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RESEARCH ARTICLE

Performance Evaluation of Routing Protocols in Mobile Ad Hoc Networks

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Abstract--- Mobile ad-hoc network are decentralize system of connected mobile node with warless links. Every node is performing both type of faction such that end system and as well as router for forwarding a data packet in over all ad-hoc network. In ad-hoc network the mobile node are free for move anywhere and manten or organize them in a network. The every node are chance over position quickly. The mainly are use of routing protocol such as proactive protocol, reactive protocol and hybrid routing protocol for forwarding a data packet in a network. But most of the routing protocol is reactive routeing protocol. This routing protocol is known as on demand routing protocol. This protocol is providing the better result or salutation in large network topology. Its protocol are reduced route over al network whenever a transmission or broadcast a data packet from source to destination in ad-hoc network. This paper is evolution of quality of service parameter with using a reactive routing protocol such as DSDV and DSR. These routing protocols gather algorithms when a mobile node is connected in MANET when only needed. As per analysis the different parameter such as throughput, packet delivery ratio as well as end to end delay and packet drop in ad-hoc network. The quality of service parameter is analysed using ns2 simulation.

Keywords— "Mobile Ad-Hoc Networks", "Dynamic Source Routing (DSR)", " NS-2.35 Simulator", "PDR" and "DSDV".

I. INTRODUCTION

Mobile Ad-Hoc Wireless Network (MANET) is a set of collection self-regulating mobile nodes such that communicate with each other though forming an electronic device, restricted network and irrespective of their prefix infrastructure that will allow user to access information and service [1, 2]. Ad-hoc network is a collection of node that can be transmission of the data amongst them using wireless links and without use of any additional communication support device facilities or infrastructure. The nodes in a MANET can be PDAs and laptops or any other device that is able to broadcast and receiving the information. Each node of the network acts as a host or destination system (broadcasting and receiving data over all networks) as well as a router at the same time. The nodes in a MANET are generally mobile and may go out of range of other nodes or other mobile node in a network. Consequently, Routing protocol in MANET is difficult since protocol causes frequent network topology changes and requires more healthy and flexible system to search for maintain the routes for the destination. If the ad-hoc network is established paths may break and the routing protocols must dynamically search for other sufficient routing path. With a changing routing topology in MANET even maintain

connectivity is very hard and keeping the routing loop free is very complicated. When a mobile Node move then handling the topology changes, routing protocols in Mobile Ad-Hoc Wireless Network (MANET).It must deal with other constraints as low bandwidth and limited energy as well as error rates of the entire wireless environment lick as in MANET.

In this paper is to evaluation of reactive routing protocols in IEEE 802.11 based on MANET. We have tack Two different routing protocol mechanisms such that DSDV (Ad hoc on demand Distance Vector) and Dynamic Source Routing (DSR). Their simplicity and performance when implement in various mobile using ns-2.35 simulation. These papers to be concentrates on performance parameters evaluation of these two protocol schemes (DSDV and DSR) in order to better understand the protocol efficiency and flexibility and the basic functionalities of these protocols. If possibilities for advance improvements results in possible development of more advanced routing protocol schemes as a future work. This paper is planned as follows in the Section II is an impression of the Protocols used in Ad-Hoc and Wireless networks and detail explains the protocol mechanism used in these study and Section III given the simulation scenario and next Section IV show the Performance Parameter evaluation and results obtained using simulation in ns-2.35 and final Section V is concludes the paper.

II. PROTOCOLS USED FOR SIMULATION

A. Dynamic Source Routing (DSR):

DSR is a reactive routing protocol which allows nodes in the MANET to dynamically find out a source route across multiple ad-hoc networks for any destination [3]. In these routing protocols is need to remove loops or loop free path as well as also the need for up-to-date broadcasting information in the intermediate mobile mode through which the packet is forwarded.

The source node collects all the information between itself and destination. During the route detection process this information is utilized by all other nodes involved in ad-hoc network. It uses a flow id to facilitate node by node forwarding. The DSR protocol is follows two mechanisms for its operation. First one is the Route detection and another one is a Route Maintenance.

Route detection operation has route information is known by sender from source node to destination node. Route cache is maintained for this process. Source route node is kept in packet header when the destination route is not known and a node wants to send data packet to destination node address, it use route detection operation for route detection phase of DSR contains two type of messages such as RREQ and RREP. If a node wants to send a message then first it broadcast an RREQ packet to its neighbour's node. Then neighbouring nodes add their ID in the RREQ packet and then transmitted the packet next neighbour's node. Broadcast message will reach to the destination node which contain route of the destination node. Each node maintains a route cache. Node checks its cache before rebroadcasting the RREQ packet.

