

Table of Contents

Analytical Models I

On Evaluating Loss Performance Deviation: A Simple Tool and Its Practical Implications	1
<i>Ying Xu (University of Pennsylvania) and Roch Guérin (University of Pennsylvania)</i>	
Extending the Network Calculus Pay Bursts Only Once Principle to Aggregate Scheduling	19
<i>Markus Fidler (Aachen University)</i>	
Modelling the Arrival Process for Packet Audio	35
<i>Ingemar Kaj (Uppsala University) and Ian Marsh (CNA Lab)</i>	
On Packet Delays and Segmentation Methods in IP Based UMTS Radio Access Networks	50
<i>Gábor Tóth (Ericsson Research) and Csaba Antal (Ericsson Research)</i>	

QoS Routing

On Performance Objective Functions for Optimising Routed Networks for Best QoS	64
<i>Huan Pham (James Cook University) and Bill Lavery (James Cook University)</i>	
An Adaptive QoS-routing Algorithm for IP Networks Using Genetic Algorithms	76
<i>Hicham Juidette (University Mohamed V), Noureddine Idboufker (University Chouaib Doukali), and Abdelghfour Berraissoul (University Chouaib Doukali)</i>	
A QoS Routing Mechanism for Reducing the Routing Inaccuracy Effects	90
<i>Xavier Masip-Bruin (Universitat Politècnica de Catalunya), Sergio Sánchez-López (Universitat Politècnica de Catalunya), Josep Solé-Pareta (Universitat Politècnica de Catalunya), and Jordi Dominigo-Pascual (Universitat Politècnica de Catalunya)</i>	
Stability and Scalability Issues in Hop-by-Hop Class-Based Routing	103
<i>Marília Curado (University of Coimbra), Orlando Reis (University of Coimbra), João Brito (University of Coimbra), Gonçalo Quadros (University of Coimbra), and Edmundo Monteiro (University of Coimbra)</i>	

Measurements and Experimental Results

Network Independent Available Bandwidth Sampling and Measurement	117
<i>Manthos Kazantzidis (UCLA), Dario Maggiorini (UCLA), and Mario Gerla (UCLA)</i>	
Less than Best Effort: Application Scenarios and Experimental Results	131
<i>Tim Chown (University of Southampton), Tiziana Ferrari (Istituto Nazionale di Fisica Nucleare), Simon Leinen (SWITCH), Roberto Sabatino (DANTE), Nicolas Simar (DANTE), and Stig Venaas (UNINETT)</i>	
TStat: TCP STatistic and Analysis Tool	145
<i>Marco Mellia (Politecnico di Torino), Andrea Carpani (Vitaminic), and Renato Lo Cigno (Politecnico di Torino)</i>	
End-to-End QoS Supported on a Bandwidth Broker	158
<i>José M. Calhariz (INOV) and Teresa Vazão (INOV)</i>	
Multidomain End to End IP QoS and SLA	171
<i>Mauro Campanella (INFN-GARR), Michal Przybylski (PSNC), Rudolf Roth (FhG FOKUS), Afrodite Sevasti (RA-CTI), and Nicolas Simar (DANTE)</i>	

QoS Below IP

Dimensioning Models of Shared Resources in Optical Packet Switching Architectures	185
<i>Vincenzo Eramo (Università di Roma La Sapienza) and Marco Listanti (Università di Roma La Sapienza)</i>	
Efficient Usage of Capacity Resources in Survivable MPLS Networks	204
<i>Lan Tran (Vrije Universiteit), Kris Steenhaut (Vrije Universiteit), Ann Nowé (Vrije Universiteit), Mario Pickavet (Ghent University-INTEC), and Piet Demeester (Ghent University-INTEC)</i>	
Performance Evaluation of a Distributed Scheme for Protection against Single and Double Faults for MPLS	218
<i>Fabio Ricciato (Università di Roma La Sapienza), Marco Listanti (Università di Roma La Sapienza), Angelo Belmonte (Università di Roma La Sapienza), and Daniele Perla (Università di Roma La Sapienza)</i>	
Edge Distributed Admission Control for Performance Improvement in Traffic Engineered Networks	233
<i>Alessandro Bosco (Ericsson Lab), Roberto Mameli (Ericsson Lab), Eleonora Manconi (Ericsson Lab), and Fabio Ubaldi (CoRiTeL)</i>	

