RESEARCH ARTICLE OPEN ACCESS

Performance Analysis of Routing Protocols Using Various Parameters in MANET Scenario

Anuradha [1], Prof. Navneet Verma [2]
Department of Computer Science and Engineering
Geeta Engineering College
Naultha Panipat
India

ABSTRACT

A MANET is a type of adhoc network that can change locations and configure itself on the fly. Because MANETS are mobile, they use wireless connections to connect to various networks. MANET is useful when infrastructure not available, impractical, or expensive. Based on the routing information update mechanism routing protocols can be classified into three major categories:-Proactive, Reactive, Hybrid protocols. Such networks can be deployed anywhere and at any time or the fly. Because of the dynamic nature of MANETs, they are typically not very secure, so it is important to be cautious what data is sent over a MANET. Routing in adhoc-networks has been a challenging task ever since the wireless networks came into existence. The major reason for this is the constant change in network topology because of high degree of node mobility. A number of protocols have been developed for accomplish this task. The objective of the proposed work is to study the Table driven (Proactive) Protocols- DSDV and Reactive Protocol-AODV protocol performance on the basis of Cumulative sum of no. of all generated packets, Throughput of dropping packets, Packet Size Vs. Average throughput of sending packets, Packet Size Vs. Average throughput of receiving packets, Throughput of receiving bits Vs. Maximal Simulation processing time. Output results are compared using network simulator-2(NS2) between DSDV and AODV.

Keywords:- MANET, NS2, DSDV

I. INTRODUCTION

A MANET is a type of adhoc network that can change locations and configure itself on the fly. Because MANETS are mobile, they use wireless connections to connect to various networks. MANET is when infrastructure not available, Impractical, or expensive .

Some MANETs are restricted to a local area of wireless devices (such as a group of laptop computers), while others may be connected to the Internet. For example, A VANET (Vehicular Ad Hoc Network), is a type of MANET that allows vehicles to communicate with roadside equipment. While the vehicles may not have a direct Internet connection, the wireless roadside equipment may be connected to the Internet, allowing data from the vehicles to be sent over the Internet. The vehicle data may be used to measure traffic conditions or keep track of trucking fleets. Because of the dynamic nature of MANETs, they are typically not very secure, so it is important to be cautious what data is sent over a MANET. The vision of mobile ad hoc networking is to support robust and efficient operation in mobile wireless networks by incorporating routing functionality into mobile nodes. Such networks are envisioned to have dynamic, sometimes rapidly-changing, random, multihop topologies which are likely composed of relatively bandwidth-constrained wireless links. It can support two type of topologies: Homogeneous (Have identical Capabilities and Responsibilities) And heterogeneous (When capability and responsibility vary).MANET are easy to deploy as compared to other networks.

Fig. 1 Mobile Adhoc Network

II. CHARACTERISTICS OF MANETS

This section discusses some interesting characteristics of an mobile ad-hoc network and describes them briefly.

1.2.1 Dynamic Topologies

Mobile ad-hoc networking topologies are dynamic in nature because nodes can move unpredictably. Links between nodes can be broken at any time because of arbitrary movement of nodes. This salient feature of mobile ad-hoc networks makes it difficult to establish secure key distribution and routing protocols for mobile ad-hoc networks.

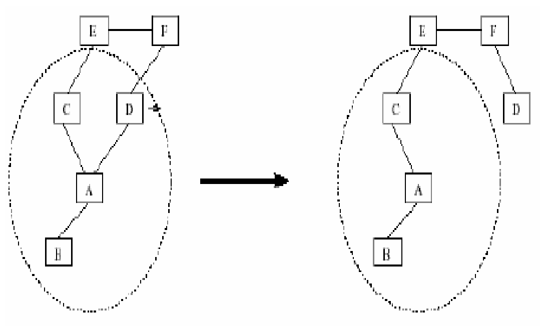

Figure 2: Changing topology of Ad-Hoc Network

1.2.2 Limited Bandwidth

In mobile ad-hoc network, nodes have to rely on wireless links for communicating with each other. Usually wireless links have less bandwidth than that of traditional wired link due to effects of fading, noise, multiple access and interference conditions. Limited bandwidth can very often be an obstacle for increasing demand of various services in mobile ad-hoc networks.

1.2.3 Energy Constrained Devices

Another characteristic of mobile ad-hoc networks are their constrained network devices which makes implementing any security a difficult task. The constraints of mobile ad-hoc network devices are small CPU, small memory, small bandwidth, and limited battery power. Sometime, cryptographic operations that require complex mathematical calculations become difficult with energy constrained devices. The devices have only weak physical protection. If an adversary has access to the device, it is most likely that he/she can read out all data. Thus, an adversary could gain access to confidential data such as secret keys.

