Performance Analysis of AODV and FBNTTAODV in Various Mobility Models under different Terrain Regions

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***Abstract*— Mobile nodes in ad hoc networks move arbitrarily changing their network location and thus establishes dynamic topology. Routing is an important challenging issue in ad hoc networks. In this paper, the performance of the routing protocols AODV and FBNTTAODV are analyzed under different square terrain regions in Random waypoint and Manhattan mobility models using Network simulator version 2.34.**

Keywords- MANETs, RoutingProtocols, AODV, FBNTTAODV, Mobility Models, Perfromance Metrics

1. INTRODUCTION

Mobile Ad-hoc network [1][2][3][4] consists of mobile hosts connected in an arbitrary manner by wireless links. Mobile nodes in an ad hoc network wander around and establishes dynamic topology. The mobility models [5][6][7] describes the behavior of the mobile nodes. All nodes in the network acts as routers and forward packets to other mobile nodes. One of the challenging issue[8] in MANETs is routing. The routing protocols [9][10][11][12] are developing to find a route for minimizing the time required to send packets and to improve the performance metrics. The rest of the paper is organized as follows: Reactive routing protocol "AODV" is illustrated in section 2, FBNTTAODV is summarized in section 3, simulation environment is presented in section 4, results is presented in section 5 and finally concluded with section 6.

2. AD-HOC ON DEMAND DISTANCE VECTOR ROUTING PROTOCOL(AODV)

Reactive routing techniques can be called as *on-demand* routing techniques because routes are discovered when they are needed. The willing node called source node initiates a route discovery method to find a fresh route for sending data packets through Route Request(RREQ) messages . Route Reply(RREP) messages are generated from the destination to acknowledge the source. Data Packets travels over the established routes. The link failures are common in AODV[13][14] and is indicated through Route Error (RERR) messages.

3. FUZZY BASED NODE TRAVERSAL TIME AODV (FBNTTAODV)

The timeliness affects the route changes and it should be determined relatively with the network size. The Node Travel Time is a constant value for any network size in AODV, whereas the Fuzzy Based Node Traversal Time AODV (FBNTTAODV) [15] indicates that the Node Traversal Time must be a dynamic value with the Network size .

4. SIMULATION ENVIRONMENT

Network simulation softwares namely NS2[16] , Glomosim[17] and Qualnet[18] etc., are available to conduct experiments in ad hoc networks. N*etwork simulator* version 2.34 is used in this simulation process. The simulation parameters used in the experiment1 and experiment2 to evaluate performance [19][120][21][22][23][24] are elaborated in the tables 1 and 2 respectively. The simulation process is shown in the figure 1.

A. Experiment 1

The performance of the two routing protocols AODV and FBNTTAODV in Random WayPoint Mobility Model with the terrain dimensions prescribed in table 1 is analyzed.

B. Experiment 2

The performance of the two routing protocols AODV and FBNTTAODV in Manhattan Mobility Model with the terrain dimensions prescribed in table 2 is analyzed.

Table 1: Scenario Parameters in Random Waypoint mobility model

Routing Protocols	AODV,FBNTTAODV
Simulation Time	360s
Area (sq.m)	920x920,1020x1020,1120x1120,1220x1220
Propagation Model	Two Ray
Traffic	CBR
Packet Size	512 bytes
Nodes	30
Antenna Type	Omni directional
Transmission range	250m
Receiver range	250m
Pause time	1 sec
Minimum speed	1 m/s
Maximum speed	5 m/s
Mobility	RandomWaypoint

Table 2: Scenario Parameters in Manhattan mobility model

Routing Protocols	AODV,FBNTTAODV
Simulation Time	360s
Area (sq.m)	920x920,1020x1020,1120x1120,1220x1220
Propagation Model	Two Ray
Traffic	CBR
Packet Size	512 bytes
Nodes	30
Antenna Type	Omni directional
Transmission range	250m
Receiver range	250m
Pause time	0 sec
Minimum speed	1 m/s
Maximum speed	3 m/s
Xblocks	5
Yblocks	5
turnProb	0.5
pauseProb	0.5
speedStdDev	0.2
MobilityModel	ManhattanGrid

5. RESULTS

The performance metrics namely Average end-end delay , Average Throughput and Packet delivery ratio are considered to analyze AODV and FBNTTAODV .

