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Session Schedule

WE: Welcome

Monday, March 31, 9:30 –10:00

Room: K3.25

Chair: Stephan Weiss (University of Strathclyde)

9:30 **Welcome by the General Chair**

Stephan Weiss (University of Strathclyde)

9:40 **Welcome by the University of Strathclyde**

Sir Jim McDonald (Principal & Vice Chancellor, University of Strathclyde)

9:50 **Welcome by the Technical Co-Chairs**

Riccardo Raheli (University of Parma, Italy), José Antonio Cortés Arrabal (University of Malaga, Spain) and Sangarapillai Lambotharan (Loughborough University, UK)

K1: Keynote

Monday, March 31, 10:00 –10:50

Room: K3.25

Chair: Sangarapillai Lambotharan (Loughborough University, United Kingdom)

10:00 **Statistics of Impulse Noise in xDSL Systems**

Stephen McLaughlin (Heriot-Watt University, Edinburgh, Scotland)

M1: Channel & Noise Characterisation

Monday, March 31, 11:10 –12:30

Room: K3.25

Chair: Masaaki Katayama (Nagoya University, Japan)

11:10 **Coherence Time and Sparsity of Brazilian Outdoor PLC Channels: A Preliminary Analysis**

Antonio A. M. Picorone (Federal University of Juiz de Fora & CEMIG - Companhia Energetica de Minas Gerais, Brazil); Raimundo Sampaio-Neto (Cetuc-Puc-Rio, Brazil); Moises Vidal Ribeiro (Federal University of Juiz de Fora, Brazil)

11:30 **An Experimental Study of the Effect of Human Activity on the Alpha-Stable Characteristics of the Power-Line Noise**

Gerardo Abel Laguna-Sanchez; Miguel Lopez-Guerrero (all Universidad Autonoma Metropolitana, Mexico)

11:50 **On Impulse Noise and Its Models**

Thokozani Shongwe (University of Johannesburg, South Africa); Han Vinck (University of Duisburg-Essen, Germany); Hendrik C Ferreira (University of Johannesburg, South Africa)

12:10 **VLF-band Power Line Channel Sounding**

David W. Rieken (Aclara Power-Line Systems Inc., USA); Zhixi Li (Aclara, USA); Chris Fleck (Aclara, USA)

M2: Device Modelling & Measurements

Monday, March 31, 11:10 –12:30

Room: K3.17

Chair: Hendrik C Ferreira (University of Johannesburg, South Africa)

11:10 **Cell-Wise Monitoring of Lithium-Ion Batteries for Automotive Traction Applications by Using Power Line Communication: Battery Modeling and Channel Characterizations**

Ichraf Ouannes (Robert Bosch GmbH, Germany); Patrick Felix Nickel (Robert Bosch GmbH, Germany); Klaus M. Dostert (Karlsruhe Institute of Technology (KIT), Germany)

11:30 High Frequency MV/LV Transformer Modelling for Power Line Communication Applications

Romain Lefort (University of Poitiers & Séolis, France); Benoit Taquet (Hautes Etudes d'Ingénieur de Lille, France); Rodolphe Vauzelle (University of Poitiers, France); Vincent Courtecuisse (Gérédis Deux-Sèvres, France); Anne-Marie Poussard (Université de Poitiers, France); Nadir Idir (Université de Lille 1 - L2EP, France)

11:50 Characterization and Modeling Breakers Effect on Power Line Communications

Richard Nizigiyimana (University of Tours & GREMAN, France); Jean-Charles Le Bunetel (University of Tours, France); Yves Raingeaud (University of Tours, France); Philippe Ravier (Université d'Orléans, France); Guy Lamarque (University of Orleans, France); Anouar Achouri (University of Tours, GREMAN, France)

12:10 A Measurement-Based Model of Energy Consumption for PLC Modems

Wafae Bakkali (Orange Labs, France); Mohamed Tlich (INNOVAS, France); Pascal Pagani (Telecom Bretagne, France); Thierry Chonavel (Institut Télécom; Télécom Bretagne & Université Européenne de Bretagne, France)

