EUCNC 2016

June 27-30

European Conference on Networks and Communications | Athens, Greece

FINAL PROGRAM

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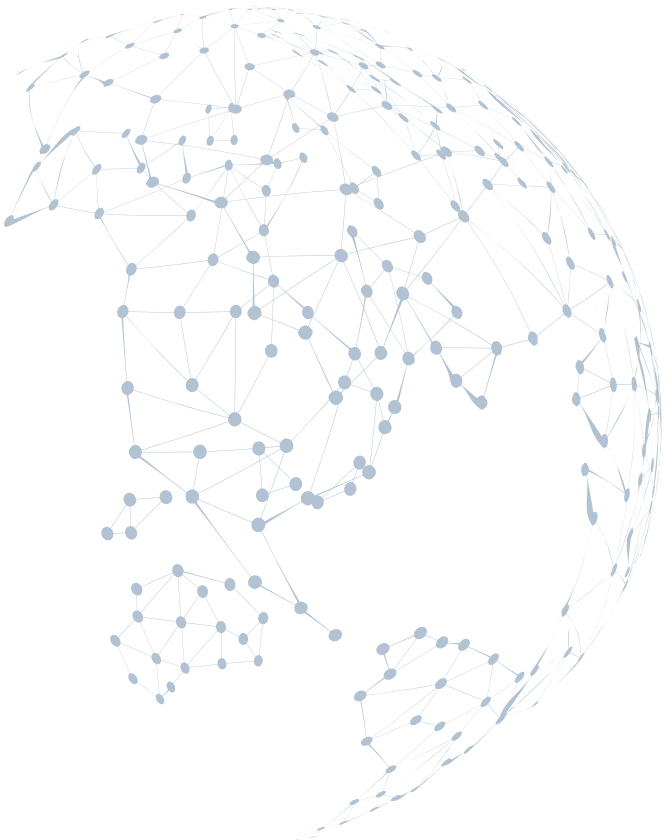

MESSAGE FROM THE GENERAL CHAIR & THE OPENING KEYNOTE SPEAKER

Mario Campolargo

Georgios Onopas

We would like welcome you to the **25th Edition** of the **European Conference on Networks and Communications**, hosted in Divani Apollon Palace & Thalasso, Vouliagmeni, **Athens, Greece**. The conference will take place from **27 to 30 June 2016**. We are certain that this year again EuCNC will be **exceptional** and a **cornerstone event** for showing the status of research in **advanced networks** and associated topics, with multiple exciting **sessions**, **workshops**, **exhibitions/demonstrations**, as well as an outstanding social program.

The next generation of **communication systems**, as pursued in **5G**, will be the first instance of a truly **converged network environment**, where wired and wireless communications will use the same infrastructure, **driving the future networked society**. It will provide**virtually ubiquitous**, **ultra-high bandwidth**, **"connectivity"** not only to **individual users**, but also to **connected objects**.

5G has set very **ambitious goals**, denoting the next major phase of mobile telecommunications standards. To this end, 5G technology has begun to mature, in terms of:

- architecture,
- spectrum,
- standards
- access networks,
- virtualisation,
- management technologies,
- business aspects,
- vertical markets.

In 5G, verticals like energy, manufacturing, healthcare and automotive are envisioned as the new user space, enabling new applications, markets and businesses. The key message is that "**5G holds promise of improved performance in terms of reduced latency, increased reliability and higher throughput under higher mobility and connectivity density. We want 5G communication networks to be programmable, energy efficient, resilient and secure innovation platforms, providing tailored level of service quality end-to-end.** "As we progress with the implementation of the European 5G Research, we will have extended opportunities to demonstrate with vertical sectors at scale the most demanding performance requirements of 5G.

In order to live **"the Dawn of 5G"** in the era of the global challenges of the digital age, Europe has to be ready to create and pursue opportunities focused on and centered around digital technologies, and develop a common strategy for 5G deployment. EuCNC2016 is the main venue for showcasing and getting the latest insights on European respective results.

We wish you a very fruitful and enjoyable EUCNC2016.

Welcome to Athens!

Mario Campolargo
(Director for "Net Futures" in DG CONNECT, Conference General Co-Chair)

Georgios Onopas
(Director of the fixed & mobile Access Networks Department of OTE Group,GR, Opening Keynote Speaker)

MESSAGE FROM THE
TECHNICAL PROGRAM COMMITTEE CO-CHAIRS

Currently EuCNC is focused on one of the hottest areas of research and development that of 5G infrastructures and services, especially regarding the serving of vertical sectors (energy, transport, manufacturing, health, media).

Even though there may be many events on 5G, EuCNC is comprehensive and has unique features. To mention few, there will be:

- Keynotes and panels from the main experts
- Presentation of the latest scientific achievements through the 80 papers, 10 workshops, 10 special sessions
- Demonstration of the latest technologies through the rather extensive exhibition booths

So EuCNC is the event for someone that wants to "live the dawning of the 5G era", it is the event for learning the requirements and latest services towards the vertical industries, seeing the latest 5G technologies, and also pursuing business opportunities and networking.

It is a pleasure for us to welcome you in Athens and we wish you a fruitful and enjoyable conference.

Panagiotis Demestichas

Emmanuel N. Protonotarios

Professor Panagiotis Demestichas
University of Piraeus

Professor Emeritus Emmanuel N. Protonotarios
Institute of Communications and Computer Systems/NTUA

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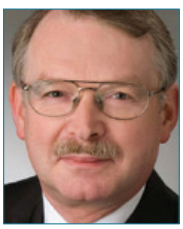

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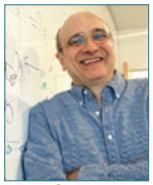

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- Yaser Elnakieb, Virginia Tech, Egypt

OPENING SESSION & KEYNOTE SPEAKERS

Tuesday June 28th, 09:00-10:30 | ROOM ARISTOTELIS

OPENING AND WELCOME ADDRESSES BY:

Professor Panagiotis Demestichas, EuCNC2016 Host and TPC Co-Chair

Mrs. Eva Kaili, Member of the European Parliament, 1st Vice-Chair of Science and Technology Options Assessment Committee

Dr. Grigoris Konstantellos, Mayor of Vari, Voula & Vouliagmeni District

KEYNOTE SPEAKERS:

Mr. Georgios A. Onopas

Director of the fixed & mobile Access Networks Department of OTE Group, Greece

"5G & IoT: Accelerating Digital & Transforming Everything"

Abstract

The presentation will focus on how the 5G will be the foundation for realizing the Connected Society, by analyzing the new capabilities of 5G, including tremendous flexibility, lower energy requirements, greater capacity, bandwidth, security, reliability and data rates, as well as lower latency and device costs. Depicting on how the move to 5G will enable the connectivity of billions devices and the new ecosystem called the Internet of the Things (IoT) the presentation will give a view on how the accelerating world's digitalization will create opportunities for new use cases, new markets and new business models which eventually will lead once again most probably in a social transformation and a new industrial revolution.

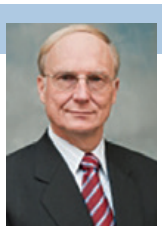
CV

Mr. Georgios A. Onopas was born in Athens, Greece, in 1968. He is currently Director of the fixed & mobile Access Networks Department of OTE Group in Greece. He has actively participated in the development of all Cosmote Group Networks in the Balkan area. He has been engaged in NGA, Fttx, 2G, 3G, 4G, WiFi deployment, Spectrum Strategy, Radio Network Planning, Network Performance monitoring and to a greater extent in measurements of receptivity and the quality of COSMOTE Network since October 1997. He has leading many innovative technology projects on a variety of technologies like GSM, UMTS, LTE, FEMTO, WiFi.

Mr. Mario Campolargo

European Commission, Director for "Net Futures" in DG CONNECT, EuCNC2016 General Chair

Mário Campolargo is Director for "Net Futures" in DG CONNECT responsible for Research and Innovation on what lies beyond the current Internet architecture, software and services and the EU-Strategy for the Cloud. Previously he has been Director for "Emerging Technologies and Infrastructures" in DG INFSO in charge of Future and Emerging Technologies, ICT based infrastructures for science and ICT trust and security, experimental facilities and experimentally driven research for Future Internet. Before joining the European Commission in 1990, he worked for 12 years in the R&D Centre of Portugal Telecom as a researcher and manager. He has a Degree in Electrical Engineering (University of Coimbra), a Master of Science in Computing Science (Imperial College London), a Post graduate in Management (Solvay Business School Brussels) and a European Studies Diploma (Université Catholique de Louvain-la-Neuve).



Dr. Edward G. Tiedemann, Jr.
Senior Vice-President, Engineering Qualcomm Technologies, USA

"The Dawn of 5G II: Vision, Technology, and Progress"

Abstract

At VTC 2013, the author gave a presentation called the Dawn of 5G. At that time, there was little discussion of 5G and many were even questioning whether 5G was needed. In the past three years, a tremendous amount of progress has been made. The ITU has completed a preparation phase with the release of several vision documents, and 3GPP has embarked upon a next generation standardization program. This presentation begins by summarizing the 5G vision with its three pillars of enhanced mobile broadband, massive machine type communications, and ultra-reliable and low latency communications with operation in licensed, unlicensed, and shared spectrum bands over an extremely wide range of frequencies. The vision for 5G also includes integrated relays, fronthaul, backhaul, and device-to-device communications. 5G will incorporate techniques such as Massive MIMO, self-contained sub-frames, and a device-centric MAC. The combination of these advanced techniques is focused on providing not only the flexibility to support growing use cases in a very diverse set of frequency bands but also the performance, capacity, and scalability required for cost effective 5G services.

CV

Dr. Edward G. Tiedemann, Jr. is a QUALCOMM Fellow and a Senior Vice President of Engineering of QUALCOMM Technologies, Inc. He leads QUALCOMM's worldwide standardization and industry organization activities. Dr. Tiedemann was instrumental in the design and development of the TIA/EIA/IS-95 CDMA system, also called cdmaOne™. He led QUALCOMM's and much of the industry's efforts in the design and development of the third-generation cdma2000® system. He currently sits on the board of several industry organizations, and is active in setting the direction for 5th generation wireless systems. Dr. Tiedemann was General Chair of GLOBECOM 2015, one of the IEEE Communications Society flagship conferences. Dr. Tiedemann holds the Ph.D. degree from MIT where he worked in the areas of queueing theory and communications networks. He holds the Master of Science degree from Purdue University where he worked on bandwidth efficient modulation. He also holds the Bachelor of Science degree from Virginia Polytechnic Institute and State University (Va Tech).

OPENING SESSION & KEYNOTE SPEAKERS

Wednesday June 29th, 09:00-10:30 | ROOM ARISTOTELIS

KEYNOTE SPEAKERS:

Dr. Chih-Lin I

Chief Scientist on Wireless Technologies, China Mobile Research Institute, China

"Mid-Point of 5G Journey"

CV

Chih-Lin I received her Ph.D. degree in electrical engineering from Stanford University. She has been working at multiple world-class companies and research institutes leading the R&D, including AT&T Bell Labs; Director of AT&T HQ, Director of ITRI Taiwan, and VPGD of ASTRI Hong Kong. She received the IEEE Trans. COM Stephen Rice Best Paper Award, is a winner of the CCCP National 1000 Talent Program, and has won the 2015 Industrial Innovation Award of IEEE Communication Society for Leadership and Innovation in Next-Generation Cellular Wireless Networks. In 2011, she joined China Mobile as its Chief Scientist of wireless technologies, established the Green Communications Research Center, and launched the 5G Key Technologies R&D. She is spearheading major initiatives including 5G, C-RAN, high energy efficiency system architectures, technologies and devices; and green energy. She was an elected Board Member of IEEE ComSoc, Chair of the ComSoc Meetings and Conferences Board, and Founding Chair of the IEEE WCNC Steering Committee. She is currently an Executive Board Member of GreenTouch, a Network Operator Council Member of ETSI NFV, a Steering Board Member of WWRF, and a Scientific Advisory Board Member of Singapore NRF. Her current research interests center around "Green, Soft, and Open".

Mr. Alain Servel

Expert in ADAS and ITS, PSA Groupe, France

"5G radio access for a multiservice integration"

Abstract

In the context of Autonomous vehicles, vehicles will have to exchange information with other vehicles (V2V) and with the infrastructure (V2I) to enhance inter-distances control and traffic efficiency, with manufacturer backend server (extended vehicle) to monitor and release safely embedded control units and third party applications (navigation, mobility services,...). For these various communication use cases, heterogeneous requirements have to be respected. But we can identify globally two types of communication profiles, local direct low latency communications for safety applications and cooperative driving, and secured high volumes communications with a remote backend server. Facing a necessity of cost and integration optimisation, the automotive industry has interest to concentrate the different embedded communication profiles on a same transversal technology. By the fact that cellular technology is widely deployed in all sectors, evolutions of cellular networks towards next 5G standards could be a good opportunity for automobile.

CV

Alain SERVEL was graduated of the "Institut National des Télécommunications" (Telecom Sud Paris) in 1985.

Since 1992, Alain Servel has been a Research and Innovation Engineer at PSA Peugeot Citroën, in the area of Advanced Driving Assist and Cooperative Intelligent Transport Systems with a particular expertise on embedded radars and communicating sensors. He has been directly involved in developments of several ADAS applications like Distance Alert, Adaptive Cruise Control or Lane Change Assist. He has been acting and is acting in several consortia like Car2Car-CC, in some European or national projects like RESPONSE, ADASE 2, UDC, PREVENT, DRIVE-C2X, ARPOD, SCOREF, RASSUR79, SCOOP@F and in standardization processes like ETSI-ITS or ISO TC204 / TC22 working groups.

PANEL 1: 5G for Vertical Industries – Major Challenges and Opportunities Ahead

Tuesday, June 28th, 14:30-16:00 | ROOM ARISTOTELIS

Organizer: Andreas Müller (Robert Bosch GmbH, Germany)

Motivation and Background

One of the major differences of 5G compared to previous generations of mobile networks is its strong focus on machine-type communication, thus laying the basis for the Internet of Things and a fully connected world. This will enable a wide variety of new use cases and applications in different vertical industries, such as the automotive, energy, industry and health sectors. However, getting there is anything but easy since the "long tail" of corresponding use cases exhibit quite diverse requirements on the connectivity infrastructure. This ranges from mission-critical applications with ultra-low latency and very high reliability requirements, such as closed-loop control in industry or platooning of cars, to massive deployments of sensor networks in agriculture or smart cities, where energy and bandwidth efficiency become key success factors. The goal of this panel is explore and discuss the ongoing 5G developments from the perspective of different vertical industries, which will be very likely among the main beneficiaries of 5G in future. To this end, some of the most promising use cases and associated requirements will be discussed as well as the main challenges that have to be overcome in order to make them become reality. In addition, also the business perspective will be taken into account. In fact, 5G may open up doors for new business models and ecosystems, requiring new partnerships and unlocking new opportunities as well as threats for both established and new market players, as the corresponding value chains may experience unprecedented changes in a rather short period of time.

Questions

1. What are major use cases being catalysed by 5G and when may they become reality?
2. What are the most important requirements and major challenges to be overcome?
3. What new business models may be enabled by 5G?
4. What should be the role split between network operators and the vertical industries?
5. May an evolved 4G be a better alternative to 5G?

PANEL 2: 5G Architecture

Wednesday, June 29th, 14:30-16:00 | ROOM ARISTOTELIS

Organizer: Simone Redana (Nokia Bell Labs , Germany)

Motivation and Background:

The current exponentially growing demand on wireless data rates, the new requirements imposed by future services and the required level of flexibility and heterogeneity call for an investigation of novel aspects of the 5G network architecture (incl. RAN, Core Network, converged wireline and wireless network with both core and access network aspects, networked cloud, Transport Network and Services). In this context, it is not surprising that there are several research initiatives dealing with integration and unification of functional and non-functional requirements, deployable elements, wired and wireless interworking, control, management and operational architecture aspects or that are looking at fundamental pieces that have an impact on the overall 5G architecture or vice versa. Furthermore, in the standardization bodies like 3GPPP, ETSI, ITU-R, IETF and ONF the work on the definition of the architecture for the 5G era has been already started. As part of the 5GPPP Initiative large number of projects attempt to either completely redesign the 5G network architecture or some of its components. Those projects have joint the forces and launched a Working Group on 5G Architecture to serve as a common platform to facilitate the discussion between projects developing architectural concepts and components and foster the discussions on the basis of the KPI's described in the 5GPPP contract. The WG has issued a White Paper end of May/beginning of June on 5G Architecture and would like to discuss it with panellists who has contributed to it and with panellists who can bring a different perspective.

Questions

1. What are the architecture design principles and building blocks for the 5G era?
2. What are the implementation aspects for the above principles and building blocks?
3. What is the standardization roadmap?

PANEL 3: ICT consolidation in 5G. The role of Software Networks

Thursday, June 30th, 11:00-12:30 | ROOM ARISTOTELIS

Organizer: Diego R. Lopez (Telefonica I+D, Spain)

Motivation and Background:

Software Networks, and in particular its current base technologies NFV and SDN, are expected to play a major role in the creation of flexible 5G networks that can adapt to the dynamic nature of mobile traffic, whilst supporting the existence of separated slices able to support the requirements of different vertical sectors, including to ability to control their own network slice. The panel will explore the challenges, benefits and business opportunities of software network techniques at all network segments, from their application in the Radio Access Network (RAN) to service datacentres, and including core networks and optical aspects. The panel will also address the technological challenges in relation to existing open source environments (the most notable being OpenStack) and the risk of technology monoculture versus the advantages of differentiation and the needs to depart from such environments to address radical solutions.

Questions

1. Would 5G requirements suitable to be achieved without an extensive use of Software Networks?
2. The term "network slice" has generalized as the main construct of the 5G network services. How would you characterize such slices?
3. Which are the required evolution of Software Networks base technologies, SDN and NFV, to fulfil the 5G promise and, more specifically, become able to support slicing?
4. What is your perspective about the big open-source macro-projects that seem to dominate Software Networks evolution? Are we risking a lack of implementation diversity and a lack of innovation momentum?
5. How do you foresee the application of Software Networks affecting 5G architecture? How can be a detailed architecture be applied to an ever-changing landscape of applications defining the network services?

Tuesday June 28th 2016

AIR SESSION 1 - Advanced modulation schemes, new coding solutions, FEC, HARQ, PAPR optimisation

ROOM | ARISTOTELIS. 11:00-12:30

Session Chair: Narcis Cardona (Universitat Politècnica de València, Spain)

- Frequency and Quadrature Amplitude Modulation for 5G Networks

  Shangbin Wu; Yue Wang; Mohammed Al-Imari; Maziar Nekovee
- MMSE-Based Receiver for Wavelet-Filtered Systems Over Flat Fading Channels

  Luiz Gonzaga de Q. Silveira Junior; Luiz F. Q. Silveira
- Link Adaptation in FBMC/OQAM Systems Using NB-LDPC Codes

  Màrius Caus; Monica Navarro; Xavier Mestre; Ana Pérez-Neira
- A Low Complexity 256QAM Soft Demapper for 5G Mobile System

  Juquan Mao; Mahmoud Abdullahi; Pei Xiao; Aijun Cao
- LLR Computation for Multistage Decoding

  Abir Ben Hadj Fredj; Jean-Claude Belfiore

SDI SESSION 1 - Network function virtualisation advances / Network programmability

ROOM | PLATON – 11:00-12:30

Chair: Uwe Herzog (EURESCOM, Germany)

- Exploring the Use of RPAs as 5G Points of Presence

  Javier Suárez; Ivan Vidal; Jaime Garcia-Reinoso; Francisco Valera; Arturo Azcorra
- Hardware-accelerated High-resolution Video Coding in Virtual Network Functions

  Paolo Comi; Paolo Secondo Crosta; Marco Beccari; Pietro Paglierani; Giuliano Grossi; Federico Pedersini; Alessandro Petrini
- On the Benefits of Wireless SDN in Networks of Constrained Edge Devices

  August Betzler; Ferran Quer; Daniel Camps; Ilker Demirkol; Eduard Garcia-Villegas
- Enabling Technologies and Benefits of Multi-Tenant Multi-Service 5G Small Cells

  Ioannis Giannoulakis; Pouria Sayyad Khodashenas; Cristina Ruiz; August Betzler; Antonino Albanese; Jose Oscar Fajardo; Emmanouil Kafetzakis; Michele Paolino; Javier Garcia Lloreda; Jordi Pérez-Romero; Leonardo Goratti; Roberto Riggio
- NFV Applicability and Use Cases in Satellite Networks

  Georgios Gardikis; Socrates Costicoglou; Harilaos Koumaras; Christos Sakkas; Anastasios Kourtis; Fabrice Arnal; Luis M. Contreras; Pedro A. Aranda Gutierrez; Maria Guta

TER SESSION 1 - Testbeds / Facilities [Smart cities, IoT and M2M / Advanced multimedia] / Tools & techniques for testbeds management

ROOM | APHRODITE A – 11:00-12:30

Chair: Jorge Pereira (European Commission, Belgium)

- Experimental Demonstration of Distributed Multi-tenant Cloud/Fog and Heterogeneous SDN/NFV Orchestration for 5G Services

  Ricard Vilalta; Arturo Mayoral; Ramon Casellas; Ricardo Martinez; Raul Muñoz
- End to End Measurements of Multimedia Streaming Over LTE

  Alejandro de la Fuente; Carlos M. Lentisco; Luis Bellido; Raquel Perez Leal; Ana Garcia Armada; Encarna Pastor; Alejandro García Bolívar
- A Unified Radio Control Architecture for Prototyping Adaptive Wireless Protocols

  Ilenia Tinnirello; Ingrid Moerman; Peter Ruckebusch; Spilios D. Giannoulis; Eli De Poorter; Domenico Garlisi; Pierluigi Gallo; Nicholas J. Kaminski; Luiz DaSilva; Mikolaj Chwalisz; Anatolij Zubow; Piotr Gawlowicz
- Q4HEALTH: Quality of Service and Prioritisation for Emergency Services in the LTE RAN Stack

  Cesar A. Garcia-Perez; Álvaro Rios; Pedro Merino; Kostas Katsalis; Navid Nikaein; Ricardo Figueiredo; Donal Morris; Terry O'Callaghan
- Semantic Coordination Protocol for LTE and Wi-Fi Coexistence

  Milorad Tosic; Valentina Nejkovic; Filip Jelenkovic; Nenad Milosevic; Zorica Nikolic; Nikos Makris; Thanasis Korakis

