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Quality of Service in Mobile Ad Hoc Networks using Bandwidth Estimation Method in AODV and AOMDV

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Abstract: Bandwidth Estimation is an important issue in MANETs, because the path of the nodes in the network can change dynamically. Due to predefined infrastructure and bandwidth constraint the Quality of Service (QOS) is challenging assignment in Mobile Ad hoc network. In this paper we propose bandwidth estimation mechanisms using AODV and AOMDV protocol. The performance shows that increase packet delivery ratio and throughput and also reduce end - to - end delay.

Keywords : Mobile ad hoc network, Quality of service, bandwidth estimation, AODV, AOMDV protocol, delay, throughput

I. INTRODUCTION

A mobile ad hoc network is a type of wireless network. It is a collection of mobile nodes or terminals can communicate one another without any help of the centralized administrator. MANETs does not have any predefined infrastructure because the nodes of the mobile network is dynamically changing that do not rely on the same network. The mobile nodes in the network can have a limited power and limited transmission range. Band width is the main resource in the network, so estimating the bandwidth is improves the performance of the quality of service. MANETs are used in disaster recovery and communication in battle field.

The Quality of service (QOS) means the network should provide a guarantee about the level of service provide to an application. The QOS referred as resource reservation control mechanism to achieve the service quality. QOS parameters based on the requirements of the application. A group of service requirement is met by the network during transmission of packets from source to destination. Quality of service metrics defined in terms of set of parameter.

In Mobile ad hoc network to provide a quality of service bandwidth estimation is an important one. Bandwidth estimation is a way to identify the data rate in the network path

II. LITERATURE SURVEY

Nyambo et.al [1] proposed QOS in MANET prepared with dual bandwidth estimation. In this paper proposed two bandwidth estimation techniques that is listening and hello method. The faults of each of the two methods solve by the other to create a robust and reliable methods.Deepak et.al[2] find a feasible route from source to destination using approximate bandwidth estimation .In this scheme not in view of current network traffic or application requirements. This QOS aware routing use approximate bandwidth estimation reply to network traffic.

In [3] Ge and Li proposed a service differentiation supported bandwidth estimation model. In existing QOS protocol discover the route and reduce overhead but this proposed method support interference of neighbor nodes and flow type. To achieve QoS performance the available bandwidth estimation used in extended AODV protocol .

In [4] Chen and Heinzelman proposed a QoS-aware routing protocol, to incorporate an admission control scheme and feedback scheme for the real time application to met QOS requirements. The Novel part of QoS aware routing protocol used for approximate bandwidth estimation. The proposed scheme used to find the residual bandwidth of each node based on the bandwidth estimation methods.

In [5] Kute and Kharat study the performance of AOMDV in QOS .In route failure probability increase mobility and route overhead .in MANET. To achieve high data packet generation and reduce route overhead in AOMDV due to multi path extension. Erbas et. al [6] proposed a novel reliable position-based network layer solution for quality of service (QoS) routing in mobile ad-hoc networks. The proposed results show architecture affords stable behavior.

In [7], the performance analysis of low bandwidth and power limitation of the nodes this paper QoS parameters are hop count , transmitted and residual energy ,bandwidth and throughput .This paper analysis low bandwidth and power limitations of nodes. In [8] estimation of bandwidth in IEEE 802.11 based networks, in this paper compare the estimation with class of service protocols and CoS AODV.

In [9] Vidhate et.al proposed approximate bandwidth estimation technique to improve the QOS aware routing to detect the network trtaffic. In [10] to estimate node to node available bandwidth with the help of neighborpsilas bandwidth in routing table.

Amamra and Hou [13] analysed two probhing techniques such as TOPP and SLoPS to estimate accuracy of available bandwidth.

III. AODV AND AOMDV PROTOCOL

A. About Aodv And Aomdv:

AOMDV is a extension version of AODV, the extension are multiple loop-free and link disjoint paths. The main

objective of AOMDV to maintain multiple loop free paths and to find link disjoint paths in each node in the MANET.

In AODV protocol, when a source node requests a route to a destination, first initiate route discovery process by torrent RREQ for destination all over the network.

AOMDV is based on distance vector and hop-by-hop routing techniques. To find route based on demand using a route discovery process. In each route discovery process to find number of routes.

In AODV route discovery process when a source node requests a route to a destination, to initiate torrent RREQ for destination all over the network Each RREQ contain unique identifier that is the sequence number, used to identify duplicate RREQ. If duplicate RREQ is found to discard the RREQ. RREQ receive by the intermediate nodes it check whether the route valid and fresh to update the route entry in the destination routing table. The destination node sends RREP to the source.

