MOBILITY MODELS IN WIRELESS AD-HOC NETWORK: A SIMULATIVE STUDY

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Abstract - There are several research works that have studied the impact of mobility models based on the routing protocols in ad hoc networking. This paper presents, an important comparative studies were devoted to develop performance of mobility models correct for estimating the show of Wireless Ad Hoc Network. The routing protocols commonly used such as DSR for performance evaluation. The commonly used mobility models are Random Way Point (RWP), and Simple Human Mobility Model. Typical performance metrics used are Packet Delivery Ratio (PDR), end to end delay and throughput for mobility models. Almost all research works have used NS-2 as a simulation tool.

Keywords - ns2.35, Routing protocol, MANET, Mobility Models, BONNMOTION 2.0.

I. INTRODUCTION

A Wireless Ad hoc Network comprises of numerous versatile hubs which speak with each other without any settled framework and incorporated administration. Every versatile hub goes about as a recipient and a switch. Every hub has preparing capacity and constrained battery control. Remote Ad hoc Network is utilized as a part of a few applications some of which are: occasion gatherings, war zone correspondence between moving vehicles and warriors, crisis save operations amid common cataclysms, meetings, and so on [1-7]. The execution of the system is influenced by the battery control, transmission run, and the information movement display, the cradle space for the message stockpiling, the registering power and above all the versatility demonstrate utilized. It is basic that the versatility demonstrate chose for execution assessment genuinely mirrors the development of hubs in the Wireless Ad hoc Network. A given convention may perform well if the portability of the hub in a given situation is effectively displayed. Without reasonable versatility of the hubs the outcomes are not genuine illustrative of the execution of the system. For instance, in the military companies and crisis help benefits the versatile hubs working in combat zone/hazardous situations will be better spoken to by a gathering portability display as opposed to a substance versatility demonstrate. The reenactments are connected to concentrate the effect of the portability in Wireless Ad Hoc arrange [5-15]. The hub portability of Wireless Ad Hoc arranges sources the system topology to adjust with the occasion, and Wireless Ad Hoc organize exhibitions ought to be animatedly corrected to such alters. Along these lines, the systems administration and convention introduction of Wireless Ad Hoc organize have particularly affected by the rate of topology conforms. The execution of systems can change altogether with atypical versatility models [5, 6]. Moreover, by flimsy different parameters of a known portability show, Wireless Ad Hoc organize exhibitions are result by an endless region. The decision of a versatility model may require an infrastructure, activity demonstrate over the remote specially appointed system which critical and reason exhibitions. Organize test systems rose as the most broad strategy for assessing the execution of the substantial complex systems administration framework. Be that as it may, for framework concerning versatile hubs, the relationship of the hubs has a huge control on the reproduction comes about. These are gathered of a situate of versatile hubs known to speak with each other over a general remote channel [5,7,12]. The hubs of a Wireless Ad hoc Network are portable. The hubs continue moving with time. Accordingly, with some speed and quickening the position of a hub changes with time. Show that precisely imitates the versatility of the hub is along these lines very
attractive. At exactly that point the execution of a convention might be accurately assessed. In this way, the precise portrayal of the versatility by the models assumes a vital part in the execution assessment of the steering conventions. The attempt ought to be to locate a model which genuinely speaks to the development of the hubs. A model which is not a genuine illustrative of the development of the hubs will prompt to wrong outcomes from the examination utilizing a test system. There are two sorts of portability models: follows and manufactured models [9-14]. The examples saw, all things considered, go under the follows versatility models. The data gave by the follows is exceptionally precise particularly if the quantity of members and the perception time frame is extensive. On the off chance that the follows have not yet been made for the new conditions, it is difficult to show the portability. In such cases the engineered versatility models are utilized. The manufactured models are an endeavor to speak to reasonably the conduct of the versatile hubs without the utilization of follows. There are two sorts of Synthetic Models: Entity Mobility Models and Group Mobility Models [16-20].

The normal for Entity Mobility Models is that the hubs move autonomously of alternate hubs in the Wireless Ad hoc Network. The usually utilized substance versatility models are: Street Section MM, Probabilistic rendition of Random Waypoint MM, Gauss-Markov MM, Boundless Simulation Area MM, Random Direction MM, Random Waypoint MM and Random Walk MM. Assemble Mobility Models in Group Mobility Models the hubs of the system are expected to shape gatherings (of hubs), and the entire gathering moves, i.e., every one of the hubs in the gathering move together. The normally utilized element versatility models are: Reference Point Group Mobility Model (RPGM), Nomadic Mobility Model, Pursue Mobility Model, Column Mobility Model [7,9,8,10,19,20].

In this article, we cover measured the impact of versatility model for the introduction of directing conventions DSR, (Reactive Protocol). For test purposes, we have picked two versatility situations: Simple Human Mobility Model and irregular way point models. These two Mobility Models are picked haphazardly and imply the possibility of its down to earth reason later on. Execution evaluation has likewise been way crosswise over insecure hub thickness and the quantity of jumps. In before test performed by some scientist's uncovered exponential scope of execution of the versatility models utilizing steering conventions, hub thickness and traverse of data corners. In the second area, we will learn about the directing conventions for Wireless Ad Hoc remote systems can be appropriate for use in our review. In the third area, we will ponder versatility models utilized for reproduction. In the Fourth Section, we will run various reproduction situations for portability models in the system. We will display the result and ascertain the execution of each tried portability models utilizing conventions, in view of the reenactment brings about the fifth segment the parameters are utilized for execution examination result for recreations and to close, in a 6th division we will complete the paper.