MT SESSION 1 - Energy-efficient networks/infrastructures / Cognitive and self-learning mechanisms

ROOM | APHRODITE C – 11:00-12:30

Chair: Hugo Tullberg (Ericsson, Sweden)

- Energy Consumption Awareness for Resource-Constrained Devices

  Edgar M. Silva; Pedro Malo; Michele Albano
- Utility Maximization for Uplink MU-MIMO: Combining Spectral-Energy Efficiency and Fairness

  Lei Deng; Wenjie Zhang; Yun Rui; Chai Kiat Yeo
- Regenerative Relaying in Energy Harvesting Cognitive Radio Networks

  Tarun Kalluri; Vivek A Bohara
- Optimal In-Network Packet Aggregation Policy for Maximum Information Freshness

  Alper Sinan Akyurek; Tajana Simunic Rosing

AIR SESSION 2 - Communications at the mm wave range

ROOM | ARISTOTELIS – 16:30-18:00

Chair: Jordi Perez-Romero (Universitat Politècnica de Catalunya, Spain)

- Analog Beamsteering for Flexible Hybrid Beamforming Design in Mmwave Communications

  Yaning Zou; Wolfgang Rave; Gerhard Fettweis
- An MDP Model for Optimal Handover Decisions in mmWave Cellular Networks

  Marco Mezzavilla; Sanjay Goyal; Shivendra Panwar; Sundeep Rangan; Michele Zorzi
- Millimeter Wave Wireless System Based on Point to Multipoint Transmissions

  Claudio Paoloni; Frederic Andre; François Magne; Marc Rocchii; Marc Marilier; Rosa Letizia; Ralp Zimmerman; Viktor Krozer; Antonio Ramirez; Ruth Vilar
- Context Information Based Initial Cell Search for Millimeter Wave 5G Cellular Networks

  Waqas Bin Abbas; Michele Zorzi
- MAC Layer Frame Design for Millimeter Wave Cellular System

  Sourjya Dutta; Marco Mezzavilla; Russell Ford; Menglei Zhang; Sundeep Rangan; Michele Zorzi

SDI SESSION 2 - SDN-based switch/router architectures

ROOM | PLATON – 16:30-18:00

Chair: Diego Lopez (Telefónica, Spain)

- On the Feasibility of "Breadcrumb" Trails Within OpenFlow Switches

  Giuseppe Bianchi; Marco Bonola; Salvatore Pontarelli
- SDN-Based Channel Assignment Algorithm for Interference Management in Dense Wi-Fi Networks

  Mirghiasaldin Seyedebrahimi; Faycal Bouhafs; Alessandro Raschellà; Michael Mackay; Qi Shi
- Packet Forwarding for Heterogeneous Technologies for Integrated Fronthaul/Backhaul

  Thomas Deiss; Luca Cominardi; Andres Garcia-Saavedra; Paola Iovanna; Giada Landi; Xi Li; Josep Mangues-Bafalluy; José Núñez-Martínez; Antonio de la Oliva
- The Role of SDN in Application Centric IP and Optical Networks

  Victor Lopez; José Manuel Gran; Juan P. Fernández-Palacios; Domenico Siracusa; Federico Pederzolli; Ori Gerstel; Yona Shikhmanter; Jonas Mårtensson; Pontus Sköldström; Thomas Szyrkowiec; Mohit Chamania; Achim Autenrieth; I Tomkos; Dimitrios Klonidis

BUS SESSION 1 - Emerging business models, monetisation of infrastructures and services / Smart cities, smart grids and environments

ROOM | APHRODITE A – 16:30-18:00

Chair: Josep Martrat (ATOS, Spain)

- Mobile Opportunistic Traffic Offloading: A Business Case Analysis

  Gamze Akpolat; David Valerdi; Engin Zeydan; Ahmet Serdar Tan
- Value Network Analysis in a Low-cost and Affordable Internet

  Jaume Benseny; Heikki Hämmäinen
- Impact of Network Slicing on 5G Radio Access Networks

  Icaro da Silva; Gunnar Mildh; Alexandros Kaloxylos; Panagiotis Spapis; Enrico Buracchini; Alessandro Trogolo; Gerd Zimmermann; Nico Bayer
- 5G Service Requirements and Operational Use Cases: Analysis and METIS II Vision

  Salah Eddine Elayoubi; Mikael Fallgren; Panagiotis Spapis; Gerd Zimmermann; David Martín-Sacristán; Changqing Yang; Sebastien Jeux; Patrick Agyapong; Luis Miguel Campoy Cervera; Yinan Qi; Shubhranshu Singh

CEC SESSION 1 - Convergence with IT technologies / Internet of Things, Machine to Machine / Smart embedded systems / Hybrid satellite and terrestrial networks

ROOM | APHRODITE C – 16:30-18:00

Chair: Werner Mohr (NOKIA, Germany)

- Wireless Access Infrastructure Expansions Through Opportunistic Networks of Moving Access Points

  Andreas Georgakopoulos; Ioannis-Prodromos Belikaidis; Kostas Tsagkaris; Vera Stavroulaki; Panagiotis Demestichas
- oneM2M Architecture Based IoT Framework for Mobile Crowd Sensing in Smart Cities

  Soumya Kanti Datta; Rui Pedro Ferreira da Costa; Christian Bonnet; Jérôme Härri
- Multiuser Hybrid Satellite-Terrestrial Relay Networks with Co-Channel Interference and Feedback Latency

  Prabhat Kumar Upadhyay; Pankaj Kumar Sharma
- Design and Development of Mobile RFID Reader

  SeongSoo Park

Tuesday June 28th 2016

SS01

Fifth generation satellites: 5G-satellite integration

Tuesday, 28 June 2016, 11:00-12:30 & 16:30-18:00 | Room KLEONIKI A

Session Chair: Ádám Kapovits (Eurescom GmbH, Germany)

The Special Session would consist of two parts / sessions, 100 minutes each. The first session would consist of a keynote speech followed by four invited presentations, whilst the second session will have a couple of invited presentations followed by a panel discussion of selected experts involving the audience by inviting them to question the panellists. Invited talks are limited to 15 minutes presentations followed by 5 minutes discussion.

Overview:

- Keynote: Combining the strengths of satellite and terrestrial networks to deploy 5G (Maria Guta, European Space Agency)
- The relevance of satellite for 5G (ESA INSTINCT study, Adam Kapovits, Eurescom)
- The Role of Satellite in Future Communications 2020-2025, The ESA SPECSI study (Omar Iqbal, Avanti Communications)
- Satellite contribution to future telecommunication service deployment (ESA Mendhosa study, Nicolas Chuberre, Thales Alenia Space)
- Eutelsat perspective on the role of satellites in 5G (Stefano Agnelli, Eutelsat)
- Satellite Backhaul for 5G Systems (ESA SATINET study, Marius Iulian Corici, Fraunhofer FOKUS)
- A converged satellite /wireless backhaul architecture for efficient transport of 5G traffic (Georgios Agapiou, OTE)
- Short contributions:
- Standardisation activities in ITU-T IMT-2020 (Alex Galis, UCL)
- Relevant 3GPP standardisation activities (Thomas Heyn, Fraunhofer IIS)
- Panel discussion (in addition to the speakers above Inmarsat, Oneweb and Telenor has been invited to join the panel)

SS02

Designing and Developing a Cloud-enabled "Small Cell as a Service" concept, for Multi-Tenancy and Edge Services in the forthcoming 5G Framework

Tuesday, 28 June 2016, 11:00-12:30 | Room KLEONIKI B

Session Chair: Ioannis P. Chochliouros (Hellenic Telecommunications Organization, Greece)

Session Chair: Ioannis P. Chochliouros (Hellenic Telecommunications Organization S.A., Greece)

- A Key-Note Speaker (CNET, Italy) with a presentation about "Small Cells and their Supportive Role in the Development towards the 5G Era".
- "Challenges for Defining Opportunities for Growth in the 5G Era: The SESAME Conceptual Model", Ioannis P. Chochliouros, Evangelos Sfakianakis, Maria Belesioti, Anastasia S. Spiliopoulou, Athanassios Dardamanis.
- "Defining a Proper Methodology for Effective SESAME-based Use Cases to Create Market Impact and Promote Novel Services", Ioannis P. Chochliouros, Evangelos Sfakianakis, Maria Belesioti, Dimitrios Arvanitozisis, Anastasia S. Spiliopoulou, Irena Trajkovska, Vincenzo Pii, Ioannis Neokosmidis, Theodoros Rokkas, Athanassios Dardamanis, Haris Mouratidis, Charles Turyagyenda, Shuping Peng.
- "CHARISMA – A Hierarchical, Intelligent, SDN/NFV-Based 5G Architecture Supporting Low Latency, Intrinsic Security and Open Access", G. Lyberopoulos, E. Theodoropoulou, K. Filis, K. Habel, V. Jungnickel, M.C. Parker, G. Koczian, S.D. Walker, S. Spirou, D. Kritharidis, Y. Liu, M. Sander Frigau, J.C. Point, E. Trouva, A. Kourtis, Th. Rokkas, I. Neokosmidis, D. Levi, E. Zetserov, A. Foglar, M. Ulbricht, P. Blaz, D. Gustincic.
- "Developing a Flexible Spectrum Management for 5G Heterogeneous Radio Access Networks", George Agapiou, Alexandros Kostopoulos, Fang-Chun Kuo, Tao Chen, Adrian Kliks, Mariana Goldhamer, Kostas Katsalis, Roberto Riggio, Dorin Panaitopol, Antonio Cipriano, Dimitri Marandin.
- "Self-X in SESAME", J. Perez-Romero, O. Sallent, C. Ruiz, A. Betzler, P.S. Khodashenas, S. Vahid, K.M. Nasr, B. Abubakar, A. Whitehead, L. Goratti.
- "SESAME Essential Architecture Features", Cristina E. Costa, Leonardo Goratti.
- "Flexible RRM/MAC solutions in a dense small cell environment: The SPEED-5G case", Ioannis-Prodromos Belikaidis, Andreas Georgakopoulos, Panagiotis Demestichas, Uwe Herzog, Oscar Carrasco, Valerio Frascolla, Michael Fitch, Benoit Miscopein, Klaus Moessner, Harald Weigold.
- "Enabling Privacy Protection by Using a Universal Privacy Risk Methodology in the Context of 5G", Ioannis P. Chochliouros, Evangelos Sfakianakis, Maria Belesioti, Nikolaos Bompetsis and Anastasia S. Spiliopoulou.

Wednesday June 29th 2016

AIR SESSION 3 - Cloud-RANs, fronthaul/backhaul aspects / Advanced Radio RRM and MAC functions

ROOM ARISTOTELIS | 11:00-12:30

Chair: Symeon Papavassileiou (NTUA, Greece)

- Heterogeneous Millimeter-wave/Micro-wave Architecture for 5G Wireless Access and Backhauling

  Juan García Rois; Beatriz Lorenzo; Francisco J. González-Castaño; Juan C. Burguillo
- Study of Indoor LTE Green Small-Cells Using Mobile Fronthaul Architecture Over Hybrid Fiber-Wireless Channels

  Yaron Hazan; Moshe Ran
- Utilization of Hybrid Access Femtocells During Multicast Transmissions in Mobile Networks

  Christos J Bouras; Nikolaos Kanakis; Vasileios Kokkinos; Nikolaos Papachristos; Demosthenes Vouyioukas
- Interference and QoS Aware Channel Segregation for Heterogeneous Networks: A Preliminary Study

  Stavroula Vassaki; Andreas Georgakopoulos; Federico Miatton; Kostas Tsagkaris; Panagiotis Demestichas
- Quality of Service Provision and Capacity Expansion Through Extended-DSA for 5G

  Uwe Herzog; Andreas Georgakopoulos; Ioannis-Prodromos Belikaidis; Panagiotis Demestichas; Salvador Diaz; Óscar Carrasco; Federico Miatton; Klaus Moessner; Valerio Frascolla

SDI SESSION 3 - Software defined networking challenges / Network overlays and federation

ROOM APHRODITE A | 11:00-12:30

Chair: Riccardo Trivisonno (HUAWEI, Germany)

- OpenFlow Flow Table Overflow Attacks and Countermeasures

  Ying Qian; Wanqing You; Kai Qian
- A High Assurance Virtualization Platform for ARMv8

  Mats Naslund; Christian Gehrmann; Christoph Baumann; Hans Thorsen; Oliver Schwarz
- Augmenting SDN by a Multi-Layer Network Model

  Zoltán Zsóka; Balázs Farkas
- Orchestration of Crosshaul Slices From Federated Administrative Domains

  Luis M. Contreras; Carlos J. Bernardos; Antonio de la Oliva; Xavier Costa-Perez; Riccardo Guerzoni

CEC SESSION 2 - Cloud infrastructures, distributed clouds / Data centre systems / Fog computing

ROOM APHRODITE B | 11:00-12:30

Chair: Oriol Sallent (Universitat Politècnica de Catalunya, Spain)

- Multi-User Computation Offloading as Multiple Knapsack Problem for 5G Mobile Edge Computing

  Istvan Ketyko; László Kecskés; Csaba Nemes; Lorant Farkas
- A Federated Edge Cloud-IoT Architecture

  Dimitris Kelaidonis; Angelos Rouskas; Panagiotis Vlacheas; Vera Stavroulaki; Panagiotis Demestichas
- On Interconnecting and Orchestrating Components in Disaggregated Data Centers: The dReDBox Project Vision

  Kostas Michael Katrinis; Georgios Zervas; Dionisios Pnevmatikatos; Dimitris Syrivelis; Theoni Alexoudi; Dimitris Theodoropoulos; Daniel Raho; Christian Pinto; Felix Espina; Sergio Lopez-Buedo; Qianqiao Chen; Mario Nemirovsky; Damian Roca; Hans Klos; Tom Berends
- CHARISMA: Converged Heterogeneous Advanced 5G Cloud-RAN Architecture for Intelligent and Secure Media Access

  Michael Parker; Geza Koczian; Anthony O.T Adeyemi-Ejeye; Terry Quinlan; Stuart D Walker; Amaia Legarrea; Muhammad Shuaib Siddiqui; Eduard Escalona; Spiros Spirou; Dimitrios Kritharidis; Kai Habel; Volker Jungnickel; Eleni Trouva; Anastasios Kourtis; Yaning Liu; Matthias Sander Frigau; Jean-Charles Point; George Lyberopoulos; Elina Theodoropoulou; Konstantinos G. Filis; Theodoros Rokkas; Ioannis Neokosmidis; David Levy; Eugene Zetserov; Andreas Foglar; Marian Ulbricht; Blaz Peternel; David Gustincic

OPT SESSION 1 - Advances in optical access networks / Components and communications / Optical and digital signal processing

ROOM APHRODITE C | 11:00-12:30

Chair: George Rouskas (NC State University, USA)

- Scalable Mobile Fronthaul with Spatial and Spectral Reconfigurability Through Virtually Passive Nodes

  Bernhard Schrenk; Thomas Zemen; Martin Stierle; Helmut Leopold
- Fronthaul Performance Demonstration in a WDM-PON-Based Convergent Network

  Zakaria Tayq; Bertrand Le Guyader; Philippe Chanclou; Stéphane Gosselin; Diallo Abdourahmane; Daniel Philip Venmani; Christelle Aupetit-Berthelemot; Stephan Pachnicke; Michael Eiselt; Achim Autenrieth; Jörg-Peter Elbers
- Variance Normalizing Transform for Performance Improvement in Radio-Over-Fiber Systems

  Iman Tavakkolnia; Majid Safari

Wednesday June 29th 2016

- PWM Fronthauling in Reflective PON

  Lorenzo Combi; Alberto Gatto; Mario Martinelli; Paola Parolari; Umberto Spagnolini

- A Scalable Optically-Switched Datacenter Network with Multicasting

  Konstantinos Tokas; Christos Spatharakis; Giannis Kanakis; Ioannis Patronas; Nikolaos Iliadis; Paraskevas Bakopoulos; Dionysios I. Reisis; Hercules Avramopoulos

AIR SESSION 4 - 5G air interfaces / Antennas and propagation / Multi-service (MBB, MCC, MTC, etc.) support

ROOM ARISTOTELIS | 16:30-18:00

Chair: Miquel Payaró (CTTC, Spain)

- FB-OFDM: A Novel Multicarrier Scheme for 5G

  Yu Xin; Guanghui Yu; Xiao Yan; Zhen Yang; Jun Xu; Bo Gao

- On the Spectral Efficient Nonorthogonal Multiple Access Schemes

  Jinho Choi

- Multi-bid Auctions for Channel Allocation in Multi-Channel Dynamic Spectrum Access Networks

  Enas Khairullah; Mainak Chatterjee

- Exact and Asymptotic Analysis of Dual-Hop AF Systems in Nakagami-m Fading with Rayleigh Interferers

  Kostas Peppas; George Efthymoglou; Valentine Aalo

- 5G Network Deployment: Interplay of Key Elements in the Challenging Outdoor-to-Indoor Scenario

  Fabiano Chaves; Kamil Bechta

TER SESSION 2 - Experimentally-driven research. Federation of testbeds/facilities / Cloud testbeds

ROOM APHRODITE A | 16:30-18:00

Chair: Klaus Moessner (University of Surrey, UK)

- SDN-Controlled Energy-Efficient Mobile Fronthaul: An Experimental Evaluation in Federated Testbeds

  Luca Valcarenghi; Koteswararao Kondepu; Andrea Sgambelluri; Filippo Cugini; Piero Castoldi; Raquel Aparicio; David Larrabeiti; Brecht Vermeulen

- Distributed MIMO Demonstrated with 5G Radio Access Prototype

  Björn Halvarsson; Elias Karam; Martin Nyström; Roger Pirinen; Arne Simonsson; Qiang Zhang; Peter Ökvist

- An End-to-End Testing Ecosystem for 5G

  Andrea F. Cattoni; German Corrales Madueño; Michael Dieudonné; Pedro Merino; Almudena Diaz Zayas; Alberto Salmeron; Frederik Carlier; Bart Saint Germain; Donal Morris; Ricardo Figueiredo; Jeanne Caffrey; Janie Baños; Carlos Cardenas; Niall Roche; Alastair Moore

- 5GTN: A Test Network for 5G Application Development and Testing

  Esa Piri; Pekka Ruuska; Teemu Kanstren; Jukka Mäkelä; Jari Korva; Atso Hekkala; Ari T. Pouttu; Olli Liinamaa; Matti Latva-aho; Kari Vierimaa; Harri Valasma

- Integration of Broadcast and Broadband in LTE/5G (IMB5) - Experimental Results From the eMBMS Testbeds

  Thomas Heyn; Javier Morgade; Swen Petersen; Kerstin Pfaffinger; Ekkehard Lang; Markus Hertlein; Georg Fischer

MT SESSION 2 - Management architectures and frameworks / Management of resources, services and customer experience / Security, trust, and privacy

ROOM APHRODITE B | 16:30-18:00

Chair: Kostas Tsagkaris (WINGS ICT Solutions/ INCELLIGENT, Greece)

- CogNet: A Network Management Architecture Featuring Cognitive Capabilities

  Lei Xu; Haytham Assem; Imen Grida Ben Yahia; Teodora Sandra Buda; Angel Martin; Domenico Gallico; Matteo Biancani; Antonio Pastor; Pedro A. Aranda; Mikhail Smirnov; Danny Raz; Olga Uryupina; Alberto Mozo; Bruno Ordozgoiti; Marius Corici; Pat O'Sullivan; Robert Mullins

- A Heuristic Approach Towards Minimizing Resource Allocation for Femto Base Station Deployment

  Anindita Kundu; Subhashis Majumder; Iti Misra; Salil Kumar Sanyal

- Auction-based Offloading for Base Station Switching Off in Heterogeneous Networks

  Alexandra Bousia; Elli Kartsakli; Angelos Antonopoulos; Luis Alonso; Christos Verikoukis

- Detecting and Isolating Pollution Attacks in Peer-to-Peer VoD Systems

  Ilias Gkortsilas; Konstantinos Deltouzos

SS03: COST: Inclusive Radio Communications for 5G and Beyond – IoT and MTC

Wednesday, 29 June 2016, 11:00-12:30, Room KLEONIKI A

Session Chair: Roberto Verdone (University of Bologna, Italy)

The session will be composed of five papers/speeches (1h40 min):

1. Ralph Stübner (COST Association, Belgium); the speech will demonstrate how the COST environment supports pre-competitive research in the field of communications and networking, and will serve as a framework for the remainder of the session.
2. Narcis Cardona (Polytechnic University of Valencia, Spain); the speech will describe the goals and ambitions of the COST

Wednesday June 29th 2016

Action CA15104 IRACON that will accompany the development of 5G standardisation and contribute to research for systems beyond 5G in the next four years. In particular, the talk will highlight the role of the experimental WGs and the testbed facilities that will be made available.

3. Chiara Buratti will present a technical paper co-authored by researchers of the University of Bologna (Italy) and TIM (formerly Telecom Italia); the paper deals with the role of Long Range Low Power systems (such as LoRa, NB-IOT, etc) in the development of future IoT applications, both in cities and rural environments.
4. Florian Kaltenberger will present a technical paper co-authored by researchers of EURECOM (France) dealing with radio waveforms for MTC-oriented applications in 5G; results achieved through the OpenAirInterface experimental facility, will be discussed.
5. Erik Ström will present a technical paper co-authored by researchers of Chalmers University (Sweden) dealing with automotive applications, one of the driving verticals for 5G.

SS04: ARCADIA Special Session on Software engineering approaches aligned with the Softwarization of Networks and Services

Wednesday, 29 June 2016, 11:00-12:30, Room KLEONIKI B

Session Chair: Raffaele Bolla (Consorzio Nazionale Interuniversitario per le Telecomunicazioni, Italy)

The special session will provide an overview of on-going work in the EU Horizon 2020 projects ARCADIA and INPUT, presentation of related initiatives, and contributions from other researchers and projects. The main goal is to share bleeding-edge knowledge, to cluster complementary activities, and to stimulate the synergy and cooperation from different technology domains and research projects.

The following topics fall within the target area of the workshop:

- Software engineering approaches adopting DevOps practices;
- Smart and automated cloud services orchestration frameworks;
- Software-defined network-based cloud Computing approaches;
- Software-defined infrastructures and fog computing;
- Dynamic service placement and scalability strategies;
- Service function chaining and deployment methodologies;
- Distributed services enabled through SDN for IoT networks;
- Distributed applications performance monitoring and profiling;
- Virtual network function analytics approaches;
- Convergence of computing and networking infrastructures;
- Energy efficiency, QoS and Security issues for distributed computing.

