# LIST OF FIGURES

1.1 A Scope of Fisheye ........................................ 4  
1.2 An outline of the simple flooding algorithm for   broadcasting in MANETs ..................................... 8  
1.3 Routing Challenges .......................................... 18  
1.4 Frame work of the thesis ................................... 25  
2.1 The major issues that affect the performance and design of mobile ad-hoc networks .................. 37  
2.2 Some major open issues in MANETs ....................... 57  
3.1 (a) Fisheye Scope  
(b) Fisheye View of Polaris-Dennis Anderson (2002)  
3.2 The Square is divided into many logical grids ........ 66  
3.3 Transmission range of each gateway could cover eight neighbor grids  
3.4 Grid Architecture with Unicast data path from Source node to Destination Node .................... 69  
3.5 Packet Delivery Ratio V/s Number of Nodes (FSR &GFSR) ........................................... 71  
3.6 Control Overhead V/s Number of Nodes (FSR &GFSR) ......................................................... 73  
3.7 Normalized Overhead v/s Number of Nodes (FSR &GFSR) .................................................... 74  
3.8 End to End Delay V/s Number of Nodes (FSR & GFSR) ......................................................... 75  
3.9 Throughput V/s Number of Nodes (FSR & GFSR) ................................................................. 75  
3.10 Average Comparison of FSR and GFSR in Performance Metrics using Simulation ..................... 77  
3.11 Comparison of FSR & GFSR – Speed Vs Throughput ......................................................... 78  
3.12 Comparison of FSR & GFSR – Speed Vs Delay .......................................................... 78
3.13 Comparison of FSR & GFSR – Speed Vs Overhead
3.14 Comparison of FSR & GFSR – Speed Vs Jitter
4.1 APBMAN - Impact of Saved Rebroadcast with 50 Nodes
4.2 APBMAN - Impact of Saved Rebroadcast with 75 Nodes
4.3 APBMAN - Packet Reachability with different Node Speed 5,10,15,20 m/sec
4.4 APBMAN - Impact of density on Reachability for different network densities with Node Speed
4.5 APBMAN - Impact of Pause-Time on Reachability with different node Pause-Time
4.6 APBMAN - Impact of P-Reachability with different Node Speed
4.7 APBMAN - Impact of Saved Rebroadcast of three broadcast schemes against network density with 100 nodes
4.8 APBMAN - Initial Deployment of nodes with random placement
4.9 APBMAN - Red circle shows flooding starts
4.10 APBMAN- Red color nodes shows that flooding message rebroadcast to its neighbors
4.11 APBMAN - Rebroadcast flooding message
4.12 APBMAN - Entire network shows rebroadcasting
4.13 APBMAN - After certain period of time some node not rebroadcast it shows in blue color
4.14 APBMAN - Impact on Saved Rebroadcast-P with respect to Reduced Flooding, Fixed Probability & Adjusted Probability
4.15 APBMAN - Impact on Reachability – P with respect to Reduced Flooding, Fixed Prob. and Adjusted Probability.
5.1 FLOODING - FSR Delay and Reduced FSR in Grid
5.2 FLOODING - End to End Delay V/s Nodes in Flooding
5.3 FLOODING - FSR PDR and Reduced FSR in Grid
5.4 FLOODING - Packet Delivery Ratio V/s Nodes in Flooding
5.5 FLOODING - FSR Throughput and Reduced FSR in Grid
5.6 FLOODING - Throughput V/s Number of Nodes in Flooding
5.7 FLOODING - FSR Jitter and Reduced FSR in Grid
5.8 FLOODING - Jitter V/s Nodes in Flooding
5.9 FLOODING - FSR Energy and Reduced FSR in Grid
5.10 FLOODING – Average Consumed Energy V/s Number of Nodes in Flooding
5.11 FLOODING - FSR Overhead and Reduced FSR in Grid
5.12 FLOODING - Control Overhead V/s Nodes in Flooding