In [11] AOMDV all duplicate copies of RREQ inspected possible alternate reverse paths, reverse paths are shaped using the copies of the preserve loop freedom and disjointness among the set of paths to the source. Intermediate node find a reverse path through RREQ copy, it verify whether present one or many suitable path to the destination. The node produce a RREP and sends back to the source with the reverse path. The RREP contain a forward path that was not used any prior RREP for route discovery. The intermediate node does not broadcast the RREQ additional. If not, the node re broadcast the RREQ copy, it has not previously forwarded any other RREQ and this is used for the formation of reverse path.

Route maintenance in AOMDV, the last path break, the node generates the RERR for a destination. AOMDV includes recover packets forwarded over failed links by re forwarding with alternate paths. By setting very small timeout values to avoid stale paths. We use a reasonable timeout values and use hello messages to remove old routes. Timeout in the current version of AOMDV primarily serve as a soft state technique with unexpected events like routing table corruption and to smaller amount for punctually removal of old routes.

B. Bandwidth Estimation:

The bandwidth estimation is an essential function that is necessary to provide QOS in mobile ad hoc network. It is an approach to determine the data rate available on a network path. Bandwidth estimation is based on link capacity of the path. In AOMDV, first we select the minimum hop count path and calculate the capacity of the path depends on link time.

The [14] available bandwidth defined to transfer maximum throughput between two neighbor nodes without affecting the flows in the network.

There are two types of available bandwidth estimation techniques, First type, Intrusive technique based on end-to-end search packet to calculate bandwidth along a path. Second type, Passive technique based on local information on the used bandwidth.

The mostly accepted definition of path capacity proposed by Prasad et.al.

$$C_{path} = \min_{i=1\ldots h} C_i$$

Here Ci represents link capacity of the path and C_{path} represents total link capacity of the path. The available bandwidth of the link for the i^{th} hop in the time interval (t–τ), t

$$ABW_{hop} = (1 - IU) \times C_{path} ,$$

$$IU = \frac{1}{\tau} \int_{t=\tau}^{t} IU(x)\, dx$$

Where IU (x) is the immediate utilization of the i^{th} link at the time x. The available bandwidth of the path at the same interval

$$ABWpath = \max \sum_{i=1}^{h} ABWhop$$

C. Steps for Selecting the Path in AODV and AOMDV :

Step 1 : In AODV it is a on demand protocol it select their path using route discovery process .It maintain a unipath, if need a new path it again broadcast RREQ packet.

Step 2 : In AOMDV it is also anon demand protocol ,it maintain multiple path

Step 3 : To Calculate Average Available Bandwidth (ABW_{path})

If ABW_{path} = highest, AOMDV to select that path Otherwise select the next higher path In AODV select the discovered unipath

IV. PERFORMANCE EVALUATION

In this paper we estimate the available bandwidth in AOMDV and AODV to apply load balancing approach. AOMDV and AODV select a path based on lower hop count and higher available bandwidth.

A. Simulation Environment:

Table 1 Simulation Setup

Parameter	*Value*
Transmission Range	250m
Topology size	800m x 800m
No. of nodes	25
No. of destination	1
Traffic type	CBR
Packet size	512 byte
MAC layer	802.11
Bandwidth	2 Mbps
Node placement	Uniform
Simulation Time	5 minutes
Routing Protocol	AODV, AOMDV

Under this simulation environment we evaluate 2 metrics.

B. Average End-to – End Delay :

During transmission of each data packet the delay occurred. AOMDV detect the average end-to-end delay because of where there is route failure occurs it select the alternate path, it reduces the route discovery latency and delay. In AODV route discovery latency and delay are increased because of the unipath. The average delay

includes route discovery time, queuing delay, transmission delay and propagation delay.

C. Average Throughput:

It is defined as the total packet received to the specified simulation time

$$PDR = \frac{NPR}{NPS}$$

$$AT = \frac{PDR}{ST}$$

Where PDR – Packet Delivery Ratio, NPR - Number of Packets Received ,NPS - Number of Packets Sent, AT- Average Throughput , ST- Simulation Time.

Normally AOMDV achieve low throughput than AODV, In our proposed method it achieve better throughput because of we select the low hop count and high available bandwidth path.