The program is the following:

- 11:00-11:20 "Network softwarization", by Dr. Antonio Manzalini, Innovation/Future Centre at TELECOM ITALIA.
- 11:20-11:40 "NFV and SDN interplay and orchestration challenges", Diego R. R. Lopez, Senior Technology Expert, Telefonica I+D.
- 11:40-11:55 "The ARCADIA Framework: a complete framework for software development, orchestration, deployment, and execution", by Dr. Anastasios Zafeiropoulos (UBITECH).
- 11:55-12:10 "Bringing computing at the network edge for virtualization of devices and things: the INPUT infrastructure for fog computing", by Dr. Roberto Bruschi (CNIT), Coordinator of the INPUT project.
- 12:10-12:30 Short discussion, "Deploying distributed applications over next-generation programmable infrastructure: vision, challenges and research directions", moderated by Dr. Nikos Koutsouris (WINGS), Dr. Antonio Manzalini (TELECOM ITALIA), Dr. Roberto Bruschi (CNIT).

SS05

FANTASTIC-5G: Ultra-Reliable and Mission Critical Communication

Wednesday, 29 June 2016, 16:30-18:00 | Room APHRODITE C

Session Chair: Frank Schaich (NOKIA, Germany)

Invited Presentation:

Presenter: Gerhard Wunder

Title: "Security on a 5G setting"

Invited Paper 1:

Presenter: Osman Yilmaz, Ericsson

Title: "Ultra-Reliable and Low-Latency 5G Communication"

Abstract: "Machine-to-machine communication, M2M, will make up a large portion of the new types of services and use cases that the fifth generation (5G) systems will address. On the one hand, 5G will connect a large number of low-cost and low-energy devices in the context of the Internet of things; on the other hand it will enable critical machine type communication use cases, such as smart factory, automotive, energy, and e-health – which require communication with very high reliability and availability, as well as very low end-to-end latency. In this paper, we will discuss the requirements, enablers and challenges to support these emerging mission-critical 5G use cases.

Invited Paper 2:

Presenter: Gianluigi Liva, DLR

Title: "Code Design for Short Blocks: A Survey"

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Abstract: "The design of block codes for short information blocks (e.g., a thousand or less information bits) is an open research problem which is gaining relevance thanks to emerging applications in wireless communication networks. In this work, we review some of the most recent code constructions targeting the short block regime, and we compare then with both finite length performance bounds and classical error correction coding schemes. We will see how it is possible to effectively approach the theoretical bounds, with different performance vs. decoding complexity trade-offs."

Invited Paper 3:

Author/Presenter: Alessandro Colazzo, AZCOM

Title: "Achieving low-latency communication in future wireless networks: the 5G NORMA approach"

Abstract: "The end-to-end network latency is generally considered by the 5G community a key requirement for future wireless networks, enabling new applications by means of end-to-end figures up to a few ms, which is a target that cannot be achieved by the current 4G technology. 5G Novel Radio Multiservice adaptive network Architecture (5G NORMA) project aims at providing a new network architecture design able to cope with the diverse and stringent 5G KPIs, including network latency. This paper describes the low latency issue from a network architecture perspective, starting from the 3GPP state-of-the-art and then describing the 5G NORMA novelties."

SS06: METIS-II views on 5G RAN design and architecture

Wednesday, 29 June 2016, 16:30-18:00, Room KLEONIKI A

Session Chair: Olav Queseth (Ericsson, Sweden)

The main content of the session will be presentations of research papers highlighting some of the most recent results of the work in METIS-II. In addition there will be a short (~10 minutes) introduction to the papers explaining how they fit into and support the project objectives, which is to develop the 5G RAN design. The authors are selected participants of the METIS II project, each dealing with clearly defined topics in order to get a clear picture and offer a clear understanding of the main drivers in the activity performed after one year of work.

SS07: Dynamic spectrum management, a building block for 5G networks - A joint special session of the SPEED-5G, ADEL and SOLDER projects

Wednesday, 29 June 2016, 16:30-18:00, Room KLEONIKI B

Session Chair: Valerio Frascolla (Intel Deutschland GmbH, Germany)

The Special Session is planned for 1.40h and is composed of 4 papers, 1 invited speaker and final panel discussion. First the papers will be discussed, each focusing on selected challenging topics in the spectrum management area, coming out of the ongoing work done in the EU-funded projects ADEL, SPEED-5G and SOLDER. Each project will provide its own view on the biggest technology challenges it faces. Focus will be put on how those technical challenges can be overcome and properly assessed by testbeds and demonstrations. Then the invited speaker will elaborate on a more general and encompassing topic related to business aspects of dynamic spectrum management. Finally the panel will trigger an open discussion, sharing and exchanging the different experiences and expertise of the session participants with the audience.

The Special Session organizing team is composed of the following people: Valerio Frascolla (Intel), Klaus Moessner (Surrey University), Florian Kaltenberger (Eurecom), Fotis Foukalas (ISI), Tharmalingam Ratnarajah (Edinburgh University), Nicola Marchetti (Trinity College Dublin).

The proposed Special Session encompasses several conference tracks, as defined in the "Call for Special Sessions", among which Air interfaces, Management Technologies, Testbed and experimental research, Business aspects. List of planned Speakers (15 minutes each):

1. Fotis Foukalas, ISI, Greece; on "Dynamic Spectrum Aggregation for 5G Networks"
2. Constantinos Papadias, Athens Information Technology, Greece; on "On the role of antenna arrays in collaborative spectrum sensing and sharing"
3. Oscar Carrasco, SISTELBANDA, Spain; on "Centralised Radio Resource Management for 5G small cells as LSA enabler"
4. Antonio Morgado, Portugal Telecom Inovação, Portugal, on -ADEL: The next stop in the LSA roadmap-

Invited Speaker (20 minutes):

Michael Fitch, BT, UK; on "Business aspects and new opportunities of dynamic spectrum management"

Panel Discussion (20 minutes):

The panel will be driven by Dr. Valerio Frascolla and is composed of the speakers of the previous sections of the special session. The main target of the panel is to facilitate an open discussion with the audience, focusing on the research and technical aspects of the following questions:

- Spectrum/Carrier aggregation evolution: the current and the next steps for an effective deployment.
- Spectrum sharing: status of the acceptance and way forward to WRC2019.
- Dynamic spectrum management: biggest hurdles and proposed solutions.

The panel will be run in a dynamic way, i.e. first it will be asked whether there are some pressing questions coming from the special session audience, if not, the panellists will be posed all or part of the above mentioned questions, depending on the time left for discussion.

Thursday June 30th 2016

AIR SESSION 5 - MIMO advances / New air interfaces below 6GHz

ROOM ARISTOTELIS | 09:00-10:30

Chair: Didier Bourse (NOKIA, France)

- MIMO Techniques in the Frequency Domain with FBMC-PAM
  Maurice Bellanger; Davide Mattera; Mario Tanda
- Heterogeneous Beamspace Design for 5G Millimeter-wave Systems
  Maria Fresia; Honglei Miao; Michael Faerber
- A Multi-Service Oriented Multiple-Access Scheme for Next-Generation Mobile Networks
  Nassar Ksairi; Stefano Tomasin; Mérouane Debbah
- Bayesian Compressed Sensing-based Channel Estimation for Massive MIMO Systems
  Hayder Al-Salihi; Mohammad Reza Nakhai

SDI SESSION 4 - Traffic engineering, QoS, energy-efficiency

ROOM APHRODITE B | 09:00-10:30

Chair: Vassilis Friderikos (King's College, London, UK)

- Resource Optimization of TCAM-Based SDN Measurements Via Diminishing-Points Autodetection
  Ahmed Abada
- An Efficient Multipath Routing Algorithm for Multipath TCP in Software-Defined Networks
  Jang-Ping Sheu; Lee-Wei Liu; Jagadeesha Rb; Yeh-Cheng Chang
- Efficient Unicast Routing Algorithms in Software-Defined Networking
  Jang-Ping Sheu; Quan-Xiang Zeng; Jagadeesha Rb; Yeh-Cheng Chang
- Innovations Through 5G-Crosshaul Applications
  Xi Li; Giada Landi; José Núñez-Martínez; Ramon Casellas; Sergio González; Carla-Fabiana Chiasserini; Jorge Rivas Sanchez; Domenico Siracusa; Leonardo Goratti; David Jimenez; Luis M. Contreras

CEC SESSION 3 - Internet of Things/ Convergence with IT technologies / Cloud infrastructures, distributed clouds

ROOM APHRODITE C | 09:00-10:30

Chair: Anastasius Gavras (EURESCOM, Germany)

- Secret Key Transmission Based on Channel Reciprocity for Secure IoT
  Jinho Choi; Jeongseok Ha
- Layered Reception for Heterogeneous Traffics From Mobile Cloud Applications
  Jinho Choi
- Towards the Cross-Domain Interoperability of IoT Platforms
  Sergios Soursos; Ivana Podnar Zarko; Patrick Zwickl; Ivan Gojmerac; Giuseppe Bianchi; Gino Carrozzo
- LTE D2D Communication for Collaborative Wearable Sensor Networks: a Connectivity Analysis
  Gary Steri; Gianmarco Baldini; Leonardo Goratti

SS08: Abstractions and Use Cases of converged Big Data, Telecom and IoT technologies

Thursday, 30 June 2016, 09:00-10:30, Room APHRODITE A

Session Chair: Theodora Varvarigou (National Technical University of Athens, Greece)

The special session will be jointly organised by the COSMOS and LeanBigData EU FP7 projects with participation from another 5 EU projects. The workshop will have 7 technical sessions and each one will last 30 minutes following by one conclusions and wrap-up discussion.

Technical sessions:

1. Welcome and Introduction
2. Satisfying Telecom and IoT big data application requirements using multiple data stores in a coherent way (Apostolos Chatzimanikatis, Neurocom, Greece)
3. Context-Aware Stream Processing for Large-scale IoT Applications (Juan Sancho, ATOS, Spain and Adnan Akbra, University of Surrey, UK)
4. Database indexing for IOT architectures (George Papalexandratos, University of the Aegean, Greece)
5. A Coherent and Rich PaaS with a Common Programming Model (Ricardo Jimenez, LeanXcale, Spain, Pavlos Kranas, ICCS/NTUA, Greece)
6. IoT and big Data for Africa-the waziup project (Philippe Cousin, EGM, France and Abdur Rahim Biswas, CREATE-NET, Italy)
7. Model-free Approach based on IoT Data Analytics for Energy Efficiency in Smart Environments (Prof. Antonio Fernando Gómez Skarmeta, University of Murcia, Spain, FP7 ENTROPY and H2020 SMARTIE)
8. Cloud metrics for supporting IoT related Use Cases (George Kousiouris, Greece, H2020 SLALOM)
9. Recap, Open floor discussion, Future Steps and Directions

Thursday June 30th 2016

SS09: Millimeter-waves as a key enabling technology for 5G: Status of the pre-development activities and way forward – A joint special session of the mmMAGIC, TWEETHER, MiWaveS and MiWEBA projects

Thursday, 30 June 2016, 09:00-10:30, Room KLEONIKI A

Session Chair: Valerio Frascolla (Intel Deutschland GmbH, Germany)

The Special Session is planned for 1.40h and is composed of 4 papers, 1 invited speaker and a final panel. First 4 well-known researchers in the mmWave arena will present their different views focusing on a particularly interesting topic coming out of the four EU-funded projects MiWaveS, Miweba, mmMAGIC and TWEETHER. Then the invited speaker will focus on more general and encompassing topics related to mmWave technologies. Finally a panel will be held, which will start an open discussion sharing and exchanging the different experiences and expertise of the session participants with the audience.

The Special Session organizing team is composed of the following people: Valerio Frascolla (Intel), Mehrdad Shariat (Samsung), Thomas Haustein (HHI), Ronan Sauleau (University of Rennes 1), Jyri Putkonen (Nokia), Ruth Vilar Mateo (Polytechnic University of Valencia), Antonio Ramirez (Fibernova).

The proposed Special Session encompasses several conference tracks, as defined in the "Call for Special Sessions", among which Air interfaces, Testbed and experimental research, Business aspects.

List of planned Papers (15 minutes each):

1. Maziar Nekovee, Samsung, UK; on "Towards 5G Radio Access above 6 GHz: Key Components and Future Architectures"
2. Laurent Dussopt, CEA-Leti, France; on "Recent progress on millimeter-wave radios and antennas for wireless access and backhaul in 5G mobile networks"
3. Kei Sakaguchi, HHI, Germany; on "Millimeter-wave on Your Hand in 5G"
4. Claudio Paoloni, Lancaster university, UK; on "W-band point to multipoint system for small cells backhaul"

Invited Speaker (20 minutes):

Emilio Calvanese Strinati, CEA-Leti, France; on "Next Generation millimetre-wave for 5G and beyond"

Panel Discussion (20 minutes):

The panel will be driven by Dr. Valerio Frascolla and is composed of the speakers of the previous sections of the special session. The main target of the panel is to facilitate an open discussion with the audience, focusing on the research and technical aspects related to the discussed presentations. The panel will be open to answer the questions from the audience and can in any case start along a discussion driven by the following questions:

- mmWave access: what are the main benefit and the main hurdles for its deployment?
- What are the most problematic blocks in a mmWave architecture from the technology perspective?
- What are the most promising demonstrations currently under work in the mmWave domain?
- Can one already agree on a realistic roadmap for mmWave deployment (access and backhaul)?

SS10: IoT innovations, applications and challenges: Market or Technology Push?

Thursday, 30 June 2016, 09:00-10:30, Room KLEONIKI B

- **Session Chairs: Angeliki Alexiou** (University of Piraeus, Greece)
- **Christos Politis** (Kingston University London, UK)
- **Konstantinos Danas** (Kingston University London, UK)

The workshop will be organised in two parts. The first part will address Vertical Industry critical applications, mainly focusing on **e/m-Health and wearables**. The second part will address **IoT technology trends**, focusing on recent advances (D2D, WiFi evolution, mmWave), **catalysts** (virtualisation, E2E network slicing) and **standardisation developments** (NB-IoT, LORA).

Each part will host 4 invited presentations from industry/research experts, including SMEs. The workshop will be concluded with a panel discussion/debate on the market or technology push question. Panelists will include a subset of the speakers of the two sessions.

4TH 5G PPP PHASE 2 INFORMATION AND STAKEHOLDERS DAY

Thursday June 30th 2016 | 14:00-17:30 | ROOM ARISTOTELIS

AGENDA – Afternoon: 5G-PPP Phase 2 Information session

14:00 Opening and Welcome

Representative of the EU Commission — Bernard Barani, EC

5G-I-Association — Werner Mohr, 5G-I-A

Introduction of Online Dialogue tool: — Jacques Magen, 5G-I-A

14:10 Introduction of the 5G-PPP Call for Phase 2 projects — Bernard Barani, EC

ICT-07-2017: 5G PPP Research and Validation of critical technologies and systems

ICT-08-2017: 5G PPP Convergent Technologies

Phase 2 contractual specificities, clause 41.4 (Q/A)

14:30 Introduction to Phase 2 5G-PPP proposal preparation

Phase 2 preparatory steps (Q/A) — Werner Mohr, 5G-I-A

A structured approach to 5G-PPP phase 2 (Q/A) — Didier Bourse, 5G-I-A

SME involvement in 5G-PPP phase 2 (Q/A) — Jacques Magen, 5G-I-A

15.00-15:30 Coffee break

AGENDA – Afternoon: Participant profiles

15:30 Stakeholders presentations and proposals — Moderator: Werner Mohr

Max 5 mins per presenter – Strict timing will be enforced!!

17:00 Open discussion and questions

17:30 End of Event

REGISTER AT: https://5g-ppp.eu/4th-5g-ppp-phase-2-information-day/

POSTER SESSIONS

Tuesday June 28th 2016 14:00-14:30 | Room: FOYER KLEONIKI A&B

Poster session 1

First session will place emphasis on Software-Defined Infrastructures, Management Technologies, Testbeds and Experimental Research, Optical Communications & Networks

1. **Multi-domain Orchestration and Management of Software Defined Infrastructures: a Bottom-Up Approach**
   Riccardo Guerzoni; David Perez-Caparros; Paolo Monti; Giovanni Giuliani; Javier Melian; Ricardo Figueiredo; Aurora Ramos; Carlos J. Bernardos; Gergely Biczók; Balázs Sonkoly; Francesco Tusa; Alex Galis; Ishan Vaishnavi; Fabio Ubaldi; Andrea Sgambelluri; Cristina Santana; Robert Szabo
2. **Network Coded Compression-based Caching for Device-to-Device Communications**
   Christoforos Vlachos; Giorgos Chochlidakis; Janus Heide; Vasilis Friderikos
3. **Change Point Detection for Monitoring SIP Networks**
   Çağatay Yıldız; Murat Semerci; Taha Ceritli; Baris Kurt; Ali Taylan Cemgil; Bulent Sankur
4. **Autonomic and Self-Managed 3GPP Core Networks**
   Kostas Tsagkaris; Michelle M Wetterwald; Nancy Alonistioti; Ranganai Chaparadza; Tayeb Ben Meriem; Benoit Radier
5. **Small Cells as a Service: From Capacity Provisioning to Full Customisation**
   Oriol Sallent; Jordi Pérez-Romero; Ramon Ferrús; Ramon Agustí
6. **Novel Connectivity for 5G Telecommunication Systems**
   Arnesh Vijay; Mikko Säily; Sofonias Hailu
7. **Cascade Control and Defense in QKD Networks**
   Xingtong Liu; Feng Chao; Chen Zhang; Ruilin Li
8. **An Overview of oneM2M Security**
   Cengiz Gezer; Erhan Taşkın; Kenan Şahin
9. **NFV Performance Optimization for Virtualised Customer Premises Equipment**
   Paul Veitch; Thomas Long; Paul Hutchison
10. **5G-Crosshaul: Towards a Unified Data-Plane for 5G Transport Networks**
    Luca Cominardi; Jorge Baranda; David Larrabeiti; Fabio Cavaliere; Philippe Chanclou; Jessé Gomes; Andrea Di Giglio; Per Ödling; Hsien-Wen Chang
11. **Improving Cuckoo Filter Performance for High Speed Packet Processing**
    Pedro Reviriego; Juan A.; Salvatore Pontarelli; Marco Bonola
12. **SDN-based Media Service Provision Over Federated Satellite and Terrestrial Networks**
    Harilaos Koumaras; Christos Sakkas; Vaios Koumaras; Christos Xilouris; Michail Alexandros Kourtis; Georgios Gardikis
13. **SONATA: Service Programming and Orchestration for Virtualized Software Networks**
    Sevil Dräxler; Manuel Peuster; Holger Karl; Michael Bredel; Johannes Lessmann; Thomas Soenen; Wouter Tavernier; Sharon Mendel-Brin; George K Xilouris
14. **SDN/NFV-enabled Satellite Communications: Ground Segment Network Architecture for 5G Integration**
    Ramon Ferrús; Harilaos Koumaras; Oriol Sallent; Tinku Rasheed; Roberto Riggio; Nicolas Kuhn; Patrick Gelard; Toufik Ahmed
15. **VirtuWind: Virtual and Programmable Industrial Network Prototype Deployed in Operational Wind Park**
    Nikolaos E. Petroulakis; Toktam Mahmoodi; Vivek Kulkarni; Petra Vizarreta; Andreas Roos; Khawar Abbasi; Xavier Vilajosana; Spiros Spirou; Anton Matsiuk; Ermin Sakic; Yannis Askoxylakis

16. **On-demand Software Defined Infrastructure for Multi-Service Support Via Network Slicing**
    Tricci So; Zhigui Yuan; Fang Xu; Qiang Yao; Zaifeng Zong; Dai Xu; Jinguo Zhu
17. **Towards Quality of Experience Management in the Next Generation of Mobile Networks**
    Eirini Liotou; Dimitris Tsolkas; Konstantinos Samdanis; Nikos Passas; Lazaros Merakos
18. **ORCHESTRA- Optical Performance Monitoring Enabling Flexible Networking**
    Kostas Christodoulopoulos; Polyzois Soumplis; Ippokratis Sartzetakis; Marco Quagliotti; Andrea Di Giglio; Annachiara Pagano; Nikolaos Argyris; Christos Spatharakis; Stefanos Dris; Hercules Avramopoulos; Jean-Christophe Antona; Camille Delezoide; Philippe Jennevé; Jelena Pesic; Yvan Pointurier; Nicola Sambo; Filippo Cugini; Piero Castoldi; Giacomo Bernini; F Moscatelli; Gino Carrozzo; Emmanouel Varvarigos
19. **TRESCIMO M2M-IoT Testbed**
    Maria Barros; Anastasius Gavras; Andreea Ancuta Corici; Ronald Steinke; Nyasha Mukudu; Neco Ventura; Joyce Mwangama; Daniel Nehls; Bjoern Riemer; Louis Coetzee; Dawid Oosthuizen; Marisa Catalan; Laura Herrera; Jacint Castells; Raviv Yatom; Hinesh Madhoo; Tiaan Willemse
20. **Techniques for Increasing Trust in Federated Experimental Platforms**
    Stephen J Taylor; Michael Boniface
21. **Data Plane Performance Analysis in OpenStack for North-South Traffic**
    Piyush Srivastava; Uday Nagaraj
22. **Load-Stress Test of Massive Handovers for LTE System in High Speed Trains**
    Ali Parichehreh; Umberto Spagnolini; Paolo Marini; Alberto Fontana; Paolo Timelli
23. **Licensed Shared Access Pilot in Italy. Part I - Regulatory Sharing Framework**
    Doriana Guiducci; Claudia Carciofi; Valeria Petrini; Antonio Vellucci; Eva Spina; Pravir Chawdhry
24. **Enabling Future Internet Testbeds with Open Source Software**
    Quang Thanh Tran; Ahmed M. Medhat; Asma Elmangoush; Giuseppe Carella

POSTER SESSIONS

Wednesday, June 29th 2016 14:00-14:30 | Room: FOYER KLEONIKI A&B

Poster session 2

Second session will place emphasis on Air Interfaces, Convergent Concepts (Cloud, IoT), Business Aspects & Vertical Markets

