

## Preface

The papers in this book present various viewpoints on the design and implementation of techniques for *QoS engineering for Internet services*. They were selected from more than 70 submissions to the 1st International workshop on “Quality of future Internet services” (QofIS) organized by COST Action 263. The main focus of the papers is on the creation, configuration and deployment of end-to-end services over a QoS assured Internet using the IntServ (Integrated Services) and DiffServ (Differentiated Services) models. The main technical programme was completed by two keynote talks: IETF Chair Fred Baker opened the workshop with a discussion on major Internet development directions and Andrew M. Odlyzko of AT&T Labs Research gave the closing talk on Internet charging issues. The presentation of papers was organised in 9 sessions.

The emphasis of Session 1 is on an assessment of the essential building blocks for a QoS assured Internet, i.e., queueing and scheduling, which basically defines the space for end-to-end services. The papers of this session discuss the bounds we may expect from these building blocks, the issues of queueing and scheduling management, and the parameters we need to tune in a dynamic implementation.

Flow control and congestion control cannot be considered without regard to the dominating impact of TCP. The keyword of Session 2 is, therefore, *Internet-friendly adaptation*. Four papers in this session are complementary and together present an emerging understanding of a basic optimal *area* for such adaptation.

Session 3 – *End-to-End* – highlights an interesting opposition within the IntServ domain between two proposed generalizations of RSVP. A third paper provides a pragmatic discussion of the issue of realizing dynamic service level agreements in a DiffServ domain.

Session 4 addresses objectives, cost and particular mechanisms for QoS routing and traffic engineering in the Internet. These aspects are shown to be important components in a global approach to the realization of QoS guarantees.

The importance of QoS measurements and measurement-based QoS mechanisms is fairly well understood. Three papers in Session 5 present some interesting developments in the fields of measurement-based *analysis*, measurement *metrics* and Internet QoS measurement *methodology*.

The papers of Session 6 analyse different issues of *fairness*, already addressed in Session 1, and discuss such aspects as: fairness as a new research area, fair bandwidth allocation via marking-based flow layering, and fairness metrics.

*Adaptation* is the focal point of Session 7 – from hybrid error correction, through dual (per-hop and end-to-end) optimal control, to active networks. Not surprisingly, two adaptation papers in this session deal with multicast which is another hot Internet topic.

One of the basic questions – *How to charge for quality classes?* – is examined in the papers of Session 8. The issue is addressed from the viewpoints of quality classes provisioning, inter-domain pricing interworking, and provider revenue, especially for mobile communication.

Finally, the very traditional questions of resource utilisation and performance are revisited in Session 9 with emphasis on DiffServ networks. The papers of this session present novel approaches for live video scheduling, for inexpensive experimental QoS performance evaluation, and for lightweight resource management.

The main track of the QofIS 2000 technical programme was accompanied by a mini-track on *Internet Charging*, represented in these proceedings by the abstracts of keynote talks and a panel.

We wish to record our appreciation of the efforts of many people in bringing about the QofIS 2000 workshop: to the authors (we regret that it was not possible to accept more papers); to the Programme Committee and to all associated reviewers; to our sponsors, who made our job a bit easier; to the local Organising Committee, and particularly the Global Networking competence centre of GMD FOKUS; to all members of COST 263 Action who organised the first of what we hope will become a series of successful QofIS workshops.

July 2000

Jon Crowcroft, Jim Roberts  
Michael Smirnov

# Organization

QofIS 2000 is organised by COST – *Cooperation europeenne dans le domaine de la recherche scientifique et technique*, Action 263.

## Executive Committee

Workshop Chairs: Jon Crowcroft (University College London, UK)  
James Roberts (FranceTelecom R&D, France)  
Program Chair: Michael Smirnov (GMD FOKUS, Germany)

## Program Committee

A. Azcorra, UC3M, Spain	G. Pavlou, Uni. Surrey, UK
F. Baker, Cisco, USA	M. Popa, Procetel, Romania
E. Biersack, Eurecom, France	C. Scoglio, FUB, Italy
C. Blondia, UIA, Belgium	D. Serpanos, ICS FORTH, Greece
O. Bonaventure, FUNDP, Belgium	M. Smirnov, GMD FOKUS, Germany
G. Carle, GMD FOKUS, Germany	J. Sole-Pareta, UPC, Spain
O. Casals, UPC, Spain	P. de Sousa, IST, CEC
J. Crowcroft, UCL, UK	I. Stavrakakis, UOA, Greece
H. Esaki, Tokyo University, Japan	H. Stuetzgen, NEC, Germany
D. Hutchison, Lancaster Uni., UK	J. Roberts, FT R&D, France
J. Jormakka, HUT, Finland	G. Ventre, UNINA, Italy
G. Karlsson, KTH, Sweden	J. Virtamo, HUT, Finland
K. Kilkki, Nokia, USA	L. Wolf, UKA, Germany
P. Kuehn, IND, Germany	A. Wolisz, TUB, Germany
M. Luoma, HUT, Finland	J. Wroclawski, MIT, USA
B. Lyles, Sprint, USA	A. Zehl, T-Nova, Germany
V. Naoumov, LUT, Finland	M. Zitterbart, TU-BS, Germany

## Sponsoring Institutions

GMD FOKUS  
Deutsche Telekom T-Nova  
Cisco Systems  
Nokia  
ERCIM  
The IST Programme, Commission of the European Communities