

Digital Television Systems



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**For
Silvana, Thiago, Raphael and Marcella**

Preface

The book presents the historical evolution of television. It also introduces the basic concepts of digital television, including signal analysis, modulation techniques, source coding, probability and channel coding. The digital television standards, including the MPEG family, the ATSC, DVB, ISDTV, DTMB and ISDB standards are discussed. Several appendices, with topics including Fourier analysis, probability and stochastic processes, tables of Fourier and Hilbert transforms, tables of radiofrequency and a glossary complement the book. Many illustrations and graphics help the reader understand the theory.

Digital television is a new topic in the educational market; it evolved from the amalgamation of different areas, such as source coding, modulation, transmission techniques, channel coding, signal analysis and digital signal processing.

In commercial terms, digital television is a driving force of the economy and its deployment throughout the world generates a huge market as the analog television sets are replaced by the new HDTV devices.

It is important to realize that the media industry, which deals with enormous sums of money each year, relies on equipment to produce and distribute its series, movies and shows. The employment market in this area requires information technology professionals and engineers.

Few books have been published covering all the subjects needed to understand the subsystems that form the digital television network. This book is aimed at senior undergraduate students, graduate students, engineers and information technology professionals in the areas of electrical engineering and computer science. It can be used as a textbook for a course on digital television. The reader is expected to have a background in calculus and signal analysis.

Chapter 1 presents the fundamentals of digital television. It is self-contained, and concisely describes the most important television standards, in terms of percentage of the world population affected.

An overview of audio and video coding standards is presented in Chapter 2, which covers the basics of the subjects. In Chapter 3 the coding standards for compression of audio and video are discussed, with emphasis on the MPEG series of standards.

Channel coding for digital television is the subject of Chapter 4, which presents the most important algorithms used to protect the television signal from noise and other disturbances during transmission.

Digital and analog modulation techniques are presented in Chapter 5. The ATSC standard, used in the USA and other countries, is the subject of Chapter 6. Chapter 7 introduces the DVB standard, which was developed in Europe and now has been adopted by more than a hundred countries.

Chapter 8 discusses the Japanese digital television standard, ISDB. The Brazilian standard, ISDBT, is the subject of Chapter 9, and Chapter 10 presents the DTMB standard, developed in China.

The book includes three appendices. Appendix A relates, in a concise manner, the evolution of television since its inception. The basics of signal analysis, which is needed to understand the book, are presented in Appendix B. Random signals and noise are the subjects of Appendix C. The book also has a glossary of the terms frequently encountered in the sphere of digital television.

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