Novel E-O Modulation and Applications
THz Technology
BSPA Competition
RoF Systems
Optical Laser andTransmitter
MWP Applications
Novel High Speed Components
MWP Signal Processing
UWB System and Applications
Functional Devices
Relative Applications

APMP 2009

Technical Program

Asia-Pacific Microwave Photonics Conference

April 22-24, 2009
Beijing International Conventional Center
Beijing, China

contents

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Greetings

from the chairs of APMP 2009

It is our honor to be the Chairs of the Asia-Pacific Microwave Photonics Conference (APMP'09).

It is not surprising that our conference can expand in its size when the world is experiencing economic recession. Actually, we gather together in Beijing now because we all believe microwave photonics has become important for the future and this international forum in Asia-Pacific region for scientists and engineers to exchange new ideas in the fields is truly necessary.

Our event is supported technically or/and financially by Tsighua University, Beijing University of Posts and Telecommunications, National Nature Science Foundation of China, Chinese Optical Society , IEEE LEOS Singapore Chapter, IEEE MTT Beijing Chapter, Anritsu and StarPoint. Let us express, on behalf of all the conference participants, warmest thanks to these organizations.

To the conference, over 20 experts are invited to give special talks, covering a wide range of topics in microwave photonics, and best student paper awards will also be selected at the conference. Their participation will bring high quality and new vitality to the conference.

Our conference venue, Beijing International Convention Center, is only 1km from the National Stadium (Bird's Nest). As you all know, Beijing, with centuries-old history as well as modern culture, boasts hundreds of places of interests. The conference will make your stay in Beijing definitely enjoyable.

Welcome toAPMP'09, and please join us to makeAPMP'09 a great success.

Prof. Jintong Lin
BUPT, China

Prof. Masayuki Izutsu
TITECH, Japan

Prof. Joha Kim
ETRI, Korea

Message

from the TPC chairs of APMP 2009

On behalf of Technical Program Committee, we would like to warmly welcome you to APMP 2009, to be held on 22-24 April 2009, in Beijing.

Of the 104 papers, including 23 invited talks, submitted to this year's conference through the conference website, the technical committee accepted a total of 86 papers for either oral or poster presentation. The oral presentations have been grouped into sessions that will focus on topics of interest to the microwave photonics community, namely, Modulation and Applications, THz Technology, Radio Over Fiber Systems, Laser and Optical Transmitters, Novel High Speed Components, UWB System and Applications, Functional Devices, and MWP Applications.

In addition to the regular oral and poster sessions, the technical program of APMP 2009 has a plenary session with three plenary talks made by Prof. David N. Payne, entitled " The Optical Fibre Revolution -- Nothing Is Difficult To A Man Who Will Try" ; Prof. Gee-Kung Chang, entitled "Millimeter Wave System Technologies and Applications for Next Generation Wireless Communications" and Mr. Bill Huang, entitled " Mobile Communication: The Future" .

We hope you enjoy the technical program of APMP 2009!

Prof. Shizhong Xie
Tsinghua University
China

Prof. Jianping Yao
University of Ottawa
Canada

ORGANISING COMMITTEE

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Tsinghua University
China

Dr. Kun Xu
BUPT
China

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International Steering Committee Chair:

Ampalavanapillai Nirmalathas (The University of Melbourne, Australia)

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K. Thyagarajan (Indian Institute of Technology, India)
Shizhong Xie (Tsinghua University, China)
Jianping Yao (University of Ottawa, Canada)
Paul Yu (University of California at San Diego, USA)

General Information

REGISTRATION DESK

On arrival at the venue, Conference Registration will be conducted at the registration desk located on BICC Level 1.
Please collect your name badge and conference materials.
The registration desk will be open between the fellowing times:

Tuesday, 21 April 2009	15:00-20:00
Wednesday, 22 April 2009	8:00-18:00
Thursday, 23 April 2009	8:00-18:00
Friday, 24 April 2009	8:00-12:30

POSTER SESSION

Date: Wednesday, 23 April 2009
Time: 13:30-15:05
Room: Conference Room 303

CONFERENCE SESSIONS

Date: 22~ 24 April 2009
Time: 8:30 -18:00
Rooms: Convention Hall No.2 305 A+B 303
Beijing International Convention Center

TOURS

The visit to National Stadium (Birds' Nest), National Aquatics Center (Water Cube)and Olympic Park will be from 15:25-18:00, before the conference banquet on 23rd Apirl. Entrance tickets will be provided to the registered attendees of APMP 2009 by the conference organizer for free.

MOBILE PHONES

Please ensure your mobile phone is switched off or in "silent" mode during all conference sessions.

NAME BADGES

Delegates are required to wear their name badges at all times. You will not be authorised for entry into the conference sessions, exhibition area or provided access to Morning and Afternoon Teas without your name badge.

PUBLIC TRANSPORT

From the airport, you can get to the conference venue by airport bus or taxis.Bus: at the airport, you can take the airport bus to the North Taipingzhuang stop, and then take the 387 bus,or 694 bus or 849 bus, and stop at North Anhuiqiao.
Taxis: We recommend taking a taxi from airport. It will costs you no more than 100RMB.

SOCIAL FUNCTIONS

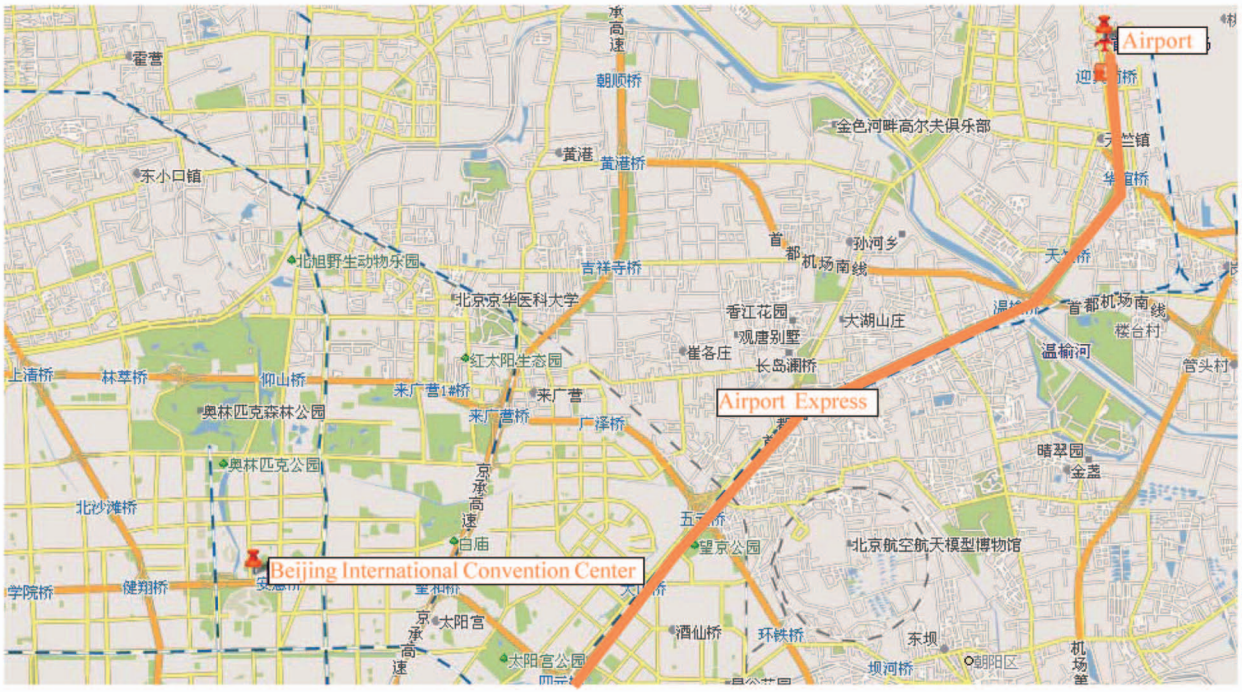
WELCOME RECEPTION

Date: Wednesday, 22 April 2009
Time: 18:30-20:30
Venue: King Roast Duck (MinZuYuanLu)
Distance: 1.8km, about 20 minutes walk.

APMP CONFERENCE BANQUET

Date: Thursday, 23April 2009
Time: 19:00-21:00
Venue: Hotelecom Hotel Beijing
* *Buses to* Hotelecom Hotel *will be provided for free. Please gather together in the front gate of BICC at 6:20pm.*

venue Map



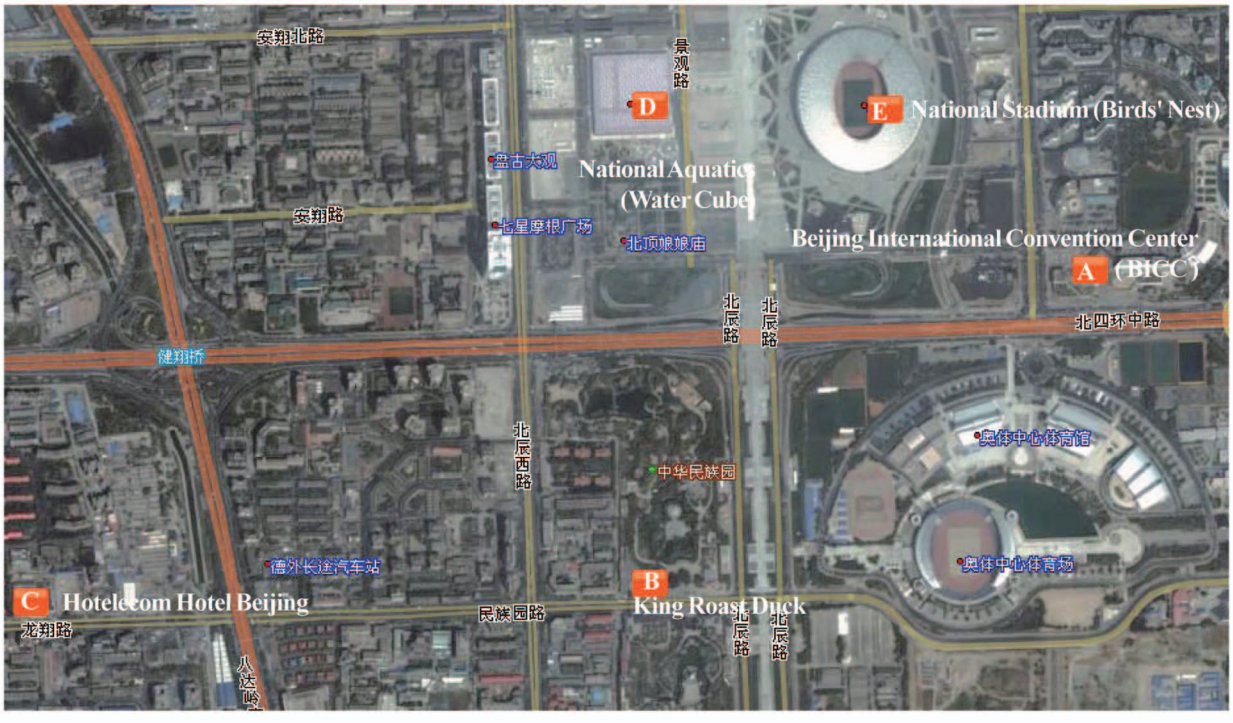
A. Beijing International Convention Center (BICC)
APMP Conference Venue
Add: No.8 Beichen Dong Road, Chaoyang District, Beijing
Tel: 8610-8498 0105
website: www.bcghotel.com

B. King Roast Duck
Welcome Reception
Add: No.1, MinZuYuanLu, ChaoYang District,Beijing
Tel: 8610-62049932

C.Hotelecom Hotel Beijing
APMP Conference Banquet
Add: NO.15. Longxiang Road. Haidian District, Bejing
Tel: 8610-59838888

D.National Aquatics Center (Water Cube)
Tours
The venue for swimming, diving, synchronized swimming and water-polo final during the 2008 Sunmmer Olympics
Location: Olympic Green

E.National Stadium (Birds' Nest)
Tours
The main track and field stadium for the 2008 Summer Olympics
Location: Olympic Green



APMP2009

David.N.Payne, Professor, Southampton University, UK
Presentation Title: *The Optical Fibre Revolution -- Nothing Is Difficult To A Man Who Will Try*

Biography: Prof David.N.Payne is a Fellow of the Royal Society and the Royal Academy of Engineering, UK, also a Fellow of OSA and IET. He is a foreign member of the Norwegian and the Russian Academy of Sciences. He has spent his entire research career in optical fibre technology at Southampton University, UK, and is now Director of the Optoelectronics Research Centre, one of the largest and best-known photonics research laboratories in the world.
Prof. Payne has published more than 300 papers in many well known journals and also as invited speaker to give academic speech in international conference and forum.
He has received a list of awards which including the 1991 John Tyndall Award (USA) and the Rank Prize. He has been honored with the Benjamin Franklin Medal (USA), the Basic Research Award by the Eduard Rhein Foundation (Germany), the Mountbatten Medal of the IET (2001) and the Microptics Award from the Optical Society of Japan.

Gee-Kung Chang, Professor, Georgia Institute of Technology, USA
Presentation Title: *Millimeter Wave Technologies and Applications for Next Generation Wireless Communicatiotns*

Biography: Professor Gee-Kung Chang is the Byers Endowed Chair Professor in Optical Networks in the School of Electrical and Computer Engineering of Georgia Institute of Technology. He is an Eminent Scholar of Georgia Research Alliance. He serves as an Associate Director and the leader of Optical Wireless Access Network and 100Gb/s next Generation Ethernet Research in Georgia Tech Broadband Research Institute.
He is an Associate Director and the leader of Optoelectronics Integrationand Packaging Alliance of NSF funded Microsystem Packaging Research Center at Georgia Tech.Dr. Chang devoted a total of 23 years of service to the Bell Systems-Bell Labs, Bellcore, and Telcordia Technologies. Prior to joining Georgia Tech, he served as Vice President and Chief Technology Strategist of OpNext, Inc., an IPO company listed in NASDAQ since February 2007, where he was in charge of technology planning and product strategy for ttthigh-speed optoelectronic components for computing and communication systems.