WS: Workshop

Monday, March 31, 13:50 –14:50

Room: K3.27

Chair: Lutz Lampe (University of British Columbia, Canada)

13:50 Devolo Workshop on Testing MIMO PLC Devices on a Broadband Power Line Channel Emulator

Nico Weling, Andreas Engelen and Stefan Thiel (Devolo AG, Aachen, Germany)

M3: In-Vehicle PLC Channel Characterisation

Monday, March 31, 14:40 –16:00

Room: K3.25

Chair: Fabienne Nouvel (INSA, France)

14:40 Statistical Assessment of Automotive PLC Multipath Channel Models

Lorenzo Guerrieri (Dora Spa, STMicroelectronics Group, Italy); Paola Bisaglia (DORA S.p.A., STMicroelectronics Group, Italy); Igor S Stievano (Politecnico di Torino, Italy); Flavio Canavero (Politecnico di Torino, Italy)

15:00 Channel Measurement and Modeling of High-Voltage Power Line Communication in a Hybrid Vehicle

Masaki Takanashi; Atsuhiko Takahashi; Hiroya Tanaka; Hiroaki Hayashi; Tomohisa Harada; Yoshiyuki Hattori (all TOYOTA Central R&D Labs., Inc., Japan)

15:20 Bit Error Recording and Modelling of In-Vehicle Power Line Communication

Mark Wilson (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa); Reolyn Heymann (University of Johannesburg, South Africa); Allan Ashraf Emlah (University of Johannesburg, South Africa)

15:40 Measurements and Channel Characterization for In-Vehicle Power Line Communications

Navid Bahrani; Vincent Gaudet (all University of Waterloo, Canada)

M4: Cognitive Methods

Monday, March 31, 14:40 –16:00

Room: K3.17

Chair: to be confirmed

- 14:40 **Detection of Broadcast Signals in Cognitive Radio Based PLC Using the FCME Algorithm**
Risto Vuohtoniemi (University of Oulu, Finland); Juha-Pekka Mäkelä (University of Oulu, Finland); Johanna Vartiainen (Centre for Wireless Communications, University of Oulu, Finland); Jari Linatti (University of Oulu, Finland)
- 15:00 **Measurement and Cognitive Detection Method of Broadcast Radio Stations in Distribution Networks**
Yang Lu (China Electric Power Research Institute (CEPRI), P.R. China); Weilin Liu (State Grid Corporation of China, P.R. China); Jianqi Li (China Electric Power Research Institute, P.R. China); Hongjian Gao (China Electric Power Research Institute, P.R. China)
- 15:20 **On Power- Line Defined PLC System**
Weilin Liu (State Grid Corporation of China, P.R. China); Gerd Bumiller (Hochschule Ruhr West & University of Applied Sciences, Germany); Hongjian Gao (China Electric Power Research Institute, P.R. China)
- 15:40 **Derivative compressive sampling with application to phase unwrapping**
Oliver Opalko; Martin Sigle; Klaus M. Dostert (all Karlsruhe Institute of Technology (KIT), Germany)

M5: Simulators & Emulators

Monday, March 31, 16:20 –17:20

Room: K3.25

Chair: Gerd Bumiller (Hochschule Ruhr West, Germany)

- 16:20 **G.hn Network Simulator, Calibration and Simulation Results**
Ievgenii Anatolijovuch Tsokalo; Rico Radeke; Ralf J. Lehnert (all Technische Universität Dresden, Germany)
- 16:40 **A G3-PLC Simulator for Access Networks**
Luca Di Bert (University of Udine, Italy); Salvatore D'Alessandro (WiTiKee srl & University of Udine, Italy); Andrea M Tonello (University of Udine, Italy)
- 17:00 **Broadband MIMO Powerline Channel Emulator**
Nico Weling; Stephan Thiel; Andreas Engelen (all Devolo AG, Germany)

M6: Emerging Systems & Solutions

Monday, March 31, 16:20 –17:20

Room: K3.17

Chair: Anil Mengi (Devolo AG, Germany)

