Handbook of Mobile Ad Hoc Networks for Mobility Models

Radhika Ranjan Roy

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Radhika Ranjan Roy
United States Army Research
Development and Engineering Command
(RDECOM)
Myer Center 2700
Fort Monmouth, NJ 07703, USA
rroy3@optonline.net

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To my Grandma for her causeless love, my parents Rakesh Chandra Roy and Sneholota Roy whose spiritual inspiration remains vividly alive within all of us, my sisters GitaSree Roy, Anjali Roy, and Aparna Roy and their spouses and my brother Raghunath Roy and his wife Nupur for their inspiration, my daughter Elora and my son-in-law Nick, my sons Ajanta and Debasri, and finally my beloved wife Jharna for their love.

Preface

Throughout the course of my work in multihop mobile ad hoc networks (MANET) over the last several years, I reached the conclusion that mobility models and performance metrics need to be treated in detail in designing these networks that are the ultimate frontier in wireless communications. A wide variety of mobility models can be used by mobile nodes. Accurate representations of the characteristics of mobile nodes are key in understanding whether a given protocol used in the wireless communications network is useful in a particular type of ad hoc mobile scenario. The mobility performance metrics aim to capture the characteristics of different mobility patterns and can be used to analyze the performance of communications protocols. This book is an attempt to put together the theoretical aspects of the mobility models and metrics that are relevant to the mobile ad hoc network.

The mobility models are divided into seven different major groups based on their basic mobility characteristics: individual mobility, group mobility, autoregressive mobility, flocking mobility, virtual game-driven mobility, non-recurrent mobility, and time-variant community mobility. Many different variants of mobility models exist in each group and have been described in a chapter dedicated to each group.

The mobility performance metrics are grouped into seven major categories based on the parameters that are being considered in each group: direct mobility metrics, mobility measure metrics, link- and path-based metrics, network connectivity metrics, quality-of-service metrics, energy performance metrics, and mobility prediction metrics. All mobility performance parameters for each group have been described in each chapter.

The book has been organized into eight chapters: I. Introduction, II. Individual Mobility Models, III. Group Mobility Models, IV. Autoregressive Mobility Models, V. Flocking/Swarm Mobility Models, VI. Virtual Game-Driven Mobility Models, VII. Non-recurrent Mobility Models, and VIII. Social-Based Community Mobility Models. Readers familiar with mobile ad hoc networks will find interesting using the details of the mobility models and metrics in designing their wireless communications networks where mobile nodes move from place to place with no fixed infrastructures.

The book contains material from many remarkable published papers. I feel proud to mention the following authors as contributors whose material has been used in a substantial way in the respective sections of the book as follows:

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Contents

Part I Introduction

1 Mobile Ad Hoc Networks . . . 3
1.1 Overview . . . 3
1.2 Mobility . . . 4
1.3 Topology Control . . . 4
1.4 Medium Access . . . 5
1.5 Routing . . . 6
1.5.1 Unicast . . . 6
1.5.2 Broadcast . . . 8
1.5.3 Multicast . . . 9
1.5.4 Geocast . . . 11
1.6 Transport Protocol . . . 14
1.7 Quality of Service . . . 15
1.8 Energy Management . . . 16
1.9 Security . . . 17
1.10 Mobile Peer-to-Peer Applications . . . 18
1.11 Summary . . . 19
1.12 Problems . . . 20
References . . . 21

2 Mobility Model Characteristics . . . 23
2.1 Introduction . . . 23
2.2 Mobility Model Classifications . . . 23
2.3 Formulation of Mobility Models . . . 25
2.4 Mobility Metrics . . . 29
2.5 Impact of Mobility Models on MANET . . . 30
2.6 Summary . . . 31
2.7 Problems . . . 31
References . . . 32

Part II Individual Mobility Models

3 Random Walk Mobility . . . 35
3.1 Introduction . . . 35
3.2 Notation . . . 38
3.3 Characteristics of Random Walk Mobility . . . 39
3.4 Stationary Distribution of Random Walk Mobility . . . 40
3.4.1 Steady-State Mobile Link Distribution . . . 41
3.4.2 Continuous-Time Steady-State Distribution Approximation . . . 46
3.4.3 Simulation Results . . . 52
3.4.4 Summary . . . 54
3.5 Limitations of Random Walk Mobility Model . . . 54
3.6 Remedy of Limitations in Random Walk Mobility Model . . . 55
3.7 Variations of Random Walk Mobility Model . . . 56
3.7.1 Markovian Random Walk Mobility . . . 57
3.7.2 Random Walk with Drift Mobility . . . 60
3.8 Summary . . . 61
3.9 Problems . . . 61
References . . . 62

4 Random Waypoint Mobility . . . 65
4.1 Introduction . . . 65
4.2 Notation . . . 67
4.3 Random Waypoint Stochastic Process . . . 67
4.4 Transition Length and Duration . . . 69
4.4.1 Stochastic Process of Transition Lengths . . . 70
4.4.2 Transition Length on 1D Line Segment . . . 71
4.4.3 Transition Length in Rectangular Area . . . 72
4.4.4 Transition Length in Circular Area . . . 75
4.4.5 Transition Time . . . 76
4.4.6 Time Between Two Direction Changes . . . 78
4.4.7 Spatial Node Distribution . . . 78
4.4.8 Movement Direction . . . 82
4.4.9 Boundary Changes . . . 86
4.4.10 Summary . . . 89
4.5 Limitations of RWP Mobility Model . . . 90
4.6 Remedy of Limitations in RWP Mobility Model . . . 91
4.7 Variations of RWP Mobility Model . . . 91
4.7.1 Notation for Generic Mobility Model . . . 92
4.7.2 Generic Mobility Model . . . 92
4.7.3 RWP on General Connected Domain . . . 94
4.7.4 Restricted RWP . . . 96
4.7.5 RWP on Sphere . . . 98
4.7.6 RWP with Wrapping . . . 99
4.7.7 RWP with Reflection . . . 100