Bill Huang, General Manager, China Mobile Research Institute
Presentation Title: *Mobile Communication: The Future*

Biography: Bill Huang is the General Manager of China Mobile Research Institute. Previously, he was Senior Vice President and CTO of UTStarcom, Inc.
Bill Huang has been a new technology advocator for Telecom industry with over 21 years of work experience in the development of key communication technologies. He has in-depth experience and striking thoughts in the areas of next generation mobile switching system, IP media streaming, GEPON system, Multi-service Softswitch, and Operation Support System, as well as Value Added Services.
Mr. Huang holds a M.S. in Electrical Engineering and Computer Science in the Uni-

A Alphones received his B.Tech. from Madras Institute of Technology in 1982, M.Tech. from Indian Institute of Technology Kharagpur in 1984 and Ph.D. degree in Optically Controlled Millimeter wave Circuits from Kyoto Institute of Technology (Japan) in 1992. He was a JSPS visiting fellow from 1996-97 at Japan. During 1997-2001, he was with Centre for Wireless Communications, National University of Singapore as Senior Member of Technical Staff, involved in the research on optically controlled passive/active devices. Currently he is Associate Professor at the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. He has 24 years of research experience. He is in the editorial review board of IEEE Microwave Theory and Techniques and Microwave and Wireless Components Letters. He has published and presented over 160 technical papers in International Journals/ Conferences. His current interests are electro-magnetic analysis on planar RF circuits and integrated optics, microwave photonics, and hybrid fiber-radio systems. His research work has been cited in the book "Millimeter Wave and Optical Integrated Guides and Circuits ", Wiley Interscience publication. He has delivered tutorials and short courses in international conferences. He had written a chapter on "Microwave Measurements and Instrumentation " in Wiley Encyclopedia of Electrical and Electronic Engineering 2002. He is a Senior Member of IEEE. He was involved with the organization of APMC'09, ICCS 2000, ICICS 2003, PIERS 2003, IWAT 2005, ISAP 2006, ICICS 2007, ICOCN 2008 and APMC 2009 conferences.

Hongwei Chen received the B.E. and Ph.D. degrees in electronic engineering from Tsinghua University, Beijing, China, in 2001 and 2006, respectively. He is an assistant professor of the Department of Electronic Engineering, Tsinghua University. His research interests include radio-over-fiber techniques, high-speed optical communications and optical packet switching networks. He is first author and co-author of over 40 technical papers. He has supervised and taken part in a number of national scientific research projects, including high-tech"863" projects and National Natural Science Foundation research projects. He got 2004 Asia-Pacific Optical Communication Conference Best Student Paper Award. He was awarded first-class outstanding PhD graduate student and best PhD thesis of Tsinghua University in 2006. He was invited to serve in 2005, 2007, 2008 the Asia-Pacific Optical Communication Conference (APOC) and the 2007 Pacific Rim Conference on optical and laser (CLEO-PR) Technical Committee.

Xiaodong Chen received the degree of B.Sc. in Electronic Engineering from the University of Zhejiang, Hangzhou, China in 1983, and the degree of Ph.D. in microwave electronics from the University of Electronic Science and Technology of China, Chengdu in 1988. In September 1988 he joined the Department of Electronic Engineering at King's College, University of London, as a Postdoctoral Visiting Fellow. In September 1990 he was employed by the King's College London as a Research Associate working on numerous research projects funded by the industry and governments. In March 1996 he was appointed to an EEV Lectureship sponsored by English Electric Valves Ltd at King's College London. In September 1999 he joined the Department of Electronic Engineering at Queen Mary and Westfield College, University of London as a College Lecturer. He was promoted to a Readership in October 2003 and a Chair of Microwave Engineering in October 2006, respectively. In March 2007, he was elevated to be a Senior Member in IEEE.
His research interests are in microwave devices and antennas, THz source research, bioelectromagnetics and nonlinear dynamics and chaos. He has authored and co-authored over 230 publications (book chapters, journal papers and refereed conference presentations). He has involved in the organisation of many international conferences; co-founding the First UK/Europe-China Workshop on Millimetre Waves and Terahertz Technologies (2008) in Chengdu, China and serving as Co-Chairman in IEEE International Workshop on Antennas and Technologies 2007 (iWAT 2007), IoP/IEE/IPEM International Workshop on EM technologies (RF-THz): Applications, Safety and Human Interactions (2008, 2005, 2003), IEE International Workshop on Ultra Wide Band Technologies and Systems (2008, 2006, 2004), IEEE International Conference on Telecommunications (ICT), 2002, respectively. He is currently a member of UK EPSRC Review College and Technical Panel of IET Antennas and Propagation Professional Network.

Young-Wan Choi received the B.S. degree in electronic engineering from the Sogang University, Seoul, Korea in 1985, and the M.S., and Ph.D. degrees in electrical and computer engineering from the State University of New York at Buffalo in 1987 and 1992, respectively. From 1992 to 1995, he was a senior researcher at the Electronics and Telecommunications Research Institute in Korea conducting research on optical switching devices such as self-electrooptic effect devices and electroabsorption modulators. In 1995, he joined the School of Electrical and Electronic Engineering at the Chung-Ang University, Seoul, Korea, where he is currently a Professor. In 2006, he served as the Dean of the Research Affair Office, Chung-Ang University. Dr. Choi has authored over 150 research papers in various international journals and conference proceedings. His current research interests are in the area of microwave-photonics, bio-photonics, and their integrated circuit systems

Afshin S. Daryoush received his Ph.D. in Electrical Engineering from Drexel University, Philadelphia, PA in 1986. After graduation he joined the faculty of Drexel University as DuPont Assistant Professor of Electrical and Computer Engineering. He was promoted to Associate Professor and Associate Director of the Center for Microwave/Lightwave Engineering in 1990 and to Full Professor in 1998. Professor Daryoush is recipient of University Graduate Teaching Award in 2000 and he has developed and taught a variety of undergraduate and graduate courses in electromagnetic fields, telecommunication, wireless communications, solid-state microwave and photonic devices, RF circuits, and antennas. Dr. Daryoush has also conducted research in microwave photonics for telecommunication, radar, and biomedical engineering applications, resulting in publication of over 200 technical papers and five book chapters. The recipient of the Microwave Prize in the 16th European Microwave Conference, Dublin, Ireland, Dr. Daryoush has also received the best presentation awards in the 1986 and 1994 International Microwave Symposia. Professor Daryoush has delivered invited talks on telecommunications systems exploiting Microwave Photonics techniques in many symposia, US government sponsored workshops (such as JASONProgram), and international research laboratories. He was also a lecturer as part of the Second Summer School on "Optics Interaction with Microwave Circuits" in 1999, Autrans, France and the NATO sponsored LS-229 on "Optics Microwave Interactions" in three countries of France, Germany, and Hungary in 2002.

Haewook Han received the B.S. and M. S. degrees from Seoul National University, Korea in 1986 and 1988, respectively, and the Ph.D. degree from University of Illinois at Urbana-Champaign in 1995, all in electrical engineering. Then he joined AT&T Bell Laboratories and worked on semiconductor lasers during 1995-1997. He is a Professor with the Electrical and Computer Engineering and Director of the National Research Laboratory for Nano-THz Photonics at Pohang University of Science and Technology, Pohang, Korea. His current research interests include ultrafast THz pulse generation and detection, THz plasmonics in nanostructues, THz near-field microscopy, and THz biomedical imaging and sensing.

Sang-Kook Han (B.S., 1986, from Electronic Engineering, Yonsei University and M. S. & Ph. D., 1994, from Electrical Engineering, University of Florida) is Professor in Department of Electrical and Electronic Eng. Yonsei University since 1996. He was working as a Senior Researcher with the Optical device lab, Hyundai Electronics, Korea, from 1994 to 1996. In the year of 2003, he was a Visting Researcher in Optical access network group, ETRI, Korea. He was the Associate Dean of College of Engineering, Yonsei Unv. from 2005 to 2007, and has been the Associate Dean of Graduate school of Engineering, Yonsei University since 2007. He also is a Division chair of FTTH industry association Korea since 2008. His research areas includes: RoF links for access networks(2007), Wired/wireless convergence networks(2008), Visible light communications(2009)

Junichiro Ichikawa received his BS and MS degrees in mineralogy from the University of Tokyo in 1987 and 1989, respectively. He joined the Optoelectronics Division of Sumitomo Osaka Cement Co., Ltd. in 1989 and has been engaged in development of optical devices using dielectric materials. His recent research interests are in micro-fabrication process of ferroelectric materials for optoelectronics and electronics applications. He received the Sakurai Memorial Award from the Optoelectronic Industry and Technology Development Association (OITDA) of Japan in 2007 for the development on integrated lithium-niobate optical modulators.

Satoshi Kohjiro received the B. S., M.S., and Ph.D. degrees from Kyushu University, Fukuoka, Japan, in 1984, 1986, and 1989, respectively.
In 1989, he joined Electrotechnical Laboratory (ETL), Tsukuba, Ibaraki, Japan, and was engaged in the development of superconducting analog devices. From 2001 when ETL was unified to the National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki, Japan, he has been a senior researcher of AIST and engaged in superconducting devices operating in submillimeter-wave region such as mixers and Josephson oscillators.
Dr. Kohjiro is a member of the Japan Society of Applied Physics.

Tetsuya Kawanishi received the B.E., M.E. and Ph.D. degrees in electronics from Kyoto University, in 1992, 1994 and 1997, respectively. From 1994 to 1995, he worked for Production Engineering Laboratory of Matsushita Electric Industrial (Panasonic) Co., Ltd. In 1997, he was with Venture Business Laboratory of Kyoto University, where he had been engaged in research on electromagnetic scattering and on near-field optics. He joined the Communications Research Laboratory, Ministry of Posts and Telecommunications (from April 1, 2004, National Institute of Information and Communications Technology), Koganei, Tokyo, in 1998. He was a Visiting Scholar at the Department of Electrical & Computer Engineering, University of California at San Diego, USA, in 2004. He is now a Senior Researcher of National Institute of Information and Communications Technology, and is currently working on high-speed optical modulators and on RF photonics. He received URSI Young Scientists Award in 1999.

Ai-Qun Liu (A. Q. Liu) received his PhD degree from National University of Singapore (NUS) in 1994. His MSc degree was from Beijing University of Posts & Telecommunications 1988 and BEng degree was from Xi'an Jiaotong University in 1982. Currently, he is Associate Professor at the Division of Microelectronics, School of Electrical & Electronic Engineering, Nanyang Technological University (NTU). He was an Associate Editor for the IEEE Sensor Journal (2004-2007) and Guest Editor for Special Issue of Sensors & Actuators - physical A 2005, and 2006. He has authored more than 110 journal publications and a book entitled "Photonic MEMS-Design, Fabrication and Control" . Also, he won the Singapore IES award in 2007 and the University Scholar award in 2008.

Ampalavanapillai (Thas) Nirmalathas is currently a Professor in the Department of Electrical and Electronic Engineering at the University of Melbourne, Australia. He is also the Director of Melbourne Engineering Research Institute (MERIT) which brings the entire research activity of the Melbourne School of Engineering within one institute.
Thas Nirmalathas obtained his B.E and PhD in Electrical and Electronic Engineering from the University of Melbourne in 1993 and 1998 respectively. Between 2000 and 2004, he was the Director of Photonics Research Laboratory (Melbourne Node of Australian Photonics CRC) and also the Program Leader of Telecommunications Technologies Program. From 2004 to 2006, he was the Program Leader for the Network Technologies Research Program in NICTA. He was also the acting Lab Director of VRL in 2007. Between 2006 and 2008, He was the Research Group Manager of the Networked Systems Group of Victoria Research Laboratory (VRL) at the National ICT Australia (NICTA), a premier Australian research centre of excellence in ICT.
Thas Nirmalathas has written more than 200 technical articles and currently hold 2 active international patents. His research interests include microwave photonics, semiconductor lasers, fiber-radio systems, optical access networks, optical performance monitoring and WDM packet switched networks.
He is currently the chair of steering committees of Asia Pacific Microwave Photonics and IEEE Topical Meeting on Microwave Photonics Conference series. He is also a member of the Steering Committee for the International Conference on Optical Internet (COIN). He was also Guest Editor for Special Issue on Opto-Electronics and Communications of the IEICE Transactions in Communications. He was the General Co-Chair of 2008 IEEE Topical Meeting on Microwave Photonics/ Asia Pacific Microwave Photonics 2008. He is currently an Associate Editor of IEEE/OSA Journal of Lightwave Technology. He is a Senior Member of IEEE, a member of Optical Society of America and a Fellow of the Engineers Australia.

Robert Minasian received the B.E. degree from the University of Melbourne,the MSc degree from the University of London, University College, London, and the PhD from the University of Melbourne,Australia. He is currently a Chair Professor with the School of Electrical and Iformation Engineering, University of Sydney, Australia. In addition, he is the Director of the Fibre-optics and Photonics Laboratory, and has also served as the Head of the School of Electrical and Information Engineering, University of Sydney. His research encompasses optical signal processing and telecommunications, and currently centers on photonic signal processing, microwave photonics, broadband optical communications, and optical phased arrays. He has contributed 230 technical publications in these areas. He is an Associate Editor of Optical Fiber Technology.