- 16:20 **Contactless Power-Line Communications**
Arnold De Beer (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa); Han Vinck (University of Duisburg-Essen, Germany)
- 16:40 **Power Line Communication Integrated in a Wireless Power Transfer System: a Feasibility Study**
Sami Barmada; Marco Raugi; Mauro Tucci (all University of Pisa, Italy)
- 17:00 **One Wire PLC System for Inter-floor Connectivity**
Shinji Tsuzuki; Hiroyuki Utsunomiya; Yoshio Yamada (all Ehime University, Japan)

RR: Recent Results Session

Monday, 31 March, 17:20 –18:00

Room: K3.25

Chair: Riccardo Raheli (University of Parma, Italy)

17:20 **On Efficiency and Validity of Previous Homeplug MAC Performance Analysis**

David Malone; Cristina Cano (all Hamilton Institute, NUI Maynooth, Ireland)

17:30 **Improving the Performance of Narrowband Powerline Communication Systems by Exploiting the Space Dimension**

Kamel Shibli and Mike Heidrich (Fraunhofer Institut ESK, Munich, Germany)

17:40 **Realistic Hardware Channel Emulation (HACE) for PLC System Testing**

Andrea Tonello (WiTiKee s.r.l., Italy)

K2: Keynote

Tuesday, April 1, 9:00 – 9:50

Room: K3.25

Chair: Stephan Weiss (University of Strathclyde)

9:00 **Anomaly Detetion in Communication Network Traffic**

David Parish (Loughborough University, Loughborough, UK)

T1: PLC Systems & Field Trials

Tuesday, April 1, 9:50 –10:50

Room: K3.25

Chair: Makoto Itami (Tokyo University of Science, Japan)

9:50 **Statistical Analysis of Brazilian In-Home PLC Channels: First Results**

Juan David Valencia-Payn (Universidade Federal de Juiz de Fora, Brazil); Thiago Oliveira (IF-SEMG - Federal Institute of Education, Science and Thechnology of the Southest of Minas Gerais, Brazil); Fernando J. A. Andrade (Federal University of Juiz de Fora, Brazil); Moises Vidal Ribeiro (Federal University of Juiz de Fora, Brazil)

10:10 **Channel Measurements and Field Tests of Narrowband Power Line Communication Over Korean Underground LV Power Lines**

Il Han Kim (Texas Instruments, USA); Wonsoo Kim (Texas Instruments, USA); Byungseok Park (Korea Electric Power Research Institute, Korea); Hyunwoo Yoo (Korea Electric Power Corporation Research Institute, Korea)

10:30 **Analysis of the Devo's 500 kHz G3-PLC Access Technology Based on Smart Grid Field Trials**

Victor Papilaya (University of Duisburg-Essen, Germany); Han Vinck (University of Duisburg-Essen, Germany); Khmaies Ouahada (University of Johannesburg, South Africa); Anil Mengi (Devo AG, Germany); Marco Weinand (Devo AG, Germany); Michael Koch (Devo AG, Germany)

T2: Signal Processing & Detection

Tuesday, April 1, 9:50 –10:50

Room: K3.17

Chair: Sangarapillai Lambotharan (Loughborough University, United Kingdom)

9:50 **Detecting the Zero-Crossing Message to Achieve Low Bit Transmission Over H-Bridge Inverter**

Alain Richard Ndjiongue (University of Johannesburg, South Africa); Han Vinck (University of Duisburg-Essen, Germany); Khmaies Ouahada (University of Johannesburg, South Africa); Abraham Snyders (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa)

10:10 **Low-Complexity Sequence Detection Algorithm for FSK-Based Power Line Communications**
Matthias Kuba; Matthias Klatt; Andreas Oeder (all Fraunhofer Institute for Integrated Circuits (IIS), Germany)

10:30 **Narrowband PLC Channel Modeling Using USRP and PSK Modulations**
Ayokunle Damilola Familua (University of Witwatersrand, South Africa); Kehinde Ogunyanda (University of Johannesburg, South Africa); Theo G. Swart (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa); Rex Van Olst (University of the Witwatersrand, South Africa); Ling Cheng (University of the Witwatersrand, South Africa)

