

# **2017 26th Wireless and Optical Communication Conference (WOCC 2017)**

**Newark, New Jersey, USA  
7-8 April 2017**



**IEEE Catalog Number: CFP17WOC-POD  
ISBN: 978-1-5090-4910-3**

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP17WOC-POD
ISBN (Print-On-Demand):	978-1-5090-4910-3
ISBN (Online):	978-1-5090-4909-7
ISSN:	2379-1268

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## WOCC Technical Sessions – Friday, April 07, 2017, 09:00 – 10:20



### Optical Transmission Systems and Modeling

Chair: Mark D. Feuer  
College of Staten Island, CUNY

*Modeling of modal dispersion in multimode and multicore optical fibers* 1  
Ioannis Roudas (Invited)  
Montana State University, Bozeman, MT

*Multicore fiber transmission over transoceanic distances* N/A  
Alexey Turukhin (Invited)  
TE SubCom, NJ

*Demonstration of a polarization diversity based SH-QPSK system with  
CMA-DFE equalizer* 7  
Rashmi Kamran, Nandish Bharat Thaker, Mehul Anghan,  
Nandakumar Nambath, and Shalabh Gupta  
Indian Institute of Technology Bombay, Mumbai, India



### Mobile Communications and Resource Optimization

Chair: Wei Feng  
Tsinghua University



*Optical Mobile Communications Principles and Challenges* 11  
Zaichen Zhang, Liang Wu, Jian Dan,  
Guanghao Zhu, Jiashun Hu, Hao Jiang,  
Xiaohu Yo, and  
Zaichen Zhang\* (Invited)  
Southeast University

*Coordinated Satellite-Terrestrial Networks: A Robust Spectrum Sharing  
Perspective* 15  
Wei Feng; Ning Ge; Jianhua Lu, and  
Wei Feng\* (Invited)  
Tsinghua University

*Resource Optimizer for Cognitive Network Using Multi-Objective Particle  
Swarm System* 20  
Hossam M. Alsake\*, Korany R. Mahmoud, Hussein  
M. ElAttar, Mohamed A. Aboul-Dahab  
Arab Academy For Science, Technology &  
Maritime Transport

*Fuzzy Logic Based Vertical Handover Algorithm for Trunking System* 26  
Lu Zhang\*; Lu Ge; Xin Su; Jie Zeng  
Chongqing University of Posts and Telecommunications,  
Tsinghua University

## WOCC Technical Sessions – Friday, April 07, 2017, 15:40 – 17:20

 <b>Free Space Optical Communications I</b>	 <b>Network and Security</b>
Chair: Ioannis Roudas Montana State University, Bozeman, MT	Chair: Hong Zhao FDU
<p><i>Impact of 5G Wireless on Modern Optical Networks</i> N/A  <u>Xiang Liu (Invited)</u>  <b>HUAWEI R&amp;D USA, NJ</b></p> <p><i>Cyber-enabled Displays - An application of Massive-Parallel Free-space Optics</i> N/A  <u>Mark D. Feuer (Invited)</u>  <b>College of Staten Island, CUNY, NY</b></p> <p><i>64 Gb/s Quantum-dash Laser based Indoor Free Space Optical Communication</i> 31  <u>M. Talal A. Khan, M.A. Shemis, A. M. Ragheb, H. Fathallah, S. Alshebeili, and M. Z. M. Khan</u>  <b>*King Fahd University of Petroleum and Minerals, Saudi Arabia</b></p> <p><i>Experimental Investigation of DCO-OFDM Adaptive Loading Using Si PN-based Receiver</i> 35  <u>Ahmed F. Hussein*, Hany Elgala, Bassem Fahs, and Mona M. Hella</u>  <b>*SUNY at Albany, NY</b></p> <p><i>A Meter-Scale 600-Mb/s 2x2 Imaging MIMO OOK VLC Link Using Commercial LEDs and Si p-n Photodiode Array</i> 40  <u>Bassem Fahs*, Matthew J. Senneca, Jeffrey Chellis, Brandon Mazzara, Sagar Ray, Javad Ghasemi, Yun Miao, Payman Zarkesh-Ha, Valencia J. Koomson, and Mona M. Hella</u>  <b>*Rensselaer Polytechnic Institute, NY</b></p>	<p><i>DoS Attacks and Countermeasures on Network Devices</i> 46  <u>Qian Wang, Timothy Dunlap, Youngho Cho, and Gang Qu (Invited)</u>  <b>University of Maryland, College Park</b></p> <p><i>A Novel Anomaly Detection System using Feature-based MSPCA with Sketch</i> 52  <u>Zhaomin Chen, Chai Kiat Yeo, Bu Sung Lee, Chiew Tong Lau</u>  <b>Nanyang Technological University, Singapore</b></p> <p><i>Wavelength Channel Bonding for Gb/s Next Generation Passive Optical Networks</i> 58  <u>Yuanqiu Luo, Liang Zhang, Nirwan Ansari, Bo Gao, Xiang Liu, Frank Effenberger</u>  <b>Huwei Technologies; NJIT</b></p> <p><i>SOSMAC: Separated Operation States in Medium Access Control for Emergency Communications on IEEE 802.11-like Crowded Networks</i> 64  <u>Paa Kwesi Esubonteng, and Roberto Rojas-Cessa</u>  <b>NJIT</b></p> <p><i>Resilient Virtual Network Mapping Against Large-scale Regional Failures</i> 70  <u>Carlos Galdamez, and Zilong Ye (Invited)</u>  <b>California State University, Los Angeles</b></p>