Professor Minasian is a Fellow of IEEE, and is a Fellow of the Optical Society of America. He is also a Fellow of the Institute of Engineers, Australia. He has served on the Australian Research Council as a member of the College of Experts. He is a member of the Technical Committee on Microwave Photonics of the IEEE Microwave Theory and Techniques Society (IEEE MTT-S), and has served and is on the program committees for many international conferences. He was the recipient of the ATERB Medal for Outstanding Investigator in Telecommunications, awarded by the Australian Telecommunications and Electronics Research Board.

Ho-Jin Song received the B.S. degree from Kyungpook National University, Korea in electronic engineering in 1999 and the M.S., and Ph. D. degree in information and communication engineering from Gwangju Institute of Science and Technology (GIST), Korea, in 2001, and 2005, respectively. From 2005 to 2006 he was involved in Center for Hybrid Optical Access Network (CHOAN) in the GIST, Korea, as a research professor. In 2006, he joined NTT Microsystem Integration Laboratories, Atsugi, Kanagawa, Japan, and is working on the development of millimeter-wave and sub-terahertz wave signal synthesizer utilizing microwave photonic technologies for communication, sensing, imaging and measurement applications. His current research interests include optical-wireless hybrid communication systems, and sub-millimeter-wave measurement and communication systems.

Andreas Stohr received the Dipl.-Ing. and Dr.-Ing. degree in electrical engineering from Gerhard-Mercator-University Duisburg, Duisburg, Germany, in 1991 and 1997, respectively. Since 1995 he has been s a member of ZHO-Optoelektronik, Universitat Duisburg-Essen, Germany. In 1998 and 1999 he joined the National Institute of Information and Communications Technology (NiCT, former CRL), Japan.

His current research interests include the design and fabrication of III/V-based microwave photonic devices and their application in microwave or millimeter-wave fiber-optic transmission systems as well as in optical sensors. He is currently engaged in advanced and ultrafast photonic components for optical millimeter-wave and THz generation. He is also active in the field of broadband millimeter-wave photonic wireless systems using radio-over-fiber techniques. He has published more than 100 papers in refereed books, journals and conferences. Dr. Stohr received the 1997 Annual Award from the Duisburger Universitatsgesellschaft (DUG), the Center of Excellence MPT fellowship Japan in 1998 and 1999 and the ICT demonstration award in 2008. Dr. Stohr is an IEEE senior member; he is actively participating to the IEEE Photonics and the IEEE Microwave Theory and Techniques (MTT) societies.

He was Conference Chair of the Photonics Europe -- Millimeter wave & THz Photonics Conference, and for many years he has been serving as a Techincal Program Committee member for several international conferences including the International Topical Meeting on Microwave Photonics and the LEOS annual meeting.

J.M.Tang received the Ph.D. degree in Optoelectronics from the University of Wales, Bangor, U.K. in 1999. His PhD dissertation research in nonlinear dynamical and spectral effects in semiconductor laser devices was completed within two and a half years, the minimum time allowed by the regulations of the university.

Immediately after obtaining the PhD degree, he joined the University of Wales, Bangor as a postdoctoral researcher working on picosecond optical switching and ultrafast nonlinearities of semiconductor optical devices. His four years of research in Bangor (1996-2000) have generated 73 papers published in refereed professional journals and national and international conferences. From 2000 to 2004, he joined Nortel Networks, Harlow, UK as a Research Engineer conducting research on next generation high capacity optical communication systems. His research activities have covered a broad range of areas including, for example, advanced transmission system design for Ethernet, metro and long-haul transmission links and development of various optical amplifiers and optical transceivers using optical and electrical signal processing. In 2005 he joined the University of Wales, Bangor, as a Lecturer, and he was promoted to Senior Lecturer in 2007. In 2008, he won The Royal Society Brian Mercer Feasibility Award and was appointed a fellow of the ERA Foundation.

His current research interests include high speed communications systems, all-optical networking and semiconductor optical devices.

Xiaofeng Tao
Beijing University of Posts and Telecommunications, China.

Yoshiyasu Ueno received Master's degree in Physics (Univ. of Tokyo, 1987), joined NEC Corporation (1987), stayed for fundamental research about one year in CREOL, University of Central Florida (1995), received PhD degree in applied physics for his original works in the AlGaInP laser research (Univ. of Tokyo, 1998), and joined the National University of Electro-Communications, Tokyo (associate professor since 2002, and professor since 2009). In his original university's master's course in 1985-1987, he studied the exciton-resonant second-order optical processes in red HgI2 crystals at the liquid-Helium temperature. In 1987-1994 with his senior and junior colleagues in the NEC's research center, he developed a 30-mW high-power 680-nm single-transverse-mode MOVPE-grown-AlGaInP laser design and was engaged in technical transfers of the research results to its mass-production division, for use in optical DVD recorder's optical pickups in the consumer market. Since 1995, he started trying to pioneer brand-new schemes of semiconductor-based all-optical gate devices for breaking-through the technical limits in the up-to-date signal-processing devices and systems, and for use in the future optical networks and computers near the Tera-bit-per-second speed in time. In 2000 for example, he and his colleagues have successfully reached the world-record-first signal-wavelength conversion of optical 168-Gb/s TDM data signals. In 1996-2002, he used to be a member of a large-scale, nation-wide research project "Femtosecond Technology," being supported by NEDO (METI) and led by Drs. Fujio Saito and Teruo Sakurai.

Andrew M. Weiner graduated from M.I.T. in 1984 with an Sc.D. in electrical engineering. Upon graduation he joined Bellcore, first as Member of Technical Staff and later as Manager of Ultrafast Optics and Optical Signal Processing Research. Prof. Weiner moved to Purdue University in 1992 and is currently the Scifres Distinguished Professor of Electrical and Computer Engineering. His research focuses on ultrafast optics signal processing and applications to high-speed optical communications and ultrawideband wireless. He is especially well known for his pioneering work in the field of femtosecond pulse shaping. Prof. Weiner is a Fellow both of the Optical Society of America and of the Institute of Electrical and Electronics Engineers (IEEE) and is a member of the U.S. National Academy of Engineering. He has won numerous awards for his research, including the Hertz Foundation Doctoral Thesis Prize (1984), the Adolph Lomb Medal of the Optical Society of America (1990), the Curtis McGraw Research Award of the American Society of Engineering Education (1997), the International Commission on Optics Prize (1997), and the Alexander von Humboldt Foundation Research Award for Senior U.S. Scientists (2000). He is joint recipient, with J.P. Heritage, of the IEEE LEOS William Streifer Scientific Achievement Award (1999) and the OSA R.W. Wood Prize (2008) and has been recognized by Purdue University with the inaugural Research Excellence Award from the Schools of Engineering (2003) and with the Provost's Outstanding Graduate Student Mentor Award (2008).
Prof. Weiner is author of a textbook entitled Ultrafast Optics, to be published in 2009 by Wiley, and has published six book chapters and over 200 journal articles. He has been author or co-author of over 350 conference papers, including approximately 80 conference invited talks, and has presented nearly 100 additional invited seminars at university, industry, and government organizations.

Kun Xu, Associate Professor, deputy director of the key lab of optical communications and lightwave technologies(Ministry of Education of China), IEEE member. Dr. Xu received his PhD degree in electronic engineering from Tsinghua University in 2003. Then he went to Nanyang Technological University of Singapore as a visiting scholar in 2004. In 2005, he won the award of " Talented Person of New Century" made by the Ministry of Education of China. Dr. Xu's current research interests include radio on the fiber system, microwave photonics and optical-wireless convergence. He is an author and coauthor of more than 60 journal articles and conference contributions

Paul Yu is currently a Professor of Electrical and Computer Engineering at the University of California, San Diego (UCSD). At UCSD he offers courses in solid state electronics and optoelectronics as well as conducts research on semiconductor materials and devices, integration technologies for various photonics, microwave and sensor applications. His research interests include: lasers for optical communication and optical interconnection; optical/RF schemes for narrow-band, high center frequency microwave transmission; high speed, high power optical detectors and high speed waveguide modulator devices for both digital and analog modulation; high power semiconductor optical switches for microwave generation; and electronic analog-to-digital conversion using high speed optical switches; nanowires for solar cells and electro-optic applications. His recent work includes novel designs using nanowire/polymer hybrid photodiode with potential for solar cells. Paul Yu has been the Principal Investigator or co-Principal Investigator of many projects on analog fiber links funded by the Department of Defense, NSF and industry. He is presently the Vice-President of Education Activities and a Distinguished Lecturer of the IEEE Electron Devices Society. He is a Fellow of IEEE, Optical Society of America and SPIE.

Xianbin Yu received his M.Sc. degree in 2002 from Tianjin University and his Ph.D degree in 2005 from Zhejiang University in China. From October 2005 to November 2007, he was a postdoctoral researcher in Tsinghua University, China. Currently, he is employed as a postdoctoral research fellow at DTU Fotonik, Technical University of Denmark. His research interests are in the areas of microwave photonics, optical fiber communications, wireless-over-fiber and short-range access technologies.

Nai Zhang
Actech, Inc. China

Wednesday, 22 April, 2009

9:00-11:45: Convention Hall No.2 / 13:30-17:35: Conference Hall No. 305 A+B

9:00-9:30

Opening Ceremony
Host: Jintong Lin
Professor, Beijing University of Posts and Communications, China

9:35-12:15

Plenary Session
Session Chair: Masayuki Izutsu
Professor, Tokyo Institute of Technology, Japan
Jianping Yao
Professor, University of Ottawa, Canada

9:35-10:25

PLE1: David.N.Payne
Professor, Southampton University, UK
The Optical Fibre Revolution£-Nothing Is Difficult To A Man Who Will Try

10:30-11:20

PLE2: Gee-Kung Chang
Professor, Georgia Institute of Technology, USA
.Millimeter Wave Technologies and Applications for Next Generation Wireless Communicatiotns

11:25-12:15

PLE3: Bill Huang
General Manager, China Mobile Research Institute
Mobile Communication: The Future

12:15-13:30

Lunch Break
Chair's Reception

13:30-15:05

Session A: Novel E-O Modulation and Applications
Session Co-chairs:
Prof. Robert Minasian (University of Sydney, Australia)
Dr. Hongwei Chen (Tsinghua University, China)

13:30-13:55

A01- *$LiNbO_3$ based optical devices for fiber communication (Invited)*
Junichiro Ichikawa
Sumitomo Osaka Cement Co., Ltd, Japan
Abstract: Lithium niobate (LiNbO3) is an useful photonic material for its electro-optic and nonlinear optical properties. In this presentation, I will introduce developments of LiNbO3 based optical devices for fiber communication, including highperformance modulators and high efficiency wavelength converters.

13:55-14:20

A02- *Lightwave Modulation Techniques for Millimeter-Wave Generation (Invited)*
Tetsuya Kawanishi
National Institute of Information and Communications Technology (NICT), Japan
Abstract: We describe lightwave modulation techniques for high-speed signal generation in digital and analog applications. Optical modulators using electro-optic effect provides phase-shift-keying and frequency-shift-keying as well as amplitude-shift-keying. Photonic micro millimeter-wave signal generation can be achieved by using advanced optical modulation techniques.

Wednesday, 22 April, 2009	
	Conference Hall No. 305 A+B
14:20-14:35	**A03-** ***Optical Frequency-Shift-Keying Modulator Using Three-Branch-Waveguide Interferometer and Polarization-Reversed Structure*** **Hiroshi Murata[(1)], Ha Viet Pham[(1)], Tsuyoshi Inoue[(1)], Yasuyuki Okamura[(1)], Takahide Sakamoto[(2)], Tetsuya Kawanishi[(2)]** [(1)]Graduate School of Engineering Science,Osaka University, Japan [(2)]National Institute of Information and Communications Technology,4-2-1 Nukui-Kita, Koganei, Tokyo 184-9795 Japan **Abstract:** A new optical frequency-shift-keying modulator is proposed utilizing a three-branch-waveguide interferometer and polarization-reversed structures. It operates with only a single clock/off-set frequency signal and a binary data signal without precise tuning. It should lead to applications in future photonic communication networks.
14:35-14:50	**A04-** ***Full Downlink Transmission of Multilevel QAM Signals over Mm-wave over Fiber System using Phase Modulator and DWDM Filtering*** **J.James,P.Shen, A.Nkansah, X.Liang.and N. J.Gomes** Senior Member, IEEE, Department of Electronics, University of Kent Canterbury, UK **Abstract:** Multilevel Quadrature Amplitude Modulation (QAM) signals (16QAM, 64QAM, 256QAM) up to 240Mbps and WLAN 802.11g signals (54 Mbps) are successfully transported over a 25GHz millimeter-wave fiber system employing a dual wavelength source (phase modulator and DWDM filter).
14:50-15:05	**A05-** ***Investigation of High-speed Modulaiton of 1.3μm InAs/InGaAs Quantum Dot VCSELs*** **C.Z.Tong, D.W.Xu, S.F.Yoon, Y.Ding, W.J.Fan** School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore **Abstract:** The influence of quantum dot (QD) density, uniformity and layer number on the 3dB bandwidth of 1.3 μm InAs-InGaAs QD VCSELs is investigated by the small signal analysis of all-pathway rate equations. The dependence of bandwidth on the QD density is shown. Linearly dependence of bandwidth on the QD uniformity is demonstrated. High speed operation (> 10GHz) of QD VCSEL emitting at 1.3 μm is predicated.
15:05-15:25	**Coffee Break**

Wednesday, 22 April, 2009

13:30-17:35: Conference Hall No. 305 A+B

15:25-15:50

Session B THz Technology

Session Co-chairs:

Dr. Jeha Kim (Electronics and Telecommunications Research Institute, Korea)

Prof. Ampalavanapillai Nirmalathas (University of Melbourne, Australia)

15:25-15:50

B01- ***THz Time-Domain Spectroscopy for Biomedical Imaging and Sensing (Invited)***

Euna Jung[(1)], Kiwon Moon[(1)], Younho Han[(1)], Haewook Han[(1)], Troung Khang Nguyen[(2)], Ikmo Park[(2)]

[(1)]Pohang University of Science and Technology, Korea

[(2)]Department of Electrical and Computer Engineering, Ajou University, Suwon, Korea

Abstract: Fundamental biological processes require both smalland large-scale structural changes within molecules, including low frequency collective vibrational motions. Many theoretical calculations have predicted that the collective vibrational motion can be characterized as the large-scale intermolecular motions in the terahertz (THz) frequency range. We describe a new measurement technique based on THz time domain spectroscopy (TDS) which can probe directly the collective vibrational motions of biomolecules which involve structural changes and specific biological Functions.

