quantum well Mach-Zehnder modulators are well suited. An InP MZM gives a V- π of 2.0, insertion loss of 11dB, and bandwidth of 8GHz.

WB4 12:00 PM - 12:15 PM

Receiver Architecture for 12.5 Gb/s 16-ary Pulse Position Modulation (PPM) Signaling, A. J. Mendez, *Mendez R&D Associates, El Segundo, CA, USA*, R. M. Gagliardi, *University of Southern California, Los Angeles, CA, USA*, V. J. Hernandez and C. V. Bennett, *Lawrence Livermore National Laboratory, Livermore, CA, USA*

The architecture of a 16-ary PPM transceiver for 12.5 Gb/s communications in fiber optic avionics applications is described. The demodulator/receiver design is based on mapping the optical output to a virtual detector array. Numerical simulations evaluating the concept are discussed.

WB5 12:15 PM - 12:30 PM

Low Cost, High Data Rate White LED (WLED) Transceiver Demonstration, E. Y. Chan, D. Koshinz, W. P. Krug, and H. Hager, *Boeing Company, Seattle, WA, USA*

Due to avionics interest in wireless white LED (WLED) communication, an experimental implementation of a WLED transceiver by retrofitting low cost COTS WLED in standard transceiver, error free free-space operation at 10Mb/s is successfully demonstrated.

12:30 PM - 1:30 PM**LUNCH BREAK****1:30 PM - 3:00 PM**

Panel: COMMERCIALIZING PHOTONICS IN AVIONICS
Moderator: Michael S. Lebby, *OIDA, Washington, DC, USA*

This session will briefly describe the panelists company's capabilities in optoelectronic technologies. They will explore more efficient ways to support defense applications in avionics. It is hoped that through discussions, better alignment can be achieved between defense and commercial sectors.

Michael S. Lebby, PhD, MBA, DEng, CEng

President and CEO

Michael Lebby's career has spanned all aspects of the optoelectronics and photonics business ranging from research and development, operations, manufacturing, and finance, to sales, marketing, and investing. He holds more than 175 U.S. patents issued in the optoelectronics and photonics field.

Lebby graduated with honors in the UK 1984 and started researching InP-based optoelectronic integrated circuits at RSRE in Malvern. In 1985, Lebby's research took him to AT&T Bell Laboratories photonics research division where he pursued OEIC-based themes that incorporated both optoelectronic and electronic device functionalities. In 1989 Lebby took his research studies to Motorola's Phoenix Corporate Research Laboratory in Arizona. At Motorola, Lebby developed highly reliable VCSEL based technologies and initiated Motorola's parallel optics interconnect program that was called Optobus™. As an R&D leader, Lebby led his research team to qualify the VCSEL and packaging technology using traditional Motorola qualification procedures. Lebby broadened his optoelectronic R&D skills through his role as Business Technology Development Manager in 1997. In this role, Lebby managed all aspects of advanced technologies in corporate R&D that included micro-displays, organic LEDs, laser diodes and detector arrays.

In August 1998, Lebby joined AMP (now Tyco) as a member of the Global Optoelectronics Division's management team. At Tyco he was responsible for growing the fiber optic datacom and telecom business through external interactions that included mergers, acquisitions strategic alliances, and technical strategic planning. Lebby drove Tyco's return into the 1 Gbps Ethernet transceiver market based on VCSEL technology. During the summer of 1999, Lebby joined Intel as a corporate investor and was responsible for sourcing, negotiating, and closing private placement equity deals in the optical networking, component, and semiconductor arenas. Lebby participated in a number of board level activities in the optoelectronics sector.

In January 2001, Lebby founded a new fiber optics company, Ignis Optics, where he served as the CEO. Lebby led the company to secure multinational customers in the telecommunications market. Lebby's team helped define the XFP standard for 10 Gbps transceivers, which gave the company market leadership on a global level. Ignis Optics was acquired by Bookham Technology in October 2003 and Lebby became responsible for corporate and technical strategy at Bookham Technology.

Dr. Lebby joined OIDA as Executive Director in early 2005 and was elected as the new president and CEO of OIDA on February 17, 2006.

In November 2005, Lebby was elected an IEEE Fellow for contributions to optoelectronics technology, and in November 2007, Lebby was elected an OSA Fellow for photonics leadership and contributions to VCSEL technology.