## WOCC Technical Sessions – Saturday, April 08, 2017, 09:00 – 10:20


**PHY/MAC technologies for  
Wireless Communications**

Chair: Uttara Sawant  
University of North Texas

*Data-Driven Power Control of Ultra-Dense  
Femtocells: A Clustering Based Approach* 74

Li-Chun Wang\*; Shao-Hung Cheng; Ang-  
Hsun Tsai

**National Chiao Tung University**

*Area Spectral Efficiency for Cellular Networks with  
Small Reuse Distance: An Algebraic Approach* 80

Hsin-An Hou; Li-Chun Wang\*

**\*National Chiao Tung University**

*Evaluation of Adaptive and Non Adaptive LTE  
Fractional Frequency Reuse Mechanisms* 86

Uttara Sawant\*; Robert Akl

**University of North Texas**

*Impact of Channel Estimation Error on Upper Bound  
of Rate Loss for Macro Cell in A VFDM System,* 92

Rugui Yao\*; Yan Gao; Juan XU; Lukun Yao




**Northwestern Polytechnical University**

*Modulation Classification Using Convolutional  
Neural Network Based Deep Learning Model,* 97

Shengliang Peng\*; Hanyu Jiang; Huaxia Wang;  
Hathal Alwageed; Yu-Dong Yao

**Huaqiao University, Stevens Institute of  
Technology**

## WOCC Technical Sessions – Saturday, April 08, 2017, 13:30 – 15:10

 <b>Optical Fiber Communication Systems and Networks</b> Chair: Xin Jiang College of Staten Island, CUNY	 <b>Massive MIMO and mmWave Technologies</b> Chair: Haixia Zhang Shandong University	 <b>Data Sensing, Modeling and Inference</b> Chair: Rensheng Wang AT&T Labs
<p><i>Impact of multiple-path interference on the performance of coherent transmission systems employing distributed Raman amplification</i> 102  <u>Lufeng Leng (Invited)</u>  City College of Technology, CUNY, NY</p> <p><i>Linearization of photonic components for digital and analog optical fiber communication systems</i> 106  <u>Benjamin Dingel<sup>1</sup> (Invited)</u>  <u>Nicholas Madamopoulos<sup>2</sup></u>  <sup>1</sup>Nasfine Photonics Inc., NY  <sup>2</sup>Hellenic Airforce Academy, Greece</p> <p><i>Linearization of a Radio-over-Fiber Mobile Fronthaul with Feedback Loop</i> 112  <u>Carlos Mateo, Jesus Clemente, Paloma Garcia-Ducar, Pedro L. Carro, Jesus de Mingo, and Inigo Salinas</u>  University of Zaragoza, Zaragoza, Spain</p> <p><i>Colorless Flexi-Grid WDM-PON System Based on Polarization Multiplexed Optical Comb</i> 118  <u>MadhanThollabandi, Ankush Mahajan, Arvind Mishra, and BadriGomatamei</u>  Sterlite Technologies Ltd. India</p>	<p><i>Joint Pilot Assignment and Pilot Contamination Precoding Design for Massive MIMO Systems</i>, 121  <u>Mei Zhao; Haixia Zhang* (Invited)</u>  <u>ShuaishuaiGuo; Dongfeng Yuan</u>  Shandong University</p> <p><i>Downlink Channel Estimation and precoding for FDD 3D Massive MIMO/FD-MIMO Systems</i> 127  <u>RubayetShafin;</u>  <u>JianzhongZhang; Lingjia Liu* (Invited)</u>  University of Kansas</p> <p><i>Optimized Time-Shifted Pilots for Maritime Massive MIMO Communication Systems</i> 131  <u>Te Wei; Wei Feng*</u>  Tsinghua University</p> <p><i>Low Complexity Hybrid Precoding for mmWave Massive MIMO Systems</i>, 136  <u>Yueyun Chen; Yaxin Xing; Yanqing Xia*;</u>  <u>Liuqing Yang</u>  University of Science and Technology Beijing</p> <p><i>Adaptive Initial Beam Search for Sparse Millimeter Wave Channels</i>, 141  <u>Mohammed Jasim*; Nasir Ghani</u>  University of South Florida</p> <p><i>A Research for Millimeter Wave Patch Antenna And Array Synthesis</i>, 147  <u>Yueyun Chen; Shuaishuai Ma; SeyedMohadeskasaei; Rongling Jian*</u>  *University of Science &amp; Technology Beijing</p>	<p><i>Stream Data Analysis of Body Sensors for Sleep Posture Monitoring: An Automatic Labelling Approach</i> 152  <u>Poyuan Jeng</u>  <u>Li-Chun Wang</u>  National Chiao Tung University</p> <p><i>Indoor Localization Framework with WiFi Fingerprinting</i> 156  <u>RajanKhullar</u>  <u>Ziqian (Cecilia) Dong</u>  New York Institute of Technology</p> <p><i>Distributed Big Data Management in Smart Grid</i> 162  <u>Umar Ahsan</u>  <u>Abdul Bais</u>  University of Regina</p> <p><i>App-SON: Application Characteristic Driven SON to Optimize LTE Network Performance and User Quality of Experience</i> N/A  <u>Ye Ouyang (Invited)</u>  Verizon Wireless</p>