15:50-17:35

Session C: BSPA Competition

Session Co-chairs:

Dr. Jeha Kim (Electronics and Telecommunications Research Institute, Korea)

Prof. Ampalavanapillai Nirmalathas (University of Melbourne, Australia)

15:50-16:05

C01- ***Bit-Error-Rate Performace of an All-Optical Frequency Upconverter Based on FWM in an SOA***

Hyoung-Jun Kim[(1)], Woo Keun Song[(1)], Jong-Soo Lee[(1)], Jong-In Song[(1)] and Ho-Jin Song[(2)]

[(1)]Center for Distributed Sensor Networks, Gwangju Institute of Science and Technology (GIST), Gwangju, Korea

[(2)]Microsystem Integration Laboratories, NTT Corporation Atsugi-shi, Kanagawa Pref., Japan

Abstract: We experimentally investigate the bit-error-rate performance of the all-optical frequency upconverter based on fourwave mixing effect in a semiconductor optical amplifier as a function of the input optical IF and LO power for radio-over-fiber applications.

16:05-16:20

C02- ***Simple Distributed Optical Fiber Sensor Based on Brillouin Amplification of Microwave Photonic Signals***

Xiaoqiang Sun[(1)], Kun Xu[(1)], Yinqing Pei[(1)], Jianqiang Li[(1)], Jian Wu[(1)], Xiaobin Hong[(1)], Jintong Lin[(1)], Songnian Fu[(2)], Junqiang Zhou[(2)], Perry Shum[(2)]

[(1)]Key Laboratory of Optical Communication & Lightwave Technologies, Ministry of Education, BUPT, China

[(2)]Network Technology Research Centre, Nanyang Technological University, NTU, Singapore

Abstract: A simple distributed fiber sensor is proposed by Brillouin amplification of microwave photonic signals based on optical carrier suppression modulation and Fresnel reflection. The single-ended configuration is convenient and reliable for temperature or/and strain monitoring.

Wednesday, 22 April, 2009

13:30-17:35: Conference Hall No. 305 A+B

16:20-16:35

C03- ***Widely Frequency Tunable Amplified Feedback Laser as 20GHz Optical Microwave Source***

Y. Sun, J. Q. Pan, L. J. Zhao, W. X. Chen, W. Wang
Key Laboratory of Semiconductor Materials Science, Institute of semiconductors, Chinese Academy of Science, China

Abstract: A monolithic integrated amplified feedback semiconductor laser is demonstrated as an optical microwave source. The optical microwave frequency is continuously tunable in the range of 19.87--26.3 GHz with extinction ratio above 6 dB, 3dB linewidth about 3MHz. The optical injection locking characteristics was investigated. Optical microwave was obtained by injecting quarter frequency modulated light.

16:35-16:50

C04- ***A novel approach to measure microwave frequency by using fiber parametric amplifier***

Lin Gui, Kun Xu, Jie Yin, Yan Li, Dapeng Wang, Jian Wu, Xiaobin Hong, Jintong Lin
Key Laboratory of Optical Communication & Lightwave Technologies, Ministry of Education, P.R.China

Abstract: We propose an approach to measure the microwave frequency in optical domain with adjustable measurement range and resolution by using four wave mixing process in single mode fiber.

16:50-17:05

C05- ***Demonstration of a Bidirectional 60-GHz RoF System with Remote Down-conversion Scheme Based on OCS and FWM in SOA***

Mo Li, Hongwei Chen, Feifei Yin, Minghua Chen and Shizhong Xie
Department of Electronic Engineering, Tsinghua University, Beijing, China

Abstract: A bidirectional 60-GHz RoF system with remote down-conversion scheme is experimentally demonstrated. OCS and FWM effect in SOA are used for generating optical LO carriers. 622-Mb/s signals for both directions are transmitted over 20-km SMF.

17:05-17:20

C06- ***Transmission Performance of Multiband Orthogonal Frequency Division Multiplexing Ultra-Wideband Wireless Systems with Fiber Distribution***

Bouchaib Hraimel[(1)], Ke Wu[(1)], Mohmoud Mohamed[(2)], Xiupu Zhang[(2)] and Meer N. Sakib[(2)]
[(1)]Department of Electrical Engineering, Polygrames research Group, Ecole Polytechnique, Montreal, Quebec, H3T 1J4, Canada
[(1)]Department of Electrical and Computer Engineering, Advanced photonic Systems Lab, Concordia University, Montreal, Quebec, H3G 1M8, Canada

Abstract: Performance of multiband-orthogonal frequency division multiplexing ultra-wideband wireless systems with fiber distribution is evaluated experimentally in terms of packet error rate versus transmitted and received signal power, modulation index, wireless transmission range and optical receiver response.

17:20-17:35

C07- ***Microwave and Millimeter-Wave Arbitrary Waveform Generation and Processing Using Fiber-Optics-Based Techniques***

Chao Wang, Jianping Yao
Microwave Photonics Research Laboratory, School of Information Technology and Engineering, University of Ottawa, Canada

Abstract: Techniques to realize microwave and millimeterwave arbitrary waveform generation and processing in the optical domain are reviewed, with an emphasis on the techniques implemented based on fiber optics.

18:30-20:30 **Reception**

Thursday, 23 April, 2009

Conference Hall No. 303

8:30-10:05 Session D: RoF Systems 1

Session Co-chairs:
Dr. Li Xia (NTU, Singapore)
Dr. Kun Xu (BUPT, China)

8:30-8:55

D01- ***Bidirectional 1.25-Gb/s WDM Radio-over-Fiber Access Networks Based on Injection Locking and Carrier Suppression in F-P Laser Diode (Invited)***

Sang-Kook Han, Yong-Yuk Won, Thang T. Pham, and Hyun-Seung Kim
Department of Electrical and Electronic Engineering Yonsei University, Seoul, Korea

Abstract: This paper presents the proposed architectures of wired/wireless converged access networks based on RoF as well as their experimental results. In the proposed schemes, both a wired and a wireless signals are simultaneously generated using an injection locking technique and optical carrier suppression modulation based on a Fabry-Perot laser as a cost-effective WDM optical source. A reflective semiconductor optical amplifier (RSOA) is employed for the purpose of a colorless and simple base station. A 20-km optical transmission is experimentally demonstrated to verify the proposed RoF systems. A bit error rate (BER) of bidirectional 1.25-Gb/s wired and wireless transmission is measured and the performance is analyzed.

8:55-9:20

D02- ***Key Technologies and System Design for Various Radio over fiber applications (Invited)***

Hongwei Chen, Mo Li, Tianliang Wang, Feifei Yin, Shiguang Wang, Minghua Chen and Shizhong Xie
State Key Laboratory on Integrated Optoelectronics, Tsinghua National Laboratory for Information Science and Technology (TNList), Department of Electronic Engineering, Tsinghua University, China

Abstract: Key technologies and new system designs for various RoF applications are proposed and demonstrated. For UWB over fiber applications, several UWB pulses generation and distribution methods are carried out. Different kinds of UWB pulses are generated based on cross-polarization modulation methods. For millimeter-wave wireless applications, a 32GHz RoF system is demonstrated with microwave frequency sextupling by optical methods. After 20km SMF transmission, the power penalty of 2.5Gb/s downlink service is less than 0.15dB. Also it is suitable to apply dense wavelength division multiplexing (DWDM) technology to the RoF system to support numerous base stations (BSs).A DWDM-based 62.5GHz RoF distributing scheme which takes advantage of the frequency interleaving conception and is able to provide wired and wireless services at the same time is proposed. Two channels of wired and wireless services sharing one 100GHz ITU-T grid are distributed to different BSs successfully though a 40km SMF link.

Conference Hall No. 305 A

Session E: Optical Laser and Transmitter

Session Co-chairs:
Prof. Afshin Daryoush (Drexel University, USA)
Prof. Xiangfei.Chen (Nanjing University, China)

E01- ***Photonic MEMS Tunable Laser Sources (Invited)***

A. Q. Liu
School of Electrical & Electronic Engineering 50 Nanyang Avenue, Nanyang Technological University, Singapore

Abstract: This paper covers laser configurations, design and experiments of photonic MEMS tunable laser sources. Three different types of MEMS tunable lasers are demonstrated as examples of natural synergy of MEMS with photonics. They are MEMS coupled-cavity lasers, injection-locked laser systems and dual-wavelength tunable lasers. The expansion and penetration of the MEMS technology to silicon nano-photonics creates on-chip optical systems at an unprecedented scale of integration. While producing better integration, robustness and compactness, MEMS improves the functionalities and specifications of laser devices. Additionally, MEMS photonic tunable lasers is able to deliver their merits of small size, fast tuning speed, wide tuning range and IC integration compatibility which broadens their applications to many fields.

E02- ***Linear optical transmitters using feed-forward and predistortion techniques (Invited)***

Young-Wan Choi and Yon-Tae Moon
Microwave and Lightwave Telecommunications Laboratory, School of Electrical and Electronics Engineering, Chung-Ang University, Seoul, Korea

Abstract: Linear optical transmitters based on feed-forward and predistortion methods are experimentally developed and evaluated for broadband radio-over-fiber link. We systematically analyze the nonlinearity of DFB-LD using microwave circuit model based on rate equations. Also, for multi-service operations, a broad-band optical feed-forward transmitter with uncooled and unisolated DFB-LDs is demonstrated at 2 GHz band. For wide frequency range from 2.05 to 2.60 GHz, the IMD3 is enhanced by more than 10 dB. With the linearization, we have achieved the maximum IMD3 suppression and SFDR enhancement of 21.3 dB and 7.11 dB, respectively, at 2.3 GHz. Moreover, broadband linearization of LD using an opto-electrical predistortion scheme is experimentally demonstrated. With the optimization of amplitude and phase, the IMD3 can be simultaneously improved by more than 10 dB at a frequency range of 510 MHz. The proposed scheme indicates that our broadband optical transmitter is very suitable for future high-capacity broadband multimedia wireless services.

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9:20-9:35

D03- ***A Novel Scheme to Generate Multiband Millimeter Wave Signals for 40-GHz full Duplex Radio-Over-Fiber System***

Jie Yin, Kun Xu, Yan Li, Lin Gui, Dapeng Wang, Jian Wu, Xiaobin Hong, Jintong Lin
Key Laboratory of Optical Communication & Lightwave Technologies, Ministry of Education, P.R.China

Abstract: We propose a new scheme to generate frequency-diversity binary phase shift keying(BPSK) millimeter wave signals at 20GHz and 40GHz employing one MZM and one PM, which can be used in the future duplex ROF system.

9:35-9:50

D04- ***Demonstration and Performance Analysis of an Uplink based on Digitized RF-over-Fiber Signal Transport***

Yizhuo Yang, Christina Lim, Prasanna Gamage, Ampalavanapillai Nirmalathas
ARC Special Research Centre for Ultra-Broadband Information Networks (CUBIN), Dept.of Electrical and Electronic Engineering, The University of Melbourne, Australia

Abstract: In this paper, we demonstrate and analytically analyze a digitized RF-over-fiber transport scheme for uplink transmission in a Radio-over-Fiber system. We achieve significant improvement in both signal-to-noise ratio (SNR) and dynamic range. The experimental and analytical results show that digitized RF link is less susceptible to nonlinearity and fiber attenuation which makes this scheme well suited for long-reach optical backhaul for wireless networks.

9:50-10:05

D05- ***Simultaneous Wired and Wireless Link for Radio-over-fiber System Compatible with OFDM-WDM-PON***

Z. Dong, Z. Cao, J. Lu, L. Chen and J. Yu
School of Computer and Communication, Hunan University Key Laboratory for Micro/Nano Opto-Electronic Devices of Ministry of Education, Hunan University, Changsha, China

Abstract: To provide simultaneously wired and wireless link services in Radio-over-fiber system compatible with a novel optical line terminal for OFDM-WDM-PON is proposed and experimentally demonstrated. In the optical line terminal, optical carrier suppression (OCS) modulation scheme is used to generate 40GHz optical millimeter-wave (mm-wave) to carry 2.5-Gb/s OFDM signal. In the base station, both wireless and wired services can be provided. The downstream OFDM lightwave can be reused to carry 2.5-Gb/s On-Off Keying non-return-to-zero upstream data without erasure of the downstream data.

