

1. Record Nr.	UNINA9910139130603321
Autore	Dorronsoro Bernabe
Titolo	Evolutionary algorithms for mobile ad hoc networks / / Bernabe Dorronsoro, University of Luxembourg, Patricia Ruiz, University of Luxembourg, Gregoire Danoy, University of Luxembourg, Yoann Pigne, University of Le Havre, Pascal Bouvry, University of Luxembourg
Pubbl/distr/stampa	Hoboken, New Jersey : , : Computer society, IEEE, Wiley, , [2014] [Piscataqay, New Jersey] : , : IEEE Xplore, , [2014]
ISBN	1-118-83202-7 1-118-83320-1 1-118-83201-9
Descrizione fisica	1 online resource (238 p.)
Collana	Nature-inspired computing series
Classificazione	COM051300
Disciplina	621.382/1201519625
Soggetti	Mobile communication systems Evolutionary computation Genetic algorithms
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Preface xiii -- PART I BASIC CONCEPTS AND LITERATURE REVIEW 1 -- 1 INTRODUCTION TO MOBILE AD HOC NETWORKS 3 -- 1.1 Mobile Ad Hoc Networks 6 -- 1.2 Vehicular Ad Hoc Networks 9 -- 1.2.1 Wireless Access in Vehicular Environment (WAVE) 11 -- 1.2.2 Communication Access for Land Mobiles (CALM) 12 -- 1.2.3 C2C Network 13 -- 1.3 Sensor Networks 14 -- 1.3.1 IEEE 1451 17 -- 1.3.2 IEEE 802.15.4 17 -- 1.3.3 ZigBee 18 -- 1.3.4 6LoWPAN 19 -- 1.3.5 Bluetooth 19 -- 1.3.6 Wireless Industrial Automation System 20 -- 1.4 Conclusion 20 -- References 21 -- 2 INTRODUCTION TO EVOLUTIONARY ALGORITHMS 27 -- 2.1 Optimization Basics 28 -- 2.2 Evolutionary Algorithms 29 -- 2.3 Basic Components of Evolutionary Algorithms 32 -- 2.3.1 Representation 32 -- 2.3.2 Fitness Function 32 -- 2.3.3 Selection 32 -- 2.3.4 Crossover 33 -- 2.3.5 Mutation 34 -- 2.3.6 Replacement 35 -- 2.3.7 Elitism 35 -- 2.3.8 Stopping Criteria 35 -- 2.4 Panmictic Evolutionary Algorithms 36 -- 2.4.1 Generational EA 36 -- 2.4.2 Steady-State EA 36 -- 2.5 Evolutionary Algorithms with