4.7.8 Weighted Waypoint Mobility . . . 101
4.7.9 Summary . . . 103
4.8 RWP Mobility with Arbitrary Waypoints . . . 103
4.8.1 General Expressions for Traditional RWP . . . 103
4.8.2 Spatial Node Distribution with Arbitrary Waypoints 109
4.8.3 Connectivity in Mobile Ad Hoc Networks . . . 116
4.8.4 Traffic Load in Dense Mobile Ad Hoc Networks . . 118
4.8.5 Summary . . . 120
4.9 Problems . . . 122
References . . . 123

5 Smooth Random Mobility . . . 125
5.1 Introduction . . . 125
5.2 Notation . . . 125
5.3 Characteristics of Smooth Random Mobility Model . . . 126
5.4 Speed Control . . . 127
5.5 Direction Control . . . 129
5.6 Correlation Between Direction and Speed Change . . . 131
5.6.1 Stop-Turn-and-Go Behavior . . . 131
5.6.2 Slowdown of Turning Nodes . . . 132
5.7 Node Distribution and Border Behavior . . . 134
5.8 Encounter-Related Statistics for the Epoch-Based Mobility Model . . . 135
5.8.1 Hitting and Meeting Times . . . 135
5.8.2 Contact Duration and Inter-meeting Time . . . 136
5.8.3 Assumptions . . . 137
5.9 Contact Time Statistics for the Epoch-Based Mobility Model . . . 138
5.10 Encounter Statistics for Smooth Random Mobility . . . 147
5.10.1 Hitting Time . . . 147
5.10.2 Meeting Time . . . 148
5.10.3 Inter-meeting time . . . 150
5.10.4 Contact Duration . . . 151
5.10.5 Accuracy of the Analysis . . . 152
5.11 Encounter-Related Statistics for the Epoch-Based RWP . . . 153
5.11.1 Hitting and Meeting Times . . . 153
5.11.2 Inter-meeting Time . . . 154
5.11.3 Contact Duration . . . 154
5.11.4 Accuracy of the Analysis . . . 157
5.12 Performance Analysis Using Encounter-Related Statistical Parameters . . . 157
5.12.1 Simulation Environments . . . 159
5.12.2 Mobility-Assisted Routing Under No Contention . 159
5.12.3 Mobility-Assisted Routing Under Contention . . . 161
5.13 Summary . . . 163

5.14 Problems . . . 164
References . . . 165

6 Geographic Constraint Mobility . . . 167
6.1 Introduction . . . 167
6.2 Notation . . . 168
6.3 Vehicular Mobility . . . 169
6.3.1 Freeway Mobility . . . 169
6.3.2 Manhattan Grid Mobility . . . 173
6.3.3 Car-Following Mobility . . . 174
6.3.4 Vehicular Mobility Model Analysis . . . 177
6.3.5 Impact of Vehicular Mobility on MANET . . . 181
6.3.6 Summary . . . 184
6.4 Obstacle Mobility . . . 185
6.4.1 Obstacle Construction . . . 185
6.4.2 Voronoi Tessellation and Pathways . . . 186
6.4.3 Semi-definitive Node Movement . . . 188
6.4.4 Exponentially Distributed Destination Selection . . 189
6.4.5 Attraction Point Movement . . . 190
6.4.6 Simulations . . . 190
6.4.7 Simulation Results . . . 194
6.4.8 Summary . . . 202
6.5 Community-Based Obstacle Mobility . . . 203
6.5.1 COM Model Characteristics . . . 204
6.5.2 Mobility Controlling Criteria . . . 204
6.5.3 Pause-Time Criteria . . . 208
6.5.4 Movement in Presence of Obstacles . . . 208
6.5.5 Simulation Results and Analysis . . . 209
6.5.6 Summary . . . 212
6.6 Voronoi-Based Mobility . . . 212
6.6.1 Voronoi Environment Model . . . 213
6.6.2 Voronoi Mobility Model Characteristics . . . 217
6.6.3 Summary . . . 219
6.7 Problems . . . 220
References . . . 221

7 Realistic Random Direction Mobility . . . 223
7.1 Introduction . . . 223
7.2 Notation . . . 224
7.3 Random Direction Mobility Model Characteristics . . . 225
7.4 Random Direction Model with Location-Dependent Parameterization . . . 226
7.4.1 Impact of Location-Dependent Parameterization . . 229
7.4.2 Automated Generation of Parameterizations . . . 230
7.5 Modified Random Direction Mobility . . . 235

7.6 Comparison Between RDM, MRD and RWP Mobility Models . . . 235
7.6.1 Simulation Environment . . . 235
7.6.2 Simulations . . . 236
7.6.3 Results . . . 240
7.6.4 Summary . . . 242
7.7 Problems . . . 244
References . . . 244

8 Deterministic Mobility . . . 245
8.1 Introduction . . . 245
8.2 Notation . . . 246
8.3 Mathematical Formulation of Deterministic Mobility . . . 246
8.4 DMM with Constant Speed and Direction . . . 247
8.5 DMM with Known Mobility Patterns . . . 248
8.5.1 Global Mobility Model . . . 248
8.5.2 Global Prediction Algorithm Using GMM . . . 250
8.5.3 Simulation and Results . . . 252
8.5.4 Summary . . . 252
8.6 Purposeful Deterministic Mobility . . . 252
8.6.1 Formulation for Purposeful Deterministic Mobility Model . . . 253
8.6.2 Summary . . . 257
8.7 DMM with Attraction Points . . . 257
8.7.1 Mobility Model . . . 258
8.7.2 Simulation Study . . . 259
8.7.3 Summary . . . 261
8.8 Problems . . . 262
References . . . 263

9 Partially Deterministic Mobility . . . 265
9.1 Introduction . . . 265
9.2 Notation . . . 266
9.3 PDM with Known Direction of Movement . . . 268
9.4 PDM with Known Mobility Patterns . . . 268
9.4.1 Local Mobility Model . . . 269
9.4.2 Hierarchical Location Prediction Algorithm . . . 275
9.4.3 Simulation and Results . . . 281
9.4.4 Prediction Performance . . . 286
9.4.5 Systems Implementation . . . 288
9.4.6 Summary . . . 291
9.5 Purposeful Partially Deterministic Mobility . . . 292
9.5.1 PPD Mobility Model . . . 293
9.5.2 Dual Tasking: Scanning and Relaying . . . 301
9.5.3 Simulation Study . . . 301
9.5.4 Summary . . . 306