Conference Hall No. 305 A

9:20-9:35

E03- ***Quarter-wave shifted distributed feedback lasers based on reconstruction-equivalent-chirp technology***

Jingsi Li[(1)], Xiangfei Chen[(1)], Yuechun Shi[(1)], Yanqing Lu[(1)], Huan Wang[(2)], Hongliang Zhu[(2)], Yitang Dai[(3)]
[(1)] National Laboratory of Microstructures, Nanjing University, China
[(2)] Key Laboratory of Semiconductor Materials Science Institute of Semiconductors, CAS, Beijing, China
[(3)] School of Applied and Engineering Physics, Cornell University, Ithaca, USA

Abstract: To our knowledge, this is the first report of experimental realization of quarter-wave phase-shift distributed feedback (DFB) semiconductor lasers based on reconstructione quivalent-chirp (REC) technology. Lasers with four different wavelengths are achieved simultaneously in this experiment.

9:35-9:50

E04- ***Self-excited Brillouin multiwavelength fiber laser and its microwave photonic applications***

Zuxing Zhang[(1)], Jian Wu[(1)], Kun Xu[(1)], and Jintong Lin[(1)], Zuxing Zhang[(2)]
[(1)] Key Laboratory of Optical Communication and Lightwave Technologies of Ministry of Education, Beijing University of Posts and Telecommunications, China
[(2)] College of Physics & Communication Electronics, Jiangxi Normal University, China

Abstract: A self-excited Brillouin multiwavelength fiber laser with inherent characteristics for microwave photonic applications has been demonstrated. Based on this laser, microwave generation and microwave photonic filter have been proposed.

9:50-10:05

E05- ***High polarization single mode photonic crystal microlaser***

Wei Chen, Mingxin Xing, Wenjun Zhou, Anjin Liu, Lianghui Chen, and Wanhua Zheng
Nano-optoelectronics Lab, Institute of Semiconductors, Chinese Academy of Sciences, China

Abstract: A photonic crystal microlaser with elongated lattice was presented. Single dipole mode with polarization extinction ratio of 51:1 was obtained. The spontaneous emission coupling factor of the laser was estimated to be 0.28.

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Conference Hall No.303

10:05-10:25 Coffee Break

Session F: MWP Applications
Session Co-chairs:
Prof. Minshan Zhao (Dalian University of Technology, China)
Prof. Minhua Chen (Tsinghua University, China)

10:25-10:50
F01- ***Recent Trends in Optical Beamforming for Phased Arrays (Invited)***
Arokiaswami Alphones, Pham Quang Thai
School of EEE, Nanyang Technological University, Singapore
Abstract: With many promising potentials, optical beamforming has attracted many researchers' attention during the last three decades. However, all optical beamforming methods were built around a simple core idea of true time delay. In this paper, that very idea, as well as how it was realized in recent optical beamformer schemes are studied and discussed.

10:50-11:15
F02- ***A 0.2-0.5 THz Low-Noise Heterodyne Receiver Based on a Superconducting Tunneling Mixer Pumped by a Photonic Local Oscillator (Invited)***
S. Kohjiro[(1)], K. Kikuchi[(1)], T. Yamada[(1)], K. H. Oh[(2)], N. Shimizu[(2)], T. Nagatsuma[(2)], Y. Kado[(2)], A. Wakatsuki [(3)], T. Furuta[(3)]
[(1)] National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan
[(2)] NTT Microsystem Integration Laboratories, NTT Corporation, Atsugi, Japan
[(3)] NTT Photonics Laboratories, NTT Corporation, Atsugi, Japan
Abstract: A heterodyne receiver is developed which covers the whole frequency range of 0.2-0.5 THz and exhibits the noise temperature of TRX < $20hf/kB$ in the bandwidth of 74% of the center frequency, where h is Planck's constant, f is the frequency, and kB is Boltzmann's constant. This receiver consists of a superconductor-insulator-superconductor (SIS) mixer pumped by a photonic local oscillator (Ph-LO). The wide frequency tunability of the Ph-LO and small LO power requirement of the SIS mixer provides 0.2-0.5 THz band which three conventional multiplier-based LOs must share. The emission spectroscopy of N_2O is demonstrated based on this receiver with preliminary minimum detectable power of ~10 fW and frequency resolution of 0.5 GHz.

Conference Hall No.305 A

10:05-10:25 Coffee Break

Session G: Novel High Speed Components
Session Co-chairs:
Prof. Young-Wan Choi (Yonsei University, Korea)
Prof. Kun Qiu (University of Electronic Science and Technology of China, China)

10:25-10:50
G01- ***High-speed Photonic Package and Packaging Technology for Fiber Optic Communications (Invited)***
Nai Zhang
Dalian Actech Inc., China
Abstract: High-speed photonic package and packaging technology are key technologies for fiber optic communications. Recently, due to the continuously increasing information traffic over the internet, the corresponding increasing of the capacity for fiber optic communication systems is highly demanded. To meet such requirements, the telecommunication market has already pushed 40G bps fiber optic components to its ramp. Therefore, the high-speed photonic package and packaging technology attracted more and more attention in fiber optic components industry. In this paper, the present technologies in high-speed photonic package and packaging industry, such as package ceramic structure for microwave transmission, microwave impedance matching and signal integrity for interconnection of high-speed opto-electronic chips and integrated circuits (ICs), optical coupling, and precision YAG welding & assembly were reviewed respectively. Furthermore, our research and development activities and achievement so far in high-speed photonic package and packaging technology were discussed introduced in detail.

10:50-11:15
G02- ***Millimeter-Wave and THz Photonic Components and Systems for Broadband Connectivity (Invited)***
Andreas Stohr
University Duisburg-Essen, Germany
Abstract: In several applications such as broadband wireless access, short range wireless in-house communications, radar, security as well as in instrumentation the operational frequency range is already in the millimeter-wave region or is expected to be in the millimeter-wave region in the near future. This paper reports on some advanced millimeter-wave photonic component and system technologies supporting those applications. In detail, 300 GHz transmitters, 110 GHz photodiodes and 60 GHz lasers will be reported. Also broadband photonic wireless access systems for 10 Gigabit Ethernet bridging as well as for shortrange in-house delivery e.g. of uncompressed HDTV signals are presented.

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11:15-11:30

F03- ***Low Noise Supercontinuum Generated in the Photonic Crystal Fiber for Microwave Photonic Applications***

Xinzhu Sang, Chongxiu Yu, Jianxin Ma, Xiangjun Xin, Kuiru Wang , Qi Zhang
Key Laboratory of Optical Communication and Lightwave Technologies, Ministry of Education
Beijing University of Posts and Telecommunications, China

Abstract: Low amplitude noise and timing jitter are important for application of supercontinuum sources in radio-over-fiber systems and photonic signal processing of microwave signals. Low noise supercontinuum generated in the photonic crystal fiber is experimentally investigated.

11:30-11:45

F04- ***Photonic-Assisted Microwave Frequency Measurement with High Resolution and Tunable Range***

Jianqiang Li[(1)], Kun Xu[(1)], Jian Wu[(1)], Jintong Lin[(1)], Songnian Fu[(2)], J. Q. Zhou[(2)], P. Shum[(2)]
[(1)] Key Laboratory of Optical Communication and Lightwave Technologies, Ministry of Education
Beijing University of Posts and Telecommunications, China
[(2)] Network Technology Research Centre, Nanyang Technological University, Singapore

Abstract: A photonic-assisted approach to microwave frequency measurement is proposed. The key component is a dual-output Mach-Zehnder modulator working at chirped modulation. The proposed scheme features simplicity, high resolution, and tunable measurement range.

11:45-12:00

F05- ***A Photonic Method for Microwave Frequency Measurement Using Optical Phase Modulator***

Xiaomin Zhang, Hao Chi, Shilie Zheng, Xiaofeng Jin, and Xianmin Zhang
Department of Information and Electronic Engineering, Zhejiang University, Hangzhou, China

Abstract: A novel photonic method for the measurement of microwave frequency using optical phase modulator is proposed and demonstrated. The given approach is simple, low loss and does not require bias control, which is highly expected in practical applications.

Conference Hall No. 305 A

11:15-11:40

G03- ***Generation of High Power THz Radiation (Invited)***

Xiaodong Chen and Daohui Li
School of Electronic Engineering & Computer Science, Queen Mary, University of London, UK

Abstract: With the fast advancement of Terahertz (THz) related technologies, more and more applications, such as high bandwidth communications, radar, and secure detection, require higher power THz radiation sources. There are different approaches to generate THz radiation. In this paper, we mainly focus on the vacuum electronic technology, which has the potential to provide a sufficient high power to facilitate a wide range of THz applications.

11:40-11:55

G04- ***10-GHz Electrical-Comb Direct-Modulation of TO-can Packaged VCSEL for RZ Generation beyond 10 Gbit/s***

Gong-Ru Lin[(1)], Chia-Chi Lin[(1)], Yu-Chieh Chi[(1)], Hao-Chung Kuo[(2)], Peng-Chun Peng[(3)]
[(1)] Institute of Photonics and Optoelectronics, Department of Electrical Engineering, National Taiwan University,No.1 Roosevelt Rd. Sec. 4, Taipei 106, Taiwan, China
[(2)] Department of Photonics, National Chiao Tung University, Taiwan, China
[(3)] Department of Applied Materials and Electro-Optical Engineering, National Chi Nan University, Taiwan, China

Abstract: 10-GHz electrical comb modulation of TO-can packaged VCSEL for RZ Generation beyond 10 Gbit/s with BER of 10^{-9} at receiving power of -13dBm under -5dBm NRZ injection is demonstrated with 3-dB extinction and 3.3-GHz chirp.

11:55-12:10

G05- ***Microwave Frequency Multiplication Using Two Cascaded Mach-Zehnder Modulators***

Wangzhe Li and Jianping Yao
Microwave Photonics Research Laboratory School of Information Technology and Engineering University of Ottawa, ON, K1N 6N5, Canada

Abstract: A comprehensive investigation on microwave frequency multiplication based on two cascaded Mach-Zehnder modulators (MZMs) is presented in this paper. Depending on the dc bias applied to the MZMs to make the MZMs operate at the maximum transmission point (MATP) or the minimum transmission point (MITP) and the modulation indices of the MZMs, a frequency-quadrupled, sextupled, or octupled microwave signal can be generated. A theoretical analysis is performed, which is confirmed by two experiments.

Thursday, 23 April, 2009

Conference Hall No.305 A

12:15-13:30 **Lunch Break;**
TPC Lunch Meeting

13:30-15:35 **Session I: MWP Signal Processing**
Session Co-chairs:
Dr. Arokiaswami Alphones (Nanyang Technological University, Singapore)
Prof. Minshan Zhao (Dalian University of Technology, China)

13:30-13:55 **I01-** ***Photonic Signal Processing of Microwave Signals (Invited)***
Robert A. Minasian, Erwin H. W. Chan and Xiaoke Yi
School of Electrical and Information Engineering The University of Sydney, NSW, Australia
Abstract: Photonic signal processing offers a new powerful paradigm for processing high bandwidth signals, overcoming inherent electronic limitations. Recent new methods in wideband signal processing, which address the challenge of realising photonic signal processors that simultaneously exhibit high resolution and low-noise are presented, including state-of-the-art results, and novel capabilities for adaptive processing.

13:55-14:20 **I02-** ***Spur-Free Dynamic Range of Electroabsorption Modulator Fiber Link (Invited)***
X. B. Xie[2], I. Shubin[1], W. S. C. Chang[1], P. K. L. Yu[1], D. S. Shin[3]
[1] University of California at San Diego, La Jolla, CA 92093, USA
[2]University of Central Florida,Orlando, Florida, USA
[3]Hanyang University, Korea
Abstract: We present the linearity performance and analysis of analog fiber-optic links based on electroabsorption modulators (EAMs) at high power and at high frequency.

14:20-14:45 **I03-** ***Microwave Photonic Sub-Terahertz Wave Generation and Its Application to Gas Spectroscopy (Invited)***
Ho-Jin Song[1], Naofumi Shimizu[1], Tadao Nagatsuma[1], Naoya[1], Kukutsu[1], Yuichi Kado[1], Tomofumi Furuta[2], Atsushi Wakatsuki[2]
[1] NTT Microsystem Integration Laboratories, NTT Corporation,3-1, Morinosato Wakamiya, Atsugi, Kanagawa, Japan
[2] NTT Photonics Laboratories, NTT Corporation, 3-1, Morinosato Wakamiya, Atsugi, Kanagawa, Japan.
Abstract: In this paper, we present two microwave photonic sub-terahertz signal generation techniques for a gas spectroscopy application, utilizing a uni-traveling carrier photodiode (UTC-PD) and commercial optical telecommunications components. One is a monochromatic signal generation providing narrow spectral linewidth and wide frequency tunability. The other is a time-continuous noise-like broadband signal generation providing a wide dynamic range of better than 30 dB, a fast scan speed, and hertz-order spectral resolution. Using the implemented sub-terahertz signal sources, we demonstrate a simple spectroscopic measurement of N_2O and H_2O.

