



## PROVISIONAL PROGRAMME





## ICT 2014 PROVISIONAL PROGRAM SCHEDULE

	4th May Sunday	5th May Monday	6th May Tuesday	7th May Wednesday
9H00	Tutorials A,B,C	Opening Keynote 1	Keynote 2 Keynote 3	Workshop/ Special Session
10H30	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11H00	Tutorials A,B,C	Parallel Sessions	Parallel Sessions	Workshop/ Parallel Session
13H00	Lunch	Lunch	Lunch	Lunch
14H30	Tutorials C,D,E	Panel Session	Panel Session	Workshop/ Parallel Session
15H30	Coffee Break	Coffee Break	Coffee Break	Coffee Break
16H00	Tutorials C,D,E	Parallel Sessions	Social Program (16H30)	Workshop
18H30				
19H00	Welcome Reception		Social Program	
			Gala Dinner (20H00)	

**Parallel Sessions** will include papers accepted from open call.

Foreseen topics are *MIMO, BS cooperation, Multicarrier systems, Optical communications, Antennas and Propagation, Resource allocation, Coding, Het Nets, Performance evaluation and Communication protocols*.



## Opening session on May 5, 2014



**Prof. Hamid Aghvami** (M'87–SM'91–F'05) received the M.Sc. and Ph.D. degrees from the University of London, London, U.K., in 1978 and 1981, respectively. In 1984, he joined the academic staff of King's College London, where he was promoted to Reader in 1989, became a Professor of telecommunications engineering in 1993, and is currently the Director of the Centre for Telecommunications Research. He carries out consulting work on digital radio communications systems for both British and international companies. He is the author of more than 500 technical papers and has given invited talks on various aspects of personal and mobile radio communications and courses on the subject worldwide. Prof. Aghvami is a Fellow of the Royal Academy of Engineering and the Institution of Electrical Engineers. From 2001 to 2003, he was a Member of the Board of Governors of the IEEE Communications Society. He is a distinguished Lecturer of the IEEE Communications Society and has been a Member, Chairman, and Vice Chairman of the technical program and organizing committees of several international conferences. He is also the Founder of the International Conference on Personal, Indoor, and Mobile Radio Communications.



**Prof. Farokh Marvasti** [S'72, M'74, SM'83] received his B.S., M.S., and Ph.D. degrees from Rensselaer Polytechnic Institute in 1970, 1971, and 1973, respectively. He has worked, consulted, and taught in various industries and academic institutions since 1972. Among these are Bell Labs, University of California Davis, Illinois Institute of Technology, and University of London, King's College. He has about 100 journal publications and has written several reference books; he also has several international patents. Besides being the co-founders of two international conferences (ICT and SampTA), he has been the organizer and special session chair of many IEEE conferences including ICASSP. He is currently a professor at SUT and the director of ACRI, and a former head of the Center for Multi-Access Communications Systems.

## Keynote presentation on May 5, 2014

*European research activities on 5G communication networks in the 5G PPP in Horizon 2020*



**Dr. Werner Mohr** (Nokia Solutions and Networks, Munich, Germany, Head of Research Alliances)

**Homepage:** <http://nsn.com/>

**Description:** Research activities on 5G communication networks are getting momentum globally. New research programs are launched in different regions. In Europe the EU Commission and the private sector started end of 2013 the 5G PPP (Public-Private-Partnership) as part of Horizon 2020 as a research program on 5G networks. 5G research is driven by the growth in data traffic and the increased use of ICT in many different vertical sectors in society and economy, machine-to-machine, IoT and sensor-based systems. Future systems have to be very reliable and highly available, because they will be used for many different critical infrastructures. Many applications require very low latency systems. In addition, energy efficiency and the reduction of the CO<sub>2</sub> footprint are a major concern. Therefore, the new program is addressing solutions, architectures, technologies from a holistic perspective and will contribute to international standards for the ubiquitous 5G communication infrastructures of the next decade. Faster, more powerful and more energy efficient solutions for integrated high capacity access and core networks for a wider range of services are investigated including wireless networks, optical networks, network management and convergence beyond the access last mile. In addition, a re-design of networks will take into account Information Centric Networks, Network Function Virtualisation, Software Defined Networking and Networks of Clouds.