II. PROTOCOL USED FOR SIMULATIVE STUDY

There are many routing protocols which describe the path to transmit the data from source to destination. Here, we introduce one protocol used for simulative study.

2.1 Dynamic Source Routing Protocol (DSR)

DSR is a reactive protocol for MANETs therefore not table driven. DSR has two phases: Route Discovery and Route Maintenance. It is based on source routing. All routing information is maintained and updated at all the nodes of the MANET. If the message reaches its destination a route reply is generated which has inserted into the route request initially contained in the route record. The primary approach of protocol throughout the route formation phase is to set up a route by flood route demand packets (RREQ) in the wireless network. The target node, on receiving a route demand packet, reacts by transmitting a route respond packet (RREP) back to source, which carry the route navigate by the route demand packet obtain [1]. This is called route discovery and is one of its two major phases along with route maintenance. For the Route invention and maintenance, source node that doesn't not a path to the target. When it’s have data packets to be sent to that target, it floods a
RREQ throughout the wireless network. Every node, upon getting a RREQ, rebroadcasts the packet to its neighbors if it’s have not onward it previously, provided that the node is not the target node and that the packet’s moment to live (TTL) counter has not been surpassed. On arrival the path reply, the target node should have a path to the source node. If the path is in the target node’s path cache, the path would be applied. Or else, the node will reverse the path based on the route record in the RREP message header. Nodes can also learn about the neighboring path traverse by data packets if operate in the promiscuous. This path supply is also applied during the route manufacture phase in the node that if an intermediary node that receive a RREQ has a path to the target node in its own path cache, and after that its reply to the source node by transmitting the RREP with the complete path information from the source node to the target node. As every node may odd the additional with a RREQ, it seems that loops might be produced as well as multiple communications of the similar RREQ, for example by a focus node that receives it through many paths. To avoid this, each RREQ carries a cycle number created by the source node and the route it has travelled. A node, upon getting a RREQ, checks the cycle number of the packet previous to onward it; therefore it is forwarded only if it is not a replacement RREQ. In the episode of serious communication, the route preservation Phase is starting where by the path error packets (RERR) are created on a node. That node sends to the others so they will eliminate the route that applies that hop, so every route, including it is reduced at that point [1-2]. Over again, the Route detection Phase is initiated to decide the mainly viable path.

III. MOBILITY MODELS USED IN SIMULATIVE STUDY

These segments present the mobility models applied in the simulation study are obtainable, evaluated and explained Simple human Mobility Model and Random way point Mobility Model. Mobility models can be differentiated according to their compute of how two nodes have needed into their movement. If two sensor nodes are moving in the same way, then they have a maximum spatial dependence and a compute of how magnitude, current velocity and direction are connected to preceding velocity. Sensor nodes having similar velocity have a high sequential need. Descriptions of mobility models given below.

3.1 Simple Human Mobility Model:

Greede et al. [2008] had anticipated an easy up till now realistic self-regulating mobility model, called SHMM. It defines a realistic indoor scenario such as any organization any campus. The access point is a particular location where split nodes carried by users from the permanent nodes. Then Nodes have been grouped into groups that allocate familiar welfare. After that, consider nodes that are inside buildings, and guest nodes. Individual node mobility is modeled based on a specific grid, featuring a mobility model based on trace [10-20]. It is an extremely easy model and similar to models such as the City Section or the Manhattan model, the main dissimilarity is that the earlier models are extra sufficient to other model.

3.2 Random Waypoint Mobility Model

In Random Waypoint Model the nodes have a pause time before the changes in direction and speed. The pause time is the time a node remains stationary in a position and starts transmission. At the end of the pause time, the node chooses a speed from the range of maximum and minimum speed and selects a new location within the specified simulation area [5,8]. The mobile nodes, in the defined area, choose a new location by moving at a selected speed as shown in Figure 1. The process described above is repeated with a short pause occurring between repetitions.

![Figure 1. Travelling Pattern of an MN using the Random Waypoint Mobility Model [8]](image-url)
IV. SIMULATIONS

The wireless networks analyzed have been carried out applying Network Simulator ns2.35 and its related tools for simulation and study of analysis. We select a Linux platform, i.e., UBUNTU 12.04 LTS, as Linux recommend a number of programming improvement tools that can be applied through the simulation procedure. We have produced mobility scenarios of Mobility Model applying BONNMOTION2.0; they can be included into TCL scripts. Random traffic links of CBR can be set up among mobile nodes applying a traffic-scenario creator script [1-4]. BONNMOTION is java supported tool for creating mobility scenario for several mobility models, developed by University of Bonn, Germany.

