Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering 43

Editorial Board

Ozgur Akan
Middle East Technical University, Ankara, Turkey

Paolo Bellavista
University of Bologna, Italy

Jiannong Cao
Hong Kong Polytechnic University, Hong Kong

Falko Dressler
University of Erlangen, Germany

Domenico Ferrari
Università Cattolica Piacenza, Italy

Mario Gerla
UCLA, USA

Hisashi Kobayashi
Princeton University, USA

Sergio Palazzo
University of Catania, Italy

Sartaj Sahni
University of Florida, USA

Xuemin (Sherman) Shen
University of Waterloo, Canada

Mircea Stan
University of Virginia, USA

Jia Xiaohua
City University of Hong Kong, Hong Kong

Albert Zomaya
University of Sydney, Australia

Geoffrey Coulson
Lancaster University, UK

Kandeepan Sithamparanathan
Mario Marchese Marina Ruggieri
Igor Bisio (Eds.)

Personal Satellite Services

Second International ICST Confernce, PSATS 2010
Rome, Italy, February 4-5, 2010
Revised Selected Papers

Springer

Volume Editors

Kandeepan Sithamparanathan
Create-Net, Cognitive Information Networks Group,
Future Network Infrastructure and Service Platforms,
Povo, 38123, Trento, Italy
E-mail: kandeepan@ieee.org

Mario Marchese
Igor Bisio
Universita of Genova, Department of Communications,
Computer and System Sciences
16145 Genova, Italy
E-mail: {mario.marchese; igor}@unige.it

Marina Ruggieri
University of Roma Tor Vergata, CTIF Italy
00133 Rome, Italy
E-mail: ruggieri@uniroma2.it

Library of Congress Control Number: 2010928054

CR Subject Classification (1998): C.2, K.6.5, E.3, D.4.6, J.1, H.4

ISSN 1867-8211
ISBN-10 3-642-13617-6 Springer Berlin Heidelberg New York
ISBN-13 978-3-642-13617-7 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

springer.com

© ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2010
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 06/3180 5 4 3 2 1 0

Proceedings

The Second International ICST Conference on Personal Satellite Services 2010 (PSATS 2010) was held at the Starhotels Michael Angelo Hotel, Rome in Italy during February 4–5, 2010, jointly organized by CREATE-NET (Italy), University of Genoa (Italy) and Eutelsat (France).

The PSATS 2010 scientific conference was a two-day event emphasizing many aspects of satellite communications ranging from satellite communications, networks, navigation to quantum satellite communications presenting several high-quality technical and scientific papers. The first day of PSATS 2010 had four regular tracks of technical paper presentations, and the second day included four special sessions on the recent advancements in satellite communications. All the presentations were followed up by fruitful question-and-answer sessions and debates leading to immense knowledge sharing in the respective fields.

The conference included a keynote speech, four regular technical tracks and four special sessions consisting of 33 high-quality scientific papers. The four technical tracks included (1) Satellite Communications: Coding and Modulations; (2) Satellite Communications: Multimedia Integration; (3) Satellite Network: Quality of Service and Architectures; and (4) Satellite Networks: Applications and Services. The four technical tracks were complemented by four special sessions on: (1) Delay-Tolerant Networks; (2) Quantum Satellite Communications; (3) Access Quality Processing and Applications of Satellite Imagery; and (4) Satellite Emergency Communications.

The keynote speech titled "ICT Evolution and the Opportunities for Satellite Communications", was given by Giovanni E. Corazza, who is the Head of the Department of Electronics Computer Science and Systems (DEIS) at the University of Bologna, Italy. Professor Giovanni was the recipient of the IEEE 2009 Satellite Communications Distinguished Service Award and is the founder of the Integral Satcom Initative (ISI) the European technology platform on satellite communications. His speech emphasized the DNA of ICT evolution and identifying the opportunities for satellite communications. The keynote speech was well received and discussed among the participants.

