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constraints and effects of imperfections; 2.5 Summary; 3 Signal-processing techniques for UWB systems; 3.1 The effects of a lossy medium on a UWB transmitted signal; 3.2 Time domain analysis; 3.2.1 Classification of signals; 3.2.2 Some useful functions; 3.2.3 Some useful operations; 3.2.4 Classification of systems; 3.2.5 Impulse response; 3.2.6 Distortionless transmission; 3.3 Frequency domain techniques; 3.3.1 Fourier transforms; 3.3.2 Frequency response approaches; 3.3.3 Transfer function; 3.3.4 Laplace transform; 3.3.5 z-transform; 3.3.6 The relationship between the Laplace transform, the Fourier transform, and the z-transform; 3.4 UWB signal-processing issues and algorithms; 3.5 Detection and amplification; 3.6 Summary; 4 UWB channel modeling; 4.1 A simplified UWB multipath channel model; 4.1.1 Number of resolvable multipath components; 4.1.2 Multipath delay spread; 4.1.3 Multipath intensity profile; 4.1.4 Multipath amplitude-fading distribution; 4.1.5 Multipath arrival times; 4.2 Path loss model; 4.2.1 Free space loss; 4.2.2 Refraction; 4.2.3 Reflection; 4.2.4 Diffraction; 4.2.5 Wave clutter; 4.2.6 Aperture-medium coupling loss; 4.2.7 Absorption; 4.2.8 Example of free space path loss model; 4.3 Two-ray UWB propagation model; 4.3.1 Two-ray path loss; 4.3.2 Two-ray path loss model; 4.3.3 Impact of path loss frequency selectivity on UWB transmission; 4.4 Frequency domain autoregressive model; 4.4.1 Poles of the AR model; 4.5 IEEE proposals for UWB channel models; 4.5.1 An analytical description of the IEEE UWB indoor channel model; 4.6 Summary; 5 UWB communications; 5.1 Introduction; 5.2 UWB modulation methods; 5.2.1 PPM; 5.2.2 BPM; 5.3 Other modulation methods; 5.3.1 OPM; 5.3.2 PAM; 5.3.3 OOK; 5.3.4 Summary of UWB modulation methods; 5.4 Pulse trains; 5.4.1 Gaussian pulse train; 5.4.2 PN channel coding; 5.4.3 Time-hopping PPM UWB system; 5.5 UWB transmitter; 5.6 UWB receiver; 5.6.1 Detection; 5.6.2 Pulse integration; 5.6.3 Tracking; 5.6.4 Rake receivers; 5.7 Multiple access techniques in UWB; 5.7.1 Frequency division multiple access UWB

Sommario/riassunto

The thoroughly revised and updated second edition of Ultra Wideband Signals and Systems in Communication Engineering features new standards, developments and applications. It addresses not only recent developments in UWB communication systems, but also related IEEE standards such as IEEE 802.15 wireless personal area network (WPAN). Examples and problems are included in each chapter to aid understanding. Enhanced with new chapters and several sections including Standardization, advanced topics in UWB Communications and more applications, this book is essential reading for senior unde