Global Mobile Information Simulator in Windows XP to Analysis the Performance of Routing Protocols in MANET

R. P. Mahapatra, Manish Bhardwaj, and Sachi pandey

Abstract—Mobile Ad hoc Network (MANET) is an autonomous system of mobile nodes connected by wireless link. It can operate without fixed infrastructure and can survive rapid changes in the network topology. They can be studied formally as graphs in which the set of parameters varies in time. The main method for evaluating the performance of MANET is simulation. This paper is subjected to how to install global mobile information system simulator in window xp and to evaluate the performance of dominating sets in Ad hoc on demand distance vector routing algorithm (AODV) that analysis packet delivery fraction and end to end delay with varying number of nodes.

Index Terms—AODV, glomosim 2.03, MANET, parsec, visualization tool.

I. INTRODUCTION

A Mobile Ad hoc Network (MANET) is a kind of wireless ad-hoc network and is a self-configuring network of mobile routers (and associated hosts) connected by wireless links—the union of which forms an arbitrary topology. If there are only two nodes that want to communicate with each other and are located very closely to each other, then no specific routing protocols or routing decisions are necessary. On the other hand, if there are a number of mobile hosts wishing to communicate, then the routing protocols come into play because in this case, some critical decisions have to be made such as which is the optimal route from the source to the destination which is very important because often, the mobile nodes operate on some kind of battery power. Thus it becomes necessary to transfer the data with the minimal delay so as to waste less power [1]. One of the main difficulties in MANET (Mobile Ad hoc Network) is the routing problem, which is aggravated by frequent topology changes due to node movement, radio interference and network partitions. Many Routing protocols have been proposed in past and reported in the literature. The reactive approaches only find new routes when required like AODV.

II. DESCRIPTION OF AODV

The Ad hoc On Demand Distance Vector (AODV) routing algorithm is a routing protocol designed for Ad hoc mobile networks. AODV is capable of both unicast and multicast routing. It is an on demand algorithm, meaning that it builds routes between nodes only as desired by source nodes.

It maintains these routes as long as they are needed by the sources. Additionally, AODV forms trees which connect multicast group members. The trees are composed of the group members and the nodes needed to connect the members. AODV uses sequence numbers to ensure the freshness of routes. It is loop-free, self-starting, and scales to large numbers of mobile nodes. AODV builds routes using a route request / route reply query cycle[2]. When a source node desires a route to a destination for which it does not already have a route, it broadcasts a route request (RREQ) packet across the network. Nodes receiving this packet update their information for the source node and set up backwards pointers to the source node in the route tables. In addition to the source node's IP address, current sequence number, and broadcast ID, the RREQ also contains the most recent sequence number for the destination of which the source node is aware. A node receiving the RREQ may send a route reply (RREP) if it is either the destination or if it has a route to the destination with corresponding sequence number greater than or equal to that contained in the RREQ[3]. If this is the case, it unicasts a RREP back to the source. Otherwise, it rebroadcasts the RREQ. Nodes keep track of the RREQ's source IP address and broadcast ID. If they receive a RREQ which they have already processed, they discard the RREQ and do not forward it. As the RREP propagates back to the source, nodes set up forward pointers to the destination. Once the source node receives the RREP, it may begin to forward data packets to the destination. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop count, it may update its routing information for that destination and begin using the better route.

AODV is another variant of classical distance vector routing algorithm, based on DSDV and DSR. It shares DSR’s on demand characteristics hence discovers routes whenever it is needed via a similar route discovery process. However, AODV adopts traditional routing table; one entry per destination which is in contrast to DSR that maintains multiple route cache entries for each destination. The initial design of AODV is undertaken after the experience with DSDV routing algorithm [4].

Fig. 1. Route request (RREQ) flooding
GloMoSim requires the following software to run. However, you need to make sure you have enough access rights of defining the computer environmental variables.

1. Microsoft VC++ version 6.0 (Essential)
2. JAVA JRE version 1.2 or higher (For VT)
3. JAVA SDK version 1.2 or higher (For VT)
4. Parsec compiler
5. GloMoSim software

Usually GloMoSim software is come along with parsec compiler if so no need to download parsec compiler separately. Otherwise download parsec compiler separately. GloMoSim tool and Parsec compiler can be downloaded free of cost from the URL

[http://pcl.cs.ucla.edu/projects/glomosim/]

Also for online Help refer to URL
[http://pcl.cs.ucla.edu/projects/parsec/]

And URL
[http://pcl.cs.ucla.edu/projects/glomosim]

Java compiler for windows can be downloaded from the sun Microsoft site or with the software cd from software vendors.