End-to-End QoS in IP Networks

Bandwidth Estimation for TCP Sources and Its Application	247
<i>Rossano G. Garroppo (Università di Pisa), Stefano Giordano (Università di Pisa), Michele Pagano (Università di Pisa), Gregorio Procissi (Università di Pisa), and Raffaello Secchi (Università di Pisa)</i>	
Best-Effort and Guaranteed Performance Services in Telecommunications Networks: Pricing and Call Admission Control Techniques	261
<i>Marco Baglietto (Università di Genova), Raffaele Bolla (Università di Genova), Franco Davoli (Università di Genova), Mario Marchese (Università di Genova), and Maurizio Mongelli (Università di Genova)</i>	
TCP Smart Framing: A Segmentation Algorithm to Improve TCP Performance	276
<i>Marco Mellia (Politecnico di Torino), Michela Meo (Politecnico di Torino), and Claudio Casetti (Politecnico di Torino)</i>	
Live Admission Control for Video Streaming	292
<i>Pietro Camarda (Politecnico di Bari) and Domenico Striccoli (Politecnico di Bari)</i>	
QoS Multicast	
<i>DQM: An Overlay Scheme for Quality of Service Differentiation in Source Specific Multicast</i>	306
<i>Ning Wang (University of Surrey) and George Pavlou (University of Surrey)</i>	
Directed Trees in Multicast Routing	320
<i>Maria João Nicolau (Universidade do Minho), António Costa (Universidade do Minho), Alexandre Santos (Universidade do Minho), and Vasco Freitas (Universidade do Minho)</i>	
A Proposal for a Multicast Protocol for Live Media	334
<i>Yuthapong Somchit (Tokyo Institute of Technology), Aki Kobayashi (Tokyo Institute of Technology), Katsunori Yamaoka (Tokyo Institute of Technology), and Yoshinori Sakai (Tokyo Institute of Technology)</i>	
On the Use of Sender Adaptation to Improve Stability and Fairness for Layered Video Multicast	347
<i>Ping Wu (Hong Kong University), Ji Xu (Hong Kong University), Feng Chen (Hong Kong University), Jiangchuan Liu (Hong Kong University), Jihui Zhang (Hong Kong University), and Bo Li (Hong Kong University)</i>	

Analytical Models II

A New Fluid-Based Methodology to Model AQM Techniques with Markov Arrivals 358
Mario Barbera (University of Catania), Antonio Laudani (University of Catania), Alfio Lombardo (University of Catania), and Giovanni Schembra (University of Catania)

Stochastic Petri Nets Models for the Performance Analysis of TCP Connections Supporting Finite Data Transfer 372
Rossano Gaeta (Università di Torino), Matteo Sereno (Università di Torino), and Daniele Manini (Università di Torino)

A Queueing Network Model of Short-Lived TCP Flows with Mixed Wired and Wireless Access Links 392
Roberta Fracchia (Politecnico di Torino), Michele Garetto (Politecnico di Torino), and Renato Lo Cigno (Politecnico di Torino)

TCP-SACK Analysis and Improvement through OMQN Models 405
Marco Bagnus (Politecnico di Torino) and Renato Lo Cigno (Politecnico di Torino)

Optical Networks

QoS Provision in Optical Networks by Shared Protection: An Exact Approach 419
Andrea Concaro (CoreCom), Guido Maier (CoreCom), Mario Martinelli (CoreCom), Achille Pattavina (Politecnico di Milano), and Massimo Tornatore (Politecnico di Milano)

Design of WDM Networks Exploiting OTDM and Light-Splitters 433
Paolo Petracca (Politecnico di Torino), Marco Mellia (Politecnico di Torino), Emilio Leonardi (Politecnico di Torino), and Fabio Neri (Politecnico di Torino)

DWDM for QoS Management in Optical Packet Switches 447
Franco Callegati (University of Bologna), Walter Cerroni (University of Bologna), Carla Raffaelli (University of Bologna), and Paolo Zaffoni (University of Bologna)

Space Division Architectures for Crosstalk Reduction in Optical Interconnection Networks 460
Andrea Borella (Università di Ancona), Giovanni Cancellieri (Università di Ancona), and Dante Mantini (Università di Ancona)

Reconfigurable Protocols and Networks

The RAMON Module: Architecture Framework and Performance Results	471
<i>Aldo Roveri (Università di Roma La Sapienza), Carla-Fabiana Chiasserini (Politecnico di Torino), Mauro Femminella (Università di Perugia), Tommaso Melodia (Università di Roma La Sapienza), Giacomo Morabito (Università di Catania), Michele Rossi (Università di Ferrara), and Ilenia Tinnirello (Università di Palermo)</i>	
Reconfigurable Packet Scheduling for Radio Access Jointly Adaptive to Traffic and Channel	485
<i>Andrea Baiocchi (Università di Roma La Sapienza), Francesca Cuomo (Università di Roma La Sapienza), Tommaso Melodia (Università di Roma La Sapienza), Alfredo Todini (Università di Roma La Sapienza), and Francesco Vacirca (Università di Roma La Sapienza)</i>	
Mobility Management in a Reconfigurable Environment: The RAMON Approach	499
<i>Mauro Femminella (Università di Perugia) and Leonardo Piacentini (Università di Perugia)</i>	
Improving End-to-End Performance in Reconfigurable Networks through Dynamic Setting of TCP Parameters	513
<i>Giacomo Morabito (Università di Catania), Sergio Palazzo (Università di Catania), Michele Rossi (Università di Ferrara), and Michele Zorzi (Università di Ferrara)</i>	

