



CONFERENCE 2022

**International Conference on
Broadband Communications
for next Generation Networks
and Multimedia Applications**

**Graz University of Technology
July 12th - 14th, 2022
Inffeldgasse 12, Graz, Austria**

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4th International Conference on Broadband Communications for Next Generation Networks and Multimedia Applications

The 4th *International Conference on Broadband Communications for Next Generation Networks and Multimedia Applications (CoBCom 2022)* will be held in Graz, Austria, on July 12th – 14th, 2022. Through its technical program, the conference provides an opportunity for the academic and industrial communities to address new research challenges, share solutions and discuss issues in information and communication technology (ICT) referring to modern telecommunications.

Additionally, the *International CEEPUS and ERASMUS Workshop on Microwave Technologies, Radars, Remote Sensing and Communications* will be held during CoBCom 2022. The workshop includes three special sessions: General CEEPUS Special Session; Special Session on Remote Sensing and Radars; Special Session on Microwave Technologies and Communications. The workshop was partly technical supported by IEEE Slovenia GRSS Chapter.

Topics CoBCom 2022

- Internet and Next-Generation networking
- Internet of Things, machine-to-machine communication and sensor networks
- Networking in the cloud
- Software defined networks and network function virtualization
- Software technologies and platforms for emerging services
- Design and applications for mobile and wireless services
- All-optical networks
- Broadband mobile and wireless communications
- Satellite and space communications
- Antennas and wave propagation including near-field communication and RFID
- Multimedia applications, rich communications services and networked games
- QoE and QoS assessment and provisioning
- Energy-efficient protocols and networking
- Smart spaces: context- and situation-awareness
- Social networking and social media
- Big data in telecommunications
- Electronic communications market and regulatory issues

General Chair

Erich Leitgeb, Graz University of Technology, Austria
Wilfried Gappmair, Graz University of Technology, Austria
Maja Matijašević, University of Zagreb, Croatia

Technical Program Chair

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Slaviša Aleksić, HfT Leipzig, Germany
Dušan Gleich, University of Maribor, Slovenia
Galia Marinova, Technical University of Sofia, Bulgaria
Vera Marković, University of Nis, Serbia
Peter Planinšič, University of Maribor, Slovenia

Program Overview

Day / Time	Tuesday July 12	Wednesday July 13	Thursday July 14	
08:30	08:30 – 09:30 Registration	08:30 – 09:00 Registration	08:30 – 09:00 Registration	
09:00		09:00 – 10:15 Protocols and Networks	09:00 – 09:30 Invited Talk G. Marinova	
09:30	09:30 – 10:00 Opening		09:30 – 10:30 CEEPUS & Erasmus	
10:00	10:00 – 11:00 Photonic and Optical Communications 1	10:15 – 10:45 Invited Talk A. Weiss		10:30 – 11:00 Coffee Break
10:30		11:00 – 11:30 Coffee Break	11:00 – 11:30 Coffee Break	
11:00	11:30 – 13:00 Photonic and Optical Communications 2			11:30 – 12:30 PHORSCH! & Vilipa 1
11:30		12:00 – 12:30 Closing Session		
12:00			12:30 – 13:00 P&V WS and Phorsch! Info	
12:30	13:00 – 14:00 Lunch	13:00 – 14:00 Lunch		
13:00			14:00 – 15:00 Keynote H. Flühr	14:00 – 15:00 Keynote M. Marciniak
13:30	15:00 – 15:30 Coffee Break	15:00 – 15:30 Coffee Break		
14:00			15:30 – 16:30 Information and Communication Technologies	15:30 – 17:15 PHORSCH! & Vilipa 2
14:30	16:30 – 17:30 RF Technologies			
15:00		17:15 – 18:00 General Track		
15:30				
16:00				
16:30				
17:00				
17:30				

18:00			
18:30	18:30 – 19:30 Guided City Tour		
19:00			
19:30	19:30 – 22:00 Lord Mayor Invitation	19:30 – 22:00 Gala Dinner Invitation Government of Styria	
20:00			
20:30			
21:00			
21:30			