Edward Cornejo, *Opnext, Inc., Eatontown, NJ, USA*

Vice President of Product Marketing

High Performance Communications in Avionics, E. Cornejo, *Opnext, Inc., USA*

ABSTRACT NOT AVAILABLE

Edward Cornejo is responsible for product marketing and strategy at Opnext, Inc. Prior to joining Opnext, Mr. Cornejo spent more than 15 years in the optoelectronics industry with Lucent Technologies Microelectronics Division and AMP, Inc encompassing manufacturing, engineering, product management and marketing roles. Throughout his career, Mr. Cornejo has been a critical force in propelling new

products to market with several successful product extensions. He has been a key contributor to IEEE 1G and 10G standards and has been co-founder of some of the most successful 10G MSA organizations further accelerating market acceptance of key technologies. He currently serves or supports 40G and 100G special interests groups, Ethernet Alliance, OIDA and is an IEEE member. Mr. Comejo has a Bachelors of Science degree in Electronics Engineering and his Masters of Science degree in Management from the New Jersey Institute of Technology.

Mr. Comejo currently serves as a key spokesman for Opnext, Inc. He is active in all media and industry analyst relations activities. He has also participated in several industry panel discussions relating to technology and market trends for higher speed Ethernet, SONET, and WDM.

Ronald T. Logan, Jr., Emcore, Alhambra, CA, USA

Managing Director and Chief Engineer

Hybrid Integrated Photonics Capabilities, R. Logan, Emcore, USA

ABSTRACT NOT AVAILABLE

Ron Logan BIOGRAPHY NOT AVAILABLE

Jan Meise, Finisar, France

Director of Strategic Marketing

Active Optical Cable Needs for Harsh Environments, J. Meise, Finisar, France

ABSTRACT NOT AVAILABLE

Jan Meise has served as the Director of Strategic Marketing for Finisar Corporation since 2006. Prior to this, he spent five years as the Director of International Sales also with Finisar. He has held various marketing management positions with Quicklogic and Future Electronics. Jan earned an MSEE from Technical University Braunschweig in Germany.

Paul Rudy, QPC Lasers, Sylmar, CA, USA

Vice President of Marketing and Sales

Recent Trends in High Brightness Semiconductor Lasers for Defense and Avionics Applications, P. Rudy, QPC Lasers, USA

Since their invention, lasers have enjoyed widespread deployment in defense and avionics platforms for a wide variety of applications such as communications, navigation, rangefinding, remote sensing, friend / foe identification, target designation, illumination, bio-chem agent detection, IRCM, ordinance initiation, and directed energy weapons. Semiconductor lasers are ideally suited for defense and avionics applications because of their compact size, efficient lightweight design, and robust operation in stressful environments. Several military applications have the potential of adopting direct diode sources as a result of ongoing advances in semiconductor laser technology such as efficiency improvements, brightness and power scaling, increased spectral stability and brightness, and extended wavelength range into the visible/UV as well as the eye-safe and mid-IR regime.

Paul Rudy, Ph.D., is Senior Vice President of Marketing & Sales for QPC Lasers, Inc. a leading manufacturer of semiconductor lasers for the defense, medical, industrial, and consumer markets. Prior to joining QPC, Dr. Rudy served as Director of Marketing at Coherent Inc.'s Semiconductor Business Unit. There, he led the tactical and strategic marketing activities of the high power diode laser business, overseeing product management and developing strategies for the business unit's technology, products, and markets. Prior to this role, Dr. Rudy worked as Coherent Inc.'s North American Market Development Manager responsible for developing and executing sales and tactical marketing strategies for the corporation's defense business. Dr. Rudy received his masters and doctoral degrees in physics from the University of Rochester and earned a B.S. and B.A. in physics and philosophy with honors from Duke University.

Basil Garabet, EM4, Inc., Bedford, MA, USA

Chief Executive Officer

Photonic Packaging and Manufacturing in Avionics, B. Garabet, EM4, USA

ABSTRACT NOT AVAILABLE

Basil Garabet has a long history of leading successful companies in the optical communications market. Prior to founding EM4, Inc., Mr. Garabet was the Senior Vice President of Marketing and Sales for Altitun, an advanced manufacturer of tunable lasers for DWDM telecommunication applications. While a member of Altitun's senior management team, Mr. Garabet was responsible for all global commercialization activities and played a leading roll in the eventual sale of the company to ADC Telecommunications. Prior to joining Altitun, Mr. Garabet was the Chief Operating Officer of Melles Griot's Photonics Division, an international manufacturer and distributor of lasers and photonics components serving the telecommunications, semiconductor and medical markets. Mr. Garabet also has experience at Pirelli Cable Corporation where he led the North American Optical Communication Systems Sales and Marketing Group specializing in WDM and optical amplifier based systems. In addition, Mr. Garabet held senior sales management positions at Lasertron and Micracor, manufacturers of IR laser and detector components.

Mr. Garabet holds a Masters of Science degree in Lasers and Applications from Essex University in Essex, United Kingdom, and a Bachelor of Science degree in Applied Physics from Portsmouth Polytechnic in Portsmouth, United Kingdom.