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	Conference Hall No. 305 A
14:45-15:00	**I04-** ***All-optical coherent-free microwave filter with switchable passbands based on phase and intensity hybrid modulation*** **Kun Zhu[(1)] , Haiyan Ou[(1)] , Biao Chen[(1)] , Sailing He[(2)]** [(1)] Centre for Optical and Electromagnetic Research, State Key Laboratory for Modern Optical Instrumentation, Zhejiang University, Hangzhou, P. R. China [(2)] Division of Electromagnetic Engineering, School of Electrical Engineering, Royal Institute of Technology, Stockholm, Sweden **Abstract:** A simple all-optical coherent-free microwave notch filter based on phase-intensity hybrid modulation scheme is proposed and experimentally demonstrated. Switchable lowpass and bandpass filtering responses are both observed and show great match with the simulated results.
15:00-15:35	**I05-** ***A Tunable Photonic Microwave Notch Filter Based on Stimulated Brillouin Scattering*** **Li Xia, S. Aditya, P. Shum, Junqiang Zhou, and Babang Putra Parhusip** Network Technology Research Centre, Nanyang Technological University, Singapore **Abstract:** A special loop structure is designed to generate the stimulated Brillouin scattering. Measured results show that the position of the notch in the two-tap microwave filter response can be tuned from 2.17 GHz to 8.77 GHz.
15:05-15:25	**Coffee Break**
15:25-18:30	**Social Program**
19:00-21:00	**Banquet**

Friday, 24 April, 2009

Conference Hall No. 303

8:30-10:05 **Session H: RoF Systems 2**

Session Co-chairs:
Dr. Pengbo Shen (University of Kent, UK)
Prof. Minhua Chen (Tsinghua University, China)

8:30-8:55

H01- ***Digitized RF over Fiber Transport: Enabling Cost-Effective Integration of Optical and Wireless Access Networks (Invited)***

Ampalavanapillai Nirmalathas[(1)], Prasanna A. Gamage[(1)], Yizhuo Yang[(1)], Christina Lim[(1)], Dalma Novak[(1),(2)], and Rod Waterhouse[(1),(2)]
[(1)]ARC Special Research Centre for Ultra-Broadband Information Networks (CUBIN), Dept. of Electrical and Electronic Engineering, The University of Melbourne, Australia
[(2)]Pharad LLC, USA

Abstract: Integration of optical and wireless broadband networks via a common backhaul network can lead to the cost-effective deployment of access networks offering both wired and wireless connectivity. We have recently shown that digitized rf-over-fiber transmission can lead to high performance links. Digitized rf-over-fiber takes advantage of mature digital optical transceivers and electronic analog-to-digital and digital-to-analog converters. In this talk, we present an overview of digitized rf-over-fiber transmission and consider issues facing this approach.

8:55-9:20

H02- ***Microwave Photonic Signal Processing Techniques and Radio-Over-Fiber Transmission Demonstration (Invited)***

Kun Xu, Jianqiang Li, Jie Yin, Ye Zhang, Hao Huang, Xiaoqiang Sun, Jian Wu, and Jintong Lin
Key Laboratory of Optical Communication & Lightwave Technologies, Ministry of Education, Beijing University of Posts and Telecommunications, Beijing, 100876, China

Abstract: Radio-over-fiber (ROF) utilizing microwave photonic signal processing techniques is a powerful solution for the future super-broadband wireless access. In this paper, we review our recent works on photonic processing techniques of microwave signals for ROF applications and experimental demonstration of ROF transmissions. Our works specifically focus on impulse-response ultra-wideband (IR-UWB) pulse generation for UWB-over-fiber systems, photonic vector modulation, novel analog modulation format, multi-service ROF system design and experimental demonstrations.

9:20-9:35

H03- ***DWDM-based Frequency-interleaved Optical Distributing System Merging Wired and Wireless Services***

Mo Li, Hongwei Chen, Feifei Yin, Minghua Chen and Shizhong Xie
Department of Electronic Engineering, Tsinghua University, Beijing, China

Abstract: A DWDM-based frequency-interleaved optical distributing system merging bansband-wired and 62.5-GHz-wireless services at 1.25-Gb/s is demonstrated. The signals are distributed over 40-km SMF and FBGs are used to drop off corresponding frequency components at access points.

9:35-9:50

H04- ***Radio-over-Fibre Downlink transmission System Using Optical Frequency Sextuple Multiplication***

Tianliang Wang, Hongwei Chen, Minghua Chen, Shizhong Xie
Department of Electronic Engineering, Tsinghua Univ. Beijing China 100084

Abstract: We propose a millimetre-wave RoF system employing optical frequency sextuple multiplication by FWM in SOA. The downlink 2.5-Gbit/s data is transmitted over 20-km with less than 0.15-dB power penalty.

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9:50-10:05

H05- ***60GHz optical mm-wave signal generation and the Radio-Over-Fiber system with wired/wireless transmission***

L. Chen, Z. Dong, Z. Cao, J. Lu and J. Yu
School of Computer and Communication and Key Laboratory for Micro/Nano Opto-Electronic Devices of Ministry of Education, Hunan University, Changsha, China

Abstract: We have experimentally investigated 60GHz optical mm-wave signal generation, transmission and detection in ROF system. BER curves and eye diagrams at different wireless distances are measured. Our experimental results show that the 2.9Gbit/s downstream data carried by 60GHz optical millimeter-wave generated by 30GHz RF source can be transmitted over 20km SMF-28 and 2.6m wireless distance at a BER smaller than $1x10^{-9}$.

10:05-10:25 **Coffee Break**

10:25-12:15 **Session J: UWB System and Applications**

Session Co-chairs:
Prof. Gong-Ru Lin (National Taiwan University, Taiwan, China)
Dr. Hongwei Chen (Tsinghua University, China)

10:25-10:50

J01- ***High-Speed Ultra-Wideband Wireless Signals over Fiber Systems: Photonic Generation and DSP Dectection (Invited)***

Xianbin Yu, Timothy Braidwood Gibbon, Idelfonso Tafur Monroy
DTU Fotonik-Department of Photonics Engineering Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark

Abstract: we firstly review the efforts in the literature on UWBover-fiber systems. Secondly, we present experimental results on photonic generation of high-speed UWB signals by both direct modulation and external optical injecting an uncooled semiconductor laser. Furthermore, we introduce the use of digital signal processing (DSP) technology to receive the generated UWB signal at 781.25 Mbit/s. Error-free transmission is achieved.

10:50-11:15

J02- ***Ultrabroadband Radio-Frequency Photonics (Invited)***

Andrew M. Weiner
School of Electrical and Computer Engineering, Purdue University West Lafayette, Indiana, USA

Abstract: We discuss research at Purdue University in which ultrafast optical signal processing approaches are adapted for generation and processing of ultrabroadband RF electrical signals. Examples include generation of impulsiveRF arbitrary waveforms with instantaneous bandwidths up to tens of GHz, dispersion compensation for broadband antennas, and photonically implemented matched filtering over nearly 20 GHz RF bandwidth.

11:15-11:30

J03- ***Effect of Relative Intensity Noise on the Performance of Multiband OFDM Ultra-Wideband over Fiber System***

Meer N. Sakib[(1)], Xiupu Zhang[(1)], Mohmoud Mohamed[(1)], Bouchaib Hraimel[(2)], Ke Wu[(2)]
[(1)] Department of Electrical and Computer Engineering, Concordia University, Canada
[(2)] Department of Electrical Engineering Polygrames research Group, Ecole Polytechnique Montreal, Quebec, Canada

Abstract: Performance of multiband ultra-wideband over fiber transmission system is investigated through theory and simulation considering the impact of relative intensity noise. Experiments are conducted to verify our analysis and good agreement is obtained.

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11:30-11:45

J04- ***UWB monocycle pulse bipolar coding based on optical cross polarization modulation***

Shiguang Wang, Hongwei Chen, Minghua Chen and Shizhong Xie
Department of Electronic Engineering, Tsinghua University, Beijing, China

Abstract: A novel all-optical method for ultra-wideband (UWB) monocycle pulse generation and bipolar coding based on cross polarization modulation effect in high nonlinearity photonic crystal fiber is proposed and experimentally demonstrated.

11:45-12:00

J05- ***Performance of Millimeter Wave MB-OFDM Ultra Wideband Signal Generation Using Optical Frequency Up-Conversion and Transmission over Fiber***

Mohmoud Mohamed[(1)], Xiupu Zhang[(1)], Meer N. Sakib[(1)], Bouchaib Hraimel[(2)], Ke Wu[(2)]
[(1)] Department of Electrical and Computer Engineering Advanced Photonic Systems Lab, Concordia University, Canada
[(2)] Department of Electrical Engineering Polygrames research Group, Ecole Polytechnique Montreal, Quebec, Canada

Abstract: Performance of millimetre-wave multibandorthogonal frequency division multiplexing ultra-wideband signal generation using optical frequency up-conversion and transmission over fiber is investigated considering modulation index and fiber dispersion. Good agreements are obtained between simulation and experiment.

12:15-13:30 **Lunch Break**

13:30-15:05 **Session L: Functional Devices**

Session Co-chairs:
Dr. Xiupu Zhang (Concordia University, Canada)
Prof. Xiangfei Chen (Nanjing University, China)

13:30-13:55

L01- ***Ultrafast, low-energy-consumption, semiconductor-based, all-optical devices (Invited)***

Yoshiyasu Ueno[(1)], Jun Sakaguchi[(2)],Ryoichi Nakamoto[(3)], Takehiro Nishida[(1)]
[(1)]Graduate School of Electronic Engineering University of Electro-Communications (UEC), Chofu city, Tokyo, Japan
[(2)]Nara Institute of Science and Technoloy, Nara, Japan
[(3)]Sumitomo Electric Industries, Ltd., Yokohama, Japan

Abstract: The relatively-low electric-energy-consumption level (3 pJ/bit) of the most fundamental all-optical semiconductor gate device (i.e., signal-wavlength converter), with respect to its ultrafast response speed in the 200-Gb/s range, are briefly reviewed.

13:55-14:20

L02- ***Thermal Sensitivity of Photonic Crystal Fibers in Optoelectronic Oscillators (Invited)***

Afshin S. Daryoush
Drexel University, USA

Abstract: Stable opto-electronic oscillators (OEOs) are realized using long fiber delay lines and changes in the index of refraction of high quality factor delay line results in temperature sensitivity of OEOs. Temperature sensitivity of various OEOs is measured to compare index of refraction variation of standard (SMF-28) and photonic crystal fiber (PCF). Both hollow-core (HC) and solid-core (SC) versions of PCF are quantified. SC-PCF exhibited a factor of three reductions in the rate of index of refraction change (about +4.7 ppm/oC) with temperature over SMF-28 (about 12 ppm/oC) based OEO. Although HC-PCF have a greater attenuation per unit length, but those fibers have demonstrated a negative rate of change (about - 0.6ppm/oC) in the effective index of refraction with temperature and prospect of thermal stability in the OEO using passive techniques is great when a combination of HC-PCF and SMF-28 are employed as fiber delay lines.

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14:20-14:35

L03- ***Ring defect photonic crystal vertical cavity surface emitting laser***

Anjin Liu, Hongwei Qu, Wei Chen, Mingxin Xing, Wenjun Zhou, and Wanhua Zheng

Nano-optoelectronics Lab, Institute of Semiconductors, CAS, Beijing, China

Abstract: Selectively oxidized ring defect photonic crystal vertical cavity surface emitting laser (RD-PCVCSEL) is demonstrated. The device achieves coherent coupling over the entire continuous-wave current range.

14:35-14:50

L04- ***CMOS Integrated Optical Receivers for Radio-over-Fiber Transmission of IEEE 802.11g WLAN Signals***

Jin-Sung Yoon, Hyo-Soon Kang, Myung-Jae Lee, Kang-Yeob Park, and Woo-Young Choi

Department of Electrical and Electronic Engineering, Yonsei University, 134 Shinchon-dong, Seodaemoon-gu, Seoul 120-749, Korea

Abstract: This paper presents an integrated optical receiver fabricated with 0.13-¦Ìm standard complementary metal-oxidesemiconductor (CMOS) technology for cost-effective radio-overfiber (RoF) systems. The CMOS integrated optical receiver is composed of a CMOS-compatible avalanche photodetector (CMOS-APD) and a transimpedance amplifier (TIA) circuits. Using a negative capacitance cell, gain and bandwidth of the CMOS integrated optical receiver are enhanced. The power dissipation (excluding output buffer) and the core size of the fabricated receiver are about 18 mW at 1.2 V supply voltage and 0.38 x 0.38 mm2, respectively. With this integrated optical receiver, radio-over-fiber transmission of IEEE 802.11g 54-Mb/s WLAN signals at 2.4 GHz is achieved with 3.89 % error vector magnitude.

14:50-15:05

L05- ***RF Distortion Effects on a Fiber Ring Based Optical Frequeny Comb Generator***

P. Shen, N. J. Gomes and P. A. Davies

Department of Electronics, University of Kent, Canterbury, Kent, CT2 7NT, UK

Abstract: This paper discusses the effect of distortion in the RF reference signal used to drive an Optical Frequency Comb Generator. It is demonstrated that the optical comb spectral profile can be significantly altered by the amplitude and phase of the RF harmonics of the drive signal.

15:05-15:25 **Coffee Break**

15:25-17:00 **Session M: Relative Applications**

Session Co-chairs:

Prof. Kun Qiu, (University of Electronic Science and Technology of China, China)

Dr. Li Xia (Nanyang Technological University, Singapore)

15:25-15:50

M01- ***Semiconductor Optical Amplifier-Enabled Intensity Modulation of Adaptively Modulated Optical OFDM signals for Passive Optical Networks (Invited)***

J.M.Tang

School of Electronic Engineering, Bangor University, UK

Abstract: The feasibility of using Semiconductor Optical Amplifiers (SOAs) to achieve intensity modulation of adaptively modulated optical orthogonal frequency division multiplexed (AMOOFDM) signals will be presented for practical applications in WDM PONs. It will be shown that the optimized SOA-based intensity modulators can offer colorless operation and support a 30Gb/s AMOOFDM signal transmission over a 80km SMF, which doubles the transmission performance offered by directly modulated DFB lasers. The aforementioned performance enhancement is mainly due to a considerable reduction in the frequency chirp effect, resulting from the strong SOA gain saturation-induced bandwidth broadening. Relatively low extinction ratio and clipping of the SOA modulated signals are identified to be the key factors limiting the maximum achievable AMOOFDM transmission performance.