9.6 Problems . . . 306
References . . . 308

10 Random Gauss–Markov Mobility . . . 311
10.1 Introduction . . . 311
10.2 Notation . . . 312
10.3 RGM Mobility Model Description . . . 313
10.3.1 One-Dimensional Case . . . 313
10.3.2 Multi-dimensional Case . . . 317
10.3.3 RGM and RWP Mobility Models . . . 318
10.3.4 RGM Mobility Tracking . . . 318
10.3.5 RGM Model Parameter Estimation . . . 319
10.4 RGM Mobility in Cellular Wireless Network . . . 320
10.4.1 Predictive Location Updating and Selective Paging Scheme . . . 322
10.4.2 Cost Estimation for Mobility Management . . . 323
10.4.3 One-Dimensional Cost Evaluation . . . 324
10.4.4 Two-Dimensional Cost Evaluation . . . 329
10.4.5 Two-Dimensional Cost Approximation . . . 330
10.4.6 Numerical Results and Comparisons . . . 331
10.4.7 Network Parameter Optimization with Ideal RGM Mobility . . . 332
10.4.8 Comparison with Non-predictive Distance-Based Scheme . . . 335
10.4.9 Dynamic RGM Mobility Parameter Estimation . . . 340
10.5 Summary . . . 342
10.6 Problems . . . 343
References . . . 344

11 Semi-Markov Smooth Mobility . . . 345
11.1 Introduction . . . 345
11.2 Notations . . . 345
11.3 Semi-Markov Smooth Mobility Model Characteristics . . . 347
11.3.1 Speedup Phase (α-Phase) . . . 347
11.3.2 Middle Smooth Phase (β-Phase) . . . 347
11.3.3 Slowdown Phase (γ-Phase) . . . 349
11.3.4 Semi-Markov Process . . . 349
11.4 Average Steady-State Speed . . . 350
11.5 Uniform Node Distribution . . . 351
11.6 Simulation Results . . . 352
11.6.1 Simulation Setup . . . 352
11.6.2 Average Speed . . . 353
11.6.3 Spatial Node Distribution . . . 354
11.6.4 Comparison . . . 354
11.7 SMS Mobility Model Properties . . . 355
11.7.1 Smooth Movement . . . 355

11.7.2 Stable Average Speed . . . 356
11.7.3 Uniform Spatial Node Distribution . . . 356
11.8 Applications of SMS Mobility Model . . . 357
11.8.1 Routing Performance . . . 357
11.8.2 Network Connectivity . . . 358
11.8.3 Group Mobility . . . 360
11.8.4 Geographic Constrained Networks . . . 361
11.9 Topology Dynamics Analysis . . . 363
11.9.1 Relative Movement Trajectory Modeling . . . 363
11.9.2 Distance Transition Probability Matrix . . . 364
11.9.3 Link Lifetime . . . 368
11.9.4 Link Change Rate . . . 369
11.9.5 Network Connectivity . . . 372
11.10 Summary . . . 374
11.11 Problems . . . 375
References . . . 377

12 Boundless Simulation Area Mobility . . . 379
12.1 Introduction . . . 379
12.2 Notation . . . 379
12.3 BSA Mobility Model Description . . . 381
12.4 BSA Mobility Model Evaluation . . . 383
12.5 Uses of BSA in Mobile Networks . . . 384
12.5.1 Zone Routing Protocol . . . 384
12.5.2 Connection Stability with Constant Velocity . . . 389
12.6 Summary . . . 401
12.7 Problems . . . 402
References . . . 403

13 Fluid-Flow Mobility . . . 405
13.1 Introduction . . . 405
13.2 Notation . . . 405
13.3 Fluid-Flow Mobility Model Description . . . 408
13.3.1 Classical Fluid-Flow Mobility . . . 408
13.3.2 Dynamic Fluid-Flow Mobility . . . 408
13.4 Applications of Fluid-Flow Mobility Model . . . 410
13.4.1 Cellular Wireless Networks . . . 410
13.4.2 Mobile Ad Hoc Networks . . . 425
13.5 Summary . . . 438
13.6 Problems . . . 439
References . . . 441

14 Gravity Mobility . . . 443
14.1 Introduction . . . 443
14.2 Notation . . . 443
14.3 Simple Gravity Mobility Model . . . 445

14.4 Gravity Mobility Model Extensions . . . 446
14.4.1 Parameter Calibration . . . 447
14.4.2 Example Methodology . . . 447
14.5 Gravity-Based Composite Mobility Model . . . 449
14.5.1 Scalable Mobility Model . . . 449
14.5.2 Disaster Mobility Model . . . 467
14.6 Problems . . . 481
References . . . 482

15 Mobility Vector Model . . . 483
15.1 Introduction . . . 483
15.2 Notation . . . 483
15.3 Mobility Vector Model Description . . . 484
15.4 Mobility Vector Framework and Other Mobility Models . . . 485
15.4.1 Gravity Mobility . . . 485
15.4.2 Location-Dependent Mobility . . . 485
15.4.3 Targeting Mobility . . . 485
15.4.4 Group Motion Mobility . . . 485
15.5 Calibration of Mobility Parameters . . . 486
15.5.1 Average Speed and Distance Traveled . . . 486
15.5.2 Transmission Range and Link Change Rate . . . 486
15.6 Impact on Network Performance Analysis . . . 489
15.6.1 Experimental Configuration . . . 490
15.6.2 Results . . . 490
15.7 Summary . . . 492
15.8 Problems . . . 493
References . . . 493

16 Correlated Diffusion Mobility . . . 495
16.1 Introduction . . . 495
16.2 Notation . . . 496
16.3 Correlated Diffusion Mobility Model Description . . . 497
16.3.1 Correlation of Motion Components . . . 497
16.3.2 Two-Dimensional-Correlated Random Walk . . . 498
16.3.3 Random Walk Statistics . . . 499
16.3.4 Limiting Behavior of Random Walk . . . 500
16.3.5 Joint Normal Solution . . . 502
16.3.6 Statistical Description of Residence Time . . . 504
16.4 Summary . . . 523
16.5 Problems . . . 524
References . . . 525

