



HAL
open science

Communications: Wireless in Developing Countries and Networks of the Future

Ana Pont, Guy Pujolle, S.V. Raghavan

► **To cite this version:**

Ana Pont, Guy Pujolle, S.V. Raghavan. Communications: Wireless in Developing Countries and Networks of the Future: Third IFIPTC6 International Conference, WCITD2010 and IFIP TC 6 International Conference, NF 2010 Held as Part of WCC 2010 Brisbane, Australia, September 20-23, 2010, Proceedings. AICT-327, Springer, 2010, IFIP Advances in Information and Communication Technology, 978-3-642-15475-1. 10.1007/978-3-642-15476-8 . hal-01556785

HAL Id: hal-01556785

<https://inria.hal.science/hal-01556785>

Submitted on 5 Jul 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Editor-in-Chief

A. Joe Turner, Seneca, SC, USA

Editorial Board

Foundations of Computer Science

Mike Hinchey, Lero, Limerick, Ireland

Software: Theory and Practice

Bertrand Meyer, ETH Zurich, Switzerland

Education

Bernard Cornu, CNED-EIFAD, Poitiers, France

Information Technology Applications

Ronald Waxman, EDA Standards Consulting, Beachwood, OH, USA

Communication Systems

Guy Leduc, Université de Liège, Belgium

System Modeling and Optimization

Jacques Henry, Université de Bordeaux, France

Information Systems

Barbara Pernici, Politecnico di Milano, Italy

Relationship between Computers and Society

Chrisanthi Avgerou, London School of Economics, UK

Computer Systems Technology

Paolo Prinetto, Politecnico di Torino, Italy

Security and Privacy Protection in Information Processing Systems

Kai Rannenberg, Goethe University Frankfurt, Germany

Artificial Intelligence

Max A. Bramer, University of Portsmouth, UK

Human-Computer Interaction

Annelise Mark Pejtersen, Center of Cognitive Systems Engineering, Denmark

Entertainment Computing

Ryohei Nakatsu, National University of Singapore

IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is less rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is in information may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

Ana Pont Guy Pujolle S.V. Raghavan (Eds.)

Communications: Wireless in Developing Countries and Networks of the Future

Third IFIP TC 6 International Conference, WCITD 2010
and IFIP TC 6 International Conference, NF 2010
Held as Part of WCC 2010
Brisbane, Australia, September 20-23, 2010
Proceedings

Volume Editors

Ana Pont
Polytechnic University of Valencia
Department of Computer Engineering
46022 Valencia, Spain
E-mail: apont@disca.upv.es

Guy Pujolle
Pierre et Marie Curie University (Paris 6), LIP6
75016 Paris, France
E-mail: guy.pujolle@lip6.fr

S.V. Raghavan
Indian Institute of Technology Madras
Department of Computer Science and Engineering
Chennai 600 036, India
E-mail: svr@cs.iitm.ernet.in

Library of Congress Control Number: 2010933096

CR Subject Classification (1998): C.2, H.4, H.3, D.2, J.1, K.4.4

ISSN 1868-4238
ISBN-10 3-642-15475-1 Springer Berlin Heidelberg New York
ISBN-13 978-3-642-15475-1 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

© IFIP International Federation for Information Processing 2010
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper 06/3180

IFIP World Computer Congress 2010 (WCC 2010)

Message from the Chairs

Every two years, the International Federation for Information Processing (IFIP) hosts a major event which showcases the scientific endeavors of its over one hundred technical committees and working groups. On the occasion of IFIP's 50th anniversary, 2010 saw the 21st IFIP World Computer Congress (WCC 2010) take place in Australia for the third time, at the Brisbane Convention and Exhibition Centre, Brisbane, Queensland, September 20–23, 2010.

The congress was hosted by the Australian Computer Society, ACS. It was run as a federation of co-located conferences offered by the different IFIP technical committees, working groups and special interest groups, under the coordination of the International Program Committee.

The event was larger than ever before, consisting of 17 parallel conferences, focusing on topics ranging from artificial intelligence to entertainment computing, human choice and computers, security, networks of the future and theoretical computer science. The conference History of Computing was a valuable contribution to IFIP's 50th anniversary, as it specifically addressed IT developments during those years. The conference e-Health was organized jointly with the International Medical Informatics Association (IMIA), which evolved from IFIP Technical Committee TC-4 "Medical Informatics".

Some of these were established conferences that run at regular intervals, e.g., annually, and some represented new, groundbreaking areas of computing. Each conference had a call for papers, an International Program Committee of experts and a thorough peer reviewing process of full papers. The congress received 642 papers for the 17 conferences, and selected 319 from those, representing an acceptance rate of 49.69% (averaged over all conferences). To support interoperation between events, conferences were grouped into 8 areas: Deliver IT, Govern IT, Learn IT, Play IT, Sustain IT, Treat IT, Trust IT, and Value IT.

This volume is one of 13 volumes associated with the 17 scientific conferences. Each volume covers a specific topic and separately or together they form a valuable record of the state of computing research in the world in 2010. Each volume was prepared for publication in the Springer IFIP Advances in Information and Communication Technology series by the conference's volume editors. The overall Publications Chair for all volumes published for this congress is Mike Hinchey.

