Preface

Communication networks are a vital and crucial element of today’s world. Mobile devices, the Internet, and all new applications and services provided by these media have changed dramatically the way both individual lives and society as a whole are organized. All these services depend on fast and reliable data connections, whether wired or wireless. To meet such requirements, information and communication technology is challenged again and again to provide faster protocols, wireless interfaces with higher bandwidth capacity, innovative mechanisms to handle failures, and so on.

For many of those challenges a variety of mathematical disciplines contribute in a supportive role, either in providing insights, evidence, or algorithms or as decision support tools. In particular, the broad area of algorithmic discrete mathematics plays a crucial role in the design and operation of communication networks. However, the discipline is fragmented between scientific disciplines such as pure mathematics, theoretical computer science, distributed computing, and operations research. Furthermore, researchers from communication engineering utilize discrete mathematical techniques and develop their own extensions.

With the aim to bring together the above-mentioned disciplines and draw synergy effects from it, the COST action 293 – Graphs and Algorithms in Communication Networks – was launched in October 2004 for a period of four years. Scientists from the above disciplines have been gathering on a regular basis to learn from each other and to work jointly on emerging applications to the benefit of the information and communication technology society. Also workshops and training schools have been organized to disseminate recent advances in all subject areas. An active exchange programme (short-term scientific missions in COST terminology) between the research groups has resulted in a high number of joint publications.

To document on the one hand the multidisciplinary research carried out within COST 293 and on the other hand to encourage further collaborations between the disciplines, this book presents a number of studies in broadband, optical, wireless, and ad hoc networks where the techniques of algorithmic discrete mathematics have provided highly recognized contributions.
The way the studies are presented, this book is particularly suited for Ph.D. students, postdoctoral researchers in mathematics, computer science, operations research, and network engineering as well as industrial researchers who would like to investigate state-of-the-art mathematical alternatives to resolve the technological challenges of tomorrow. An introductory chapter should ease access to the material for researchers not familiar with the mathematical terminology used by the chapters’ authors.

As chair and vice-chair of COST 293, it has been a pleasure for us to prepare this book. We would like to thank all authors and reviewers for the contributions. Without their voluntary help it would have been impossible to publish this book. We also are grateful to COST for supporting our action in general and the dissemination of this book in particular.

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