The presentation will address the drivers for 5G systems, major building blocks from the today's perspective and will describe the 5G PPP.

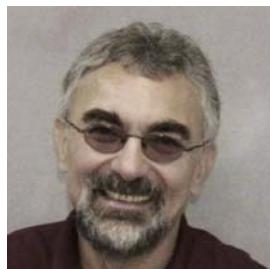
### **Speaker's Biography:**

**Werner Mohr** was graduated from the University of Hannover, Germany, with the Master Degree in electrical engineering in 1981 and with the Ph.D. degree in 1987.

Dr. Werner Mohr joined Siemens AG, Mobile Network Division in Munich, Germany in 1991. He was involved in several EU funded projects and ETSI standardization groups on UMTS and systems beyond 3G. Werner Mohr coordinated several EU and Eureka Celtic funded projects on 3G (FRAMES project), LTE and IMT-Advanced radio interface (WINNER I, II and WINNER+ projects), which developed the basic concepts for future radio standards. Since April 2007 he is with Nokia Siemens Networks in Munich Germany, where he is Head of Research Alliances. In addition, he is chairperson of the Net!Works European Technology Platform and now of the new communications networks related ETP. Werner Mohr is also Chair of the Board of the 5G Infrastructure PPP Association. He was chair of the "Wireless World Research Forum – WWRF" from its launch in August 2001 up to December 2003. He is co-author of a book on "Third Generation Mobile Communication Systems" a book on "Radio Technologies and Concepts for IMT-Advanced" and a book "Mobile and Wireless Communications for IMT-Advanced and Beyond".

## **Keynote presentation on May 6, 2014**

*Large-Scale MIMOs, Coherent versus Non-Coherent Detection and the Spatial Modulation Saga*



**Prof. Lajos Hanzo**, School of Electronics and Computer Science, University of Southampton, UK

**Homepage:** <http://www-mobile.ecs.soton.ac.uk>

**Description:** The classic Shannon-Hartley law suggests that the achievable channel capacity increases logarithmically with the transmit power, which is not a 'good deal'! More beneficially, the MIMO capacity increases linearly with the number of transmit antennas, provided that the number of receive antennas is equal to the number of transmit antennas. With the further proviso that the total transmit power is increased proportionately to the number of transmit antennas, a linear capacity increase is achieved upon increasing the transmit power, which justifies the spectacular success of MIMOs... □ However, there are huge challenges, which have to be tackled, before these 'massive MIMOs' might become an off-the-shelf reality. For example, estimating all the (N x M) MIMO channels imposes a potentially excessive complexity, hence - perhaps somewhat surprisingly owing to its potential performance erosion - non-coherent detection might become an attractive low-complexity solution, as demonstrated in this lecture. □ Another challenge is the provision of numerous Radio-Frequency (RF) chains, which is THE most costly part of a transceiver. This problem might be circumvented with the aid of Spatial Modulation (SM), where only a single one or a limited fraction of the transmit antennas is activated during any symbol interval. This 'win-win saga' continues, since apart from the potential benefit of requiring only a single RF chain, SM also has the potential of implicitly conveying extra bits by inferring say  $\log_2(M)$  bits from the specific index of the activated transmit antenna, as discussed in this light-hearted overview.

For further information please refer to <http://eprints.soton.ac.uk/> <http://eprints.soton.ac.uk/>

### **Speaker's Biography:**

**Lajos Hanzo** (FREng, IEEE, FIET, Fellow of EURASIP, DSc) received his degree in electronics in 1976 and his doctorate in 1983. In 2009 he was awarded the honorary doctorate "Doctor Honoris Causa" by the Technical University of Budapest. During his 37-year career in telecommunications he has held various research and academic posts in Hungary, Germany and the UK. Since 1986 he has been with the School of Electronics and Computer Science, University of Southampton, UK, where he holds the chair in telecommunications.