T3: Smart Grid Roll-Out
Tuesday, April 1, 11:10 –12:30

Room: K3.25

Chair: Ralf J. Lehnert (Technische Universitaet Dresden, Germany)

11:10 **High Availability Solution for Medium Voltage BPL Communication Networks**
Marta Solaz (Iberdrola & Iberdrola Ingeniera Spain, Spain); Javier Simon (Iberdrola SA, Spain); Alberto Sendin (Iberdrola, Spain); Lars Andersson (Ormazabal Current, Switzerland); Michael Maurer (Ormazabal, Switzerland)

11:30 **Narrowband PLC for LV Smart Grid Services, Beyond Smart Metering**
Alberto Sendin (Iberdrola, Spain); Iker Urrutia (Iberdrola, Spain); Mikel Garai (ZIV CG Automation, Spain); Txetxu Arzuaga (CG Automation, Spain); Noelia Uribe Perez (CIEMAT-CEDER, Spain)

11:50 **PLC Deployment and Architecture for Smart Grid Applications in Iberdrola**
Alberto Sendin; Javier Simon; Iker Urrutia; Inigo Berganza (all Iberdrola SA, Spain)

12:10 **500 kHz G3-PLC Access Technology for the Roll-outs in Germany**
Anil Mengi; Markus Wächter; Michael Koch (all Devolo AG, Germany)

T4: Coding Techniques
Tuesday, April 1, 11:10 –12:30

Room: K3.17

Chair: Riccardo Raheli (University of Parma, Italy)

11:10 **Experimental Verification of Frequency Mappings with Hadamard Transform for Power Line Communications Channel**
Tedy Lukusa (University of Johannesburg, South Africa); Khmaies Ouahada (University of Johannesburg, South Africa); Alain Richard Ndjiongue (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa); Han Vinck (University of Duisburg-Essen, Germany)

11:30 **An OFDM Inter-Subcarrier Permutation Coding Scheme for Power-line Communication**
Mpendulo Ndlovu (University of the Witwatersrand, South Africa); Ling Cheng (University of the Witwatersrand, South Africa)

11:50 **A Comparative Performance Study of LDPC and Turbo Codes for Realistic Powerline Communication Channels**
Gautham Prasad (University of Florida, USA); Haniph A. Latchman (University of Florida, USA); Youngjoon Lee (University of Florida, USA); Weiler A. Finamore (UFJF - Federal University of Juiz de Fora, Brazil)

12:10 **Error Performance of RS Coded Binary FSK in PLC Channels with Nakagami and Impulsive Noise**
Anirban Chattopadhyay (B. C. Roy College of Engineering, India); Kalyan Sharma (Nit Durgapur, India); Aniruddha Chandra (National Institute of Technology, Durgapur, India)

K3: Keynote

Tuesday, April 1, 9:00 – 9:50

Room: K3.25

Chair: to be confirmed

13:50 Addressing the Challenges in Delivering the Smart Grid Through Model-Based Design

Graham Dudgeon (Mathworks, Boston, USA)

T5: Signal Processing & Modulation

Tuesday, April 1, 14:40 –16:00

Room: K3.25

Chair: Andrea M Tonello (University of Udine, Italy)

14:40 Echo Cancellation in a Power Line Modem in the Presence of Abrupt Channel Variations

Carlo Tripodi (University of Parma, Italy); Gianluigi Ferrari (University of Parma, Italy); Riccardo Pighi (Selta S.p.A, Italy); Riccardo Raheli (University of Parma, Italy)

15:00 Adaptive Impedance Matching for Vehicular Power Line Communication Systems

Nima Taherinejad; Lutz Lampe; Shahriar Mirabbasi (all University of British Columbia, Canada)

15:20 OFDM PLC Transmission for Aircraft Flight Control System

Thomas Larhzaoui (University of Rennes 1 & IETR, France); Fabienne Nouvel (INSA, France); Jean-Yves Baudais (CNRS, France); Virginie Degardin (University of Lille & IEMN, France); Pierre Degauque (University of Lille, France)

