A Review of Random Based Mobility Model for AODV and DSDV MANET's Routing Protocols

Sunita[1], Sunil Makkar[2]

[1]MTech Student, Department of Computer Science & Engineering BRCM CET, Bahal (Haryana), India

[2]Assistant Professor, Department of Computer Science & Engineering BRCM CET, Bahal (Haryana), India

Abstract: *In Mobile Ad hoc network (MANETS), no fixed infrastructure is available. Different wireless hosts are free to move from one location to another without any centralized administration, so, the topology changes rapidly or unpredictably. Every node operates as router as well as an end system. Routing in MANETs has been a challenging task ever since the wireless networks came into existence. The major reason for this is continues changes in network topology because of high degree of node mobility. The MANET routing protocols have mainly two classes: Proactive routing (or table-driven routing) protocols and Reactive routing (or on-demand routing) protocols. In this paper, we have reviewed various Random based mobility models: Random Waypoint model, Random Walk model, Random Direction model and Probabilistic, Random Walk model using AODV and DSDV protocols.*

Keywords: Mobile Ad hoc, AODV, DSDV, TCP, CBR, routing overhead, packet delivery fraction, End-to-End delay, normalized routing load

1. Introduction

A wireless network is a growing new technology that will allow users to access services and information electronically, irrespective of their geographic position. Wireless networks can be classified in two types.

Infrastructure based network consists of a network with fixed and wired gateways. A mobile host interacts with a bridge in the network (called base station) within its communication radius. The mobile unit can move geographically while it is communicating. When it goes out of range of one base station, it connects with new base station and starts communicating through it. This is called handoff. In this approach the base stations are fixed.

A Mobile ad hoc network is a group of wireless mobile computers (or nodes); in which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points, and can be quickly and inexpensively set up as needed.

A wireless Ad-Hoc network is a collection of mobile/semi mobile nodes with no pre-established infrastructure forming a temporary network. Each of the nodes has a wireless interface and communicates with each other over either radio or infrared media. Laptop computers and personal digital assistances (PDAs) that communicate directly with each other are some example of nodes in an Ad-Hoc network. Nodes in the Ad-Hoc network are often mobile, but can also consist of stationary nodes, such as access points to the Internet. Semi-mobile nodes can be used to deploy relay points in areas where relay points might be needed temporarily.

2. Routing in MANET

In MANET, there is no infrastructure support as is the case with wireless networks, and since a destination node might be out of range of a source node transferring packets; so there is need of a routing procedure. This is always ready to find a path so as to forward the packets appropriately between the source and the destination. Within a cell, a base station can reach all mobile nodes without routing via broadcast in common wireless networks. In the case of ad-hoc networks, each node must be able to forward data for other nodes. This creates additional problems along with the problems of dynamic topology which is unpredictable connectivity changes.
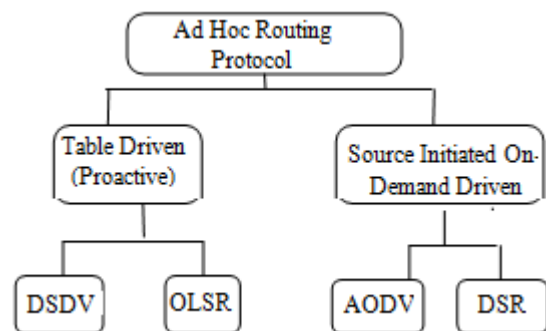
The some of the problems of routing in MANET are Asymmetric links, Routing Overhead, Interference and Dynamic Topology.

1. Proactive Routing Protocol
Proactive MANET protocols are also called as table-driven protocols and will actively determine the layout of the network. Through a regular exchange of network topology packets between the nodes of the network, at every single node an absolute picture of the network is maintained. There is hence minimal delay in determining the route to be taken. This is especially important for time-critical traffic. Examples of Proactive MANET Protocols include:

- Optimized Link State Routing (OLSR)
- Fish-eye State Routing (FSR)
- Destination-Sequenced Distance Vector (DSDV)
- Cluster-head Gateway Switch Routing Protocol (CGSR)

2. Reactive routing protocol

Reactive protocols start to set up routes on-demand. The routing protocol will try to establish such a route, whenever any node wants to initiate communication with another node to which it has no route. The mobility of the nodes causes the topology of the network to change constantly. Keeping track of this topology is not an easy task, and too many resources may be consumed in signaling. Reactive routing protocols were intended for these types of environments. These are based on the design that there is no point on trying to have an image of the entire network topology, since it will be constantly changing. Instead, whenever a node needs a route to a given target, it initiates a route discovery process on the fly, for discovering out a pathway. The different types of On Demand driven protocols are:

