

1. Record Nr.	UNINA9910878044803321
Autore	El Ghzaoui Mohammed
Titolo	Next Generation Wireless Communication : Advances in Optical, Mm-Wave, and THz Technologies
Pubbl/distr/stampa	Cham : , : Springer, , 2024 ©2024
ISBN	9783031561443
Edizione	[1st ed.]
Descrizione fisica	1 online resource (667 pages)
Collana	Signals and Communication Technology Series
Altri autori (Persone)	DasSudipta SamudralaVarakumari MedikonduNageswara Rao
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Contents -- Part I Millimeter Wave (mm-Wave) Technology and Its Applications -- 1 Compact MIMO Antenna Design with Enhanced Isolation for mm-Wave Applications -- 1.1 Introduction -- 1.2 MIMO Antenna Design -- 1.3 Results and Discussions -- 1.4 Conclusion -- References -- 2 Security Threats and Privacy Challenges in Millimeter-Wave Communications -- 2.1 Introduction -- 2.1.1 Evolution of mmWave Communications -- 2.1.2 Scope and Significance of Security Threats -- 2.1.3 Privacy Challenges in mmWave Networks -- 2.2 Security Threats in mmWave Communications -- 2.2.1 Eavesdropping and Interception -- 2.2.2 Man-in-the-Middle Attacks -- 2.2.3 Denial-of-Service (DoS) Attacks -- 2.2.4 Physical Layer Attacks -- 2.2.5 Authentication and Authorization Vulnerabilities -- 2.3 Privacy Concerns in mmWave Networks -- 2.3.1 Location Tracking and Profiling -- 2.3.2 Data Breaches and Information Leakage -- 2.3.3 Identity Theft and Impersonation -- 2.4 Vulnerabilities and Exploitable Weaknesses -- 2.4.1 Beamforming and Signal Interception -- 2.4.2 Spectrum Sharing and Frequency Hijacking -- 2.4.3 Inadequate Authentication Mechanisms -- 2.4.4 Lack of Standardized Security Protocols -- 2.5 Mitigation Strategies for Security Threats -- 2.5.1 Encryption and Cryptographic Techniques -- 2.5.2 Secure Key Exchange Protocols -- 2.5.3 Intrusion Detection and Prevention

Systems -- 2.5.4 Enhanced Authentication Mechanisms -- 2.5.5 Spectrum Management and Dynamic Frequency Allocation -- 2.6 Future Perspectives and Emerging Trends -- 2.6.1 Advancements in mmWave Security Solutions -- 2.6.2 Integration of AI and Machine Learning for Threat Detection -- 2.6.3 Evolving Privacy Standards and Policies -- 2.6.4 Anticipated Challenges in Next-Generation mmWave Networks -- 2.7 Conclusion -- References.