The conference had close to 50 participants both from the industrial and the academic sectors from various parts of the world such as Japan, France, Greece, Spain, UK and Italy. The logistical organization of the conference is highly commendable and a special acknowledgment is due to Barbara Torok from ICST for running the event smoothly. The conference provided tea and coffee breaks as well as lunch at the hotel for all the participants throughout the conference. A Gala Dinner event was also organized on the first day of the conference. The quality of the venue, services provided by the hotel staff and especially the quality of food and drinks were all highly spoken about during the conference by the participants and the Organizing Committee as well.

Last but not least, I would like to thank the Organizing Committee members, Special Session Chairs, the Technical Program Committee members, and all the authors and reviewers who contributed immensely towards the success of this event. Also, on behalf of the Organizing Committee and the Steering Committee of PSATS, I would like to thank the ICST for sponsoring this event, and CREATE-NET, University of Genoa, and Eutelsat for their extended support in making this event a successful one.

We very much look forward to another successful conference in 2011 in Malaga with PSATS 2011, and in the forthcoming years.

Marina Ruggieri
Mario Marchese
Kandeepan Sithamparanathan

Organization

General Chair

Marina Ruggieri	University of Rome, "Tor Vergata", Italy
Mario Marchese	University of Genoa, Italy
Kandeepan Sithamparanathan	Create-Net, Italy

Steering Committee Chair

Imrich Chlamtac	President, Create-Net, Italy

General Vice-Chairs

Alessandro Vanelli-Coralli	University of Bologna, Italy
Haitham Cruickshank	University of Surrey, UK

Technical Program Committee Chairs

Claudio Sacchi	University of Trento, Italy
Giovanni Giambene	University of Sienna, Italy
Mauro De Sanctis	University of Rome, Tor Vergata", Italy

Industrial Chair

Agnelli Stefano	ESOA/Eutelsat, France

Advisory Committee

Giovanni E. Corazza	University of Bologna, Italy
Abbas Jamalipur	University of Sydney, Australia
Sam Reisenfeld	Macquarie University, Australia
Sandro Scalise	German Aerospace Centre, Germany
Takaya Yamazato	Nagoya University, Japan
Tarik Taleb	Tohuku University, Japan

Publications Chair

Igor Bisio	University of Genoa, Italy

Local Chair

Tommaso Rossi	University of Rome, "Tor Vergata", Italy

Conference Coordinators

Barbara Torok	ICST, Belgium

Website Chair

Lorenzo Mucchi	University of Florence, Italy

Special Session on Delay-Tolerant Networks

Haitham Cruickshank	University of Surrey, UK
Carlo Caini	University of Bologna, Italy

Special Session on Quantum Satellite Communications

Paolo Villoresi	University of Padua, Italy
Rupert Ursin	Austrian Academy of Science, Austria

Special Session on Access Quality Processing and Applications of Satellite Imagery

Giuseppe Conti	Fondazione Graphitech, Italy
Mattia Crespi	University of Rome "La Sapienza", Italy

Special Session on Satellite-Based Emergency Services

Mauro De Sanctis	University of Rome, "Tor Vergata", Italy
Simone Morosi	University of Florence, Italy

Technical Program Committee

Alban Duverdier	Centre National d'Etudes Spatiales - CNES, France
Fatih Alagoz	Bogazici University, Turkey
Franco Davoli	University of Genoa, Italy
Thierry Gayraud	Laboratory for Analysis and Architecture of Systems: LAAS-CNRS, France
Gianluca Reali	University of Perugia, Italy
Maurizio Mongelli	University of Genoa, Italy
Francesco Potorti	Institute of Information Science and Technologies: ISTI -CNR, Italy
Sandro Scalise	German Aerospace Centre: DLR, Germany