Structured Populations 36 -- 2.5.1 Cellular EAs 37 -- 2.5.2
Cooperative Coevolutionary EAs 38 -- 2.6 Multi-Objective Evolutionary
Algorithms 39 -- 2.6.1 Basic Concepts in Multi-Objective Optimization
40 -- 2.6.2 Hierarchical Multi-Objective Problem Optimization 42 --
2.6.3 Simultaneous Multi-Objective Problem Optimization 43 -- 2.7
Conclusion 44 -- References 45 -- 3 SURVEY ON OPTIMIZATION
PROBLEMS FOR MOBILE AD HOC NETWORKS 49 -- 3.1 Taxonomy of the
Optimization Process 51 -- 3.1.1 Online and Offline Techniques 51 --
3.1.2 Using Global or Local Knowledge 52 -- 3.1.3 Centralized and
Decentralized Systems 52 -- 3.2 State of the Art 53 -- 3.2.1 Topology
Management 53 -- 3.2.2 Broadcasting Algorithms 58 -- 3.2.3 Routing
Protocols 59 -- 3.2.4 Clustering Approaches 63 -- 3.2.5 Protocol
Optimization 64 -- 3.2.6 Modeling the Mobility of Nodes 65 -- 3.2.7
Selfish Behaviors 66 -- 3.2.8 Security Issues 67 -- 3.2.9 Other
Applications 67 -- 3.3 Conclusion 68 -- References 69.
4 MOBILE NETWORKS SIMULATION 79 -- 4.1 Signal Propagation
Modeling 80 -- 4.1.1 Physical Phenomena 81 -- 4.1.2 Signal
Propagation Models 85 -- 4.2 State of the Art of Network Simulators 89
-- 4.2.1 Simulators 89 -- 4.2.2 Analysis 92 -- 4.3 Mobility Simulation
93 -- 4.3.1 Mobility Models 93 -- 4.3.2 State of the Art of Mobility
Simulators 96 -- 4.4 Conclusion 98 -- References 98 -- PART II
PROBLEMS OPTIMIZATION 105 -- 5 PROPOSED OPTIMIZATION
FRAMEWORK 107 -- 5.1 Architecture 108 -- 5.2 Optimization
Algorithms 110 -- 5.2.1 Single-Objective Algorithms 110 -- 5.2.2
Multi-Objective Algorithms 115 -- 5.3 Simulators 121 -- 5.3.1
Network Simulator: ns-3 121 -- 5.3.2 Mobility Simulator: SUMO 123 --
5.3.3 Graph-Based Simulations 126 -- 5.4 Experimental Setup 127 --
5.5 Conclusion 131 -- References 131 -- 6 BROADCASTING PROTOCOL
135 -- 6.1 The Problem 136 -- 6.1.1 DFCN Protocol 136 -- 6.1.2
Optimization Problem Definition 138 -- 6.2 Experiments 140 -- 6.2.1
Algorithm Configurations 140 -- 6.2.2 Comparison of the Performance
of the Algorithms 141 -- 6.3 Analysis of Results 142 -- 6.3.1 Building
a Representative Subset of Best Solutions 143 -- 6.3.2 Interpretation of
the Results 145 -- 6.3.3 Selected Improved DFCN Configurations 148
-- 6.4 Conclusion 150 -- References 151 -- 7 ENERGY MANAGEMENT
153 -- 7.1 The Problem 154 -- 7.1.1 AEDB Protocol 154 -- 7.1.2
Optimization Problem Definition 156 -- 7.2 Experiments 159 -- 7.2.1
Algorithm Configurations 159 -- 7.2.2 Comparison of the Performance
of the Algorithms 160 -- 7.3 Analysis of Results 161 -- 7.4 Selecting
Solutions from the Pareto Front 164 -- 7.4.1 Performance of the
Selected Solutions 167 -- 7.5 Conclusion 170 -- References 171 -- 8
NETWORK TOPOLOGY 173 -- 8.1 The Problem 175 -- 8.1.1 Injection
Networks 175 -- 8.1.2 Optimization Problem Definition 176 -- 8.2
Heuristics 178 -- 8.2.1 Centralized 178 -- 8.2.2 Distributed 179 --
8.3 Experiments 180 -- 8.3.1 Algorithm Configurations 180 -- 8.3.2
Comparison of the Performance of the Algorithms 180.
8.4 Analysis of Results 183 -- 8.4.1 Analysis of the Objective Values
183 -- 8.4.2 Comparison with Heuristics 185 -- 8.5 Conclusion 187 --
References 188 -- 9 REALISTIC VEHICULAR MOBILITY 191 -- 9.1 The
Problem 192 -- 9.1.1 Vehicular Mobility Model 192 -- 9.1.2
Optimization Problem Definition 196 -- 9.2 Experiments 199 -- 9.2.1
Algorithms Configuration 199 -- 9.2.2 Comparison of the Performance
of the Algorithms 200 -- 9.3 Analysis of Results 202 -- 9.3.1 Analysis
of the Decision Variables 202 -- 9.3.2 Analysis of the Objective Values
204 -- 9.4 Conclusion 206 -- References 206 -- 10 SUMMARY AND
DISCUSSION 209 -- 10.1 A New Methodology for Optimization in
Mobile Ad Hoc Networks 211 -- 10.2 Performance of the Three
Algorithmic Proposals 213 -- 10.2.1 Broadcasting Protocol 213 --

10.2.2 Energy-Efficient Communications 214 -- 10.2.3 Network Connectivity 214 -- 10.2.4 Vehicular Mobility 215 -- 10.3 Global Discussion on the Performance of the Algorithms 215 -- 10.3.1 Single-Objective Case 216 -- 10.3.2 Multi-Objective Case 217 -- 10.4 Conclusion 218 -- References 218 -- INDEX 221.

Sommario/riassunto

"This comprehensive guide describes how evolutionary algorithms (EA) may be used to identify, model, and optimize day-to-day problems that arise for researchers in optimization and mobile networking. It provides efficient and accurate information on dissemination algorithms, topology management, and mobility models to address challenges in the field. It is an ideal book for researchers and students in the field of mobile networks"--