He has successfully supervised 80+ PhD students, co-authored 20 John Wiley/IEEE Press books on mobile radio communications totalling in excess of 10 000 pages, published 1300+ research entries at IEEE Xplore, acted both as TPC and General Chair of IEEE conferences, presented keynote lectures and has been awarded a number of distinctions. Currently he is directing a 100-strong academic research team, working on a range of research projects in the field of wireless multimedia communications sponsored by industry, the Engineering and Physical Sciences Research Council (EPSRC) UK, the European Research Council's Advanced Fellow Grant and the Royal Society's Wolfson Research Merit Award. He is an enthusiastic supporter of industrial and academic liaison and he offers a range of industrial courses. He is also a Governor of the IEEE VTS. During 2008 - 2012 he was the Editor-in-Chief of the IEEE Press and a Chaired Professor also at Tsinghua University, Beijing. His research is funded by the European Research Council's Senior Research Fellow Grant. For further information on research in progress and associated publications please refer to <http://www-mobile.ecs.soton.ac.uk> Lajos has 19 000+ citations.

## Keynote presentation on May 7, 2014

### Title:

*Future Cellular Systems: A Unified Infrastructure and Spectrum Framework*



**Prof. Elvino de Sousa**, Department of Electrical and Computer Engineering,  
University of Toronto

**Homepage:** <http://www.comm.toronto.edu/~sousa/sousa.html>

**Description:** This talk will discuss some of the trends in current wireless research in the area of public wireless, or cellular systems. There are various initiatives throughout the world in next generation wireless systems research. The talk will present new ways of looking at cellular systems emphasizing the role of infrastructure and spectrum in a unified framework. We discuss various approaches to the evolution of cellular systems beyond the current 4G and their prospects in terms of meeting the ultimate goals of proving coverage, capacity, flexibility, and robust deployment. We discuss approaches that we refer to as two-tier cellular systems including aspects of network MIMO, relays, organic deployment, spectrum management, multi-RAT, multi-mode, and multi-operator scenarios.

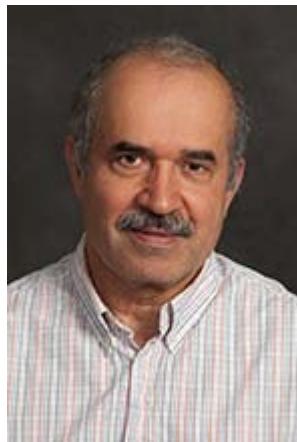
### Speaker's Biography:

**Elvino S. Sousa** received his B.A.Sc. in engineering science, and the M.A.Sc. in Electrical Engineering from the University of Toronto in 1980 and 1982 respectively, and his Ph.D. in electrical engineering from the University of Southern California in 1985. Since 1986 he has been with the department of Electrical and Computer Engineering at the University of Toronto where he is now a Professor and the Jeffrey Skoll Professor in Computer Network Architecture. His current interests are in the areas of autonomous infrastructure wireless networks, cognitive radio, self configurable wireless networks, and two-tier networks. He pioneered the area of wireless communications at the University of Toronto and is the director of the wireless lab, which has undertaken research in wireless systems for the past 28 years. He is the inventor of the autonomous infrastructure wireless network concept. He has been invited to give numerous lectures and short courses on spread spectrum, CDMA, and wireless systems in many countries, and has been a consultant to industry and Governments internationally in the area of wireless systems. He was the technical program chair for PIMRC 95, vice-technical program chair for Globecom '99, Co-Technical Program Chair for WPMC 2010 and for PIMRC 2011, and has been involved in the technical program committee of numerous international conferences. He has also been involved in various standardization and industry related wireless activities and currently is actively participating in NGMN as an advisor. He is a past chair of the IEEE Technical Committee on Personal Communications and has been elected IEEE Fellow. He has spent sabbatical leaves at Qualcomm and Sony CSL/ATL. He has been awarded the Queen Elizabeth II Golden Jubilee Medal.



## Tutorials on May 4, 2014

### Tutorial A - ZigBee Wireless Sensor and Control Network



**Prof. Ata Elahi** (Professor of Computer Science at Southern Connecticut State University, USA)

**Duration:** 4h

**Homepage:**

<http://www.southernct.edu/academics/schools/arts/departments/computerscience/people/elahi.html>

#### Description:

Wireless Sensor and Control Networks are quickly becoming an integral part of the automation process within chemical plants, refineries, and commercial buildings. As a result, the market for wireless sensor and control networks is rapidly growing. Furthermore, according to a new market research report, it will be a \$3.8 billion industry by the year 2017. To accommodate this burgeoning technology, numerous standards are being developed for wireless sensor and control networking such as SP100.11(Wireless Systems for Automation) by the Industrial Standard for Automation (ISA), Wireless HART (Highway Addressable Remote Transducer) by the HART organization, IPv6 over Low Rate Wireless Personnel Network (6LoWPAN) by IETF (the Internet Engineering Task Force) and ZigBee by the ZigBee alliance. The following is a list of the more common applications for wireless sensor and control networks.