For full details of the World Computer Congress, please refer to the webpage at <http://www.ifip.org>.

June 2010 Augusto Casaca, Portugal, Chair, International Program Committee
Phillip Nyssen, Australia, Co-chair, International Program Committee
Nick Tate, Australia, Chair, Organizing Committee
Mike Hinchey, Ireland, Publications Chair
Klaus Brunnstein, Germany, General Congress Chair

Preface

Communications: Wireless in Developing Countries and Networks of the Future

The present book contains the proceedings of two conferences held at the World Computer Congress 2010 in Brisbane, Australia (September 20–23) organized by the International Federation for Information Processing (IFIP): the Third IFIP TC 6 International Conference on Wireless Communications and Information Technology for Developing Countries (WCITD 2010) and the IFIP TC 6 International Network of the Future Conference (NF 2010). The main objective of these two IFIP conferences on communications is to provide a platform for the exchange of recent and original contributions in wireless networks in developing countries and networks of the future.

There are many exciting trends and developments in the communications industry, several of which are related to advances in wireless networks, and next-generation Internet. It is commonly believed in the communications industry that a new generation should appear in the next ten years. Yet there are a number of issues that are being worked on in various industry research and development labs and universities towards enabling wireless high-speed networks, virtualization techniques, smart networks, high-level security schemes, etc.

We would like to thank the members of the Program Committees and the external reviewers and we hope these proceedings will be very useful to all researchers interested in the fields of wireless networks and future network technologies.

July 2010

Ana Pont
Guy Pujolle
S.V. Raghavan

WCITD 2010

International Advisory Board

Edward Knightly	Rice University, USA
Ramon Puigjaner	Universitat de les Illes Balears, Spain
Tharam S. Dillon	Curtin University of Technology, Australia
Leonard Barolli	Fukuoka Institute of Technology, Japan
Augusto Casaca	Instituto Superior Técnico, Portugal

General Chairs

Mieso Denko	University of Guelph, Canada
Albert Y. Zomaya	The University of Sydney, Australia

Program Committee Chair

Ana Pont	Universidad Politécnica de Valencia, Spain
----------	--

Program Committee Members

Pedro Cuenca	University of Castilla La Mancha, Spain
Benjamín Baran	National University of Asunción, Paraguay
José A. Gil Salinas	Universidad Politécnica de Valencia, Spain
Jason B. Ernst	University of Guelph, Canada
Joel Rodrigues	University of Beira Interior, Portugal
Rajkumar Buyya	The University of Melbourne, Australia
Krithi Ramamritham	IIT Bombay, India
Jose Neumann de Souza	Universidade Federal do Ceará, Brazil
Yacine Ghamri-Doudane	ENSIIE, France
Ramon Puigjaner	Universitat de les Illes Balears, Spain
Antoine Bagula	University of Cape Town, South Africa
Rodrigo Santos	Universidad Nacional del Sur, Argentina
Siraj Shaikh	Cranfield University, UK
Benoid Vaidya	Tribhuvan University, Portugal
Dimitris Varoutas	University of Athens, Greece
Tadeusz A. Wysocki	University of Nebraska – Lincoln, USA
Aruna Jayasuriya	University of South Australia, Australia
Noureddine Boudriga	University of Carthage, Tunisia
Adnan Al-Anbuky	Auckland University of Technology, New Zealand
Augusto Casaca	Instituto Superior Técnico, Portugal

NF 2010

Program Committee Chairs

Guy Pujolle UPMC, France
S.V. Raghavan IITM, India

Program Committee Members

Ozgur B. Akan Middle East Technical University, Turkey
Pedro A. Aranda Gutierrez Telefonica, Spain
Luis Orozco Barbosa UCM, Spain
Alessandro Bassi Hitachi, France
Chris Blondia University of Antwerp, Belgium
Raouf Boutaba Waterloo University, Canada
Dariusz Bursztynowski TPSA, Poland
Lee Bu Sung, Francis NTU, Singapore
Georg Carle TUM, Germany
Matteo Cesana Milan, Italy
Chih-Yung Chang Tamkang University, Taiwan
Omar Cherkaoui UQAM, Canada
Arek Dadej University of South Australia, Australia
Simon Dobson University College Dublin, Ireland
Mischa Dolher CTTC, Spain
William Donnelly WIT, Ireland
Emmanuel Dotaro Alcatel, France
Otto Duarte UFRJ, Brazil
Wissam Fawaz Lebanese American University, Lebanon
Luigi Fratta Milano, Italy
Dominique Gaïti UTT, France
Alex Galis UCL, UK
Mario Gerla UCLA, USA
Annie Gravey Telecom Bretagne, France
Gunther Harring University of Vienna, Austria
Bijan Jabbari Mason University, USA
Shengming Jiang South China University of Technology, China
Daniel Kofman Telecom ParisTech, France
Matti Latva-aho University of Oulu, Finland
Herman de Meer Passau, Germany
Edmundo Monteiro DEI, Portugal
José-Marcos Nogueira FUMG, Brazil
Mai Trang Nguyen UPMC, France

