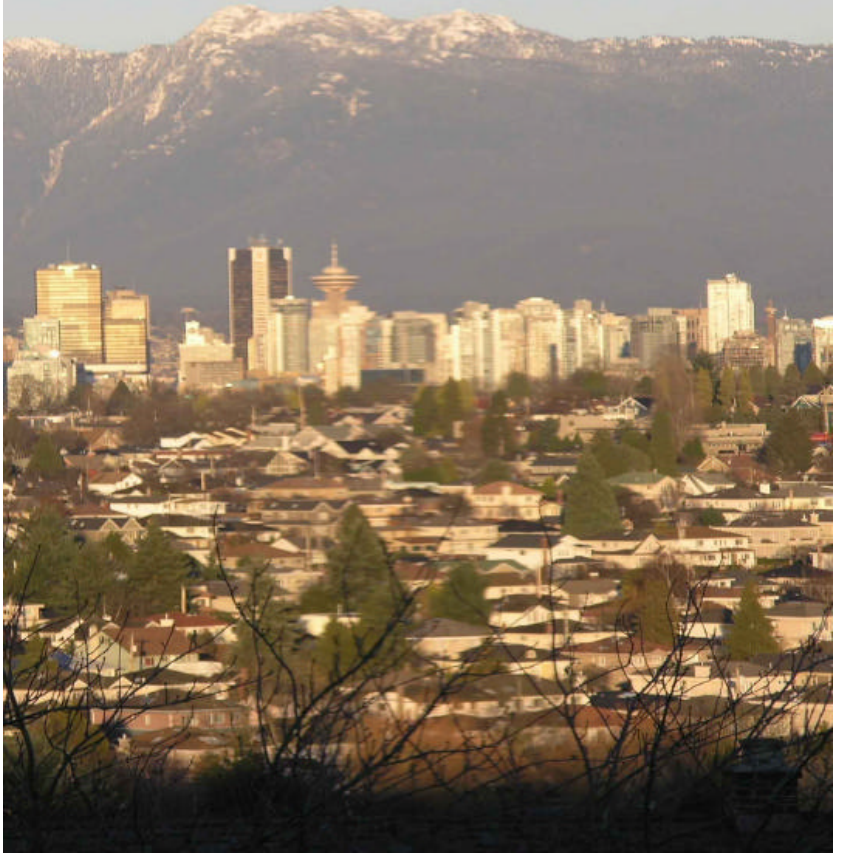
9th ISPLC Vancouver 2005

# 2005 International Symposium on Power Line Communications and its Applications

**Vancouver, Canada ~ April 6-8 2005**



Vancouver Section

IEEE

POWER ENGINEERING SOCIETY PES IEEE

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# 2005 International Symposium on Power Line Communications and Its Applications

ISPLC 2005

April 6-8, 2005

Vancouver, Canada

## Technical Co-Sponsors




## Patrons







# Message from the ISPLC 2005 General Chair

It is with great pleasure that I welcome you to the 2005 International Symposium on Power Line Communications and Its Applications (ISPLC 2005) in Vancouver. After a series of eight ISPLCs in Europe and Japan, ISPLC 2005 is the first symposium to be held in North America. As such it marks a further step in establishing ISPLC as the leading international scientific conference on technology and applications for communication over power lines.

ISPLC 2005 demonstrates that interest in this topic is not only steady but (against some odds) even growing again. This year, we have received a total of 132 paper submissions, which is the highest number of submissions in the history of ISPLC! Of these submissions we were able to select 90 papers for presentation, which is an acceptance rate of 68%. The presentations are organized into 14 regular sessions and one poster session. This technical program is complemented by three keynotes speeches and two panel discussions, presented and chaired by distinguished speakers and moderators. Also at ISPLC 2005 the newly formed IEEE Communications Society Technical Sub-Committee on PLC will have a meeting, open to all conference participants. One agenda item at this meeting will be the decision on the venue for ISPLC 2006!

ISPLC 2005 enjoys technical co-sponsorship by the IEEE Communications Society, the IEEE Power Engineering Society, and the IEEE Vancouver Section. Furthermore, it is my pleasure to thank BC Hydro (Canada), OSMB Consulting Services (Canada), iAd GmbH (Germany), Advanced Digital Design S.A. (Spain), Ambient Corporation (U.S.A), and Korea Electrotechnology Research Insititute (Korea) for their sponsorship and support of this event.

During the preparation of ISPLC 2005 I drew upon the support of 20 technical program committee members and organizers. The Department of Electrical and Computer Engineering at the University of British Columbia and its Head, Prof. Vijay Bhargava, have been of utmost help by acting as host for the event, and organizing the local arrangements for ISPLC 2005. Prof. Fotini-Niovi Pavlidou deserves our gratitude for her terrific work on the technical program, and Prof. Han Vinck for his valuable guidance and advice. I also would like to extend my special thanks to Dr. Stefano Galli for relentless liaison work with several IEEE entities.

I truly believe you will enjoy not only the technical program, but also the social program at ISPLC 2005, and I hope that you will be able to combine work and leisure during your visit to Vancouver, the pearl of British Columbia, Canada.