17 Particle-Based Mobility . . . 527
17.1 Introduction . . . 527
17.2 Notation . . . 527

17.3 Particle-Based Mobility Using Newtonian Mechanics 529
17.4 Generalized Particle-Based Mobility and Concept of Behavioral Forces 529
17.5 Application of the Particle-Based Mobility Model in Pedestrian Dynamics 531
17.5.1 Simulation Results 533
17.5.2 Summary 543
17.6 Particle-Based Mobility Application in MANET 544
17.6.1 Particle-Based Mobility Using Newton's Gravitational Law 545
17.6.2 Simulation Results 547
17.6.3 Summary 554
17.7 Particle-Based Mobility Using Quantum Mechanics 555
17.8 Problems 555
References 556

18 Hierarchical Influence Mobility 557
18.1 Introduction 557
18.2 Notation 558
18.3 Features of Hierarchical Influence Mobility Model 559
18.4 Graph-Based HIMM 560
18.5 Binary HIMM 562
18.6 Evil Rain HIMM 562
18.7 Mobility Simulation Scenarios 563
18.7.1 Pedestrian Crossing 563
18.7.2 Intra-state Travel 566
18.8 Summary 568
18.9 Problems 569
References 569

19 Behavioral Mobility 571
19.1 Introduction 571
19.2 Notation 572
19.3 Behavioral Mobility Model Paradigm 572
19.3.1 Definition of Behavioral Rules 574
19.3.2 Precise Mobility Modeling of Individuals 574
19.3.3 Dynamic Interactions 574
19.4 Modeling of Movement from Behavioral Rules 575
19.5 BM Model for Individual Pedestrian Mobility 576
19.6 BM Model Group Mobility 578
19.6.1 Evaluation 580
19.7 Practical Issues and Tradeoffs 581
19.7.1 Computational Complexity 581
19.7.2 Practical Issues 581
19.7.3 Benefits of BM Modeling Approach to Mobility . . 582

19.8 Summary . . . 583
19.9 Problems . . . 583
References . . . 584

20 Steady-State Generic Mobility . . . 585
20.1 Notation . . . 585
20.2 Random Trip Mobility Model . . . 586
20.2.1 Introduction . . . 586
20.3 Random Trip Mobility . . . 587
20.3.1 Model Description . . . 587
20.3.2 Strong Stochastic Stability for Random Trip . . . 590
20.3.3 Summary . . . 593
20.4 Clustered Mobility Model . . . 593
20.4.1 Introduction . . . 593
20.4.2 Characteristics of Scale-Free Mobile Ad Hoc Network . . . 594
20.5 Clustered Mobility Model Description . . . 595
20.5.1 Analysis of CMM . . . 597
20.5.2 Performance Evaluation . . . 600
20.5.3 Summary . . . 605
20.6 Problems . . . 606
References . . . 606

21 Graph-Based Mobility . . . 607
21.1 Introduction . . . 607
21.2 Notation . . . 608
21.3 Graph Walk Mobility Model . . . 608
21.3.1 Routing Protocols . . . 611
21.3.2 Simulation Environment . . . 613
21.3.3 Simulation Results . . . 615
21.3.4 Summary . . . 620
21.4 Area Graph-Based Mobility Model . . . 621
21.4.1 Broadcast Protocols . . . 623
21.4.2 Experimental Studies . . . 625
21.4.3 Summary . . . 632
21.5 Problems . . . 633
References . . . 633

Part III Group Mobility Models

22 Reference Point Group Mobility . . . 637
22.1 Introduction . . . 637
22.2 Notation . . . 637
22.3 RPGM Model Description . . . 638
22.4 Applications of RPGM Model . . . 642
22.5 Modified Version of RPGM Model . . . 643

22.6 Performance with RPGM Model . . . 644
22.6.1 Performance Metrics . . . 644
22.6.2 Simulation Environment . . . 645
22.6.3 Simulation Results . . . 646
22.7 Exponential Correlated Random Group Mobility . . . 651
22.8 Column Mobility . . . 652
22.9 Nomadic Community Mobility . . . 654
22.9.1 Topology Control Algorithm Using Nomadic Community Mobility . . . 655
22.10 Pursue Mobility . . . 664
22.10.1 Performance Evaluation . . . 666
22.11 Summary . . . 668
22.12 Problems . . . 669
References . . . 670

23 Reference Velocity Group Mobility . . . 671
23.1 Introduction . . . 671
23.2 Notation . . . 672
23.3 RVGM Model Description . . . 673
23.4 RVGM Model Applications . . . 676
23.4.1 Mobile Ad Hoc Network Partitioning Problems . . . 676
23.4.2 Partition Prediction . . . 677
23.4.3 Partition Prediction Algorithm . . . 677
23.4.4 Application of Partition Prediction . . . 680
23.4.5 Mobile Node Velocity Clustering . . . 681
23.4.6 Sequential Clustering Algorithm . . . 681
23.4.7 Illustration of Sequential Clustering Algorithm . . . 682
23.5 Summary . . . 683
23.6 Problems . . . 684
References . . . 684

24 Reference Velocity and Acceleration Group Mobility . . . 685
24.1 Introduction . . . 685
24.2 Notation . . . 686
24.3 RVAG Mobility Model Description . . . 686
24.4 Clustering Algorithm . . . 688
24.5 Partition Prediction Scheme . . . 689
24.6 Performance Evaluation . . . 690
24.7 Summary . . . 693
24.8 Problems . . . 694
References . . . 694

25 Structured Group Mobility . . . 695
25.1 Introduction . . . 695
25.2 Notation . . . 696
25.3 Structured Group Mobility Model Description . . . 696