Tom Palkert, *Xilinx, San Jose, CA, USA*

Silicon Photonics in Avionics, T. Palkert, *Xilinx, Inc., USA*

ABSTRACT NOT AVAILABLE

Tom Palkert BIOGRAPHY NOT AVAILABLE

3:00 PM - 3:30 PM

COFFEE BREAK

3:30 PM - 5:00 PM

Session WC:

WDM I

Session Co-Chairs:

William P. Krug, *Boeing Company, Seattle, WA, USA*

Rick C. Stevens, *Lockheed Martin, Eagan, MN, USA*

WC1 3:30 PM - 4:00 PM (Invited)

Monolithically Integrated Tunable Laser Transmitters for WDM Avionics System, K.-Y. Liou, *Multiplex, Inc., South Plainfield, NJ, USA*

We describe InP-based tunable laser transmitters with integrated electro-absorption modulator at 10 Gb/s for avionic WDM communication systems. Monolithic chip construction and ultra-compact subsystem integration for aerospace environment are reported.

WC2 4:00 PM - 4:30 PM (Invited)

Topics in VCSEL-Based High-Speed WDM Optical Interconnects, J. Cheng, *University of Texas at Austin, Austin, TX, USA*

Several approaches using wavelength division multiplexing of high-speed VCSELs to achieve optical interconnects with high aggregate bandwidth are described.

WC3 4:30 PM - 5:00 PM (Invited)

Multi-Mode WDM Transceiver, P. S. Guilfoyle, K. M. Patel, M. T. Harris, U. Retnasingham, S. Q. Luong, D. Kumar, D. A. Louderback and S. Mahnkopf, *OptiComp Corporation, Zephyr Grove, NV, USA*

A transceiver module is presented that is capable of transmitting and receiving 4 wavelength channels. Each channel can be modulated at 2.5Gbps with peak Tx powers of 6.0mW per channel and Rx sensitivity of -6.5dBm.

Thursday, 02 October 2008

8:30 AM - 9:45 AM

Session ThA:

WDM II

Session Co-Chairs:

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

William P. Krug, *Boeing Company, Seattle, WA, USA*

ThA1 8:30 AM - 8:45 AM

Integrated Ruggedized Fiber Optic Transmitter for Avionic WDM Network Applications, J. Ma, *OptoNet, Evanston, IL, USA*

A recently developed tunable DFB laser-packaging platform has successfully undergone 500 temperature cycles. It has wide operating temperature range of -55°C to 95°C, can be directly modulated at 2.5 Gb/s and has 4-channel tunability at 100 GHz channel spacing.

ThA2 8:45 AM - 9:00 AM

RONIA Results: WDM-based Optical Networks in Aircraft Applications, S. F. Habiby, *Telcordia Technologies, Inc., Red Bank, NJ, USA* and M. J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*

We review network requirements resulting from the Requirements for Optical Networks in Avionics (RONIA) project (DARPA contract HR0011-07-C-0028) highlighting how WDM-based optical networks in aircraft applications can help achieve next generation avionics networks that are high capacity, transparent, flexible, scalable, future-proof, secure and low cost.

ThA3 9:00 AM - 9:15 AM

Effect of Traffic Patterns on Optical Time-Division-Multiplexed/WDM Networks for Avionics, A. Kumar, M. Sivakumar, D. Wang and J. Y. McNair, *University of Florida, Gainesville, FL, USA*

Torus architecture is proposed for WDM LANS in avionic platforms. OTDM based WDM networks are examined and efficient time slot allocation strategies are designed to meet the performance requirements.

ThA4 9:15 AM - 9:30 AM

Reference Physical Layer Analysis of WDM Fiber Optic Network for Aerospace Platforms, H. N. Poulsen, *University of California - Santa Barbara, Santa Barbara, CA, USA*, D. H. Richards, P. V. Mena, A. Ramapanicker, *RSoft Design Group, Inc., Ossining, NY, USA* and D. J. Blumenthal, *University of California - Santa Barbara, Santa Barbara, CA, USA*

We review a proposed physical layer reference path for an optical WDM network for avionics. To obtain the most realistic assessment, critical components are identified and their characteristics measured.

ThA5 9:30 AM - 9:45 AM

CORIN/DORIN: A WDM-Enabled Platform for Aero-Engine Control Systems, M. Xia, *University of California - Davis, Davis, CA, USA*, B. Moslehi, *Intelligent Fiber Optic Systems, Santa Clara, CA, USA*, B. Mukherjee, *University of California - Davis, Davis, CA, USA*, A. Behbahani, *US Air Force Research Laboratory, Wright-Patterson Air Force Base, OH, USA* and R. Millar, *US Naval Air Systems Command, Patuxent River, MD, USA*

We introduce a layered WDM-based optical network architecture featuring scalability and modularity. The fiber ring structure and incorporated protection scheme inherently support aero-engine control systems requiring distributed organization, large bandwidth and high reliability.

