# SCC 2017

11th International ITG Conference on Systems, Communications and Coding

## Proceedings

**Monday February 6, 2017**

13:30 – 18:30  |  Tutorials

**Tuesday February 7, 2017**

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<td>9:15 – 10:30</td>
<td>Session 1: Shannon / Network Coding</td>
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<tr>
<td>10:30 – 11:20</td>
<td>Poster Session P1</td>
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<tr>
<td>11:20 – 12:35</td>
<td>Session 2: Information Theory</td>
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<td>14:00 – 15:35</td>
<td>Session 3: Cooperative Communications and Computing</td>
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<td>15:35 – 16:25</td>
<td>Poster Session P2</td>
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<td>16:25 – 18:00</td>
<td>Session 4: Channel Coding</td>
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**Wednesday February 8, 2017**

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<td>9:00 – 10:30</td>
<td>Session 5: Industry 4.0 / Industrial Radio</td>
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<td>10:30 – 11:20</td>
<td>Poster Session P3</td>
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<td>11:20 – 12:40</td>
<td>Session 6: Secure Communications and Compressed Sensing</td>
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<td>14:00 – 15:45</td>
<td>Session 7: Localization</td>
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<td>Session 8: Internet of Things and Video Compression</td>
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<td>Session 9: Cellular Systems: 5G and Beyond</td>
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<td>10:30 – 11:20</td>
<td>Poster Session P5</td>
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<td>11:20 – 12:55</td>
<td>Session 10: Massive MIMO</td>
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<td>14:00 – 15:30</td>
<td>Session 11: Fiber-Optical Communications</td>
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<td>16:00 – 17:40</td>
<td>Session 12: Channel Coding and Modulation</td>
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### Session 1: Shannon / Network Coding

Chair: Gerhard Bauch, Hamburg University of Technology

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<tr>
<td>9:15 – 10:30</td>
<td>Invited Talk:</td>
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<tr>
<td></td>
<td>Claude E. Shannon 100th Birthday:</td>
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<tr>
<td></td>
<td>The Founding Father of the Information Age</td>
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<td></td>
<td>Joachim Hagenauer, Technische Universität München, Germany</td>
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<tr>
<td></td>
<td>Invited Talk: BATS: Network Coding in Action</td>
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<td>Raymond W. Yeung, The Chinese University of Hong Kong</td>
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P1-1
Asymptotically Tight Capacity Bounds for a Class of Memoryless Nonlinear AWGN Channels
Karsten Wiedmann, Tobias Weber, University of Rostock, Germany

P1-2
Mutual Information-Based Clustering: Hard or Soft?
Bernhard C. Geiger, Rana Ali Amjad, Technische Universität München, Germany

P1-3
On the Equivalence Between Classical and Distributional Convergence for Shannon Type Interpolation Series and Applications
Ezra Tampubolon, Holger Boche, Technische Universität München, Germany

P1-4
Structure of Signals and Systems with Non-Convergent Sampling Representation
Ullrich J. Mönich, Holger Boche, Technische Universität München, Germany

P1-5
Achieving Minimum Latency in Relay Assisted Interference Networks
Soheil Gherekhloo, Aydin Sezgin, Ruhr Universität Bochum, Germany

P1-6
Layering of Communication Networks and a Forward-Backward Duality
Michael Cyran, Johannes Huber, University of Erlangen-Nuremberg, Germany
Birgit Schotsch, Airbus Group, Germany
Robert F. H. Fischer, Ulm University, Germany

P1-7
On the Connectivity of Two-Hop Networks in Finite Domains
Dene A. Hedges, Justin P. Coon, University of Oxford, United Kingdom
Orestis Georgiou, Toshiba Telecommunications Research Laboratory, United Kingdom

P1-8
Overview and Investigation of Algorithms for the Information Bottleneck Method
Shayan Hasanspourn, Dirk Wübben, Armin Dekorsy, University of Bremen, Germany

P1-9
On the Relationship Between the KL Means Algorithm and the Information Bottleneck Method
Brian Michael Kurkoski, Japan Advanced Institute of Science and Technology (JAIST), Japan

P1-10
Channel Capacity and Optimum Transmission Bandwidth of In-Body Ultra Wideband Communication Links
Jan-Christoph Brumm, Gerhard Bauch, Hamburg University of Technology, Germany