25.4 Applications of Structured Group Mobility Model 699
25.4.1 Firefighters Operating in a Building 699
25.4.2 Military Units on the Battlefield 699
25.5 MANET Behavior in Face of Induced Link Breakages 700
25.6 Simulations with Structured Groups 701
25.6.1 Simulator 701
25.6.2 Movement Patterns 702
25.6.3 Evaluation 703
25.7 Results 705
25.8 Summary 709
25.9 Problems 710
References 710

26 Virtual Track-Based Group Mobility 711
26.1 Introduction 711
26.2 Virtual Track-Based Group Mobility Description 712
26.3 Defining Switch Stations and Virtual Tracks 713
26.4 Initial Node Distribution and Group Affiliation 714
26.5 Group Mobility Under Constraint of Tracks 714
26.6 Group Split/Merge at the Switch Station 714
26.7 Random and Individual Nodes Mobility 715
26.8 Simulation Evaluation 715
26.8.1 Simulation Platform 715
26.8.2 Performance with Mobile Groups 715
26.8.3 Impact of Individual Random Moving and Static Nodes 718
26.9 Summary 720
26.10 Problems 720
References 720

27 Drift Group Mobility 721
27.1 Introduction 721
27.2 Notation 722
27.3 Drift Group Mobility Description 723
27.4 Applications of Drift Group Mobility on Routing Group . . . 725
27.5 Performance Results 728
27.6 Summary 731
27.7 Problems 732
References 732

28 Gathering Group Mobility 733
28.1 Introduction 733
28.2 Notation 734
28.3 Scale-Free Characteristics in Mobility 734
28.4 Gathering Group Mobility Model Description 737
28.5 Experiment Results 738

28.6 Summary . . . 740
28.7 Problems . . . 740
References . . . 740

29 Group Force Mobility . . . 743
29.1 Introduction . . . 743
29.2 Notation . . . 745
29.3 Group Force Mobility Model Description . . . 746
29.3.1 Basic Force Model . . . 746
29.3.2 Group Force Mobility Model . . . 747
29.4 Simulation and Results . . . 750
29.4.1 Simulation Methodology . . . 750
29.4.2 Simulation Results . . . 752
29.5 Performance Assessment . . . 754
29.5.1 Performance Metrics and Methodology . . . 754
29.5.2 Performance Analysis . . . 755
29.6 Summary . . . 758
29.7 Problems . . . 758
References . . . 759

30 Group Mobility Extending Individual Mobility Models . . . 761
30.1 Introduction . . . 761
30.2 Group Mobility Models . . . 762
30.3 Simulations . . . 764
30.4 Basic Scenarios . . . 765
30.5 Impact of Node Speeds . . . 767
30.6 Impact of Group Numbers . . . 769
30.7 Impact of Area Size . . . 770
30.8 Summary . . . 771
30.9 Problems . . . 771
References . . . 772

Part IV Autoregressive Mobility Models

31 Autoregressive Individual Mobility . . . 775
31.1 Introduction . . . 775
31.2 Notation . . . 776
31.3 Individual Linear System Mobility Model . . . 777
31.4 Autoregressive Individual Mobility Model Description . . . 778
31.5 Observation Data . . . 780
31.6 Mobility Tracking Algorithm . . . 782
31.6.1 Pre-filtering . . . 783
31.6.2 Initialization Module . . . 784
31.6.3 Extended Kalman Filter for Mobility State Estimation . . . 784
31.6.4 AMM with First-Order Autocorrelation of Mobility . . . 785

31.7 Numerical Results . . . 785
31.7.1 Simulation Setup . . . 786
31.7.2 Mobility Estimation and Prediction . . . 786
31.8 Summary . . . 788
31.9 Problems . . . 789
References . . . 789

32 Autoregressive Group Mobility Model . . . 791
32.1 Introduction . . . 791
32.2 Notation . . . 792
32.3 Autoregressive Group Mobility Model Description . . . 793
32.4 Detection and Estimation of Group Mobility . . . 795
32.4.1 Group Mobility Detection – Correlation Index Test . . . 795
32.4.2 Group Mobility Estimation . . . 796
32.5 Numerical Results . . . 797
32.5.1 GPS Data . . . 797
32.5.2 Simulation Data . . . 802
32.6 Summary . . . 805
32.7 Problems . . . 805
References . . . 806

Part V Flocking/Swarming Mobility Models

33 Flocking Mobility Models . . . 809
33.1 Introduction . . . 809
33.2 Notation . . . 810
33.3 Preliminaries . . . 810
33.3.1 Graphs and Nets . . . 812
33.3.2 α-Lattices and Quasi-α-Lattices . . . 813
33.3.3 Deviation Energy of Conformation . . . 813
33.3.4 α-Norms and Bump Functions . . . 814
33.3.5 Collective Potential Functions . . . 815
33.4 Flocking Algorithm for Free Space . . . 817
33.4.1 Collective Dynamics . . . 818
33.4.2 Stability Analysis of Flocking in Free Space . . . 819
33.5 Flocking with Obstacle Avoidance . . . 820
33.5.1 β-Neighbors of α-Agents and (α, β)-Nets . . . 821
33.5.2 Constrained α-Lattices . . . 822
33.5.3 Multi-species Collective Potentials . . . 822
33.5.4 Flocking Algorithm in the Presence of Obstacles . . . 823
33.5.5 Calculation of Position and Velocity of β-Agents . . . 824
33.5.6 Analysis of Flocking with Obstacle Avoidance . . . 825
33.6 Flocking Mobility Model for Mobile Ad Hoc Networks . . . 826
33.6.1 Flocking-Based Mobility Model for Ad Hoc Network in Arbitrary m-Dimensional Space . . . 828

33.7 Peer-to-Peer Information Flow with Constrained Flocking . . 829
33.8 Simulation Results 830
33.8.1 Two-Dimensional Flocking in Free Space 831
33.8.2 Two-Dimensional Fragmentation in Free Space . . 832
33.8.3 Three-Dimensional Flocking in Free Space 833
33.8.4 Split and Rejoin Maneuver 834
33.8.5 Squeezing Maneuver: Moving Through Narrow Spaces 836
33.9 What Constitutes Flocking? 838
33.9.1 Verification of α-Flocking 838
33.10 Summary 839
33.11 Problems 840
References 841