9:45 AM - 10:15 AM

COFFEE BREAK

10:15 AM - 12:00 PM

Session THB: MEASUREMENT

Session Co-Chairs: Michael J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*
Rick C. Jones, *Lockheed Martin, Fort Worth, TX, USA*

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

The SAE AS5603 Link Loss Power Budget Methodology for Aerospace Platforms Standard, M. R. Lange, *Harris Corporation, Melbourne, FL, USA*, P. Anumolu, *Northrop Grumman Corporation, Bethpage, NY, USA*, M. W. Beranek, *US Naval Air Systems Command, Patuxent River, MD, USA*, D. N. Harres, *Boeing Company, Belleville, IL, USA*, T. Shu, *Naval Air Systems Command, Patuxent River, MD, USA* and B. L. Uhlhorn, *Lockheed Martin, Eagan, MN, USA*

Link loss power budgeting is an important part of the systems engineering process. The new SAE standard AS5603, Digital Fiber Optic Link Loss Power Budget Methodology for Aerospace Platforms, provides a methodical standardized means, for establishing such loss budgets.

ThB2 10:45 AM - 11:15 AM (Invited)

Fiber Optic Measurement Considerations for the Aerospace Industry: Lessons Learned from Telecommunications, P. A. Williams and T. Drapela, *National Institute of Standards and Technology, Boulder, CO, USA*

We review some of the challenging measurement issues encountered in the development of optical fiber telecommunications and describe the empirical steps used in the measurement cycle. We also point out telecommunications measurement infrastructures applicable to fiber optics for avionics.

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

Standardization of Measurement Launch Condition for Multimode Fiber Cabling, P. Kolesar, *CommScope, Inc., Richardson, TX, USA*

As data rates have climbed to multiple gigabit levels, the allocation within the power budget for attenuation and insertion loss has diminished to small fractions of that afforded to lower rate applications, necessitating greater precision from the field test instruments used to measure installed cabling loss.

ThB4 11:45 AM - 12:00 PM

Detecting and Measuring Interconnection Reflectance in Fiber Optic Cable Assemblies with a Video Microscope, W. R. Woodward, *ECPI College of Technology, Virginia Beach, VA, USA* and D. Stone, *KITCO Fiber Optics, Virginia Beach, VA, USA*

This paper presents a simple method to qualitatively measure interconnection reflectance in short fiber optic cables such as those used on aircraft, spacecraft, or submarines with a video microscope.

12:00 PM - 1:30 PM

LUNCH BREAK

1:30 PM - 2:45 PM

Session THC: CONNECTORS AND SPLICES

Session Co-Chairs: Ron Pirich, *Northrop Grumman Corporation, Bethpage, NY, USA*
Paul Matthews, *Northrop Grumman Corporation, Baltimore, MD, USA*

ThC1 1:30 PM - 2:00 PM (Invited)

Avionics Fiber Optic Cable Splice, K. X. Liu, C. X. Qian and A. R. Kost, *All Optronics, Tucson, AZ, USA*

We present a ruggedized fiber optic splice for avionics harsh environment applications that provides the capability of permanent repair and cable restoration of broken fiber optic cables in an on-aircraft field environment.

ThC2 2:00 PM - 2:15 PM

New Connectivity Solution for Optical Fibres using Phasoptx Shape Memory Alloy Optimend®, G. Trouillard, *Phasoptx, Montréal, Canada*

A new optical fibre connection, reusable, very small and compatible with high temperature environment is presented in this paper. The method of connection but also optical and mechanical performances are discussed.

ThC3 2:15 PM - 2:30 PM

Automation: The Means to High Reliability Aerospace Fiber Optic Cables, D. L. Enlow, J. T. Sroga, *Lockheed Martin, Newtown, PA, USA*, A. J. Christopher, *kSARIA Corporation, Wilmington, MA, USA*, J. S. Mazurowski, *Penn State Electro-Optics Center, Freeport, PA, USA*, D. Ditto, *Pennsylvania State University, University Park, PA, USA* and M. J. Hackert, *US Naval Air Systems Command, Patuxent River, MD, USA*

Photonics, with its virtually infinite bandwidth, electrical noise immunity, small size, low cost, and increased capacity are being inserted into a number of military platforms to handle higher data rates and larger traffic volumes.

ThC4 2:30 PM - 2:45 PM

Efficacy of Manual Fiber Optic Cleavers Used on Coated Optical Fibers, J. S. Mazurowski and J. E. Toney, *Penn State Electro-Optics Center, Freeport, PA, USA*

This work compares the performance to two manual fiber cleavers, which are specifically intended to solve the problem of field cleaving fibers in the presence of durable coatings such as polyimide.

END OF PROGRAM