IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 1, Issue 5, Oct-Nov, 2013
ISSN: 2320 - 8791
www.ijreat.org

Analyzing The Throughput of Different Routing Algorithms in Mobile Ad-Hoc Networks

Faizul Hussain Ahamed Mansoor[1]

[1] Pervasive Computing Technology, Bharathidasan Institute of Technology, Anna University, Regional Center, Tiruchirappalli, TamilNadu 620024, India

Abstract

The performance calculation in MANET (mobile ad hoc network) used to improve the development of technology. The proposed model analysis based on TCP (Transmission Control Protocol) used to check throughput for different routing algorithms, experiments with various workloads and also compare the differences between the routing algorithms. This paper does the comprehensive performance analysis of the routing protocols using ns2 simulator

Keywords: *AODV, DSDV and DSR, mobile devices, TCP, mobile computing.*

1. Introduction

A MANET is a wireless network that comes together when it is needed. Mobile ad hoc network consists of many mobile nodes that act as both hosts as well as router in the free space air. It is a collection of wireless nodes without relying on assistance from the existing infrastructure. The mobile nodes are free to move randomly. The field of wireless networking emerges from the integration of personal computing, cellular technology, and the Internet. This is due to the increasing interactions between communication and computing, which are changing information access from "anytime anywhere" into "all the time, everywhere."

The proposed model is to calculate the throughput value for routing algorithm, experiments with various nodes and also compare the differences for routing algorithms. The paper is organized as follows. Section 2 presents the overview of proposed model used routing algorithms. Section 3 presents simulation result for our System model. Outputs of the proposed model are discussed in section 4. Section 5 presents conclusion and future research work.

2. Overview of the proposed model used in routing algorithm

Ad-hoc routing protocols can be characterized in many ways. Especially Ad hoc routing protocol must operate in a distributed approach allowing each node to enter and leave the network on its own. Operate of the nodes classify a proactive or reactive mode. In wired networks environment, proactive protocols are table-driven and maintain routes for the entire network within each node. The nodes are all managed continuous communication about changes in the topology. Few dynamic topologies, proactive protocols can introduce a large overhead in bandwidth and energy consumption on the network. Reactive protocols trades off this overhead with increased delay. A route to a destination is established when it is needed based on an initial discovery between the source and the destination. There are two protocols are conventionally used in communication. One is Transmission Control Protocol and other is User Datagram Protocol. In Transmission Control Protocol (TCP) is a connection oriented control protocol, it is given the three important factors every communication must to used that factors, there are (i) establishment (ii) data transfer (iii) connection release. But User Datagram Protocol is a connectionless protocol. Here one important factor is data transfer between the nodes there is no establishment and connection release. In this paper focus on Transmission control protocol (TCP) communication based routing protocol such as AODV, DSDV, DSR [1].

2.1 Destination – Sequenced Distance Vector

Destination-Sequenced Distance Vector (DSDV) is a variation of the Distributed Bellman-Ford algorithm.

DSDV is table-driven; each node maintains a routing table with the next hop entry for each destination and the metric for the link.
Each link has a sequence number associated with it. This sequence number is periodically incremented by the destination node for the link. Other nodes then choose the route with highest sequence number, as that is the least stale route to the destination. If a node detects that a link has broken, it sets the metric to infinity, and issues a route update to the other nodes regarding the link status. Other nodes repeat this action until they receive an update with a higher sequence number to provide it with a fresh route again [2].

2.2 Ad-Hoc On-Demand Routing (AODV)

AODV is a modification of the DSDV algorithm. When a source node desires to establish a communication session, it initiates a path-discovery process to locate the other node. The source node broadcasts a RREQ packet with its IP address, Broadcast ID, and the sequence number of the source and destination. While, the BrID and the IP address is used to uniquely identify each request, the sequence numbers are used to determine the timeliness of each packet. Receiving nodes set the backward pointer to the source and generates a RREP unicast packet if it is the destination or contains a route to the destination with a sequence number greater than or equal to the destination sequence number contained in the original RREQ [3].

