

1. Record Nr.	UNINA9910877331603321
Autore	Liu Yuanwei
Titolo	Next Generation Multiple Access
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	1-394-18052-7 1-394-18050-0
Edizione	[1st ed.]
Descrizione fisica	1 online resource (624 pages)
Altri autori (Persone)	LiuLiang DingZhiguo ShenXuemin
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- About the Editors -- List of Contributors -- Preface -- Acknowledgments -- Chapter 1 Next Generation Multiple Access Toward 6G -- 1.1 The Road to NGMA -- 1.2 NonOrthogonal Multiple Access -- 1.3 Massive Access -- 1.4 Book Outline -- Part I Evolution of NOMA Towards NGMA -- Chapter 2 Modulation Techniques for NGMA/NOMA -- 2.1 Introduction -- 2.2 SpaceDomain IM for NGMA -- 2.2.1 SMBased NOMA -- 2.2.1.1 Multi RF Schemes -- 2.2.1.2 SingleRF Schemes -- 2.2.1.3 Recent Developments in SMNOMA -- 2.2.2 RSMBased NOMA -- 2.2.3 SM Aided SCMA -- 2.3 FrequencyDomain IM for NGMA -- 2.3.1 NOMA with FrequencyDomain IM -- 2.3.1.1 OFDMIM NOMA -- 2.3.1.2 DM OFDM NOMA -- 2.3.2 CNOMA with FrequencyDomain IM -- 2.3.2.1 Broadcast Phase -- 2.3.2.2 Cooperative Phase -- 2.4 CodeDomain IM for NGMA -- 2.4.1 CIMSCMA -- 2.4.2 CIMMCCDMA -- 2.5 Power Domain IM for NGMA -- 2.5.1 Transmission Model -- 2.5.1.1 TwoUser Case -- 2.5.1.2 Multiuser Case -- 2.5.2 Signal Decoding -- 2.5.3 Performance Analysis -- 2.6 Summary -- References -- Chapter 3 NOMA Transmission Design with Practical Modulations -- 3.1 Introduction -- 3.2 Fundamentals -- 3.2.1 Multichannel Downlink NOMA -- 3.2.2 Practical Modulations in NOMA -- 3.3 Effective

