Effect of Change in Packet Size with Different Pause Time in Wireless Ad-hoc Networks

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Abstract—A Mobile Ad-hoc networks is an autonomous which is formed without any centralized infrastructure where node move arbitrarily in the dynamically change in topology. A node establishes a temporary connection where nodes can join or leave the networks at any time. These networks have quite a many constrains because of uncertainty of radio interface and its limitations. In recent years a variety of new routing protocols has been implemented to compare for their performance. In this performance of the networks has been analyzed for the different packet size with varying pause time in terms of metrics: Throughput, Average end to end delay, Average jitter for AODV & DSR Routing Protocols.

Keywords: MANET, AODV, DSR, CBR, Random Way Point Mobility Model, and Pause time Packet Size, Qualnet 6.1

1. INTRODUCTION

Infrastructure less is a networking which mobile nodes communicate with each other through wireless link. These networks are called Ad-hoc networks[6]. MANET comprises of many property which makes it more unique to work with. Self configuring and dynamically change in topology are the highlights of MANETs. MANET is a wireless network consists of many independent nodes that communicate under the appropriate frequency [1]. In the MANET, Access point is not required for communication the nodes can directly communicate through intermediate node by sending “HELLO” message and forming appropriate route to the destination under radio range. The dynamic change in topology [2] makes routing challenging task as the existing path is rendered inefficient and unsafe. An ad hoc network provides a cost effective means of communication among many mobile hosts. Applications of an ad hoc network include battlefield communications where soldier need to decide for a defend or offend, riot control and law enforcement where only law enforcing personnel need to communicate while others are not allowed to do so to prevent spreading of rumors, emergency rescue missions and disaster recovery where the communication infrastructure is abolished. Some of the restriction in the wireless network are packet delay, packet loss due to transmission error limited communication bandwidth, variable capacity links frequent disconnections dynamic change in topology and routing[8]. Further, people may communicate forming an ad hoc network in convention centers and online conferences and classrooms without routing their calls to the available infrastructure. Thus, an ad hoc network may provide a cost-effective and cheaper way to share information among many mobile hosts.

Figure 1: Mobile Ad-hoc networks

2. ROUTING IN MANET

To enable direct communication within MANET, Routing Protocol plays an important role while forwarding packets within the source node and targeted nodes. The node can only forward the data packets to the other nodes when the nodes within the transmission range. Multiple networks hops may be needed to enable data communication between two nodes in the networks. Due to MANETS property of decentralization all the mobile nodes. Operates not only as a host but also as a router. This forwarding of packets in the mobile nodes is thing routing protocols. There are mainly routing protocols and they work accordingly with their own properties.

A. Ad-hoc on demand vector routing (AODV)

Ad-hoc on demand distance vector enables multihop routing between the mobile nodes which establish and appropriate route is Ad-hoc network [2]. This routing protocol is based on transmitting route request (RREQ) & Route Reply (RREP). AODV routing protocols property of both protocols i.e.(DSDV) & DSR from DSDV. It uses destination sequence no. which corresponds to destined nodes which was requested by routing sender node and from DSR, it uses route discovery procedure. This route discovery begins when one node wants to communicate to other node [7]. When a source node requires a appropriate route to a destination it broadcast route request (RREQ) packet
through the network [4]. RREQ contains hop count, source and destination address. This routing protocol can be scaled to a large number of mobile nodes and it is a loop free routing protocol [1]. AODV is using table driven which means each node has only one hop routing information. AODV also provide quick deletion of invalid routes breakages. An important feature of AODV is that it uses a destination sequence number which corresponds by a routing sender node [4].

B. Dynamic source routing (DSR)

Dynamic Source Routing protocol is a pure reactive routing protocol which is based on the source routing. Source routing is the routing techniques in which the sender of packet determines the complete sequence of nodes through which the packet has to pass i.e. the sender (initiator) determine the whole path from the source to destination node. DSR is based on the link state routing algorithm which means that each node is capable to save the best way to a destination. The DSR protocol is consist two main mechanisms that work together to allow discovery and maintenance of source route in MANET.

