

Editorial: Special Issue on “5G Workshop on Networks, Services and Applications”

Selected topics from the 1st Joint Workshop between Center for TeleInFrastruktur (CTIF), Denmark and Center for Wireless Innovation (CWI), Norway, October 8, 2009, Aalborg, Denmark

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The first joint workshop between Center for TeleInFrastruktur (CTIF), Denmark and Center for Wireless Innovation (CWI), Norway, was held in Aalborg, Denmark on October 8, 2009, focusing on yet undefined term, ‘5G mobile networks’.

The fifth generation mobile networks will bring unlimited wireless world interconnection, convergence, and cooperation (geographically including cities, countries, continents, and finally, the whole world), together with a large variety of multimedia services at very high data rates. The objective of the event was to promote the convergence of interest with industrial commitment and leadership in determining strategic research agendas for 5G networks.

This Special Issue features eleven selected papers based on networks, services and applications aspects of 5G.

The first paper, “*Location-Aware Mobile Intrusion Detection with Enhanced Privacy in a 5G Context*” by Nils Ulltveit-Moe, Vladimir A., Oleshchuk and Geir M. Kjøien, presents location aware mobile intrusion prevention system architecture. This solution is envisaged in a future 5G network with increased but varying bandwidth and an evolved threat picture compared to what mobile devices typically experience today.

The second paper, “*Cooperative MAC Design in Multi-hop Wireless Networks, Part I: When Source and Destination are within the Transmission Range of Each Other*” by Xin He and Frank Y. Li, proposes ARQ medium access protocol which addresses various aspects of cooperative communications in a distributed wireless network. The focus is on multi-hop, cooperative, ad-hoc networking independent of any future network features.

The third paper, “*Cooperative MAC Design in Multi-hop Wireless Networks—Part II: When Source and Destination are Two-hops away from Each Other*” by Hongzhi Jiao and Frank Y. Li, proposes a novel MAC protocol which enables two-hop cooperative

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communications by involving one or more one-hop neighbors of both source and destination as the relays for cooperative communication.

The fourth paper, “Denial of Service Prevention for 5G” by Yao Li, Bipjeet Kaur and Birger Andersen proposes a secret version of Adaptive Frequency Hopping (AFH) focusing security and especially prevention of denial of service attacks which will become more common in commercial networks through increasing availability of easy programmable SDRs.

The fifth paper, “Future Cooperative Communication Systems Driven by Social Mobile Networks” by Laszlo Blazovics, Csaba Varga, Will Bamford, Peter Zanaty and Frank H.P. Fitzek, presents thoughts on social mobile networks and cooperative communication. By the example of the Gedda-Headz gaming community, possible links between cooperative mobile communication and social mobile networks are shown.

The sixth paper, “5th Generation Networking Principles for a Service Driven Future Internet Architecture” by Ram Kumar, motivates the need for a general update of the Internet architecture and discusses current approaches. It proposes a layer-less architecture taking into account principles of service oriented architectures.

The seventh paper, “5G—Service Continuity in Heterogeneous Environments” by Josef Noll, and Mohammad M. R. Chowdhury, introduces service continuity as the main driver for 5G systems. It addresses user and service aspects in recently opened LTE networks, and identifies the system challenges. The paper also covers network, user and service authentication as well as user and society requirements.

The eighth paper, “Remote Patient Monitoring within a Future 5G Infrastructure” by Vladimir Oleshchuk and Rune Fensli, presents a case for body area networks as an important part of 5G networks. The paper also discusses indirectly the advantages of 5G networking to use cloud computing in the context of mobile sensors to continuously analyze sensor data, e.g., heart rhythms, with higher accuracy.

The ninth paper, “5G based on Cognitive Radio”, by Cornelia-Ionela Badoi, Neeli Prasad, Victor Croitoru and Ramjee Prasad, provides a clear motivation for 5G and discusses core issues related to terminal and network capabilities. The topic of Cognitive Radio (CR) and its application to 5G is in the centre of the paper.

The tenth paper, “Full Rate Space Time Codes for Large Number of Transmitting Antennas with Linear Complexity Decoding” by Amir Laufer and Yeheskel Bar-Ness, describes a new coding scheme that promises to achieve full rate but maintains linear complexity of decoding for multiple transmitting antennas based on MIMO technology. MIMO, which boosts throughput and range, will play a key role in the design of the future 5G networks.

The eleventh paper, “Single Carrier Frequency Domain Equalization (SCFDE) Space-Time Block-Spread CDMA (STBS-CDMA) with MUI-Free Detection” by Kodzovi Acolatse and Yeheskel Bar-Ness, proposes a joint multiuser and interference cancelation for mitigating the effects of time varying channel. The scheme makes use of time diversity gain which surpasses the multiuser interference caused by time varying channel.