34 Swarm Group Mobility Model 843
34.1 Introduction 843
34.2 Notation 844
34.3 Swarm Group Mobility Model Description 844
34.3.1 Physical Model 845
34.3.2 Perception Model 845
34.3.3 Behavioral Model 847
34.3.4 Complexity 849
34.4 Experimentation 849
34.5 Summary 852
34.6 Problems 852
References 852

Part VI Virtual Game-Driven Mobility Models

35 Virtual Game-Driven Mobility Models Description 857
35.1 Introduction 857
35.2 Notation 857
35.3 Virtual Game-Driven Mobility Framework and Abstraction 858
35.4 User Movements 860
35.5 Analysis of the Ad Hoc Network Performance Data Using Multi-player Game 862
35.6 Simulation Results 866
35.7 Summary 874
35.8 Problems 875
References 875

Part VII Non-recurrent Mobility Models

36 Non-recurrent Mobility Models 879
36.1 Notation 879

36.2 KDS-Based Mobility Model Preliminaries . . . 880
36.2.1 Definitions . . . 880
36.2.2 KDS Framework . . . 884
36.2.3 Motion in Computational Geometry . . . 885
36.2.4 Kinetic Data Structures . . . 887
36.2.5 Kinetic Sorted List . . . 888
36.2.6 General Polygonal Models . . . 889
36.2.7 Spline and Algebric Objects . . . 892
36.2.8 Dynamic Queries . . . 893
36.2.9 Proximity Maintenance . . . 893
36.3 Mobility Model Formulation in KDS . . . 894
36.3.1 Swept Volume-Based Collision Detection . . . 894
36.3.2 Methodology for Solving Problems . . . 896
36.3.3 Motion Formulation . . . 897
36.3.4 Boundary Volume Hierarchies Generation and Culling . . . 899
36.3.5 Swept Volume Generation . . . 900
36.3.6 Collision Detection in KDS . . . 901
36.3.7 Implementation . . . 903
36.3.8 Main Results . . . 905
36.4 KDS-Based Mobility Application to Mobile Ad Hoc Networks . . . 906
36.5 Some Non-KDS-Based Mobility Models . . . 908
36.5.1 Contraction Mobility Model . . . 908
36.5.2 Modified Contraction Mobility Model . . . 909
36.5.3 Expansion Mobility Model . . . 909
36.6 Summary . . . 909
36.7 Problems . . . 910
References . . . 910

Part VIII Social-Based Community Mobility Model

37 Time-Variant, Community-Based, and Home-Cell Community-Based Mobility Model . . . 913
37.1 Notation . . . 913
37.2 Time-Variant Community Mobility Model . . . 915
37.2.1 Introduction . . . 915
37.2.2 Theoretical Analysis of the TVC Mobility Model . . . 917
37.2.3 TVC Mobility Model Validation . . . 927
37.2.4 Performance Prediction Using TVC Model . . . 932
37.2.5 Summary . . . 934
37.3 Community-Based Mobility Model . . . 934
37.3.1 Introduction . . . 934
37.3.2 CBM Description . . . 934
37.3.3 Gregorian Behavior in CBM . . . 936

37.4 Home-Cell CBM Model . . . 943
37.4.1 HCBM Versus CBM in Controlling Node Positions . . . 944
37.4.2 Modified HCBM . . . 947
37.4.3 Modeling Movements in HCBM . . . 950
37.4.4 Mobility Pattern Evaluation . . . 956
37.4.5 Summary . . . 962
37.5 Problems . . . 962
References . . . 963

38 Orbit-Based Mobility . . . 965
38.1 Introduction . . . 965
38.2 Notation . . . 966
38.3 Orbit-Based Mobility Parameters . . . 967
38.4 General Orbit Mobility Model . . . 968
38.5 Random Orbit Model . . . 968
38.6 Uniform Orbit Model . . . 969
38.7 Restricted Orbit Model . . . 969
38.8 Overlay Orbit Model . . . 969
38.9 Orbit-Aware Routing in Mobile Ad Hoc Network . . . 970
38.9.1 Analytical Model . . . 971
38.9.2 Routing Protocol Description . . . 978
38.9.3 Performance Analysis . . . 983
38.10 Comparison with Other Mobility Models . . . 989
38.11 Summary . . . 990
38.12 Problems . . . 991
References . . . 992

39 Entropy-Based Individual/Community Mobility Model . . . 993
39.1 Introduction . . . 993
39.2 Notations . . . 993
39.3 Entropy-Based Mobility Model in Virtual Space . . . 995
39.3.1 Virtual Space Concept . . . 995
39.3.2 Mobility Pattern Characterization . . . 995
39.3.3 Entropy-Based Mobility Model Description . . . 999
39.3.4 Simulation Results . . . 999
39.3.5 Summary . . . 1005
39.4 Entropy-Based Mobility Model in Community Structure Environment . . . 1006
39.4.1 Mobility Model Description . . . 1006
39.4.2 Applications in Mobile Ad Hoc Network . . . 1008
39.4.3 Summary . . . 1018
39.5 Entropy-Based Mobility in QOS and Clustering of MANET . 1019
39.5.1 Mobility Model Description . . . 1019
39.5.2 Optimized Entropy-Based WCA with Tabu Search . 1023
39.5.3 Entropy-Based WCA Simulation Results . . . 1025