Lutz Lampe
ISPLC 2005 General Chair

# ISPLC 2005 Organizing Committee

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S. Mirabbasi, Canada
J. Newbury, UK
M. Raugi, Italy
A. Sanz, Spain
A. Scaglione, USA
A. Tonello, Italy
V. Wong, Canada

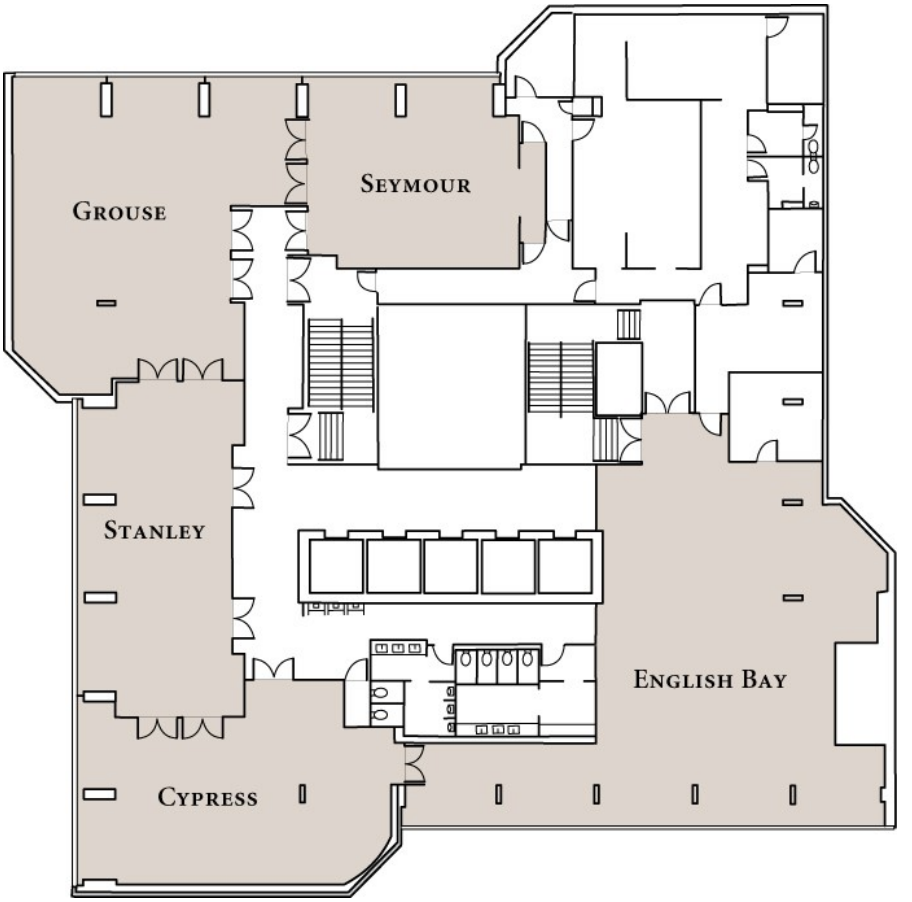
# ISPLC 2005 –Conference Schedule Overview

| | Wednesday, April 6 | Thursday, April 7 | Friday, April 8 |
|---|---|---|---|
| 8:30–9:15 | Opening Address<br>Keynote I<br>*Grouse Room* | Keynote II<br>*Grouse Room* | Keynote III<br>*Grouse Room* |
| 9:30–10:30 | Session A1 *Grouse Room*<br>Session B1 *Stanley Room* | Poster Session<br>*English Bay* | Session A6 *Grouse Room*<br>Session B6 *Stanley Room* |
| 10:30–11:00 | Coffee Break<br>*English Bay* | Coffee Break<br>*English Bay* | Coffee Break<br>*English Bay* |
| 11:00–12:40 | Session A2 *Grouse Room*<br>Session B2 *Stanley Room* | Session A4 *Grouse Room*<br>Session B4 *Stanley Room* | Session A7 *Grouse Room*<br>Session B7 *Stanley Room* |
| 12:40–14:30 | Lunch<br>*(sponsored by BC Hydro)*<br>*English Bay* | Lunch<br>*English Bay* | Conference ends<br>*Grouse Room* |
| 14:30–16:10 | Session A3 *Grouse Room*<br>Session B3 *Stanley Room* | Session A5 *Grouse Room*<br>Session B5 *Stanley Room* | |
| 16:10–16:30 | Coffee Break<br>*English Bay* | Coffee Break<br>*English Bay* | |
| 16:30–17:30 | Panel Discussion I<br>*Grouse Room* | Panel Discussion II<br>*Grouse Room* | |
| 18:00–21:00<br>19:00–22:00 | Welcome Reception<br>*English Bay* | Conference Banquet<br>*Grouse & Stanley Room* | |

# Conference Rooms

Hyatt Regency Vancouver, 655 Burrard Street

Perspectives Level (34th floor)



# ISPLC 2005 Keynotes

**Keynote I: Regulatory Developments in the U.S.**

Bruce Romano
Federal Communications Commission, USA
(CV not available)

**Keynote II: Modeling of Electrical Power Supply Systems as Communication Channels**

Klaus Dostert, University of Karlsruhe, Germany
Stefano Galli, Telcordia Technologies, USA

**Klaus Dostert** received his master's degree from RWTH Aachen, Germany, in 1976, and the doctoral degree from the University of Kaiserslautern in 1980. During the following years he worked as a post-doctoral fellow in the fields of RF communications, signal processing and data transmission over power lines. In 1991 he completed his habilitation dissertation and became a full professor at the University of Karlsruhe in 1992. During the past 13 years his work centered around various aspects of PLC, including channel emulation, system design and EMC analysis. Dr. Dostert is an IEEE senior member and has published more than 120 scientific papers and two books on power line communications. In 2000 he was a guest lecturer at the Technical University of Vienna.

