Commission GASS 2021 Report

Commission C

1. Results of Election of Vice-Chair

Four candidates applied for the Vice-Chair position (2021-2023):

Debashis De (India)
Hesham M. El-Badawy (Egypt)
Kumar Vijay Mishra (India)
Caiyun Wang (China)

Kumar Vijay Mishra has been elected as the new Vice-Chair.

2. Results of Election of Early Career Representative

Four candidates applied for the ECR position (2021-2026):

Krzysztof K. Cwalina (Poland)
Pape Abdoulaye Fam (Senegal)
Yongzhe Li (China)
Anwesha Mukherjee (India)

Krzysztof Cwalina has been elected as the new ECR

3. Appointment of Associate Editor for *Radio Science Bulletin*

Three members of Comm. C will serve Radio Science Bulletin as Associate Editors:

Pape Abdoulaye Fam (Senegal)
Ruisi He (former ECR of Comm C) (China)
Alberto Tarable (Italy)

4. Updates/Status of Working Groups

Two Working Groups have been set up during GASS 2021:

- Quantum communications (Yves Louet, France ; Alberto Tarable, Italy)
- Efficient & Green Wireless Comm (Pape Abdoulaye Fam, Senegal; Yves Louet, France)

5. Updates to Terms of Reference of Commission C

The updated list of the Terms of Reference of Commission C is:

Information theory, coding, modulation & detection
Massive Multi-Input Multi-Output antenna systems
Waveform for radar & communications
Smart radio-communications: cognitive radio, software defined radio
Reconfigurable intelligent surfaces
Radar, sonar, navigation systems & positioning
Artificial intelligence and machine learning
Energy efficient communications and wireless power transfert
Security & privacy in communications
Quantum communications
Wireless networks
6G and future high frequency radio systems

6. Meetings proposed to be supported in the coming triennium

So far (8th of Sept. 2021), no meeting has been proposed for the two upcoming years to be supported by Comm. C

7. Report and comments on the scientific program of the Commission for the current GASS

The list of all the papers presented for Comm. C are as follows:

Resource Management in Future Wireless Communications

Mo-C01-AM1-1 **Non-Orthogonal Multicast and Unicast Beamforming for Multi-Beam Satellite Communications**

You, Li (1); Gao, Linna (1); Wang, Wenjin (1); Gao, Xiqi (1)

(1) Southeast University (China)

Mo-C01-AM1-2 **An OFDM based interference reducing scheme with trajectory and resource optimization for UAV-powered IoT Networks**

Gao, Yuan (1); Cao, Jiang (1); Guo, Yang (1); Wang, Ping (1); Wang, Jing (1); Yang, Siming (1); Lu, Weidang (2); Si, Peiyuan (2); Zhao, Ming (3); Wu, Xiao (1)

(1) Academy of Military Science of the PLA (China);
(2) Zhejiang University of Technology (China); (3) Tsinghua University (China)

Mo-C01-AM1-3 **Digital-intelligent Twin for UAV Swarm based 5G Emergency Networks**

Wang, Ping (1); Gao, Yuan (1)

(1) Academy of Military Science of the PLA (China)

Session C02: Application of Machine Learning in Wireless Communications (Part 1)

Tu-C02-AM1-1 **Wi-Fi Adaptor Identification Based on Receiver-Agnostic RF Fingerprint**

Liu, Hsin-Chin (1); Yang, Hsin-Hung (1); Wang, Tzu-chia (1); Yang, Yi-Ju (1); Wang, Jo-Yun (1); Lin, Ting Yu (2); Lai, Send (2)

(1) National Taiwan University of Science and Technology (Taiwan);
(2) Institute for Information Industry (Taiwan)

Tu-C02-AM1-2 **Resource Allocation Based on Deep Reinforcement Learning for Wideband Cognitive Radio Networks**

Zhou, Fuhui (1); Wu, Yuhang (1); Wu, Qihui (1)

(1) Nanjing University of Aeronautics and Astronautics (China)

Tu-C02-AM1-3 **Machine Learning for QoE Management in Future Wireless Networks**

Kougioumtzidis, Georgios (1); Poulkov, Vladimir (1); Zaharis, Zaharias (2); Lazaridis, Pavlos (3)

