

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

Alfred Kobsa

University of California, Irvine, CA, 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

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Rui Valadas Paulo Salvador (Eds.)

Traffic Management and Traffic Engineering for the Future Internet

First Euro-NF Workshop, FITraMEn 2008
Porto, Portugal, December 2008
Revised Selected Papers



Springer

Volume Editors

Rui Valadas

Instituto de Telecomunicações, Instituto Superior Técnico

Av. Rovisco Pais, 1049-001 Lisboa, Portugal

E-mail: rui.valadas@ist.utl.pt

Paulo Salvador

Instituto de Telecomunicações, Universidade de Aveiro

Campus de Santiago, 3810-193 Aveiro, Portugal

E-mail: salvador@ua.pt

Library of Congress Control Number: 2009934595

CR Subject Classification (1998): C.2, D.4.4, G.2.2, H.3.4, C.2.5, C.2.6

LNCS Sublibrary: SL 5 – Computer Communication Networks
and Telecommunications

ISSN 0302-9743

ISBN-10 3-642-04575-8 Springer Berlin Heidelberg New York

ISBN-13 978-3-642-04575-2 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

© Springer-Verlag Berlin Heidelberg 2009

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12756650 06/3180 5 4 3 2 1 0

Preface

Designing the future internet requires an in-depth consideration of the management, dimensioning and traffic control issues that will be involved in the network operations of these networks. The International Workshop on Traffic Management and Traffic Engineering of the Future Internet, FITraMEn 2008, organized within the framework of the Network of Excellence Euro-NF¹, provided an open forum to present and discuss new ideas in this area in the context of fixed, wireless and spontaneous (ad hoc and sensor) networks.

The Network of Excellence Euro-NF “Anticipating the Network of the Future - From Theory to Design” is a European project funded by the European Union within the Seventh Framework Program. The focus of Euro-NF is to develop new principles and methods to design/dimension/control/manage multi-technology architectures. The emerging networking paradigms raise new challenging scientific and technological problems embedded in complex policy, governance, and worldwide standards issues. Dealing with the diversity of these scientific and social, political and economic challenges requires the integration of a wide range of research capabilities, a role that Euro-NF aims to fulfill.

This proceedings volume contains a selection of the research contributions presented at FITraMEn 2008. The workshop was held December 11–12, 2008 in Porto, Portugal, organized by Instituto de Telecomunicações².

The workshop was attended by a total of 44 participants, 12 external to the Euro-NF community. The technical program included, in addition to the paper presentations, two keynote speeches, one by Nandita Dukkipati of Advanced Architecture and Research at Cisco Systems, San Jose, on “Challenges in the Traffic Management of Future Networks” and the other by Andreas Kind, from IBM Zurich Research Laboratory, on “Monitoring the Future Internet.”

To participate in the workshop the authors submitted a full paper on their recent research work in the field of traffic management and traffic engineering. The 54 papers submitted to the workshop were carefully reviewed by at least 3 members of the Technical Program Committee. A total of 30 papers were selected for oral presentation at the workshop. From these, 15 revised papers incorporating the numerous referee comments and the suggestions made in the workshop were accepted for publication in this book.

The papers contained in this book provide a general view of the ongoing research on traffic management and traffic engineering in the Euro-NF Network of Excellence, and give a representative example of the problems currently

¹ <http://euronf.enst.fr>

² <http://www.it.pt>

investigated in this area, spanning topics such as bandwidth allocation and traffic control, statistical analysis, traffic engineering, and optical networks and video communications.