D. Simulation Results:

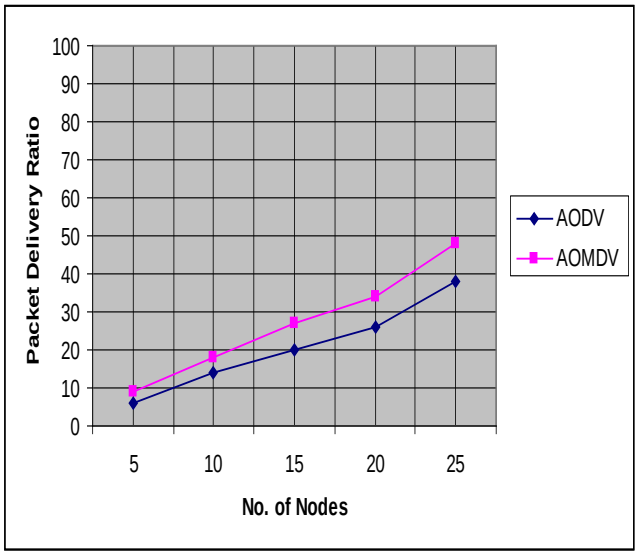

Figure 1 No.of Node Vs Packet Delivery Ratio (%)

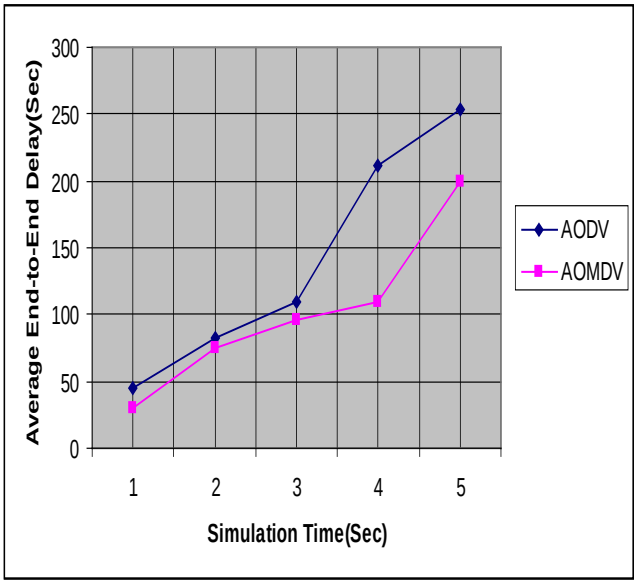

Figure 2 Simulation Time Vs Average End-to-End Delay

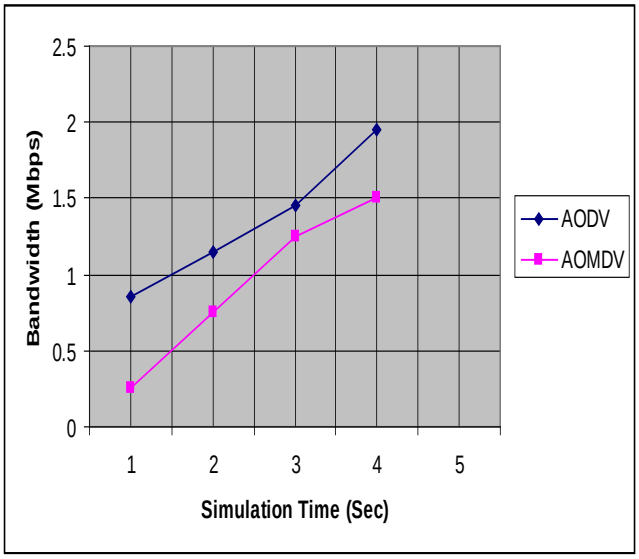

Figure 3 Simulation time Vs Bandwidth

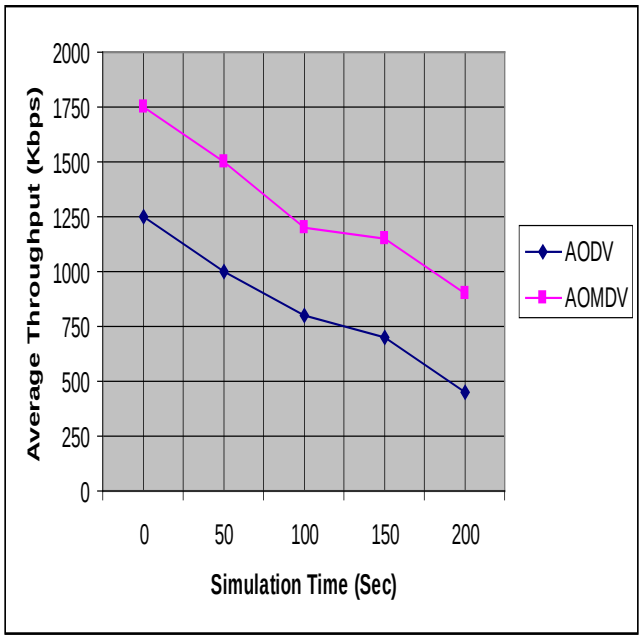

Figure 4 Simulation Time Vs Average Throughput

V. CONCLUSION

In this paper evaluate the performance of AODV and AOMDV based on hop count and available bandwidth .The suggested result AOMDV compare the AODV it reduce the average delay and achieve the better throughput. It also reduces the routing load of the network.

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