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15:50-16:15

M02- ***R & D of the 4th Generation Mobile Comunication System in China (Invited)***

Xiaofeng Tao
BUPT, China

16:15-16:30

M03- ***AWG Channel Spacing Induced WRC-FPLD Based WDM-PON for Crosstalk Reduction and Increase of Network Capacities***

Tzu-Kang Cheng[(1)], Yi-Hung Lin[(1)], Gong-Cheng Lin[(2)] and Hai-Lin Wang[(2)], Gong-Ru Lin[(1)]
[(1)]Institute of Photonics and Optoelectronics, Department of Electrical Engineering, National Taiwan University, No.1 Roosevelt Rd. Sec. 4, Taipei 106, Taiwan, China
[(2)]Telecommunication Laboratories Advanced Technology, Chunghwa Telecom Co., Ltd., Taoyuan, Taiwan, China

Abstract: Disscuss the effect of AWG filter bandwidth on the transmission performances and by filtering the ASE source with another AWG filter at local ONU, the AWG induced reflection is minimized to improve the upstream data.

16:30-16:45

M04- ***Chirp and Extinction of Weak-Resonant-Cavity FPLD based DWDM-PON with 200GHz AWG Channel***

Tzu-Kang Cheng[(1)], Yi-Hung Lin[(1)], Gong-Cheng Lin[(2)] and Hai-Lin Wang[(2)], Gong-Ru Lin[(1)]
[(1)]Institute of Photonics and Optoelectronics, Department of Electrical Engineering, National Taiwan University, No.1 Roosevelt Rd. Sec. 4, Taipei 106, Taiwan, China
[(2)]Telecommunication Laboratories Advanced Technology, Chunghwa Telecom Co., Ltd., Taoyuan, Taiwan, China

Abstract: Weak-resonant-cavity FPLD injection-locked by 200GHz-AWG filtered ASE with BER below 10-9 at receiving power <-30 dBm, mode-number independent penalty <0.25dB, back-to-back/25km-transmitted chirp and chirp parameters (d2 Φ / dt2) of -0.8/-6.4 GHz and -1.6/-13 MHz/ps are reported.

16:45-17:00

M06- ***All-optical Wavelength Conversion Based on FWM in SOA for OFDM Optical Signal***

J. Lu, L. Chen, Z. Dong, Z. Cao , H. Zhou and J. Yu
School of Computer and Communication, Hunan University, Key Laboratory for Micro/Nano Opto-Electronic Devices of Ministry of Education, Hunan University, Changsha, China

Abstract: We have theoretically and experimentally investigated all optical wavelength conversion based on four-wave mixing in a SOA for OFDM optical signal. Theoretical model is developed for FWM in SOA for different pump schemes. The experimental results are consistent with theoretical analysis.

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Conference Hall No. 303

P01- ***Quantitative Analysis on the Computing Performance Improvement by Parallel Optical Interconnection***

Liang LI, Yaojun Qiao, Yuefeng JI
Beijing University of Posts and Telecommunications, China

Abstract: This paper quantitatively analyzes the computing performance improvement in different topology systems, and design an experiment to demonstrate this performance promotion. Both results show parallel optical interconnection can bring large advantages in promoting computing performance.

P02- ***The design of tunable edge emitting microlaser on photonic crystal slab***

Mingxin Xing, Wanhua Zheng, Wei Chen, Wenjun Zhou, Anjin Liu, Hailing Wang, Lianghui Chen
Institute of Semiconductors, Chinese Academy of Sciences, China

Abstract: Tunable edge emitting microlaser is designed with a line-defect-waveguide in which the radii of holes adjacent to the defect were varied gradually. The theoretical tunable range of 71nm can be realized according to the simulation.

P03- ***A new kind of flat microwave photonic filter with multiple taps***

Qi Chunhui, Pei Li, Ning Tigang, Wu Shuqiang, Guo Lan, Zhao Ruifeng, Ruan Yi
Beijing Jiaotong University, China

Abstract: We put forward a new kind of flat microwave photonic filter with multiple taps using Mach-Zehnder (MZ) modulator ,fiber Bragg grating and erbium-doped fiber. The flat response can be changed by some parameters easily.

P04- ***Phase Mismatching Slope Optimization for Magneto-optic Pulse Compression***

Xiang Gao, Bao-Jian Wu, and Kun Qiu
University of Electronic Science and Technology of China, China

Abstract: The collinear diffraction effects of linearly chirped Gaussian optical pulses with continuous magnetostatic surface waves (MSSWs) excited in magnetooptic (MO) film waveguides under a horizontal bias magnetic field are the oretically studied. MO pulse coupling equations and the analytic solution are presented. It is shown that optical pulse compression based on the MO Bragg diffraction is dependent on phase mismatching slope, which can be greatly increased by using different modenumber of incident and diffracted guided optical waves (GOWs) and appropriately choosing normalized thickness of MO film(ratio of the film thickness to the light wavelength). In TE0 -->TM8 diffraction full-width-at-half-maximum (FWHM) ratio of the diffracted and incident optical pulses comes up to 38%.

P05- ***40-Gbps Electro-absorption Modulated Distributed Feedback Laser***

Yuanbing Cheng,
Institute of Semiconductors, Chinese Academy of Sciences, China

Abstract: A 40-Gbps MQW electroabsorption modulator (EAM) with a lumped electrode monolithically integrated with a distributed feedback (DFB) laser is demonstrated. Superior characteristics are exhibited for the device, such as low threshold current of 18 mA, over 40 dB side-mode suppression ratio at 1550 nm and more than 30 dB extinction ratio when oupled into a single-mode fiber. By adopting deep ridge waveguide and planar electrode structures combined with buried benzocyclobutene (BCB), the capacitance of the EAM is reduced down to 0.18pF and over 33 GHz modulation bandwidth at a small signal has been demonstrated. Negative chirp operation is realized when the bias voltage is beyond 1.6V.

P06- ***A New Scheme to Generate Optical Single Sideband Using One Electroabsorption Modulator***

Jun Wu, Shengyong Li,Yingjian Wang, Xuejun Zhou, Lianghui Chen
Electronic Engineering Institute,Naval University of Engineering, Wuhan, Hubei Province, P. R. China

Abstract: A new scheme to generate optical single sideband (OSSB) using only one electroabsorption modulator (EAM) is proposed through the cancellation between the nonlinear phase due to dispersion and the linear phase due to optical delay.

P07- ***Impact of Nonlinear Distortion on FDM Signals in Radio-over-Fiber Systems with Multiple RF Tones***

Yinqing Pei, Kun Xu, Jianqiang Li, Xiaoqiang Sun, Jian Wu, Xiaobin Hong, Jintong Lin
BUPT, China

Abstract: A numerical analysis model is proposed to evaluate the impact of nonlinear distortion on FDM signals in Radioover-Fiber systems with multiple tones. The obtained dynamic range is beneficial for optimization.

P08- ***Nonlinearly Chirped Grating Based Continuously Tunable High Notch Rejection Microwave Photonic Filter***

Junqiang Zhou, Li Xia, Sheel Aditya, Perry Shum Ping, Babang Putra Parhusip
Nanyang Technological University, Singapore

Abstract: We propose a continuously tunable high notch rejection microwave photonic filter which is based on a nonlinearly chirped fibre Bragg grating (NLCFBG). The filter response is caused by the dispersion induced by the NLCFBG and tunability is realized through changing the operating optical wavelength. Measured results demonstrating notch frequency tuning of 4.7 GHz with more than 45 dB notch rejection are presented.

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P09- ***A Fiber-based Method for Millimeter-Wave Harmonic Signal Generation***

Haiyan Ou, Kun Zhu, Ying Hu, Biao Chen
Centre for Optical and Electromagnetic Research, Zhejiang University, Hangzhou, China

Abstract: A fiber-based millimeter-wave harmonic signal generation method is proposed and verified experimentally. By implementing a tunable single passband microwave photonic filter, specific order of harmonic signals can be generated.

P11- ***Phase Noise Characteristics of the Carrier Signal Transmitted by the DSB-CS Modulation System***

Xin Luo, Xiuyou Han, Yiying Gu, Shanfeng Li, Mingshan Zhao
Dalian University of Technology, China

Abstract: Phase noise characteristics of the carrier signal transmitted by the DSB-CS modulation system are investigated. Based on the established DSB-CS modulation system, the phase noise of the input carrier signal and the output doubled frequency signal is measured. The influencing factors on the far-from-carrier phase noise are discussed in detail. The noise current mean-square value of the signal-spontaneous beat noise is firstly derived in the case that there is two-mode laser light generated by DSB-CS modulation. It is shown that the farfrom-carrier phase noise is degraded primarily due to the signal-spontaneous beat noise and the RIN. If a laser with the RIN lower than the minimum detectable RIN is used, the signal-spontaneous beat noise is left as the only major influencing factor.

P12- ***Impact of Pointing Errors on Performance of a Ground-to-Satellite Laser Uplink Communication System based on M-ary Pulse Position Modulation***

Zhuoli Chen, Juanjuan Yan
School of Electronic and Information Engineering, Beihang University, China

Abstract: The laser beam propagating in the ground-to-satellite laser communication system is affected by intensity scintillation due to atmospheric turbulence and pointing errors due to beam wander. These effects would greatly degrade the system performance. Pulse Position Modulation (PPM) is a powerefficient modulation scheme to overcome this problem. The effect of pointing errors on the performance of a ground-tosatellite laser uplink communication system with M-ary PPM is analyzed in this paper. The results show that pointing error degrades the system performance, and that the effect is more significant for a shorter work wavelength. This work benefits the ground-to-satellite laser uplink communication system with M-ary PPM design.

P13- ***CATV signal transmission over WDM-PON using a broadband light source***

Song Chen, Biao Chen
Zhejiang University, China

Abstract: A cost-effective scheme for cable television (CATV) service delivery over a wavelength division multiplexing passive optical network (WDM-PON) is proposed and its performance is analyzed in detail.

P14- ***A 5-Bit Fiber Delay Line Based on Magneto-Optic Switch***

Shuangjin Shi, Qi Qiu, Zhicheng Qiu, Jun Su, Yun Liao
The Institute of Opto-Electronic Technology, University of Electronic Science and Technology of China, China

Abstract: Optical true time delay line based on magneto-optic switch was analyzed. Several key supporting aspects were discussed. A 5 bit optical delay line module based on MO switch and fiber was made. The maximal delay error of 32 states is less than 2.6ps.

P15- ***Phase locking of two diode lasers at 9.2 GHz***

Hong Guo[(1)], Wenzhuo Tang[(1)], Luming Li[(2)]
[(1)] Peking University, China
[(2)] Jiangxi Electric Power Information and Communication Company, China

Abstract: We implement an optical phase locked loop (OPLL) between two external cavity diode lasers (ECDLs) at 9.2 GHz. Hence it becomes possible to study coherent effects based on hyperfine levels of cesium atom in experiment.

P16- ***16QAM OFDM Optical Signal Transmission over 200km SSMF with Convolutional Encoding and Viterbi Decoding***

Z£®Z. Cao[(1)], L. Chen, Z. Dong[(1)], J. Lu[(1)], and J. Yu[(1)], Z. P. Wang[(2)]
[(1)] School of Computer and Communication and Key Laboratory for Micro/Nano Opto-Electronic Devices of Ministry of Education, Hunan Univ., China
[(2)] School Of Information and Electronic Engineering Zhejiang Science and Technology Univ., China

Abstract: A 16QAM OFDM optical signal transmission over 200km SSMF with Convolutional encoding and Viterbi decoding is experimentally demonstrated. Convolutional codes have been widely used in wireless communication systems for error correction for its superiority in random error correction. They are suitable for slowly varying channels such as optical link of single mode fiber (SMF). In this paper we employ Convolutianal encoding and Viterbi decoding for error correction in optical transmission system for the first time. Experimental result suggests that the power penalty of OFDM signal with encoding can be largely reduced for 5Gb/s OFDM signal transmission over 200km SMF-28. The real bit rate is 2.5Gb/s after overhead is removed.

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P17- ***A novel all-optical label swapping based on RZ-DQPSK/IRZ-ASK combined modulation format***

Xueguang Yuan, Jinnan Zhang, Yangan Zhang, Minglun Zhang, Yongqing Huang, Xiaomin Ren
Key Laboratory of Optical Communication and Lightwave Technologies, Ministry of Education, BUPT, China

Abstract: A novel all-optical label swapping based on RZ-DQPSK/IRZ-ASK combined modulation format scheme is investigated and analyzed theoretically. IP packets can be efficiently labeled and optical processed using this proposed scheme. Numerical simulation is taken to demonstrate the transmission characteristic of the all-optical label swapping based on RZ-DQPSK/IRZ-ASK modulation format. The transmission performance can be affected by the duty cycle of the inverse RZ pulse, the IRZ-ASK label extinction ratio, the dispersion compensation ratio, received optical power and the coupling coefficient of the coupler. Results show that the IRZ-ASK label extinction ratio is almost infinite and preferable performance is obtained. The proposed scheme is a practical solution to meet the data rate and cost-efficient of the optical links simultaneously in tomorrow's all-optical label swapping.

P18- ***Fourier-Transform Pulse Shaping Using a Single Chirped Fiber Bragg Grating***

Chao Wang and Jianping Yao
Microwave Photonics Research Laboratory, School of Information Technology and Engineering, University of Ottawa, Canada

Abstract: A Fourier-transform pulse shaper using a single linearly chirped fiber Bragg grating (LCFBG) is proposed and investigated. The LCFBG in the system performs three functions: temporally stretching the input pulse, shaping the pulse spectrum, and compressing the spectrum-shaped pulse. The impulse response of the entire system is equal to the Fourier transform of grating reflection spectral function. By appropriately designing the grating reflection response, a temporal optical waveform in the sub-picosecond regime can be accurately synthesized.

