DECLARATION

This is to certify that material embodied in the thesis titled “Design and Analysis of An Efficient Technique for Traffic Management in Mobile Ad hoc Networks” is based on my original research work. The thesis has not been submitted to any other University or Institute for the award of any other degree or diploma. My indebtedness to others work has been duly acknowledged at relevant places.

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Vikas Siwach
ABSTRACT

MANETs are an innovative epitome of infrastructure-less, wireless communication for highly mobile users without usage of any such pre-existing infrastructure of communication. These networks can be formed as well as de-formed wherever and anywhere “on the fly” in the absenteeism of any sort of central administration unlike routers in wireline networks. These are composite, distributed, momentary, transitory, co-operative, possibly multi-hop, wireless, networks made up of a collection of dynamically self-organizing, self-creating, self-configuring, self-adaptive, self-administering, indiscriminately as well as arbitrarily located wireless transmitting and relaying nodes, which can possibly be bandwidth-constraint as well as resource (battery power)-constrained. In circumstances, where mobile telephony is either impossible or difficult to initiate, perhaps MANETs can be of great help whereby dependency on a costly infrastructure can be heavily reduced as equated to current situation in telecommunication wired as well as wireless networks. However, MANETs suffers from various shortcomings in comparison to wireline networks. Wireless networks is a “sea” of channels, with the objective to deliver required performance in most proficient manner, it becomes imperative for ‘Traffic Managers’ to administer Quality of Service (QoS) routes via regulating congestion by installing efficient routing mechanisms as well as congestion control mechanisms.

Here, varied Unicast as well as Multicast Routing protocol of MANETs were discussed, along with their Comparative Analysis for varied Simulation Metrics using Qualnet as Simulator is carried out. However, it is also established from simulation results of varied routing protocols that all of them exhibit different results under uniform MANET’s traffic environment, scenario and application environment. In MANETs, traffic management is one of the vital issues which are affected by routing to a great extent. So, there are various shortcomings in different routing protocols and it is difficult to choose routing protocol for different situations as there is trade-off between various protocols. Therefore, there is a necessity, inevitability and possibility of scheming efficacious Routing Protocols for MANET’S by transforming existing ones or developing newer ones according to necessities.

Here, numerous Routing Optimization Techniques as well as our Proposed Algorithm is extensively discussed along with its flowchart as well as its simulation environment in
MATLAB thereby realizing results and their analysis with varied count of nodes by comparing various parameters with BFOA as well as without BFOA for various performance metrics and finally conclusion is reached. Consequently, we can say that our Proposed Algorithm supported network is more efficient than preceding work.

Here, Congestion Control is extensively discussed along with Congestion collapse in wireless multi-hop networks, existing techniques for comparison with Proposed Technique named as Modified Adaptive Dynamic Congestion Control Technique (MAD-AODV) on simulation environment in Network Simulator (ns-2) thereby realizing results as well as their analysis for various performance metrics thereby finally conclusion is reached that our proposed method performs better than others on most of the performance metrics.

Here, Performance of varied TCP Variants in MANETs is extensively discussed along with impact of several factors on Variants of TCP as well as our Proposed Modified TCP Vegas using Network Simulator (ns-2.35 version) thereby realizing results and their analysis on the basis of mobility of nodes as well as Count (number) of nodes in the network for various performance metrics thereby finally conclusion is reached. After analyzing performance from simulated data and graphs, we found that Proposed Modified TCP Vegas is better than any other TCP variants for sending data and information due to better features embedded in it.

Here, various Quality of Service (QoS) centred Routing Protocols for MANETs is extensively discussed as well as our Proposed QoS Routing Protocol-Adaptive Hybrid QoS Routing Protocol (AH-AODV) for Estimation as well as selection of QoS Route contingent on various parameters using Network Simulator (ns-2.29 version) thereby realizing results and their analysis on various performance metrics, thereby finally conclusion is reached.

Here, Efficient Traffic Management is extensively discussed along with existing and proposed one using MATLAB as Simulator thereby realizing results and their analysis on the basis of Count (number) of nodes in the network for various performance metrics, thereby finally conclusion is reached.

So, Traffic classification system is a major technique for community as well as method protection within elaborate surroundings. To gain robust network traffic classification, a newer scheme is endorsed here to sort out main issues of unidentified purposes within the decisive effort of a minor ‘supervised training set’.
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# LIST OF ABBERIVATION