39.5.4 Entropy-Based QOS Routing Simulation Results . 1029
39.5.5 Summary 1031
39.6 Problems 1032
References 1033

40 Knowledge-Driven Mobility Model 1035
40.1 Introduction 1035
40.2 Notation 1036
40.3 KDM Model Description 1037
40.3.1 Parameterizing Host Motion 1037
40.3.2 Exploiting Motion Profiles for Finding Services . . 1038
40.3.3 Service Requests by Mobile Hosts 1039
40.4 Mobile Service Satisfying Set 1040
40.4.1 Service Satisfiability 1040
40.4.2 Service Reachability 1041
40.4.3 Logical Service Mobility 1041
40.5 Exploiting KDM Model in Ad Hoc Mobile Environments . . 1043
40.5.1 Proactive Service Relocation 1043
40.5.2 Ensuring Continuous Connectivity 1044
40.6 KDM Functional Architecture 1045
40.6.1 Middleware Software Architecture 1046
40.6.2 Knowledge Management System 1047
40.6.3 Knowledge Representation 1048
40.6.4 Knowledge Base 1050
40.6.5 Knowledge Aggregation 1051
40.6.6 Knowledge Dissemination 1053
40.6.7 Anatomy of Service Request 1053
40.7 KDM Simulation and Results 1056
40.7.1 Simulation Setup 1056
40.7.2 Results Varying Networking Parameters 1057
40.8 Some Observations 1062
40.9 Summary 1063
40.10 Problems 1064
References 1065

Index 1067

List of Figures

2.1 Movement of a node in a MANET: (**a**) epoch mobility vectors and (**b**) resultant mobility vector [4]. © IEEE – Reproduced with permission 26
2.2 Joint mobility transformation: (**a**) joint node case and (**b**) joint mobility transformation [4]. © IEEE – Reproduced with permission 28
3.1 Traveling pattern of an MN using the 2D random walk mobility model (*time*) [3]. © IEEE – Reproduced with permission 36
3.2 Traveling pattern of an MN using the 2D random walk mobility model (*distance*) [3]. © IEEE – Reproduced with permission 37
3.3 Generalized mobility model simulation algorithm [12] 52
3.4 Marginal X-coordinate steady-state probability for random walk ($W = 135$ m) [12] 53
3.5 Chi-squared distance for steady-state location approximation [12] 54
3.6 Markov chain and probability matrix of Markovian random walk mobility model [3]. © IEEE – Reproduced with permission 57
3.7 Mobile node's movement pattern using Markovian random walk model [3]. © IEEE – Reproduced with permission 59
3.8 Markov chain state transition for simple individual mobility Markovian model [22] 59
4.1 Traveling pattern of a mobile node using the random waypoint mobility model [2]. © IEEE – Reproduced with permission 66
4.2 Average neighbor in percentage versus time [2]. © IEEE – Reproduced with permission 66
4.3 PDF of transition length of RWP nodes in a rectangle [1]. © Kluwer Academic Publishers – Reproduced with permission 74

4.4 Expected length and PDF: (**a**) expected transition length of RWP nodes within an $a \times b$ rectangle and (**b**) PDF of transition length of RWP nodes on a disk of radius a [1]. © Kluwer Academic Publishers – Reproduced with permission 75
4.5 Spatial node distribution resulting from the RWP model (simulation results): (**a**) square system area and (**b**) circular system area [1]. © Kluwer Academic Publishers – Reproduced with permission 80
4.6 Definition of direction angles [1]. © Kluwer Academic Publishers – Reproduced with permission 83
4.7 Distribution of movement direction: $f_\Theta(\theta|r)$, r/a, and θ [1]. © Kluwer Academic Publishers – Reproduced with permission 85
4.8 Distribution of movement direction: $f_\Theta(\theta)$ and θ [1]. © Kluwer Academic Publishers – Reproduced with permission 85
4.9 Cell changes per transition [1]. © Kluwer Academic Publishers – Reproduced with permission 87
4.10 Expected cell boundary change rate $E\{C_t\}$ on a square area of size $\|A\| = 62,500\alpha^2$ m^2, Number of cells $= \alpha^2$, and length of one square cell $= 250$ m [1]. © Kluwer Academic Publishers – Reproduced with permission 89
4.11 Random waypoint on a non-convex Swiss flag domain [14]. © IEEE – Reproduced with permission 95
4.12 Random waypoint on a non-convex city section domain [14]. © IEEE – Reproduced with permission 95
4.13 Restricted random waypoint on a plane with four squares [14]. © IEEE – Reproduced with permission 96
4.14 Restricted random waypoint fish-in-a-bowl surface [14]. © IEEE – Reproduced with permission 97
4.15 Random waypoint on a sphere [14]. © IEEE – Reproduced with permission 98
4.16 Random waypoint (or random walk) with wrapping [14]. © IEEE – Reproduced with permission 99
4.17 Random waypoint (or random walk) with billiard-like reflection at the edges of the domain [14]. © IEEE – Reproduced with permission 100
4.18 Markov model of location transition of mobile nodes 102
4.19 Zigzag movement of the RWP process [19]. © IEEE – Reproduced with permission 104
4.20 Illustration of the variables: P_1, ϕ, r, Δ, dA, and a_1 [19]. © IEEE – Reproduced with permission 106
4.21 Illustration of the integral over $[0, 2\pi]$ [19]. © IEEE – Reproduced with permission 106

4.22 Derivation of a_1 and a_2 in a unit disk [19]. © IEEE – Reproduced with permission 107
4.23 The pdf of the node location, $f(r)$, (*left*) and the pdf of the distance of a node from the origin, $f_R(r)$, (*right*) for a unit disk. The *solid curves* correspond to our exact results and the *dashed curves* to approximation $P1(r)$ (see Table 4.4) [19]. © IEEE – Reproduced with permission 108
4.24 Notation for analysis of RWPB [19]. © IEEE – Reproduced with permission 111
4.25 The pdf is resulting from the RWPB model in unit square. The *left* figure corresponds to pdf of the interior mode $f_0(r)$, and the *right* figure corresponds to pdf of the border mode $f_i(r)$ [19]. © IEEE – Reproduced with permission 114
4.26 Notation for analysis of RWPB in a unit circle [19]. © IEEE – Reproduced with permission 115
4.27 The cdf $F_R(r)$ of the distance of the node from the origin (*left*) and the pdf $f(r) = f(|r|)$ of the node location (*middle* and *right*) for the RWPB model in a unit disk [19]. © IEEE – Reproduced with permission 116
4.28 Comparison of $C_n(d)$ with RWP node distribution (*dashed lines*), RWPB node distribution (*solid lines*), and uniform node distribution (*dotted lines*) for $n = 20$, $n = 100$, and $n = 500$ nodes (from *left* to *right*) [19]. © IEEE – Reproduced with permission 117
4.29 On the *left* figure the *lower curve* corresponds to the pdf of the node location according to RWP model and the *upper curve* the pdf of the packet location in a dense ad hoc network. The figures on the *right* illustrate the respective pdfs in three-dimensions [19]. © IEEE – Reproduced with permission 120
5.1 Speed behavior $v(t)$ of car in downtown [6]. © ACM – Reproduced with permission 129
5.2 Direction behavior of a node using smooth random behavior [6]. © ACM – Reproduced with permission 131
5.3 Three mobility traces [6]. © ACM – Reproduced with permission 132
5.4 Speed slowdown and node distribution: (**a**) modeling of slowdown of mobile nodes before turning and (**b**) spatial node distribution histogram [6]. © ACM – Reproduced with permission 133
5.5 The first node enters the transmission range of the second node at an angle ϕ to the tangent at A and moves along the chord AB [7]. © Inderscience – Reproduced with permission . . . 139
5.6 Comparison of theoretical and simulations results for the expected hitting and meeting times under the random

