

2023 IEEE Conference on Standards for Communications and Networking (CSCN 2023)

**Munich, Germany
6-8 November 2023**



**IEEE Catalog Number: CFP23C06-POD
ISBN: 979-8-3503-9539-6**

**Copyright © 2023 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:	CFP23C06-POD
ISBN (Print-On-Demand):	979-8-3503-9539-6
ISBN (Online):	979-8-3503-9538-9
ISSN:	2644-3244

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
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

Open RAN for 5G Supply Chain Diversification: The BEACON-5G Approach and Key Achievements	1
<i>Adnan Aijaz, Sajida Gufran, Tim Farnham, Sita Chintalapati, Adrián Sánchez-Mompó, Peizheng Li</i>	
Service-Oriented Architecture Evolution Towards 6G Networks.....	8
<i>Tao Chen, Slawomir Kuklinski, Emmanouil Pateromichelakis, Konstantinos Samdanis, Akis Kourtis, Navid Nikaein, Antonio Skarmeta</i>	
Risk Assessment Method for 5G-Oriented DLMS/COSEM Communications	15
<i>Alexios Lekidis, Elpiniki I. Papageorgiou</i>	
Joint Channel Estimation for In-Band Full Duplex MIMO Cellular Communications	22
<i>Abdullah Yaqot, Horst Hellbrueck</i>	
Novel Joint Estimation and Decoding Metrics for Short-Blocklength Transmission Systems.....	28
<i>Mody Sy, Raymond Knopp</i>	
Signalling-Efficient CFRA Resource Updating for Conditional Handover in 5G-Advanced	34
<i>Jedrzey Stanczak, Umur Karabulut, Ahmad Awada, Panagiotis Spapis</i>	
Improving the Safety of Autonomous Driving by Using Direct-To-Satellite Connectivity: The Case of Iridium and Starlink Satellite Constellations.....	40
<i>Anastasia Yastrebova-Castillo, Marko Höyhtyä, Mikko Majanen, Tiia Ojanperä, Johan Scholliers, Seppo J. Rantala</i>	
SafeSmart: A VANET-LTE-Based Solution for Faster and Safer Response in Critical Situations	47
<i>Eduardo K. Duarte, Mikael Erneberg, Edison Pignaton De Freitas, Boris Bellalta, Alexey Vinel</i>	
Automative Video Compression for Remote Driving Via Safety Considerations	54
<i>Dan Peled, Armin Shmilovici, Ofer Hadar</i>	
Evaluating the Impact of Numerology and Retransmission on 5G NR V2X Communication at a System-Level Simulation	59
<i>Donglin Wang, Pranav Balasaheb Mohite, Qiheng Zhou, Anjie Qiu, Hans D. Schotten</i>	
On the Performance of SIC-Based NOMA in the C-V2X Sidelink Autonomous Mode	66
<i>Vittorio Todisco, Claudia Campolo, Antonella Molinaro, Antoine O. Berthet, Richard A. Stirling-Gallacher, Alessandro Bazzi</i>	
LTE-V2X Technology and Standards	73
<i>Jim Lansford</i>	
AI/ML-Based Sensing-Assisted Edge Computing in Next-Generation Mobile Networks.....	77
<i>Abdullah Ridwan Hossain, Abbas Kiani, Tony Saboorian, Amanda Xiang, John Kaippallimali, Nirwan Ansari</i>	
RIS-Aided Systems Under Faulty Configuration	83
<i>Pedro H. C. De Souza, Luciano L. Mendes</i>	

