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Preface

The contemporary technical world is based on informatics solutions. Most of them are based on functionality dispersion and use distributed processing. This would be impossible without appropriate methods and ways of data transmission. Fundamentals, in this case, are computer network technologies. Hence, there is a big role for engineers who are able to act as specialists in the domain of communication in computer and information science. It is a common view and opinion that almost everyone knows something about this area. However, deep knowledge and skills related to networking are very rare. Especially when one takes into consideration a wide and systemic point of view, not a particular skill.

Nowadays, information technologies are objects of regular changes and improvements. Communications questions, as a key in this matter, have been evolving constantly. On the one hand well-known solutions are not sufficient; on the other hand some of them are no longer developed and become obsolete in the context of current requirements. The main reason for such a state is the constant growth of expectations in almost every branch of human activity as well as the constant development of the human environment.

It necessitates the modernization of existing solutions as well as creating brand new ones. New methods and tools for designing, modelling, testing, and for other actions supporting researchers enable networking technologies to be continuously enriched and changed. First of all, a general development is possible thanks to the results of research and thanks to the proposals of modern applications delivered by a group of engineers and scientists whose eminent representatives are authors of this book. The contents include 48 chapters covering a broad spectrum of issues, problems and topics that are strongly connected to the following subjects, currently considered as valid and up to date:

- New and emerging technologies related to networking fields
- Fundamentals of computer networks
- Internet and internetworking
- Security and safety issues
- Industrial computer networks
- Wireless systems and sensor networks
- Theory of queues and queuing networks
- Applications and computer networks usage

Additionally, there are some topics referring to QoS issues, multiservice, cellular, high-speed, and mobile networks as well as quantum technologies.

Generally, the book is focused on the above-mentioned subjects in the presented order. However, we decided not to create separate parts because the contents of the chapters are not separated from one another but overlap partially.

The chapters related to the fundamentals and to the subjects of new approaches are presented at the beginning of the book and comprise among others: Web services, content-aware networks, data mining methods, and quantum technologies.

The next group concerns network and resource management, performance forecasting, flow analysis, efficiency consideration while streaming, and other important issues referring to internetworking.

The fourth group is related to security issues, particularly on various risks and methods of detection and prevention. Among others, topics about retrieving a program code based on voltage supply changes, analyses of malware activity from the honeypots viewpoint, and micrographics usage in information security domains are presented, as well as valid issues related to traffic anonymization and the analysis of IP storage security.

A very important field of computer communications is the industrial informatics area. It is considered in the next few chapters related to the new concept of data transmission with real-time constraints, performance estimation of data transfer based on the OPC UA model, as well as to authentication, management, and failure-detection topics.

A great effort in the research of the new-generation networks is focused on wireless solutions. Many common applications such as home and entertainment networks, and specialized ones such as sensor networks, are based on wireless technologies. The next part of the book presents topics on networking without a cable, e.g., energy consumption, modeling, simulations, and routing algorithms. Additionally, there are interesting chapters which refer to cellular technology. The first one refers to the evaluation of data transmission performance in cellular networks used in industrial computer systems and the second one refers to the influence of weather conditions on mobile phone usage.

Next, in view of the importance of the theory of queues, a few chapters related to this area are included in the book. At the end of the volume there are chapters with an evident application character. They are connected with the e-Bussiness area, vehicular sensor networks, earth science calculations in cluster architecture, efficiency of DCOM and CORBA standard techniques within distributed wireless environments, and last but not least, the weather to warning systems.

We would like to take this opportunity to express our thanks to all the authors for sharing the research results and for their assistance in creating this monograph. This book, in our belief, is a valuable reference on computer networks. We would also like to thank the members of international Program Committee for their participation in reviewing each paper twice.

April 2012

Andrzej Kwiecień
Piotr Gaj

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