Time	Tuesday July 12
8:30 – 09:30	Registration
09:30 – 10:00	Opening
10:00 – 11:00	P&OC 1 (3 Papers)
11:00 – 11:30	Coffee Break
11:30 – 13:00	P&OC 2 (5 Papers)
13:00 – 14:00	Lunch
14:00 – 15:00	Keynote H. Flühr
15:00 – 15:30	Coffee Break
15:30 – 16:30	I&CT (3 Papers)
16:30 – 17:30	RFT (3 Papers)
18:30 – 19:30	Guided City Tour
19:30 – 22:00	Lord Mayor Invitation

Tuesday, 09:30 – 10:00

Conference Opening

Welcome address by Harald Kainz, Rector of the Graz University of Technology

Tuesday, 10:00 – 11:00

Photonic and Optical Communications 1 (P&OC 1)

Chair: Erich Leitgeb

Balanced APD Homodyne Receiver for Quantum Applications

Dinka Milovančev; Nemanja Vokic; Florian Honz; Martin Achleitner; Christoph Pacher; Bernhard Schrenk

Analysis of Call Admission Control Mechanisms in Nodes of Elastic Optical Networks

Maciej Sobieraj; Mariusz Glabowski

Feedback Solution for Blind Symbol Timing Recovery in Bandlimited Optical Intensity Channels

Wilfried Gappmair; Harald Schlemmer

Tuesday, 11:30 – 13:00

Photonic and Optical Communications 2 (P&OC 2)

Chair: Wilfried Gappmair

Orthogonal Frequency Division Multiplexing for Underwater Optical Wireless Communications

Nadia Abd Razak; Callum T Geldard; Egecan Guler; Wasiu O. Popoola

Comparison of CAP and OFDM Modulation for LED Based Underwater Optical Wireless Communications

Minqing Yu; Callum T Geldard; Wasiu O. Popoola

Experimental Coupling Loss Analysis of Free Space Optical Link Under Different Weather Conditions

Yingjie Liu; Ziad Hatab; Erich Leitgeb; Peiyuan Wang

Transmission Type Nano-Layered Electro-Optical Modulator for Chip-To-Chip Optical Interconnection: Electromagnetic Modelling by the Method of Single Expression

Hovik Baghdasaryan; Tamara M. Knyazyan; Tamara Hovhannisyan; Gurgen Mardoyan; Tigran Baghdasaryan; Hristo Ivanov; Pasha Bekhrad; Marian Marciniak; Erich Leitgeb

Design, Simulation & Optimization on Electrical and Optical Parameters of Alq3 QW-OLED

Shaimaa Gamal; Tawfik Ismail; Ihab Talkhan

Tuesday, 14:00 – 15:00

Keynote Talk I CoBCom: Holger Flühr “5G Mobile Communications versus Aeronautical Radio Altimeters – Considerations from Aviation and Industry”

Holger Flühr (FH JOANNEUM (University of Applied Sciences), Graz, Austria)

Already in 2018, ICAO technical committees discussed possible interference with radio altimeters (RA) caused by upcoming wireless systems on board aircraft as well as by future mobile communications. Detailed interference studies by a “5G Task Force” based in the Radio Technical Commission for Aeronautics (RTCA) on possible impairments of RA function by 5G NR in the C-band (3.70 – 3.98 GHz) revealed the existing risk of interference in all aircraft categories, up to the risk of a catastrophic failure. With the 2021 spectrum auction, the roll-out of 5G NR started in the USA. Several reports of RA malfunctions especially during the landing phase and under poor visibility conditions were published. As a result, the FAA published airworthiness directives (AD) for fixed-wing and rotary-wing aircraft and prohibited certain types of landing procedures based on RA data.

Although there are currently no known reports in Europe, the issue also negatively affects European airlines flying to airports in the United States. Also rescue flights as well as future flight operations within the framework of urban air mobility are equally affected, since high 5G NR field strengths can be expected especially in urban regions. The presentation will highlight both the technical principles of 5G NR as well as avionics using the example of radio altimeters and tries to explain the existing conflict potential as well as possible solutions.