(1) Technical University of Sofia (Bulgaria);
(2) Aristotle University of Thessaloniki (Greece); (3) University of Huddersfield (United Kingdom)

Session C02: Application of Machine Learning in Wireless Communications (Part 2)

Tu-C02-AM2-1 **Radio Waveforms Classification via Deep Q Learning Network**

Lai, Siqi (1); Tao, Mingliang (1); Zhang, Xiang (2); Wang, Ling (1)

(1) Northwestern Polytechnical University (China); (2) Shanghai Institute of Satellite Engineering (China)

Tu-C02-AM2-2 **Low-Interception Waveform: To Prevent the Recognition of Spectrum Waveform Modulation via Adversarial Examples**

Xie, Haidong (1); Tan, Jia (2); Zhang, Xiaoying (1); Ji, Nan (1); Liao, Haihua (1); Yu, Zuguo (2); Xiang, Xueshuang (1); Liu, Naijin (1)

(1) Qian Xuesen Laboratory of Space Technology (China);
(2) School of Mathematics and Computational Science (China)

Session C03: 5G Wireless Communications and IoT

Mo-C03-AM2-1 **A Partial Computation Offloading Strategy for Microcell-femtolet based Future Generation Edge-Cloud Network**

Mukherjee, Anwesha (1)

(1) Mahishadal Raj College (India)

Mo-C03-AM2-2 **Time-Varying Characteristics for V2V Channels in Complicated Scenarios**

Yang, Mi (1); Ai, Bo (2); He, Ruisi (2); Zhong, Zhangdui (2); Chen, Ruifeng (3); Zhang, Haoxiang (4)

(1) Beijing Jiaotong University (China); (2) State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University (China); (3) Institute of Computing Technology, China Academy of Railway Sciences (China); (4) (4) China Academy of Industrial Internet, Ministry of Industry and Information Technology (China)

Session C05: Optimization of Wireless Power Transfer

Mo-C05-PM1-1 **RCS calculation of the human body for a phantom of human body detection at 5.7 GHz**

Sato, Kazuki (1); Saito, Kazuyuki (2)

(1) Chiba University (Japan); (2) Center for Frontier Medical Engineering (Japan)

Mo-C05-PM1-2 **Light-Weight and High-Efficiency Capacitive Coupling Wireless Power Transfer System for Drone Charging Stations**

Tsukamoto, Satoshi (1); Abe, Shinji (1); Mizutani, Minoru (1); Ohira, Takashi (1); Sugino, Masayoshi (2); Sakura, Nobukazu (2); Sasaki, Kunihiko (2); Ueta, Genyo (3); Nozaki, Hiroyuki (3); Hamada, Hiroshi (3)

(1) Toyohashi University of Technology (Japan);
(2) DENSO Corporation (Japan);
(3) Tokyo Electric Power Company Holdings, Inc. (Japan)

Session C06: Internet of Things for licensed and unlicensed spectrum (Part 1)

Tu-C06-PM1-1 **Design and Implementation of a Low-Cost Core Board for Mobile IoT Rapid System Prototyping and Service Roll-Out**

Ganchev, Ivan (1); Ji, Zhanlin (2)

(1) University of Plovdiv "Paisii Hilendarski" (Bulgaria);
(2) North China University of Science and Technology (China)

Tu-C06-PM1-2 **LoRaWAN Networks: a More Precise Assessment of the Energy Consumption**

Faye, Ibrahima (1); Fam, Pape Abdoulaye (2); Traore, Papa silly (2) ; NDIAYE, Mamadou Lamine (2)

(1) Université Cheikh Anta Diop (Senegal);
(2) Ecole Superieure Polytechnique de DAKAR (Senegal)

Tu-C06-PM1-3 **Artificial Intelligence for Jamming Mitigation in IoT Networks: LoRaWAN Field Measurements Using IoTligent**

Moy, Christophe (1)

(1) Université de Rennes (France)

Session C06: Internet of Things for licensed and unlicensed spectrum (Part 2)

Tu-C06-PM2-1 **Optimization of Energy Consumption for Narrowband Internet of Things (NB-IoT) Cellular Radio User Equipment (UE)**

Novakov, Emil (1)

(1) University Grenoble Alpes, IMEP-LAHC (France)

