TABLE OF CONTENTS

Chapter No. | Title | Page No.
--- | --- | ---
LIST OF TABLES |  | xvi
LIST OF FIGURES |  | xvii
ACRONYMS |  | xviii

I INTRODUCTION |  | 2

1.1 Mobile Ad hoc Networks (MANET) | 3
1.1.1 Constraints and Challenges in Ad hoc Networks | 5
1.1.2 Applications of Mobile Ad hoc Networks | 7
1.1.3 Communications in MANETS | 9
1.1.4 Security issues in MANETS | 11
1.1.5 Key Management Requirements | 13
1.1.6 Existing Key Management Approaches | 16

1.2 Proposed Methodology | 20
1.2.1 Integration of OMCT with DSDV | 21
1.2.2 Enhancement of OMCT with DSDV | 22
1.2.3 Cluster Based Multicast Tree with MDSDV | 22
1.2.4 Adaptability of CBMT with Mobility aware MDSDV | 23
1.2.5 Efficient CBMT | 23

1.3 Performance Evaluation and Analysis of Results | 25
1.3.1 Performance Metrics | 25
1.3.2 Simulation Environment | 26
1.3.3 Analysis of Simulation Results 26
1.4 Objective of the Thesis 29
1.4.1 Organization of the Thesis 29
1.5 Chapter Summary 31

II RELATED WORKS 33

2.1 Key Management Approaches for MANET 33
2.1.1 Centralized Approaches 34
2.1.2 Distributed Key Agreement Approaches 39
2.1.3 Decentralized Approaches 41
2.1.4 Discussions 43

2.2 Routing Protocols for MANET 44
2.2.1 Broad Classification of Routing Algorithms 45
2.2.2 Well Known Routing Algorithms 47
2.2.3 Comparison of Routing Protocols 54
2.2.4 Previous Enhancement on DSDV 56

2.3 Mobility models for MANET 59
2.3.1 Mobility Models 61

2.4 Chapter Summary 66

III PROPOSED METHODOLOGY 68

3.1 Multicast Cluster Formation 68

3.2 Multicast Key Distribution 69
3.2.1 Existing Multicast Key Distribution Approaches 72
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3</td>
<td>Enhancement of OMCT with Energy Efficient DSDV</td>
<td>98</td>
</tr>
<tr>
<td>5.3.1</td>
<td>DSDV on Energy Efficiency</td>
<td>98</td>
</tr>
<tr>
<td>5.4</td>
<td>Performance evaluation</td>
<td>99</td>
</tr>
<tr>
<td>5.5</td>
<td>Simulation Results</td>
<td>100</td>
</tr>
<tr>
<td>5.5.1</td>
<td>Analysis of Simulation Results</td>
<td>102</td>
</tr>
<tr>
<td>5.6</td>
<td>Chapter Summary</td>
<td>105</td>
</tr>
<tr>
<td>VI</td>
<td>CLUSTER BASED MULTICAST TREE WITH MDSDV</td>
<td>108</td>
</tr>
<tr>
<td>6.1</td>
<td>Multicast Version of DSDV</td>
<td>108</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Multicast DSDV Algorithm</td>
<td>109</td>
</tr>
<tr>
<td>6.2</td>
<td>Cluster based Multicast Tree with MDSDV</td>
<td>110</td>
</tr>
<tr>
<td>6.2.1</td>
<td>CBMT Algorithm</td>
<td>112</td>
</tr>
<tr>
<td>6.3</td>
<td>Performance evaluation</td>
<td>114</td>
</tr>
<tr>
<td>6.4</td>
<td>Simulation Results</td>
<td>114</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Analysis and Discussion</td>
<td>116</td>
</tr>
<tr>
<td>6.5</td>
<td>Chapter Summary</td>
<td>120</td>
</tr>
<tr>
<td>VII</td>
<td>ADAPTABILITY OF CBMT WITH MOBILITY AWARE MDSDV</td>
<td>124</td>
</tr>
<tr>
<td>7.1</td>
<td>Mobility Aware Multicast DSDV</td>
<td>125</td>
</tr>
<tr>
<td>7.1.1</td>
<td>Algorithm of Mobility Aware MDSDV</td>
<td>126</td>
</tr>
<tr>
<td>7.2</td>
<td>CBMT with Mobility Aware MDSDV</td>
<td>128</td>
</tr>
<tr>
<td>7.3</td>
<td>Performance Evaluation</td>
<td>128</td>
</tr>
<tr>
<td>7.4</td>
<td>Simulation Results</td>
<td>129</td>
</tr>
<tr>
<td>7.4.1</td>
<td>Scenario 1: Different Number of Nodes</td>
<td>129</td>
</tr>
</tbody>
</table>