Lecture Notes in Computer Science

4517

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Fernando Boavida Edmundo Monteiro Saverio Mascolo Yevgeni Koucheryavy (Eds.)

Wired/Wireless Internet Communications

5th International Conference, WWIC 2007 Coimbra, Portugal, May 23-25, 2007 Proceedings



Volume Editors

Fernando Boavida Edmundo Monteiro University of Coimbra, Departamento de Engenharia Informatica Polo II, Pinhal de Marrocos, 3030-290 Coimbra, Portugal E-mail: {boavida, edmundo}@dei.uc.pt

Saverio Mascolo Politecnico di Bari, Dipartimento di Elettrotecnica ed Elettronica Via Orabona 4, 70125 Bari, Italy E-mail: saverio.mascolo@gmail.com

Yevgeni Koucheryavy Tampere University of Technology P.O. Box 553, 33101 Tampere, Finland E-mail: vk@cs.tut.fi

Library of Congress Control Number: 2007926907

CR Subject Classification (1998): C.2, D.4.4, D.2, H.3.5, H.4, K.6.4

LNCS Sublibrary: SL 5 – Computer Communication Networks and Telecommunications

ISSN 0302-9743

ISBN-10 3-540-72694-2 Springer Berlin Heidelberg New York ISBN-13 978-3-540-72694-4 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 is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2007 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper SPIN: 12068319 06/3180 5 4 3 2 1 0

Preface

WWIC 2007 was organized by the University of Coimbra, Portugal, and it was the fifth event of a series of International Conferences on Wired/Wireless Internet Communications, addressing research topics such as the design and evaluation of protocols, the dynamics of the integration, the performance trade-offs, the need for new performance metrics, and cross-layer interactions. Previous events were held in Berne (Switzerland) in 2006, Xanthi (Greece) in 2005, Frankfurt (Germany) in 2004, and Las Vegas (USA) in 2002.

As in 2005 and 2006, WWIC was selected as the official conference by COST Action 290 (Wi-QoST-Traffic and QoS Management in Wireless Multimedia Networks).

WWIC 2007 brought together active and proficient members of the networking community, from both academia and industry, thus contributing to scientific, strategic, and practical advances in the broad and fast-evolving field of wired/wireless Internet communications.

The WWIC 2007 call for papers attracted 257 submissions from 36 different countries in Asia, Australia, Europe, North America, and South America. These were subject to thorough review work by the Program Committee members and additional reviewers. The selection process was finalized in a Technical Program Committee meeting held in Malaga, Spain, on February 15, 2007.

A high-quality selection of 32 papers, organized into 8 single-track technical sessions made up the WWIC 2007 main technical program, which covered transport layer issues, handover and QoS, traffic engineering, audio/video over IP, IEEE 802.11 WLANs, sensor networks, protocols for ad-hoc and mesh networks, and OFDM systems. The technical program was complemented by two keynote speeches, by Henning Schulzrinne (Columbia University, New York, USA) and Nitin Vaidya (University of Illinois at Urbana-Champaign, USA), on New Internet and 4G Wireless Networks, and Multi-Channel Wireless Networks, respectively.

In addition to the main technical program, the two days preceding the conference were dedicated to two workshops: the 1st ERCIM workshop on eMobility (http://www.emobility.unibe.ch/workshop) and the 1st WEIRD workshop on WiMax, Wireless and Mobility (http://workshop.ist-weird.eu/).

We wish to record our appreciation of the efforts of many people in bringing about the WWIC 2007 conference: to all the authors that submitted their papers to the conference, we regret that it was not possible to accept more papers; to the Program Committee and to all associated reviewers for their careful reviews; to our sponsors and supporting institutions; to the University of Malaga, for hosting the TPC meeting. Finally, we would like to thank all the people that helped us at the University of Coimbra and all the volunteers from the Laboratory of Communications and Telematics.