Average End-to-End delay denotes the packets travelling time from the source to the application layer of the destination. Average End-to-End delay for Random waypoint model and Manhattan Grid model is given in the figure 2 and figure 5 respectively.

Average Throughput indicates the total amount of data received by the receiver during the simulation period. Average throughput for Random waypoint model and Manhattan Grid model is given in the figure 3 and figure 6 respectively.

Packet Delivery Ratio denotes the ratio of the number of data packets delivered to the destination to the number of data packets sent. Packet Delivery ratio for Random waypoint model and Manhattan Grid model is given in the figure 4 and figure 7 respectively.

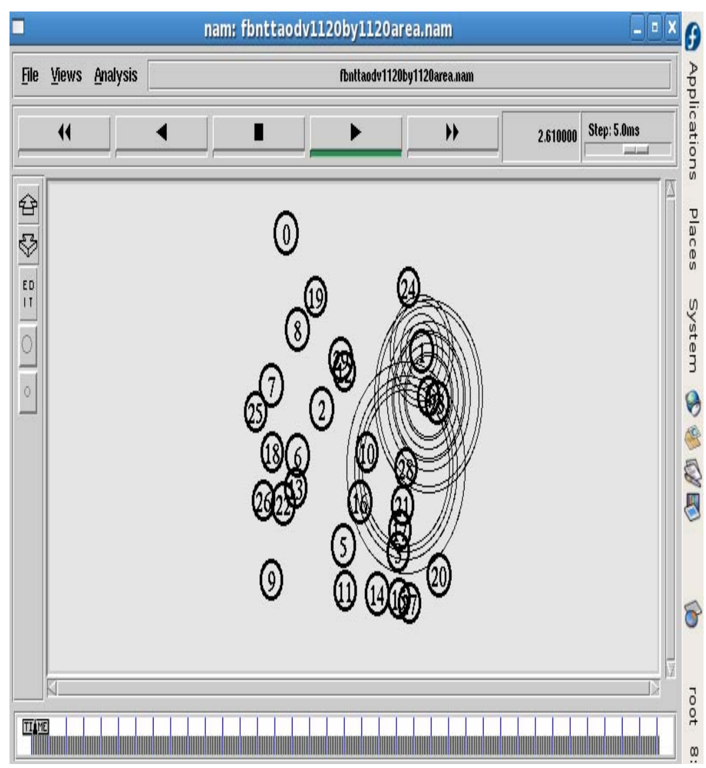

Figure 1. Simulation process

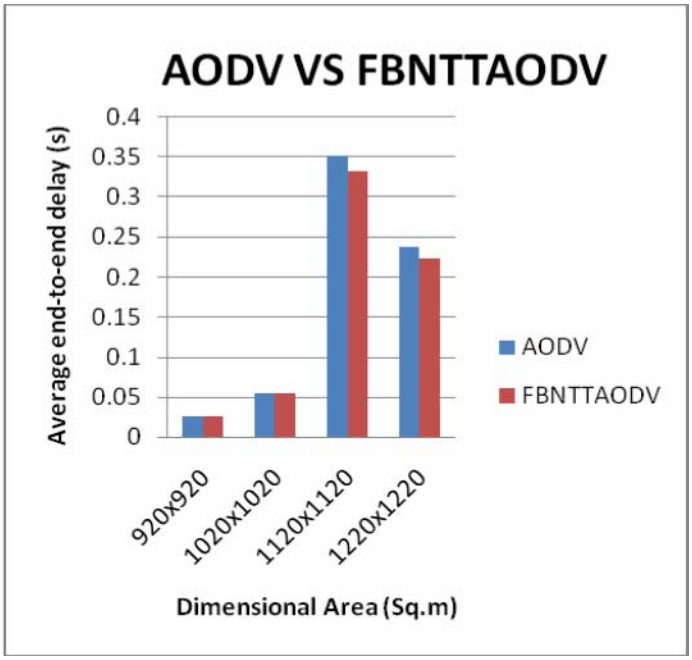

Figure 2. Average End-to-End delay for AODV and FBNTTAODV in Random Waypoint Mobility model