**Stefano Galli** received his M.S. degree and Ph.D. in Electrical Engineering from the University of Rome "La Sapienza" (Rome, Italy) in 1994 and 1998, respectively.

After completing his Ph.D., Dr. Galli continued as a Teaching Assistant in Signal Theory at the Info-Com Dpt. In October 1998, he joined Bellcore (now Telcordia Technologies) in Piscataway, NJ, in the Broadband Networking Research Department where he is now a Senior Scientist. Dr. Galli's main research efforts are devoted to various aspects of xDSL systems, wireless/wired home networks, personal wireless communications, power line communications, and optical CDMA. His research interests also include detection and estimation, communications theory, and signal processing.

Dr. Galli is an IEEE Senior Member, a reviewer for several IEEE journals and conferences, has published over 70 papers, and holds three issued patents and several pending ones. Since October 2004, Dr. Galli is serving as Chair of the IEEE Communications Society Technical Sub-Committee on power line communications. He also served as a Guest Editor for the Feature Topic "Broadband is Power: Internet Access through the Power Line Network" (IEEE Communications Magazine, May 2003), and as Co-Guest Editor for the special Issue on Power Line Communications of the IEEE Journal on Selected Areas in Communications. Dr. Galli also served as Technical Program Committee member for the IEEE Vehicular Technology Conference (VTC'04 Spring), for the IEEE International Symposium on Power Line Communications (ISPLC'04, ISPLC'05), for the IEEE International Conference on Communications (ICC'04, ICC'05), and is serving as the general Co-Chair of the IEEE Workshop on Signal Processing Advances in Wireless Communications (SPAWC'05).

**Keynote III: Experimental Developments Towards an International Standard for Broadband PLT**

John Newbury
The Open University in the North West, UK

**John Newbury** holds the degrees in physics and mathematics at B.Sc. and in theoretical physics at Master level and he received his Ph.D. in experimental physics. Dr. Newbury is Head of the Power Communications Systems Research Group, Faculty of Technology, The Open University, United Kingdom. His group currently consists of three research fellows and seven doctoral research students engaged on theoretical, experimental and empirical research into all aspects of broadband power line communications. Key to these investigations are the identification of the cardinal parameters that will identify both qualitative and quantitative aspects that will lead to a clear understanding of the mechanisms of this technology. Currently with some 15 sites in different parts of the world to carry out first line measurements clear trends are emerging. In addition to these measurements the group has membership of the British Standards Institute, the European Cenelec and ETSI committees together with the 6th Framework Programme OPERA, and IEC and ISO committees associated with broadband communications. Dr. Newbury is member of the IEEE Power Engineering Society, for which he is chairman of the Power Systems Communications Committee, a member of the Technical Council, and member of the IEEE Standards Board Committee for broadband communications. Dr. Newbury is Fellow of the American Academy of Science, New York.

# ISPLC 2005 Panel Discussions

**Panel Discussion I: PLC/BPL-An ideal Communications Platform for a More Intelligent Electric Grid?**

Chair: Bruce Renz
Amperion, Inc., USA

In September 2000, **Bruce Renz** retired from American Electric Power Company, following a 36-year career, and formed Renz Consulting, LLC. In August 2001, he joined Amperion, an AEP/CISCO/Red Leaf joint venture to develop high-speed communications over medium voltage power lines.

Prior to retirement, Renz was AEP vice president - Energy Delivery Support. He was responsible for electrical research, electrical laboratories, telecommunications, technology delivery, I.T. application development, measurements and customer support systems.

Renz began his career with the AEP Service Corporation as an assistant engineer in 1963. He held a variety of technical and managerial positions (including assistant to the CEO) over the next several decades, becoming chief electrical engineer in 1990 and vice president in 1992.

Renz holds bachelor's and master's degrees in electrical engineering from New Jersey Institute of Technology and Brooklyn Polytechnic Institute, respectively. He also earned a master's degree in industrial management from the Massachusetts Institute of Technology as a Sloan Fellow, and completed the General Electric Power Systems Engineering Course and the AEP System Management Development Program at the University of Michigan.

Renz has been a vice president of the U. S. National Committee of CIGRE, the international conference of large, high-voltage electric systems, headquartered in Paris. He was also Chairman of the Power Engineering Society's Industry Advisory Council. He has served on the Ohio State University Electrical Engineering Department Advisory Council, the EPRI Research Advisory Committee and he chaired the EPRI Power Delivery Group Council. He was founder and chairman of the AEIC Committee on Electric System Reliability, as well as Executive Committee Chairman of the Industry-wide Power Delivery Reliability Initiative. A registered professional engineer in New York and Ohio, Renz has been recognized as the Columbus Technical Council's Person of the Year - 1992. He is a member of Eta Kappa Nu and a Fellow of IEEE.