1. DSR  Dynamic Source Routing  
2. MANET  Mobile Ad-hoc Network  
3. UML  Unified Module Language  
4. TCL  Tool Command Language  
5. NS  Network Simulator  
6. ACK  Acknowledgment  
7. MAC  Media Access Control  
8. WLAN  Wireless Local Area Network  
9. RREQ  Request Reply  
10. RREP  Request Packet  
11. DSDV  Dynamic Destination Sequenced Distance Vector Routing Protocol  
12. WRP  Wireless Routing Protocol  
13. GSR  Global State Routing  
14. AODV  Ad hoc On-Demand Distance Vector Routing  
15. MANETs  Mobile Ad-hoc Networks  
16. LAN  Local Area Network  
17. GPS  Global Positioning System  
18. ISPs  Internet Service Providers  
19. BSC  Base Service Station  
20. MSC  Mobile Switching Center  
21. AP’s  Access Points  
22. RF  Radio Frequency  
23. ISM Band  Industrial Scientific and Medical Band  
24. BW  Band Width  
25. SANET  Static Ad-Hoc Networks  
26. PRNET  Packet Radio Networks  
27. ALOHA  Arial Locations of Hazardous Atmospheres  
28. CSMA  Carrier Sense Multiple Access  
29. SURAN  Survivable Adaptive Radio Networks
30. IETF  Internet Engineering Task Force
31. GloMo  Global Mobile Information Systems
32. NTDR  Near-term Digital Radio
33. VANETs  Vehicular Ad-Hoc Networks
34. In-VANET’s  Intelligent Vehicular Ad-Hoc Networks
35. I-MANETs  Internet Based MANETs
36. MAC  Media Access Control
37. ODMRP  On-Demand Multicast Routing Protocol
38. DVMRP  Distance Vector Multicast Routing Protocol
39. PIM  Protocol Independent Multicast
40. MOSPF  Multicast Open Shortest Path First
41. RREQ  Route Request
42. RREP  Route Reply
43. IP  Internet Protocol
44. WSN  Wireless Sensor Network
45. PAN  Personal Area Network
46. FCC  Federal Communication Commission
47. RTT  Round Trip Time
48. BER  Bit Error Rate
49. RTO  Retransmission Time Out
50. TCP  Transmission Control Protocol
51. DoS  Denial of Service
52. QoS  Quality of Service
53. RPC  Remote Procedure Call
54. GC  Group Controller
55. TXI  Transaction Identifier
56. TDM  Time Division Multiplexing
57. ATM  Asynchronous Transfer Mode
58. 3GPP  Third Generation Partnership Project
59. HSDPA  High-Speed Shared Downlink Packet Access
60. DAC  Digital Analog Communication
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92. NTP  Network Time Protocol
93. CSMA  Carrier Sense Multiple Access
94. BB  Black-Burst
95. ELFN  Explicit Link Failure Notification
96. M-ADTCP  Modified AD-hoc Transmission Control Protocol
97. AOMDV  Ad-hoc On-Demand Multipath Distance Vector Routing Protocol
98. CA-AOMDV  Channel Aware AOMDV
99. HTTP  Hyper Text Transfer Protocol
100. OPNET  Operations Network
101. CBFO  Cooperative Bacterial Foraging Optimization
102. GA  Genetic Algorithm
103. BCOA  Bacterial Foraging Optimization Algorithm
104. SAI  Swarm Artificial Intelligence
105. MLP  Multi-Layer Perceptron
106. GMM  Gaussian Mixture Model
107. SVM  Support Vector Machine
108. P2P  Peer-to-Peer
109. LDA  Linear Discriminate Evaluation
110. NN  Nearest Neighbor
111. SML  Supervised Machine Learning
112. DPI  Deep Packet Inspection
113. TTL  Time to Live
114. LASER  LCS based Application Signature Extraction technique
115. DYMO  Dynamic MANET On-Demand
116. NHPD  Neighborhood Discovery Protocol
117. OLSR  Optimized Link State Routing Protocol
118. ACOR  Admission Control Enabled On-demand Routing
119. AMRRoute  Ad-hoc Multicast Routing
120. AMRIS  Ad-hoc Multicast Routing Protocol Utilizing Increasing-idNumbers
121. BR  Branch Reconstruction
122. CAMP  Core-Assisted Mesh Protocol

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123. BER  Bit Error Rate
124. SNR  Signal-to-Noise Ratio
125. FSR  Fisheye State Routing
126. ZRP  Zone Routing Protocol
127. RPs  Routing Protocols
128. MPRs  Multipoint Relays
129. IARP  Intra-zone Routing Protocol
130. IERP  Inter-zone Routing Protocol
131. HSR  Hierarchical State Routing
132. TBRPF  Topology Based Reverse Path Forwarding
133. DREAM  Distance Routing Effect Algorithm for Mobility
134. STAR  Source Tree Adaptive Routing Protocol
135. GUI  Graphical User Interface
136. CBR  Constant Bit Rate
137. IGMP  Internet Group Management Protocol
138. LSA  Link State Advertisement
139. AS  Autonomous system
140. RIP  Routing Information Protocol
141. TRPB  Truncated Reverse Path Broadcasting
142. RPF  Reverse Path Forwarding
143. NLT  Neighbor Liveness Timer
144. MCBR  Multicast Constant Bit Rate
145. FTP  File Transfer Protocol
146. UDP  User Datagram Protocol
147. ES  Evolutionary Strategies
148. EP  Evolutionary Programming
149. MATLAB  Matrix Laboratory
150. MADC-AODV  Modified Adaptive Dynamic AODV
151. LSD  Link Stability Degree
152. CFR  Congestion Free Route
153. FIFO  First In First Out
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