Tu-C06-PM2-2 **Cross-correlation index and multiple-access performance of spreading codes**

Wojuola, Olanrewaju (1)

(1) North-West University (South Africa)

Tu-C06-PM2-3 **Using Dynamic Operational features to Identify Embedded Devices**

Khanna, Pooja (1); Howells, Gareth (1)

(1) University of Kent (United Kingdom)

Session C09: Radar and Communications Co-Design

Mo-C09-PM4-1 **(Invited) Colocated and Distributed MIMO-Radar-MIMO-Communications**

Mishra, Kumar Vijay (1)

(1) United States CCDC Army Research Laboratory (USA)

Session C10: Multi-antenna technologies and massive MIMO

We-C10-PM1-1 **User Selection Based on Inter-Channel Interference for Massive MIMO under Line-of-sight Propagation**

Chaves, Rafael (1); Cetin, Ediz (2); Lima, Markus (3); Martins, Wallace (3)

(1) Federal University of Rio de Janeiro and Macquarie University (Brazil);
(2) Macquarie University (Australia); (3) Federal University of Rio de Janeiro (Brazil)

We-C10-PM1-2 **Simulation based channel hardening of cell-free massive MIMO in mm-Wave**

Qin, Chunxia (1); Gao, Yuan (2); Chen, Jiming (2); Glazunov, Andrés Alayón (1); Zhang, Jie (3)

(1) University of Twente (The Netherlands);
(2) Ranplan Wireless Network Design Ltd. (United Kingdom);
(3) University of Sheffield (United Kingdom)

We-C10-PM1-3 **Impact of Localization Error on Open-Loop Distributed Beamforming Arrays**

Mghabghab, Serge (1); Nanzer, Jeffrey (1)

(1) Michigan State University (USA)

Session C12: Global Navigation Satellite System (Part 1)

We-C12-AM1-1 **Design Considerations of an In house Developed Tri-band Reference Receiver for NavIC Ground Segment**

T, Subramanya Ganesh (1); B Narasimhamurthy, Ramakrishna (1); Dakkumalla, Suresh (1); Maharana, Shikha (1); Sengupta, Amitava (2); Vashisth, Sharda (3)

(1) ISRO Telemetry Tracking & Command Network (India);
(2) NorthCap University (India); (3) The NorthCap University (India)

We-C12-AM1-2 **Direct-path Delay Estimation under Closely-spaced Multipath Interference**

Wang, Wentao (1); Shen, Yuyao (1); Wang, Yongqing (1)
(1) Beijing Institute of Technology (China)

We-C12-AM1-3 **A theoretical comparison of NavIC and GPS RAIM performance**

Biswas, Sanat K (1)
(1) Indraprastha Institute of Information Technology (India)

Session C12: Global Navigation Satellite System (Part 2)

We-C12-AM2-1 **A Hardware-In-Loop simulation Test-bed for NavIC Reflectometry Experiments**

Ansari, Bushra (1); Biswas, Sanat K (2)
(1) Indraprastha Institute of Information Technology (India);
(2) Indraprastha Institute of Information Technology, Delhi (India)

We-C12-AM2-2 **High Performance Three Bands Receiver for Simultaneous Reception of RF Signals from Galileo and GPS Satellite Navigation Systems**

Novakov, Emil (1)
(1) University Grenoble Alpes, IMEP-LAHC (France)

We-C12-AM2-3 **Performance Analysis of Vehicular Localization Accuracy With Non-Line-of-Sight Identification**

Zhao, Weicheng (1); He, Ruisi (2); Ai, Bo (2); Huang, Chen (3);
Yang, Mi (1); Zhong, Zhangdui (2); Zhang, Haoxiang (4)
School of Electronic and Information Engineering, Beijing Jiaotong University (China); (2) State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University (China); (3) School of Computer and Information Technology, Beijing Jiaotong University, (China);
(4) China Academy of Industrial Internet,
Ministry of Industry and Information Technology (China)

Session C14: Age of Information in Wireless Networks and its Applications

We-C14-PM3-1 **Information aging in massive MIMO systems affected by phase noise**

Tarable, Alberto (1); Escribano, Francisco J. (2)

(1) National Research Council (Italy); (2) Universidad de Alcalá (Spain)

