Editors
Nikos E. Mastorakis
Zoran Bojkovic

Advances in Circuits, Systems, Signal Processing and Telecommunications

Proceedings of the 9th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '15)

Dubai, United Arab Emirates, February 22-24, 2015

Scientific Sponsor

University of Naples
Federico II

Recent Advances in Electrical Engineering Series | 44

Advances in Circuits, Systems, Signal Processing and Telecommunications

ADVANCES in CIRCUITS, SYSTEMS, SIGNAL PROCESSING and TELECOMMUNICATIONS

Proceedings of the 9th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '15)

Dubai, United Arab Emirates
February 22-24, 2015

Scientific Sponsor

University of Naples Federico II, Italy

Recent Advances in Electrical Engineering Series | 44

ISSN: 1790-5117
ISBN: 978-1-61804-271-2

ADVANCES in CIRCUITS, SYSTEMS, SIGNAL PROCESSING and TELECOMMUNICATIONS

Proceedings of the 9th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '15)

Dubai, United Arab Emirates
February 22-24, 2015

Published by WSEAS Press
www.wseas.org

All papers of the present volume were peer reviewed by no less that two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.

ISSN: 1790-5117
ISBN: 978-1-61804-271-2

ADVANCES in CIRCUITS, SYSTEMS, SIGNAL PROCESSING and TELECOMMUNICATIONS

Proceedings of the 9th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '15)

Dubai, United Arab Emirates
February 22-24, 2015

Editors:
Prof. Nikos E. Mastorakis, Technical University of Sofia, Bulgaria
Prof. Zoran Bojkovic, University of Belgrade, Serbia

Committee Members-Reviewers:

Bimal Kumar Bose
Narsingh Deo
Pierre Borne
Wasfy B. Mikhael
Yuriy S. Shmaliy
George Vachtsevanos
D. Subbaram Naidu
Tadeusz Kaczorek
Jiri Hrebicek
Sorinel Oprisan
Gen Qi Xu
Maria Isabel Garcia-Planas
Theodore B. Trafalis
Panagiotis Agathoklis
Imre J. Rudas
Brett Nener
Ronald Tetzlaff
Peter Szolgay
Xiang Bai
Alexander Gegov
Jan Awrejcewicz
Carla Pinto
Hamid Reza Karimi
Hung-Yuan Chung
Elbrous M. Jafarov
Bosukonda Murali Mohan
Bharat Doshi
Gang Yao
Lu Peng
Pavel Loskot
Abdullah Eroglu
Francesco Zirilli
Yoon-Ho Choi
Winai Jaikla
Ki Young Kim
Ryszard S. Choras
Kamisetty Rao
Pan Agathoklis
Demetri Terzopoulos
Georgios B. Giannakis
Abraham Bers
Brian Barsky
Aggelos Katsaggelos
Anastassios Venetsanopoulos
Nikolaos Paragios
Nikolaos G. Bourbakis
Lei Xu
Sidney Burrus
Biswa N. Datta
Hisashi Kobayashi
Leonid Kazovsky
Steven Collicott
Dimitri Kazakos

Stephen Weinstein
Dharma P. Agrawal
Jose M. F. Moura
Vijayakumar Bhagavatula
Liang-Gee Chen
Ahmed H. Tewfik
Jenq-Neng
Amir Hussain
Gergely V. Zaruba
Mohammed Ghanbari
C.-C. Jay Kuo
Amar Mukherjee
Athanassios Manikas
Dengsheng Zhang
Xingquan Zhu
Satnam Dlay
W. L. Woo
Stamatios Kartalopoulos
Vyacheslav Tuzlukov
Stevan Berber
Alexander Zemliak
Zoran Bojkovic
Etsuji Tomita
Lawrence Mazlack
Dragana Krstic
Natasa Zivic
Tomas Zelinka
Andrzej Chydzinski
Dimitrios A. Karras
Sandra Sendra
Kemal Tutuncu
Filippo Neri
Aboubekeur Hamdi-Cherif
Agoujil Said
Ali Yousef
Anastasios Salis
Calin Ciufudean
Carlos E. Formigoni
Chi,Chieh-Tsung Bruce
Cledson Akio Sakurai
Dariusz Jakobczak
Ehsan Kamrani
Emmanouil Zoulias
Helio Plapler
Jianqiang Gao
Kandarpa Kumar Sarma
Khaled Eskaf
Luiza Grigorescu
Massimiliano Todisco
Mazdak Zamani
Mohd Ashraf Ahmad
Muhammad Naufal Mansor
Ravishankar Chityala

Saad Bakkali
Sergey Stankevich
Shrishailappa Patil
Silvy Huang
Tohru Kawabe
Zahéra Mekkioui

Preface

This year the 9th International Conference on Circuits, Systems, Signal and Telecommunications (CSST '15) was held in Dubai, United Arab Emirates, February 22-24, 2015. The conference provided a platform to discuss network theory and applications, molecular electronics, microelectronics, nonlinear circuits, sensors, semiconductors, systems theory, dynamical systems, wavelets, hybrid systems, digital control, signal reconstruction, machine vision, applied electromagnetics etc. with participants from all over the world, both from academia and from industry.