- Ad hoc On Demand Distance Vector (AODV)
- Dynamic Source routing protocol (DSR)
- Temporally ordered routing algorithm (TORA)
- Associatively Based routing (ABR)
- Signal Stability-Based Adaptive Routing (SSA)
- Location-Aided Routing Protocol (LAR)

3. Literature Review

Suresh Kr, Rathy and Pandy [2009], have compared the AODV and DSR reactive routing protocols by considering multiple performance metrics to bring out their merits for Random Waypoint Mobility Model using NS2. They have analyzed the performance of protocols by varying network load, mobility and type of traffic (CBR and TCP). They considered packet delivery fraction, normalized routing load, average delay, routing overhead and packet loss as metrics for performance analysis of these protocols. They have been find out that in normal situations (normal load and mobility) DSR is the right choice for CBR traffic and for TCP application AODV is found to be a better choice.

Payal and Sudesh Jakhar [2013], did comprehensive investigations on routing protocols Dynamic Source Routing (DSR), Ad-hoc On demand distance vector (AODV) and Destination-Sequenced Distance-Vector (DSDV) on Random Waypoint Mobility Model using ns2 simulator considering TCP as transport protocol and FTP as traffic generator. Simulation results indicate that the performance of proactive routing protocol DSDV is far better than reactive routing protocols. DSR which uses source routing is the best among reactive routing protocols. It is observed that TCP is not appropriate transport protocol for highly mobile multihop wireless networks because TCP protocol is unable to manage efficiently the effects of mobility.

Anuj K. Gupta, Harsh and Anil K. Verma [2013], have made an attempt to compare different mobility models and provide an overview of their current research status. The main focus is on Random Mobility Models and Group Mobility Models. Firstly, they present a survey of the characteristics, drawbacks and research challenges of mobility modeling. At the last they present simulation results that illustrate the importance choosing a mobility model in the simulation of an ad hoc network protocol. Also, they illustrate how the performance results of an ad hoc network protocol drastically change as a result of changing the mobility model simulated.

4. Future Scopes

Here the performance of only three MANET routing protocols have been proposed for investigation using four Mobility Models. This work can be extended on the following aspects:

- Investigation of other MANET Routing Protocols under different Mobility Models using different types of traffic.
- Security aspects of MANETs.

Software Requirements

Operating System	Linux or Windows with Cygwin
Simulator	NS-2
Software	Java, MS Excel

Hardware Requirements

Processor	Pentium-IV or higher
RAM	1 GB RAM or higher
Hard Disk	80 GB or higher
Drives	DVD writer and USB

References

[1] S.K. Sarkar, T.G. Basawaraju and C Puttamadappa, "Ad hoc Mobile Wireless Networks: Principles, Protocols and Applications", Auerbach Publications, pp. 1, 2008.[2] Network Simulator - NS-2. Available at: http://www.isi.edu/nsnam/ns/.

[2] C.K. Toh , "Ad Hoc Mobile Wireless Networks: Protocols and Systems", Prentice Hall PTR, 2002.

[3] C. Bettstetter, G. Resta and P. Santi, "The node distribution of the random waypoint mobility model for wireless ad hoc networks," Proc. of IEEE Transactions on Mobile Computing 2, pp. 257–269, July–September 2003

[4] IETF's IP Performance Metrics (IPPM) Working Group, RFC 2330, Available at: http://www.ietf.org/html.charters/ippm-charter.htmlPayal and Sudesh Kumar Jakhar, "TCP

[5] Mohammad Naserian, Kemal E. Tepe and Mohammed Tarique, "Routing overhead analysis for reactive routing protocols in wireless ad hoc networks," IEEE Conference on WirelessAnd Mobile Computing, Networking And Communications, WiMob, 2005, pp. 87 – 92.

[6] Uyen Trang Nguyen and Xing Xiong, "Rate-adaptive Multicast in Mobile Ad hoc Networks," IEEE International Conference on Ad hoc and Mobile Computing, Networking and Communications, WiMob, Montreal, Canada.

Paper ID: SEP14618

2451

[7] Maan. F and Mazhar, N., "MANET routing protocols vs mobility models: A performance evaluation," Third IEEE International Conference on Ubiquitous and Future Networks (ICUFN), 2011.

[8] Anuj K. Gupta, Harsh and Anil K. Verma, "Performance Analysis of MANET Routing Protocols in Different Mobility Models, "I.J. Information Technology and Computer Science, 06, 73-82, 2013.

[9] Traffic Based Performance Investigations of DSDV, DSR and AODV Routing Protocols for MANET Using NS2,"

[10] International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-3, Issue-2, July 2013