3 The Performance Analysis on Channel Estimation in Millimeter-Wave Communication and Their Challenges -- 3.1 Introduction -- 3.2 System Model -- 3.2.1 Problem Formulation -- 3.3 Iterative Methods -- 3.3.1 Approximate Message Passing (AMP) Algorithm -- 3.3.2 Learned Approximate Message Passing (AMP) Algorithm -- 3.3.3 Learning the LAMP Parameters -- 3.3.4 Vector Approximate Message Passing (VAMP) Algorithm -- 3.3.5 EM-VAMP Algorithm -- 3.4 Proposed VAMP-SBL-EM Algorithm -- 3.5 Simulation -- 3.6 Conclusion -- References -- 4 Innovative mm-Wave Compact Dual-Port MIMO Antenna with Inherent Wideband Isolation at 28 GHz for 5G Wireless Networks -- 4.1 Introduction -- 4.2 Structure and Performance Analysis of the Submitted Individual Antenna -- 4.2.1 Submitted Antenna Layout -- 4.2.2 Antenna Evolutionary Phases -- 4.2.3 Exploration of Trapezoidal Slot Parameters Through Comprehensive Analysis -- 4.2.4 Findings and Analysis -- 4.3 Antenna Configuration in MIMO Composition -- 4.3.1 Layout and Scattering Parameters -- 4.3.2 Characteristics of Diversity -- 4.3.3 Evaluation Through Relevant Earlier Research -- 4.4 Conclusion -- References -- 5 Design of Ka-Band Power Amplifier and Low-Noise Amplifier for 5G Communication Systems -- 5.1 Introduction -- 5.1.1 Power Amplifier -- 5.1.2 Low-Noise Amplifier -- 5.1.3 GaN HEMT -- 5.1.4 Objective -- 5.2 Literature Survey -- 5.2.1 5G RF Front End -- 5.2.2 Power Amplifier -- 5.2.3 Low-Noise Amplifier -- 5.2.4 Biasing Network -- 5.3 Design of Power Amplifier -- 5.3.1 Design Consideration -- 5.3.2 Proposed Power Amplifier Using UMS GH15-10 -- 5.4 Low-Noise Amplifier -- 5.4.1 Design Consideration -- 5.4.2 Proposed Low-Noise Amplifier Design Using UMS GH15-10 -- 5.5 Summary -- References -- 6 Advanced MIMO Antenna Design with Defected Ground Structure for 5G NR (N75 and N77) Applications -- 6.1 Introduction. 6.2 Geometry of the MIMO System -- 6.3 MIMO Analysis -- 6.4 Conclusion -- References -- 7 Beamforming Array Failure Correction for mm-Wave Synthetic Aperture Radar Applications -- 7.1 Introduction -- 7.1.1 Significance of Cosecant 4th Power Pattern -- 7.1.2 Element Failure -- 7.2 Literature Review -- 7.2.1 Software-Based Antenna Array Element Failure Correction Techniques -- 7.3 Microstrip Patch Series-Fed Antenna -- 7.4 Proposed Genetic Algorithm for Element Failure Correction -- 7.5 Results and Discussion -- 7.6 Summary -- Appendix -- References -- 8 A Novel, Compact, Broadband Band-Stop Filter for Rejecting 5G Millimeter-Wave Communications -- 8.1 Introduction -- 8.2 Fundamentals of Filters -- 8.2.1 Filter Categories -- 8.2.2 Filter Classes -- 8.2.3 Importance of Filters in Communication Systems -- 8.2.4 Filtenna -- 8.3 Fundamentals of Filters -- 8.3.1 Types of Band-Stop Filters -- 8.3.2 Characteristics of Band-Stop Filters -- 8.3.3 Applications and Uses -- 8.4 Design and Analysis of a Band-Stop Filter -- 8.4.1 Parametric Study -- 8.4.2 Band-Stop Filter Equivalent Circuit -- 8.5 Conclusion -- References -- 9 A Compact Two-Port Semi-flexible Dual-Band Circularly Polarized MIMO Antenna Structure for Millimeter-Wave 26/31 GHz 5G Applications -- 9.1 Introduction -- 9.2 MIMO Antenna Design and Discussion -- 9.3 Simulated Results and Discussion -- 9.3.1 Impedance Characteristics -- 9.3.2 Bending Analysis -- 9.3.3 Radiation Characteristics -- 9.3.4 Diversity