Route Maintenance operation has two types of packets are used such as RERR and acknowledgement (ACK). DSR confirm the reality of the route on the basis of ACK received from the neighbouring node and describing that packet has been delivered to the next neighbour's node. ACK packet also contains passive acknowledgements. As an RERR packet is also generated, when a node are not receive an ACK message. This RERR packet is send to the source for reinitializing the route detection operation if the unnecessary route to the destination is not available. When RERR packet is received by the node, it remove the route entries from their route cache which uses those failed links [11, 12]. To reduce the transparency, DSR also maintain current state to be established in intermediate neighbour nodes. This current state provide facility of node by node broadcast information with the same source based route as provided by the original source route.

B. Destination-Sequenced Distance-Vector Routing (DSDV):

DSDV is basically an enrichment of Dynamic Destination-Sequenced Distance-Vector (DSDV) routing protocol [4]. But DSDV protocol is a reactive routing protocol as an alternative of being proactive protocol and it minimize the number of broadcast message by creating routes based on demand. This is not the case for DSR. When any source node wants to broadcast a data packet to a destination mobile node, it broadcasts a route request (RREQ) packet. The neighbouring nodes in turn transmitted the packet to their neighbour's mobile node and the process continues until the data packet reach to the destination node. During the process of forwarding the RREQ, then the intermediate nodes record the address of the neighbour mobile node from which the first copy of the transmitted packet is received and this record is stored in their route tables and helps for establishing

a reverse path. If the path has addition copies of the same route request are later received, when this packet are discarded. The reply to the node is sent using the reverse path. For route maintenance. If when a source node moves. That can be reinitiating a route detection process. If any intermediate node moves within a particular route and the neighbour of the drifted node can detect the link failure and sends a link failure notification to its upstream neighbour node. This process will be continues until the failure notification reaches the source node or destination node. Based on the received information, the source might decide to reinitiate the route detection process. Each of the routing protocols was tested in our simulation experiments in simulation lab. The details of our works and our built prototype are mentioned in the following sections.

III. SIMULATION PARAMETERS

Simulations have been passed out by the Network Simulator version 2.35 (NS2) [4]. Hardware and operating system (OS) configuration for performing simulations is specified in Table 1.

Table 1: Quality of Service parameters

Parameter	**Value**
Channel type	Wireless channel
Simulator	NS 2 (Version 2.35)
protocols	DSDV, DSR
Simulation duration	400sec
Number of nodes	10,20,30,40,50,60,70
Queue length	200
MAC Layer Protocol	802.11
Antenna	Omni antenna
Traffic type	CBR(Constant Bit Rate)
Environment Size	1000m * 1000m

For each simulation, the location and activities of the nodes are put randomly as well as the traffic among them. Setting the randomly accurately is a key point, because if this is done wrong some simulations outcome can be associated and we can come up with bad results. If we think, we have performed a sufficient amount simulated to describe a common case [11]. Each protocol must be checked or analysed in order to see how much time is necessary to be skipped. Additionally, according to [12, 17], CBR traffic below UDP must be used to compare accurately the different protocols in MANET.

IV. PERFORMANCE PARAMETER AND RESULTS ANALYSIS

A. Performance Parameters

The management of routing protocols in the following significant Quality of Services (QoS) metrics for routing parameter:

1. Packet Delivery Ratio (PDR):

Packet delivery ratio is an important parameter as it defines the loss rate, which will be seen by the transport protocols. Those run on top of the network layer. It evaluates the loss rate and measures up both the correctness and efficiency of ad-hoc routing protocols, a higher packet delivery ratio is hoped in any network. It is defined in [9,10] as the ratio between the number of packets originated by the application layer CBR sources and the number of data packets are received by the CBR sink at the final destination address [14,16]. It is the percentage of data packets delivered to the destination address to those generated from the sources. It is calculated such as dividing the number of packets received by destination through the number packet originated from the source.

$$PDR = (Pr / Ps)*100$$

Where Pr is Packet received & Ps is Packet sent.

2. Average End-to-End Delay:

Average End to end delay includes all possible delays caused by buffering during route detection latency, queue at the interface queue, retransmission delay at the MAC layer, and propagation and transfer times [9,10]. That is defined as the time taken for a data packet to be transmitted across an Ad Hoc network from source node to destination node.

End to End Delay = (Tr –Ts),
Where T_r is total receive Time and Ts is total sent Time.

3. Packet Drop:

A packet has dropped with in two cases. The first one, when buffer is full then the packet needs to be buffered, and the time of that the packet has been buffered exceeds the limit. And the second one, when the data packet dropping was observed for several nodes and varied the nodes each time and the dropped was counted at destination node during entire simulation period whose amount.