2.3 Dynamic Source Routing

Dynamic Source Routing (DSR) is one of the more generally accepted ad-hoc routing protocols. As the name indicates, it utilizes source-based routing rather than table-based, and it is source-initiated rather than hop-by-hop. When a node wishes to establish a route, or issues a Route Request to all of its neighbors. Each neighbor rebroadcasts this Request, adding its own address in the header of the packet. When the Request is received by the destination or by a node with a route to the destination, a Route Reply is generated and sent back to the sender along with the addresses accumulated in the Request header [4].

3. Metrics

In comparing the protocols, the following metrics are listed
Throughput: It is defined as total number of packets received by the destination.
Routing overhead: The ratio between the total number of routing packets transmitted to data packets.
Path optimality: The difference between the number of hops a packet took to reach its destination and the length of the shortest path that physically existed.
This proposed model mainly focuses on route the packets in different areas and calculates the throughput values in various numbers of nodes and finally to compare the performance between the routing algorithms.

4. System Model

Three TCP based routing protocol simulated here. Simulating all three routing protocol in different areas like 750, 1000, 1250, 1500 and also different simulating nodes like 10, 20, 30, 40, 50. After this process done, there are different throughput values taken in each Routing algorithms [5]. The Average calculated throughput mean values in this routing algorithm in different nodes is listed in table 1

Table 1: Simulation settings in NS2

Simulation Parameters	**Value**
Simulator	NS-2
Simulation Time	900 Sec
Simulation Area	(750-1500),(750-1500)
Number nodes	10-50
Traffic Type	CBR
Data Payload	512
Mac Layer	802.11
RF Propagation Model	Two-Ray Ground
Antenna	Omni-directional

Table2. Nodes, Area and Throughput Mean Value

Node	Area	Average Mean Value Throughput		
		AODV	DSDV	DSR
10	750	207.2e3	186.0e3	383.5e3
	1000	176.2e3	148.5e3	386.8e3
	1250	198.2e3	177.0e3	373.8e3
	1500	192.5e3	160.7e3	378.7e3
20	750	135.4e3	073.8e3	205.4e3
	1000	114.2e3	132.1e3	162.5e3
	1250	098.3e3	133.0e3	156.3e3
	1500	099.5e3	124.4e3	185.2e3
30	750	087.3e3	124.8e3	152.4e3
	1000	078.3e3	108.5e3	165.3e3
	1250	413.8e3	099.2e3	373.8e3
	1500	094.3e3	111.5e3	142.3e3
40	750	084.6e3	088.1e3	098.5e3
	1000	074.0e3	069.5e3	088.5e3
	1250	072.2e3	082.8e3	102.4e3
	1500	090.1e3	067.1e3	112.2e3
50	750	052.7e3	052.8e3	065.7e3
	1000	050.2e3	056.4e3	078.5e3
	1250	399.0e3	062.6e3	098.6e3
	1500	049.2e3	063.7e3	123.5e3

5. Simulation Results

The Table 1 illustrates the average throughput for the various terrain regions of simulation area and for various number of nodes arranged in grid pattern and simulation is carried out in NS-2.28 version [6].