- 1- Commercial Building Automation;
- 2- Home automation;
- 3- Industrial and process automation;
- 4- Energy and utility automation;
- 5- Health Care;
- 6- Remote Control.

#### Detailed Tutorial Topics:

1- Wireless Sensor and Control Technologies; 2- ZigBee Wireless Sensor and Control Network; 3- ZigBee Protocol Architecture; 4- IEEE 802.15.4 Physical Layer; 5- IEEE 802.15.4 Medium Access Control (MAC) Layer; 6- Network Layer; 7- Application Support Sub-layer (APS); 8- Application Layer; 9- Security; 10- Address Assignment and Routing; 11- ZigBee Home Automation and Smart Energy Network; 12- ZigBee RF4CE; 13- IPv6 and Sensor network

#### Intended Audience:

The primary purpose of this tutorial is to provide a basic understanding of ZigBee Wireless Network and it is intended for educators, researchers, system designers, embedded programmers, and anyone wishing to learn more about this new technology.

#### Speaker's Biography:

**Ata Elahi** is a professor of Computer Science at Southern Connecticut State University. Dr. Elahi received his Ph.D. in Electrical Engineering from Mississippi State University in 1982. He is the author of the following textbooks:



*ZigBee Wireless Sensor and Control Network*, Prentice Hall, 2010

*Data, Network & Internet Communications Technology*, Thomson Learning, 2006

*Network Communication Technology*, Delmar Thomson Learning, 2001

Dr. Elahi has presented tutorials and workshops on ZigBee Technology at several conferences and corporations.

### Tutorial B - *A pragmatic introduction to network coding*



**Dr. Ángeles Vasques-Castro** (Associate Professor at the Telecommunications and Systems Engineering Dpt. of the Universitat Autònoma de Barcelona, Spain, and Working Group Leader in the COST Action 1104 on Network Coding)

**Duration:** 3h

**Homepage:** <http://gent.uab.cat/mavazquez-castro/>

#### Description:

Internet can be considered today as a critical socio-economical infrastructure requiring improvement and innovation in connectivity, digital media usage and storage, mobility, security, resilience, location-awareness, Quality of Service/Quality of Experience, etc. To meet these challenges, network coding emerges as a possible enabling paradigm. With network coding, intermediate nodes do not just forward packets but rather create new ones by combining incoming packets. Practical understanding of network coding has been growing steadily since its inception in 2000, and a number of applications have been proposed demonstrating its potential in scenarios such as peer-to-peer content distribution, multimedia streaming, multicast, wireless mesh networks, error correction over lossy networks, etc. Network Coding protocol design at packet-level can be made oblivious or fully aware of dynamics at the lower layers, thus blurring the distinction between wired and wireless networks.

In this tutorial, a pragmatic introduction to network coding protocol design is proposed. First, the fundamentals of network coding will be explained: routing vs. network coding and min-cut/max-flow theorem of unicast. Second, the multicast theorem will be examined with focus on linear and random network coding. Third, canonical examples will be described to illustrate the fundamental concept: satellite and butterfly scenario. Fourth, encoding and decoding and practical protocol design issues will be discussed. Finally, simulation and experimental results for the satellite scenario will be presented.

#### Intended audience:

People from industry and/or academia dealing with advanced techniques of wireless networking for increased throughput, involving wireless elements with computing capabilities. Networking scenarios of interest are both terrestrial wireless and satellite.