Harry Perros	NCSU, USA
Reinhard Posch	CIO, Austria
Ramon Puigjaner	Baleares Island University, Spain
Jennifer Rexford	Princeton, USA
James Roberts	Orange Labs, France
Roberto Sabella	Coritel, Italy
Adrian Segall	Technion, Israel
Joan Serrat	UPC, Spain
Fabrizio Sestini	European Commission
Joao da Silva	European Commission
Junehwa Song	KAIST, Korea
Paulo de Sousa	European Commission
Yutaka Takahashi	Kyoto University, Japan
Phuoc Tran-Gia	Würzburg, Germany
Kurt Tutschku	Vienna, Austria
Vilas Wuwongse	AIT Bangkok, Thailand
Yabin Ye	Huawei Technologies
Djamal Zeglache	Telecom SudParis, France

Table of Contents

WCITD 2010

Preface	1
<i>Ana Pont</i>	
Semantic Clustering in Wireless Sensor Networks	3
<i>Atslands Rego da Rocha, Igor Leão dos Santos, Luci Pirmez, Flávia C. Delicato, Danielo G. Gomes, and José Neuman de Souza</i>	
C ³ TO: A Scalable Architecture for Mobile Tutoring over Cell Phones . . .	15
<i>Laurie Butgereit and Reinhardt A. Botha</i>	
Wireless Mesh Networks for Infrastructure Deficient Areas	26
<i>Roman Seibel, Nils-Hendrik Klann, Tim Waage, and Dieter Hogrefe</i>	
Establishing Low Cost Aquatic Monitoring Networks for Developing Countries	39
<i>Jarrold Trevathan, Ian Atkinson, Wayne Read, Ron Johnstone, Nigel Bajema, and James McGeachin</i>	
Infrastructure and Business Model for Universal Broadband Access in Developing Regions: The Ceara State Digital Belt	51
<i>Cid F. Gomes, Fernando C. Gomes, and Marcial P. Fernandez</i>	
ICT Driven Knowledge Management in Developing Countries: A Case Study in a Chinese Organisation	60
<i>Jin Tong and Siraj A. Shaikh</i>	
Technical ICTD - A User Centered Lifecycle	72
<i>Joerg Doerflinger and Tom Gross</i>	

NF 2010

Preface	85
<i>Guy Pujolle and S.V. Raghavan</i>	
An Introduction to the Network of the Future	87
<i>Guy Pujolle</i>	
Future Internet Is by Ethernet	95
<i>Marko Luoma, Raimo Kantola, and Jukka Manner</i>	
On the Way to a Theory for Network Architectures	108
<i>Thi-Mai-Trang Nguyen</i>	

Green Network Planning Model for Optical Backbones	120
<i>Jose Gutierrez, Tahir Riaz, Michael Jensen, Jens M. Pedersen, and Ole B. Madsen</i>	
Internet Sensor Grid: Experiences with Passive and Active Instruments	132
<i>Peter Komisarczuk and Ian Welch</i>	
Data-Driven MAC for Efficient Transmission of Spatially Correlated Data in WSNs	146
<i>Nahdia Tabassum and Guojun Lu</i>	
Leveraging Trusted Network Connect for Secure Connection of Mobile Devices to Corporate Networks	158
<i>Kai-Oliver Detken, Hervais Simo Fhom, Richard Sethmann, and Günther Diederich</i>	
OpenFlow and Xen-Based Virtual Network Migration	170
<i>Pedro S. Pisa, Natalia C. Fernandes, Hugo E.T. Carvalho, Marcelo D.D. Moreira, Miguel Elias M. Campista, Luís Henrique M.K. Costa, and Otto Carlos M.B. Duarte</i>	
Virtual Network Urbanization	182
<i>Othmen Braham, Ahmed Amamou, and Guy Pujolle</i>	
New Routing Paradigms for the Next Internet	194
<i>Djamel H. Sadok, Luciana Pereira Oliveira, and Judith Kelner</i>	
End-to-End Performance Evaluation of Interconnected Optical Multi-ring Metropolitan Networks	206
<i>Tülin Atmaca and Tuan Dung Nguyen</i>	
A Relative Bandwidth Allocation Method Enabling Fast Convergence in XCP	217
<i>Hanh Le Hieu, Kenji Masui, and Katsuyoshi Iida</i>	
On the Interest of Introducing Randomness in Ad-Word Auctions	229
<i>Patrick Maillé and Bruno Tuffin</i>	
The Role and Future Challenges of Wireless Communication Networks for Cooperative Autonomous City Vehicles	241
<i>Andrei Furda, Laurent Bouraoui, Michel Parent, and Ljubo Vlacic</i>	
Performance Analysis of User-Centric Network Selection and Network-Centric Resource Allocation Approaches in Wireless Networks	252
<i>Sahin Albayrak, Manzoor A. Khan, Fikret Sivrikaya, Ahmet C. Toker, and Cuong Truong</i>	
Author Index	265