May 2007

Fernando Boavida Edmundo Monteiro Saverio Mascolo Yevgeni Koucheryavy

Organization

Executive Committee

General Chairs Edmundo Monteiro, University of Coimbra, Portugal Yevgeni Koucheryavy, Tampere University of Technology, Finland

Program Chairs Fernando Boavida, University of Coimbra, Portugal Saverio Mascolo, Polytechnic of Bari, Italy

Local Organizing Committee

Jorge Sá Silva, University of Coimbra, Portugal Paulo Simões, University of Coimbra, Portugal Marilia Curado, University of Coimbra, Portugal Fernando Velez, University of Beira Interior, Portugal

Steering Committee

Torsten Braun, University of Bern, Switzerland Georg Carle, University of Tubingen, Germany Giovanni Giambene, University of Siena, Italy Yevgeni Koucheryavy, Tampere University of Technology, Finland Peter Langendoerfer, IHP Microelectronics, Germany Ibrahim Matta, Boston University, USA Vassilis Tsaoussidis, Demokritos University, Greece Nitin Vaidya, University of Illinois, USA

Supporting and Sponsoring Organizations

Project COST290
Cisco Europe
Alvarion
Advanced Resources
Critical Software
Fundação Calouste Gulbenkian
Câmara Municipal de Coimbra
University of Coimbra