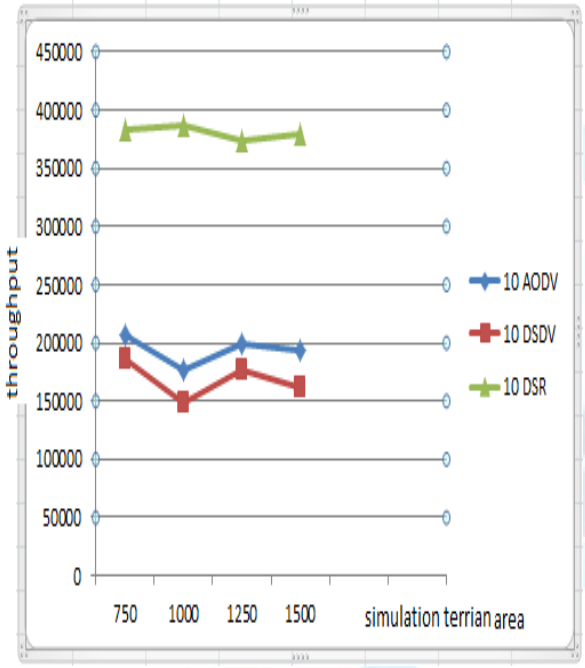

Fig 1: Analysis of throughput for 10 nodes vs. terrain area

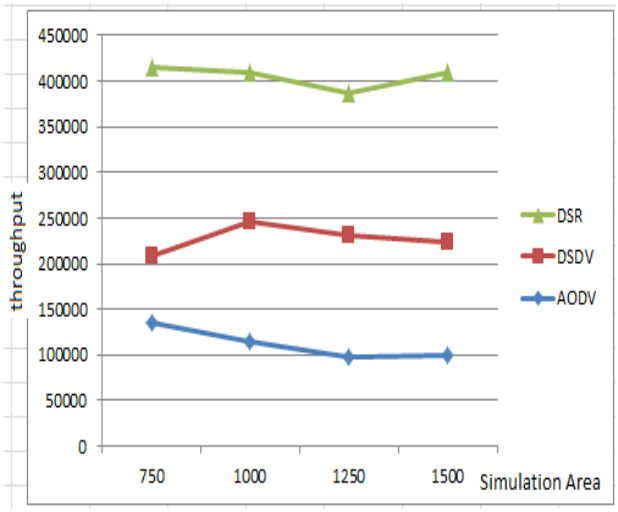

Fig 2: throughput vs. terrain area for 20 nodes.

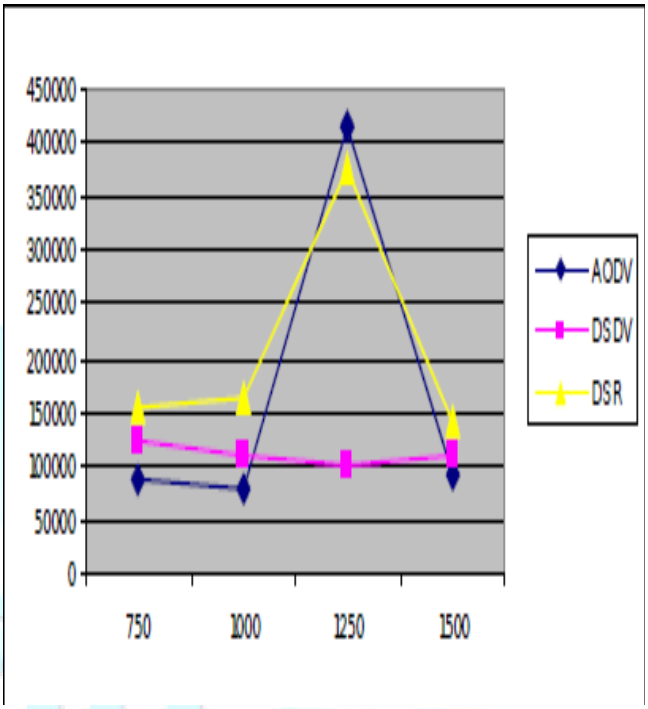

Fig 3: throughput analysis for 30 nodes.