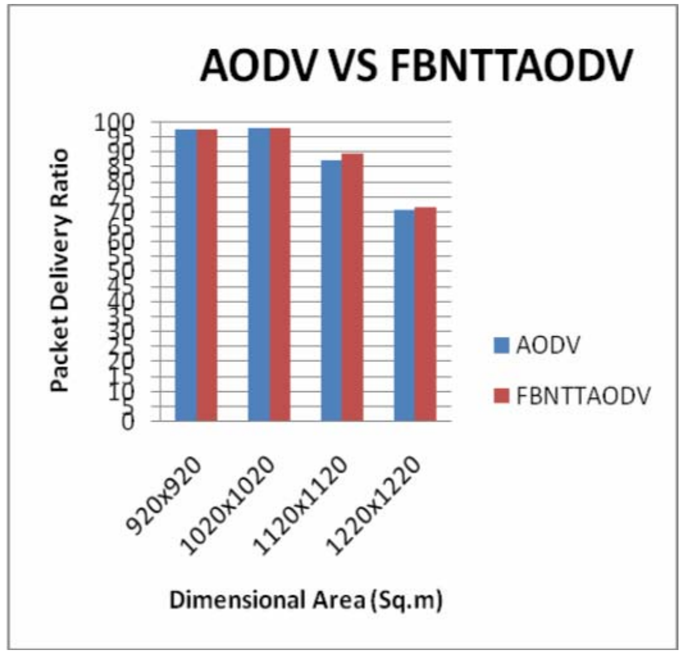

Figure 4. Packet Delivery ratio for AODV and FBNTTAODV in Random Waypoint Mobility model

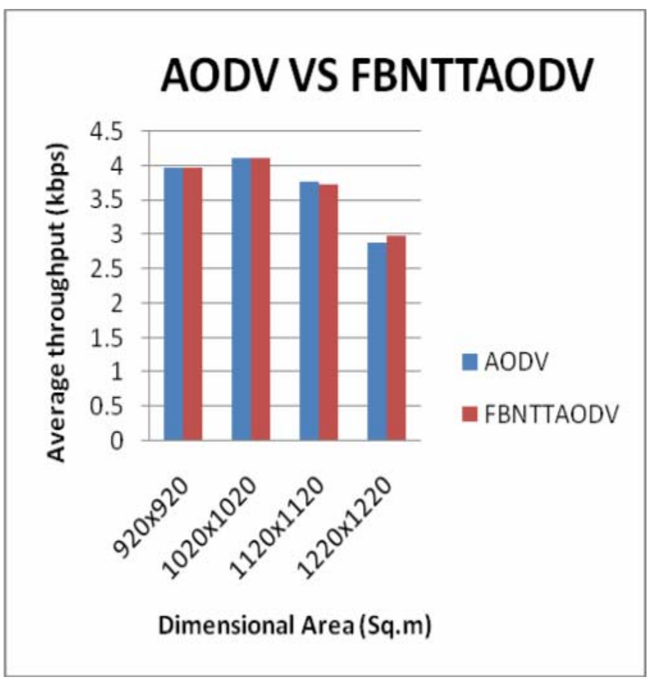

Figure 3. Average throughput for AODV and FBNTTAODV in Random Waypoint Mobility model