Packet Drop = (Ts-Tr), where Ts is Total packet send and Tr is Total packet received

4. Throughput:

Throughput is an average rate of successful delivery data packet over a broadcasting channel. This data packet may be delivered over all a physical or logical link layer, or pass through a certain network in MANET. The throughput is regularly considered in bits per second and from time to time in data packets per second or data packets per time slot. That is the measure of, how soon an end user is able to receive data packet and it is determined as the ratio of the total data received to required propagation time. A superior throughput will directly impact the user's perception of the quality of service performance (**QoS**).

Throughput = (Ts/Ti)
Where Ts is the total number of packets delivered successfully and Ti is taking time for sending a packets

B. Result Analysis

Performance parameter and results analysis we have considered above performance parameters. In Figure1, 2, 3, 4 the simulations are focusing for analysing the performance on routing overhead, throughput. Average End-to-End Delay, PDR, Packet Drop and packet delivery ratio. The results also compared with two routing protocol that we had chosen .The result will show the performance with respect to protocols that had been selected under different protocol such that DSDV and DSR.

1. ***Packet delivery ratio (PDR):***

Packet delivery ratio is an important parameter for performance analysis it explain the loss rate that will be observed by the protocols. Thus the packet delivery ratio in turn reflects the highest throughput that the network cans support. In the above discussed scenario the performance of DSR is far better than the DSDV due to its route discovery mechanism. The given graph produced the comparatively result of DSDV and DSR on the different node such as, 10 nodes, 20 nodes, 30 nodes, 40 nodes, 50 nodes, 60 nodes and 70 nodes. At lower speed 10 of node movement, the routing protocols DSDV performed particularly well, they delivering the large

amount of data packets regardless of delivery rate from DSR but in all cases of nodes speed, protocols DSDV and DSR always perform better at low speed of nodes; When movement speed of nodes greater than 2 m/s the routing protocols DSDV can delivered data packet between 80% to 70% and DSR routing protocols can delivered data packet between 20% to 30%, unlike when the speed greater than 20m/s the ratio of delivered packet will go to decreasing in all routing protocols. DSDV Perform particularly well, delivering over 95% of the data packets regardless of delivery rate.

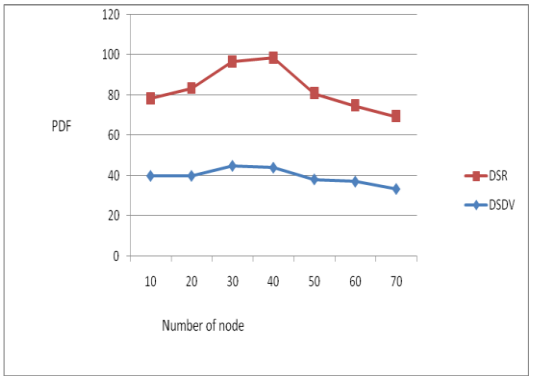

Figure1: Packet Delivery Ratio

2. *Average End-to-End Delay:*

In Figure:2, those simulation result showed us that DSDV and DSR protocols are having higher end to end delays other then, indicating that the speed of simulation in big scale networks will be affected by this. Shows the large amount of delay in scaled up background. This analysis completely deals with the network speed and communication efficiency. Higher the delay if lower speed and possibility of packet drop so needs the fault tolerance approach of selecting these protocols.

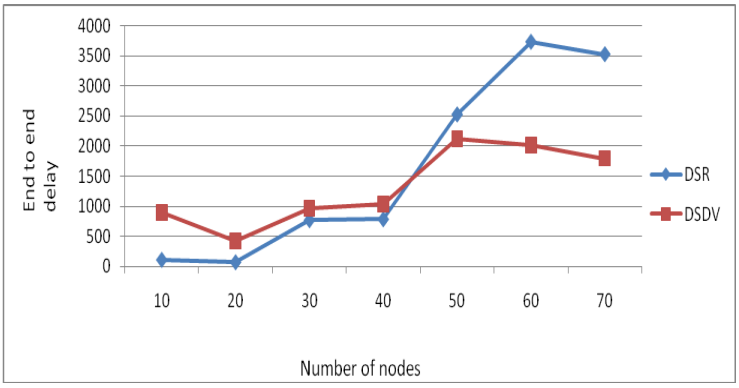

Figure2: Average End-to-End Delay

3. Packet Drop:

The result shows both the cases. First one is the buffer is full when the packet needs to be buffered and the time that the packet has been buffered exceeds the limit. And second one is packet dropping was observed for several nodes and varied the nodes each time and the dropped was counted at destination node during entire simulation period whose amount was as in Figure: 3.