Open RAN Meets Semantic Communications: A Synergistic Match for Open, Intelligent, and Knowledge-Driven 6G	87
<i>Peizheng Li, Adnan Aijaz</i>	
Value of Information and Timing-Aware Scheduling for Federated Learning	94
<i>Muhammad Azeem Khan, Howard H. Yang, Zihan Chen, Antonio Iera, Nikolaos Pappas</i>	
On the Detection of Spectrum Irregularities Through Deep Learning in Dense IoT Architectures.....	100
<i>Katerina Kyriakou, Kostas Chounos, Thanasis Korakis</i>	
Anomaly Detection Using a Semi-Supervised Deep Learning Model on Open 5G Core Metrics During User-Equipment Registration	106
<i>Akash Gopikrishnan, Arun Prakash, Christian Hein, Klauss Mößner, Marius Corici, Thomas Magedanz</i>	
Estimation of 5G End-To-End Delay Through Deep Learning Based on Gaussian Mixture Models	113
<i>Diyar Fadhil, Rodolfo Oliveira</i>	
Performance Analysis of 5G Cellular Networks Serving Terrestrial and Aerial Users in the Presence of Interference Coupling.....	118
<i>Ramon Delgado Pulgar, Gábor Fodor, Hieu Do, Zhiqiang Tyler Qi</i>	
A Chatbot Assistant for Optimizing the Fault Detection and Diagnostics of Industry 4.0 Equipment in the 6G Era.....	124
<i>Nikolaos Gkatzios, Nikolaos Vryonis, Constantinos Fragkos, Christos Sakkas, Vasileios Mavrikakis, Vaios Koumaras, George Makropoulos, Dimitrios Fragkos, Harilaos Koumaras</i>	
Meta Standard Requirements for Harmonizing Dataspace Integration at the Edge	130
<i>Parwinder Singh, Nidhi, Asim Ul Haq, Michail Beliatas</i>	
Terahertz Communications for Industrial Manufacturing: A Use Case Analysis	136
<i>Tommaso Zugno, Lutfi Samara, Mate Boban, Per Hjalmar Lehne, Thomas Kürner</i>	
Towards a Connected Robotic Ecosystem.....	142
<i>Marcell Balogh, Bence Kovács, Attila Vidács, Géza Szabó</i>	
Standardisation Landscape for 6G Robotic Services.....	148
<i>Mona Ghassemian, Dejan Vukobratovic, Christos Papadopoulos, Xueli An, Periklis Chatzimisios, Adnan Aijaz, Peizheng Li, Andres Meseguer Valenzuela, Mohammad Shikh-Bahaei, Alben Mihovska, Nikolaos Bartzoudis, Rich Walker, Rr. Venkatesha Prasad, Firooz Saghezchi</i>	
A Novel 3D Object Classification Paradigm Through Reconfigurable Intelligent Surfaces	155
<i>Stavros Tsimpoukis, Dimitrios Tyrovolas, George Karagiannidis, Sotirios Ioannidis, Christos Liaskos</i>	
Towards Realistic Stochastic Channel Modeling for Mobility-Enabled Low Earth Orbit Satellites.....	159
<i>Mohammad Momani, Muhammad Nabeel</i>	
On Spectrum Access Approaches for Connectivity in Remote Areas in Brazil and Finland.....	165
<i>Lucas Dos Santos Costa, Luciano Leonel Mendes, Pedro Henrique Carneiro De Souza, Marja Matinmikko-Blue, Matti Latva-Aho, Harri Saarnisaari</i>	
5G Sidelink Positioning in 3GPP Release 18 and Release 19	171
<i>Trung-Kien Le, Sebastian Wagner, Florian Kaltenberger</i>	

Performance Evaluation of 5G Sidelink Positioning.....	177
<i>Taylan Sahin, Leonardo Chiarello, Diomidis S. Michalopoulos, Berthold Panzner</i>	
Service Placement and Migration Algorithm Utilizing Precise Positioning for Connected and Automated Vehicles.....	183
<i>Osama Elgarhy, Muhammad Mahtab Alam, Luca Reggiani, Muhammad Moazam Azeem</i>	
Low-Complexity Linear and Non-Linear Digital Self-Interference Cancellation.....	189
<i>Muhammad Nabeel, Akram Chbib, Muhammad Sohaib Amjad, Falko Dressler, Jürgen Peissig</i>	
FROST: Towards Energy-Efficient AI-On-5G Platforms – a GPU Power Capping Evaluation	195
<i>Ioannis Mavromatis, Stefano De Feo, Pietro Carnelli, Robert J. Piechocki, Aftab Khan</i>	
Sustainability in 6G Networks: Vision and Directions.....	202
<i>Ijaz Ahmad, Arne Mämmelä, Md Munjure Mowla, Adam Flizikowski, Muhammad Ali Babar Abbasi, Dmitry Zelenchuk, Mahnaz Sinaie</i>	
A Joint Wireless Data-Power Exchange Approach for Distributed Energy Harvesting Networks	209
<i>Georgios Kallitsis, Vasileios Karyotis, Symeon Papavassiliou</i>	
Frequency Hopping Scheduling Algorithm in Green LoRaWAN: Reinforcement Learning Approach	216
<i>Jui Mhatre, Ahyoung Lee, Hoseon Lee</i>	
Low-Power Wake-Up Signal Design in 3GPP Release 18	222
<i>Sebastian Wagner, Kien Le Trung, Raymond Knopp</i>	
QoS-Aware Congestion Control Using SRv6.....	228
<i>Sepehr Javid, Miika Komu, Jimmy Kjällman</i>	
Analysis of Real-Time Video Streaming and Throughput Performance Using the Open Air Interface Stack on Multiple UEs.....	235
<i>Bharat Agarwal, Clemens Felber, Neel Pandeya, Florian Kaltenberger, Marco Ruffini, Gabriel-Miro Muntean</i>	
Evaluation of New Radio Beam Management Framework for LEO Satellites	241
<i>Xavier Artiga, Miguel Ángel Vázquez</i>	
A Framework for Roaming Between 5G Non-Public-Networks (NPNs).....	247
<i>Pousali Chakraborty, Marius Corici, Hemant Zope, Carlos Barjau, Muhammad Faheem Awan, Josep Ribes, Aaron Montilla Vicent, David Gomez-Barquero, Thomas Magedanz</i>	
Exploiting Core Openness as Native-AI Enabler for Optimised UAV Flight Path Selection.....	254
<i>George Makropoulos, Dimitrios Fragkos, Harilaos Koumaras, Nancy Alonistioti, Alexandros Kaloxylos, Fotini Setaki</i>	
Sub-THz X-Haul Architecture with Ultra Capacity Wireless Distribution and Transport.....	259
<i>Claudio Paoloni, Viktor Krozer, François Magne, Antonio Ramirez</i>	
Securing Modbus TCP Communications in I4.0: A Penetration Testing Approach Using OpenPLC and Factory IO.....	265
<i>George Lazaridis, Anastasios Drosou, Periklis Chatzimisios, Dimitrios Tzovaras</i>	
On Secrecy Performance of Mixed THz-FSO Relaying System.....	271
<i>Rupender Singh, Ijaz Ahmad, Jyrki Huusko</i>	