5.13 FLOODING - FSR Delay and Reduced FSR in Grid
5.14 FLOODING - Pause-time v/s Delay
5.15 FLOODING - FSR Overhead and Reduced FSR in Grid
5.16 FLOODING - Pause-time v/s Overhead
5.17 FLOODING - FSR Jitter and Reduced FSR in Grid
5.18 FLOODING - Pause-time v/s Jitter
5.19 FLOODING - FSR Throughput and Reduced FSR in Grid
5.20 FLOODING - Pause-time v/s Throughput
5.21 FLOODING - FSR PDR and Reduced FSR in Grid
5.22 FLOODING - Pause-time v/s PDR
5.23 Flooding produced in Nam Window
5.24 Reduced Flooding in NAM Window
6.1 Noise is caused by boundary region
6.2 Elimination of noise decreased the boundary
6.3 Average consumed energy in Weighted Rough Set Routing
6.4 Total consumed energy in Weighted Rough Set Routing
6.5 PDR in Weighted Rough Set Routing
6.6 Throughput in Weighted Rough Set Routing
6.7 Overhead in Weighted Rough Set Routing
6.8 Normalized Overhead in Weighted Rough Set Routing
7.1 Comparison - Average Consumed Energy versus Pause-time
7.2 Comparison - Total Consumed Energy versus Pause-time
7.3 Comparison - Packet Delivery Ratio versus Pause-time
7.4 Comparison - Throughput versus Pause-time
7.5 Comparison - Overhead versus Pause-time
7.6 Comparison - Normalized Overhead versus Pause-time
7.7 Comparison - Speed versus Average Consumed Energy
7.8 Comparison - Speed versus Total Consumed Energy
7.9 Comparison - Speed Vs Packet Delivery Ratio
7.10 Comparison - Speed Vs Throughput
7.11 Comparison - Speed Vs Delay
8.1 Triangular Membership function expression for a number closed to 10
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2</td>
<td>The membership function for Total Energy Consumed with three Fuzzy regions</td>
<td>201</td>
</tr>
<tr>
<td>8.3</td>
<td>Decision Tree for WRS Model</td>
<td>204</td>
</tr>
<tr>
<td>8.4</td>
<td>Decision Tree for Flooding</td>
<td>208</td>
</tr>
<tr>
<td>8.5</td>
<td>Decision Tree for APBMAN</td>
<td>212</td>
</tr>
<tr>
<td>8.6</td>
<td>Comparison - Nodes Vs Average Consumed Energy</td>
<td>215</td>
</tr>
<tr>
<td>8.7</td>
<td>Comparison - Nodes Vs Total Consumed Energy</td>
<td>216</td>
</tr>
<tr>
<td>8.8</td>
<td>Comparison - Nodes Vs Packet Delivery Ratio</td>
<td>216</td>
</tr>
<tr>
<td>8.9</td>
<td>Comparison - Nodes Vs Throughput</td>
<td>217</td>
</tr>
<tr>
<td>8.10</td>
<td>Comparison - Nodes Vs Delay</td>
<td>217</td>
</tr>
</tbody>
</table>
LIST OF TABLES

2.1 Summary of Literature Review 55
3.1 Comparative Analysis of FSR and GFSR in NS2 76
4.1 Summary of the parameters used in the Simulation experiments 89
4.2 Dataset for No of Nodes Vs Saved Re Broadcast 100
4.3 Dataset for Speed Vs Reach ability 100
4.4 Dataset for Nodes Vs Density 100
4.5 Nodes Vs Pause-time 101
4.6 Nodes and SRB with Total Vector Cost 102
4.7 Nodes Speed and Reach ability with Total Vector Cost 103
4.8 Nodes and Density with Total Vector Cost 103
4.9 Nodes and Reach ability with Total Vector Cost 104
5.1 Data set of resources allotted to five paths 129
5.2 Fuzzified set of resources 129
5.3 Data set after the calculation of information gain 130
5.4 Decision table for rule extraction region 130
8.1 WRS Model - Data set of resources allotted to five paths 201
8.2 WRS Model - Fuzzified set of resources 201
8.3 WRS Model - Data set after the calculation of information gain 202
8.4 FLOODING - Data set of resources allotted to five paths 205
8.5 FLOODING - Fuzzified set of resources 205
8.6 FLOODING - Data set after the calculation of information gain 206
8.7 APBMAN - Data set of resources allotted to five paths 208
8.8 APBMAN -Fuzzified set of resources 209
8.9 Data set after the calculation of information gain 210