

1. Record Nr.	UNINA9910140876903321
Autore	Yong Su-Khiong
Titolo	60 GHz technology for Gbps WLAN and WPAN : from theory to practice // Su-Khiong Yong, Pengfei Xia, Alberto Valdes Garcia
Pubbl/distr/stampa	Chichester, West Sussex, U.K. : , : Wiley, , 2011 [Piscataway, New Jersey] : , : IEEE Xplore, , [2010]
ISBN	1-119-95674-9 1-282-88456-5 9786612884566 0-470-97294-7 0-470-97293-9
Edizione	[1st edition]
Descrizione fisica	1 online resource (298 p.)
Altri autori (Persone)	XiaPengfei GarciaAlberto Valdes
Disciplina	621.384
Soggetti	Millimeter wave communication systems Wireless LANs Gigabit communications Wireless communication systems
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	-- Preface xiii -- List of Contributors xvii -- 1 Introduction to 60GHz 1 / Su-Khiong (SK) Yong -- 1.1 What is 60 GHz? 1 -- 1.2 Comparison with other Unlicensed Systems 2 -- 1.3 Potential Applications 6 -- 1.4 Worldwide Regulation and Frequency Allocation 7 -- 1.4.1 North America 7 -- 1.4.2 Japan 8 -- 1.4.3 Australia 9 -- 1.4.4 Korea 9 -- 1.4.5 Europe 9 -- 1.5 Industry Standardization Effort 10 -- 1.5.1 IEEE 802.15.3c 11 -- 1.5.2 ECMA 387 12 -- 1.5.3 WirelessHD 13 -- 1.5.4 IEEE 802.11.ad 14 -- 1.5.5 Wireless Gigabit Alliance 14 -- 1.6 Summary 14 -- References 15 -- 2 60GHz Channel Characterizations and Modeling 17 / Su-Khiong (SK) Yong -- 2.1 Introduction to Wireless Channel Modeling 17 -- 2.2 Modeling Approach and Classification of Channel Model 18 -- 2.2.1 Deterministic Modeling 18 -- 2.2.2 Stochastic Modeling 20 -- 2.3 Channel Characterization 21 -- 2.3.1

Large-Scale Channel Characterization	21
2.3.2 Small-Scale Channel Characterization	29
2.3.3 Polarization	40
2.4 Industry Standard Channel Models	43
2.4.1 IEEE 802.15.3c	43
2.4.2 IEEE 802.11ad	47
2.5 Summary	57
References	57
3 Non-Ideal Radio Frequency Front-End Models in 60GHz Systems	63 / Chang-Soon Choi, Maxim Piz and Eckhard Grass
3.1 RF Front-End Architecture	64
3.1.1 Super-Heterodyne Architecture	64
3.1.2 Direct-Conversion Architecture	66
3.1.3 Low-IF Architecture	66
3.2 Nonlinear Power Amplifier	67
3.2.1 Tradeoff Between Linearity and Efficiency	67
3.2.2 Nonlinearity Modeling	69
3.2.3 Behavioral Models	71
3.2.4 Output Backoff Versus Peak-to-Average Power Ratio	75
3.2.5 Impact of Nonlinear Power Amplifier	76
3.3 Phase Noise from Oscillators	78
3.3.1 Modeling of Phase Noise in Phase-Locked Loops	78
3.3.2 Behavioral Modeling for Phase Noise in Phase-Locked Loops	82
3.4 Other RF Non-Idealities	82
3.4.1 Quantization Noise in Data Converters	82
3.4.2 I/Q Mismatch	86
References	87
4 Antenna Array Beamforming in 60GHz	89 / Pengfei Xia.
4.1 Introduction	89
4.2 60 GHz Channel Characteristics	90
4.2.1 Path Loss and Oxygen Absorption	90
4.2.2 Multipath Fading	91
4.3 Antenna Array Beamforming	93
4.3.1 Training for Adaptive Antenna Arrays	95
4.3.2 Training for Switched Antenna Arrays	107
4.3.3 Channel Access in 60 GHz Wireless Networks	110
4.4 Summary	115
References	115
5 Baseband Modulation	117 / Pengfei Xia and Andre Bourdoux
5.1 Introduction	117
5.2 OFDM Baseband Modulation	120
5.2.1 Principles of OFDM	120
5.2.2 OFDM Design Considerations	123
5.3 Case Study: IEEE 802.15.3c Audio Video OFDM	126
5.3.1 Uncompressed Video Communications	126
5.3.2 Equal and Unequal Error Protection	127
5.3.3 Bit Interleaving and Multiplexing	130
5.3.4 AV OFDM Modulation	132
5.4 SC with Frequency-Domain Equalization	135
5.4.1 Introduction	135
5.4.2 Case Study: IEEE 802.15.3c SC PHY	137
5.5 SC Transceiver Design and System Aspects	142
5.5.1 Transmit and Receive Architecture	142
5.5.2 SC with Frequency-Domain Equalization	146
5.6 Digital Baseband Processing	149
5.6.1 Burst Detection and Rough Timing/CFO Acquisition	149
5.6.2 Joint Fine CFO and Channel Estimation Without I/Q Imbalance	155
5.6.3 Joint Estimation of Fine CFO, Channel and I/Q Imbalance	156
5.6.4 Time-Domain Equalization, Despreading and Tracking	161
References	166
6 60GHz Radio Implementation in Silicon	169 / Alberto Valdes-Garcia
6.1 Introduction	169
6.2 Overview of Semiconductor Technologies for 60 GHz Radios	170
6.3 60 GHz Front-End Components	173
6.3.1 60 GHz LNAs in SiGe and CMOS	174
6.3.2 60 GHz PAs in SiGe and CMOS	176
6.3.3 Process Variability in Silicon Millimeter-Wave Designs	179
6.4 Frequency Synthesis and Radio Architectures	180
6.5 Radio / Baseband Interface	182
6.5.1 ADCs and DACs for Wide Bandwidth Signals	182
6.5.2 Modulators, Demodulators and Analog Signal Processors for Gbps Applications	187
References	189
7 Hardware Implementation for Single Carrier Systems	193 / Yasunao Katayama.
7.1 Introduction	193
7.2 Advantages and Challenges of SC Systems	194
7.3 System Design with Non-Coherent Detection	196
7.4 System Design with Differentially Coherent Detection	201
7.5 Test and Evaluation	203
7.6 Advanced SC System with Per-Packet Coherent Detection	205
7.7 Conclusion	209
References	209
8 Gbps OFDM Baseband Design and Implementation for 60GHz Wireless LAN Applications	211 / Chang-Soon Choi, Maxim Piz, Marcus Ehrig and Eckhard Grass
8.1 OFDM Physical Layer Implemented on FPGA	212
8.1.1 Designed OFDM Physical Layer	212
8.1.2 Performance	