**Panel Discussion II: Considering Techo-Economic Criteria in PLC/BPLA Applications and Commercialization**

Chair: Paul Brown
White Box Associates Ltd, UK

**Paul A. Brown** is the Executive Technical Director of White Box Associates Ltd a, UK based, independent, R&D company and Chief Executive Officer of White Box Solutions Ltd a, UK based, consultancy company which specialises in the Telecommunication and Utility Sectors. He holds an Honorary Professorship in Communications Research at Lancaster University in the UK. His current research activities focus on the development of novel applications for utility assets, combined local access architectures, intellectual property portfolio management, regulation and standards development, EMC predictive modelling and the development of novel, in-situ, emission measurement techniques for wired networks.

Paul Brown received an Honours Degree from the Open University in 1980 and a PhD in Telecommunication Networks for Remote Electricity Supply Metering and Load Control from the same university in 1990. He is a Chartered Engineer, a member of the IEEE, IEE and a fellow of the CMA. Currently he serves on the British Standards Institute's PEL205A Mains Signalling Committee, the ETSI / CENELEC Joint Working Group on the EMC of Conducted Telecommunication Networks, the CENELEC SC205A Technical Committee and the CENELEC SC205A High Frequency PLC working group 10.

His pioneering work in the Power Line Telecommunication (PLT) field includes the development of the first, CT2 based, Digital Telephony Access System operating over a Low Voltage Electricity Distribution Network. Later he was Power Systems R&D Manager for NOR.WEB undertaking development work on Digital Power Line (DPL) Internet access services. He has also served on various IEC working groups. In 2002 he served as a member of the UK Radiocommunication Agency's VDSL and PLT Technical Working Group and is a co-author of the RA's Report on VDSL & PLT. He has over 70 published papers in the field of telecommunication R&D and is cited as the inventor or co-inventor on over 50 patents and patent applications.

# ISPLC 2005 Banquet Speeches

**The BPL Industry - What Do We Need to Take The Next Step?**

Jim Mollenkopf
Current Technologies, USA

**Jim Mollenkopf** serves as the Vice President, Architecture and Products at Current Technologies, a leading developer of broadband over power line systems. In this role he is responsible for systems architecture, network performance and planning, product management, key technology development and regulatory compliance. Prior to joining Current, Mollenkopf worked at Orbital Sciences where he led the communications system design team for the Orbcomm space segment. Before joining Orbital, he served for 11 years with the US government in a variety of technology development positions. He holds a BSEE from Virginia Polytechnic Institute and State University.

**Memorable Experiences as an IEEE Volunteer**

Vijay Bhargava
University of British Columbia, Canada

**Vijay K. Bhargava** received his B.Sc., M.Sc. and Ph.D. degrees from Queen's University, Kingston, Ontario in 1970, 1972 and 1974 respectively. Vijay has held regular/visiting appointments at the Indian Institute of Science, University of Waterloo, Concordia University, Ecole Polytechnique de Montreal, UNIDO, NTT Wireless Communications Labs, Tokyo Institute of Technology, University of Indonesia, the Hong Kong University of Science and Technology and the University of Victoria. Currently he is a professor and Head of the Department of Electrical and Computer Engineering at the University of British Columbia.

As a Fellow of the IEEE, the Engineering Institute of Canada (EIC), the Royal Society of Canada, and the Canadian Academy of Engineering, Vijay has been honoured many times by his colleagues. Amongst these awards are the IEEE Centennial Medal, A.F. Bulgin Premium of IEE, U.K., the John B. Stirling Award of the EIC, the Applied Science and Engineering Gold Medal from the Science Council of British Columbia, IEEE Canada's McNaughton Gold Medal, IEEE Larry K. Wilson Transnational Award, the IEEE Harden Pratt Award, the IEEE Millennium Medal, and the IEEE Graduate Teaching Award. He was also awarded a Tier I Canada Research Chair in 2001, which he held until 2003.

Vijay is very active in the IEEE and has served as the President of the Information Theory Society, Vice President for Regional Activities Board, Director of Region 7, Montreal Section Chair and Victoria Section Chair. Currently he is a member of the Board of Governors of the IEEE Communications Society. He was nominated by the IEEE BoD as a candidate for the office of President-Elect in 1996 and 2002.

# ISPLC 2005 Displays

*In English Bay, open Wednesday (April 6) through Friday (April 8)*

**OSMB Consulting Service, Canada**
*Consulting, Partnership, and Networking Solutions*

**Korea Electrotechnology Research Institute, Korea**
*Monitoring & Control Systems and AMR Systems through PLC, PLC Devices*

**Advanced Digital Design S.A., Spain**
*System on Chip solutions for automatic metering reading (AMR) and domotic systems and industrial applications*

# Technical Program

## Wednesday, April 6

**8:30–9:15 Grouse Room**

**Keynote I: Regulatory Developments in the U.S.**
Bruce Romano
Federal Communications Commission, USA

**9:30–10:30 Grouse Room**

**Session A1: PLC Systems and Channel Capacity**

**Chair**: Francisco Javier Cañete

1. **Medium Voltage Overhead Power-Line Broadband Communications; Transmission Capacity and Electromagnetic Interference**
   *P. Amirshahi, M. Kavehrad, Pennsylvania State University, USA*
2. **Broadband Powerline Channel and Capacity Analysis**
   *E. Liu, Y. Gao, G. Samdani, O. Mukhtar, T. Korhonen, Helsinki University of Technology, Finland*
3. **Potential Performance of PLC Systems Composed of Several Communication Links**
   *V.B. Balakirsky, A.J.H. Vinck, University of Duisburg-Essen, Germany*