Route Discovery- when a source node 5 wishes to send a packet to the destination node 12, this is called route discovery. Route discovery is used only when node 5 attempts to send a packet to node 12 and has no information of a route to node 12 [2].

Route Maintenance- when there is a change in the, the existing route can no longer be used. In such a scenario the source node 5 can use an alternative route to the destination node 12, if it is knows one, or invoke Route Discovery. This is called Route maintenance [2].

Random way point (RWP) mobility model

In random way point mobility model, all the nodes are randomly select different locations as their destinations within the simulation area. With the start of simulation the nodes start moving towards the selected destinations from their existing locations with selected randomly uniform velocities from the uniformly distributed array \([0, V_{\text{max}}]\) where \(V_{\text{max}}\) is the maximum allowable velocity for every mobile node. After reaching the destination, the node stops for a duration. This duration is defined by ‘pause time’ parameter. The pause time is selected from the array \([0, T_{\text{pause}}]\). The above process is repeated until the simulation time is over.

3. SIMULATION ENVIRONMENT

3.1 Simulation parameter

The evaluation of two reactive routing protocols is used with different packet size and different pause time. In this paper we have two different packet sizes with two different pause times. And we have used a Random way point mobility model.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulator</td>
<td>QualNet 6.1</td>
</tr>
<tr>
<td>Terrain Area (m*m)</td>
<td>1500*1500</td>
</tr>
<tr>
<td>Simulation time</td>
<td>150 sec</td>
</tr>
<tr>
<td>Routing Protocols</td>
<td>AODV, DSR</td>
</tr>
<tr>
<td>No. of nodes</td>
<td>50</td>
</tr>
<tr>
<td>Packet size(bytes)</td>
<td>256, 512</td>
</tr>
<tr>
<td>Pause time(s)</td>
<td>5,10,15,20,25</td>
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<tr>
<td>Traffic type</td>
<td>CBR</td>
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<tr>
<td>Mobility model</td>
<td>Random Way Point</td>
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<td>MAC layer</td>
<td>802.11b</td>
</tr>
<tr>
<td>Antenna</td>
<td>Omni-directional</td>
</tr>
</tbody>
</table>

4. METRICS PERFORMANCE

There are various performance metrics. MANET has no. of qualitative and quantitative metrics that can be used to compare Ad-hoc routing protocols. But in our simulation Throughput, Average End to End Delay, Average jitter were measured in AODV and DSR.

Average end to end delays - It is defined as the average time taken by data packet to go from source to destination across a MANET. It includes all possible delays caused by buffering during route discovery latency, queuing at the interface queue, retransmission delays at the MAC. This metrics is calculated by

\[
D = T_r - T_s
\]

Where, \(T_r = \) receive time, 
\(T_s = \) sent time

Throughput - The amount of data transferred between two different locations in a particular time period is known as Throughput.

Average jitter - Jitter is defined as the variation in packet transmits delay caused by Queuing, contention and serialization effect on the path through the network.

5. RESULT ANALYSIS

The Performance of AODV &DSR has been analyzed with varying pause time (5,10,15,20,25)s and different packet size (256,512) bytes.
Throughput - The result graph shown above shows throughput with respect to pause time from the graph the performance of DSR is better and more packets are received to destination in the DSR routing protocol rather than AODV and also as the packet size increases throughput increases to double.

Average jitter – The maximum variation in the time causing delay in the delivery of the packet is jitter the result graph shown above performance of AODV is best as the variation in time is less in the AODV for both packet size.

Average end to end delay - Delay in the average time when the packet are delivered from source to destination is average end to end delay. It is evident from the result the AODV performance is better than DSR minimum the delay is better the performance of the routing protocol and as the packet size increases the delay decreases.

6. CONCLUSION

From the result it is seen that the throughput for the different packet size is better for the DSR whereas the average jitter and average end to end delay is better for AODV. As the packet size increases the throughput increases and the average end to end delay decreases.

REFRENCE