We observe that the power resources of typical MANET devices are usually stronger than the ones of sensors but nevertheless still constraint. Note that batteries of MANET devices are likely to be rechargeable in most applications, whereas the batteries of most sensors cannot be recharged once released. A new trend in sensor technology is the use of energy scavengers instead of conventional batteries. Scavengers can convert noise, heat, vibrations, or light from the environment into electrical power. Sensors that use such scavengers are totally independent because they do not need to be recharged once deployed, and are thus not required to be accessible anymore.

1.2.4 Limited Physical Security

In mobile ad-hoc networks nodes have very limited physical security then their wires counterpart. As the nodes are exposed and mobile, the possibility of nodes being compromised physically is very high.

1.2.5 Short-range Network

Most mobile ad-hoc networks are wireless networks using infrared or radio frequency for transmission. As a consequence, the transmission range is limited. For instance, IrDA Data protocols of the Infrared Data Association have a typical transmission range of 2 meters between two devices.

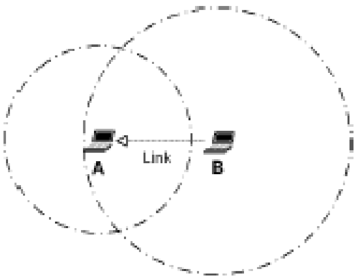

Figure 3: Asymmetric link

The range is usually shorter for low power devices, where it typically varies between 20-30 cm. The range can be increased by sending packets to neighbor nodes that are within the transmission range. These neighbor nodes will forward the packets until they reach their destination. These kind of networks are called multi-hop networks.

1.2.6 Self-organizing Network

This property is unique to mobile ad-hoc networks and distinguishes them from all other network types. After the network initialization, the network should be self-organized. For instance, if network nodes join or leave the network, the other nodes carry out all required steps independent of a server or any other third party. These steps could include distributing keys or other data, and establishing shared secrets. Consequently, no external trusted third party is involved in any network activities after the network has been set up.

1.2.7 Similar Devices

In mobile ad-hoc networks all devices have similar constraints. This distinguishes the architecture of a mobile ad-hoc network from a client-sever structure. In client-server networks some heavy computations can be shifted to the server which is computationally stronger than the clients. In contrast, all computations in a mobile ad-hoc network should be balanced among all participants. It should be obvious that protocols using balanced computations can be easily adapted to server-client networks but imbalanced protocols cannot be used in mobile ad-hoc networks.

III. MANET Protocol Classification

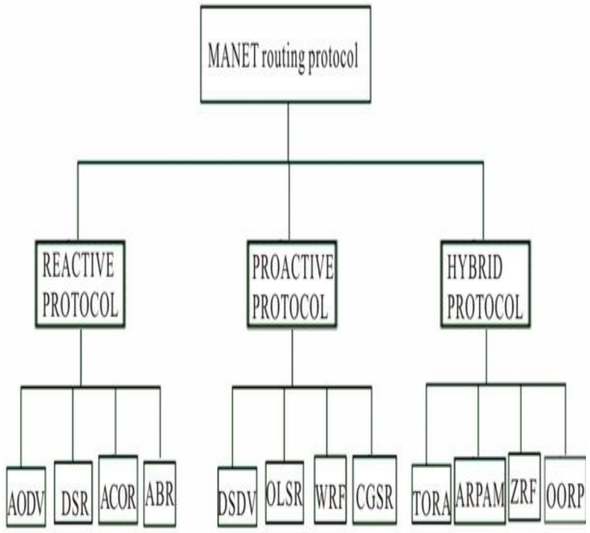

Fig. 4 Classification Of MANET Protocols

Reactive Protocols:- Reactive protocols seek to set up routes on-demand. If a node wants to initiate communication with a node to which it has no route, the routing protocol will try to establish such a route.

Proactive Protocols:- In networks utilizing a proactive routing protocol, every node maintains one or more tables representing the entire topology of the network. These tables are updated regularly in order to maintain a up-to-date routing information from each node to every other node. To maintain the up-to-date routing information, topology information needs to be exchanged between the nodes on a regular basis, leading to relatively high overhead on the network. One the other hand, routes will always be available on request.

Hybrid Routing Protocol (HRP):- is a network routing protocol that combines Distance Vector Routing Protocol (DVRP) and Link State Routing Protocol (LSRP) features. HRP is used to determine optimal network destination routes and report network topology data modifications.