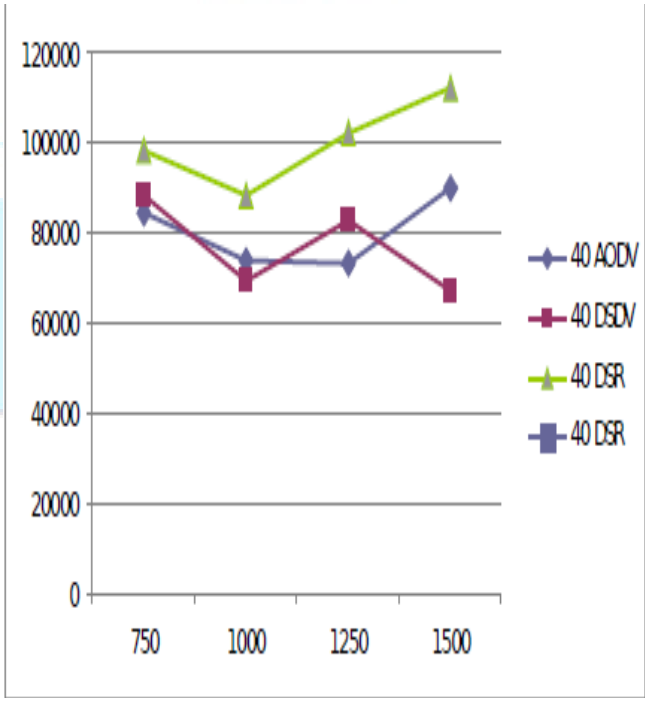

Fig 4: throughput analysis for 40 nodes.

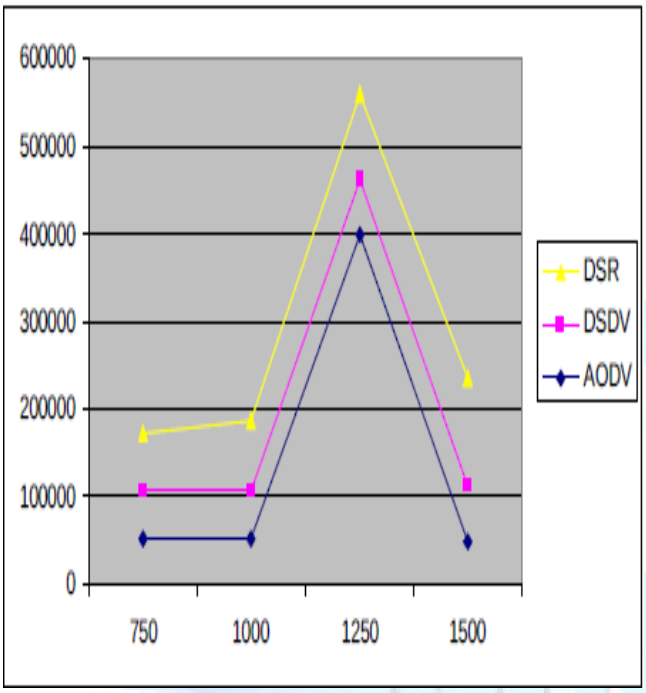

Fig 5: throughput analysis for 50 nodes

Each routing algorithm has its own individuality for the metrics and simulation settings taken the AODV give the better result for the Simulation parameters.

6. Conclusion

In this paper, to analyse the performance of throughput evaluation in different nodes and the compared differences of three routing protocols DSDV, AODV, and DSR is done. Each routing algorithm has its own individuality for the metrics and simulation settings taken, the AODV gives the better result for the Simulation parameters. The future work was to evaluate more metrics from this experiment with different variation in other parameters.

References

[1] A.Boukerche, "Performance Comparison and Analysis of Adhoc Routing Algorithms", IEEEICPCC, 2001, pp.171- 178.

[2]. S.R.Das, C.E.Perkins and E.M.Royer, "Performance Comparison of Two for Adhoc Networks", 19th INFOCOM, vol.1, 2000, pp.3-12.

[3] Shugong Xu and Tarek Saadawi, "Performance evaluation of TCP algorithms in multi-hop Wireless packet Networks", Journal of Wireless Communication and Mobile Computing, 2002, pp. 225-232.

[4] David B. Johnson, David A. Maltz, and Yih-Chun Hu, "The Dynamic Source Routing Protocol for Mobile Ad Hoc Networks (DSR)", 19 July 2004.

[5] Home page of IETF Mobile Ad hoc Networks (MANET) WG [Online] Available: http://www.ietf.org/html.charters/ manetcharter.html.

[6] The network simulator NS-2, [Online] Available: http://www.isi.edu/nsnam/ns.