Table 1: Performance Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel type</td>
<td>Wireless channel</td>
</tr>
<tr>
<td>Simulator</td>
<td>NS 2 (Version 2.35)</td>
</tr>
<tr>
<td>Protocols</td>
<td>DSR</td>
</tr>
<tr>
<td>Simulation duration</td>
<td>800s</td>
</tr>
<tr>
<td>Number of nodes</td>
<td>25, 50, 75, 100</td>
</tr>
<tr>
<td>Transmission range</td>
<td>250m</td>
</tr>
<tr>
<td>Movement Model</td>
<td>Simple Human, Mahattam</td>
</tr>
<tr>
<td>MAC Layer Protocol</td>
<td>802.11</td>
</tr>
<tr>
<td>Pause Time (s)</td>
<td>15 ± 4 s</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>25</td>
</tr>
<tr>
<td>Minimum speed</td>
<td>0.5</td>
</tr>
<tr>
<td>Packet Rate</td>
<td>4 packet/s</td>
</tr>
<tr>
<td>Traffic type</td>
<td>CBR (Constant Bit Rate)</td>
</tr>
<tr>
<td>Data Payload</td>
<td>512 bytes/packet</td>
</tr>
<tr>
<td>Max of CBR connections</td>
<td>10, 20, 40</td>
</tr>
<tr>
<td>Environment Size</td>
<td>800m * 800m</td>
</tr>
<tr>
<td>Channel type</td>
<td>Wireless channel</td>
</tr>
</tbody>
</table>

V. PERFORMANCE PARAMETERS AND RESULTS ANALYSIS

5.1 Performance Parameters

The organization of routing protocols is through the following important Quality of Services (QoS) metrics for usual procedures:

5.1.1 Packet Delivery Ratio (PDR)

It has classified in [18-20] as the fraction among the amount of packets created with the application layer. It has the fraction of data packets send to the target to those created from the starting point. It is estimated by separating the amount of packets obtained by target throughout the packet initiated from the source.

\[
PDF = \frac{Pr}{Ps} * 100, \\
Pr = \text{total Packet obtain} \\
Ps = \text{the total Packet transmit.}
\]

5.1.2 Throughput

It has the standard amount of messages effectively send per unit time number of bits delivered per second [10].

Throughput = (Total received packets/ total simulation time) Kbits/Sec

N = number of data sources.
5.1.3 Average End-to-End Delay
It has described as the time in use for a packet to be broadcast across an Ad Hoc from basis to target.

\[ D = (T_r - T_s) \]
\[ T_r = \text{receive Time} \]
\[ T_s = \text{sent Time} \]

5.2 Result Analysis
In the case of presentation investigation we have measured presentation parameters. In Figure 2, 3,4 The simulations are focused on Analyzing the performance of routing overhead, the simulations are focused on throughputs and packet delivery ratio. The results also compared with Simple Human Mobility Model and random way point mobility. The result will also show the performance for every mobility model that had been selected. Here, DSR routing protocol is used for this.

5.2.1 Throughput:
Both Random way point model and Simple Human Mobility Model have more or less same throughputs. Due to the lower number of hop, the high throughput is contributed the lower delay.

![Figure 2: Throughput versus number of nodes](image)

5.2.2 Packet Delivery Ratio (PDR):
Simple Human Mobility Model performed better in delivering packet data to destination.

![Figure 3. PDR versus number of nodes](image)

by considering the pause time every time changing their directions. The Simple Human Mobility Model is improved significant with the increasing number of nodes the proposed mobility models are improved significant because the number of load is small and the traffic is not heavy.

5.2.3 Average End To End Delays:
Due to the movement of each mobile node ,it shows that the proposed mobility model is generated the highest routing overhead compared with the random way point mobility model nodes.
are being enforced to the border of the simulation area before changing track. Simple Human Mobility Model performs lowest routing overhead and it’s good for the routing communication.

VI. CONCLUSION

In this section we have thought about use of wireless Ad Hoc protocols as DSR for sensor node. The Simple Human Mobility Model model predicts the node movement more preasaly as compared to Random way point. This reduces the link failure in the network which results is less number of packet loss and improvement in throughput and end to end delay. The Simple Human Mobility Model reduce the number of messages required by routing protocol for maintaining the result, because link failure has been minimized based on person movement. This is turn makes the network available for data transfer which contribute in enhancement of QoS parameter such as Throughput ,Packet loss ratio, End to End Delay.

In the Simple Human Mobility Model , we have calculated the various performance parameters with respect to Simple Human Mobility Model, Random Way point Mobility models using DSR routing protocol. In this work we have given new mobility models which closely capture the movement of common campus users .The percentage difference of Average End To End Delay for nodes 25,50,75,100 are 15.52%, 21.88% ,14.29% ,4.35% respectively, Packet Delivery Ratio (PDR) for nodes 25,50,75,100 are 19.27%. 51.83%, 38.53%, 24.63% respectively and Throughput for nodes 25,50,75,100 are 3.68% ,17.41% ,13.92% ,11.90% respectively . The Simple Human Mobility Model model has shown better results in terms of Throughput, PDR and end to end delay where DSR has been taken as a routing protocol. The improvement in performance is achieved by better prediction of nodes.

REFERENCES