IV. SIMULATED INFORMATION

A. DSDV Protocol

Parameters	Value
Simulator	**NS2**
Channel Type	Channel/Wireless Channel
Radio-propagation model	Propagation/TwoRayGround
Network Interface Type	Phy/WirelessPhy
MAC Type	Mac/802.11
Interface Queue Type	Queue/DropTail/PriQueue
Maximum packet in ifq	50
Link Layer Type	LL
Antenna Model	Antenna/OmniAntenna
Set val(nn)	10/50
Set val(rp)	DSDV
Set Val(x)	500
Set val(y)	400
Set val(stop)	140

Table 1: Simulated information of DSDV protocol

B. AODV Protocol

Parameters	Value
Simulator	**NS2**
Channel Type	Channel/Wireless Channel
Radio-propagation model	Propagation/TwoRayGround
Network Interface Type	Phy/WirelessPhy
MAC Type	Mac/802.11
Interface Queue Type	Queue/DropTail/PriQueue
Maximum packet in ifq	50
Link Layer Type	LL
Antenna Model	Antenna/OmniAntenna

Set val(nn)	20
Set val(rp)	AODV
Set Val(x)	500
Set val(y)	400
Set val(stop)	140

Table 2: Simulated information of AODV protocol

V. RESULTS

DSDV PROTOCOL ANALYSIS

1. **Cumulative sum of no. of all generated packets**

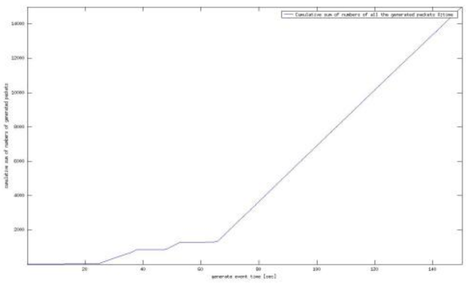

Figure 5 DSDV GEN.

In this graph plotted between Cumulative sum of no. of generated packets vs. generate event time .After reaching at 70 time Cumulative sum of no. of generated packets is increasing directly.

2. **Throughput of dropping packets**

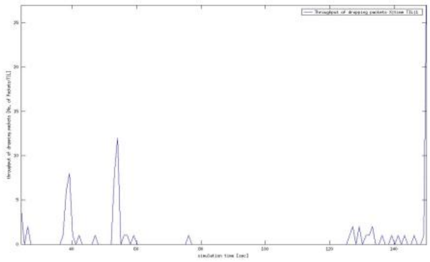

Figure 6 DSDV DROP

Graph is plotted between Throughput of dropping packets Vs. simulation time.

3. **Packet Size Vs. Average throughput of sending packets**

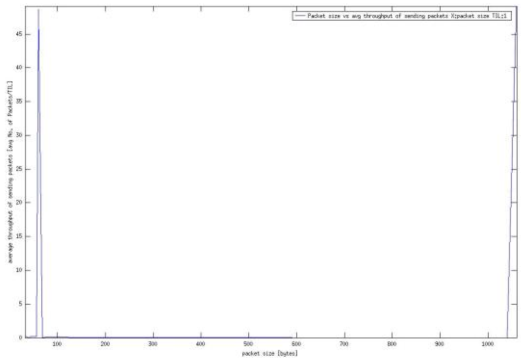

Figure 7 DSDV SEND

In this graph is plotted between Average Throughput of sending packets Vs. packet size

4. **Packet Size Vs. Average throughput of receiving packets**

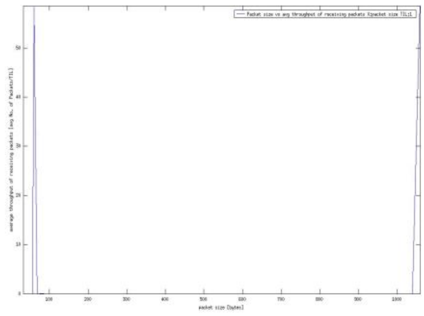

Figure 8 DSDV RECV

In this graph is plotted between Average Throughput of receiving packets Vs. packet size

5. Throughput of receiving bits Vs. Maximal Simulation processing time

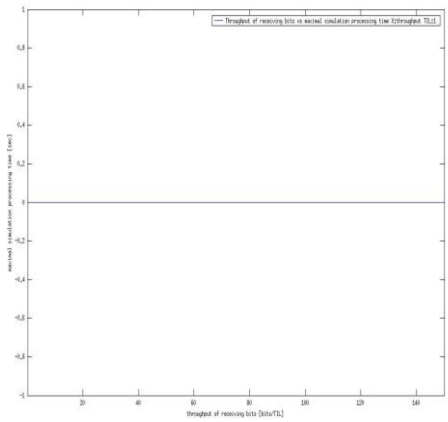

Figure 9 DSDV SIM

Graph is plotted between throughput of receiving bits and Maximal simulation time.