1. **Massive MIMO: The Scalable 5G Technology**
   Claude Desset; Steve Blandino; Liesbet Van der Perre; Emil Björnson; Erik G. Larsson; Björn Debaillie; Andre Bourdoux; Sofie Pollin; Wim Dehaene; Ove Edfors; Liang Liu; Fredrik Tufvesson; Dielacher Franz; Javier Lorca; Eleftherios Karipidis; Klaus-Michael Koch; Tom Marzetta
2. **Stochastic Analysis of Two-Tier HetNets Employing LTE and WiFi**
   George Arvanitakis; Florian Kaltenberger
3. **Improvement of Stability in Cooperative IEEE 802.11 WLAN**
   Rasool Sadeghi; Hamed Taheri; Mohammad Soltan Aghaei
4. **Enhanced Ultrawideband LOS Suffiency Positioning and Mitigation for Cognitive 5G Wireless Setting**
   Akeem Aderibigbe Adebomehin; Stuart D Walker
5. **Interference Cooperation Multi-user Detection for Multi-operator Overlapped Spectrum in 5G**
   Syed Hassan Raza Naqvi; Umberto Spagnolini
6. **MIMO V2V Communications Via Multiple Relays: Relay Selection Over Space-Time Correlated Channels**
   Emmanouel T. Michailidis; Konstantinos Maliatsos; Athanasios G. Kanatas
7. **A BER Based Selection Combining Protocol for Adaptive Cooperative Cognitive Radios**
   Saloni Mittal; Vivek A Bohara; Naveen Gupta
8. **A LTE MIMO OTA Test System Using Vector Signal Transceivers**
   Chong Li; Tian Hong Loh; David Humphreys; Guisong Yun; Haowen Wang; Fei Qin
9. **Multidimensional Channel Characterization in Forested Environment**
   Davy P Gaillot; Pierre Laly; Martine Liénard; Shiqi Cheng; Pierre Degauque
10. **Cognitive Ultrawideband Methods for 5G LOS Sufficient Positioning and Mitigation**
    Akeem Aderibigbe Adebomehin; Stuart D Walker
11. **An Effective Slotframe Technique for IEEE802.15.4e TSCH Based on Virtual Slotframe**
    YuVin Ha; Sang-Hwa Chung; Sung-Hoon Park
12. **Channel Estimation and Data Detection for Visible Light ACO-OFDM Systems**
    Habib Senol; Atilla Ozmen
13. **Coordinated Scheduling in a Virtual-RAN Prototype with OpenAirInterface**
    Niccolò Iardella; Giovanni Nardini; Giovanni Stea; Antonio Virdis; Francesco Mauro; Dario Sabella; Marco Caretti; Gian Michele Dell'Aera
14. **Coordinated Scheduling in a Virtual-RAN Prototype with OpenAirInterface**
    Niccolò Iardella; Giovanni Nardini; Giovanni Stea; Antonio Virdis; Francesco Mauro; Dario Sabella; Marco Caretti; Gian Michele Dell'Aera
15. **mmWave Small Cell Networks: First E Band Backhaul Prototyping Results in MiWaveS**
    Eckhard Ohlmer; Vincent Kotzsch; Pekka Wainio; Jyri Putkonen; Kimmo Aronkytö; Daniele Disco; Ronan Sauleau; Jussi Säily

16. **Definitions of the Stakeholders and the Factors for the Data Subject on the International Cooperation Information Sharing Platform**
    Naonori Kato; Haruo Takasaki; Yousuke Murakami
17. **Multicast and Broadcast in 5G Networks: What Lessons Learned From 4G Experience?**
    Alessandro Grassi; Giuseppe Piro; Domenico Striccoli; Roberto Fantini; Gennaro Boggia
18. **Internet and 5G Tussles and a Way to Mitigate Them Innovative SPNP Re-Enginnering**
    George Darzanos; Manos Dramitinos; Ioanna Papafili; George Stamoulis; Håkon Lønsethagen
19. **Theft Detection Using Internet of Things BLE-based Participatory Sensing Concepts**
    Nikos Bakalos; Emmanuel Protonotarios; Nikos Papadakis; Socrates Costicoglou
20. **A Multipath Routing Protocol for Lossy Communications in Ad-hoc Networks**
    Nikolaos Pavlatos; Olayinka Adigun; Alexandros Ladas; Nuwan S Weerasinghe; Christos Politis
21. **Managing Data Streams for Cross-Platform Cross-Context IoT Applications Development: The Smart City Landscape**
    Aqeel H. Kazmi; Zeeshan Jan; Martin Serrano
22. **Adaptive Cross Layered Cooperative Routing Model in Mobile Ad Hoc Networks**
    Mahadev Gawas
23. **FCA-VANET: Feedback Control Architecture for Video Streaming in Urban VANET**
    Bechir Alaya
24. **Decoupling Resource Ownership From Service Provisioning to Enable Ephemeral Converged Networks (ECNs)**
    Johann M. Marquez-Barja; Marco Ruffini; Nicholas J. Kaminski; Nicola Marchetti; Linda Doyle; Luiz DaSilva

WORKSHOPS
W01: International Workshop on 5G Architecture

Monday June 27th 2016 – 09:00-17:30 | ROOM APHRODITE A

Organisers:

Simone Redana (Nokia, Germany)

Alexandros Kaloxylos (Huawei, Germany)

Motivation and Background

The current exponentially growing demand on wireless data rates, the new requirements imposed by future services and the required level of flexibility and heterogeneity call for an investigation of novel aspects of the 5G network architecture (incl. RAN, Core Network, converged wireline and wireless network with both core and access network aspects, networked cloud, Transport Network and Services). In this context, it is not surprising that there are several research initiatives dealing with integration and unification of functional and non-functional requirements, deployable elements, wired and wireless interworking, control, management and operational architecture aspects or that are looking at fundamental pieces that have an impact on the overall 5G architecture or vice versa. Furthermore, in the standardization bodies like 3GPPP, ETSI, ITU-R, IETF and ONF the work on the definition of the architecture for the 5G era has been already started. As part of the 5GPPP Initiative large number of projects attempt to either completely redesign the 5G network architecture or some of its components. Those projects have joint the forces and launched a Working Group on 5G Architecture to serve as a common platform to facilitate the discussion between projects developing architectural concepts and components and foster the discussions on the basis of the KPI's described in the 5GPPP contract. The WG is proposing this workshop to involve also external research activities into the consensus building on the 5G Architecture.

Structure

The workshop will comprise:

2-3 paper sessions depending on the number of accepted papers

3 keynote speakers: one keynote speaker from telco industry (operator or vendor), one from vertical segment (e.g. Bosch or ABB) and presentation of the White Paper launched at 5G Summit (speaker TBD)

panel session: keynote speakers, one representative of the EC (e.g. Bernard Barani)

W02a: Network Machine Learning

Monday June 27th 2016 – 09:20-12:30 | ROOM APHRODITE B

Organisers:

Sheng Jiang (Huawei Technologies Co. Ltd, China)

Panagiotis Demestichas (University o f Piraeus, Greece)

Motivation and Background

Machine learning technologies can learn from historical data, and make predictions or decisions, rather than following strictly static program instructions. They can dynamically adapt to a changing situation and enhance their own intelligence with by learning from new data. This approach has been successful in many applications and area. It also has potential in the network technology area. It can be used to intelligently learn the various environments of networks and react to dynamic situations better than a fixed algorithm. When it becomes mature, it would be greatly accelerate the development of autonomic networking.

The primary goal of this workshop is to inspire the potential of machine learning technologies for networks. In particular, work on potential approaches that apply machine learning technologies in network control, network management, and supplying network data for upper-layer applications would be in priority. The use cases and solutions of applying machine learning mechanism in network control and management would be presented and discussed.

The secondary goal of this workshop is to raise further awareness about the ongoing research and standardization activities in the scope of the IRTF Network Machine Learning Research Group on future networks with the European and worldwide initiatives.

Structure

Session I: 9:20-10:30

1. NMLRG Dash - 5 min

9:20 - 9:25, by co-chairs

2. IRTF NMLRG Introduction & Standardization - 15 min

9:25 - 9:40, by Sheng Jiang

3. Mobile network state characterization and prediction - 30 min

9:40 - 10:10, Panagiotis Demestichas

4. Learning How to Route - 20 min

10:10 - 10:30, Albert Cabellos

Break 10:30~11:30

Session II: 11:00-12:30

5. NML in Inria High Security Lab: overview and datasets - 30 min

11:00 - 11:30, by Jérôme François

6. Use Cases of Applying Machine Learning Mechanism with Network Traffic - 30 min

11:30 - 12:00, by Bing Liu

7. Panel Discussion on the Potential Standardization of Network Machine Learning - 25 min

12:00 - 12:25, by Panagiotis Demestichas, Albert Cabellos, Bing Liu, Jérôme François, Sheng Jiang

8. Summary & NMLRG Future Activities - 5 min

12:25 -12:30, by co-chairs

WORKSHOPS
W02b: Research and Standards for Self-Managing 5G Networks

Monday June 27th 2016 – 14:00-17:30 | ROOM APHRODITE B

Organisers:
Diego Lopez (Telefonica, Spain)
Mikhail Smirnov (Fraunhofer, Germany)
Sheng Jiang (Huawei Technologies Co. Ltd, China)
Laurent Ciavaglia (Nokia Bell Labs, France)

Motivation and Background

Several research and standardization activities on future (5G) networks management are ongoing across standards development organizations (SDOs), open source communities and collaborative research initiatives. In particular, innovative approaches using cognitive, autonomic, adaptive control and management are being explored and revisited under new paradigms. In the scope of the IETF (ANIMA WG) and the IRTF (NMRG), Autonomic networking refers to the self-managing characteristics (configuration, protection, healing, and optimization) of distributed network elements, adapting to unpredictable changes while hiding intrinsic complexity from operators and users. Autonomic Networking, which often involves closed-loop control, is applicable to the complete network (functions) lifecycle (e.g. installation, commissioning, operating, etc). An autonomic function that works in a distributed way across various network elements is a candidate for protocol design. Such functions should allow central guidance and reporting, and co-existence with non-autonomic methods of management. The general objective of this working group is to enable the progressive introduction of autonomic functions into operational networks, as well as reusable autonomic network infrastructure, in order to reduce the OpEx. IETF has formed the ANIMA (Autonomic Networking Integrated Model and Approach) working group to work on the infrastructure of Autonomic Network since 2014. It targets to develop a common infrastructure for distributed autonomic functions. In modest, it specifies a set of reusable infrastructure components to support autonomic interactions between devices. Now, it is time to discuss expand the Autonomic Network infrastructure with more components and more autonomic agents that autonomically decide specific management objectives with the support from the autonomic network infrastructure.

Structure

The workshop will be organized around a simple and dynamic structure composed of 4 topics presented in a consistent way under the workshop unifying thematic. (Please refer to the draft program below for details on the topics envisaged) Each topic will be addressed in a dedicated session presenting briefly (approx. 7-10 min.) perspectives from 3 different angles in order to stimulate active discussions, expression and comparison of viewpoints. To foster the debate, each topic / session will contain a discussion slot (approx. 20 min.), animated by the session moderator and the three speakers. Engagement of the audience will be encouraged and motivated by a set of thought-provoking questions. (Those questions will be prepared by the workshop organizing committee together with the speakers once the workshop is approved for the conference) Speakers will be briefed in advance and questions prepared so as to allow for good efficiency and lively debates during the sessions. The workshop itself will be open by the workshop organizers with an introductory presentation on “Towards Self Managing 5G Networks - Closing the gaps”. The presentation will present the main challenges ahead and provide a general overview of the workshop content and goals. A concluding session will collect the interesting and relevant items produced in the discussions and draft the so-called “Roadmap and action plan”. In addition to the above, we will also prepare a “Workshop Questionnaire” for the participants to express the views and informed opinions. The questionnaire will be available online before the meeting and will be distributed in a written form at the beginning of the workshop. This questionnaire will encourage active participation in the workshop by allowing attendees to “feel connected and concerned”, seeking a real interaction. We hope also to collect diverse and useful input information for the drafting of the roadmap with this support. The scheduling of a high profile keynote talk is under consideration at the time of submission. Speakers will be requested a presentation abstract, inputs to and preparation of the workshop questions, and a short biography. All workshop material will be made available online.

W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz

Monday June 27th 2016 – 09:00-17:30 | ROOM APHRODITE C

Organisers:
Frank Schaich (NOKIA, Germany)
Berna Sayrac (Orange, France)
Gerhard Wunder (Heinrich Hertz Institute, Germany)
Mehrdad Shariat (Samsung R&D Institute, UK)
Miurel Tercero (Ericsson, Sweden)
Maziar Nekovee (Samsung R&D Institute, UK)
Michael Färber (Intel Deutschland, Deutschland)
Tapio Rautio (VTT, Finland)
Miquel Payaró (CTTC, Spain)

Motivation and Background

The air interfaces for 2G, 3G, and 4G were all designed for specific use cases (limited only to voice and data communications) with a certain number of limited KPIs in mind (throughput, capacity, dropped/blocked call rates, etc.). However, 5G requires the support of a much broader class of services and consequently a very diverse family of devices and traffic characteristics. The scope of the workshop is to contribute to the design of a new 5G air interface taking specifically the above application constraints into account. An important subject of the workshop is the feasibility of a single golden air interface below 6GHz able to support these requirements in a highly flexible manner.

Moreover, there are promising vacant frequency bands available in what is known as mmWave bands above 6GHz. Communications in mmWave bands will bring new challenges and opportunities. In particular, mmWave channel characteristics in conjunction with the required highly directional antenna beams face antenna steering and propagation hurdles compared to lower frequency bands. This requires again a flexible and novel air-interface design to address all challenges.

Finally, it is also important to highlight that the implementation of the new 5G air interface for bands below and above 6 GHz will pose stringent requirements on the hardware platforms on top of which transceivers for network elements and user devices will be implemented. For that reason, an important topic dealt with in this workshop will be also be related to new concepts and solutions for highly performant, energy efficient and flexible hardware (both analogue and digital) in 5G networks.

Structure

The workshop shall include:

3-4 keynotes and invited speeches both from European industry and academia (outside 5GPPP).

The workshop has already attracted some interest from European ICT industry: **Rohde & Schwarz International GmbH** (prospective**EuCNC 2016 sponsor**) will provide a talk with perfect fit to the workshop focus:

Title: "mm-Wave Channel Sounding for 5G: Fundamentals, Measurement Techniques and Experimental Data Analysis"

Technical paper presentations (oral and/or poster presentation, depending on the number of submissions)

Panel discussion (members from industry and academia mainly outside 5GPPP to initiate **controversial discussions**)

Potentially demonstrators (e.g. in the form of software visualization of 5G RAN design concepts). There will be an interaction with the **booth presence** of the organizing projects.

WORKSHOPS

W04a: Workshop on Next generation fronthaul/backhaul integrated transport networks

Monday June 27th 2016 – 09:00-12:30 | ROOM KLEONIKI A

Organisers:

Arturo Azcorra (University Carlos III of Madrid, Spain)

Motivation and Background

The Fifth Generation of communication networks will not only focus on providing more bandwidth to the final user through a novel air interface, but will also work on redesigning the overall network infrastructure, including access, transport and core network segments, to achieve a network with a lower total cost of ownership while improving the service offer to the end-users.

Two key characteristics define this new generation of networks. On the one hand, the concept of multi-tenancy, where the network resources are shareable among different owners or tenants, will be an integral part of the design of future networks with the aim to reduce the CAPEX and OPEX and increase the resource utilization efficiency. On the other hand, networks will need to cater for the specific needs of each of the tenants. The customization of network services and characteristics will allow different network views (e.g. by the different tenants) to coexist on top of a common shared infrastructure.

This workshop aims at bringing together top-notch researchers in the area of fronthaul and backhaul integration under the umbrella of the EU H2020 5G-PPP 5G-Crosshaul project to share their ideas and research results, and hence create an opportunity for synergy in particular with other 5GPPP and H2020 5G projects, taking advantage of the EuCNC'16 venue that acts as central hub for European research.

Structure

The workshop will be structured as follows:

Session 1 (30min): Keynote presentation (20min) with Q&A (10min) – (Welcome: Arturo Azcorra, Keynote: industrial partner)

Session 2 (1h 30min): Technical presentations related to the project technical work – (Presenter: Several presenters)

Coffee Break

Session 3 (1 h 30 min): Technical presentations of the relevant FP7, H2020 and 5G PPP projects:

- 5G-NORMA
- 5G-Exchange
- 5G-Xhaul
- Flex5Gware
- NETIDE
- ACINO
- STRAUSS
- COMBO

Session 4 (30 min): Wrap up and conclusions

W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz

Monday June 27th 2016 – 14:00-17:30 | ROOM KLEONIKI A

Organisers: Jörg-Peter Elbers (ADVA Optical Networking),
Eckhard Grass (IHP Microelectronics),
Alain Mourad (Interdigital)

Abstract:

Increasing demands on data rate and latency drive the search for new architectures in the mobile front- and back-haul domain. The workshop will review architectural requirements, discuss challenges of current approaches and present converged x-haul solutions for 5G. Topics such as next-generation Cloud-RAN, modified functional splits between BBUs and RRHs, are in the focus of current research with the aim to reduce cost, data rate and timing accuracy in mobile front-haul. Novel data plane and control plane approaches for converged front- and backhaul will be discussed. The workshop will comprise invited presentations from network operators, mobile and optical equipment vendors, as well as academic institutions with subsequent Q&A possibilities. The presentations will be followed by a panel discussion aiming at identifying challenges, consenting viewpoints, comparing solutions, and exploring common areas of interest. An active participation from the audience is solicited.

Session I: 14.00-15.30h (6 slots with 12mins presentations + 3mins Q&A)

1) Konstantinos Filis, Cosmote: Trends in mobile networks

2) Zakaria Tayq, Orange: Fronthaul field trials and future trends

3) Chih-Lin I, China Mobile: No more “cells”

4) Thomas Deiss, Nokia: Fronthaul requirements of 5G mobile networks

5) Chenguang Lu, Ericsson: Bit-Rate Bound Derivation for compressed time-domain fronthaul

6) Daniel Münch, ADVA Optical Networking: Converged Ethernet for next-gen x-haul

Session II: 16.00h-17.30h (3 slots with 12mins presentations + 3mins Q&A, followed by a panel discussion)

7) John Govert, Viavi Solutions: Test & assurance implications for different front-haul network architectures and split options

8) Anna Tzanakaki, Bristol University: Optical transport for 5G in Bristol is Open

9) Arturo Azcorra, IMDEA: Control Plane Approaches for 5G Crosshaul in the 5TONIC Testbed

Panel Discussion with previous speakers (45 mins)

WORKSHOPS

W05a: Operators' Workshop on Optical-Wireless Integration

Monday June 27th 2016 – 09:00-12:30 | ROOM KLEONIKI B

Organisers:

Jorge Pereira (European Commission, DG CONNECT, Belgium)

Motivation and Background

Wireless and optical network research problems are often treated in isolation of each other by two distinct communities. Current wireless trends such as cell densification, coordinated communication, massive MIMO and millimetre-wave, pose a new set of challenges that require the joint consideration of optical and wireless network architectures. These problems are of direct impact to mobile operators, in fact to operators in general.

On the wireless side, the proliferation of small cells increases frequency reuse and is responsible for a major proportion of the gains in mobile network capacity. Moreover, new spectrum access modalities such as Licensed Shared Access (LSA) will soon open new bands for mobile broadband. This raises the need for smarter use of existing infrastructure and for smarter investment strategies based upon resource sharing, at least with Broadband access. On the optical side, network function virtualization and the concept of software-defined networks are revolutionizing the way that network resources are managed. We view virtualization on the optical side and densification and capacity increase on the wireless access as major game changers in future networks that should be co-designed on top of shared infrastructure. The aspect of joint experimentation is that more critical.

This workshop will bring together researchers from industry and academia, with focus on participation by mobile operators, to discuss trends, challenges and opportunities for research and development at the wireless/optical network boundary.

This Workshop is proposed by the H2020 project FUTEBOL (Federated Union of Telecommunications Research Facilities for an EU-Brasil Open Laboratory) together with the FP7 projects ACCORDANCE (Converged Copper-Optical-Radio OFDMA-based access Network with high Capacity and Flexibility), COMBO (Convergence of fixed and Mobile Broadband access/aggregation networks) and iJoin (Interworking and Joint Design of an Open Access and Backhaul Network Architecture for Small Cells based on Cloud Networks). A follow-up Operators Workshop will be organized in Brazil in 2017 by FUTEBOL.

Structure

- Introduction and Motivation (30')
- Operators' Perspectives (20' each)
  - Deutsch Telekom, DE
  - Orange, FR
  - OTE, EL
  - Portugal Telecom, PT
  - Telecom Italia, IT
  - Telefónica, ES
  - Telia, SE
- Q&A
- *Lunch Break*
- Trends, Challenges and Opportunities
  - short presentations from the projects (30' each)
  - ACCORDANCE -
  - COMBO -
  - iJOIN -
  - FUTEBOL -
- Q&A
- Panel Discussion with the Operators
  - Deployment Strategies
  - Infrastructure Sharing
  - New business models

W05b: Big Data for Reliable 5G Networking and Above 6 GHz

Monday June 27th 2016 – 14:00-17:30 | ROOM KLEONIKI B

COST Action IC1304 (ACROSS)
Hans van den Berg (TNO / University of Twente, Netherlands)
Rob van der Mei (CWI / VU University Amsterdam, Netherlands)

Motivation and Background

5G aims at bringing new, distinctive network and service capabilities fulfilling the needs of the future Internet of Things. Besides new radio access capabilities, network softwarization through emerging technologies such as Software Defined Networking (SDN) and Network Functions Virtualization (NFV) as well as Mobile Edge Computing (MEC) are introduced to provide the means and flexibility needed to reach the required performance and scalability targets in an efficient way. However, to actually achieve the full potential of future 5G networks, huge challenges regarding network and system management are faced. Data analytics and Big Data techniques exploiting data coming from countless network devices in forms of device logs, usage histories, media contents delivered over networks and so on, provide a promising direction to prevail these problems. The workshop addresses fundamental scientific challenges regarding the use of Big Data techniques for 5G network management. Specific topics of interest include Big Data for resource and service optimization, Big Data for QoS/QoE driven self-management, monitoring behavioural data while guaranteeing the users' privacy, etc.

