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PREFACE

Note from the editors

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This Special Volume of the *Annals of Operations Research* (ANOR) contains frontier research papers on performance analysis techniques for resource allocation in communication networks. In November 2006, a workshop on this subject (with the name *StoPeRA*, standing for *Stochastic Performance Models for Resource Allocation in Communication Systems*) was held at the Center for Mathematics and Computer Science (CWI) in Amsterdam. The workshop, organized under the umbrella of *EuroNGI*, the European Network of Excellence on Next Generation Internet, attracted around 70 participants, predominantly from Europe. The theme of this Special Volume is at the very core of the research consortium *EuroNGI* (and its successors *Euro FGI* and *Euro NF*), whose mission is to create and maintain a prominent European center of excellence in Next Generation Internet design and engineering, and to foster intensive collaboration between partners from academia and industry, leading towards a leadership in this domain.

Most of the contributions to this Special Volume are based on presentations given at the StoPeRa workshop. After a highly selective refereeing process, 14 papers were chosen for their quality and relevance to the Special Volume's topic. We would like to thank the authors of all submitted papers for their interest in and support for this Special Volume. We would also like to use this opportunity to thank all reviewers; in particular many authors of submitted papers kindly agreed to act as reviewers.

The subject of this Special Volume is a very timely one. Over the past few decades the development of information and communication technology has clearly changed our modern society. The use of telecommunication services has been growing at an unprecedented rate,

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and will continue to expand in the near future. Recent advances in networking and software technology boost the development of new and advanced services offered over communication systems that integrate a widely heterogeneous mix of applications and wired/wireless networks. Without careful network planning and management, the implied dramatic increase in the demand for networking and transportation resources and remote application services (link bandwidth, buffer storage, CPU power) may lead to substantial degradation of the Quality of Service as experienced by the end users. Hence, in the increasingly competitive market of telecommunications, service and network providers must allocate networking and processing resources to their customers in an efficient and cost-effective manner, while possibly meeting customer-oriented fairness conditions. To achieve this, operators may rely on scheduling mechanisms or, in a distributed-control environment, use pricing to provide users with the proper incentives to ensure a desirable allocation of network resources.

Efficient resource allocation in integrated communication systems cannot be realized without a thorough understanding of the implications for the performance of sustained services. This raises the need for the development and analysis of new performance models that capture the complex interaction of traffic with widely heterogeneous characteristics and requirements in an ever so heterogeneous mix of networking and processing environments.

The papers included in this volume of ANOR address the issues raised above, relying on a broad spectrum of performance analysis techniques, including real-life Internet measurements and involving numerical solution techniques.

During the review process we were struck by the sad news that ANOR's Editor-in-Chief Peter Hammer had passed away. We would like to mention the very pleasant contacts we had with Professor Hammer when setting up plans for this Special Volume and express our gratitude to him, as well as to his successor Professor Endre Boros, for their trust placed in us.