P19- ***Multi service link design for Radio on fiber CATV network***

Shota YAO[(1)], Kazuo KUMAMOTO[(1)], Koji YASUKAWA[(1)], and Takeshi HIGASHINO[(2)], Katsutoshi TSUKAMOTO[(2)], Shozo KOMAKI[(2)], Keizo INAGAKI[(3)]
[(1)] Faculty of Eng., Osaka Institute of Technology, Japan
[(2)] Division of Electrical, Electronic and Information Engineering, Osaka University, Japan
[(3)] Wave Engineering Lab., ATR, 2-2-2 Hikaridai, "Keihanna Science City", Kyoto, Japan

Abstract: For the purpose of providing digital broadcasting, WiMAX and wireless LAN (WLAN) services using CATV network in the blind area of these services, this paper describes results of link design, that is, carrier to noise plus distortion power ratio (CNDR), out of band emission etc, for radio on fiber link.

P20- ***Microwave Environment Transport Technology over Digital Free Space Optical Network***

Yozo Shoji, Yoshihisa Takayama, Morio Toyoshima, Hiroo Kunimori, and Hiroki Ohta
National Institute of Information and Communications Technology, Japan

Abstract: The applications of microwave environment transport technology over digital optical free space optical (DFSO) network are discussed. The technology realizes a quick, easy, and low-cost deployment of wireless systems among a number of space stations or manned space activity areas which might be built on lunar or Mars in future. The use of DFSO network in networking those stations can avoid radiating undesirable microwaves into space. A remote sensing or monitoring of radiated microwaves for any desired areas will be another good application to utilize the technology. In order to start a feasibility study on this technology, we developed a simple demonstration system, where UHF band microwave is converted into IP packets by using AD converter and FPGA based circuit. The IP packets are transported to the destination via a fiber-optic based Giga-bit Ethernet link. Then the original microwave is regenerated. We report the quality of the regenerated microwave in terms of signal-to-noise power ratio and distortion.

P21- ***Throughput Performance of IEEE 802.11a over RoFSO Link***

Kyung-Hwan Kim[(1)], Takeshi Higashino[(1)], Takuya Nakamura[(1)], Yuji Aburakawa[(1)], Katsutoshi Tsukamoto[(1)], Shozo Komaki[(1)], Kazuhiko Wakamori[(2)], Toshiji Suzuki[(2)], Kamugisha Kazaura[(2)], Mohamad Shah Alam[(2)], Koichi Takahashi[(2)], Kazunori Ohmae[(2)], Mitsuji Matsumoto[(2)]
[(1)] Division of Electrical, Electronic and Information Engineering, Graduate School of Engineering, Osaka University, Japan
[(2)] GITI, Waseda University, Nishiwaseda, 1-3-10, Shinjuku-ku, 169-0051, Japan

Abstract: This paper introduces a statistical model of radio on free space optics (RoFSO) channel on time-correlation of scintillation based on the measured data. Throughput performance of IEEE 802.11a over RoFSO link is evaluated by using proposed model. Degradation due to scintillation of 8.4 percents occurs at worst for radio path length of 25.8m, it is found to be more sensitive to longer radio path length.

Thursday, 23 April, 2009 13:30-15:05

Room: 303

P22- ***Nonlinear distortion cancellation scheme for SCM Radio on Fiber transmission using two lasers***

Kazuo KUMAMOTO[1], Koji YASUKAWA[1], Takeshi HIGASHINO[2], Katsutoshi TSUKAMOTO[2], Kamugisha Kazaura[2], Mohamad Shah Alam[2], Koichi Takahashi[2], Shozo KOMAKI[2], Keizo INAGAKI[3]

[1] Faculty of Eng., Osaka Institute of Technology, Japan
[2] Division of Electrical, Electronic and Information Engineering, Osaka University, Japan
[3] Wave Engineering Lab., ATR, Japan

Abstract: Convergence of communication and broadcasting based on Radio over Fiber (RoF) network has been investigated. In RoF networks, although system costs can be reduced by employing sub-carrier multiplexing (SCM), it has issue that influence of inter-modulation distortion caused by nonlinearity of E/O conversion becomes large. To overcome this issue, this paper demonstrates simultaneous cancellation scheme of 2nd order and 3rd order nonlinear distortion using transfer characteristics of electro absorption modulator (EAM) with two lasers. Experimental results will show that nonlinear distortions are effectively cancelled and spurious free dynamic-range (SFDR) is improved.

P23- ***Sideband characteristic analysis of optical millimeter wave generation based on Optical Carrier Suppression***

Chunning Hou, Xiao Liu, Xi Zheng, Nan Chi
School of Information Science and Engineering, Fudan University, China

Abstract: The optical sidebands power and the electrical harmonic frequencies as a function of the departure of the bias voltage from the null point are analyzed. The bias drift tolerance is found between 0.97v to 1.04v.

P24- ***A Novel Non-uniformed Coherent Heterodyne WDM System with high channel efficiency***

Yan Li, Kun Xu, Jie Yin, Xiaogang Yi, Jian Wu, Xiaobin Hong, and Jintong Lin
Key Laboratory of Optical Communication and Lightwave Technologies, Ministry of Education, BUPT, China

Abstract: A novel non-uniform spacing coherent heterodyne WDM system with high channel efficiency is proposed and analyzed. The system exhibits excellent laser linewidth toleration of 10MHz and channel space deviation toleration of ±40%. The average channel space is reduced to its half value comparing to the traditional uniform WDM systems. Experimental setup is established at 2.5-Gb/s for DPSK and NRZ modulation formations.

P25- ***Next-Generation Distributed and Heterogeneous Radio Architectures: the FUTON Project***

S. Pato, P. Monteiro[1], N.J. Gomes[2], A. Gameiro[3], T. Kawanishi[4]
[1] Nokia Siemens Networks S.A.Amadora, Portugal
[2]University of Kent Canterbury, UK
[3] Univ. Aveiro, Instituto de Telecomunicacoes Aveiro, Portugal
[4] NICT, Tokyo, Japan

Abstract: The FUTON project aims to develop and validate a fibre based infrastructure for transparently interconnecting multiple remote antennas to a central location, exploiting the merits of the joint processing of radio signals. This paper overviews the objectives of the FUTON project, describing its concept and its main challenges.

P26- ***Research on Noise Figure of Directly Modulated Microwave Photonic Link***

Jixin Chen, Tao Zhou, Baohua Fan
National Information Control Lab, Chengdu, China

Abstract: Microwave photonic link (MPL) can provide significant benefits in the propagation of microwave signal by optical fiber. However, MPL is generally limited by high noise figure, which affects dynamic range of system. In this paper, a model about directly modulated MPL is built, and the expression about noise figure is deduced. The effects on noise figure of MPL are investigated. The results can provide theoretical reference for decreasing noise figure of MPL. Index Terms -- microwave signal, photonic link, noise figure, dynamic range.

P27- ***An Equivalent Circuit Model for Uni-Traveling-Carrier Photodiode***

Xiaojian Li[1], Yejin Zhang[2], Guoyu Li[1], Lilin Tian[1]
[1] The applicable sponsors are with Institute of Microelectronics, Tsinghua University, China
[2] Institute of Semiconductors, Chinese Academy of Science, China

Abstract: In this paper, an equivalent circuit model of unitraveling-carrier photodiode (UTC-PD) is developed. According to the feature of UTC, electron continuity equation is introduced. The results from the model agree well with that of numerical simulation.

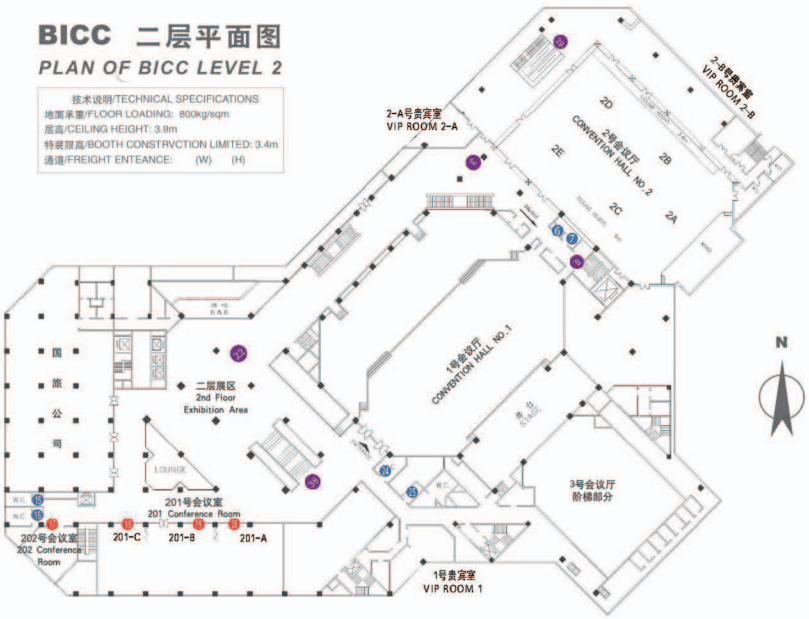
P28- ***Proposal of an RF Transmission over the IP based Network and Its SNR Performance Evaluation***

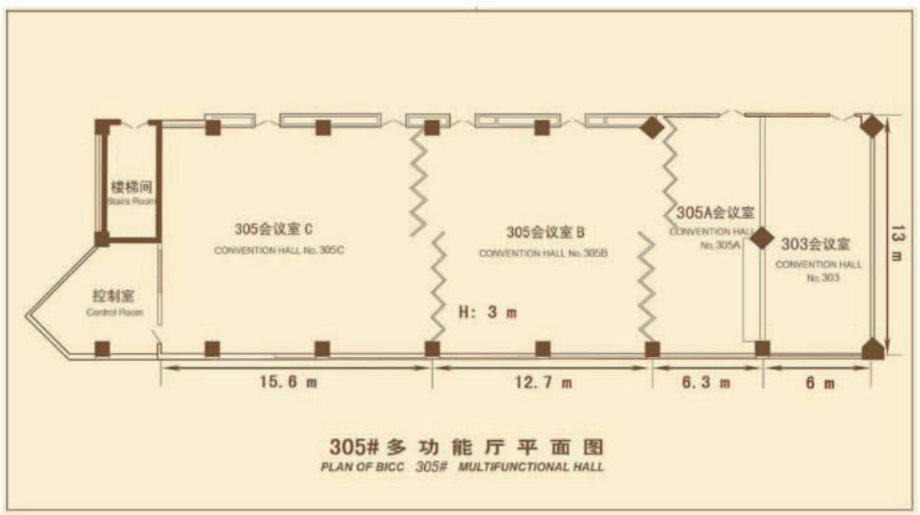
Bo Hu, Takeshi Higashino, Katsutoshi Tsukamoto, Shozo Komaki
Electronic and Information Engineering, Graduate School of Engineering, Osaka Univ., Japan

Abstract: In this paper, we propose a packetized RF transmission over the IP based network to reduce receiver equipments in the conventional software definable radio gateway (SDRGW), and apply turbo codes and bit interleavers to improve RF signal quality against packet losses.

APMP 2009 CONFERENCE VENUE
BEIJING INTERNATION CONVENTION CENTER
FLOOR PLAN

Convention Hall No.2 Conference Room 305 A+B 303 -- Level 2 ,3





Convention Hall No.2
Opening Ceremony
Plenary Session

Convention Hall No. 303:
Session D, F
Poster Session

Convention Hall No. 305A+B:
Session A,B,C

Convention Hall No. 305A:
Session E, G, H, I, J, L, M

Asia-Pacific Microwave Photonics Conference

PROGRAM AT A GLANCE

Tuesday, 21st April	
TIME	Level 1, BICC
15:00-20:00	Registration

Wednesday, 22nd April	
TIME	9:00-11:45: Convention Hall No.2 / 13:30-17:35: Conference Hall No. 305 A+B
8:00-18:00	Registration (Level 1, BICC)
9:00-9:30	Opening Ceremony
9:35-12:15	Plenary Session
12:15-13:30	Lunch Break; Chair's Reception
13:30-15:05	Session A:Novel E-O Modulation and Applications
15:05-15:25	Coffee Break
15:25-15:50	Session B: THz Technology
15:50-17:35	Session C: BSPA Competition
18:30-20:30	Reception

Thursday, 23rd April		
TIME	Conference Hall No.303	Conference Hall No.305A
8:00-18:00	Registration (Level 1, BICC)	
8:30-10:05	Session D: RoF Systems (I)	Session E:Optical Laser and Transmitter
10:05-10:25	Coffee Break	
10:25-12:15	Session F: MWP Applications	Session G:Novel High Speed Components
12:15-13:30	Lunch Break; TPC Lunch Meeting	
13:30-15:05	Poster Session	Session I: MWP Signal Processing
15:05-15:25	Coffee Break	
15:25-18:00	Social Program	
19:00-21:00	Banquet	

Friday, 24th April	
TIME	Conference Hall No.303
8:00-12:30	Registration (Level 1, BICC)
8:30-10:05	Session H: RoF Systems (II)
10:05-10:25	Coffee Break
10:25-12:15	Session J: UWB System and Applications
12:15-13:30	Lunch Break;
13:30-15:05	Session L: Functional Devices
15:05-15:25	Coffee Break
15:25-17:00	Session M: Relative Applications