Workshop Programme

14.00 – 14.30 **Rob van der Mei,** CWI / VU University Amsterdam, Netherlands
Opening and introduction to COST ACROSS

14.30 – 15.00 **Kostas Tsagkaris**, WINGS ICT Solutions, Greece
Big Data and Machine Learning for optimized telecom operations

15.00 – 15.30 **Jeroen Famaey,** University of Antwerp, Belgium
SDN-based load balancing in heterogeneous local area networks

15.30 – 16.00 *Coffee break*

16.00 – 16.30 **Fidel Liberal**, Univ. of the Basque Country, Spain
Big Data implications: C-RAN vs. MEC

16.30 – 17.00 **Periklis Chatzimisios**, Alexander Technological Educational Institute of Thessaloniki, Greece
Big Data-Driven Optimization for Mobile Networks toward 5G

17.00 – 17.30 **Martín Varela,** VTT, Finland
QoE in 5G Networks, from Large-scale Monitoring to QoE-driven Network Management

17.30 – 17.45 **Hans van den Berg,** TNO / University of Twente, Netherlands
Wrap-up and closing

WORKSHOPS

W06a: Network Management, Quality of Service and Security for 5G Networks

Monday, June 27th 2016, 09:00-12:30 | ROOM POSEIDON A

Organiser:

Robert Mullins (Waterford Institute of Technology, Ireland)

Motivation and Background

The reason for the workshop is to show case the work of the Network Management, Quality of Service and Security Working Group of the EU 5GPPP and also to present the newly developed whitepaper on these same topics as developed the projects involved in the Working Group.

The workshop will bring together the various contributing projects within the 5GPPP that are involved in this working group and also interested parties (projects and/or organisations) which have a common interest in the development and progression of the identified topics below:

Network Management:

Integration of Networking Technologies

Integrated & Cognitive Network Management

Virtual Network Platforms

Multi Domain Software Networks

Service Program and Orchestration

Network Softwarisation

Security:

Network Security, Protection and Resilience

Network Slicing

Network Integrity and Privacy

Quality of Services:

Metrics, Algorithms and Techniques for QoS and QoE of the Network & Services

SDN and NFV technology:

These will be core to 5G and the QoS and security of the network will depend heavily on the proper management and manipulation of these technologies.

Structure

The workshop will comprise:

1 keynote speakers: one keynote speaker from telco industry (operator or vendor).

Presentations of the White Paper launched by the Working Group

Papers

1. NFV Reliability with Machine Learning – (CogNet)
2. Using Machine Learning to Detect Noisy Neighbours in 5G Networks – (CogNet)
3. A New Radio Access Stratum Security Architecture Supporting Dynamic 5G Radio Access Networks – (5G Norma)
4. The SELFNET approach to Self Protection through Autonomic Network Management – (SelfNet)
5. An Energy Efficient Architecture for 5G Network Management – (CogNet)
6. Towards Micro Segmentation in 5G Network Security – VTT (5G Ensure)
7. A Monitoring Framework for Heterogeneous NFV/SDN Coud Environments – (SONATA)
8. Cooperative Caching in C-RAN using Bayesian Classification and Greedy Placement - (CogNet)

W06b: Workshop on Network Function Virtualisation (NFV) and Programmable Software Networks

Monday, June 27th 2016, 14:00-17:30 | ROOM POSEIDON A

Organizers:

Georgios Xilouris (NCSR Demokritos, Greece) | **Josep Matrat** (ATOS, Spain)

Carlos Bernardos (Universidad Carlos III de Madrid, Spain) | **Prof. Filip De Turck** (iMinds, Belgium)

Marinos Charalambides (University College London, UK)

Motivation and Background

The advent of Network Function Virtualisation (NFV), based on emerging resource and service virtualisation technologies enables the dynamic deployment and management of virtualised network functions (VNFs) within the network infrastructure. Moreover, the logical centralisation of the network control plane, separating it from the data plane, achieved via Software Defined Networking (SDN), allows for greater network programmability and dynamicity. In this context, major European research initiatives are delving into the aspects of network service virtualisation and programmability, aiming at significant cost efficiency, introduction of new services and transformation of the networking market.

A research ecosystem of horizontal and vertical R&D actions is being formed, which examines the impact and the capabilities of virtualisation and programmability across all networking domains: from core to edge and access, from wired/optical to wireless, cellular and also satellite.

This open workshop aims at reinforcing this European research ecosystem by strengthening the liaison between the participating projects, facilitating the exchange of ideas and helping each research group to take advantage of the results produced by other projects, improving focus of innovation and aligning towards common goals and milestones, thus maximising the overall impact. The workshop will provide the links between currently active projects funded under the FP7 scheme and new 5G-PPP projects conducting research in the areas of SDN and NFV technologies, empowering effective knowledge transfer, potent partnerships and mutual collaboration amongst them.

The workshop is endorsed by the Software Networks Working Group of the 5G-PPP (https://5gppp. eu/), and supported by participating projects and partners. The participants will have the opportunity to exchange ideas, share hands-on experience and solutions and discuss research results. The workshop will aim in extending collaborations and paving common exploitation strategies. The structure of the workshop is based on invited presentation from FP7 and H2020 projects that operate on the same focus area, followed by breakout sessions on particular subjects allowing immediate interaction between the delegates and facilitating the exchange of expertise and best practices in the field.

Structure

Management of Software-based Networks, Marinos Charalambides (UCL) – FP7 - Flamingo

Ethernet OAM and SDN:a matching opportunity, Luca Cominardi (InterDigital) – H2020 – 5G Crosshaul

Superfluidity: A Flexible Functional Architecture for 5G Networks, George Tsolis (Citrix) – H2020 – Superfluidity

Virtualization and Control in Multi-Provider Environment: the 5G Exchange approach

Carlos J. Bernardos (Universidad Carlos III de Madrid) – H2020-5GEX

NetIDE: SDN applications by means of integration and orchestration of SDN controllers, Dr. Pedro A. Aranda Gutiérrez (TID) – FP7-NETIDE

T-NOVA: Network Functions as-a-Service over virtualized infrastructures, George Xilouris (NCSRD) – FP7 T-NOVA

DevOps for Network Function Virtualization: The SONATA Approach, Josep Matrat (ATOS) – H2020-SONATA

CHARISMA Control, Management and Orchestration platform, Eleni Trouva (NCSRD) – H2020-CHARISMA

Multi-domain/technology Service Function Chain Orchestration based on SDN and NFV, George Agapiou (OTE) – FP7 – UNIFY

SDN/NFV-based service function chaining at the terminal side of the satellite link,
Thierry Masson (One-Access) – H2020-VITAL

TUTORIALS

Tutorial 1: RINA: a future-proof approach towards re-architecting the infocomms protocol stack supporting Cloud, IoT and beyond 5G requirements

Monday, June 27th 2016, 09:00-12:30, ROOM POSEIDON B

Speakers

Miquel Tarzan (Fundació i2CAT, Spain)

Dimitri Staessens (iMinds, Belgium)

Peyman Teymoori (University of Oslo, Norway)

Vladimir Vesely (Brno University of Technology, Czech Republic)

Leonardo Bergesio (Fundació i2CAT, Spain)

Vincenzo Maffione (Nextworks, Italy)

Motivation and Context

RINA is the only complete network architecture proposed to date that departs fundamentally from the assumptions and design decisions underpinning the current Internet protocol suite. RINA is based on a strong theory that not only describes computer networking but also the fundamentals of distributed computing. The simplicity and elegance of RINA's structure provides a general solution for many of the problems that today can only be mitigated under certain circumstances using point solutions, such as multi-homing, mobility, security or quality of service. Therefore, RINA has the potential to become a real revolution in computer networking; allowing the field to move from an artisan approach – in which knowledge is based on experience and tradition – to a more scientific one - in which network architects have models to reason about their designs before actually building them.

EUCNC 2016 provides a very good timing and venue for a RINA tutorial. RINA is already gaining momentum in Europe, where the European Commission has funded a number of research projects such as IRATI, IRINA, PRISTINE or ARCFIRE (starting January 2016). US-based RINA activities have also been funded by the National Science Foundation, including experimental activities on GENI testbeds. Institutions in Mexico and Brazil are also involved in RINA research and education. RINA standardization activities are being discussed under the auspices of the ISO SC6 WG7('Future Networks'), and may be of interest to ETSI under the Next Generation Protocols ISG, whose goal is to discuss sustainable alternatives to the current TCP/IP networking protocol suite.

Moreover, a number of open-source tools such as an OMNeT++ RINA Simulator or the IRATI implementation for Linux/OS are becoming more mature and fit for the purpose of education and experimentation. Tutorials and detailed examples explaining how to reproduce RINA results reported in scientific publications are also becoming available.

Tutorial 2: Energy-Neutral System-Level Analysis and Optimization of 5G Wireless Networks

Monday, June 27th 2016, 14:00-17:30 | ROOM POSEIDON B

Speakers

Alessio Zappone (Technische Universitat Dresden, Germany)

Marco Di Renzo (Paris-Saclay University, France)

Eduard Jorswieck (Technische Universitat Dresden, Germany)

Motivation and Context

The Internet of Things (IoT) will connect billions of devices by 2020. Such systems suppose batteries and/or energy harvesting from the environment, which also bets for very low energy devices. In order to enable IoT service capabilities, 5G wireless networks will need to bring a drastic energy efficiency improvement and will need to develop energy harvesting capabilities. This energy chase will cover low energy devices and network elements, and will rely on the availability of renewable energy sources, dedicated power sources, as well as the possibility of harvesting energy directly from the radio waves that are primarily used for data transmission. This leads to a new design space, where the availability of energy is not deterministic anymore but may depend on environmental factors, the interference may not necessarily be harmful as it may be a natural source electromagnetic-based power to be used for replenishing the batteries of low-energy devices, and the intended signals may be exploited for both data transmission and energy harvesting.This paradigm-shift introduces a new concept in the design of 5G wireless networks: energy-neutral networks are systems that not only make an efficient use of the available energy, but, more importantly, that operate in a complete self-powered fashion. The present tutorial provides the audience with a complete survey of the potential benefits, research challenges, implementation efforts and application of technologies and protocols for achieving energy-neutrality, as well as the mathematical tools for their modeling, analysis and optimization. This tutorial is unique of its kind, as it tackles both system-level modeling and optimization aspects, which are usually treated independently. Special focus will be put on two methodologies for enabling the system-level modeling and the system-level and distributed optimization of energy-neutral 5G wireless networks: stochastic geometry and fractional programming. In the proposed tutorial, we illustrate how several candidate transmission technologies, communication protocols, and network architectures for 5G can be modeled, studied, optimized, and compared for their energy-neutral operation. This is the reason why this tutorial is expected to be of interest for people working both in academia and industry: it is intended to bridge theory and practice. It is, in addition, inspired by the keynote speech gave by Nicolas Demassieux (Orange Labs, France) at EuCNC 2015 that was held in Paris last year. It embraces, in fact, his dream that future networks (5G) are conceived by taking into account energy efficiency by design rather than by tweaking a capacity-optimized system. His motto was: "...from 7 AM in the morning, think energy first and then capacity... it is a change of mindset..." (https://www.youtube.com/watch?v=CCrp_tQpFc0&feature=player_embedded#t=399). The proposed tutorial, as a result, is expected to gather the interest of the attendees of EuCNC 2016, as it will present several solutions to make 5G networks energy-autonomous, by optimizing the use of energy resources and by simultaneously taking advantage of all available energy sources (renewable, man-made radio frequency, etc.).

TUTORIALS

Tutorial 3: Emerging topics in 5G networks: spectral and energy efficient network architecture, transceiver and algorithm design

Monday, June 27th 2016, 09:00-12:30 | ROOM POSEIDON C

Speakers

Marco Maso (Huawei, France)

Muhammad Ali Imran (University of Surrey, UK)

Motivation and Context

The deployment of every new generation of cellular networks is typically preceded by both an analysis of the issues affecting the current generation and the identification of new technological challenges. The importance of this step is evident at the dawn of the development of the Fifth generation (5G) network. One of the biggest concerns for both the telecommunication industry and the operators in view of 5G is to achieve the expected overall spectral efficiency enhancement, all the while minimizing both the additional operational/capital expenditure and the carbon footprint of the information and communication technology infrastructure. The development of new algorithms, resource management policies, transceivers and in general network technologies is seen as a necessary step to take to achieve the expected performance increase. As a matter of fact, such development will come at a non-negligible cost for operators. In this context, spectral and energy efficiency will be key metrics to assess the performance of the future network, whose deployment should be both spectral and energy efficiency aware. The reason is very simple and can be undertsood by taking a step back and focusing on the world's information and communication technology ecosystem as a whole. A mid–range estimate of its annual electricity consumption is around 1500 TWh. To contextualize this impressive figure, it is sufficient to consider that this quantity is actually equal to all the electric generation of Japan and Germany combined, or alternatively to the consumption of the global illumination system in 1985. As a matter of fact, ICT approaches 10\% of the current world electricity generation, or in other terms 150\% of what is generated for global aviation. In this tutorial, we start by providing an overview of these problems and discuss novel solutions and paradigms functional to achieve the expected future network performance and end-user quality-of-experience.

Tutorial 4: COST: Fundamentals of Coding for Network Coding and Applications

Monday, 27 June 2016, 14:00-17:30 | ROOM POSEIDON C

Speakers

Marcus Greferath (Aalto University School of Science, Finland)

Ángeles Vazquez-Castro (Autonomous University of Barcelona, Spain)

Motivation and Context

The fundamental motivation of this proposal is the dissemination of the work and results of the COST Action IC1104 with title Random Network Coding and Designs over GF(q). This COST Action is coming to the end in April 2016 after four successful years during which a number of results of very high interdisciplinary nature have been produced and published. The tutorial will provide an account of the deep fundamentals of network coding, coding over network coding and latest results. Practical applications will be also introduced showing how network coding technology can provide actual solutions to technological challenges in the framework of 5G trends in networking. We believe this interdisciplinary tutorial can attract the innovation community at EUCNC, both from industry and academy.

CLOSING SESSION

Thursday June 30th | 12:30-13:30 | ROOM ARISTOTELIS

EuCNC Best Paper Award

EuCNC/EURASIP Student Best Paper Award

EuCNC/EURACON Student Best Paper Award

EuCNC Best Booth Award

EuCNC2017 Presentation

Status update on the 5GPPP Collaboration – Moving Ahead

Next Steps and Concluding Remarks, European Commission

Special Issue on "Green Engineering and Energy Efficiency in the context of 5G"

Context. This special issue is based on - but not limited to - selected papers presented at the European Conference on Networks and Communications (EuCNC 2016), to be held in Athens, Greece, on June 27-30, 2016.

EuCNC aspects. EuCNC 2016 is the 25th edition of a successful series of a technical conference in the field of telecommunications, sponsored by the European Commission. The focus of the conference ranges from the physical layer to all types of supported applications, with particular focus on 5G technologies.

Theme and Scope. The conference tracks are:

Air Interfaces (PHY, MAC, RRM)

Optical Communications – Networks

Software-Defined Infrastructures

Management Technologies

Convergence with Emerging Concepts

Business Aspects - Vertical markets - Applications/ Services

Testbeds and Experimental Research

Paper selection. Selected best papers from all EuCNC2016 tracks presented at the conference will be invited for submission to the special issue of the Journal of Green Engineering, **given that these papers are relevant to green engineering and/or energy efficiency in the context of 5G**. A significantly extended version of these papers will be submitted and additional reviews will be made, according to the Journal's rules. Papers submitted to the special issue are subject to no Article Processing Charges.

More information can be found on the journal website: http://www.riverpublishers.com/journal.php?j=JGE

Important Dates

Conference dates: June 27-30, 2016

Manuscript submission deadline: August 29th, 2016

Notification of Acceptance/Rejection/Revision: September 30th, 2016

Final papers submission deadline: October 21st, 2016

Tentative Publication Date: 4rd Quarter, 2016

Guest Editor

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Special Issue on Emerging Air Interfaces and Management Technologies for the 5G Era

EURASIP Journal on Wireless Communications and Networking welcomes submissions to the new thematic series on "Emerging Air Interfaces and Management Technologies for the 5G Era ".

This Special Issue originates from the international conference EuCNC2016, which was held in June 2016 in Athens, Greece. Initially, it publishes some key contributions presented at the conference describing different aspects in the most recent 5G activities in the areas of Air Interfaces and Management Technologies. The series continues with further articles in the context of the same area.

5G (5th Generation) mobile networks/wireless systems are the next step of mobile telecommunication standards, offering services and speed far beyond what 4G may offer. The most recent research activities focus on the development of 5G communications and networks, aiming to be fully available for the consumers through their devices by 2020. The scope of this Special Issue is to focus on aspects like 5G communications and networks technologies and more specifically Air Interfaces and Management Technologies.

Papers originating from **EUCNC** that wish to be considered for this special issue should contain additional scientific material (The editors suggest at least 1/3) , with written content that is significantly different from its conference counterpart.

Potential topics include, but are not limited to:

Air Interfaces (PHY, MAC, RRM):

- 5G air interfaces.
- Advanced modulation schemes, new coding solutions, FEC, HARQ, PAPR optimisation.
- Advanced Radio RRM and MAC functions.
- Antennas and propagation.
- Cloud-RANs, fronthaul/backhaul aspects.
- Communications at the mm wave range.
- MIMO advances.
- Multi-service (MBB, MCC, MTC, etc.) support.
- New air interfaces below 6GHz.
- Integration through wireless and fixed optical access technologies in the context of ubiquitous 5G access.
- Integration of radio and optical access technologies in the context of ubiquitous 5G access.
- Management Technologies:
- Autonomic network management.
- Big Data, analytics, predictive and prescriptive technologies.
- Cognitive and self-learning mechanisms.
- Energy-efficient networks/infrastructures.
- Management architectures and frameworks.
- Management of resources, services and customer experience.
- Resilience and network reliability.
- Security, trust, and privacy.

Submission instructions:

Before submitting your manuscript, please ensure you have carefully read the Instructions for Authors for *EURASIP Journal on Wireless Communications and Networking*. The complete manuscript should be submitted through the EURASIP Journal on Wireless Communications and Networking submission system. To ensure that you submit to the correct thematic series please select the appropriate section in the drop-down menu upon submission. In addition, indicate within your cover letter that you wish your manuscript to be considered as part of the Thematic Series on Emerging Air Interfaces and Management Technologies for the G5 Era. All submissions will undergo rigorous peer review and accepted articles will be published within the journal as a collection.

Deadline for submissions: 5 October, 2016

Lead guest editor:

Panagiotis Demestichas, University of Piraeus, Greece

Guest editors:

Emmanuel Protonotarios, National Technical University of Athens, Greece

Bernard Barani, European Commission, Belgium

Didier Bourse, Nokia, France

Victor C.M. Leung, The University of British Columbia, Canada

Exhibition Opening hours

Tuesday 09:00 – 18:00
Wednesday 09:00 – 18:00
Thursday 09:00 – 12:30

STAND 01 | NATIONAL INSTRUMENTS

Prototyping the future of 5G Communications

Every year the number of wireless enabled devices and the amount of data consumed continues to grow at an exponential rate. As these devices create and consume growing amounts of data, the wireless communications infrastructure that connects these devices must evolve to support the demand NI is providing tools and technologies for prototyping and defining this new frontier for wireless communications.

A multitude of novel use cases are foreseen for 5G wireless systems and in this context, an equally large number of requirements have emerged. National Instruments is committed to provide researchers with prototyping platforms that facilitate the early assessment of performance trade-offs of new algorithms and technologies in practical environments.

Three particularly interesting aspects are demonstrated:

1. A rapidly expanding mmWave prototyping solution for the highest radio frequency band in practical use today.
2. A real-time implementation of 4G LTE as a starting point for 5G physical layer prototyping.
3. A real-time prototyping and simulation platform for end-to-end 5G wireless networks.

STAND 02 | ROHDE & SCHWARZ

Rohde & Schwarz

For more than 80 years, Rohde & Schwarz has stood for quality, precision and innovation in all fields of wireless communications. The privately owned company is strategically based on five pillars: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. The electronics group, headquartered in Munich (Germany), has a global presence and is among the world market leaders in all of its business fields.

STAND 03 | NETIDE

NetIDE – Controller Independence supporting composed SDN Applications

Tinku Rasheed (Create-Net, Italy)

The current SDN (Software-defined Networking) landscape is extremely fragmented. Different open and closed source controller frameworks eg, OpenDaylight, Ryu, Floodlight or ONOS exist. Porting SDN applications between platforms is time-consuming requiring significant effort. This is especially true in upcoming SDN/NFV-enabled 5G systems where network segments will be supported by different SDN controllers. Consequently, SDN users (e.g. mobile operators) face the danger of vendor/platform lock-in, confined to applications working for the platform of choice, or forced to re-implement their solutions when they choose a new platform. NetIDE provides an interesting approach for network operators to explore application-centricity and application-nativeness for future 5G network deployments.

The main objective is to demonstrate the mature technologies developed in NetIDE. The NetIDE's Development Environment allows application/network developers to design the network topology and to build network applications through composition of multiple modules.

Once deployed onto the NetIDE Network Engine, modules implemented for different controller frameworks (ODL, RYU, Floodlight) cooperate as a single SDN application controlling the network.

The network application can even be updated at runtime by adding new modules and by dynamically reloading the composition specification.

Demo: The NetIDE demonstration consists of four main parts:

Demonstration of the NetIDE Development Environment and its capabilities to build network applications

Demonstration of the capabilities of the NetIDE Network Engine

Demonstration of runtime tuning of the network applications by stopping/starting/adding modules and reloading the composition specification

Demonstration of the NetIDE debugging toolset implanted for testing and profiling the network application.

STAND 04 | METIS II

METIS-II 5G Visualisation

Olav Queseth (ERICSSON, Sweden)

In the demo we will show the current status of the visualization platform based on Unity 3D as well as a few examples of technologies developed in the project, together with an overall presentation of the project. The use of the UNITY 3D tool will be used for a simplified simulation of the technology components developed in METIS-II and other 5G-PPP research projects allowing the person operating the tool for real time interaction with simulated environment.

STAND 05 | RESCUE

Exploiting Lossy Links in 5G Communications

Hicham Khalifé (Thales Communications and Security, France)

The constant increase in the number of devices as well as the exponential growth in the exchanged data volumes make the future networks highly dense in terms of number of nodes and conveyed traffic. In a wireless environment, this density challenges today's wireless communication techniques and protocols and calls for new interference mitigation strategies. A major requirement for 5G becomes offering robust, efficient and low latency information transfer over such dynamic and complex networks. We aim to influence with our solution 5G researchers and stakeholders and impact future wireless standards mainly 5G and IEEE802.11x.

Demo: We propose to demonstrate our new communication paradigm called Links on the fly (LOTF) which is based on distributed joint source channel coding, lossy forwarding relaying and advanced network protocols, through an integrated and fully operational proof of concept. Our demo aims to highlight how LOTF enables communication over lossy links in a set of scenarios and configurations where communication with state of the art solutions is deemed impossible. It is our target to convince 5G stakeholders and influence future wireless standards.