AODV PROTOCOL ANALYSIS

1. **Cumulative sum of no. of all generated packets**

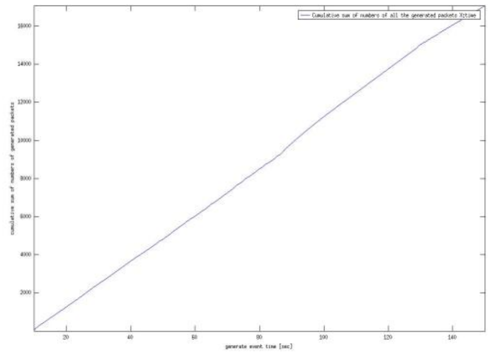

Figure 10 AODV GEN

In this graph, Cumulative sum of no. of generated packets vs. generate event time .

2. Throughput of dropping packets

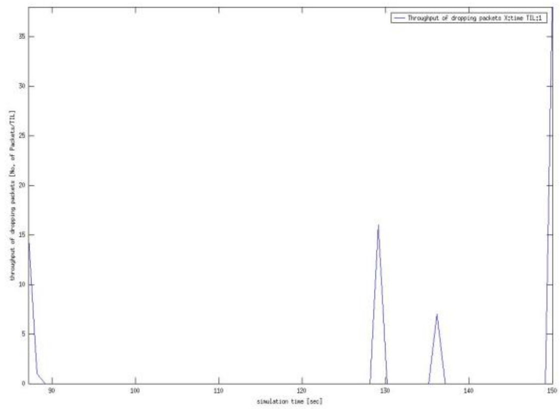

Figure 11 AODV DROP

Graph is plotted between Throughput of dropping packets Vs. simulation time.

3. Packet Size Vs. Average throughput of sending packets

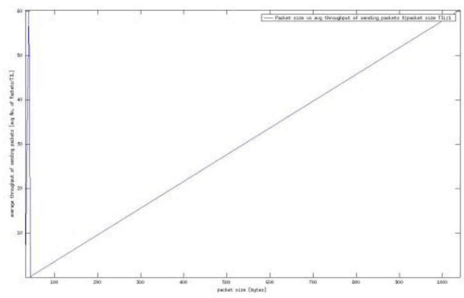

Figure 12 AODV SEND

In this graph is plotted between Average Throughput of sending packets Vs. packet size

4. Packet Size Vs. Average throughput of receiving packets

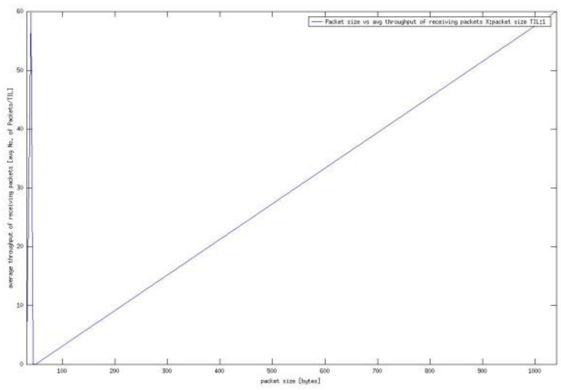

Figure 13 AODV RECV

In this graph is plotted between Average Throughput of receiving packets Vs. packet size

5. Throughput of receiving bits Vs. Maximal Simulation processing time

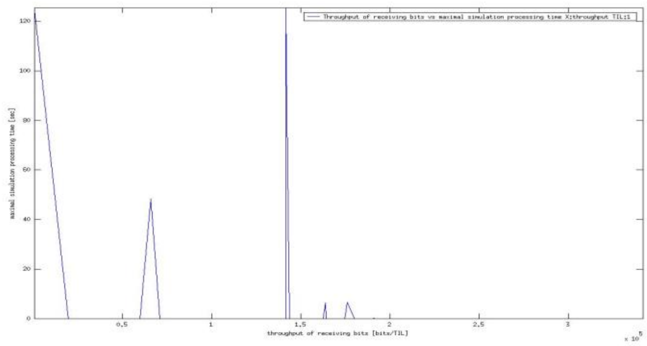

Figure 14 AODV SIM

Graph is plotted between throughput of receiving bits and Maximal simulation time.