#### Speaker's Biography:

**Ángeles Vasques-Castro** is an Associate Professor with the Telecommunications and Systems Engineering Dpt. at the Universitat Autònoma de Barcelona since 2002, where she teaches and leads research activities. She has visited several research centres both in US and Europe such as University of Southern California and University of California Los Angeles. She was a research fellow for 2 years at the European Space Agency, in Noordwijk, The Netherlands. She participates and leads international research projects won by open competition. She has co-authorized book chapters and over 100 peer-reviewed publications, 3 of which have received best paper awards. She holds 2 patents, and is member of the Technical Committees of the IEEE Communications Society conferences. Currently, she leads the [Working Group 2 of COST Action IC1104](#).



## Tutorial C - *The LTE-Sim simulator*



**Dr. Giuseppe Piro** (Researcher at the Telematics Research Group of the Department of Electrical and Information Engineering, Politecnico di Bari, The Technical University of Bari, Italy)

**Duration:** 3.5h

**Homepage:** <http://telematics.poliba.it/index.php/en/people/piro>

### Description:

Nowadays, an increasing number of researchers and industries are putting a large effort for designing, implementing, and optimizing novel and efficient protocols, algorithms, and network architectures for the emerging 4G cellular technologies (i.e., LTE and LTE-A). To evaluate and assess the performance of the conceived solutions, these activities need for flexible and standard compliant network simulation platforms. In this context, the adoption of publicly available network simulator, especially open source projects, provides a favorable way to reach this important goal.

This tutorial is dedicated to one of the widely used, freely available, and open source simulation platform for 4G technologies: LTE-Sim. LTE-Sim encompasses several aspects of LTE and LTE-A networks. In particular it supports single and heterogeneous multi-cell environments, QoS management, multi users environment, user mobility, handover procedures, frequency reuse techniques, heterogeneous networks, femtocells, audio, video, and best effort applications, a number of scheduling strategies for both downlink and uplink, and a wide range of channel models.

Starting from an accurate description of the main features covered by the simulator, the tutorial will highlight the role that LTE-Sim has in the research community and the most important research results achieved with it. Moreover, practical demonstrations will be conducted to show how using the tool to model and evaluate different kind of facets of the LTE system, as well as to demonstrate how its high flexibility can be exploited to implement and test additional features not yet included into the official release of the simulator. Finally, further developments and improvements of the simulator, which have been planned for the future, will be presented too.

**Intended audience:** students, researchers, and practitioners working current and next generation cellular networks.

### Speaker Biography:

**Giuseppe Piro** is a postdoctoral researcher at Politecnico di Bari, Italy. He received a first level degree and a second level degree (both cum laude) in telecommunications engineering from “Politecnico di Bari”, Bari, Italy, in 2006 and 2008, respectively. He received the Ph.D. degree in electronic engineering from “Politecnico di Bari,” Bari, Italy, on March 2012.

His main research interests include quality of service in wireless networks, radio resource management in cellular systems, network simulation tools, heterogeneous networks, IoT, information centric networking, and nanonetworks. In June 2009 and in November 2009 he has been visiting student at the INRIA (Planete project, Sophia Antipolis, France) for working on radio resource scheduling in WiMax networks. During the period June-August 2010 he participated at the Google Summer of Code 2010, starting the development of the LTE module for the Network Simulator 3 (NS-3). In July 2010 he participated to the Working Capital Tour 2010 (Bari, IT), winning a 12-months Telecom Italia scholarship. He mentored the development of the LTE module for NS-3 during the NS-3 Summer of Code 2011. He has been TPC member for a number of conferences, including WNS3 2012, WBS3 2013, INFOCOM NOMEN Workshop 2014, ICT 2014, WNS3 2013. He got the “best student paper award” for a SIMUTools conference (2010), the “Premio Carassa 2012” during the Italian telecommunication congress for his work carried out in the telecommunication network field, and the “IEEE TVT 2012 Top Reviewer Award”.



He founded both LTE-Sim and NANO-SIM projects and he is a developer of Network Simulator 3. Actually, he is a member of the IETF 6TiSCH WG and the IEEE P1906.1 WG. Recently, he developed an ns-3 module modeling the nanoscale communication framework conceived within the IEEE P1906.1 WG and the tool has been considered one of the reference simulation platform by the same WG.