P1-11
Link Analysis Between an Airborne Mobile Station and a Terrestrial GSM Network
Rodrigo Justavino, Rainer Grünheid, Gerhard Bauch, Hamburg University of Technology, Germany
Florian Wolff, Stefan von der Heide, Siemens Convergence Creators, Germany

P1-12
Faster-than-Nyquist Signaling for Satellite Communications: A PAPR Analysis
Thomas Delamotte, Andreas Knopp, University of Federal Armed Forces Munich, Germany
Gerhard Bauch, Hamburg University of Technology, Germany
### Session 2: Information Theory
Chair: Gerhard Kramer, Technische Universität München

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| 11:20 – 11:55 | **Invited Talk:** Other Notions of Channel Capacity  
Amos Lapidoth, ETH Zurich, Switzerland |
| 11:55 – 12:15 | **On the Capacity of Censored Channels**  
Arash Behboodi, Gholamreza Alirezaei, Rudolf Mathar, RWTH Aachen University, Germany |
| 12:15 – 12:35 | **On the Capacity of Fading Broadcast Channels with Statistical CSIT and Memory**  
Pin-Hsun Lin, Eduard Jorswieck, Martin Mittelbach, Dresden University of Technology, Germany  
Rafael F. Schaefer, Berlin University of Technology, Germany |

### Session 3: Cooperative Communications and Computing
Chair: Volker Kühn, University of Rostock

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| 14:00 – 14:35 | **Invited Talk:** Self-Organizing Synchronization in Networked Systems  
Christian Bettstetter, University of Klagenfurt, Austria |
| 14:35 – 14:55 | **On Compress and Forward with Multiple Carriers in the 3-Node Relay Channel Exploiting Information Bottleneck Graphs**  
Daniel Kern, Volker Kuehn, University of Rostock, Germany |
| 14:55 – 15:15 | **Cooperative Wireless Backhauling**  
Vahid Jamali, Robert Schober, University of Erlangen-Nuremberg, Germany  
Nikola Zlatanov, Monash University, Australia |
Quy Hong Le, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany |

### Poster Session P2
15:35 - 16:25

P2-1  
**Design of Protograph-Based LDPC Code Ensembles with Fast Convergence Properties**  
Ian P. Mulholland, Mark F. Flanagan, University College Dublin, Ireland  
Enrico Paolini, University of Bologna, Italy

P2-2  
**GLDPC Coded Modulation and Its Squared Euclidean Distance Distribution**  
Mark F. Flanagan, University College Dublin, Ireland  
Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany  
Enrico Paolini, University of Bologna, Italy

P2-3  
**Chained Polar Subcodes**  
Peter Trifonov, Saint-Petersburg State Polytechnic University, Russia

P2-4  
**On the Performance of Short Tail-Biting Convolutional Codes for Ultra-Reliable Communications**  
Lorenzo Gaudio, Tudor Ninacs, Thomas Jerkovits, Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

P2-5  
**Low Complexity ML-Detection of Arbitrary Spherical Codes**  
Christoph Rachinger, Ralf R. Müller, Johannes B. Huber, University of Erlangen-Nuremberg, Germany

P2-6  
**Improved Syndrome Decoding of Interleaved Subspace Codes**  
Hannes Bartz, Manuela Meier, Vladimir Sidorenko, Technische Universität München, Germany
**Session 4: Channel Coding**
Chair: Martin Bossert, Ulm University

16:25 – 17:00 **Invited Talk:**
*The VLSI Energy Cost of Encoding and Decoding*
Frank R. Kschischang, University of Toronto, Canada

17:00 – 17:20 **Latency Reduced LTE-A Turbo-Code Decoding with Iteration Balancing on Transport Block Level**
Stefan Weithoffer, Norbert When, University of Kaiserslautern, Germany

17:20 – 17:40 **Feed-Forward Staircase Codes**
Lei Zhang, University of Toronto, Canada
Laurent Schmalen, Nokia Bell Labs, Germany

17:40 – 18:00 **Discrete Channel Estimation by Integer Passing in Information Bottleneck Graphs**
Jan Lewandowsky, Maximilian Stark, Rico Mendrzik, Gerhard Bauch, Hamburg University of Technology, Germany