Program Committee

Rui Aguiar, University of Aveiro, Portugal

Bengt Ahlgren, SICS, Sweden

Ozgur B. Akan, Middle East Technical University, Turkey

Khalid Al-Begain, University of Glamorgan, UK

Manuel Alvarez-Campana, UPMadrid, Spain

Chadi Barakat, INRIA, France

Carlos Bernardos, Universidad Carlos III de Madrid, Spain

Bharat Bhargava, Purdue University, USA

Fernando Boavida, University of Coimbra, Portugal

Torsten Braun, University of Bern, Switzerland

Wojciech Burakowski, Warsaw University of Techology, Poland

Maria Calderon, University Carlos III de Madrid, Spain

Georg Carle, University of Tübingen, Germany

Hermann de Meer, University of Passau, Germany

Ruy de Oliveira, CEFET-MT, Brazil

Michel Diaz, LAAS-CNRS, France

Sonia Fahmy, Purdue University, USA

Giovanni Giambene, University of Siena, Italy

Geert Heijenk, University of Twente, The Netherlands

Marc Heissenbüttel, Swisscom Mobile, Switzerland

Markus Hofmann, Columbia University, USA

Andreas Kassler, Karlstads University, Sweden

Ibrahim Khalil, RMIT University, Australia

Daniel Kofman, ENST, France

Yevgeni Koucheryavy, Tampere University of Technology, Finland

Rolf Kraemer, IHP Microelectronics, Germany

Peter Langendoerfer, IHP Microelectronics, Germany

Remco Litjens, TNO, The Netherlands

Pascal Lorenz, University of Haute Alsace, France

Christian Maihöfer, DaimlerChrysler, Germany

Saverio Mascolo, Politecnico di Bari, Italy

Paulo Mendes, DoCoMo Euro-Labs, Germany

Ingrid Moerman, Ghent University, Belgium

Dmitri Moltchanov, Tampere University of Technology, Finland

Edmundo Monteiro, University of Coimbra, Portugal

Liam Murphy, University College Dublin, Ireland

Marc Necker, University of Stuttgart, Germany

Guevara Noubir, Northeastern University, USA

Philippe Owezarski, LAAS-CNRS, France

George Pavlou, University of Surrey, UK

George Polyzos, AUEB, Greece

Utz Roedig, University of Lancaster, UK

Alexandre Santos, University of Minho, Portugal

Jochen Schiller, Free University Berlin, Germany

Andrew Scott, Lancaster University, UK

Patrick Sénac, ENSICA, France

Dimitrios Serpanos, University of Patras, Greece

Jorge Silva, University of Coimbra, Portugal

Vasilios Siris, University of Crete / ICS-FORTH, Greece

Dirk Staehle, University of Würzburg, Germany

Burkhard Stiller, University of Zurich / ETH Zurich, Switzerland

Ivan Stojmenovic, University of Ottawa, Canada

Phuoc Tran-Gia, University of Wuerzburg, Germany

Vassilis Tsaoussidis, Demokritos University, Greece

J.L. van den Berg, TNO / University of Twente, The Netherlands

Fernando Velez, University of Beira Interior, Portugal

Giorgio Ventre, University of Naples, Italy

Thiemo Voigt, SICS, Sweden

Miki Yamamoto, Kansai University, Japan

Chi Zhang, Florida International University, USA

Martina Zitterbart, University of Karlsruhe, Germany

Additional Reviewers

Imad Aad Wei Chai Roman Chertov Janet Adams Mifdaoui Ahlem Luca Cicco Ivano Alocci Paolo Costa Paul Amer Marilia Curado Mina Amin Saumitra Das Houyou Amine Daniel Dietterle Berl Andreas Stylianos Dimitriou Omar Ashagi Roman Dunavtsev Baris Atakan Barbara Emmert Urtzi Ayesta Ernesto Exposito Alper Bereketli Sílvia Farraposo Giuseppe Bianchi Pedro Ferreira Andreas Binzenhoefer Andreas Festag Erik-Oliver Blaß John Fitzpatrick Roland Bless Frances Frances Thomas Bohnert Bob Gaglianello Nafeesa Bohra Thomas Gamer Alister Burr Thierry Gayraud Orlando Cabral Vasken Genc Tiago Camilo Stelios Georgoulas Wagenknecht Gerald Maxweel Carmo **Brian Carrig** O. Gonzalez-Duque Ed Casey Alfredo Grieco Tim Casey Cataldo Guaragnella Marcel Castro Karim Guennoun Francisco Cercas Antonis Hadjiantonis Eduardo Cerqueira Jarmo Harju

Robert Henjes Kin-Hon Ho Hans-Jochim Hof Richard Holzer Tobias Hossfeld Michael Howarth Michael Howarth Christian Hübsch Bernhard Hurler Talha Isik Dedinski Ivan Aravind Iyer Jakub Jakubiak Oberender Jens Ljupco Jorguseski Guy Juanole Eleni Kamateri Alexander Klein Gerald Koch T. Kontonikolas Jukka Koskinen Andreas Kuntz Jerome Lacan Gabriela Leao António Lebres Emmanuel Lil Luis Loyola Andreas Maeder

Maurizio Maggiora Damien Magoni Apostolos Malatras Lefteris Mamatas Zoubir Mammeri Dimitri Marandin **Brogle Marc** Portman Marius Anwander Markus Wälchli Markus Wulff Markus Antonio Marques Rüdiger Martin I. Martinez-Yelmo Saverio Mascolo Volkamer Melanie Abdelhamid Mellouk Michael Menth Dmitri Moltchanov Andreas Müller Christian Müller John Murphy Sean Murphy Marc Necker

Augusto Neto Simon Oechsner Olga Ormond Evgeni Osipov Vittorio Palmisano Manuel Pedro Tanguy Perennou P. Papadimitriou Giorgos Papastergiou Wuechner Patrick Steffen Peter Krzysztof Piotrowski Rastin Pries Ioannis Psaras Andre Rodrigues Christian Rohner Frank Roijers Sabyasachi Roy Christos Samaras Venkatesh Saranga Julian Satran Michael Scharf Isaac Seoane

Pablo Serrano

Bilhanan Silverajan Paulo Simoes Siva Sivavakeesar Rute Sofia Dirk Staehle Mikael Sternad Werner Teich Staub Thomas Christina Thorpe Ageliki Tsioliaridou Francesco Vacirca Luc Vandendorpe Luis Veloso Lars Völker Nicolas Wambeke N. Wang Ning Wang Ning Wang Wang Wenbo Joerg Widmer Yan Wu Santiago Zapata Xuan Zhong