Creating a Security Enforcement Environment for a Vehicular Platform.....	278
<i>Marinos Tsantekidis, Souleima Abdelghani, Mohammad Hamad, Vassilis Prevelakis</i>	
Open Questions in VRU Standards from Security and Privacy Perspectives.....	284
<i>Takahito Yoshizawa, Bart Preneel</i>	
Formal Verification of the FDO Protocol	290
<i>Simone Bussa, Riccardo Sisto, Fulvio Valenza</i>	
Security in Intent-Based Networking: Challenges and Solutions.....	296
<i>Ijaz Ahmad, Jere Malinen, Filippou Christou, Pawani Porambage, Andreas Kirstädter, Jani Suomalainen</i>	
5G Network Enhancements to Support Ambient IoT Devices	302
<i>Apostolis K. Salkintzis, Dimitrios Dimopoulos</i>	
Testing the Limits of 5G Communication with Articulated Robots in Various Traffic Conditions	308
<i>Michael Sonnberger, Robert Merz, Jorge F. Schmidt</i>	
Practical Random Tree Generation: Information-Theoretic Analysis and Applications to IoT	312
<i>Amirmohammad Farzaneh, Mihai-Alin Badiu, Justin P. Coon</i>	
Synchronization in Industrial IoT: Impact of Propagation Delay on Time Error	318
<i>Fatiha Hamma, Daniel Philip Venmani, Kamal Singh, Bruno Jahan</i>	
A LoRaWAN Adaptive Retransmission Mechanism	324
<i>Shahzeb Javed, Dimitrios Zorbas</i>	
Effect of Wake-Up Signal Location and Guard RB on Interference Mitigation at Wake-Up Receiver in 5G.....	328
<i>Tanumay Manna</i>	
Workload Prediction of Virtualized RAN in the Edge Micro Data Center: An Experimental Progress	334
<i>Adam Flizikowski, Md Arifur Rahman, Md Munjure Mowla, Farinaz Kooshki</i>	
NFV-MANO Support for Orchestration and Management of the Virtualized RAN.....	339
<i>Kostas Katsalis, Joan Triay, Hammad Zafar, Zarrar Yousaf, Janusz Pieczerak, Lingli Deng, Bruno Chatras</i>	
Adaptive ILP Formulation for Disaster-Resilient Service Function Chains in Beyond 5G Networks	346
<i>Mohamed Abderrahmane Madani, Fen Zhou, Ahmed Meddahi</i>	
Load Balancing Traffic Among Kubernetes Replicas by Utilizing Workload Estimation.....	353
<i>Lucas Laukka, Carl Fransson, Nikolaos Pappas</i>	
NEMI: A Standardized Approach to Intent Based Networking	357
<i>Varun Gowtham, Florian Schreiner, Marius-Iulian Corici, Thomas Magedanz</i>	
Cloud-Based TSN Stream Identification: The First Step for TSN Standards in Clouds.....	362
<i>Amir Hoseein Ghorab, Mohammed Abuibaid, Aysun Aslan Saruhan, Marc St-Hilaire, István Moldován, Miklós Máté</i>	
Integration of DetNet/TSN Reliability Functions in 5G Systems: A Case Study and Measurements	369
<i>Mohammed Abuibaid, Amirhossein Ghorab, Aysun Aslan Saruhan, Marc St-Hilaire, Glenn Parsons, János Farkas, Balázs Varga, István Moldován, Miklós Máté, Syed Hassan Raza Naqvi</i>	