Provision of Multimedia Services

Adaptive MPEG-4 Video Streaming with Bandwidth Estimation	525
<i>Alex Balk (UCLA), Dario Maggiorini (UCLA), Mario Gerla (UCLA), and M.Y. Sanadidi (UCLA)</i>	
Dynamic Quality Adaptation Mechanisms for TCP-friendly MPEG-4 Video Transfer	539
<i>Naoki Wakamiya (Osaka University), Masaki Miyabayashi (Osaka University), Masayuki Murata (Osaka University), and Hideo Miyahara (Osaka University)</i>	
Traffic Sensitive Active Queue Management for Improved Multimedia Streaming	551
<i>Vishal Phirke (Worcester Polytechnic Institute), Mark Claypool (Worcester Polytechnic Institute), and Robert Kinicki (Worcester Polytechnic Institute)</i>	

A QoS Providing Multimedia Ad Hoc Wireless LAN with Granular OFDM-CDMA Channel 567
Hyunho Yang (Suncheon Cheongam College) and Kiseon Kim (Kwangju Institute of Science and Technology K-JIST)

QoS in Multidomain Networks

SIP Originated Dynamic Resource Configuration in Diffserv Networks: SIP / COPS / Traffic Control Mechanisms 581
Stefano Giordano (Università di Pisa), Marco Listanti (Università di Roma La Sapienza), Fabio Mustacchio (Università di Pisa), Saverio Niccolini (Università di Pisa), Stefano Salsano (Università di Roma Tor Vergata), and Luca Veltri (Università di Parma)

Virtual Flow Deviation: Dynamic Routing of Bandwidth Guaranteed Connections 592
Antonio Capone (Politecnico di Milano), Luigi Fratta (Politecnico di Milano), and Fabio Martignon (Politecnico di Milano)

Design and Implementation of a Test Bed for QoS Trials 606
Giorgio Calarco (Università di Bologna), Roberto Maccaferri (Università di Bologna), Giovanni Pau (Henry Samueli School of Engineering and Applied Science), and Carla Raffaelli (Università di Bologna)

A Linux-Based Testbed for Multicast Sessions Set-Up in Diff-Serv Networks 619
Elena Pagani (Università di Milano), Matteo Pelati (Università di Milano), and Gian Paolo Rossi (Università di Milano)

Invited Paper

Light-Trails: A Solution to IP Centric Communication in the Optical Domain 634
Imrich Chlamtac (University of Texas at Dallas) and Ashwin Gumaste (University of Texas at Dallas)

Congestion and Admission Control

End-to-End Bandwidth Estimation for Congestion Control in Packet Networks 645
Luigi Alfredo Grieco (Università di Lecce) and Saverio Mascolo (Politecnico di Bari)

Priority-Based Internet Access Control for Fairness Improvement and Abuse Reduction	659
<i>Tsung-Ching Lin (National Taiwan University), Yeali S. Sun (National Taiwan University), Shi-Chung Chang (National Taiwan University), Shao-I Chu (National Taiwan University), Yi-Ting Chou (National Taiwan University), and Mei-Wen Li (National Taiwan University)</i>	
A Probing Approach for Effective Distributed Resource Reservation	672
<i>Lihua Yuan (National University of Singapore), Chen-Khong Tham (National University of Singapore), and Akkihebbal L. Ananda (National University of Singapore)</i>	
Dynamic Adaptation of Virtual Network Capacity for Deterministic Service Guarantees	689
<i>Stephan Recker (IMST GmbH), Heinz Lüdiger (IMST GmbH), and Walter Geisselhardt (Gerhard-Mercator-University)</i>	
Architectures and Protocols for QoS Provision	
Towards RSVP Version 2	704
<i>Rosella Greco (NEC Europe), Luca Delgrossi (NEC Europe), and Marcus Brunner (NEC Europe)</i>	
Analysis of SIP, RSVP, and COPS Interoperability	717
<i>Csaba Király (Budapest University), Zsolt Pándi (Budapest University), and Tien Van Do (Budapest University)</i>	
Simulation Study of Aggregate Flow Control to Improve QoS in a Differentiated Services Network	729
<i>Sergio Herrería-Alonso (Universidade de Vigo), Andrés Suárez-González (Universidade de Vigo), Manuel Fernández-Veiga (Universidade de Vigo), Raúl F. Rodríguez-Rubio (Universidade de Vigo), and Cándido López-García (Universidade de Vigo)</i>	
Quality of Service Multicasting over Differentiated Services Networks . . .	742
<i>Giuseppe Bianchi (Università di Palermo), Nicola Blefari-Melazzi (Università di Roma Tor Vergata), Giuliano Bonafede (Università di Palermo), and Emiliano Tintinelli (Università di Roma Tor Vergata)</i>	
Author Index	757