15:40 Low-Complexity SOCPBFSK-OOK Interface Between PLC and VLC Channels for Low Data Rate Transmission Applications

Alain Richard Ndjiongue (University of Johannesburg, South Africa); Hendrik C Ferreira (University of Johannesburg, South Africa); Khmaies Ouahada (University of Johannesburg, South Africa); Han Vinck (University of Duisburg-Essen, Germany)

T6: PLC Applications

Tuesday, April 1, 14:40 –16:00

Room: K3.17

Chair: Michael Koch (Devolvo AG, Germany)

14:40 Applicability of Narrowband Power Line Communication in an LVDC Distribution Network

Antti Pinomaa (Lappeenranta University of Technology, Finland); Jero Ahola (Lappeenranta University of Technology, Finland); Antti Kosonen (Lappeenranta University of Technology & Institute of Energy Technology, Finland); Pasi Nuutinen (Lappeenranta University of Technology, Finland)

15:00 Measurements and Evaluation of PLC Modem with G3 and PRIME Standards for Street Lighting Control

Petr Mlynek (Brno University of Technology, Czech Republic); Martin Koutny (Brno University of Technology, Czech Republic); Jiri Misurec (Brno University of Technology, Czech Republic); Zdenek Kolka (Brno University of Technology, Czech Republic)

15:20 Experimental Investigation of Broadband Power Line Communication Modems for Onshore Oil & Gas Industry: A Preliminary Analysis

Jair Adriano Lima Silva (Federal University of Espirito Santo, Brazil); Leonardo Ribas Martins Castor (Universidade Federal do Espirito Santo & Petroleo Brasileiro S/A, Brazil); Ricardo Natale (Federal University of Espirito Santo, Brazil); Marcelo Segatto (Federal University of Espirito Santo, Brazil)

15:40 **A Comparison of Receiver Topologies for Digital Load-Side Transmission in General LED Lighting**

Lukas Lohaus (RWTH Aachen University & Integrated Analog Circuits and RF Systems Laboratory, Germany); Arne Rossius (RWTH Aachen University, Germany); Ralf Wunderlich (RWTH Aachen University, Germany); Stefan Heinen (RWTH Aachen, Germany)

PS: Panel Session

Tuesday, April 1, 16:20 – 18:00

Room: K3.25

Chair: Lutz Lampe (University of British Columbia, Canada)

16:20 **What Research Do We Need for PLC 2020?**

Gerd Bumiller (Hochschule Ruhr West, Germany); Il Han Kim (Texas Instruments, USA); Michael Koch (Devol, Germany); David Rieken (Aclara, USA); Alberto Sendin Escalona (Iberdrola, Spain); Andrea Tonello (University of Udine & WiTiKee, Italy)

W1: MIMO PLC

Wednesday, April 2, 9:30 –10:50

Room: K3.25

Chair: José Antonio Cortés (Universidad de Málaga, Spain)

9:30 **Influence of Interference in MIMO Power Line Communication Systems**

Nhan Vo (Telecom Bretagne, France); Karine Amis (Institut TELECOM ; TELECOM Bretagne & Université européenne de Bretagne, France); Thierry Chonavel (Institut Télécom; Télécom Bretagne & Université Européenne de Bretagne, France); Pierre Siohan (France Telecom, France); Pascal Pagani (Telecom Bretagne, France)

9:50 **Performance of MIMO PLC in Measured Channels Affected by Correlated Noise**

Alberto Pittolo; Andrea M Tonello; Fabio Versolatto (all University of Udine, Italy)

10:10 **MIMO Capacity of Class A Impulsive Noise Channel for Different Levels of Information Availability At Transmitter**

Babak Nikfar; Tarik Akbudak; Han Vinck (all University of Duisburg-Essen, Germany)

10:30 **Physical Layer Security in MIMO Power Line Communication Networks**

Yifei Zhuang; Lutz Lampe (all University of British Columbia, Canada)