**Session 5: Industry 4.0 / Industrial Radio**
Chair: Armin Dekorsy, University of Bremen

9:00 - 9:20 **Introduction to Industrial Radio and Industry 4.0**
Armin Dekorsy, University of Bremen, Germany

9:20 - 9:55 **Invited Talk:**
*Security Concepts for the Internet of Things and Industry 4.0*
Fabian Mackenthun, NXP Semiconductors GmbH, Germany

9:55 - 10:30 **Invited Talk:**
*The Role of Wireless Communication for Industry 4.0*
Andreas Mueller, Robert Bosch GmbH, Germany
**Poster Session P3**
10:30 - 11:20

**P3-1**
Realizing Pulse-Coupled Oscillators Synchronization on IEEE 802.15.4 Wireless Networks  
Wasif Masood, Jorge F. Schmidt, University of Klagenfurt, Austria

**P3-2**
Single-Receiver Switched Opportunistic Approach to AoA Estimation in Hardware Impaired Scenarios  
Andrea Papaiz, University of Udine, Italy  
Andrea M. Tonello, University of Klagenfurt, Austria

**P3-3**
Optimal Factorization in Lattice-Reduction-Aided and Integer-Forcing Linear Equalization  
Sebastian Stern, Robert F. H. Fischer, Ulm University, Germany

**P3-4**
Time-Domain Equalization in Broadband DC-PLC Sensor Networks  
Vladimir Burstein, Werner Henkel, Jacobs University Bremen, Germany

**P3-5**
Low-Effort On-Board Memoryless Predistortion Techniques for SATCOM  
Ovais Bin Usman, Thomas Delamotte, Andreas Knopp, University of Federal Armed Forces Munich, Germany

**P3-6**
Throughput Performance of Time- And Frequency-Asynchronous ALOHA  
Vicente Almonacid, University of Montpellier, France  
Laurent Franck, Télécom Bretagne, France

**P3-7**
Decentralized Power Control for Slotted Spread Spectrum Aloha with Successive Interference Cancellation  
Francisco Lázaro Blasco, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

**P3-8**
Redundant and Non-Redundant Spectrum Shaping Schemes for Reflection-Limited Chip-to-Chip Communication  
Yu Zhao, Rainer Grünheid, Gerhard Bauch, Torsten Reuschel, Christian Schuster, Hamburg University of Technology, Germany

**P3-9**
Approximate Image Authentication and Correction Using Spatial and Frequency Domain Features  
Obaid Ur-Rehman, Natasa Zivic, Christoph Ruland, University of Siegen, Germany

**P3-10**
Timing Attack Resilient Decoding Algorithms for Physical Unclonable Functions  
Sven Puchinger, Sven Müelich, Martin Bossert, Ulm University, Germany  
Antonia Wachter-Zeh, Technische Universität München, Germany

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**Session 6: Secure Communications and Compressed Sensing**
Chair: Christoph Ruland, University of Siegen

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<tr>
<td>11:20 – 11:40</td>
<td>Compressed Sampling and Authenticated-Encryption</td>
<td>Robin Fay, Christoph Ruland, University of Siegen, Germany</td>
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<td>11:40 – 12:00</td>
<td>Compound Biometric Authentication Systems with Strong Secrecy</td>
<td>Nima Tavangaran, Sebastian Baur, Andrea Grigorescu, Holger Boche, Technische Universität München, Germany</td>
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| 12:00 – 12:20 | Network Coding Security for Bidirectional Network Flows | Robert F. H. Fischer, Vahid Forutan, Ulm University, Germany  
Michael Cyran, Johannes Huber, University of Erlangen-Nuremberg, Germany |
| 12:20 – 12:40 | A New Error Correction Scheme for Physical Unclonable Functions | Sven Müelich, Martin Bossert, Ulm University, Germany                   |
### Session 7: Localization
Chair: Christoph Günther, German Aerospace Center, Oberpfaffenhofen