Rate Splitting Multiple Access: Prototypes, Experiments and Standardization Efforts.....	376
<i>Sundar Aditya, Onur Dizdar, David Vargas, Bruno Clerckx, Stephen Wang, Xinze Lyu, Sibozhang</i>	
Exploring Electromagnetic Field Exposure in the Age of Non-Terrestrial Networks	377
<i>Amina Fellan, Hans D. Schotten</i>	
Construction of Mobile Coverage Map Including Altitude to Build a Sky Road for UAVs.....	378
<i>Jong-Hong Park, Jiho Lee, Sung-Chan Choi, Sungwook Jung</i>	
Flexible 5G gNB Implementation for Easy Tactical Deployment: A Focus on the Radio Unit.....	379
<i>Guillaume Vercasson, Cyril Collineau, Malo Manini, Jean Dion, Vincent Savaux, Patrick Savelli</i>	
Autonomous Drone-Aiming Antenna Tracker Application Based on oneM2M IoT Platform	380
<i>Jiho Lee, Jong-Hong Park, Sung-Chan Choi, Sungwook Jung</i>	
A Drone Control System Supporting Simultaneous Interworking Between Real and Virtual Drones	381
<i>Sungwook Jung, Wonseok Jung, Jong-Hong Park, Sungchan Choi, Jiho Lee, Il-Yeop Ahn</i>	
Standardized and Interoperable Digital Twins.....	382
<i>Robert Klar, Vangelis Angelakis</i>	
Reliability in Future Railway Mobile Communication Systems	383
<i>Dogukan Atik, Murat Gursu, Behnam Khodapanah, Wolfgang Kellerer</i>	
Demonstration of Opticom's Portable 5G Network with NC-Systems Positioning Solution for Mission Critical Applications	384
<i>Syed Adil Abbas Kazmi, Kerim Agdaci, Stefan Richter, Enrico Köppe, Julian Schmidt</i>	
A 5G-Based Authentication Framework for V2X Communication.....	385
<i>Diana Magalhães, Vinicius C. Ferreira, Nelson Rodrigues, João M. Fernandes</i>	
Omnidirectional Beamsteering Array Antenna Using Renewable Energy for Sustainable Remote Powering of IoT Devices for Continuous Monitoring.....	386
<i>Hoseon Lee, Ahyoung Lee</i>	
On the Effectiveness of the IEEE 802.11ah RAW Mechanism	387
<i>Hamid Taramit, José Pedro García Díaz, Luis Orozco Barbosa</i>	
Coordination, Trust and Orchestration of Cognitive, Open, Multi-Vendor Network Automation Functions	388
<i>Anubhab Banerjee, Georg Carle</i>	
Distributed MIMO for 6G sub-Networks in the Unlicensed Spectrum.....	389
<i>Mohamed Elwekeil, Lorenzo Galati Giordano, Paolo Baracca, Stefano Buzzi</i>	
Reducing Duration of the MU-MIMO CSI Acquisition Procedure in Wi-Fi Networks with OFDMA.....	395
<i>Yegor Golubev, Sergei Tutelian, Vyacheslav Loginov, Evgeny Khorov</i>	
Throughput Analysis of IEEE 802.11bn Coordinated Spatial Reuse	401
<i>Francesc Wilhelmi, Lorenzo Galati-Giordano, Giovanni Geraci, Boris Bellalta, Gianluca Fontanesi, David Nuñez</i>	
M-TDLS: Enhancement of VR Quality of Service Using Coordinated OFDMA and Direct Links.....	408
<i>Mary Mirzoiian, Vyacheslav Loginov, Evgeny Khorov</i>	

On the Involvement of IEEE 802.11ah Enabled Unmanned Aerial Vehicles (UAVs) in Emergency Networks	413
<i>Kostas Chounos, Manos Maroulis, Thanasis Korakis</i>	
On Robustness of IEEE 802.11 WLAN-Based Human Activity Recognition.....	417
<i>Yeqin Li, David Chieng, Boon Giin Lee, Chiew Foong Kwong, Chenyu Yang</i>	
Simulation Based IEEE 802.11ad Performance Assessment in Factory Workshop.....	423
<i>Joseba Osa, Iñaki Val, Mikel Mendicute</i>	

Author Index