Throughput Analysis -- 3.3.1 Effective Throughput of the SingleUser Channels -- 3.3.2 Effective Throughput of the TwoUser Channels -- 3.4 NOMA Transmission Design -- 3.4.1 Problem Formulation -- 3.4.2 Power Allocation -- 3.4.2.1 Power Allocation within Channels -- 3.4.2.2 Power Budget Allocation Among Channels -- 3.4.3 Joint Resource Allocation -- 3.5 Numerical Results -- 3.6 Conclusion -- References -- Chapter 4 Optimal Resource Allocation for NGMA -- 4.1 Introduction -- 4.2 SingleCell SingleCarrier NOMA -- 4.2.1 Total Power Minimization Problem -- 4.2.2 SumRate Maximization Problem. 4.2.3 EnergyEfficiency Maximization Problem -- 4.2.4 Key Features and Implementation Issues -- 4.2.4.1 CSI Insensitivity -- 4.2.4.2 Rate Fairness -- 4.3 SingleCell Multicarrier NOMA -- 4.3.1 Total Power Minimization Problem -- 4.3.2 SumRate Maximization Problem -- 4.3.3 EnergyEfficiency Maximization Problem -- 4.3.4 Key Features and Implementation Issues -- 4.4 Multicell NOMA with SingleCell Processing -- 4.4.1 Dynamic Decoding Order -- 4.4.1.1 Optimal JSPA for Total Power Minimization Problem -- 4.4.1.2 Optimal JSPA for Sum Rate Maximization Problem -- 4.4.1.3 Optimal JSPA for EE Maximization Problem -- 4.4.2 Static Decoding Order -- 4.4.2.1 Optimal FRPA for Total Power Minimization Problem -- 4.4.2.2 Optimal FRPA for SumRate Maximization Problem -- 4.4.2.3 Optimal FRPA for EE Maximization Problem -- 4.4.2.4 Optimal JRPA for Total Power Minimization Problem -- 4.4.2.5 Suboptimal JRPA for SumRate Maximization Problem -- 4.4.2.6 Suboptimal JRPA for EE Maximization Problem -- 4.5 Numerical Results -- 4.5.1 Approximated Optimal Powers -- 4.5.2 SCNOMA versus FDMA-NOMA versus FDMA -- 4.5.3 Multicell NOMA: JSPA versus JRPA versus FRPA -- 4.6 Conclusions -- Acknowledgments -- References -- Chapter 5 Cooperative NOMA -- 5.1 Introduction -- 5.2 System Model for D2MDCNOMA -- 5.2.1 System Configuration -- 5.2.2 Channel Model -- 5.3 Adaptive Aggregate Transmission -- 5.3.1 First Phase -- 5.3.2 Second Phase -- 5.4 Performance Analysis -- 5.4.1 Outage Probability -- 5.4.2 Ergodic Sum Capacity -- 5.5 Numerical Results and Discussion -- 5.5.1 Outage Probability -- 5.5.2 Ergodic Sum Capacity -- 5.A.1 Proof of Theorem 5.1 -- References -- Chapter 6 MultiscaleNOMA: An Effective Support to Future Communication-Positioning Integration System -- 6.1 Introduction -- 6.2 Positioning in Cellular Networks -- 6.3 MSNOMA Architecture -- 6.4 Interference Analysis. 6.4.1 SingleCell Network -- 6.4.1.1 Interference of Positioning to Communication -- 6.4.1.2 Interference of Communication to Positioning -- 6.4.2 Multicell Networks -- 6.4.2.1 Interference of Positioning to Communication -- 6.4.2.2 Interference of Communication to Positioning -- 6.5 Resource Allocation -- 6.5.1 The Constraints -- 6.5.1.1 The BER Threshold Under QoS Constraint -- 6.5.1.2 The Total Power Limitation -- 6.5.1.3 The Elimination of Near Far Effect -- 6.5.2 The Proposed Joint Power Allocation Model -- 6.5.3 The Positioning-Communication Joint Power Allocation Scheme -- 6.5.4 Remarks -- 6.6 Performance Evaluation -- 6.6.1 Communication Performance -- 6.6.2 Ranging Performance -- 6.6.3 Resource Consumption of Positioning -- 6.6.3.1 Achievable Positioning Measurement Frequency -- 6.6.3.2 The Resource Element Consumption -- 6.6.3.3 The Power Consumption -- 6.6.4 Positioning Performance -- 6.6.4.1 Comparison by Using CP4A and the Traditional Method -- 6.6.4.2 Comparision Between MSNOMA and PRS -- References -- Chapter 7 NOMAAware Wireless Content Caching Networks -- 7.1 Introduction -- 7.2 System Model -- 7.2.1 System Description -- 7.2.2 Content Request Model -- 7.2.3 Random System State -- 7.2.4 System Latency Under Each Random State -- 7.2.5 System's Average Latency --