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<td>14:00 – 14:35</td>
<td>Invited Talk: Localization and Communication for Control Applications</td>
<td>Henk Wymeersch, Chalmers University, Sweden</td>
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<td>14:35 – 15:10</td>
<td>Invited Talk: Power Allocation for Network Localization</td>
<td>Moe Z. Win, Massachusetts Institute of Technology (MIT), USA</td>
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<td>15:10 – 15:45</td>
<td>Invited Talk: Cooperative Interacting Automobiles</td>
<td>Christoph Stiller, Karlsruhe Institute of Technology, Germany</td>
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### Poster Session P4
15:45 - 16:25

| P4-1 | Smart Sampling for Ultra-Wideband Nonparametric Belief Propagation Indoor Localization | Rico Mendrzik, Gerhard Bauch, Hamburg University of Technology, Germany |
| P4-2 | Packet-Based Ranging with a Low-Power, Low-Cost Acoustic Modem for Micro AUVs | Christian Renner, Hamburg University of Technology, Germany |
| P4-3 | Multiple Channel Access Techniques for Diffusion-Based Molecular Communication | Sebastian Korte, Invensity GmbH, Germany, Martin Damrath, Peter A. Hoeher, University of Kiel, Germany |
| P4-4 | Detection and Combining Techniques for Asynchronous Random Access with Time Diversity | Federico Clazzer, Francisco Lázaro Blasco, Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany, Mario Marchese, DIST-University of Genova, Italy |
| P4-5 | Joint Resource Allocation and Power Control for Maximizing the Throughput of Multicast C-RAN | Di Chen, Volker Kuehn, University of Rostock, Germany |
| P4-6 | Resource Allocation for Underlay Device-to-Device Communication in HetNet with Rate Constraints | Yongyun Choi, Jinhoon Park, Seung Geun Hong, Jae Hong Lee, Seoul National University, Korea |
| P4-7 | Algorithms for the Iterative Estimation of Discrete-Valued Sparse Vectors | Susanne Sparrer, Robert F. H. Fischer, Ulm University, Germany |
| P4-8 | Off-Grid Parameter Estimation Based on Joint Sparse Regularization | Augustin Colonna Walewski, Christian Steffens, Marius Pesavento, Technische Universität Darmstadt, Germany |
| P4-9 | Residual Based Compressed Sensing Recovery Using Sparse Representations Over a Trained Dictionary | Ali Akbari, Maria Trocan, Institut Supérieur d'Electronique de Paris (ISEP), France, Bertrand Granado, Laboratoire d'Informatique, Université de Paris (UPMC), France |
| P4-10 | Spatial Field Reconstruction with Distributed Kernel Least Squares in Mobile Sensor Networks | Ban-Sok Shin, Henning Paul, Armin Dekorsy, University of Bremen, Germany |
| P4-11 | In-Network Processing by the Example of Maxima Estimation in Spatial Fields | Reiner Jedermann, Henning Paul, Walter Lang, University of Bremen, Germany |
| P4-12 | Modulated Wideband Converter for Compressive Phase Retrieval of Bandlimited Signals | Volker Pohl, Holger Boche, Technische Universität München, Germany, Cagkan Yapar, Technische Universität Berlin, Germany |
### Session 8: Internet of Things and Video Compression
Chair: Anja Klein, Technische Universität Darmstadt

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| 16:25 – 17:00 | Invited Talk: Dependable Internet of Things in Adverse Environments  
Gernot Kubin, Graz University of Technology, Austria |
| 17:00 – 17:35 | Invited Talk: Recent Advances in Video Compression  
Thomas Wiegand, Fraunhofer Heinrich-Hertz-Institute, Berlin |

### Session 9: Cellular Systems: 5G and Beyond
Chair: Armin Dekorsy, University of Bremen

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| 9:00 – 9:35   | Invited Talk: Distributed MIMO Signal Transmissions for 5G Mobile Communications Networks  
Fumiyuki Adachi, Tohoku University, Sendai, Japan |
| 9:35 – 10:30  | Industry Panel and Interactive Session on Cellular Systems beyond 5G |