Evaluation in the Presence of Clock Deviation and Phase Noise 214 -- 8.2 OFDM Baseband Receiver Architecture 214 -- 8.2.1 Receiver Front-End 217 -- 8.2.2 Receiver Back-End 222 -- 8.3 OFDM Baseband Transmitter Architecture 225 -- 8.4 60 GHz Link Demonstration 226 -- 8.4.1 60 GHz OFDM Demonstrator Architecture 226 -- 8.4.2 Wireless Link Demonstration with 60 GHz Radio 227 -- 8.5 Next-Generation OFDM Demonstrators for 60 GHz Wireless LAN Applications 229 -- 8.5.1 Channel Plan and RF Transceiver 230 -- 8.5.2 Next-Generation Multi-Gbps OFDM Physical Layers 231 -- 8.5.3 Performance Evaluation with 60 GHz NLOS Channel and 60 GHz Phase Noise Models 232 -- References 236 -- 9 Medium Access Control Design 239 / Harkirat Singh -- 9.1 Design Issues in the Use of Directional Antennas 240 -- 9.2 IEEE 802.15.3c MAC for 60 GHz 244 -- 9.2.1 Neighbor Discovery 244 -- 9.2.2 Aggregation and Block-ACK 245 -- 9.3 Design Considerations for Supporting Uncompressed Video 252 -- 9.3.1 Pixel Partitioning 254 -- 9.3.2 Uncompressed Video ARQ 255 -- 9.3.3 Unequal Error Protection 256 -- 9.3.4 Error Concealment 257 -- 9.4 Performance Study 258 -- 9.4.1 Effect of UEP and EEP 260 -- 9.4.2 Stability of UEP 261 -- 9.4.3 VQM Scores 262 -- 9.5 Conclusions and Future Directions 263 -- References 264 -- 10 Remaining Challenges and Future Directions 267 / Alberto Valdes-Garcia, Pengfei Xia, Su-Khiong Yong and Harkirat Singh. References 270 -- Index 273.

Sommario/riassunto

This book addresses 60 GHz technology for Gbps WLAN and WPAN from theory to practice, covering key aspects for successful deployment. In this book, the authors focus specifically on 60 GHz wireless technology which has emerged as the most promising candidate for multi-gigabit wireless indoor communication systems. 60 GHz technology offers various advantages over current or existing communications systems (e.g. huge unlicensed bandwidth worldwide, high transmit power, high frequency reuse and small form factor), which enables many disruptive applications that are otherwise difficult if not impossible to be realized at lower frequencies. The book addresses all aspects of the state-of-the-art in 60 GHz technology for high data rate wireless applications. Key Features: . Comprehensive coverage from theory to practice: provides readers with a thorough technical guide of 60 GHz technology development. Brings together the entire area of 60GHz technology for Gigabits per second (Gbps) WLAN and WPAN applications.. Discusses practical system designs covering wide aspects such as antenna propagation, beamforming, circuit design, digital communication, signal processing, system architectures, etc.. Provides up-to-date standardization activities, regulatory issues, technology development as well as future trends. Includes examples and case studies for practical scenarios. Contains theoretical, simulation and experimental results to demonstrate and compare the performance of various schemes (or systems) This book serves as an excellent reference for system engineers, system architects, IC designers, standard engineers, researchers, and vendor and manufacturer consumers. Technical consultants, software and application developers will also find this book of interest.