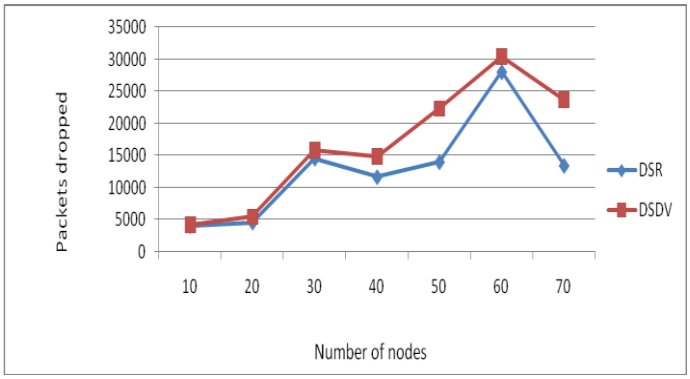

Figure3: Packet Drop

4. *Throughput:*

Throughput of the network is calculated by extracting the data from tcl file and two curve for protocol: DSR,DSDV, by taking the no. of node 10,20,30,40,50 ,60,70 on X axis and No. of packet 100, 200,300,400,500,600 on Y Axis as shown in given Figure 4. It is visible that as the no. of node is increase throughput is decreasing. But variation of DSR is as lesser as than DSDV protocol because increased overhead. As DSDV is unpredictable so curve of throughput has much variation and does not depend on as no of node is increasing.

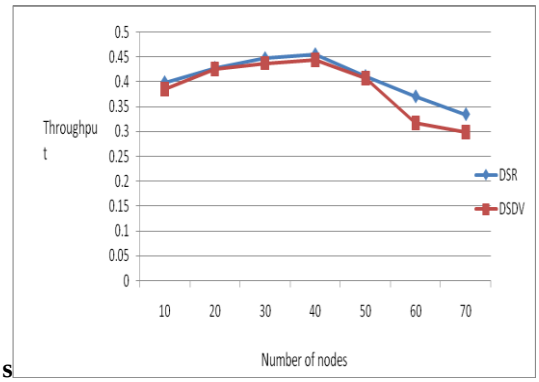

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Figure4: Throughput

V. CONCLUSION

DSR is a commonly used routing protocol for MAMET, but has very low delivery rates and poor performance in lightly loaded networks with high node movement. Several of the modifications proposed in the literature such as turning off intermediate node replies improves the performance somewhat. This paper presents two simple routing protocols techniques limiting replies sent by destination, keeping only one route per destination, and preferring fresher routes over shorter ones to further improve the performance of DSR. While multiple routes may benefit at higher traffic loads, keeping only one route per destination helps sender nodes gather routes when the topology changes. On the other hand DSR perform better when the numbers of nodes are less but it will fails when the numbers of nodes increase but DSR showed high end to end delay due to formation of temporary loops within the network. Without using any complicated strategies, our proposed techniques perform significantly better than previously proposed modifications at very low traffic loads and about the same at higher traffic loads.

REFERENCES

[1] Dr. Umadevi Chezhian and Mr. Raja Adeel Ahmed. Average Delay and Throughput Analysis on Ad Hoc Network Protocols, IJARCSSE ISSN: 2277 128X Volume 3, Issue 2, February 2013.

[2] Sk. Munwar and Dr. V.V.Rama Prasad. "Comparative Study of Reactive Routing Protocols for MANETs", (IJCNWC), ISSN: 2250-3501 Vol.2, No.2, April 2012.

[3] Arshad Shaikh and Khalid H. Mohammadani, Performance Analysis of MANET Routing Protocols – A Comparative Study ,IJCA (0975 – 8887) Volume 83 – No 7, December 2013.

[4] Ankur Jain and Ritu Choudhary Improving The Quality of Service in Mobile Ad- hoc Network Using ant Colony Optimization IJARCSSE ISSN: 2277 128X Volume 4, Issue 6, June 2014

[5] Anit Kumar and Pardeep Mittal. A Comparative Study of AODV & DSR Routing Protocols in Mobile Ad-Hoc Networks, IJARCSSE Volume 3, Issue 5, May 2013 ISSN: 2277 128X

[6] J. Yoon, M. Liu, and B. Noble. Random waypoint considered harmful. In Proceedings of INFOCOM'03, 2003.

[7] Reena. Rekha Pandit, and Vineet Richariya." Performance Evaluation of Routing Protocols for Manet using NS2", pages 0975 – 8887, IJCA, Volume 66– No.24, March 2013.

[8] Ankul Sharma et al, International Journal of Computer Science and Mobile Computing, Vol.4 Issue.5, May-2015, pg. 1069-1076