**9:30–10:30 Stanley Room**

**Session B1: MAC Layer**

**Chair**: Haniph Latchman

1. **In-Home AV PLC MAC with Neighboring Networks Support**
   *D. Ruiz, A. Salas, A. Badenes, D. Arlandis, V. Romero, J.C. Riveiro, DS2, Spain*
2. **Investigation of MAC Protocols for Single Frequency Network Technique Applied in Powerline Communications**
   *L.P. Do, H. Hrasnica, Dresden University of Technology, Germany*
   *G. Bumiller, iAd GmbH, Germany*
3. **Efficient Framing and ARQ for High Speed PLC Systems**
   *S. Katar, L. Yonge, Intellon Corporation, USA*
   *R. Newman, H. Latchman, University of Florida, USA*

**11:00–12:40, Grouse Room**

**Session A2: Multicarrier Modulation**

**Chair**: Andrea Tonello

1. **On Multicarrier Signal Transmission for High-Voltage Power Lines**
   *R. Pighi, R. Raheli, University di Parma, Italy*
2. **Robust and High-Bit Rate Communications over PLC Channels: a Bit Loading Multi-Carrier Spread Spectrum Solution**
   *M. Crussière, J-Y. Baudais, J.F. Hélard, Institute of Electronics and Telecommunications of Rennes, France*
3. **An OFDMA Based Modem for Powerline Communications Over the Low Voltage Distribution Network**
   *S. Gault, W. Hachem, Supélec, France*
   *P. Ciblat, ENST, France*
4. **A Study on Adaptive Modulation of Data Spread OFDM**
   *H. Ishikawa, M. Fujii, M. Itami, K. Itoh, University of Science, Japan*
5. **Subchannels Allocation on Multiple pDSL Lines**
   *T. Antonakopoulos, University of Patras, Greece*
   *N. Papandreou, Research Academic Computer Technology Institute, Greece*

**11:00–12:40, Stanley Room**

**Session B2: Real-time Energy Management via Powerlines and Internet (REMPLI)**

**Chair**: Ralf Lehnert

1. **Secure and Reliable Wide-Area Power-Line Communication for Soft-Real-Time Applications within REMPLI**
   *G. Bumiller, iAd GmbH, Germany*
   *T. Sauter, G. Pratl, A. Treytl, Vienna University of Technology, Austria*
2. **A Power Line Communication Stack for Metering, SCADA and Large-Scale Domotic Applications**
   *F. Pacheco, M. Pinho, Instituto Superior de Engenharia do Porto Portugal*
   *M. Lobashov, G. Pratl, Vienna University of Technology, Austria*
3. **Security Concept for a Wide-Area Low-Bandwidth Power-Line Communication Systems**
   *A. Treytl, T. Sauter, Vienna University of Technology, Austria*
4. **Clock Synchronization in Powerline Networks**
   *G. Gaderer, T. Sauter, Vienna University of Technology, Austria*
   *G. Bumiller, iAd GmbH, Germany*
5. **Data Transparency in PLC-Based SCADA and Metering Protocols**
   *A. Bratukhin, G. Pratl, M. Lobashov, Vienna University of Technology, Austria*
   *P. Maas, TelecContro Expert GmbH, Germany*
6. **Influence of Single Frequency Network Transmission on the Physical Layer of a Multi Carrier Modulation System**
   *G. Bumiller, iAd GmbH, Germany*

**14:30–16:10, Grouse Room**

**Session A3: Coding and Modulation**

**Chair**: Han Vinck

1. **A Decoding for Low Density Parity Check Codes over Impulsive Noise Channels**
   *H. Nakagawa, D. Umehara, S. Denno, Y. Morihiro, Kyoto University, Japan*
2. **Low Density Parity-Check Coding for Impulse Noise Correction on Power-Line Channels**
   *M. Ardakani, F.R. Kschischang, W. Yu, University of Toronto, Canada*
3. **Short-Block LDPC Codes for a Low-Frequency Powerline Communications System**
   *Q. Spencer, Distribution Control Systems, Inc., USA*
4. **Reed-Solomon Coding to Enhance the Reliability of M-FSK in a Power Line Environment**
   *D.J.J. Versfeld, H.C. Ferreria, University of Johannesburg, South Africa*
   *A.J.H. Vinck, University of Essen, Germany*
5. **Symbol-by-Symbol MAP Detection of Differential Frequency Hopping Signals for PLC Applications**
   *R. Zhang, K. Liu, Tianjin University, China*