### Poster Session P5
10:30 - 11:20

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<th>Poster Number</th>
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<th>Authors</th>
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<tr>
<td>P5-1</td>
<td>Ultra-low Latency in Next Generation LTE Radio Access</td>
<td>John Camilo Solano Arenas, Torsten Dudda, Laetitia Falconetti, Ericsson Research, Germany</td>
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| P5-2          | Low-latency Ultra-Reliable 5G Communications: Finite-Blocklength Bounds and Coding Schemes  
Johan Ostman, Giuseppe Durisi, Erik G. Ström, Chalmers University of Technology, Sweden  
Jingyi Li, Henrik Sahlin, Ericsson Research, Sweden  
Gianluigi Liva, German Aerospace Center (DLR), Oberpfaffenhofen, Germany |
| P5-3          | Delay-Constrained Data Transmission for Energy Harvesting Transmitter  
Xiang Li, Tobias Weber, University of Rostock, Germany  
Andrea Ortiz, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany |
| P5-4          | Partial Interference Cancellation in Heterogeneous LTE-Advanced Networks  
Melanie Falk, Rodrigo Justavino, Gerhard Bauch, Hamburg University of Technology, Germany  
Eiko Seidel, Nomor Research GmbH, Germany |
| P5-5          | Stochastic Geometry for the Analysis of Small Radio Cells and PLC Back-Hauling  
Francesco Marcuzzi, Andrea M. Tonello, University of Klagenfurt, Austria |
| P5-6          | Feasibility of Serving K Secondary Users in Underlay Cognitive Radio Networks Using Massive MIMO  
Shailesh Chaudhari, Danijela Cabric, University of California, Los Angeles, USA |
| P5-7          | Spatial Oversampling in LOS MIMO Systems with 1-Bit Quantization at the Receiver  
Tim Hälsig, Berthold Lankl, University of Federal Armed Forces Munich, Germany |
| P5-8          | Pareto Boundary for Massive-MIMO-Relay-Assisted Interference Networks: Half-Duplex vs. Full-Duplex Processing  
Ali Kariminezhad, Amr Elbassiouni, Aydin Sezgin, Ruhr-Universität Bochum, Germany |
| P5-9          | Exploiting Additional Transmit Antennas for More Degrees of Freedom in 3-User MIMO Interference Channel with Delayed CSIT  
Alexey Buzuverov, Hussein Al-Shatri, Anja Klein, Technische Universität Darmstadt, Germany |
### Session 10: Massive MIMO
Chair: Wolfgang Utschick, Technische Universität München

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Erik G. Larsson, Linköping University, Sweden |
| 11:55 - 12:15 | Massive MIMO Detection Based on Belief Propagation in Spatially Correlated Channels  
Yuan Gao, Han Niu, Thomas Kaiser, University of Duisburg-Essen, Germany |
| 12:15 - 12:35 | Design of a Simple Phase Percoder for Generalized Spatial Modulation in LOS Millimeter Wave Channels  
Nemanja Stefan Perović, Peng Liu, Andreas Springer, Johannes Kepler University Linz, Austria |
| 12:35 - 12:55 | On MSE Based Receiver Design for Massive MIMO  
David Neumann, Michael Joham, Wolfgang Utschick, Technische Universität München, Germany |

### Session 11: Fiber-Optical Communications
Chair: Robert F. H. Fischer, University of Ulm

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| 14:00 – 14:35 | Invited Talk: Integrated Parallelism and DSP for Optical Networks with 10-Tb/s Interfaces in Pb/s Systems  
Peter J. Winzer, Bell-Labs, USA |
| 14:35 – 15:10 | Invited Talk: The Nonlinear Fourier Transform in Fiber-Optic Communications  
Sergei K. Turitsyn, Aston University, United Kingdom |
Sander Wahls, TU Delft, The Netherlands |

### Session 12: Channel Coding and Modulation
Chair: Dirk Wübben, University of Bremen

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| 16:00 – 16:20 | Spatially Coupled Hybrid Concatenated Codes  
Saeedehe Moloudi, Michael Lentmaier, Lund University, Sweden  
Alexandre Graell i Amat, Chalmers University of Technology, Sweden |
| 16:20 – 16:40 | Flexible Length Polar Codes Through Graph Based Augmentation  
Ahmed Elkelesh, Moustafa Ebada, Sebastian Cammerer, Stephan ten Brink, University of Stuttgart, Germany |
Comparison of Geometric and Probabilistic Shaping with Application to ATSC 3.0
Fabian Steiner, Georg Böcherer, Technische Universität München, Germany

Pulse Shaping Applied to Cyclic Block FMT for Improved Spectrum Usage
Mauro Girotto, University of Udine, Italy
Andrea M. Tonello, University of Klagenfurt, Austria

Finite-Length Analysis of Frameless ALOHA
Francisco Lázaro Blasco, German Aerospace Center (DLR), Oberpfaffenhofen, Germany
Čedomir Stefanović, Aalborg University, Denmark