Tuesday, 15:30 – 16:30

Information and Communication Technologies (I&CT)

Chairs: Ales Svigelj and Maciej Sobieraj

DynaSens: Dynamic Scheduling for IoT Devices Sustainability

Neda Maleki; Arslan Musaddiq; Daniel Toll; Francis Palma; Tobias Ohlsson; David Mozart; Mustafa Omareen; Fredrik Ahlgren

Application of the 2D Local Entropy Information in Sparse TFD Reconstruction

Vedran Jurdana; Ivan Volaric; Victor Sucic

Base Station Anomaly Prediction Leveraging Model-Driven Framework for Classification in Neo4j

Nenad Petrovic; Issam Al-Azzoni; Dragana Krstić; Abdullah Alqahtani

Tuesday, 16:30 – 17:30

RF Technologies (RFT)

Chairs: Tawfik Ismail and Reinhard Teschl

Circularly Polarized Ultra-Wideband Antenna for Dependable Wireless Localization Systems

Gerzon Gomez-Bravo; Reinhard Teschl; Wolfgang Bosch

Modelling Child Life Presence Detection with Ultra-Wideband Radars for an Automotive Environment

Gert Freiberger; Helmut Schreiber

OFDM Symbol-Timing and Carrier-Frequency Offset Estimation Based on Singular Value Decomposition

Ziad Hatab; Hiroaki Takahashi; Michael Gadringer; Wolfgang Bosch

Time	Wednesday July 13
08:30 – 09:00	Registration
09:00 – 10:15	P&N (4 Papers)
10:15 – 10:45	Invited Talk A. Weiss
11:00 – 11:30	Coffee Break
11:30 – 12:30	P&V 1 (4 Papers)
12:30 – 13:00	P&V WS and Phorsch! Info
13:00 – 14:00	Lunch
14:00 – 15:00	Keynote M. Marciniak
15:00 – 15:30	Coffee Break
15:30 – 17:15	P&V 2 (4 Papers)
17:15 – 18:00	GT (4 Papers)
19:30 – 22:00	Gala Dinner Invitation Government of Styria

Wednesday, 09:00 – 10:15

Protocols and Networks (P&N)

Chair: Dragana Krstic

Downlink Throughput Prediction in LTE Cellular Networks Using Time Series Forecasting

Ali Mostafa; Mustafa Elattar; Tawfik Ismail

Dynamic Allocation of Resources in a Heterogeneous Cloud Radio Access Network

Ales Svigelj; Ivan Boškov

The Impact of the Adopted Queue Discipline on the Accuracy of the Analytical Model in Queuing Systems with Elastic and Adaptive Traffic

Slawomir Hanczewski; Joanna Weissenberg

Analysis of Strategies for Minimising End-To-End Latency in 5G Networks

Afonso Carvalho; Luis M. Correia; António Grilo; Ricardo Dinis

Wednesday, 10:15– 10:45

Invited Talk: Andreas Peter Weiss “Visible Light Technologies – Background, Principles, Current applications and future developments”

Andreas Peter Weiss (JOANNEUM RESEARCH Forschungsges.mBH, Pinkafeld, Austria)

For centuries, humans have used light for communication, positioning and sensing purposes. With the ongoing rapid advancements in the field of Light emitting diodes (LED), photosensitive devices and the associated electronic components these applications of light, gain more and more relevance in our modern digitized world. Visible light communication (VLC), Visible light positioning (VLP) and Visible Light sensing are ideal candidates for realization of novel communication and sensing solutions, whilst the high requirements regarding privacy, complexity and resource/energy can be met.

Based on the introduction of the main principles of these Visible Light Technologies, current applications will be highlighted, outlining the major advantages compared to other technological approaches as well as discussing current limitations. In particular, based on the already obtained results of the ongoing Project Vilipa, the future possibilities of these approaches are elaborated.

Wednesday, 11:30 – 12:30

PHORSCHI & Vilipa 1 (P&V 1)

Chair: Branko Mikac

Design and Simulation of 3D 1x4 Multimode Interference Splitter

Stanislava Serecunova; Dana Seyringer; Frantisek Uherek; Heinz Seyringer; Dusan Pudis; Tomas Mizera

AWG-Channel-Spacing: A New Software Tool to Calculate Accurate Channel Spacing of an AWG Optical Multiplexer/Demultiplexer

Manuel Humpeler; Stanislava Serecunova; Dana Seyringer

AWG-Wuckler: A Novel Software Tool for Flexible Design of Arrayed Waveguide Gratings