Our demo will highlight the feasibility of the new LOTF concept based on a practical testbed consisting of up to 4 ETTUS USRP radio devices and the open software platform GNU Radio. On top of these devices, we will run our designed PHY and MAC layers protocols. The results will be displayed in an intuitive and easy to understand manner through a picture transmission whereby speed and quality of the arriving pictures illustrate the performance gain of our solution compared to baseline concept. The demo will be interactive and intuitive. Surrounding 3-4 posters and a video detailing in an accessible way the LOTF concept and its practical validation.

STAND 06 | MECANEX

Multimedia Annotated Content in Multi-Screen Environments

Symeon Papavassiliou (Institute of Communications and Computer Systems, Greece)

The technologies to be adopted and demonstrated, either explicitly or implicitly, include:

- Multimedia content analysis and automatic annotation
- Editorial process and tool aiming at providing both content and semantic enrichments
- Multiscreen technology and toolkit, providing a rapid prototyping environment for multiscreen client applications in a device and platform independent manner
- Personalization, relevance feedback and social recommendation in order to improve user's (viewer's) Quality of Experience.
- Use cases and exploitation applies to both business-to-customer (b2c) and business-to-business (b2b) applications.
- Demonstrate the operation of a combined toolkit with the following features:
- Enabling the Automatic Annotation and Editorial Process during the creation, production and postproduction of multimedia content.
- Providing Search and Retrieval Mechanisms for existing enriched multimedia content that could be used as building blocks of a fast innovative creative process.
- Pairing Created Metadata with Multimedia Content enabling interactivity through clickable video and access to relevant educational and recreational content.
- Delivering a Multi-screen Tool enabling automatic porting to different target platforms, such as regular web pages, mobile pages and mobile apps as wells as TV applications.
- Exploit Relevance Feedback, Personalization and Social Recommendation Mechanisms, allowing targeted advertising.

Demo: We will demonstrate a toolkit where multimedia content after creation, is enriched and expanded with content allowing playback in multi-screen environments, as well as providing access to enriched content and relevant online material. Focus will be placed on Content and context- Aware Second Screen Advertising experiences delivered to users. Exploiting the annotated multimedia content that users are currently watching, and driven by the social recommendation and personalization tool the media delivery platform can identify and provide the most relevant advertisement content, ensuring campaigns optimization. We will demonstrate the operation of Multimedia Content Annotations for Rapid Exploitation in Multi-Screen Environments toolkit that consists of the following key components/tools: a) the automatic annotation and editorial tool, b) the multi-screen tool and c) the social and personalization tool. User(s) can search for a specific video and during the display, they are presented with personalized advertisements. Multiscreen environment is used for displaying (or single screen may be split into the following areas): i) Recommended Videos; Section which presents videos similar to the one they are currently watching (based on social recommendation and personalization tool); ii) Side Advertisements; Modules that display offerings linked to the selected video (based on proper tagging).

STAND 07 | ADEL

Advanced Dynamic Spectrum 5G mobile networks Employing Licensed shared access (ADEL): Proof-of-concept Demonstrations

Constantinos Papadias (Athens Information Technology, Greece)

ADEL
Advanced Dynamic spectrum
5G mobile networks Employing
Licensed shared access

Licensed Shared Access has been proposed in order to enable the shared use of frequency resources allocated to an Incumbent Operator by one or more Licensee Operators. LSA promises to relieve the spectrum crunch experienced by the wireless communications industry. FP7 project ADEL is at the forefront of LSA research, having developed an end-to-end architecture as well as novel collaborative sensing, cooperative communication, and resource allocation protocols to extend LSA beyond today's state-of-the-art spectrum sharing practice.

Demo: This demo will serve as proof-of-concept of FP7 ADEL project's approach to Licensed Shared Access (LSA). ADEL advocates LSA that is dynamic, allows homogeneous types of service by the incumbent and licensee operators and even spectrum co-existence between them. The demo will focus on the following key items:

1. Over-the-air demonstration of collaborative sensing and spectrum co-existence

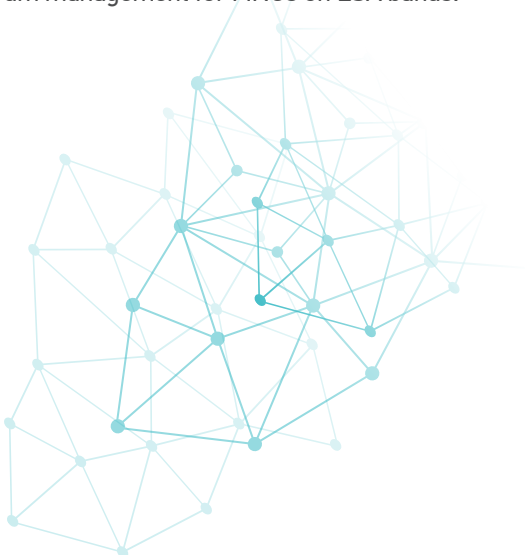
This part of the demo, contributed by Athens Information Technology (AIT) will consist of two phases: in Phase 1), two Licensee access points, each equipped with a 6-sector antenna array, will perform collaborative sensing in order to detect the presence of incumbent activity. The spatial dimension enabled by the employed parasitic antenna arrays will allow much improved detection probability and reduced false alarm rate. In Phase 2), both incumbent and licensee transmissions will take care simultaneously by dynamic spectrum allocation based on the sensing achieved in Phase 1). The demo will show how spectrum can be shared dynamically in a way that provides good QoS to both incumbent and licensee operators by use of these technology components (antenna array-assisted collaborative sensing and spectrum allocation).

2. Reciprocity attainment in TDD MIMO systems for reduced channel sharing requirements

This part of the demo, contributed by Institut Eurecom, aims at achieving good channel reciprocity in MIMO time-division duplexing (TDD) systems. Channel reciprocity is important in order to drastically reduce the sharing of channel information needed between multiple cooperating nodes is spectrum-coexistence networks, such as the LSA networks studied in ADEL. However, the Tx and Rx radio frequency (RF) frontends in transceivers are usually not symmetric, which breaks the channel reciprocity seen from the digital processing domain. Calibration is thus needed to compensate this hardware non-symmetry, so that the base station can assess CSIT from UL channel estimation. This demo will showcase techniques of calibrating hardware non-symmetry internally at the base station for a MIMO system. We will illustrate that the beamforming performance based on the proposed calibration method greatly outperforms the case where calibration is not used, and can almost achieve the performance when ideal CSIT is known.

3. System-level demonstration of spectrum management in LSA networks

The final part of the ADEL demo includes a video to introduce the viewer to the concept of Licenced Spectrum Access (LSA) within the ADEL context and a Graphical User Interface (GUI) to show the results and findings on LSA. The GUI is based on an off-line presentation illustrating the main contributions of ADEL to spectrum management for MNOs on LSA bands.



STAND 08 | KEYSIGHT TECHNOLOGIES

Keysight's 5G solutions - Evolution. Revolution. Reality

The development of 5G depends on up-to-date tools that let designers easily explore new signals, scenarios and topologies. Keysight's 5G solutions are ready to enable deeper insights as development evolves with the standard. In design and test, Keysight is enabling industry leaders to innovate across new and existing technologies as they transform ideas into reality.

STAND 09 | COST

COST - European Cooperation in Science and Technology

Chris Irons (COST Association, Belgium)

To promote COST and to illustrate how the large scale interdisciplinary networking of researchers across Europe (and beyond) and systematic knowledge sharing, can give a strong impetus to the development of ideas and strategies with respect to Information and Communication Technologies in general and, particularly to the conference topics such as: network technologies, spectrum sharing, etc... We plan to demonstrate the added value of bottom-up, open research initiatives through the presentation of several COST Actions as well as the disseminated information.

Demo: At the COST Booth, you will learn that COST Actions are:

- bottom-up science and technology networks
- open to researchers and stakeholders
- with a duration of four years
- active through a range of networking tools (workshops,-conferences, training schools, short-term scientific missions (STSMs) and dissemination activities)

STAND 10 | EUROPEAN COMMISSION

STAND 11 | PROTEUS

Embedded and Cloud-based software for smarter (reactive, predictive, cognitive) Smart Systems for Water Monitoring

Panagiotis Vlacheas (WINGS ICT Solutions, Greece)

The size and diversity of the networks requires availability of sensors in large number, while a very strong constraint on the final cost of water requires that the cost for monitoring means is relatively low. At the same time, due to dynamics in water networks, they should be able to evolve, while in use if possible. To that respect, long-term management of water resources requires widespread, low-cost monitoring means with highly differentiated requirements and adaptive capabilities.

In the context of Proteus project, WINGS is developing software (embedded and non-embedded), which comes to offer on the one hand, the required adaptability that enables a single device architecture to support several, highly differentiated applicative goals related to water network monitoring, and on the other hand, the cognitive capabilities that manage evolving contexts and requirements during exploitation even in a predictive manner.

Demo: The scope of this demo is to present the Software Integrated Prototype developed by WINGS. We introduce the hardware platform used for the prototyping of the smart system and we present the demonstration and testing scenarios targeting the innovations listed below:

- To enable reactive capabilities in the smart system.
- To enable predictive capabilities in the smart system.

STAND 12 | CHARISMA

5G-PPP CHARISMA Project

Eduard Escalona (Fundació i2CAT, Spain)

CHARISMA's objective is the development of an open access, converged 5G network, via virtualised slicing of network resources to different service providers (SPs), with network intelligence distributed out towards end-users over a self-similar hierarchical architecture. Such an approach offers a means to achieve important 5G key performance indicators (KPIs) related to low latency, high and scalable bandwidths, energy efficiency and virtualised security (v-security). CHARISMA integrates such diverse technologies into a single architecture with SDN and NFV advancements.

Demo: Three demos will be performed:

Demo1: Showcase of multi-tenancy in open access networks;

Demo2: Demonstration of an end-to-end security management automation mechanism for 5G networks;

Demo3: Development of physical access technologies for low latency video caching application.

Demo1 will show an open access scenario with network slicing isolation, multi-tenancy functionalities and an active node at the Optical Line Termination (OLT) for distributed computing; Demo2 will present the detection and neutralization of a DDoS attack performed against a 5G network targeting an end-user application running over virtualized computing infrastructure. Demo 3 will demonstrate a video caching use case with low latency physical layer implementation based on 60Ghz wireless and GbE through various CHARISMA Aggregation Level's with their local intelligence and data processing functionalities.

STAND 13 | SOLDER

SOLDER – Spectrum OverLay through aggregation of heterogeneous DispERsed Bands

Florian Kaltenberger (Eurecom, France)

The goal of SOLDER is to develop technology and systems, which will provide the efficient aggregation of non-continuous dispersed spectrum bands licensed to heterogeneous networks (HetNets) and heterogeneous Radio Access Technology (h-RATs).

Several proof-of-concepts are being developed in the SOLDER project. In this demo we will present the new features of OpenAirInterface, that make it simpler than ever to use it for LTE-compliant spectrum-agile experimentation. These include the implementation of the Release 10 carrier aggregation features as well as an API that lets users implement their own scheduling algorithms and plug them directly into OpenAirInterface.

Demo: OpenAirInterface (OAI) provides an open-source standard-compliant implementation of LTE Release 10 for UE, eNB, MME, HSS, SGw and PGw on standard Linux-based computing equipment (Intel x86 PC/ARM architectures) that can be used in conjunction with off-the-shelf SDR platforms such as USRP, Blade RF, Sodera, and ExpressMIMO2. The platform can be used for real-time experimentation and is interoperable with commercial equipment. The demonstration will showcase the carrier aggregation features of OAI together with a test UE from Sequans.

STAND 14 | NORMA

"5G-NORMA HW- and SW-based demos"

Miguel A. Puente (Atos, Spain)

Current centralized mobile network solutions have been designed with a network architecture which is static and fixed in nature. However such a static network design is not future-proof since increasing demands for high throughput and low latency can only be catered properly with a more flexible design approach. Such flexible network architecture should allow fast and easy reconfiguration to meet the future 5G service requirements (e.g. E2E network latency of a few ms). In order to enable this kind of flexibility and service-aware functionalities, a new network architecture design and innovative and novel concepts need to be developed.

Demo: There are two different demos, so the objective is twofold:

To represent the performance of a flexible and service-dependent radio access network (RAN) as one of the key innovations of 5G NORMA project. The radio resource management (RRM) functionality will be placed in different network locations taking into account the user service requirements and network characteristics. Additionally, the (de-)centralized radio resource management algorithm will optimally adapt the user resource utilization on the traffic load fluctuations and inter-cell interference conditions.

To show the E2E latency impact of function decomposition and relocation moving the network functions closest to the end users. Current EPC components will be moved into the eNB baseband board, enabling local traffic routing.

There are two different demos, namely a SW-based demo and a HW-based demo:

The SW-based demo deals with multi-service and con-

text-aware scheduling. Using a network simulator, we simulate two different services, i.e. HD-video streaming traffic for pedestrians and car-to-car communication via infrastructure (V2X). We demonstrate that by re-locating the RRM unit to a central cloud, the throughput for HD-video users will be improved due to the interference mitigation using a centralized coordinated scheduling, whereas on the other hand for autonomous driving service shifting the mobile network functions to the network edge improves the end-to-end latency as the key service requirements for such a time-critical service.

A video will show the HW-based demo, where a scale model rally car is driven using a commercial tablet as the steer, both connected to the LTE eNB, in two different situations. In the first one the EPC routing components (S-GW) are moved into the eNB baseband board. This solution guarantees the lowest latency possible with this HW setup and the video shows that it's possible to drive remotely the car with a very good control feeling. The second situation mimics a commercially deployed LTE network, in which an average e2e latency of hundreds of ms is experienced. The driving experience is very bad due by the great delay between the command and the response of the model car.

STAND 15 | MiWaveS

MiWaveS: 5G Heterogeneous Networks with mmWave small-cell access and backhaul

Laurent Dussopt (CEA, France)

The booth will present the activities carried out in the project MiWaveS (www.miwaves.eu) on millimeter-wave technologies for access and backhaul communications in 5G wireless mobile networks. MiWaveS is currently the largest European project focused on mm-wave technologies for 5G, an area attracting many interests nowadays in Europe as well as US and Asia. The project is in its final year (01/2014-12/2016) and we will be able to present significant results obtained on HetNet design and mm-Wave wireless technologies at 60 GHz and 71-86 GHz for high-data rate access and backhaul.

The objective is to communicate on the activities carried out in MiWaveS and present the results obtained to date as well as the demonstrations planned by the end of the project on the implementation of mm-wave wireless access and backhaul links using 60-GHz and 71-86 GHz radios and antennas developed by the partners. If other EU projects involved in mm-waves, like mmMAGIC, MiWEBA and E3Network, organize their own booth, there would be an interest to have them adjacent to ours in order to highlight the complementarity of these projects and the involvement of the EC in this field.

Demo: We plan to exhibit hardware prototypes of mmWave radio transceivers and antennas operating at 60 GHz and 71-76 GHz as well as live videos of demonstrations of high throughput wireless access and backhaul links in these frequency bands. Posters and brochures will support the material exhibited in the booth.

STAND 16 | NOKIA

NOKIA

NOKIA will present demos showing the evolution to telco cloud and 5G architecture::

- Shared Data Layer optimizes cloud architecture to realize full benefits of telco cloud
- 5G industrial automation / cooperative robots

STAND 17 | iKaaS

iKaaS (Intelligent Knowledge as a Service)

Dimitris Kelaidonis (WINGS ICT Solutions, Greece)

The success of the IoT world requires service provision attributed with ubiquity, reliability, high-performance, efficiency, scalability. Towards this goal, iKaaS merges IoT with Cloud Computing concepts by combining global and local clouds, security gateways, communication interfaces, storage units and applications for the realization of an intelligent Knowledge-as-a-Service platform. The introduction of cognition was the first step for the IoT success, as it brought essential self-management/ awareness. iKaaS aims to proceed to the next vital step for the IoT success and for new business value propositions for the IoT world combined with cloud principles.

iKaaS develops an intelligent, privacy preserving and secure Big Data resource and analytics engine built atop a multi-cloud infrastructure that will be fed with large scale ubiquitous data collected from heterogeneous sensing networks and data sources. The objective of the demo is to showcase through the pilots and applications focusing on smart city and smart health aspects, the power of the iKaaS platform, in terms of combining Local and Global Clouds to provide optimal service deployment, smart virtual object as a service and Knowledge as a Service for building innovative, cross-border, situation-aware applications.

Demo: Aspects of iKaaS pilots will be showcased: i) environmental health in Madrid; ii) town management in Tago - Nishi. Demonstrated applications include: i) a town management application, which is provided by using virtual reality technology and head-mounted display to enhance the user experience in immersive environment; (ii) an assisted living application where the iKaaS platform is exploited for services to improve the quality of life of elderly/disabled individuals. The security gateway concept will be showcased, providing access control to each local cloud while interpreting the differences in regulations between countries.

STAND 18 | NOVA - VITAL

NFaaS in terrestrial and satellite networks

George Xilouris (NCSR Demokritos, Greece)

T-NOVA: NFV is creating new opportunities for software companies to enter the networking market. T-NOVA introduces a novel NFV Marketplace, focused on lowering entry barriers to the telecom market for developers and SMEs, who will use T NOVA to offer innovative virtual network appliances, and to monetize their offerings. T-NOVA also provides a common intersection point between developers and telecom operators, leading to more performant networks and reducing time-to market for innovative services. VITAL: The combination of Terrestrial and Satellite networks by bringing Network Functions Virtualization (NFV) into the satellite domain and by enabling Software-Defined-Networking (SDN)-based paves way for a unified control plane that would allow operators to efficiently manage and optimize the operation of hybrid SatCom-Terrestrial networks.

Demo: With respect to T-NOVA demo, the objective is to demonstrate the concept of Network Function as-a-Service (NFaaS) implemented by T-NOVA. The demo will demonstrate the VNF offerings via the Marketplace, the composition of NS and finally the provision and deployment and operation of an example Network Service over the T-NOVA Pilot infrastructure.

With respect to VITAL demo, the objective is to enable NFV into SatCom domain, which will provide the operators with appropriate tools and interfaces in order to establish end-to-end fully operable virtualised satellite networks to be offered to third-party operators/service providers. The demo focuses on developing around three key application scenarios: Satellite Virtual Network Operator (SVNO) services, Satellite backhauling and hybrid telecom service delivery.

The T-NOVA demo will showcase:

- T-NOVA NFV Orchestrator (TeNOR) base components: utilizing the Orchestrator GUI to instantiate, deploy, and monitor different NFV services.
- T-NOVA stakeholder interaction with the Marketplace: User registration, administration, VNF and service composition, SLA template creation, VNF acquisition and trading
- Platform-Aware VNF Deployment: Exploiting the VNF requirements to identify the appropriate platform-specific resources for its deployment.
- The VITAL demo will showcase:
- VITAL NFV Manager: utilizing the VITAL manager GUI to instantiate, deploy, and monitor different NFV services.
- Virtual Customer Premises Equipment (vCPE): Demonstrating the NFV and SDN support at a whitebox located at the customer premises, allowing the execution of value added services at the edge of the network.
- Emulated satellite demos, showing the SDN-applicability at hybrid satellite and terrestrial architectures.

STAND 19 | RIVER PUBLISHERS

River Publishers is active in many areas of Science and Technology, such as Electrical Engineering, Computer Science, Materials Science, Optics and Photonics, Biomedical Engineering, Nano Science and Science Education, and we publish peer reviewed research books, proceedings and journals in all these areas. River Publishers works with internationally established authors and editors, and we interact with them in a personal and professional manner so as to ensure high quality publications. This is reflected in the fact that all our books published after 2010 are indexed in the Thomson Reuters Book Citation Index.

STAND 20 | SPEED-5G

Quality of Service Provision and Capacity Expansion through Extended-DSA for 5G

Valerio Frascolla (Intel, Germany)

The main objective of SPEED-5G is to achieve a significantly better exploitation of heterogeneous wireless technologies, providing higher capacity together with the ultra-densification of cellular technology, and effectively supporting the new 5G Quality of Experience (QoE) requirements.

Demo: The demo booth aims to promote the project's concept and show to the conference attendants a first impact of flexible RRM and MAC solutions that are being proposed by SPEED-5G.

It is important to have SPEED-5G representation in a EC-supported event, in order to show the ongoing work and project's benefits.

Software demonstration for flexible RRM and MAC solutions in 5G environments.

STAND 21 | Fed4FIRE

Federation of testbeds for Future Internet research and experimentation

HALID HRASNICA, EURESCOM, GERMANY

The Fed4FIRE has been successful at federating a multitude of testbeds in Europe and world-wide, ensuring simple and remote access to one or more testbeds for various types of experiments. Besides the demonstrations on easy usage of the federated testbeds, the booth presentation will also focus on how experiments and other projects leverage on Fed4FIRE. For this, a selection of experiments implemented in the Fed4FIRE federation will be presented through digital posters and through live demos it will be shown how different projects, such as F-Interop (interop tests for IoT), eWINE/WISHFUL (wireless networking experimentation), and FORGE (online learning platform using testbeds), leverage on using the Fed4FIRE tools and testbeds.

STAND 22 | WiSHFUL

WiSHFUL – Heterogeneous wireless networking experimentation anywhere

Ingrid Moerman (iMinds, Belgium)

1. Many wireless test facilities exist, but are generally located in fixed physical environments, each with their own characteristic propagation properties and unique interference conditions. This often limits the validity of results, as the target environment in which a wireless solution will eventually be deployed may be very different from the fixed physical environments where the solution has been developed and evaluated through experimentation.
2. Widely available "off-the-shelf" hardware and software is not flexible, because radio drivers are closed and only expose limited functionality. Documentation of interfaces is generally very limited or even lacking. Even a minor tweak or adaptation may require huge effort and cost.
3. Software Defined Radio devices are more flexible, but often lack high-level specification and programming tools. SDR research mainly focuses on PHY layer development. Higher layer protocols (in particular medium access control) generally exhibit low performance in terms of time control, limiting research directions where low transmission latency is required.

The main objective of the WiSHFUL project is to reduce the threshold for wireless experimentation by building open, flexible & adaptive software platforms with unified programming interfaces for intelligent radio and network control of off-the-shelf as well as SDR hardware platforms. These platforms are offered in wireless test facilities that follow the de facto standards for testbed interoperability set by Fed4FIRE (http://www.fed4fire.eu).

In addition WiSHFUL project aims to increase the realism of experimentation by offering portable testbeds that can be deployed at any location allowing validation in real-world environments involving real users. More info on the portable testbed can be found at: http://www.wishful-project.eu/PortableTestbed.