### **Tutorial D - Sensors, Vehicles and Things: Can We Secure the New Species on the Internet Landscape?**



**Prof. João Barros** (Associate Professor at the University of Porto and Director of the Instituto de Telecomunicações site in Porto)

**Duration:** 3h

**Homepage:** <http://paginas.fe.up.pt/~jbarros/>

#### **Description:**

As the Internet evolves into an immense jungle of people, computers, mobile devices, sensors, vehicles and networked infrastructures, bringing forward unexpected technologies, applications, products and services, the proposed security sub-systems seem strangely "deja vu", relying on variations of established techniques such as hashing, symmetric encryption, public-key cryptography or access control policies. But is this really all that it takes to secure the internet of things, smart grids or intelligent transportation systems, to name just a few of the envisioned future internet environments? In this tutorial, we shall address this question from various angles by looking at case studies such as vehicular networking, distributed sensing, network coding and physical-layer security. Our ultimate goal is to point at ways to ensure that such technologies can be well integrated in the (hopefully) secure internet of the future.

**Intended audience:** Practicing engineers, graduate students and undergraduate students with basic understanding of communication networks and protocols.

#### **Speaker Biography:**

**João Barros** is an Associate Professor (with “Agregação”) of Electrical and Computer Engineering (ECE) at the University of Porto (UP) and Founding Director of the Institute for Telecommunications (IT) in Porto, Portugal, with about 80 active members. He was a Fulbright scholar and has held visiting positions at the Massachusetts Institute of Technology (MIT), Carnegie Mellon University and Cornell University. He also teaches at the Porto Business School and co-founded two recent startups, Streambolico and Veniam, commercializing wireless video and vehicular communication technologies, respectively. Between 2009 and 2012, Dr. Barros served as National Director of the Carnegie Mellon Portugal Program, a five-year international partnership funded by the Portuguese Foundation of Science and Technology, with a total budget of 56M Euros. In recent years, João Barros has been Principal Investigator (PI) and Co-PI of numerous national, European and industry funded projects, co-authoring one book and 150 research papers in the fields of networking, information theory and security, with a special focus on smart city technologies, network coding, physical-layer security, sensor networks, and intelligent transportation systems. Dr. Barros has received several awards, including the 2010 IEEE Communications Society Young Researcher Award for the Europe, Middle East and Africa region, the 2011 IEEE ComSoC and Information Theory Society Joint Paper Award, the 2012 BES National Innovation Award, and a state-wide best teaching award by the Bavarian State Ministry of Sciences, Research and the Arts. He is an IEEE Senior Member and currently serves as Senior Editor of the IEEE Journal on Selected Areas in Communications. Dr. Barros is frequently invited as an expert speaker by international organizations such as the European Commission, OECD, ITU, IGF, EuroDIG and IEEE. He also works as an independent consultant for various organizations and projects. Dr. Barros is fluent in Portuguese, German, English, French and Spanish. He received his undergraduate education in ECE from the UP, Portugal and Universitaet Karlsruhe, Germany, a performing arts degree in flute from the Music Conservatory of Porto, and the Ph.D. degree in Electrical Engineering and Information Technology from the Technische Universitaet Muenchen (TUM), Germany.



## Tutorial E - Wireless Infrastructure Deployment and Economics



**Dr Jan Markendahl** (Associate Professor at KTH - Royal Institute of Technology, Stockholm)

**Duration:** 3.5h

**Homepage:** <https://www.kth.se/profile/janmar/>

### Description:

The agenda of the tutorial is as follows:

1. Fundamentals of wireless infrastructure economics Wireless Access fundamentals, Network capacity, amount of spectrum, spectral efficiency and deployment, cost-capacity relations, basic cost structure models.
2. Network deployment models & dimensioning user demand, data rates and average throughput, capacity and cost of different radio access technologies, dimensioning principles and trade-offs, more on cost structure, capex and opex trade-offs between capacity, network costs and amount of spectrum, Coopers law.
3. A basic exercise on network dimensioning and cost structure analysis.
4. Business models & infrastructure sharing in future wireless systems mobile operator business, vertically integrated value chains, spectrum, network sharing solutions, roaming, MVNOs, offloading, local operators, benefits and barriers for network sharing.

### Intended audience:

Academics and Industrial engineers with general technical background in wireless systems that need to understand the business concepts involved in wireless access and wireless economics. The tutorial is important since it provides an understanding of the interrelations between amount of spectrum, network capacity and cost for network deployment and operation. In addition business model aspects are discussed which is of vital importance to understand operator strategies.