Severin Keller; Dana Seyringer; Stanislava Serecunova; Fiorentino Conte; Dusko Vukovic

Stable Optical Frequency Transmission over a Free Space Optical Testbed

Peter Barcik; Jan Hrabina; Martin Cizek; Petr Skryja; Zdenek Kolka; Lenka Pravdova

Wednesday, 12:30 – 13:00

P&V WS and Phorsch! Info

Erich Leitgeb (Graz University of Technology, Graz, Austria)

Die unsichtbare Welt: Infrarot und Polarisation im Schulunterricht

Bernhard Basnar (5 minütiger Vortrag bei Phorsch!)

Discussions

Keynote Talk II CoBCom: Marian Marciniak “Optical Wireless Communications international standards – a review”

Marian Marciniak (National Institute of Telecommunications, Warsaw, Poland)

The Optical Wireless Communications (OWC) international standardisation activities are strongly emphasized in the Memorandum of Understanding of the COST Action CA19111 European Network on Future Generation Optical Wireless Communication Technologies (NEWFOCUS). Also the International Electrotechnical Commission (IEC), the International Telecommunication Union – Radiocommunication Sector (ITU-R), and the Institute of Electrical and Electronics Engineers (IEEE) are progressing in developing and maintaining Optical Wireless Communications standards.

Optical Wireless is a well established Communication Technology. In this talk Optical Wireless Communications (OWC) or Free Space Optics (FSO) is considered within the focus of regulations and standardisation-bodies for future applications. The OWC and FSO Technology is compared to other Communication Technologies and ITU, IEC, and IEEE International standards for Free-Space Optical links will be reviewed. In this talk the recent progress in various standardisation organisations worldwide including an ongoing work will be shown, and future directions will be outlined. The co-existence and compatibility of neighbouring systems, propagation atmospheric conditions, visible light communications, and laser safety issues will be considered too.

PHORSCH! & Vilipa 2 (P&V 2)

Chair: Irena Jurdana

Visible Light Sensing for Recognising Human Postural Transitions

Ziad Salem; Andreas P. Weiss

Integrated Sensing and Communication in the Visible Spectral Range: A Novel Closed Loop Controller

Christian Fragner; Andreas P. Weiss; Franz Wenzl; Erich Leitgeb

An Optimal Solution for a Human Wrist Rotation Recognition System by Utilizing Visible Light Communication

Saman Zahiri-Rad; Andreas P. Weiss; Erich Leitgeb; Ziad Salem

Educational Activities with Photonics Explorer

Dana Seyringer; Paul Schreivogel; Karin Langer; Gerd Christian Krizek; Erich Leitgeb; Arno Grabher-Meyer

General Track (GT)

Chairs: Reinhard Teschl and Mario Kusek

Commissioning a Fully-Reconfigurable Communication Chain in a CCSDS-Compliant Way on OPS-SAT Satellite

Maximilian Henkel; Andreas Hörmer; Manuel Kubicka; Reinhard Zeif

Service Function Chaining to Support Ultra-Low Latency Communication in NFV

Mohammad Mohammadi Erbati; Mohammad Mahdi Tajiki; Gregor Schiele; Faramarz Keshvari

Air Traffic Simulation and Modeling Framework

Philipp Ortner; Raphael Steinhöfler; Erich Leitgeb; Holger Fluehr

NFC Communication Through Metal

Michael Gebhart; Amira Hedhili; Peter Lukan

Time	Thursday July 14
08:30 – 09:00	Registration
09:00 – 09:30	Invited Talk
09:30 – 10:30	C&E (3 Papers)
10:30 – 11:00	Coffee Break
11:00 – 12:00	ERASMUS Session (4 Papers)
12:00 – 12:30	Closing Session
14:00 – 19:30	Buschenschank

Invited Talk: Galia Marinova “Innovative approach in a CEEPUS academic network”

Galia Marinova (Technical University-Sofia, Sofia, Bulgaria)

The lecture presents the innovative and creative approach implemented in the academic CEEPUS network BG-1103-06-2122 in order to make the network viable, especially with the COVID 19 obstacles to mobility.