March 2009

Rui Valadas
Paulo Salvador

Organization

Organizing Committee

Rui Valadas	Institute of Telecommunications, Portugal
Paulo Salvador	Institute of Telecommunications, Portugal
António Nogueira	Institute of Telecommunications, Portugal
Joel Rodrigues	Institute of Telecommunications, Portugal
Susana Sargentó	Institute of Telecommunications, Portugal
Eduardo Rocha	Institute of Telecommunications, Portugal
Sandra Corújo	Institute of Telecommunications, Portugal

Referees

Alvelos, Filipe	Kilpi, Jorma	Rodrigues, Joel
Antunes, Nelson	Krieger, Udo	Sabella, Roberto
Atmaca, Tulin	Mellia, Marco	Salvador, Paulo
Borst, Sem	Menth, Michael	Sargentó, Susana
Brown, Patrick	Naldi, Maurizio	Sidi, Moshe
Casaca, Augusto	Nogueira, António	de Sousa, Amaro
Casetti, Claudio	Norros, Ilkka	Tassiulas, Leandros
Collange, Denis	Oliveira, Rosário	Valadas, Rui
Dotaro, Emmanuel	Oriolo, Gianpaolo	Vaton, Sandrine
Fiedler, Markus	Pacheco, António	Virtamo, Jorma
Garcia, Nuno	Pereira, Paulo	Zúquete, André
Jajszczyk, Andrzej	Pioro, Michal	
Johansson, Mikael	Roberts, James	

Sponsoring Institutions

EU-funded Euro-NF network of Excellence
Institute of Telecommunications, Portugal

Table of Contents

Bandwidth Allocation and Traffic Control

Models for Capacity Demand Estimation in a TV Broadcast Network with Variable Bit Rate TV Channels	1
<i>Zlatka Avramova, Danny De Vleeschauwer, Kathleen Spaey, Sabine Wittevrongel, Herwig Bruneel, and Chris Blondia</i>	
A Distributed Scheme for Value-Based Bandwidth Reconfiguration	16
<i>Åke Arvidsson, Johannes Göbel, Anthony Krzesinski, and Peter Taylor</i>	
A Fair and Dynamic Load-Balancing Mechanism	36
<i>Federico Larroca and Jean-Louis Rougier</i>	

The Impact of Congestion Control Mechanisms on Network Performance after Failure in Flow-Aware Networks	53
<i>Jerzy Domżał, Robert Wójcik, and Andrzej Jajszczyk</i>	

Statistical Analysis

On the Dependencies between Internet Flow Characteristics	68
<i>M. Rosário de Oliveira, António Pacheco, Cláudia Pascoal, Rui Valadas, and Paulo Salvador</i>	
Peer-Level Analysis of Distributed Multimedia Content Sharing	81
<i>Joana Gonçalves, Paulo Salvador, António Nogueira, and Rui Valadas</i>	
Volume Anomaly Detection in Data Networks: An Optimal Detection Algorithm vs. the PCA Approach	96
<i>Pedro Casas, Lionel Fillatre, Sandrine Vaton, and Igor Nikiforov</i>	

Traffic Engineering

Traffic Engineering of Telecommunication Networks Based on Multiple Spanning Tree Routing	114
<i>Dorabella Santos, Amaro de Sousa, and Filipe Alvelos</i>	
Local Restoration for Trees and Arborescences	130
<i>Paola Iovanna, Gaia Nicosia, Gianpaolo Oriolo, Laura Sanità, and Ezio Sperduto</i>	

Blind Maximum-Likelihood Estimation of Traffic Matrices in Long Range Dependent Traffic	141
<i>Pier Luigi Conti, Livia De Giovanni, and Maurizio Naldi</i>	
Optimizing Network Performance in Multihoming Environments	155
<i>Nuno Coutinho, Susana Sargent, and Vitor Jesus</i>	
Optical Networks and Video Communications	
Performance of Optical Ring Architectures with Variable-Size Packets: In-Line Buffers vs Semi-synchronous and Asynchronous Transparent MAC Protocols	169
<i>Thaere Eido, Tuan Dung Nguyen, Tülin Atmaca, and Dominique Chiaroni</i>	
A Priority-Based Multiservice Dynamic Bandwidth Allocation for Ethernet Passive Optical Networks	185
<i>Minh Thanh Ngo and Annie Gravey</i>	
High-Performance H.264/SVC Video Communications in 802.11e Ad Hoc Networks	200
<i>Attilio Fiandratti, Dario Gallucci, Enrico Masala, and Juan Carlos De Martin</i>	
Framework for Personal TV	211
<i>André Claro, Paulo Rogério Pereira, and Luís Miguel Campos</i>	
Author Index	231