Tomaso De cola	German Aerospace Center: DLR, Germany
Ruhai Wang	Lamar University, Texas, USA
Carlo Caini	University of Bologna, Italy
Fatih Alagoz	Bogazici University, Turkey
Niki Pissinou	Florida International University, USA
Masoumeh Karimi	Florida International University, USA
Shamila Makki	COMMTECH, LLC, USA
Kami Makki	Lamar University, Texas, USA
Ljiljana Trajkovic	Simon Fraser University, Canada
Petia Todorova	The Fraunhofer Institute for Open Communication Systems: FOKUS, Germany
Rafael Asorey-Cacheda	Universidad de Vigo, Spain
Antonella Molinaro	University "Mediterranea" of Reggio Calabria, Italy
Hongfei Du	Alcatel-Lucent Bell Labs, USA
Matteo Berioli	German Aerospace Center: DLR, Germany
Gianmarco Baldini	Joint Research Centre (JRC), European Commission, Italy

Table of Contents

Track 1 - Satellite Communications: Coding and Modulation

Overview of PHY-Layer Design Challenges and Viable Solutions in W-Band Broadband Satellite Communications 3
Claudio Sacchi and Tommaso Rossi

FM Discriminator for AIS Satellite Detection 19
Maria Angeles Jurado Gallardo and Ghislain Ruy

Simulation of a Feasible Galileo System Operating in L1 and E5 Bands 35
Spyridon K. Chronopoulos, Christos Koliopanos, Antigoni Pappa, and Constantinos T. Angelis

Compensations of Nonlinear Effects of TWTA for Signal Super-Positioning Satellite Communication Systems 44
Kenta Kubo, Shigeo Naoi, Yozo Takeda, Ryusuke Miyamoto, Takao Hara, and Minoru Okada

Track 2 - Satellite Communications: Multimedia Integration

Comparative Analysis of Image Compression Algorithms for Deep Space Communications Systems 63
Igor Bisio, Fabio Lavagetto, and Mario Marchese

Ka-Band Satellite Consumer Triple-Play and Professional Video Services 74
Guillaume Benoit, Hector Fenech, Stefano Pezzana, and Alessia Tomatis

On the Consideration of an UMTS/S-UMTS Based GEO-MSS System Architecture Design 86
Jianjun Wu, Yuxin Cheng, Jiancheng Du, Jian Guo, and Zhenxing Gao

Track 3 - Satellite Networks: Quality of Service and Architectures

End-to-End QoS Evaluation of IP-Diffserv Network over LEO Satellite Constellation 99
Lukman Audah, Zhili Sun, and Haitham Cruickshank

A Cross-Layer Approach to Dynamic Bandwidth Allocation in Satellite Networks 114
Andrea Fiaschetti, Antonio Pietrabissa, and Laura Pimpinella

End-to-End QoS Measurement over a DVB-RCS Satellite Network 130
M. Ali, L. Liang, Z. Sun, H. Cruickshank, P. Thompson, L.M. Audah, T. Bouquentar, and N. Alagha

Track 4 - Satellite Networks: Applications and Services

Towards an IP/GSE-Only Signalling Framework for DVB Transmission Systems 147
Nimbe L. Ewald and Gorry Fairhurst

No-Reference H.264/AVC Statistical Multiplexing for DVB-RCS 163
Hamed Ahmadi Aliabad, Sandro Moiron, Martin Fleury, and Mohammed Ghanbari

The Interplanetary Network Node: Architecture and Preliminary Performance Evaluation 179
Giuseppe Araniti, Igor Bisio, and Mauro De Sanctis

WiFi Assisted GPS for Extended Location Services 191
Saverio Cacopardi, Mauro Femminella, Gianluca Reali, Andrea Sedini, Fortunato Palella, Maurizio Turina, Andrea Vignoli, Giuseppe Confessore, Emanuela Scacchi, and Angela Maria Saraceno