Its success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of this conference are published in this Book that will be sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to many Journals for further evaluation.

Conferences such as this can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

Table of Contents

Plenary Lecture 1

5G Networks Era Perspectives: Architecture, Mobility, Application Requirements

Professor Zoran Bojkovic
Full Professor of Electrical Engineering
University of Belgrade
Serbia
E-mail: z.bojkovic@yahoo.com

Abstract: While mobile traffic is growing, the need for more sophisticated broadband services will push the limit on current standardization process. The main goal is to provide integration between wireless technologies and higher speeds, requiring a new generation of mobile communications-the fifth generation (5G). In contrast to the fourth generation (4G), 5G network should achieve 1000 times the system capacity, 10 times the spectral efficiency,higher data rates (for example, 10Gb/s for cell center users and 5Gb/s for cell edge users), 25 times the average cell throughput, 5 times reduction in end-to-end latency, and support 100 times more connected devices with 10 times longer battery life for low-power devices. The 5G infrastructure when defined as the ultra-broadband network enabling the future Internet, will be associated with the true revolution in the communication technology field.The network will take forward new services to everyone and everything, such as cognitive objects and cyber physical systems.New traffic types as well as data services are emerging, especially machine-to-machine communications to support some concepts such as the smart grid, smart homes and cities, e-health. These applications have very diverse communication requirements. The race to search for innovative solutions to enable 5G era has began worldwide. In early 2013, the European Commission announced that it would invest 50 million euros in 2013 for 5G research in multiple projects such as METIS, quickly followed by the formation of the Chinese Government-led IMT-2020 Promotion Group, in February 2013 and the initiation of the Korean Government-led 5G Forum, in May 2013. In Japan,the 2020 and Beyond Ad Hoc Group is under the Association of Radio Industries and Business (ARIB) advanced wireless communications study committee.In the United States, the three main activities on 5G era in Intel Strategic Research Alliance (ISRA), 4G Americas and NYU Wireless Research Center. At the moment, the standard bodies and idustry are dealing with a time frame to organize 5G technology, which is expected to be between 2016 and 2018, followed by initial deployment around 2020. This Plenary Lecture contains three parts. Starting with the description of the road to 5G , HetNet architecture evolution is pointed out. Macro and small cells may be connected to each other via backhaul resulting in different levels of coordination across the network for mobility and interference management. The second part deals with mobility for 5G network. The emphasis is on IP mobility management which is based on centralized data path. Next, the third part provides main drivers in the research for 5G application requirements including Internet of Things, Gigabit wireless connectivity and Tacktile Internet. Finally, standard activities conclude the presentation.

Brief Biography of the Speaker: Prof. Dr Zoran bojkovic (http://www.zoranbojkovic.com) from the University of Belgrade, Serbia, is the permanent Visiting Professor of the University of Texas at Arlington, UTA,TX,USA,EE Department, M;ultimedia System Lab. He was a visiting professor at more than 20 Universities worldwide and taught a number of courses in the field of electrical technology, digital signal processing, communication and computer networks,wire/wireless multimedia communications. Prof.Bojkovic is the co-author of 7 International Monographies/Books and 20 Chapters of the International Books published by Prentice Hall, Wiley, CRC Press Taylor&Francis Group, Springer, Elsevier WSEAS Press,Editura Politechnica, Alinea Editrice, NTNU Trondheim Norway, TICSF Finland. He is co-editor in 75 International Books and Conference Proceedings. He has published more than 450 papers in peer-reviewed journals and conference proceedings. He served as Editor-in-Chief, Associate Editor and Guest Editor in 7 International Journals. Prof.Bojkovic has conducted many Keynote/Plenary/Invited Lectures, Workshops/Tutorials, Seminars and participated in many international scientific and industrial projects. He is a Senior Member of IEEE, member of EURASIP, IASTED Canada, SERC Korea, expert in IAMSET, full member of Engineering Academy of Serbia, and a member of Serbian Scientific Society.