7.3 Algorithm Design -- 7.3.1 User Pairing and Power Control Optimization -- 7.3.2 Cache Placement -- 7.3.3 Recommendation Algorithm -- 7.3.4 Joint Optimization Algorithm and Property Analysis -- 7.4 Numerical Simulation -- 7.4.1 Convergence Performance -- 7.4.2 System's Average Latency -- 7.4.3 Cache Hit Ratio -- 7.5 Conclusion -- References -- Chapter 8 NOMA Empowered MultiAccess Edge Computing and Edge Intelligence -- 8.1 Introduction -- 8.2 Literature Review -- 8.3 System Model and Formulation -- 8.3.1 Modeling of TwoSided Dual Offloading. 8.3.2 Overall Latency Minimization -- 8.4 Algorithms for Optimal Offloading -- 8.5 Numerical Results -- 8.6 Conclusion -- Acknowledgments -- References -- Chapter 9 Exploiting Non orthogonal Multiple Access in Integrated Sensing and Communications -- 9.1 Introduction -- 9.2 Developing Trends and Fundamental Models of ISAC -- 9.2.1 ISAC: From Orthogonality to Nonorthogonality -- 9.2.2 Downlink ISAC -- 9.2.3 Uplink ISAC -- 9.3 Novel NOMA Designs in Downlink and Uplink ISAC -- 9.3.1 NOMAEmpowered Downlink ISAC Design -- 9.3.2 SemiNOMABased Uplink ISAC Design -- 9.4 Case Study: System Model and Problem Formulation -- 9.4.1 System Model -- 9.4.1.1 Communication Model -- 9.4.1.2 Sensing Model -- 9.4.2 Problem Formulation -- 9.5 Case Study: Proposed Solutions -- 9.6 Case Study: Numerical Results -- 9.6.1 Convergence of Algorithm 9.1 -- 9.6.2 Baseline -- 9.6.3 Transmit Beampattern -- 9.7 Conclusions -- References -- Part II Massive Access for NGMA -- Chapter 10 Capacity of ManyAccess Channels -- 10.1 Introduction -- 10.2 The Many Access Channel Model -- 10.3 Capacity of the MnAC -- 10.3.1 The EqualPower Case -- 10.3.2 Heterogeneous Powers and Fading -- 10.4 Energy Efficiency of the MnAC -- 10.4.1 Minimum Energy per Bit for Given PUPE -- 10.4.2 Capacity per UnitEnergy Under Different Error Criteria -- 10.5 Discussion and Open Problems -- 10.5.1 Scaling Regime -- 10.5.2 Some Practical Issues -- Acknowledgments -- References -- Chapter 11 Random Access Techniques for MachineType Communication -- 11.1 Fundamentals of Random Access -- 11.1.1 Coordinated Versus Uncoordinated Transmissions -- 11.1.2 Random Access Techniques -- 11.1.2.1 ALOHA Protocols -- 11.1.2.2 CSMA -- 11.1.3 Retransmission Strategies -- 11.2 A Game Theoretic View -- 11.2.1 A Model -- 11.2.2 Fictitious Play -- 11.3 Random Access Protocols for MTC -- 11.3.1 4Step Random Access. 11.3.2 2Step Random Access -- 11.3.3 Analysis of 2Step Random Access -- 11.3.4 Fast Retrial -- 11.4 Variants of 2Step Random Access -- 11.4.1 2Step Random Access with MIMO -- 11.4.2 Sequential Transmission of Multiple Preambles -- 11.4.3 Simultaneous Transmission of Multiple Preambles -- 11.4.4 Preambles for Exploration -- 11.5 Application of NOMA to Random Access -- 11.5.1 PowerDomain NOMA -- 11.5.2 SALOHA with NOMA -- 11.5.3 A Generalization with Multiple Channels -- 11.5.4 NOMAALOHA Game -- 11.6 LowLatency Access for MTC -- 11.6.1 Long Propagation Delay -- 11.6.2 Repetition Diversity -- 11.6.3 Channel CodingBased Random Access -- References -- Chapter 12 GrantFree Random Access via Compressed Sensing: Algorithm and Performance -- 12.1 Introduction -- 12.2 Joint Device Detection, Channel Estimation, and Data Decoding with Collision Resolution for MIMO Massive Unsourced Random Access -- 12.2.1 System Model and Encoding Scheme -- 12.2.1.1 System Model -- 12.2.1.2 Encoding Scheme -- 12.2.2 Collision Resolution Protocol -- 12.2.3 Decoding Scheme -- 12.2.3.1 Joint DADCE Algorithm -- 12.2.3.2 MIMOLDPCSIC Decoder -- 12.2.4 Experimental Results -- 12.3 Exploiting Angular Domain Sparsity for GrantFree Random Access: A Hybrid AMP Approach -- 12.3.1 Sparse Modeling of

Massive Access -- 12.3.2 Recovery Algorithm -- 12.3.2.1 Application  
to Unsourced Random Access -- 12.3.3 Experimental Results -- 12.4  
LEO SatelliteEnabled GrantFree Random Access -- 12.4.1 System  
Model -- 12.4.1.1 Channel Model -- 12.4.1.2 Signal Modulation --  
12.4.1.3 Problem Formulation -- 12.4.2 Pattern Coupled SBL  
Framework -- 12.4.2.1 The PatternCoupled Hierarchical Prior --  
12.4.2.2 SBL Framework -- 12.4.3 Experimental Results -- 12.5  
Concluding Remarks -- Acknowledgments -- References -- Chapter 13  
Algorithm Unrolling for Massive Connectivity in IoT Networks.  
13.1 Introduction.

---