direction (or smooth random) mobility model [7]. © Inderscience – Reproduced with permission 150
5.7 Random direction (or smooth random) mobility model: (**a**) comparison of the theoretical and simulation results for the expected contact time for parameters $N = 100 \times 100$, $\overline{T} = 300$, $\overline{v} = 1$. (**b**) meeting time distribution with parameters $N = 100 \times 100$, $K = 30$, $\overline{T} = 160$, $\overline{v} = 1$, $\overline{T}_{\text{stop}} = 150$. (**c**) Inter-meeting time distribution with parameters $N = 100 \times 100$, $K = 30$, $\overline{T} = 160$, $\overline{v} = 1$, $\overline{T}_{\text{stop}} = 150$ [7]. © Inderscience – Reproduced with permission 152
5.8 Node A will pass through the transmission range of node B if and only if its destination lies in the shaded region [7]. © Inderscience – Reproduced with permission 155
5.9 Comparison of theoretical and simulation results for the expected hitting and meeting times under the random waypoint model [7]. © Inderscience – Reproduced with permission 158
5.10 Random waypoint mobility model: (**a**) comparison of the theoretical and simulation results for the expected contact time for parameters $N = 100 \times 100$, $\overline{v} = 1$, $\overline{T}_{\text{stop}} = 150$; (**b**) meeting time distribution with parameters $N = 100 \times 100$, $K = 30$, $\overline{v} = 1$, $\overline{T}_{\text{stop}} = 150$; and (**c**) inter-meeting time distribution with parameters $N = 100 \times 100$, $K = 30$, $\overline{T} = 160$, $\overline{v} = 1$, $\overline{T}_{\text{stop}} = 150$ [7]. © Inderscience – Reproduced with permission 158
5.11 Upper and lower bounds on the delay of mobility-assisted routing scheme under random direction [7]. © Inderscience – Reproduced with permission 160
5.12 Simulation and analytical results for the expected delay of (**a**) direct transmission and (**b**) epidemic routing. Network parameters: $N = 150 \times 150$, $\overline{v} = 1$, $\overline{L} = 55$, $M = 50$, $\overline{T} = 0$ [7]. © Inderscience – Reproduced with permission 163
6.1 Freeway mobility model: (**a**) freeway mobility model, (**b**) mobile node traveling pattern in freeway/city section, and (**c**) pathway graph used in freeway 170
6.2 Mobile nodes (e.g., vehicles) moving in two-lane freeway [5]. © IEEE – Reproduced with permission 171
6.3 Mobility rules in multi-lane freeways for mobile nodes 172
6.4 Manhattan mobility model 173
6.5 Car-following mobility model algorithm 175
6.6 Evolution of speed and headway time for the first 20 vehicles belonging to a queue of cars meeting a slow vehicle ahead (at time $t = 60$ s, the slow vehicle starts accelerating) [5]: (**a**) freeway model, (**b**) FTM model,

(**c**) IDM model, and (**d**) Kraub model. © IEEE – Reproduced with permission 179
6.7 Speed waves generated by the IDM model in presence of severe traffic congestions on the highway scenario [5]. © IEEE – Reproduced with permission 179
6.8 Average speed profile of vehicular outflow (*top*) and inflow (*bottom*) in presence of an intersection [5]. © IEEE – Reproduced with permission 180
6.9 Vehicular density in an urban scenario obtained with the IDM-IM model [5]: (**a**) random mobility and (**b**) activity-based mobility. © IEEE – Reproduced with permission 181
6.10 PDR distribution over hop count with random mobility (*top*) and activity-based mobility (*bottom*) [5]. © IEEE – Reproduced with permission 183
6.11 PDR versus time for different configurations [5] (**a**) single s/d pair, random mobility, (**b**) single s/d pair, activity-based mobility, and (**c**) multiple s/d pairs, activity-based mobility, IDM-IM model. © IEEE – Reproduced with permission 184
6.12 Voronoi diagram with obstacles and terrain with labeled sites [3]. © IEEE – Reproduced with permission 187
6.13 Voronoi diagram for terrain with labeled sites [3]. © IEEE – Reproduced with permission 187
6.14 Example of semi-definite node movement [3]. © IEEE – Reproduced with permission 189
6.15 Example network scenario for simulation by obstacle mobility model [3]. © IEEE – Reproduced with permission 191
6.16 Node density [3]. © IEEE – Reproduced with permission 195
6.17 Path length versus time [3]. © IEEE – Reproduced with permission 196
6.18 Average link duration [3]. © IEEE – Reproduced with permission 197
6.19 Data packet reception [3]. © IEEE – Reproduced with permission 197
6.20 Control packet overhead [3]. © IEEE – Reproduced with permission 198
6.21 End-to-end latency [3]. © IEEE – Reproduced with permission 199
6.22 Data packet reception versus signal attenuation percentage [3]. © IEEE – Reproduced with permission 200
6.23 Data packet reception [3]. © IEEE – Reproduced with permission 201
6.24 Control packet overhead [3]. © IEEE – Reproduced with permission 201