**14:30-16:10, Stanley Room**

**Session B3: Networking and Protocols**

**Chair**: Fotini-Niovi Pavlidou

1. **Power Line Carrier Communications for Pivot Irrigation Control**
   *R. Wall, B. King, University of Idaho, USA*
2. **Analytic Performance Comparison of Routing Protocols in Master-Slave PLC Networks**
   *G. Bumiller, iAd GmbH, Germany*
   *L. Lu, Y. Song, LORIA-TRIO, France*
3. **Periodic Contention-Free Multiple-Access for Broadband Multimedia Powerline Communication Networks**
   *Y-J. Lin, Charleston Southern University, USA*
   *H.A. Latchman, J.C.L. Liu, R. Newman, University of Florida, USA*
4. **PANDeMOO: A Powerline Communications Access Network Designer Based on Multi-Objective Optimization**
   *A Haidine, R, Lehnert, Dresden University of Technology, Germany*
   *I. Mellado, Technical School of Telecommunication Engineering of Barcelona, Spain*
5. **PLC QoS Management and Integration for IPv6 Applications and Services**
   *J.J. Pujante, D. Martinez, A. Gómez, I. Marin, University of Murcia, Spain*

**16:30–17:30, Grouse Room**

**Panel Discussion I: PLC/BPL-An ideal Communications Platform for a More Intelligent Electric Grid?**

**Chair**: Bruce Renz, Amperion, Inc., USA

**Panel Members:** Gerd Bumiller, iAd GmbH, Germany

Don Von Dollen, Electric Power Reseach Institute, USA

Mathew Oja, Idacomm (Idaho Power), USA

## Thursday, April 7

**8:30–9:15, Grouse Room**

**Keynote II: Modeling of Electrical Power Supply Systems as Communication Channels**

Klaus Dostert, University of Karlsruhe, Germany
Stefano Galli, Telcordia Technologies, USA

**9:30–10:30, English Bay**

**Poster Session**

1. **Modelling Developing and Implementing Sub-Sea Power-Line Communications Networks**
   *J. Yazdani, K. Glanville, P. Clarke, School of Science and Technology, UK*
2. **Simulation Results for Permutation Trellis Codes Using M-ary FSK**
   *T.G. Swart, I. de Beer, H.C. Ferreira, University of Johannesburg, South Africa*
   *A.J.H. Vinck, University of Essen, Germany*
3. **An Experimental Setup for In-Circuit Optimization of Broadband Automotive Power-Line Communications**
   *P.A.J. van Rensburg, Walter Sisulu University, South Africa*
   *H.C. Ferreira, A.J. Synders, University of Johannesburg, South Africa*
4. **Characterization of the Cyclic Short-Time Variation of Indoor Power-Line Channels Response**
   *J.A. Cortès, F.J. Cañete, L. Diez, J.T. Entrambasaguas, University of Malaga, Spain*
5. **Modelling and Simulation of a SFN Based PLC Network**
   *R. Brito, Y. Song, LORIA-TRIO, France*
   *G. Bumiller, iAd GmbH, Germany*
6. **Reservation Domains in MAC Protocols for Broadband PLC Networks**
   *H. Hrasnica, R. Lehnert, Dresden University of Technology, Germany*
7. **OFDM and Wavelets Performance Comparison in Power Line Channels**
   *J. Abad, L.M. Torres, J.C. Riveiro, DS2, Spain*
8. **Impulsive Noise Cancellation System Based on Fuzzy Logic for a PLC Receiver**
   *A. Purroy, A. Sanz, J.I. Garcia-Nicolas, University of Zaragoza, Spain*
9. **On Combined Spectral Shaping Coding and M-FSK Modulation for Power Line Communications**
   *K. Ouahada, H.C. Ferreira, L. Cheng, University of Johannesburg, South Africa*
   *A.J.H. Vinck, University of Essen, Germany*
10. **Dynamic Bit-Loading in pDSL Communications Systems**
    *N. Papandreou, Research Academic Computer Technology Institute, Greece*
    *T. Antonakopoulos, University of Patras, Greece*

11. **Distribution Network Modeling for Power Line Communications Applications**
*T. Tran-Anh, P. Auriol, Ècole Centrale de Lyon, France*
*T. Tran-Quoc, Lab Electrotechnique de Grenoble, France*
12. **In Home PLC Ready for Triple Play**
*D. Gutierrez, L.M. Torres, F. Blasco, J. Carreras, J.C. Riveiro, DS2, Spain*
13. **Evaluation and Integrated Diagnostic of High Speed Narrow Band Power-Line Chipset**
*G. Bumiller, iAd GmbH, Germany*
14. **Broadband Services Provision in Powerline Communications of Developing Countries**
*J. Anatory, M.M. Kissaka, N.H. Mvungi, University of Dar es Salaam, Tanzania*
15. **Field Trials of Utility Applications Employing Ambient Corporation Power Line Communications at Consolidated Edison**
*G. Jee, D. Sciano, Consolidated Edison Co. of New York, USA*
*R. Rao, Y. Cern, Ambient Corporation, USA*
*B. Nugent, Orange & Rockland Utilities, USA*
16. **Advanced "Orphelec" Test Equipment and Novel Test Procedures**
*J. Bausch, T. Kistner, University of Karlsruhe, Germany*
*A. Moreau, S. Sauvage, S. Milanini, TRIALOG, France*
17. **PLC Technology of KEPCO**
*Y. Kim, S. Joo, T. Lee, B. Park, D. Hyun, Korea Electric Power Research Institute, Korea*
18. **Secure and Reliable Wide-Area Power-Line Communications for Soft-Real-Time Applications within REMPLI**
*G. Bumiller, iAd GmbH, Germany*
*T. Sauter, G. Pratl, A. Treytl, Vienna Technical University, Austria*
19. **The Challenges of Integrating BPL into Existing Telecom Business Models: Market Visions from Brazilian Research**
*A. Cunha, H. Quintella, Universidade Federal Fluminense, Brazil*
*P. Biggs, OSMB Consulting, Canada*
20. **An Overview of the Upcoming HomePlug AV Standard**
*K.H. Afkahamie, S. Katar, L. Yonge, Intellon Corporation, USA*
*R. Newman, University of Florida, USA*
21. **High Data Rate Internet Service over Medium Voltage Power Lines**
*J-J. Lee, Y-J. Park, S-W. Kwon, H-M. Oh, H-S. Park, K-H. Kim, Korean Electrotechnology Research Institute, Korea*
*D-Y. Lee, Kyung-Hee University, Korea*
*Y-H. Jeong, Seoul University, Korea*
22. **Distribution of Digital TV Signals over Home Power Line Networks**
*G. Markarian, X. Huo, University of Leeds, UK*
23. **In Situ Characterization of Impedance Mismatch in a Medium Voltage Network**
*F. Issa, M. Goldberg, Electricité de France, France*
*E. Marthe, F. Rachidi, Swiss Federal Institute of Technology, Switzerland*
24. **Development of High-Rate Control System for LED-Based General Lighting Applications**
*O. Mukhtar, S.M. Golam, E. Liu, T.O. Korhonen, Helsinki University of Technology, Finland*