A. Installing Glomosim 2.03

Download the glomosim2.03 software from the internet. Inside the glomosim directories which consist of two sub directories, can be found namely GloMoSim and parsec. Copy these sub directories into the c drive directly. Now set the path for environmental variables as mentioned below:

1) Install visual studio (vc++) 6.0 or above. While installation check the option Register Environment variable,
for path setup
2) Go to command prompt
   c:.....\>cl     (some message will appear)
   If cl not recognized appears the path is not set.
3) Must have GloMoSim 2.03 in your system which
   contains directories – GloMoSim and Parsec
4) Take both the directories out of GloMoSim 2.03 and
   place them directly into c drive (Let both are placed in
   c:\(this is not necessary but for our convenience)
5) Go to My computer----- right
    click--properties-----Advanced tab----environmental
    variables tab

Fig. 3. Path setup in environmental variables

6) Click new tab----------------NAME           PCC_Directory
    VALUE         c:\parsec
7) Select include and click Edit tab------

Leave the already included path as it is and add above
mentioned path afterwards.
Select Path and click Edit tab----------

Leave the already included path as it is and add above
mentioned path after wards.
   Check pcc environment in DOS prompt by
   C:.....\>pcc     (then press enter)
   A Message No Input files must appear if the path is
   properly set
   C:\glomosim\main\makent     (press enter)
   C:\glomosim\bin\GloMoSim config.in     (press enter)
   GloMoSim is now ready to use.

B. Simulate Network Using Glomosim 2.03
   After successfully installing GloMoSim, a simulation can
   be started by executing the following command in the BIN
   subdirectories.
   C:\glomosim\bin\glomosim config.in
   The input file contains the configuration parameters for the
   simulation (an example of such file is CONFIG.IN). A file
   called GLOMO.STAT is produced at the end of the
   simulation and contains all the statistics generated [13], [14].

V. THE VISUALIZATION TOOL
   The output data of the network is generated and stored in
   glomo.stat file. We can use other tools to do an analysis of
   glomo.stat file either by Gnuplot, Qualnet and java and by
   making program in c by showing result in excel.

Fig. 4. Stat files to collect data

VI. EXPERIMENTAL RESULT
   The network simulation is implemented using GloMoSim
   2.03 simulation tool. In this scenario, AODV routing
   protocols are evaluated based on the two performance
   metrics which are
   1) Packet delivery fraction
   2) End to End delay
   The simulation environment for this scenario is as below:

<table>
<thead>
<tr>
<th>TABLE I: PARAMETER EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
</tr>
<tr>
<td>Simulator</td>
</tr>
<tr>
<td>Protocol Studied</td>
</tr>
<tr>
<td>No. of Nodes</td>
</tr>
<tr>
<td>Simulation Area</td>
</tr>
<tr>
<td>Mobility model</td>
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<tr>
<td>Node speed</td>
</tr>
</tbody>
</table>

A. Packet Delivery Fraction
   Based on the figure we analysis the performance of AODV
   on metric packet delivery fraction with varying no. of nodes.
B. End To End Delay

Based on the figure us analysis the performance of AODV on metric End to End Delay with varying no. of nodes.

VII. CONCLUSION

The performance of all routing protocols in MANET were measured with respect to metric like packet delivery fraction, end to end delay with varying no. of nodes by using GloMoSim simulator 2.03. This paper presents a simulation library called GloMoSim whose goal is to support accurate performance prediction of large scale network model. By the help of this simulator we can analyses the performance of any routing protocols like AODV.

REFERENCES


Manish Bhardwaj M.Tech (Computer Science & Engineering) presently working as Assistant Professor (CSE) at Modinagar Campus of SRM University Chennai; contributing his enormous research works in the area of Computer Science, Simulations, Mobile Ad hoc network protocols.

Rajendra Prasad Mahapatra PhD (CSE) presently working as Associate Dean at Modinagar Campus of SRM University Chennai; contributing his enormous research works in the area of Computer Science, Simulations, Network Security and Artificial Intelligence and RF Technology.

Sachi Pandey M. Tech (Computer Science & Engineering) presently working as Assistant Professor (CSE) at Modinagar Campus of SRM University Chennai; contributing his enormous research works in the area of Computer Science, Simulations, Mobile Ad hoc network protocols.