Author Biographies



Ramjee Prasad Fellow of IEEE (USA), The IET (UK) and IETE (India), has obtained B.Sc. Engineering in Electronics and Communication from the Bihar Institute of Technology, Sindri, India in 1968 followed by a M.Sc. Engineering from the Birla Institute of Technology (BIT), Ranchi, India in 1970 and a Ph.D. from BIT, India in 1979. Ramjee Prasad is a world-wide established scientist, who has given fundamental contributions towards development of wireless communications. He achieved fundamental results towards the development of CDMA and OFDM, taking the leading role by being the first in the world to publish books in the subjects of CDMA (1996) and OFDM (1999). He is the recipient of many international academic, industrial and governmental awards and distinctions, huge number of books (more than 25), journals and conferences publications (together more than 750), a sizeable amount of graduated Ph.D. students (over 60) and an even larger amount of graduated M.Sc. students (over 200). Several of his students are today worldwide telecommunication leaders themselves.

Recently, under his initiative, international M.Sc. and Ph.D. programmes have been started with the Sinhgad Technical Education Society in India, the Bandung Institute of Technology in Indonesia and with the Athens Information Technology (AIT) in Greece. Ramjee Prasad has a long path of achievements until to date and a rich experience in the academic, managerial, research, and business spheres of the mobile and wireless communication area. Namely, he played an important role in the success that the Future Radio Wideband Multiple Access Systems (FRAMES) achieved. He was the leader of successful EU projects like the MAGNET and MAGNET Beyond, among others, as well as the driver of fruitful cooperation with companies in projects, like Samsung, Huawei, Nokia, Telenor, among others. He started as a Senior Research Fellow (1970–1972) and continued as an Assistant Professor (1972–1980) at the Birla Institute of Technology (BIT), Mesra, Ranchi, India. He was appointed as an Associate Professor in 1980–1983 and head of the Microwave Laboratory there. From 1983–1988 Ramjee Prasad worked at the University of Dar es Salaam (UDSM), Tanzania, where he became Full Professor of Telecommunications in the Department of Electrical Engineering in 1986. From February 1988 till May 1999 Ramjee Prasad worked at the Delft University of Technology (DUT), The Netherlands at the Telecommunications and Traffic Control Systems Group. He was the founding head and program director of the Centre for Wireless and Personal Communications (CWPC) of the International Research Centre for Telecommunications-Transmission and Radar (IRCTR) at DUT, The Netherlands. Since June 1999, Ramjee Prasad has been holding the Professorial Chair of Wireless Information and Multimedia Communications at Aalborg University, Denmark (AAU). Here, he was also the Co-Director of the Center for PersonKommunikation until December 2002. He became the research director of the department of Communication Technology in 2003. In January 2004, he became the Founding Director of the Center for TeleInfrastruktur (CTIF), established as large multi-area research center at the premises of Aalborg University. CTIF at Aalborg University was inaugurated on January 29, 2004. Under Ramjee Prasad's successful leadership and due to his extraordinary vision, CTIF turned into CTIF-Global by opening 4 divisions, namely: CTIF-Italy (inaugurated in 2006 in Rome), CTIF-India (inaugurated in 2007 in Kolkata), CTIF-Copenhagen and CTIF-Japan (inaugurated in 2008). Ramjee Prasad is the founding chairman of Global ICT Standardization Forum for India (GISFI).



Frank Reichert has been working for over 20 years on technology and strategies for fixed and wireless communication systems both on national and international level. Since July 2005 he is with UiA (University of Agder), undertaking research in wireless communication networks and services. Currently he is the Dean of the Faculty of Engineering & Science. Co-operations include projects with Ericsson on wireless residential communications and the Norwegian Center for Wireless Innovation with six other institutions. From 1995 he was with Ericsson Sweden, guiding investigations on, e.g., Future Service Layer Architectures, Wireless Internet technologies, and 3G applications and terminals. Assignments included creating and managing European Research projects (e.g. EUREKA Subproject PRO-COM, ACTS OnTheMove). Frank established Ericsson Cyberlab Singapore in 1999, focusing on user centric, ethnographic application and terminal design, as well as rapid prototyping of new HW/SW products exhibited at fairs like CeBIT 2001 and COMDEX (e.g. Ericsson Cordless WebScreen,

Delhipad, Nanorouter). He was board member for Singapore CWS (Centre for Wireless Communications). He has been working as an expert, evaluator and auditor for the European Commission in industrial R&D frameworks such as RACE, ACTS, 5FP, 6FP, and Celtic Calls 1-3. Dr. Reichert holds a Ph.D. degree in Electrical Engineering from Aachen University of Technology, Germany. He has published about 60 papers at international conferences on mobile technologies.