**11:00–12:40, Grouse Room**

**Session A4: Channel Characterization and Modeling**

**Chair**: Klaus Dostert

1. **Simulation of High Frequency Signal Transmission on Power Lines**
   *S. Barmada, M. Raugi, Università di Pisa, Italy*
2. **Derivation of Statistical Properties for Mass Transit Power Supply Networks as Powerline Communication Channel**
   *S. Hüttinger, J. Rupp, G. Griepentrog, Siemens AG, Germany*
   *P. Karols, K. Dostert, University of Karlsruhe, Germany*
3. **Branched-Bus HF Power-Delay-Profile Approach of Indoor PLC Channels**
   *I.C. Papaleonidopoulos, C.G. Karagiannopoulos, N.J. Theodorou, National Technical University of Athens, Greece*
   *C.A. Ionnou, Public Power Corporation S.A., Greece*
4. **A Mathematical Model of Narrowband Power-Line Noise Based on Measurements**
   *M. Katayama, T. Yamazato, H. Okada, Nagoya University, Japan*
5. **Fundamentals of the Cyclic Short-Time Variation of Indoor Power-Line Channels**
   *F.J. Cañete, J.A. Cortés, L Diez, J.T. Entrambasaguas, J.L. Carmona, University of Málaga, Spain*

**11:00–12:40, Stanley Room**

**Session B4: Applications and System Implementation I**

**Chair**: John Newbury

1. **Tutorial About the Implementation of a Vehicular High Speed Communication System**
   *J. Schirmer, T. Hogenmüller, Robert Bosch GmbH, Germany*
   *T. Huck, K. Dostert, University of Karlsruhe, Germany*
2. **Powerline Communication over Special Systems**
   *E. Liu, Y. Gao, G. Samdani, O. Mukhtar, T. Korhonen, Helsinki University of Technology, Finland*
3. **DC Powerline Communication Network for a Wearable Health Monitoring System**
   *E.R. Wade, H.H. Asada, Massachusetts Institute of Technology, USA*
4. **A Physical Layer for the CAN Bus using Modulated PLC**
   *D.M. Davenport, R.T. Hoctor, General Electric Global Research, USA*
5. **Protocol to Avoid Noise in Power Line Networks**
   *K. Ackerman, D. Dodds, C. McCrosky, University of Saskatchewan, Canada*

**14:30–16:10, Grouse Room**

**Session A5: OFDM and Spread Spectrum Techniques**

**Chair**: Bahram Honary

1. **Extended Even-Odd Discrimination Method of Hopping Pattern Synthesis for MMFSK Power-Line Transmission System**
   *G. Marubayashi, Nagaoka University of Technology, Japan*
   *M. Hamamura, Kochi University of Technology, Japan*
2. **Space-Frequency Coded OFDM System for Multi-Wire Power Line Communications**
   *C.L. Giovaneli, B. Honary, P.G. Farrell, Lancaster University, UK*
3. **Spectral Encoding as a Means to Ensure Spectral Compatibility Between PLCs and Radio Services**
   *S. Galli, R. Menendez, Telecordia Technologies, USA*
4. **OFDM Receiver Performance Analysis with Measured Power Line Channel Model for Coded OFDM System**
   *Y-H. Kim, S-C. Kim, Seoul National University, Korea*
   *H.M. Oh, Korea Electrotechnology Research Institute, Korea*
5. **The Impact of Coupling/Filtering on Orthogonal M-FSK**
   *A.J. Snyders, H.C. Ferreira, A.W. Ballot, University of Johannesburg, South Africa*
   *P.A.J. van Rensburg, Walter Sisulu University, South Africa*