We-C14-PM3-2 **(Invited) Improving Age-of-Information in Distributed Vehicle Tracking**

Severinson, Lars Albin (1); Rosnes, Eirik (2); Graell i Amat, Alexandre (3)

(1) Simula UiB and the University of Bergen (Norway); (2) Simula UiB (Norway); (3) Chalmers University of Technology (Sweden)

Session CB: Functional Metasurfaces for Communication and Radar Systems (Part 1)

Fr-CB-AM1-1 **Wideband Metasurface Antenna for Microwave Brain Imaging systems**

Salimitorkamani Mahdi (1); Odabasi, Hayrettin (1); Turan, Goksel (1)

(1) Electrical and Electronics Engineering, Eskisehir Osmangazi University (Turkey)

Fr-CB-AM1-2 **(Invited) Radiation Pattern Control through Metasurface Antennas**

Martini, Enrica (1); Minatti, Gabriele (2); Caminita, Francesco (2); Della Giovampaola, Cristian (3); Maci, Stefano (1)

(1) University of Siena (Italy); (2) Wave Up Srl (Italy); (3) Wave Up (Italy)

Fr-CB-AM1-3 **Smart EM Surfaces for Future Wireless Communication Systems**

Costanzo, Sandra (1); Venneri, Francesca (1)

(1) University of Calabria (Italy)

Session CB: Functional Metasurfaces for Communication and Radar Systems (Part 2)

Fr-CB-AM2-1 **(Invited) Designing Cognitive Coded Metasurfaces for Next-Generation Radar and Communications**

Mishra, Kumar Vijay (1); Hodge, John (2); Zaghloul, Amir i (2)

(1) United States CCDC Army Research Laboratory (USA); (2) Virginia Tech (USA)

Fr-CB-AM2-2 **Self-Phased Metasurface Pixels/Cells: Concept, Design and Applications**

Nguyen, Quang (1); Hodge, John (2); Zaghloul, Amir (3)

(1) US Army Research Laboratory (USA); (2) Virginia Tech (USA);
(3) CCDC US Army Research Laboratory (ARL) (USA)

Session CFH: Radio Science Measurements from Spacecraft Telecom. Signals (Part 1)

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Th-CFH-AM1-1 **Radio Occultation Observations of the Solar Corona with Akatsuki Spacecraft**

Imamura, Takeshi (1); Chiba, Shota (2); Ando, Hiroki (3);
Tokumaru, Munetoshi (4); Shiota, Daikou (5); Murata, Yasuhiro
(6); Takeuchi, Hiroshi (6); Toda, Tomoaki (6)

(1) The University of Tokyo (Japan);
(2) University of Tokyo (Japan);
(3) Kyoto Sangyo University (Japan);
(4) Nagoya University (Japan);
(5) National Institute of Information and Communications Technology (Japan);
(6) Japan Aerospace Exploration Agency (Japan)

Th-CFH-AM1-2 **Hera Radio Science Investigations through Ground-based and Satellite-to-Satellite Doppler Tracking**

Zannoni, Marco (1); Gramigna, Edoardo (1); Gai, Igor (1);
Lombardo, Marco (1); Lasagni Manghi, Riccardo (1); Tortora, Paolo (1)

(1) University of Bologna (Italy)

Th-CFH-AM1-3 **(Invited) Atmospheric structure of Venus revealed by Akatsuki radio occultation measurements**

Ando, Hiroki (1); Imamura, Takeshi (2); Noguchi, Katsuyuki (3);
Tellmann, Silvia (4); Pätzold, Martin (5); Häusler, Bernd (6); Limaye, Sanjay (7);
Choudhary, R.K. (8)

(1) Kyoto Sangyo University (Japan); (2) The University of Tokyo (Japan);
(3) Nara Women's University (Japan); (4) Universität zu Köln (Germany);
(5) Rheinisches Institut für Umweltforschung, Cologne (Germany);
(6) Universität der Bundeswehr Munich, Neubiberg (Germany);
(7) University of Wisconsin (USA); (8) Space Physics Laboratory, VSSC, ISRO (India)

Session CFH: Radio Science Measurements from Spacecraft Telecom. Signals (Part 2)