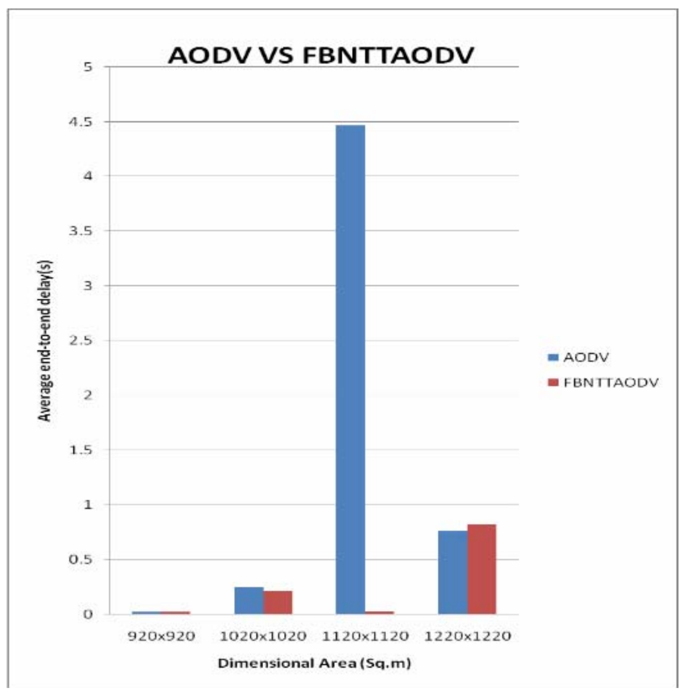

Figure 5. Average End-to-End delay for AODV and FBNTTAODV in Manhattan Mobility model

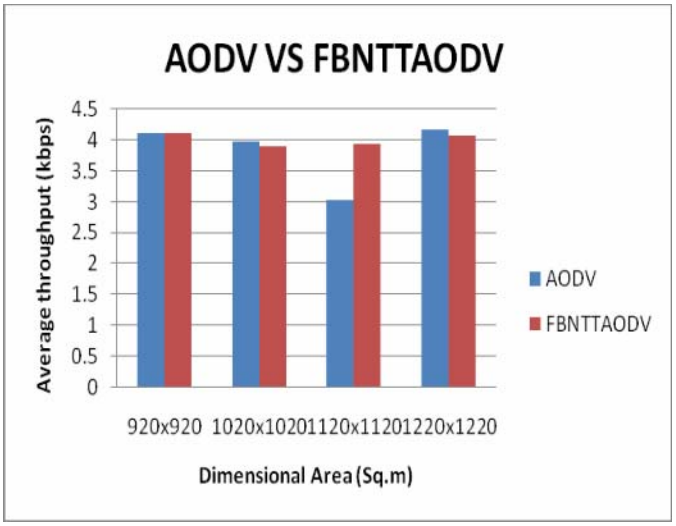

Figure 6. Average throughput for AODV and FBNTTAODV in Manhattan Mobility model

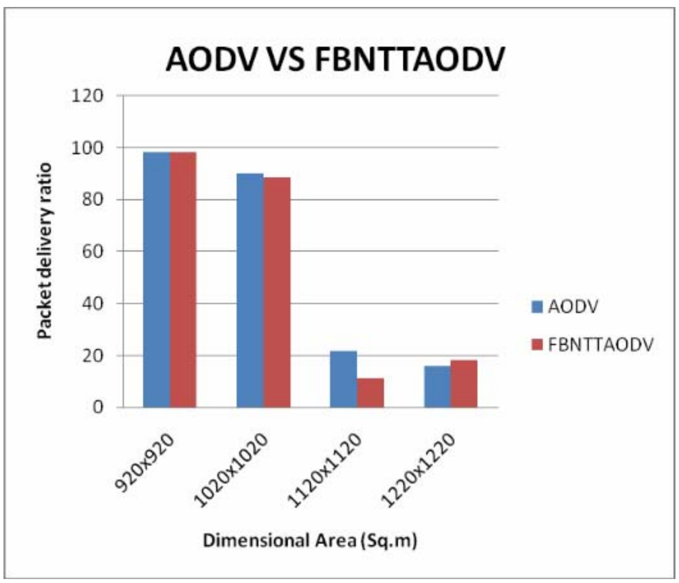

Figure 7. Packet Delivery ratio for AODV and FBNTTAODV in Manhattan Mobility model

6. CONCLUSION

From the simulation results, it was observed that FBNTTAODV performs better than AODV for the given square terrain in the above QOS metrics. FBNTTAODV performs well in Random waypoint mobility model comparative to the Manhattan mobility model. The FBBTTAODV can further be studied in different placement models.

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