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978-0-521-86985-0 — Hands-On Networking: From Theory to Practice
Maria Luisa Merani , Maurizio Casoni , Walter Cerroni
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Hands-On Networking

From Theory to Practice

Learn the core theory and engage with real-world networking issues with this richly illustrated example-based textbook.

Hands-On Networking provides students with:

- An accurate view of modern networks through detailed coverage of the most relevant networking technologies,
- Carefully designed, affordable laboratory exercises based on open-source software networking tools for hands-on practice with real networking devices,
- Numerous case studies and examples that link theory to practice,
- A bottom-up approach that is easy to follow and perfect for lab-oriented courses.

Maria Luisa Merani is an Associate Professor at the University of Modena and Reggio Emilia, Italy, where she has taught networking courses since 1993. She is an IEEE Senior Member, an Editor of the *IEEE Transactions on Wireless Communications*, and is the author of more than 70 technical papers in the field.

Maurizio Casoni is an Associate Professor in Telecommunications at the University of Modena and Reggio Emilia, Italy.

Walter Cerroni is an Assistant Professor in Telecommunications at the University of Bologna, Italy. His teaching experience covers different aspects of communication networks, with most of the courses integrating theory and laboratory exercises or simulations.

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MARIA LUISA MERANI
University of Modena and Reggio Emilia, Italy

MAURIZIO CASONI
University of Modena and Reggio Emilia, Italy

WALTER CERRONI
University of Bologna, Italy

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To Pierangelo and our three enchanting children:
Pietro, Filippo and Margherita.
Maria Luisa

To Francesco, Beatrice and Rita, happiness of my life.
Maurizio

To Lara, for her total love, constant support and extreme patience.
Walter

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Preface

The topics this book touches lie within the networking field, an exciting area that in the last 20 years has experienced a stunning growth and gained an increasing popularity. Just as previous ages of modern society have been marked by technological advancements that significantly shaped them, from transistors to personal computers, our life is now molded by emails, our work and leisure time clocked by websites, our children daily accompanied by the Internet. What lies behind this boiling surface? What infrastructures and communication rules allow us to connect to the Internet from home through an ADSL connection? How does information travel on a high-speed backbone from our office to an overseas destination? Through a rigorous yet practical approach, the aim of this volume is to provide all the concepts needed for a thorough knowledge of networking technologies, as well as to breed the development of agile skills in modern network design.

After laying the common language foundations and the basic concepts and terminology within the field, the book is committed to a critical treatment of the technologies, protocols and devices adopted in contemporary networks. A special emphasis is placed on building an effective competence in all subject areas: hence, each topic is complemented by guided and commented practices, where proficiencies are challenged through real problems. The aim is to strengthen the abilities needed for present-day network design. The chapter structure reflects the authors' pedagogical view: first build good foundations and gain expertise in each topic, then consolidate and confront real networking issues.

With only a few exceptions, the practical examples described in the book are based on open-source software networking tools. The rationale behind this choice is to give the reader the chance to experiment on real networking devices and tools at relatively limited cost, as most of the practices can be replicated using a few PCs and some very common networking hardware. However, this open and accessible methodology does not limit the technical quality of the examples: the same conceptual approach holds when using commercial – and expensive – networking equipment.

Undoubtedly, this book has been conceived to provide university students with strong competence in the networking field, an ambitious task that requires the blend of two distinct ingredients. First, to master theory and concepts rigorously, acquiring a critical methodology in approaching problems: the latter is the ultimate lesson a university professor should strive to teach! Second, to tame real systems and real problems, a goal where universities sometimes fall short. Our hope is to contribute to partly bridge the gap, pouring our teaching and professional experiences into this writing adventure.

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Who are the intended recipients of the volume? Both university students and professionals willing to achieve a solid foundation in the networking field. It might be used as a textbook for a one-semester undergraduate or first graduate course complemented by its laboratory class, both in electrical engineering and computer science departments. For professionals and practitioners in industry, its pragmatic approach allows one to easily frame the concepts and design issues lying behind the interconnecting world. Deliberately, the book does not require any specific competence in the field of probability theory, statistics and stochastic processes.

If the reader is ready to take his or her first swimming lesson, it is time to commence: in the allegory, the water is the networking world, the book is the pool and the goal . . . well, not the Olympics: setting – just slightly – less prestigious goals does not depend on the athlete, rather, on the instructors. Nevertheless, at the end of the entire swimming course the authors of the book will consider a good result to have their pupil swim fearlessly and be in good shape.

So, let us dive in . . .

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