### Speaker's Biography:

**Jan Markendahl** was appointed Associate Professor in Wireless Infrastructure Deployment and Economics 2012. He received his PhD degree in Techno-economics 2011 and his Lic Eng degree in Telecommunication Theory 1986 both at KTH.

Jan has more than 20 years of experience of R&D, business development, management and marketing from Ericsson, Nokia Networks, Telia, Teleplan, Communicator Guide and Framfab.

He has worked with mobile broadband deployment, spectrum, cost structure and business model aspects in the EU FP7 projects Ambient Networks, QUASAR and in the ongoing METIS projects.

His research interests include mobile broadband, network deployment, cost structure modelling & analysis, spectrum allocation, business modelling, M2M, Internet of things, mobile payments

The lecturer has developed and given lectures in a number of courses (and course modules) at the undergraduate and graduate levels as well as for continuing education, e.g., Wireless networks and Tele-economics.



## Tutorial F

**Title:** IEEE 802.11... Long Live the King (moving from WiFi to 5G)



**Dr. Periklis Chatzimisios and Dr. Athanassios Iossifides,**  
Alexander TEI of Thessaloniki (Greece)

**Duration:** 4 hours

**Homepage:** <http://aetos.it.teithe.gr/~peris/>  
<http://teithe.academia.edu/AthanassiosIossifides>

### Description:

A long time has passed since IEEE released the first 802.11 standard in 1997 for satisfying users need to access internet wirelessly (mostly webpages and emails) through Wireless Local Area Networks (WLANs). During the next years, IEEE 802.11 Working Groups have carried out a prolific program of introducing new standards (e.g. the well-known 802.11a/b/g/n) as well as improvements and extensions driven by a complete alphabet of amendments that led recently to fully revised standard 802.11-2012 incorporating most contemporary applications requirements. Currently, a new generation of standards is making its appearance (IEEE 802.11ac and 802.11ad are the latest additions) that is capable of achieving speeds of multiple gigabits per second, supporting a wide variety of new applications and delivering high Quality of Experience (QoE) to users.

This tutorial aims to bridge the gap between the well-known and widely applied IEEE 802.11 variants with the recently developed amendments, focusing on three major technical aspects/areas of interest: (i) the Physical layer (PHY) (ii) the Medium Access Control (MAC) layer and (iii) the new usage models and applications that will be supported in the coming years. The tutorial will start with a historic flashback of IEEE 802.11 standards and then will focus on a detailed review of IEEE 802.11-2012 that incorporates all the previous amendments. We will continue with a presentation of the emerging (recent and on-going) IEEE 802.11 standard amendments, such as IEEE 802.11aa (Robust Audio Video Transport Streaming), IEEE 802.11ac (Very-high throughput below the 6 GHz band), IEEE 802.11ad (Very-high throughput at the 60 GHz band), IEEE 802.11ae (Prioritization of Management Frames), IEEE 802.11af (WLAN in the TV White Space), IEEE 802.11ah (Radio frequencies below 1 GHz) and IEEE 802.11ai (Fast initial link setup). We will also provide an overview of the applications and trends like Bring Your Own Device (BYOD) connectivity, high-speed video delivery and multiplayer gaming that can be supported by the introduction of the emerging amendments. Finally, we will outline and discuss various challenges/open issues and we will conclude the presentation with an update of the status of the future amendments due to the on-going standardization activities of IEEE 802.11 Working Groups.

### Intended audience :

This tutorial is very timely since it fully covers the recent IEEE 802.11-2012 as well as all the emerging amendments and on-going IEEE 802.11 standardization activities on WLANs, a research area/market that is expected to grow even more in the next years. Furthermore, challenges and open issued will be identified along the entire tutorial, therefore making the presentation valuable and inspiring for people from industry as well as for academics, researchers and students.