## WOCC Technical Sessions – Saturday, April 08, 2017, 15:40 – 17:20

<b>O4</b> <b>Free Space Optical Communications II</b> Chair: Lufeng Leng City College of Technology, CUNY	<b>W4</b> <b>Wireless Sensor Networks and Relay</b> Chair: Djamel Djenouri CERIST Research Center	<b>B2</b> <b>Big Data Analytics</b> Chair: Ye Ouyang Verizon Wireless
<p><i>Wide Laser Beam in Free-Space Optical Communications for High-Speed Trains</i> N/A  <u>Roberto Rojas Cessa (Invited)</u>  <b>New Jersey Institute of Technology</b></p> <p><i>Dual-slope linear optical frequency discriminator for flexible, high performance frequency modulated direct detection (FM-DD) microwave photonics links</i> 168  <u>Benjamin Dingel</u>  <b>Nasfine Photonics Inc. NY</b></p> <p><i>Hybrid Polymer Optical Fibre and Visible Light Communication Link for in-Home Network</i> 172  <u>Wasiu O. Popoola, Evangelos Pikasis and Isaac Osahon</u>  <b>The University of Edinburgh, UK</b></p> <p><i>Low Loss Polymeric Electro-Optic Modulator Based on Disperse Red 1 Doped Fluorinated Polyimide</i> 178  <u>Jie Tang, Li-Jiang Zhang, Long-De Wang, Feng Shan, and Tong Zhang*</u>  <b>*Southeast University, China</b></p> <p><i>Underwater Positioning System Based on Cellular Underwater Wireless Optical CDMA Networks</i> 181  <u>Farhad Akhouni*, Amir Minoofar, Jawad A. Salehi</u>  <b>*The University of Arizona, AZ</b></p>	<p><i>ADABCAST: ADaptive BroadCAST Approach for Solar Energy Harvesting Wireless Sensor Networks</i> 184  <u>Mustapha Khiati; Djamel Djenouri*</u>  <b>CERIST Research Center</b></p> <p><i>One-Step Clustering Protocol for Periodic Traffic Wireless Sensor Networks</i> 190  <u>Nassima Merabtine; Djamel Djenouri*; Djamel Eddine Zegour; Elseddik Lamini; Rima Bellal; Imene Ghaoui; Nabila Dahlal</u>  <b>CERIST Research Center</b></p> <p><i>Sum-Rate Based Opportunistic Relay Selection With Channel Estimation Error For A Dual-Hop Multiple Half/Full-Duplex Bi-directional Wireless Relaying Networks</i> 196  <u>Volkan Ozduran*; Ehsan Soleimani-Nasab; Siddik Yarman</u>  <b>Istanbul University</b></p> <p><i>Optimal Power Allocation for Achievable Secrecy Rate in An Untrusted Relay Network with Bounded Channel Estimation Error</i> 202  <u>Tamer Mekkawy; Rugui Yao*; Fei XU; Ling Wang</u>  <b>Northwestern Polytechnical University</b></p> <p><i>Relay Assisted Multiple Input Multiple Output Wireless Communication System for Multiple Access Channel using Hybrid-STBC-VBLAST</i> 207  <u>M. MKamruzzaman</u>  <b>Department of Computer and Information Science, Aljouf University, KSA</b></p>	<p><i>Differential Evolution Algorithms under Multi-population Strategy</i> 213  <u>Ishani Chatterjee</u>  <u>Mengchu Zhou</u>  <b>New Jersey Institute of Technology</b></p> <p><i>Decision Tree Rule-based Feature Selection for Large-scale Imbalanced Data</i> 220  <u>Haoyue Liu</u>  <u>Mengchu Zhou</u>  <b>New Jersey Institute of Technology</b></p> <p><i>Statistic Analysis on Riemannian Manifold for Large-scale Visual Set Classification</i> N/A  <u>Shuanglu Dai (Invited)</u>  <b>Stevens Institute of Technology</b></p> <p><i>Visualization in the Big Data Era</i> N/A  <u>Rensheng Wang (Invited)</u>  <b>AT&amp;T Research</b></p>