The main innovations implemented in the network are:

- Event-based approach and implementation of the innovative Flexible course;
- Joint doctoral program with an innovative – network-wide joint co-tutorship and co-supervision;
- Innovative platform for e-management of the academic network IMA-NET;
- Innovative ways of cooperation with Business partners of the network.

The lecture describes these innovations, providing quantitative and qualitative measures and illustrating the implementation, probation, feedback and survey results from the IMA-NET platform. Plans for the academic year 2022/2023 will be discussed.

CEEPUS & Erasmus (C&E)

Chairs: Hristo Ivanov and Maja Matijasevic

Efficient Energy Management in a Microgrid

Vassil Guliashki; Galia Marinova

THz Imaging Based on Frequency Domain Spectroscopy

Pongrac Blaz; Andrej Sarjas; Dušan Gleich

Selecting Communication Technologies for Sensing in Agriculture

Juraj Biscan; Mislav Has; Krunoslav Trzec; Mario Kusek

ERASMUS

Chairs: Erich Leitgeb and Galia Marinova

Availability Study of Atmospheric Gaussian Pulse Propagation with Normally Distributed Time Jitter for Optical Wireless Communication Systems

Dimitrios Oreinos; Panagiotis Gripeos; Kapotis Kapotis; Hector Nistazakis; Evgenia Roditi; George S Tombras

Estimating Application Cyberthreat Impact Score for Honeypot Coverage Prioritization