### Speakers' Biographies:

**Periklis Chatzimisios** (SMIEEE) serves as an Associate Professor at the Alexander TEI of Thessaloniki (Greece). He is currently a Visiting Academic/Researcher in University of Toronto (Canada) and Massachusetts Institute of Technology (USA). For more than 10 years he is researching IEEE 802.11 protocols and lately he has contributed in other protocols and standards (i.e. IEEE 802.15.4). Dr. Chatzimisios is involved in several standardization activities serving as a Member of the Standards Development Board for the IEEE Communication Society (ComSoc) (2010-today) and lately as Secretary of the IEEE 1907.1 Standardization Working Group. He is also very active in IEEE activities and he serves as the Secretary of the IEEE Technical Committee on Cognitive Networks (TCCN).



Dr. Chatzimisios is the author/editor of 5 books and more than 80 peer-reviewed papers and book chapters. His published research work has received more than 1000 citations by other researchers.

**Athanassios Iossifides** (MIEEE) serves as an Assistant Professor on Wireless and Mobile Communication for Alexander TEI of Thessaloniki (Greece) since 2010. He has a rich professional experience of over a decade working with COSMOTE Mobile Telecommunications S.A. as a telecom engineer (at first) and manager of the Network Management Section of North Greece. He participated in numerous company internal development projects as well as several additional research projects on mobile and wireless communications. His main research interests lie in the areas of modulation, coding, diversity, multiple access and radio resource management techniques. He has published several papers (with a conference best paper award among them) and has been invited for lectures and seminars on these topics in various cases. He serves as a TPC member for several IEEE conferences and since 2012 he holds the position of Vice-Chair of IEEE VTS & AESS Greece Chapter.



## Workshops on May 7, 2014 (morning)

- **Workshop on M2M Solutions and Services**  
Scalability, cost, traffic mix aspects of M2M communications  
(speakers and program to be announced)

This workshop includes the following subjects:

- Precise implications and bottlenecks related to the co-existence of machine and human type of traffic.
- Network scalability aspects related to large number of devices.
- Suitability of cellular network deployments to efficiently support a mix of human and machine traffic.
- Impact of large number of devices within a cell with different amounts of human data communications.
- Comparison between capillary networks and wide area cellular technology.
- Identification of technologies/methods for enabling long-range and low energy M2M communications.
- Cost-efficient deployments of long-range solutions.
- Business model options for M2M services to enable an evolution beyond current approaches.

## Workshops on May 7, 2014 (afternoon)

- **Defence research in the communications context**

**SEACON Project – Undersea robotics supporting Navy operations**  
Prof. Lobo (CINAV)

**SIMOC Project – Maritime situational awareness**  
Lt.Cdr. Santos Fernandes (IH)

**SIC-T Project – The mobile environment in the Army context**  
(To be confirmed by the Portuguese Army)

**CORASMA Project – Cognitive radio research – how far from reality?**  
Vitor Cristina (TEKEVER)

**PITVAN Project – UAV developments**  
Lt.Cor Morgado (CIAFA)

**Panel – still TBD**



## Panel Session on May 5, 2014 (afternoon)

### *5G: Technologies and applications*

**Moderator:** Prof. Luis M. Correia, IST / INOV-INESC, University of Lisbon, Portugal

#### **Participants:**

- Lajos Hanzo, University of Southampton, UK
- Hamid Aghvami, King's College London, UK
- Elvino Sousa, University of Toronto, Canada
- Bosco Fernandes, Consultant, Germany

## Panel Session on May 6, 2014 (afternoon)

### *Business models for IoT (Internet of Things)*

**Moderator:** Jan I Markendahl, KTH, Royal Institute of Technology, Stockholm, Sweden

#### **Participants:**

- Sanchez Ponte, Mikel, Tecnalia
- Paulo Libano Monteiro, EDP - Energias de Portugal
- Joaquín García-Baquero, Net4Things
- Two other Industry partners (to be announced soon)

## Panel Session on May 7, 2014 (morning)

### *Defence perspectives on telecommunication for a battlefield advantage*

**Moderator:** Carlos Salema, IT, Instituto de telecomunicações, Lisboa, Portugal

#### **Participants:**

- (KNS) Alm. Gameiro Marques/Prof. Carlos Salema/Prof. Francisco Cercas
- EDA work and roadmap on communication systems  
Michael Sieber – European Defence Agency
- NATO perspectives and main concerns on communication systems  
NCIA (panelist to be confirmed)
- Portuguese MoD main concerns and Support to Development  
João Neves – MoD



## ISCTE-Lisbon University Institute, the venue ...





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