

Preface

What should still be something pretty amazing seems just like a part of everyday life to a lot of people. In recent decades, the old dream driving human development toward a mobility spanning time and space has become unprecedented reality. And this without a single physical law being broken. Instead we have learned to deal with a surprising number of things in life in a dematerialized, digitalized form. Dematerialized in the sense that instead of confronting the things themselves directly we interact with their digital "shadows." In essence, their descriptions, which are coded in the form of zeros and ones and then transported at the speed of light via electromagnetic signals to be processed at any computer. Two technological developments have made this possible. First, computers in all their forms provide the cosmos to give these digital shadows complete expression. Here, they can be realized anew, processed, linked and stored. Second, the Internet offers the possibility of transporting the digital shadows almost anywhere in the world at the speed of light where they achieve their full effect at another computer, even if it's at the other end of the world.

In fact, the computer and Internet rank among those very few technological developments in human history that have intrinsically changed people's lives and actions. The industrial revolution of the 19th and 20th centuries expanded our physical mobility in way that had been unparalleled up to that time. Just as cars, airplanes and space ships have dramatically increased the radius of human physical activity, the drivers of the digital revolution - computers and Internet technology - have extended our intellectual mobility in a way that was previously unthinkable. Our range of mental activity has been freed from (almost) every physical limitation. While it is likely that even the most modern physical transportation medium will still need some hours to bring a person from one continent to another, he or she is now able to bridge this distance almost immediately with the help of the Internet. Feelings, thoughts and instructions can be sent within seconds as we respond to the wishes and needs of those far away. And in contrast to physical transportation this can be done without significant cost.

The Internet is not even 50 and the WWW a good 20 years old - a young and ongoing history, with the rapid developments in computer and network technology continuing unabated. This makes it all the more interesting to look behind the scenes and gain an understanding of the technical basics of how the Internet and the WWW really work. This is just what "Internetworking" has set out to do. Together with this trilogy's two other volumes, "Digital Communication" and "Web Technologies," we aim to offer the reader an understandable, comprehensive, trustworthy, informative and detailed guide.

The specific concepts presented in volume 1 of the trilogy, "Foundations of Digital Communication," (computer networks, media and their coding, communication

protocols and security in computer networks) form the basis for the book at hand, volume 2, "Internetworking." Against the background of the developmental history of the Internet and a short guide through the Internet with its various actors, the actual functioning of Internet technology - the TCP/IP protocol stack - is introduced. We will look in detail at the physical layer required for every digital communication, as well as at the network access layer with its numerous technologies - wireless LAN, wired LAN, WAN. Attention will be given to the Internet layer with the protocols that support the Internet: IPv4, IPv6 and Mobile IP and the transport layer with the second protocol of the Internet - the eponymous TCP, as well as the application layer with its multi-faceted Internet services that have helped the Internet achieve its revolutionary significance for today's society. Only the World Wide Web has been excluded here and will be examined on its own in the third volume, "Web Technologies." Underlying Web technologies, such as URL, HTTP, HTML, CSS, XML, web programming, search engines, Web2.0 and the Semantic Web are presented in detail there.

The multi-dimensional material, containing understandable descriptions complemented by numerous, technically detailed excursus and glossaries offering chapter-related commentaries, indexes and bibliographic references, is arranged in such a way as to be an invitation for further research and reading. The reader is assisted in gaining the easiest access possible to the fullness of available material and also guided in making an interest or topic-based selection.

We have gone to great lengths in the hope that those of you who are interested laypeople will be infected by the fascination of the new digital world offered in this book. We also aim to provide hard-working students - who don't shy away from a bit of extra effort - with a useful and comprehensive textbook. Furthermore, we would like to present readers who are seasoned professionals with a reliable, handy reference book that can serve to classify areas of specialization easily and safely within the context of the huge complex of digital communication.

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