W2: Network Performance

Wednesday, April 2, 9:50 –10:50

Room: K3.17

Chair: Haniph A. Latchman (University of Florida, USA)

9:30 **A Switch Promotion Algorithm for Improving PRIME PLC Network Latency**

Eduardo Alonso (Universidad Pontificia Comillas, Spain); Javier Matanza (Universidad Pontificia Comillas, Spain); Carlos Rodriguez-Morcillo (Universidad Pontificia Comillas, Spain); Sadot Alexandres (Instituto de Investigación Tecnológica, Universidad Pontificia Comillas, Spain)

9:50 **Mathematical Modeling and EDA-based Network Planning for Broadband Power Line Communication Access Systems**

Jaspreet S Oberoi; Daniel Lee (all Simon Fraser University, Canada)

10:10 **Performance Evaluation of the Priority Resolution Scheme in PLC Networks**

Cristina Cano; David Malone (all NUI Maynooth, Ireland)

10:30 **Performance Evaluation of the G.hn PLC PHY Layer**

Stanislav Mudrievskyi; Ralf J. Lehnert (all Technische Universitaet Dresden, Germany)

W3: Cooperation & Network Coding
Wednesday, April 2, 11:10 –12:30

Room: K3.25

Chair: Han Vinck (University of Duisburg-Essen, Germany)

- 11:10 **Cooperative Power Line Communication: Analysis of Brazilian In-Home Channels**
Juan David Valencia-Payn (Universidade Federal de Juiz de Fora, Brazil); Thiago Oliveira (IF-SEMG - Federal Institute of Education, Science and Thechnology of the Southeast of Minas Gerais, Brazil); Moises Vidal Ribeiro (Federal University of Juiz de Fora, Brazil)
- 11:30 **Cooperative Relaying in Narrow-band PLC Networks Using Fountain Codes**
Wendyida Abraham Kabore (University of Limoges, France); Vahid Meghdadi (University of Limoges, France); Jean-Pierre Cances (XLIM, France)
- 11:50 **Joint Network Coding and OFDMA Based MAC-layer in PLC Networks**
Sana Ezzine (ENIT, Tunisia); Fatma Abdelkefi (High School of Communications of Tunis (SUP-COM), Tunisia); Jean Pierre Cances (University of Limoges, France); Vahid Meghdadi (University of Limoges, France); Ammar Bouallegue (National School of Engineers of Tunis, Tunisia)
- 12:10 **Reliable Communications with Network Coding in Narrowband Powerline Channel**
Josu Bilbao (IKERLAN Technological Research Center, Spain); Aitor Calvo (Ikerlan, Spain); Igor Armendariz (Ikerlan Technological Research Center, Spain); Pedro M. Crespo (CEIT and TECNUN (University of Navarra), Spain); Muriel Médard (MIT, USA)

W4: Noise & Interference Mitigation
Wednesday, April 2, 11:10 –12:30

Room: K3.17

Chair: Francisco J. Cañete (Universidad de Málaga, Spain)

- 11:10 **A Study on Channel Estimation Using Pilot Symbols Under Impulsive PLC Channel**
Hirotomo Yasui (Tokyo University of Science, Japan); Kohei Ohno (Meiji University, Japan); Makoto Itami (Tokyo University of Science, Japan)
- 11:30 **Robust Timing Synchronization Against Narrowband Interference for PLC Systems**
Hongjian Gao (China Electric Power Research Institute, P.R. China); Gerd Bumiller (Hochschule Ruhr West & University of Applied Sciences, Germany); Weilin Liu (State Grid Corporation of China, P.R. China)
- 11:50 **On Enhancing the Performance of the DPTE-Based Noise Cancellation Method Utilizing the PTS PAPR Reduction Scheme in PLC Systems**
Khaled Rabie; Emad Alsusa (all The Manchester of University, United Kingdom)
- 12:10 **Single-Carrier FDMA with Blanking/Clipping for Mitigating Impulsive Noise Over PLC Channels**
Khaled Rabie; Emad Alsusa (all The Manchester of University, United Kingdom)