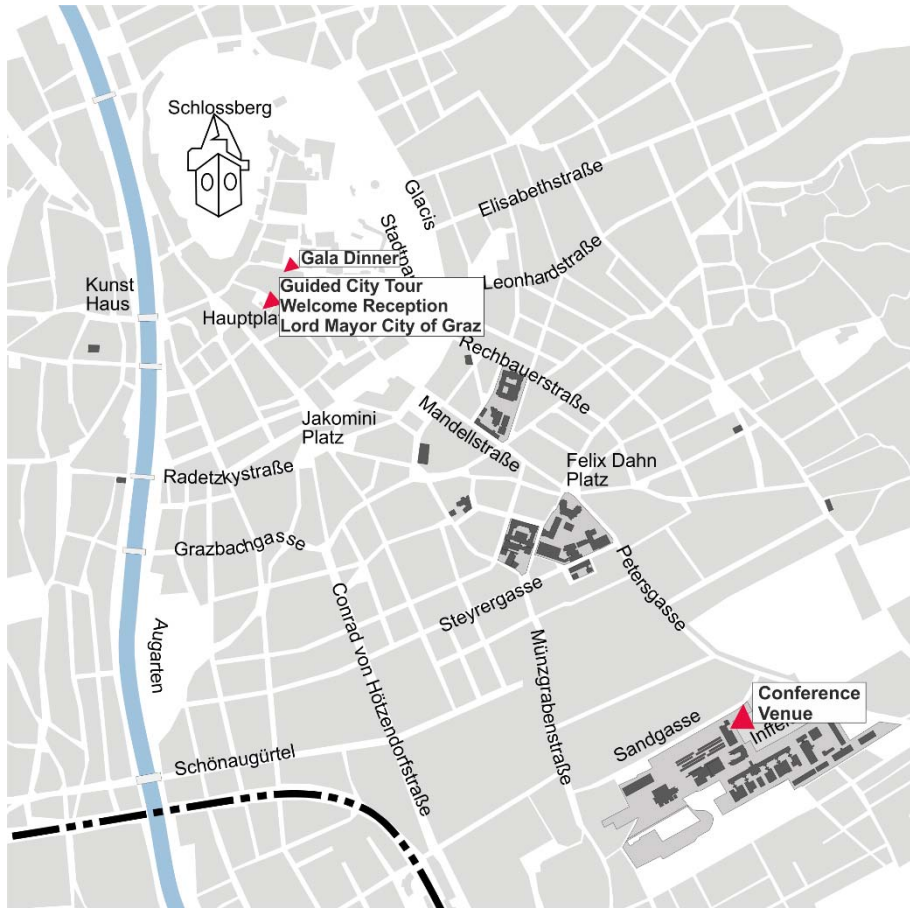
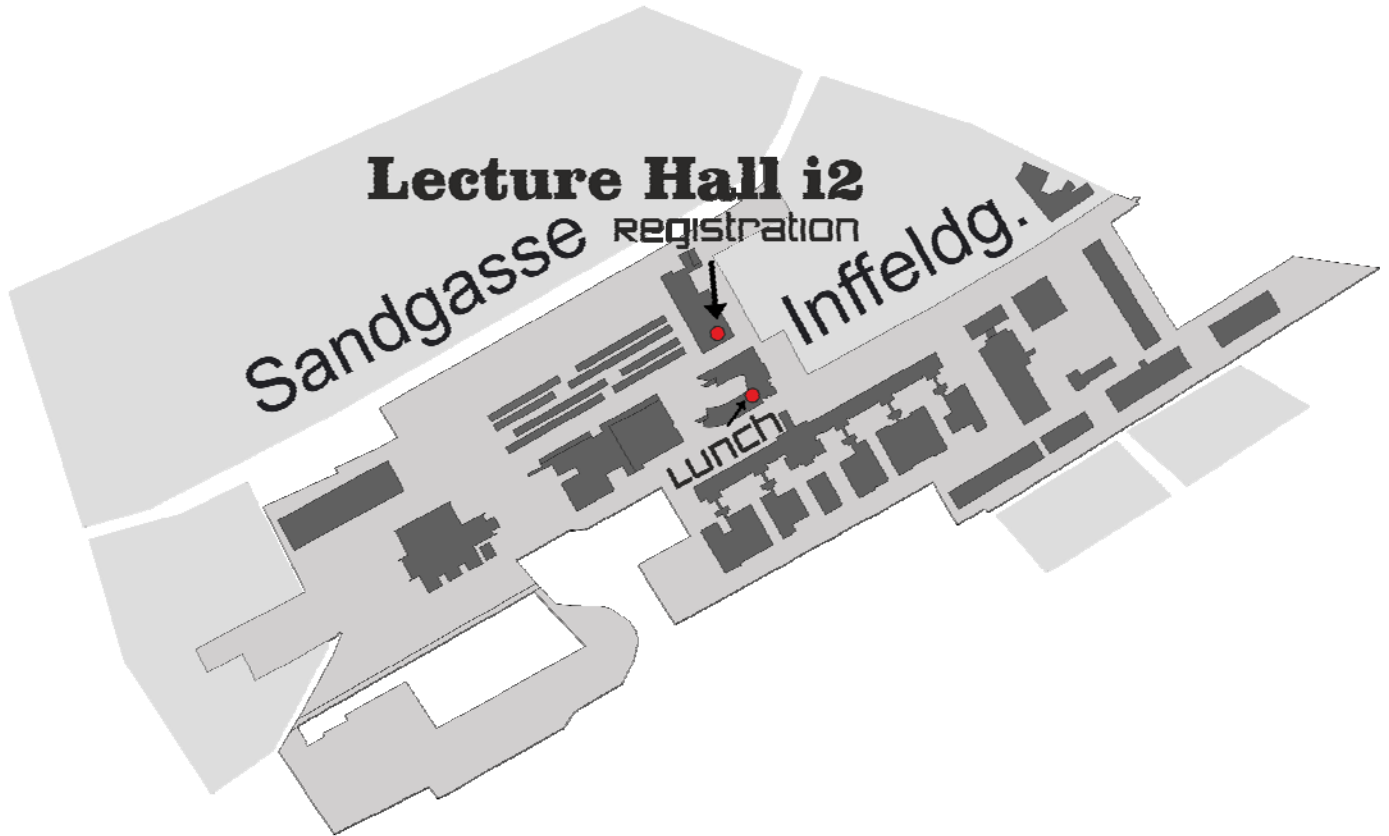
Matej Kren; Andrej Kos; Urban Sedlar

Gamma Gamma Turbulence and Nonzero Boresight Spatial Jitter Influence at the Outage Performance of THz Links

George Varotsos; Efstratios Chatzikontis; Hector Nistazakis; Konstantinos Aidinis; Andreas Tsigopoulos; Vasilis Christofilakis

Graphene-Based Tunable Metasurface Screen with Fresnel Zone Resonators (FZR)

Ozan Gündüz; Cumali Sabah; Erich Leitgeb



Telephone Numbers

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