IV. CONCLUSIONS

In case of DSDV and AODV simulation takes place for 150 time units and it is found that the Cumulative sum of no. of all generated packets are uniform in case of AODV but has not generated in case of DSDV when time unit is below 20 units. Throughput of dropping packets is maximum in case of DSDV when compared DSDV with AODV. In case of AODV its value at 50 is 12 but its maximum value is attained when time unit is above 120 units. In case of AODV its value is maximum at 128 time units and value achieved is 25 .

Packet Size Vs. Average throughput of sending packets is maximum at initial and final position of timeline in case of DSDV while in case of AODV Packet Size Vs. Average throughput of sending packets is uniform over all timeline but initial value attained is 60.

Packet Size Vs. Average throughput of receiving packets is maximum at initial and final position of timeline in case of DSDV while in case of AODV Packet Size Vs. Average throughput of receiving packets is uniform and linear proportion to packet size over all timeline but initial value attained is 60. Throughput of receiving bits Vs. Maximal Simulation processing time is constant and parallel to X-axis in case of DSDV while changes occurred in case of AODV. In case of AODV throughput of receiving bits is 3*10^5 and maximal simulation time . When throughput is 1.25 *10^5 its maximal simulation time is 120 time units.

REFERENCES

[1] V. SAMESWARI, DR.E.RAMARAJ Research Scholar "A Study of Table-Driven and On-Demand Routing Protocols in MANET**"** IJCTA | March-April 2014.

[2] Ravi Kumar, Prabhat Singh " Performance analysis of AODV, TORA, OLS and DSDV Routing Protocols using NS2 Simulation" International Journal of Innovative Research in Science, Engineering and Technology Vol. 2, Issue 8, August 2013.

[3] Ashish K. Maurya, Dinesh Singh, and Ajeet Kumar "Performance Comparison of DSR, OLSR and FSR Routing Protocols in MANET Using Random Waypoint Mobility Model" International Journal of Information and Electronics Engineering, Vol. 3, No. 5, September 2013

[4] M. K. Marina, S. R. Das, "Ad hoc on-demand multipath distance vector routing", Wirel. Commun. Mob. Comput., Vol. 6, pp. 969-988, 2006

[5] Amith Khandakar "Step by Step Procedural Comparison of DSR, AODV and DSDV Routing protocol" *4th International Conference on Computer Engineering and Technology* (ICCET 2012)

[6] Ramprasad Kumawat, Vinay Somani " Comparative Analysis of DSDV and OLSR Routing Protocols in MANET at Different Traffic Load **"**International Conference on Computer Communication and Networks CSI- COMNET-2011

[7] C.E. Perkins & P. Bhagwat, "Highly Dynamic Destination Sequence-Vector Routing (DSDV) for Mobile Computers", Computer Communication Review, vol. 24, no.4, 1994, pp. 234-244

[8] Akshai Aggarwal, Savita Gandhi and Nirbhay Chaubey "PERFORMANCE ANALYSIS OF AODV,DSDV AND DSR IN MANETS" International Journal of Distributed and Parallel Systems (IJDPS) Vol.2, No.6, November 2011

[9] P. Manickam1, T. Guru Baskar 2, M.Girija 3, Dr.D.Manimegalai "PERFORMANCE COMPARISONS OF ROUTING PROTOCOLS IN MOBILE AD HOC NETWORKS" International Journal of Wireless & Mobile Networks (IJWMN) Vol. 3, No. 1, February 2011

[10] Dilpreet Kaur, Naresh Kumar "Comparative Analysis of AODV, OLSR, TORA, DSR and DSDV Routing Protocols in Mobile Ad-Hoc Networks" I. J. Computer Network and Information Security, 2013, 3, 39-46

[11] Arun Kumar B. R., Lokanatha C. Reddy, Prakash S. Hiremath " Performance Comparison of Wireless Mobile Ad-Hoc Network Routing Protocols ", IJCSNS International Journal of Computer Science and Network Security, VOL.8 No.6, June 2008

[12] Sunil Taneja and Ashwani Kush"A Survey of Routing Protocols in Mobile Ad Hoc Networks" in International Journal of Innovation ,Management and Technology, Vol. 1, No. 3, August 2010 ,ISSN: 2010-0248

[13] Matthias Transier " Ns2 tutorial running simulations ".

[14] www.isi.edu/nsnam/ns/tutorial Marc Greis tutorial on ns2

[15] Changling Liu, Jörg Kaiser "A Survey of Mobile Ad Hoc network Routing Protocols"Department of Computer Structures University of Ulm, Germany October 2003

[16] T.Clausen and P. Jacquet ,OLSR RFC(3626)(Experimental)

[17] Amith Khandakar "Step by Step Procedural Comparison of DSR, AODV and DSDV Routing protocol" *4th International Conference on Computer Engineering and Technology* (ICCET 2012)