Demo: The demo will showcase the use of the first release of the portable testbed that has been developed in the WiSHFUL project. The portable testbed offers identical functionality (in terms of testbed access, provisioning of resources, experiment control, monitoring, etc.) to researchers and wireless developers as if they would run their experiments in one of the advanced wireless testbeds in a fixed physical environment. Several use cases will be demonstrated on the portable tested, using heterogeneous wireless hardware (off-the-shelf: IEEE 802.15.4, IEEE 802.11; and SDR) and using the WiSHFUL Unified Programming Interfaces (UPIs) for the real-time configuration of radio and network settings. One use case will focus on the real-time adaption of the MAC strategy (adjusting MAC protocol parameters, more specifically the contention window as a function of network load) or switching between contention-based and schedule-based MAC protocols (CSMA/CA versus TDMA). Another showcase is cross-technology control for improving coexistence of heterogeneous wireless technologies that share the same spectrum (in this use case IEEE 802.11 and IEEE 802.15.4e). It will be shown that the same experiment can be run on the portable testbed as well as remotely in a fixed testbed.

STAND 23 | FIRE LTE testbeds for Open Experimentation (FLEX)

FLEX experimentation environment for 5G technologies

Thanasis Korakis (University of Thessaly, Greece)

FLEX (FIRE LTE testbeds for Experimentation) project is currently active in the Seventh Framework programme of the EC. FLEX project enhances FIRE's resource pool with remotely accessible and highly configurable LTE and beyond resources (4G/5G), that boost the experimentally driven research on the telecommunications field. The testbed setup of FLEX is based on two different approaches: 1) one based on commercial LTE equipment, using commercial Evolved Packet Core network and eNodeBs, provided by partners of the project and 2) a second approach based on the open source OpenAirInterface platform.

During the EuCNC event, we request an exhibition booth in order to demonstrate the main achievements of the FLEX project. The demonstration is targeting to raise the community awareness of the FLEX project and showcasing its potential for the experimental evaluation of technologies opted for the 5th Generation (5G) communications. The objective is to attract 5Grelated stakeholders industry, SMEs and Academia) in order to take advantage of the facilities, aiding in strengthening the experimentally driven research on wireless technologies over real testbed infrastructure.

Demo: In this demo we will showcase the achievements of the FLEX project during the first 2 years of operation: 1) the remotely accessible developed platform for evaluating inter-RAT (e.g. LTE to WiFi/WiMAX) handovers and applications, 2) in the spirit of 5G applications, an experimental evaluation of LTE in the 5GHz unlicensed band, collocated with the WiFi technology, 3) a solution for intelligent wireless back-haulingby using Software Defined Networking approaches and 4) a fully RF-interference controlled testing environment for LTE communications.

STAND 24 | SUNRISE

THE INTERNET OF UNDERWATER THINGS

Daniele Spaccini, Petrika Gjanci, Luigi Picari, Chiara Petrioli, João Borges de Sousa, Paulo Dias, Tommaso Arzilli, Davide Lamanna

During the demo the user will interact through the SUNRISE Gate web interface with a testbed composed of static and underwater vehicles. The user will remotely instruct each vehicle on the mobility plan to run and will request the collection and visualization in real time of various measurements using the on board sensors. Both SUNSET-SDCS and DUNE will run in emulation mode, emulating the same exact set-up and user interaction demonstrated during a real in-field experiments conducted in Porto, Portugal, in November 2015. A video will be projected showing the in-field operations of the same instruments and solutions used for the demo.

STAND 25 | F-INTEROP

F-Interop: Online Interoperability, Performance and Scalability Tests for the Internet of Things

Eldad Zack (EANTC AG, Germany)

The objectives and aims of F-Interop are:

to integrate and extend several European testbed federations with a shared "Testbed as a Service" interconnecting three European testbeds federations (Fed4FIRE, OneLab, IoT Lab), bringing together over 32 testbeds and 4755 nodes. It will develop a new architecture model enabling easier access.

to research and develop online testing tools for the Internet of Things, including for interoperability tests, conformance tests, scalability tests, Quality of Service (QoS) and Quality of Experience (QoE) tests, and Energy efficiency tests to support IoT standardization and enable closer cooperation with the industry, through a close collaboration with standards development organizations, including ETSI, oneM2M, IETFand W3C,- and be researching and developing online certification and labelling mechanisms. F-Interop will enable an easier participation of researchers and industry in the standardization process.

to organize an Open call for SMEs and developers to use and enrich the developed testing platform with additional modules and extensions (additional test tools, tests specifications, etc.).

Outreach to the community, raising awareness about the F-Interop framework, specifically for SMEs and experimenters/developers.

Demonstrate the current state of development and the vision of the F-Interop project.

Demo: we will demonstrate two modules that will be integrated in the F-Interop platform.

1. IoT interoperability test for the Constrained Application Protocol (CoAP):

   In this demo, we will demonstrate a tool that allows remote online interoperability verification between two CoAP implementation.

   We will use an implementation provided by a user of the F-Interop platform, an automated implementation is driven by F-Interop without human interaction and execute the test.

At the end of the execution, the tool will display an evaluation marking for each test case.

2. QoS monitoring based on active probes and SDN passive monitoring:

   This demo will present a monitoring tool which integrates passive measurements collected by a centralized SDN controller and active measurements collected by a distributed monitoring platform.

   The tool is based on an OpenDaylight controller and will be fully integrated in the F-Interop platform to allow users to test their network, under different conditions, in a simulated environment (based on Mininet) or on their own networks using OpenFlow switches.

STAND 26 | FIESTA

"Internet of Things FIRE Testbeds and Experimental Research for the Next Generation Internet"

Martin Serrano (FIESTA-IoT / EU FIRE Initiative, Ireland)

The Internet as we know it todays is a critical infrastructure supporting and transforming all aspects of our lives. The inexorable shift towards everything connected, lead mainly by the Internet of Things paradigm, is creating a two-fold society where in one side we have data-driven world, productivity, knowledge, and experience and in the other hand a dependency for increasingly open, dynamic, interdependent and complex networked systems. The challenge is to define how Internet will evolve based on the understanding on how the Internet behaves today and define how emergent systemic behaviours observed a posteriori will play an increasingly important role in the so called Next Generation Internet. The Internet evolves through experimentation. Individuals and companies use experiments as a way to build the knowledge and insights necessary to create viable, acceptable and innovative solutions driving benefits to Internet ecosystems and their stakeholders. In current times where most of world economies are driven by innovation and where changes in technology and culture in societies are happening rapidly due to the technology immersion, Europe must continue to play a leading role in the Next Generation Internet. Through experimentation the Next Generation Internet will evolve, engaging ecosystem in finding innovative solutions, activating business markets in Europe and world-wide, and addressing important societal challenges. To achieve this goal, fostering the creation of experimentation ecosystems and supporting the research and development of open experimentation platforms must form an integral element of public investment policy for the Next Generation Internet.

FIESTA-IoT provides a Blueprint Experimental Infrastructure for Heterogeneous IoT Technologies

FIESTA-IoT provides tools, techniques, processes and best practices enabling IoT testbed/platforms operators to interconnect their facilities in an interoperable way based upon cutting edge semantics-based solutions.

Demo: The 2016 EUCNC "FIRE-FIESTA-IoT Experimentation" booth will focus on explaining to the visitors the concept of Experiment-as-a-Service (EaaS), an innovative initiative that aims to capitalize value and return on investment for Research and Experimentation infrastructure in the area of the Internet of Things. FIESTA framework will be showcase in the form of demos and use cases for particular domains (i.e. smart city, smart building and automation, 4G-5G networks and smart infrastructure and users mobility). FIESTA-IoT tools and best practices that adapt data from the federated existing IoT platforms and testbeds will be also showcased. Finally the IoT data and its adaptations to a common FIESTA data model enabling compliance to common semantics will be also showcased and explained, as well as the provision of a common standards based on common interface for accessing the IoT services from the federated testbeds.

STAND 27 | EURO-5G

5G PPP – The 5G Public Private Partnership

Uwe Herzog (EURESCOM GmbH, Germany)

The 5G Public Private Partnership (5G PPP) has been initiated by the EU Commission and industry manufacturers, telecommunications operators, service providers, SMEs and researchers. The 5G PPP will deliver solutions, architectures, technologies and standards for the ubiquitous next generation communication infrastructures of the coming decade.

The objective of the exhibition booth is to increase the visibility of 5G PPP among everyone working on 5G. It will provide overview information on the PPP overall as well as summary information of it individual projects in current Phase 1. This will help visitors to find out what projects are working on and how to get in touch with them, but also provide information on how to get involved in the activities.

Demo: Various information materials will be provided at the booth: brochures and flyers on the 5G PPP as well as on projects, video material and presentations. Stand personnel will have an overview of the PPP so that individual questions of visitors can be answered. Representatives of 5G projects as well as of the 5G Infrastructure Association will man the stand.

STAND 28 | HUAWEI & FANTASTIC 5G

FANTASTIC-5G: Flexible Air iNTerfAce for Scalable service delivery wiThin wIreless Communication networks of the 5th Generation

Musbah Shaat (Centre Tecnològic de Telecomunicacions de Catalunya, Spain)

Ricardo Trivisonno (Huawei, Germany)

FANTASTIC-5G is a European project which will develop a new multi-service air interface for below 6 GHz through a modular design. Ultimate target of the project is to allow the system to adapt to any means arising from diverse service requirements and device capabilities, various deployment and environment settings and mobility levels. The proof-of-concepts (PoC) target to implement key technical components developed within FANTASTIC-5G. Part of the PoCs being developed in the project will be demonstrated in this booth.

The showcasing aims at providing information about the project approach to achieve the multi-service air interface in addition to the software and hardware platforms that are being developed in FANTASTIC-5G. The focus in this demo will be on the system level simulator and different transceiver architectures. The demonstration aims at showing the validity, the feasibility and the superiority of the different components of the foreseen 5G air interface.

Demo: The different demos that will be presented in the booth are:

5G system level simulator (WINGs)

P-OFDM for Async. UL in Frequency Domain and Real time D2D transmission (HWDU).

2x2 MIMO 5G DL transmission with FBMC-like waveform and demonstration of coexistence with legacy OFDM transmission waveform (LTE based) (CEA).

Demonstration of Low latency modified CP-OFDM optimized for mission critical communication services (HHI).

In addition to the software and hardware platforms, description posters of the different demos will be shown.

STAND 29 | FLEX5GWARE

From the antenna to the virtual RAN: proof-of-concept in Flex5Gware

Miquel Payaró (Centre Tecnològic de Telecomunicacions de Catalunya, Spain)

The overall objective of Flex5Gware is to deliver highly reconfigurable HW platforms together with HW-agnostic SW platforms targeting both network elements and devices taking into account increased capacity, reduced energy footprint, as well as scalability and modularity. In particular, Flex5Gware is focusing on providing a proof-of-concept (PoC) of the key building blocks that 5G HW/SW platforms will be composed of. Accordingly, Flex5Gware PoCs cover the whole value chain of 5G platforms: starting from the antenna, RF module and mixed signal stages and going up to digital HW and SW aspects.

In Flex5Gware, 11 different PoCs will be all showcased in a final demo event by June 2017. However, preliminary prototypes and results of these 11 PoCs are already available. Thus, the main goal of this exhibition is to demonstrate the progress achieved in a selected set of 5 PoCs. In particular, the following will be shown: improvements in terms of reduced cost and footprint for the analogue hardware, mixed signal architectures for improved transmission rates and spectral efficiency, and, finally, increased flexibility and reduced energy techniques based on context awareness.

Demo: The exhibition area will be divided in five different areas, each one covering one of the following PoCs:

Compact low-profile antenna for mmWave (HW prototype + poster)

on-chip frequency generator for 28 GHz 5G mobile beamforming systems (HW prototype + poster)

full-duplex transceiver (demonstrator)

Reconfigurable and programmable radio platform based on information from sensors (demonstrator)

Flexible resource allocation in a virtual RAN environment (video + poster)

STAND 30 | 5G-Crosshaul

Technological Components for the Future 5G-Crosshaul

Arturo Azcorra (University Carlos III of Madrid, Spain)

The control plane of 5G Networks will have to handle flexible reconfiguration of networks and associated network elements in order to provide the e2e services and optimization of utilized transport, storage and signal and data processing resources (i.e., computing). Additionally, a unified fronthaul/backhaul data plane architecture (referred to as crosshaul) is also under development. The first prototypes of novel technology components are being demoed at EUCNC and will be later evaluated in 4 large scale 5G testbed facilities in Europe and in Taiwan.

Creating awareness, presentation and promotion of:

- Control Plane Architecture of 5G-Crosshaul and relevant use cases and KPIs
- Novel technology components to be developed in project
- 5G testbeds at large scale and targeted integrated demonstrations

Discussion with experts in the field and interaction with other 5GPPP projects

Demo: Several technological components and 5G testbeds are presented:

- Introduction of high speed train analogue radio over fibre scenario in Taiwan
- Optical Wireless Communication for Small Cell Backhaul
- A novel Fronthaul Compression Scheme
- Flexible RAN functional split with virtualization of core network functions
- Presentation of 4 large scale 5G Testbeds and associated 5G-Crosshaul demo cases

STAND 31 | SESAME

Small Cells coordination for Multi-tenancy and Edge services

Ioannis Giannoulakis (OTE S.A., Greece)

EuCNC demo tracks: Software-Defined Infrastructures, Management Technologies, Convergence with Emerging Concepts, Testbeds and Experimental Research As data traffic soars, installing small cells is an effective way to achieve greater performance and capacity to both indoor and outdoor places. The 5G-PPP SESAME project aims at providing a fresh 5G mobile network platform so as to support the ambitious goal of small cell virtualization, multi-tenancy between network operators and edge cloud services and capabilities, to be offered to both network operators and the mobile users. SESAME's key innovations focus on providing a multi-operator (multi-tenancy) enabling framework and an edge-based, virtualised execution environment.

During the Demo, the initial experimentation platform developed by the 5G-PPP SESAME project will be presented. The objective is to show:

- SESAME architectural elements and features;
- End-to-end connectivity in the SESAME system;
- Integration of the main SESAME components: professional Evolved Packet Core (EPC), an ARM-based computing platform and a commercial LTE small cell;
- Virtualization using an ARM-based computing platform;
- Performance of an accelerated virtual switching solution.

Demo: The SESAME demo consists of three parts:

- An LTE small cell connected to an Evolved Pact Core (EPC) and an ARM-based computing platform, running Virtual Network Functions, will be connected between the small cell and the EPC for offering local IP access.
- An ARM micro-server, based on the NXP platform, running two KVM virtual machines (VMs) and an accelerated virtual switch to show availability or seamless VNF upgrade.
- Joint demonstration between the 5G-PPP SESAME and COHERENT projects, in the area of multi-domain orchestration.

STAND 32 | COHERENT

Virtual Network Functions Orchestration in Heterogeneous 5G Networks

Navid Nikaein (EURECOM, France)

The objective of this demonstration is to showcase synergies among the H2020-COHERENT [1] and H2020-SESAME [2] projects both running under the 5GPP umbrella. This is based on a use case execution and presentation that will bridge the gap between the telecom provides and the cloud worlds by creating an integrated network service based on the services and technologies originating from both projects.

Demo: The demonstration will consist of 2 PoPs (point of presence). One deployed at the SESAME booth and another deployed at the COHERENT both. A remote cloud deployed located at ZHAW premises will also be used. During the demo we plan to the delivery of the following individual services:

Cloud-RAN deployment of a RAN and EPC services based on the OpenAirInterface project [3] over the OpenStack+Julu framework. The service on-boarding will be performed using the Hurtle orchestrator.

SDN-based Service Function Chaining between the cloud-deployed VNFs namely Virtual Traffic Classifier (vTC) and Virtual Media Transcoder (vMT). This leverage on both Wifi and LTE technologies in order to deliver connectivity to the end-users.

SDN-based functional split in WiFi-based Small Cells with VNF implementing part of the Wifi MAC deployed at edge micro servers. Both data-plane and management plane functions will be considered in this demo.

TUESDAY JUNE 28th 2016

WELCOME RECEPTION

LOCATION: in the pool area of Divani Apollon Palace & Thalasso

TIME: After the end of the conference sessions, at 18:30.

[available for registration types: R01, R02, R03, R04, R07, R08, R11]

Meet your colleagues and socialize with your friends during the “Welcome Reception”.

WEDNESDAY JUNE 29th 2016

CONFERENCE BANQUET

LOCATION: Myth of the Sea Restaurant, across the Divani Apollon Palace & Thalasso

TIME: 20:00

At the entrance of the Conference please hand in the invitation you will receive at the regastration desk.

Tickets for the conference banquet may be purchased at the registration desk.

[available for registration types: R01, R03, R11, R12]

Located opposite the hotel’s main building, this restaurant offers a large decked-terrace overlooking Kavouri bay. It offers a magical setting and an unforgettable sunset. Our guests can enjoy carefully prepared seafood specialties and the best of Mediterranean cuisine.

Travel information

Athens International Airport "Eleftherios Venizelos" is located approximately 20km from the EuCNC2016 Venue Divani Apollon Palace & Thalasso Hotel and 40km from Athens city center.

Reaching the Divani Apollon Palace & Thalasso Hotel.

❖ **By bus**

The Venue may be easily reached from the Athens International Airport using the bus X96: Airport-Piraeus. This is an express line connecting the Airport and the South Athens Prefecture on a 24hour basis. The Hotel is 900m from the bus station "Pigadakia". Estimated time: 40 minutes (depending on traffic load). Ticket cost is 5€ and it may be retrieved at the bus ticket kiosks and at the ticket offices of metro and tram, as well as in the buses, sold by the bus drivers. Further information on the X96 Express Bus may be retrieved in this link.

❖ **By taxi**

Taxis are available on 24hour basis at Athens International Airport. It takes approximately 20-25mins to reach the Venue by taxi, depending on the traffic load. The cost is approximately 40€/60€ (day time fare/night time fare). Further information on booking a taxi from the airport may be retrieved in this link, as well as in the application suggestions below.

Please note: According to the Greek Legislation, taxi drivers should provide a receipt for the amount paid for transportation services.

Reaching the Athens city center

❖ **By bus**

The city center of Athens is approximately 40km from the Airport. The Express Bus X95 (Airport-Syntagma) runs 24hours and reaches the central Syntagma Square. Estimated time: 50 minutes (depending on traffic load). Ticket cost is 5€ and it may be retrieved at the bus ticket kiosks and at the ticket offices of metro and tram, as well as in the buses, sold by the bus drivers. Further information on the X95 Express Bus may be retrieved in this link.

❖ **By metro**

The metro runs from the Airport to the city center (Syntagma Square) every 30mins, from 05:30 to midnight, the cost is 8€ and it takes approximately 50mins. Further information on the timetable may be retrieved in this link.

❖ **By taxi**

In order to reach the Athens city center, there is a flat rate of 38€ and 54€ for day time and night time, respectively, while it takes approximately 60mins, depending on the traffic load.

Useful transportation applications (available in Google Play and AppStore):

- ATH Airport. [Athens International Airport Application. Information on flights, transportation, parking, etc]
- TfA tickets. [Athens transportation tickets issuing via credit card]
- Moovit: next bus & train info. [Information on the time of arrival of buses]
- Taxibeat. [Scheduling of taxi pick-up date and place, no extra fees are charged]
- Taxiplon. [Scheduling of taxi pick-up date and place, no extra fees are charged]

CURRENCY & ATM MACHINE

The currency in Greece is Euros €.

The venue has an ATM Machine (ALPHA BANK) in the lobby, opposite the reception.

Social media

Facebook: EuCNC
Twitter: @eucnc
Instagram: EuCNCeu
Linkedin: EuCNC
Website: http://www.eucnc.eu/

FUSEAMI is the official EuCNC2016 application
Download it to connect and get all the latest info!
[AppStore and Google play]

ANNOUNCEMENT OF EUCNC 2017

EUCNC 2017 June 12-15

European Conference on Networks and Communications | Oulu, Finland

12 - 15 June 2017

www.eucnc.eu

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EuCNC'2017 is the 26th edition of a successful series of a technical conference in the field of telecommunications, sponsored by the European Commission. The event will be organized in Oulu, Finland. It targets to bring together researchers from all over the world to present the latest research results, and it is one of the main venues for showcasing (demonstrating, trialling) the results of research projects, especially, from successive European R&D programmes co-financed by the European Commission.

The conference program will include:

- Keynotes,
- Panels,
- Regular oral sessions, with papers from the open call (to be submitted for uploading to IEEE Xplore),
- Special sessions, with papers on specific topics,
- Workshops, with papers and presentations on specific topics,
- Poster sessions, with papers from the open call addressing latest results,
- Tutorials,
- Demos and exhibitions.

Key dates:

06 Feb. 2017 – Deadline for submission of papers for regular oral sessions

06 Feb. 2017 – Deadline for submission of proposals for workshops, special sessions, and tutorials.

20 Mar. 2017 – Deadline for submission of extended abstracts for posters

10 Apr. 2017 – Notification of acceptance of workshops, special sessions, and tutorials.

10 Apr. 2017 – Notification of acceptance of papers and extended abstracts.

10 Apr. 2017 – Deadline for submission of proposals for exhibitions

24 Apr. 2017 – Deadline for final papers for all sessions and workshops

29 May 2017 – Deadline for authors registration

15 May 2017 – Draft program available

PATRONS

PLATINUM PATRON

The European Commission is the Platinum Patron of the conference.

http://ec.europa.eu

GOLD PATRONS

COSMOTE is a Gold Patron of the conference.

https://www.cosmote.gr

KEYSIGHT TECHNOLOGIES is a Gold Patron of the conference.

http://www.keysight.com/

Keysight's 5 G solutions - Evolution. Revolution. Reality.

The development of 5G depends on up-to-date tools that let designers easily explore new signals, scenarios and topologies. Keysight's 5G solutions are ready to enable deeper insights as development evolves with the standard. In design and test, Keysight is enabling industry leaders to innovate across new and existing technologies as they transform ideas into reality.

SILVER PATRONS

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http://www.huawei.com/

NOKIA is a Silver Patron of the conference.

https://networks.nokia.com/

NATIONAL INSTRUMENTS is a Silver Patron of the conference.

http://www.ni.com/

Prototyping the future of 5G Communications

Every year the number of wireless enabled devices and the amount of data consumed continues to grow at an exponential rate. As these devices create and consume growing amounts of data, the wireless communications infrastructure that connects these devices must evolve to support the demand NI is providing tools and technologies for prototyping and defining this new frontier for wireless communications. A multitude of novel use cases are foreseen for 5G wireless systems and in this context, an equally large number of requirements have emerged. National Instruments is committed to provide researchers with prototyping platforms that facilitate the early assessment of performance trade-offs of new algorithms and technologies in practical environments.