Hybrid Satellite-Optical Ring Network for Regional Blackspots in Australia's National Broadband Network 203
Sithamparanathan Kandeepan, Chava Vijaya Saradhi, Sam Reisenfeld, Eryk Dutkiewicz, Nicolas Chuberre, and Pierre Fraise

Special Session 1 - Delay Tolerant Network

Mitigating Denial of Service Attacks in Delay-and Disruption-Tolerant Networks 221
Godwin Ansa, Enyenihi Johnson, Haitham Cruickshank, and Zhili Sun

Delay/Disruption Tolerant Network Architecture for Aircrafts Datalink on Scheduled Routes 235
Mohammed Al-Siyabi, Haitham Cruickshank, and Zhili Sun

Access Control Framework for Delay/Disruption Tolerant Networks 249
Enyenihi Johnson, Godwin Ansa, Haitham Cruickshank, and Zhili Sun

ID Based Cryptography and Anonymity in Delay/Disruption Tolerant Networks 265
Naveed Ahmad, Haitham Cruickshank, and Zhili Sun

Virtualization Technologies for DTN Testbeds 276
Carlo Caini, Rosario Firrincieli, Daniele Lacamera, and Marco Livini

Special Session 2 - Quantum Satellite Communications

On the Polarization Analysis of Optical Beams for Use in Quantum Communications between Earth and Space 291
Alberto Dall'Arche, Andrea Tomaello, Cristian Bonato, and Paolo Villoresi

100 MHz Amplitude and Polarization Modulated Optical Source for Free-Space Quantum Communications at 850 nm 297
M. Jofre, A. Gardelein, G. Anzolin, G. Molina-Terriza, J.P. Torres, M.W. Mitchell, and V. Pruneri

Novel Techniques for Information Reconciliation, Quantum Channel Probing and Link Design for Quantum Key Distribution 305
Marina Mondin, Fred Daneshgaran, Maria Delgado, and Fabio Mesiti

Using Redundancy-Free Quantum Channels for Improving the Satellite Communication 317
Laszlo Bacsardi, Laszlo Gyongyosi, and Sandor Imre

Efficient Long Range Communication by Quantum Injected Optical Parametric Amplification 330
Chiara Vitelli, Lorenzo Toffoli, Fabio Sciarrino, and Francesco De Martini

Special Session 3 - Access Quality Processing and Applications of Satellite Imagery

Semi-automatic Objects Recognition Process Based on Fuzzy Logic 343
Federico Prandi and Raffaella Brumana

GeoEye-1: Analysis of Radiometric and Geometric Capability 354
Mattia Crespi, Gabriele Colosimo, Laura De Vendictis, Francesca Fratarcangeli, and Francesca Pieralice

Local Detection of Three-Dimensional Systematic Errors in Satellite DSMs: Case Studies of SRTM and ASTER in Lombardy 370
Maria Antonia Brovelli, Xuefei Liu, and Fernando Sansò

Interactive Access and Processing of Multispectral Imagery: The User in the Loop 381
Bruno Simões, Stefano Piffer, Angelo Carriero, Giuseppe Conti, and Raffaele De Amicis

Time Series Analysis of the Digital Elevation Model of Kuwait Derived from Synthetic Aperture Radar Interferometry 396
K.S. Rao and Hala K. Al Jassar

Special Session 4 - Satellite Based Emergency Services

Cooperative Strategies of Integrated Satellite/Terrestrial Systems for Emergencies 409
Simone Morosi, Sara Jayousi, and Enrico Del Re

Software Defined Radio Assisted Localization for Emergency Scenarios 425
Enrico Del Re, Luca Simone Ronga, Luca Vettori, Simone Morosi, Letizia Lo Presti, Emanuela Falletti, and Marco Pini

Hybrid System HAP-WiFi for Incident Area Network 436
G. Araniti, M. De Sanctis, S.C. Spinella, M. Monti, E. Cianca, A. Molinaro, A. Iera, and M. Ruggieri

Author Index 451