Andre Zimmermann

Table of Contents

Transport Layer issues
TCP Contention Control: A Cross Layer Approach to Improve TCP Performance in Multihop Ad Hoc Networks
Providing Relative Service Differentiation to TCP Flows over Split-TCP Geostationary Bandwidth on Demand Satellite Networks
An Analytical Comparison of the Slow-but-Steady and Impatient Variants of TCP NewReno
SCTP Performance Issue on Path Delay Differential
Handover and QoS
Handover for Seamless Stream Media in Mobile IPv6 Network
A Secure Handover Protocol Design in Wireless Networks with Formal Verification
Seamless Handover for Multi-user Sessions with QoS and Connectivity Support
QoS and Authentication Experiences in a Residential Environment Within a Broadband Access Framework
QoS and Traffic Engineering
Security and Service Quality Analysis for Cluster-Based Wireless Sensor Networks

Admission Control for Inter-domain Real-Time Traffic Originating from Differentiated Services Stub Domains
Stylianos Georgoulas, George Pavlou, Panos Trimintzios, and Kin-Hon Ho
Fault Tolerant Scalable Support for Network Portability and Traffic Engineering
Marcelo Bagnulo, Alberto García-Martínez, and Arturo Azcorra
Class-Based OSPF Traffic Engineering Inspired on Evolutionary Computation
Fearo Sousa, Miguei Rocha, Miguei Rio, ana Fauto Correz
Audio/Video over IP
An Experimental Investigation of the Congestion Control Used by
Skype VoIP Luca De Cicco, Saverio Mascolo, and Vittorio Palmisano
A Quality Adaptation Scheme for Internet Video Streams
Performance Analysis of VoIP over HSDPA in a Multi-cell
Environment
Feasibility of Supporting Real-Time Traffic in DiffServ Architecture $Jinoo\ Joung$
IEEE 802.11 WLANs
Multi-rate Relaying for Performance Improvement in IEEE 802.11
WLANs Laura Marie Feeney, Bilge Cetin, Daniel Hollos, Martin Kubisch, Seble Mengesha, and Holger Karl
Performance Analysis of IEEE 802.11b Under Multiple IEEE 802.15.4 Interferences
Dae Gil Yoon, Soo Young Shin, Jae Hee Park, Hong Seong Park, and Wook Hyun Kwon
Characterization of Service Times Burstiness of IEEE 802.11 DCF Francesco Vacirca and Andrea Baiocchi
ID-Based Multiple Space Key Pre-distribution Scheme for Wireless Sensor Networks

Sensor Networks and Location-Aware Systems	
Distributed Event Localization and Tracking with Wireless Sensors Markus Wälchli, Piotr Skoczylas, Michael Meer, and Torsten Braun	247
Cross-Layer Distributed Diversity for Heterogeneous Wireless Networks	259
Location-Aware Signaling Protocol for WWAN and WLAN Interworking	271
Performance Evaluation of Non-persistent CSMA as Anti-collision Protocol for Active RFID Tags	279
Protocols for Ad Hoc and Mesh Networks	
Multicast Overlay Spanning Tree Protocol for Ad Hoc Networks	290
Detection of Packet Forwarding Misbehavior in Mobile Ad-Hoc Networks	302
Reliable Geographical Multicast Routing in Vehicular Ad-Hoc Networks	315
A Flexible Tree-Based Routing Protocol with a Mesh Relaying Node in Multi-hop Wireless Mesh Networks	326
Efficient Spectrum Use	
An Interference-Robust Transmission Method for OFDMA Uplink Ki-Chang Lee and Tae-Hyun Moon	338
An Efficient Heterogeneous Wireless Access Based on Region and Time Partitioning in D-TDD OFDM Systems	346
Cognitive Radio Based Bandwidth Sharing Among Heterogeneous OFDM Access Systems	358

XIV Table of Contents

CDMA Power Control Using Channel Prediction in Mobile Fading	
Channels	370
Sangho Choe	
Author Index	381