Performance -- 9.4 Conclusion -- References -- 10 Extension of Indoor MmW Link Radio Coverage in Non-line-of-Sight Conditions -- 10.1 Introduction -- 10.2 Propagation Using Passive Reflectors at 60 GHz -- 10.2.1 Use of a Passive Reflector in an L-Shaped Corridor -- 10.2.2 Use of a Passive Reflector Array in a T-Shaped Corridor -- 10.3 Impact of Blocking by the Human Body at 60 GHz. 10.3.1 Measurement Environment -- 10.3.2 Measurement Scenario -- 10.3.3 Measurement Results -- 10.4 Conclusions -- References -- 11 Design and Analysis of Conformal Millimeter Wave Antenna for Next Generation Wireless Communication -- 11.1 Introduction -- 11.2 Design of Conformal Antenna Array -- 11.3 Result and Discussion -- 11.4 Conclusion -- References -- 12 H-Shaped Resonators for UWB Bandpass Filter for 5G Applications -- 12.1 Introduction -- 12.2 Overview of Filters -- 12.3 The First Bandpass Filter -- 12.4 The Second Bandpass Filter -- 12.5 The Proposed UWB Bandpass Filter -- 12.6 Conclusion -- References -- 13 Spatially Correlated Channels Investigation: Estimation and Hardening in Millimeter-Wave Massive MIMO Systems -- 13.1 Introduction -- 13.2 Related Works -- 13.2.1 Work Organization -- 13.3 System Model -- 13.3.1 Pilots Sequence Phase -- 13.4 Channel Estimation -- 13.5 Channel Hardening -- 13.6 Spatial Correlation Matrix -- 13.6.1 Spatial Correlation Matrix Over ULC -- 13.6.2 Spatial Correlation Matrix Over UCC -- 13.7 Simulation Results -- 13.8 Conclusion -- References -- Part II Terahertz Technology and Its Applications -- 14 THz Antennas: Applications and Challenges-A Review -- 14.1 Introduction -- 14.2 Single THz Antenna -- 14.3 Array THz Antenna -- 14.4 MIMO THz Antenna -- 14.5 THz Antenna's Challenges -- 14.6 Conclusion -- References -- 15 Fractal MIMO Antenna Design for High-Frequency Terahertz Applications -- 15.1 Introduction -- 15.2 Antenna Geometry -- 15.3 Results Explanation -- 15.4 MIMO Parameters -- 15.5 Conclusion -- References -- 16 Evaluating the Performance of a Transparent MIMO Nano-Antenna for Wireless Health: Addressing Terahertz Challenges in Integrated Medical Device Networks -- 16.1 Introduction -- 16.2 Related Works -- 16.3 Antenna Characteristics -- 16.3.1 AI-Enhanced Antenna Radiation Pattern Optimization. 16.3.2 Enhancing Antenna Gain with Artificial Intelligence -- 16.3.3 Antenna Selection Factors -- 16.3.4 Key Antenna Parameters and Practical Design Guidelines -- 16.4 MIMO Nano-Antenna -- 16.5 Performance Analysis and Discussion -- 16.6 Conclusion -- References -- 17 Design of a Broadband (0.84-1.2 THz) Microstrip Patch Antenna Utilizing Graphene Material and Polyimide Substrate for Terahertz 6G Applications -- 17.1 Introduction -- 17.2 Presentation of Graphene -- 17.3 Design of the Proposed Graphene Patch Antenna -- 17.4 Simulation Results and Discussion -- 17.5 Comparison Analysis -- 17.6 Conclusion -- References -- 18 Investigation on LP-OFDM for THz Application -- 18.1 Introduction -- 18.2 The LP-OFDM System -- 18.2.1 Description of the LP-OFDM -- 18.2.2 LP-OFDM Signal Expressions -- 18.2.3 The Choice of the Linear Precoding Matrix -- 18.2.4 Receiving LP-OFDM Signals -- 18.2.5 Characteristics of an LP-OFDM Signal -- 18.3 Formulation of the BER Maximization Problem -- 18.3.1 The Classic Method -- 18.3.2 Improvement of the LP-LCG Method -- 18.4 Simulation Results and Discussion -- 18.4.1 Performance of the Proposed System -- 18.4.2 Comparison of the Different Solutions -- 18.5 Conclusion -- References -- 19 Terahertz Technology and Its Importance in the Field of Biomedical Application: A Review -- 19.1 Introduction -- 19.2 Terahertz Technology: A Historical Perspective -- 19.2.1 Early Research -- 19.2.2 Key Developments in 1980s-1990s -- 19.2.3 Applications

and Progress in 2000s-2010s -- 19.2.4 Advancements in Terahertz Technology Post-2010 -- 19.2.5 Major Advancements 2010-2023 -- 19.3 Biomedical Applications of Terahertz Technology -- 19.3.1 Terahertz Imaging -- 19.3.2 Advantages of THz for Heart Attack Detection -- 19.3.3 Terahertz Spectroscopy for Disease Diagnosis -- 19.3.4 Advantages of Terahertz Technology in Brain Tumour Detection. 19.4 Importance of Terahertz Technology in Biomedicine.

---