Three particularly interesting aspects are demonstrated:

A rapidly expanding mmWave prototyping solution for the highest radio frequency band in practical use today.

A real-time implementation of 4G LTE as a starting point for 5G physical layer prototyping.

A real-time prototyping and simulation platform for end-to-end 5G wireless networks.

ROHDE & SCHWARZ is a Silver Patron of the conference.

https://www.rohde-schwarz.com

Rohde & Schwarz

For more than 80 years, Rohde & Schwarz has stood for quality, precision and innovation in all fields of wireless communications. The privately owned company is strategically based on five pillars: test and measurement, broadcast and media, secure communications, cybersecurity, radiomonitoring and radiolocation. The electronics group, headquartered in Munich (Germany), has a global presence and is among the world market leaders in all of its business fields.

BRONZE PATRONS

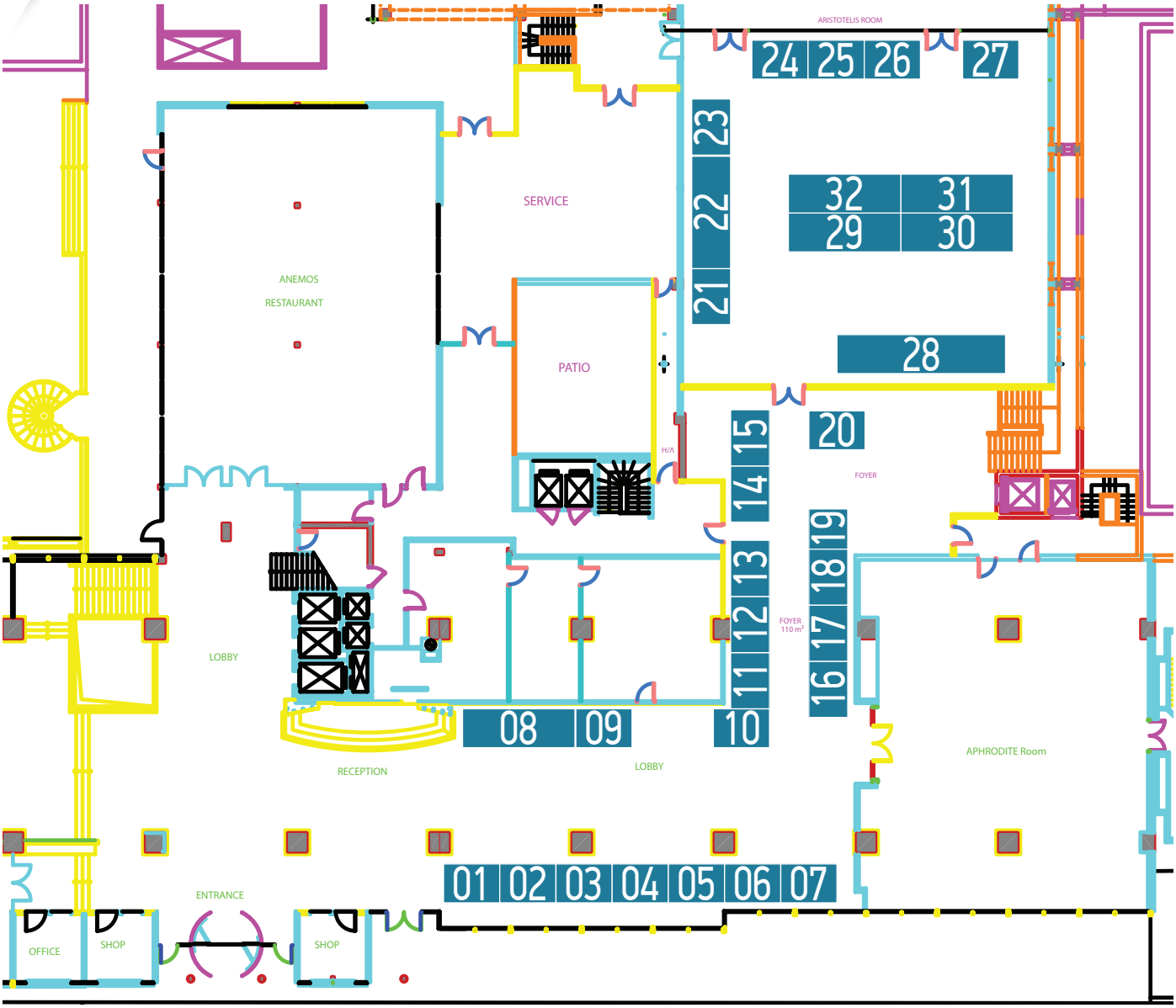
ERICSSON is a Bronze Patron of the conference.

http://www.ericsson.com/

INTRACOM TELECOM is a Bronze Patron of the conference.

http://www.intracom-telecom.com/

EXHIBITION MAP



LIST OF EXHIBITORS

Monday, June 27th, 2016

	APHRODITE A	APHRODITE B	APHRODITE C	KLEONIKI A	KLEONIKI B	POSEIDON A	POSEIDON B	POSEIDON C
	5G Architecture	Standardisation	Physical Layer	Fronthaul/ Backhaul for 5G	Optical-Wireless Integration	Management, NFV & Programmable Networks		
09.00-10:30	W01: International Workshop on 5G Architecture	W02a: Network Machine Learning	W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz	W04a: Workshop on Next generation fronthaul/backhaul integrated transport networks	W05a: Operators' Workshop on Optical-Wireless Integration	W06a: Network Management, Quality of Service and Security for 5G Networks	T01: RINA: a future -proof approach towards re-architecting the infocomms protocol stack supporting Cloud, IoT and beyond 5G requirements	T03: Emerging topics in 5G networks: spectral and energy efficient network architecture, transceiver and algorithm design.
10:30-11:00	Coffee/Tea Break							
11:00-12:30	W01: International Workshop on 5G Architecture	W02a: Network Machine Learning	W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz	W04a: Workshop on Next generation fronthaul/backhaul integrated transport networks	W05a: Operators' Workshop on Optical-Wireless Integration	W06a: Network Management, Quality of Service and Security for 5G Networks	T01: RINA: a future -proof approach towards re-architecting the infocomms protocol stack supporting Cloud, IoT and beyond 5G requirements	T03: Emerging topics in 5G networks: spectral and energy efficient network architecture, transceiver and algorithm design.
12:30-14:00	Lunch							
14:00-15:30	W01: International Workshop on 5G Architecture	W02b: Research and Standards for Self-Managing 5G Networks	W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz	W04b: Towards Converged X-Haul for 5G Networks – A joint workshop of the iCirrus, 5G-XHaul and 5G-Crosshaul projects	**Big Data** W5b: Big Data for Reliable 5G Networking	W06b: Workshop on Network Function Virtualisation (NFV) and Programmable Software Networks	T02: Energy–Neutral System‐Level Analysis and Optimization of 5G Wireless Networks	T04: COST: IC1104 Fundamentals of Coding for Network Coding and Applications
15:30-16:00	Coffee/Tea Break							
16:00-17:30	W01: International Workshop on 5G Architecture	W02b: Research and Standards for Self-Managing 5G Networks	W03: 5GPPP Workshop on 5G Physical Layer Design and Hardware Aspects Below and Above 6 GHz	W04b: Towards Converged X-Haul for 5G Networks – A joint workshop of the iCirrus, 5G-XHaul and 5G-Crosshaul projects	W5b: Big Data for Reliable 5G Networking	W06b: Workshop on Network Function Virtualisation (NFV) and Programmable Software Networks	T02: Energy–Neutral System‐Level Analysis and Optimization of 5G Wireless Networks	T04: COST: IC1104 Fundamentals of Coding for Network Coding and Applications

Tuesday, June 28th, 2016

All day	Exhibition/ Demonstration stands					
	Room: ARISTOTELIS					
09.00-10.30	Opening addresses Chaired by Professor Panagiotis Demestichas, EuCNC2016 Host and TPC Co-Chair					
	Mrs. Eva Kaili Member of the European Parliament, 1st Vice-Chair of Science and Technology Options Assessment Committee			**Dr. Grigoris Konstantellos** Mayor of Vari, Voula & Vouliagmeni District		
	Keynote addresses Chaired by **Professor Panagiotis Demestichas**, EuCNC2016 Host and TPC Co-Chair					
	Mr. Georgios A. Onopas Director of the fixed & mobile Access Networks Department of OTE Group, Greece "5G & IoT: Accelerating Digital & Transforming Everything"		**Mr. Mario Campolargo** European Commission, Director for "Net Futures" in DG CONNECT, EuCNC2016 General Chair		**Dr. Edward G. Tiedemann, Jr.** Senior Vice-President, Engineering Qualcomm Technologies, USA "The Dawn of 5G II: Vision, Technology, and Progress"	
10.30-11.00	Coffee/Tea Break					
	ARISTOTELIS	**PLATON**	**APHRODITE A**	**APHRODITE C**	**KLEONIKI A**	**KLEONIKI B**
11.00-12.30	AIR SESSION 1 - Advanced modulation schemes, new coding solutions, FEC, HARQ, PAPR optimisation	SDI SESSION 1 - Network function virtualisation advances / Network programmability	TER SESSION 1 - Testbeds / Facilities [Smart cities, IoT and M2M / Advanced multimedia] / Tools & techniques for testbeds management	MT SESSION 1 - Energy-efficient networks/ infrastructures / Cognitive and self-learning mechanisms	SS01: Fifth generation satellites: 5G-satellite integration	SS02: Designing and Developing a Cloud-enabled "Small Cell as a Service" concept, for Multi-Tenancy and Edge Services in the forthcoming 5G Framework
12.30-14.00	Lunch					
	Room: FOYER KLEONIKI A&B					
14.00-14.30	**Poster session 1** **First session will place emphasis on Software-Defined Infrastructures, Management Technologies, Testbeds and Experimental Research, Optical Communications & Networks**					
14.30-16.00	**Room: ARISTOTELIS** **Panel 1: 5G for Vertical Industries – Major Challenges and Opportunities Ahead**					
16.00-16.30	Coffee/Tea Break					
	ARISTOTELIS	**PLATON**	**APHRODITE A**	**APHRODITE C**	**KLEONIKI A**	
16.30-18.00	AIR SESSION 2 - Communications at the mm wave range	SDI SESSION 2 - SDN-based switch/router architectures	BUS SESSION 1 - Emerging business models, monetisation of infrastructures and services / Smart cities, smart grids and environments	CEC SESSION 1 - Convergence with IT technologies / Internet of Things, Machine to Machine / Smart embedded systems / Hybrid satellite and terrestrial networks	SS01: Fifth generation satellites: 5G-satellite integration	
18.00-20.00	Welcome Reception					

Wednesday, June 29th, 2016

All day	Exhibition/ Demonstration stands					
	Room: ARISTOTELIS					
09.00-10.30	Keynote addresses Chaired by Professor Panagiotis Demestichas, EuCNC2016 Host and TPC Co-Chair					
	Dr. Chih-Lin I Chief Scientist on Wireless Technologies, China Mobile Research Institute, China Mid-Point of 5G Journey			**Mr. Alain Servel** Expert in ADAS and ITS, PSA Groupe, France 5G radio access for a multiservice integration		
10.30-11.00	Coffee/Tea Break					
	ARISTOTELIS	**APHRODITE A**	**APHRODITE B**	**APHRODITE C**	**KLEONIKI A**	**KLEONIKI B**
11.00-12.30	AIR SESSION 3 - Cloud-RANs, fronthaul/backhaul aspects / Advanced Radio RRM and MAC functions	SDI SESSION 3 - Software defined networking challenges / Network overlays and federation	CEC SESSION 2 - Cloud infrastructures, distributed clouds / Data centre systems / Fog computing	OPT SESSION 1 - Advances in optical access networks / Components and communications / Optical and digital signal processing	SS03: COST: Inclusive Radio Communications for 5G and Beyond – IoT and MTC	SS04: ARCADIA Special Session on Software engineering approaches aligned with the Softwarization of Networks and Services
12.30-14.00	Lunch					
14.00-14.30	Room: FOYER KLEONIKI A&B Poster session 2 Second session will place emphasis on Air Interfaces, Convergent Concepts (Cloud, IoT), Business Aspects & Vertical Markets					
14.30-16.00	Room: ARISTOTELIS Panel 2: 5G Architecture					
16.00-16.30	Coffee/Tea Break					
	ARISTOTELIS	**APHRODITE A**	**APHRODITE B**	**APHRODITE C**	**KLEONIKI A**	**KLEONIKI B**
16.30-18.00	AIR SESSION 4 - 5G air interfaces / Antennas and propagation / Multi-service (MBB, MCC, MTC, etc.) support	TER SESSION 2 - Experimentally-driven research. Federation of testbeds/facilities / Cloud testbeds	MT SESSION 2 - Management architectures and frameworks / Management of resources, services and customer experience / Security, trust, and privacy	SS05: FANTASTIC-5G: Ultra-Reliable and Mission Critical Communication	SS06: METIS-II views on 5G RAN design and architecture	SS07: Dynamic spectrum management, a building block for 5G networks - A joint special session of the SPEED-5G, ADEL and SOLDER projects
20.00	Conference Banquet					

Thursday, June 30th, 2016

All day	Exhibition/ Demonstration stands					
	ARISTOTELIS	**APHRODITE B**	**APHRODITE C**	**APHRODITE A**	**KLEONIKI A**	**KLEONIKI B**
09.00-10.30	AIR SESSION 5 - MIMO advances / New air interfaces below 6GHz	SDI SESSION 4 - Traffic engineering, QoS, energy-efficiency	CEC SESSION 3 - Internet of Things/ Convergence with IT technologies / Cloud infrastructures, distributed clouds	SS08: Abstractions and Use Cases of converged Big Data, Telecom and IoT technologies	SS09: Millimeter-waves as a key enabling technology for 5G: Status of the pre-development activities and way forward - A joint special session of the mmMAGIC, TWEETHER, MiWaveS and MiWEBA projects	SS10: IoT innovations, applications and challenges: Market or Technology Push?
10.30-11.00	Coffee/Tea Break					
11.00-12.30	**Room: ARISTOTELIS** **Panel 3: ICT consolidation in 5G. The role of Software Networks**					
12.30-13.30	**Room: ARISTOTELIS** **Closing session** **EuCNC Best Paper Award** **EuCNC/EURASIP Student Best Paper Award** **EuCNC/EURACON Student Best Paper Award** **EuCNC Best Booth Award** **EuCNC2017 Presentation** **Status update on the 5GPPP Collaboration – Moving Ahead** **Next Steps and Concluding Remarks, European Commission**					
13.30-14.30	Lunch					
14.30	Conference Ending					
14:00-17:30	5G PPP PUBLIC-PRIVATE PARTNERSHIP **4th 5G PPP Phase 2 Information and Stakeholders Day**					

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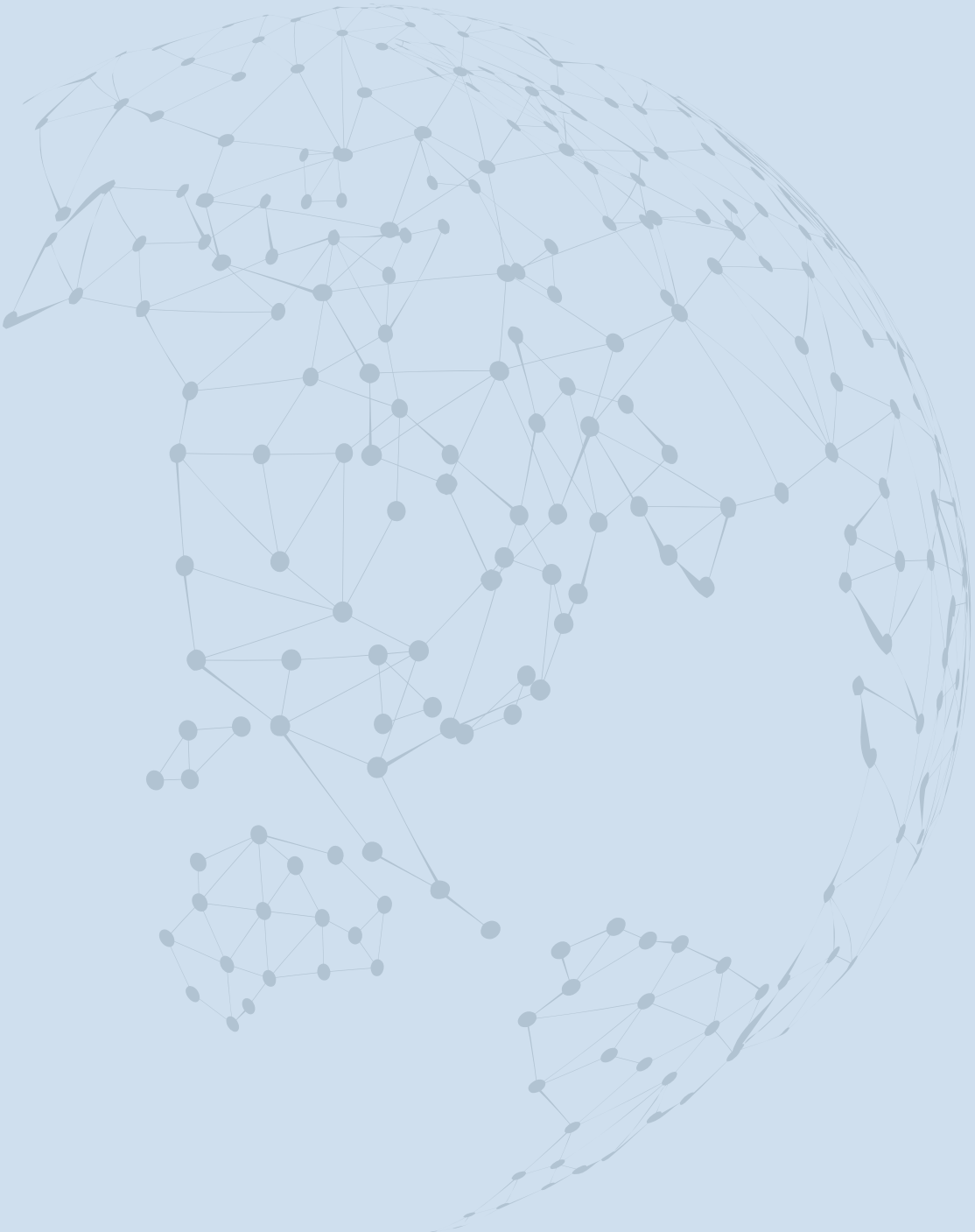

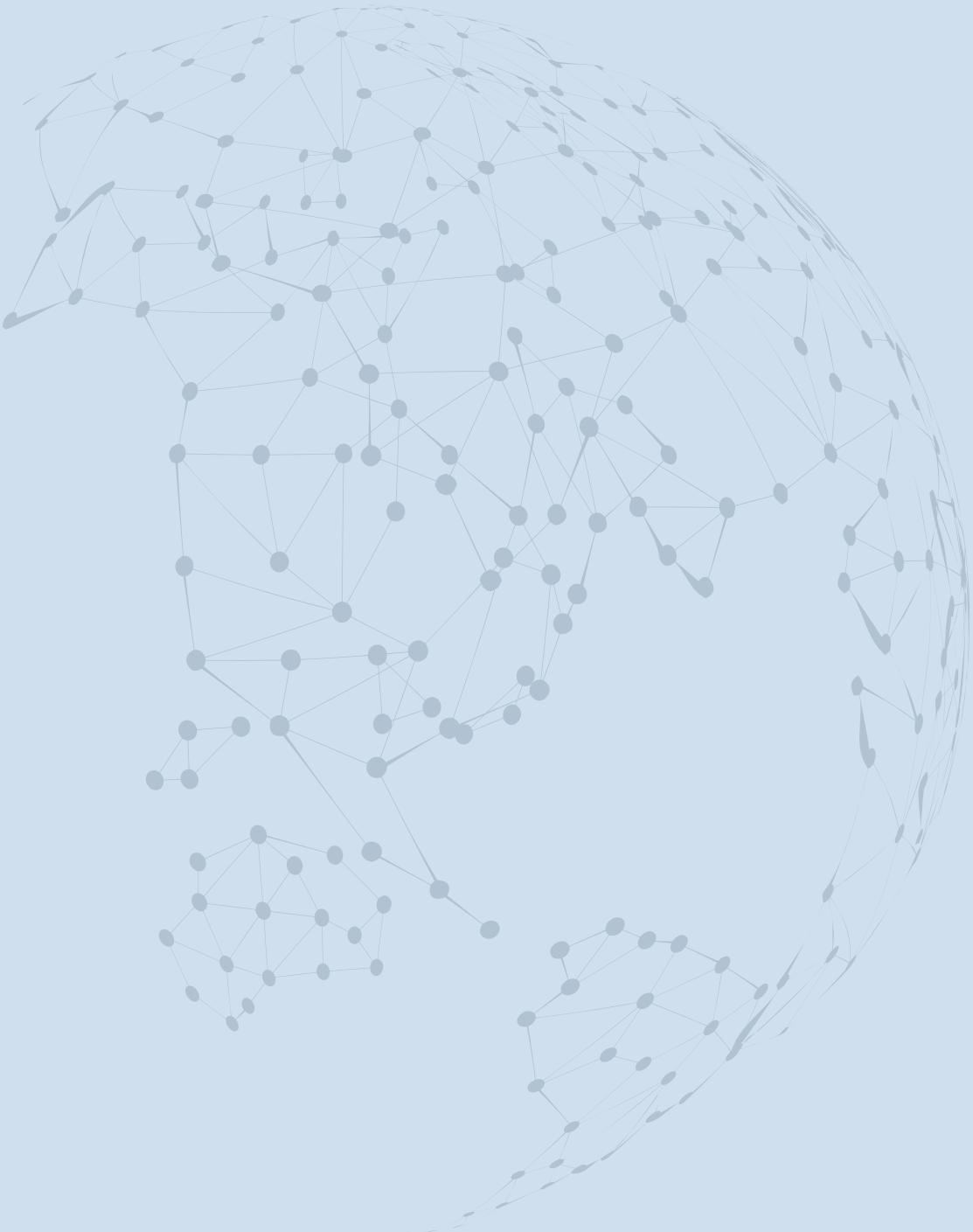

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