Th-CFH-AM2-1 **(Invited) Resolving Small-Scale Structures in Planetary Atmospheres and Ionospheres by Radio Sounding**

Tellmann, Silvia (1); Pätzold, Martin (2); Häusler, Bernd (3)
; Andert, Tom P. (4); Ando, Hiroki (5); Bird, Michael K. (6);
Hinson, David P. (7); Imamura, Takeshi (8); Oschlisniok, Janusz (2);
Peter, Kerstin (2); Remus, Stefan (9)

(1) Universität zu Köln (Germany);
(2) Rheinisches Institut für Umweltforschung, Cologne (Germany);

(3) Universität der Bundeswehr Munich, Neubiberg (Germany);
(4) Universität der Bundeswehr Munich (Germany);
(5) Kyoto Sangyo University (Japan);
(6) Argelander Institut für Astronomie, Bonn (Germany);
(7) Carl Sagan Center, SETI Institute, Mountain View, CA (USA);
(8) The University of Tokyo (Japan); (9) ESA ESTEC, Noordwijk (The Netherlands)

Th-CFH-AM2-2 **Prediction of Marsâ€™ Ionosphere Impact on Radio-Science Experiment.**

Bergeot, Nicolas (1); Witasse, Olivier (2); Blelly, Pierre-louis (3)
; Kofman, Wlodek (4); Le Maistre, Sébastien (1);
Peter, Kerstin (5); Dehant, Véronique (1);
Chevalier, Jean-Marie (1); Karatekin, özgür (1)
(1) Royal Observatory of Belgium (Belgium);
(2) European Space Agency (The Netherlands);
(3) Institut de Recherche en Astrophysique et Planétologie (France);
(4) Université Grenoble Alpes (France);
(5) Rheinisches Institut für Umweltforschung, Cologne (Germany)

Th-CFH-AM2-3 **(Invited) Inter-satellite Radio Science System for Small Spacecraft**

Genova, Antonio (1)
(1) Sapienza University of Rome (Italy)

Session CFH: Radio Science Measurements from Spacecraft Telecom. Signals (Part 3)

Th-CFH-PM1-1 **Systematically Characterizing Planetary Surface Roughness Using Spacecraft Radio Communications Antennas**

Palmer, Elizabeth (1); Heggy, Essam (2)
(1) University of Southern California (USA);
(2) University of Southern California; NASA JPL/Caltech (USA)

Th-CFH-PM1-2 **Using Doppler radio-tracking data to map the gravity field of planets**

Rosenblatt, Pascal (1); Belmino, Georges (2); Marty, Jean-charles
(3); Dumoulin, Caroline (4)
(1) Laboratoire de Planétologie et Géodynamique (France);
(2) Emerite CNES (France); (3) CNES/GRGS (France);
(4) Laboratoire de Géodynamique et planétologie (France)

Th-CFH-PM1-3 **(Invited) Measuring angles, distances and velocities in the solar system: Can microwave tracking systems still be improved?**

Iess, Luciano (1)
(1) Sapienza University of Rome (Italy)

Session CK: Over-the-Air testing: State-of-the-Art & Future of Technology & Apps

We-CK-PM3-3

(Invited) 3D wave field synthesis testbed for Over-the-Air testing of advanced GNSS antenna designs

Schwind, Ramona (1); Vintimilla, Renato Zea (2); Kotterman, W. (2); Landmann, Markus (1)

(1) Fraunhofer Institute for Integrated Circuits IIS (Germany); (2) Ilmenau University of Technology (Germany)

Session Commission Tutorials

Mo-CTu-PM3-1

(Invited) Cognitive Radar

Mishra, Kumar Vijay (1)

(1) United States Army Research Laboratory (USA)

Session Flash Interactive Presentations - Commission C

Th-FIP-C06-2

A Reduced Complexity of Space-Time Block Decoders for Aeronautical Telemetry

Louët, Yves (1); Othman, Rami (2)

(1) IETR/CentraleSupélec (France); (2) CentraleSupélec (France)

Th-FIP-C10-3

Adaptive Spatial Multiple Access (SMA) for millimeter waves 28 GHz Outdoor Channel

Polus, Remon (1); Elkhamy, Said (1); Elragal, Hassan (1)

(1) Alexandria University (Egypt)