**14:30–16:10, Stanley Room**

**Session B5: EMC and EMI**

**Chair**: Marco Raugi

1. **Power-Line Channel Modeling for Common-Mode Signal Transmission/Suppression**
   *S. Tsuzuki, M. Yoshida, Y. Yamada, Ehime University, Japan*
2. **Discussion on the Assessment and Mitigation of Radiation from PLC Networks**
   *M. Rubinstein, J.L. Bermudez, M. Schneider, University of Applied Sciences, Switzerland*
   *F. Rachidi, A. Vukicevic, E. Marthe, Swiss Federal Institute of Technology, Switzerland*
3. **Propagation of Disturbance Signal between PLC Modem and Radio Receiver**
   *M. Heina, A. Röhrich, H. Hirsch, University of Duisburg-Essen, Germany*
4. **Influence of PLC Transmission on the Sensitivity of a Short-Wave Receiving Station**
   *S. Battermann, H. Garbe, University of Hannover, Germany*
5. **Evaluation of Key Parameters for Determining the Efficiency of Signal Propagation in Broadband PLT Systems**
   *R. Brannon, T. Haq, J. Newbury, K. Morris, F. Robertson, L. Willis, I. Summers, The Open University, UK*

**16:30–17:30, Grouse Room**

**Panel Discussion II: Considering Techo-Economic Criteria in PLC/BPLA Applications and Commercialization**

**Chair**: Paul Brown, White Box Associates Ltd, UK

**Panel Members:** Peter Biggs, OSMB Consulting, Canada
Jim Mollenkopf, Current Technologies, USA
Richard Newman, University of Florida, USA
Bruce Romano, FCC, USA
Han Vinck, University of Essen, Germany

## Friday, April 8

**8:30–9:15, Grouse Room**

**Keynote III: Experimental Developments Towards an International Standard for Broadband PLT**

John Newbury
The Open University in the North West, UK

**9:30–10:30, Grouse Room**

**Session A6: Signal Processing**

**Chair**: Stefano Galli

1. **An Impulse Modulation Based PLC System with Frequency Domain Receiver Processing**
   *A.M. Tonello, Università di Udine, Italy*
2. **Channel Coding for Power Line Communications Based on Oversampled Filter Banks**
   *C. Liu, S. Weiss, S. Redif, University of Southampton, UK*
   *T. Cooper, J.G. McWhirter, QinetQ Ltd., UK*
   *L. Lampe, University of British Columbia, Canada*
3. **An Extended Kalman Filter Based Fuzzy Adaptive Equalizer for Powerline Channel**
   *W.K. Wong, H.S. Lim, Multimedia University, Malaysia*

**9:30–10:30, Stanley Room**

**Session B6: Multiple Access Techniques**

**Chair**: Richard Newman

1. **Multiuser Power and Bit Allocation over Power Line Channels**
   *C. Assimakopoulos, F.N. Pavlidou, Aristotle University of Thessaloniki, Greece*
2. **Coexistence in PLC Networks**
   *D. Arlandis, J. Barbero, A. Matas, S. Iranzo, J.C. Riveiro, D. Ruiz, DS2, Spain*
3. **A New Multiple Access Scheme for DC Power Line Communications**
   *O. Amrani, Tel Aviv University, Israel*
   *A. Rubin, Yamar Electronics Ltd., Israel*

**11:00–12:20, Grouse Room**

**Session A7: System Architecture and Coupling**

**Chair**: Paul Brown

1. **Design Methodology for Powerline Coupling Circuit: A System-Level and Monte Carlo Simulation Based Approach**
   *R.N. Gore, D.M. Davenport, GE Global Research, USA*
   *E.A. Andarawis, India*
2. **Transformer Bypass Circuit**
   *V. Krishnan, The State University of New York, USA*
3. **Wideband Impedance Matching Using Tchebycheff Gain Functions**
   *F. Issa, M. Goldberg, Electricité de France, France*
   *H. Li, S. Rowland, University of Manchester, UK*
4. **Influence of the Properties of Magnetic Materials on the Size and Performance of PLC Couplers**
   *J. Binkofski, Vacuumschmelze GmbH, Germany*

**11:00–12:40, Stanley Room**

**Session B7: Applications and System Implementation II**

**Chair**: Masaaki Katayama

1. **A Complete Node for Power Line Communications in a Single Chip**
   *A. Sanz, J.I. Garcia-Nicolás, University of Zaragoza, Spain*
   *P. Estopiñan, Advanced Digital Design S.A., Spain*
2. **An FPGA-Based High-Speed Emulation System for Powerline Chennels**
   *M. Babic, K. Dostert, University of Karlsruhe, Germany*
3. **Robust Transmission of Multimedia Data over Power-Lines**
   *R. Bernardini, M. Durigon, R. Rinaldo, A. Tonello, University of Udine, Italy*
   *A. Vitali, ST Microelectronics, Italy*
4. **Connecting Electrical Appliances to a Home Network Using Low-Cost Power-Line Communication**
   *A. Ricci, G. Matrella, P. Ciampolini, Università degli Studi di Parma, Italy*
   *V. Aisa, V. Cascio, Wrap s.p.a., Italy*
5. **Channel Modeling for and Performance of Contactless Power-Line Data Transmission**
   *Z. Hua, Y. Wang, K.D. Mueller-Glaser, University of Karlsruhe, Germany*
   *O. Simon, SEW-EURODRIVE GmbH, Germany*

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