Th-FIP-C11-4

Array-Type High-Speed and Large Detection Area Integrated Wireless Optical Receiver

Czylwik, Andreas (1)

(1) University Duisburg-Essen (Germany)

Th-FIP-C12-5

DME Interference Mitigation for GNSS Receivers via Nonnegative Matrix Factorization

Barboza da Silva, Felipe (1); Cetin, Ediz (2); Alves martins, Wallace (3)

(1) Macquarie University & Federal University of Rio de Janeiro (Australia); (2) Macquarie University (Australia); (3) University of Luxembourg & Federal University of Rio de Janeiro (Luxembourg)

Th-FIP-C13-6	**1948: the birth date of modern telecommunications** Louët, Yves (1) *(1) IETR/CentraleSupélec (France)*
Th-FIP-C13-7	**Open-Source Software-Defined Radio Receiver Platform for Harmonic Radar Applications to Track Airborne Insects** Penaloza Aponte, Diego (1); Urbina, Julio (1); Fuentes, Jose d. (1) *(1) Pennsylvania State University (USA)*
Th-FIP-C15-8	**Evaluation of Adaptive CFR-DPD for LTE Signals** Rihawi, Basel (1); Cheaito, Ali (1); Louët, Yves (1) *(1) IETR/CentraleSupélec (France)*
Th-FIP-C09-10	**Synthesis and Research of New Marked Signal-Code Structures and Methods of Their Processing for Use in Modern Detection Systems with Multiple Transmitting and Receiving Antennas in a Complex Interference Environment** Ben-Shimol, Yehuda (1); Nenashev, Vadim (2); Sergeev, Mikhail (2); Shepeta, Alexander (2); Grigoriev, Eivgeniy (2) *(1) School of Electrical and Computer Engineering, Ben-Gurion University (Israel);* *(2) State University of Airspace Instrumentation (SUAI) (Russian Federation)*

General remarks

The attendance in the room dedicated to Comm. C was variable (max 7 people). Most of the attendees were on-line (max 15). Almost all speakers up-loaded their video and thanks to the help of the students in the room, it worked very good.

The session on “Space-craft signals” and GNSS worked very good.

The tutorial of Comm. C was given by Kumar Vintay Mishra, incoming Vice-Chair of Comm. C

The Commission Coordinated Meetings gave birth to many good proposals (sessions for AT-RASC, tutorials, RSB editors, …). Around 10-15 people attended (on-site and on-line).

The Italian chair of Comm C was on place (Fortunato Santuci).

8. Proposed sessions for the next GASS

It is a little soon to precisely list the sessions for next GASS. Nevertheless, this is almost sure that the following topics will constitute the earth of the program:

- Quantum communications (output of the Working Group set up at GASS 2021)
- Wireless Power Transfer
- 6G and high-frequencies radio-communication systems
- Satellite-mobile communications
- Security & privacy of communications

9. Proposed sessions for the AT-RASC

The following sessions will be given in AT-AP RASC 2022:

1. Radar & communication co-design (Amir Zaghloul, Kumar Vijay Mishra)
2. Concepts and ideas for consumer wireless communications paradigms
3. (Máirtín O'Droma, Ivan GANCHEV, Dr Zhanlin JI, Jacqueline Walker)
3. 6G and future wireless systems (Haijun Zhang, Satoshi Tsukamoto)
4. Reconfigurable Intelligent surfaces (Alberto Tarable, Kumar Vijay Mishra, Amir Zaghloul)
5. Advanced digital communications schemes (Yves Louet, Alberto Tarable)
6. Wireless Power Transfer (Satoshi Tsukamoto, Guillaume Villemaud)
7. Satellite Systems & positioning (Sanat K Biswas, Amitava Sen Gupta)
8. Efficient & Green Communications (Pape Abdoulaye Fam, Yves Louet)
9. AI & Machine learning in communications (Krzysztof Cwalina, Kumar Vijay Mishra)

In addition, Comm. C would like to propose two short-courses:

- Hybrid beamforming for massive MIMO communications: From optimization to deep learning (Dr Kumar Vijay Mishra)
- High energy-efficient waveforms for radio-communications: from theory to applications

(Prof. Yves Louet)

10. Other business

Nothing special to add.