To Evaluate Performance of the Dynamic Source Routing Protocol for Mobile Ad-Hoc Network

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Abstract: **Mobile Ad-hoc Network is considered as a new paradigm of infrastructure-less mobile wireless communication system. Routing in MANET is considered a challenging task due to the frequent and dynamic changes in the network topology. In this paper, we evaluate the performance of one of the most popular reactive routing protocols i.e. Dynamic Source Routing (DSR) using various network performance parameters.**

***Keywords*: Ad-hoc, MANET, DSR, Routing Protocols, , OPNET14.0.**

1. INTRODUCTION

An ad-hoc network is a collection of mobile nodes which cooperate by forwarding packets for each other to allow a node to communicate beyond its direct network range. Ad-hoc networks require no central administration or fixed network infrastructure such as base stations or access points and could be quickly and inexpensively set up as needed. In Ad-Hoc Networks the each mobile node act at the same time as both the router and the host.

Mobile networks can be classified into infrastructure networks and Mobile Ad Hoc Networks according to their dependence on fixed infrastructures [1]. MANET is a collection of self- reliant mobile routers or nodes which can communicate to each other via some wireless network such as radio links. In MANET, two nodes can communicate directly but if these nodes are beyond the network range then they need some transitional nodes to deliver the packet to the designated node. As the nodes are mobile so the network topology changes dynamically and due to this motivation MANET can't be pre-deployed.

Features of MANET:

- Infrastructure less: no need to setup any infrastructure for their deployment.
- Rapidly deployed: can be deployed any time and anywhere easily.
- Flexible: network can be extended or reduced to anywhere.
- Distributed: routing traffic can be distributed to underutilized nodes for load balancing.
- Self-configuring: no need of network administrator to maintain routing tables.

In this paper, the most popular DSR routing protocol is evaluated on various parameters such as throughput, data rate, transmitted and received packet rate and delay in MANET.

II. Brief Description of Dynamic Source Routing Protocol

Dynamic Source Routing is a routing protocol for wireless interconnects networks. It is works similar way to AODV in that it sets up a route on-demand when a transmitting mobile node requests one. Though it uses source routing as an alternative of relying on the routing table at each intermediate device. Dynamic source routing protocol (DSR) is an on-demand source routing protocol, in which all the routing information is maintained and is frequently updated at mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, lacking the need for any existing network infrastructure or administration. The DSR protocol is composed of the two main techniques of 'Route Discovery' and 'Route Maintenance'.

Both works together to allow nodes to discover and maintain routes to arbitrary receivers in the ad hoc network. A best path for a communication between a source node and target node is determined by Route Discovery process. The Route Maintenance ensures that the communication path remains most favorable

and loop-free according the adjustment in network conditions, even if this requires altering the route during a transmission. Route Reply will only be generated if the message has reached the projected destination node. To return the Route Reply, the target node should have a route to the source node. If the route is in the route cache of target node the route would be used or the node will reverse the route based on the route record in the Route Reply message header. In the event of failed transmission, the Route Maintenance Phase is initiated whereby the Route Error packets are generated at a node. The wrong hop will be detached from the node's route cache and all routes containing the hop are reduced at that point. Yet again the Route Discovery Phase is initiated to determine the most viable route. The major difference between DSR and other on-demand routing protocols is that it is beacon-less and hence it does not have need of periodic hello packet transmissions, those are used by a node to inform its neighbors of its presence. The fundamental approach of this protocol throughout the route creation phase is to launch a route by flooding Route Request packets in the network. Whereas the destination node on receiving a Route Request packet responds by transferring a Route Reply packet back to the source which bears the route passed through by the Route Request packet received.

On receiving the first Route Request packet the destination node, replies to the source node through the reverse path the Route Request packet had navigated. Nodes could also be trained about the neighboring routes traversed by data packets if activated in the promiscuous mode. The route cache is also used during the route creation phase. If an mediator node receiving a Route Request has a route to the destination node in its route cache, subsequently it replies to the source node by sending a Route Reply with the complete route information from the source node to the destination node.

III. Simulation and Results for proposed work

The simulator tool used for the performance analysis of DSR routing protocols is Optimized Network Engineering Tools 14.0. OPNET is a simulator built on top of discrete event system (DES) and it simulates the system behavior by modeling each event in the system and processes it through user defined processes. OPNET is very powerful software to simulate heterogeneous network with various protocols. OPNET is a high level user interface that is built as of C and C + + source code with huge library of OPNET function.

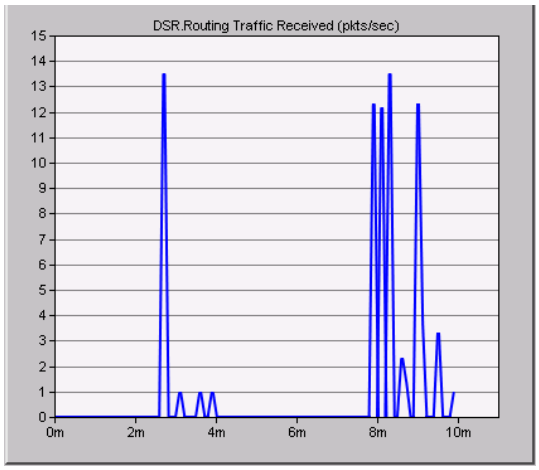

Fig 1 Total Traffic sen in packets per second for DSR Protocol

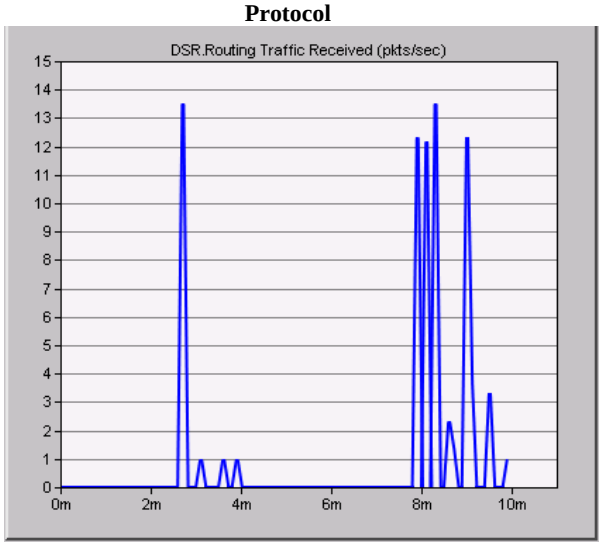

Fig: 2 Total Traffic received in packets per second for DSR Protocol

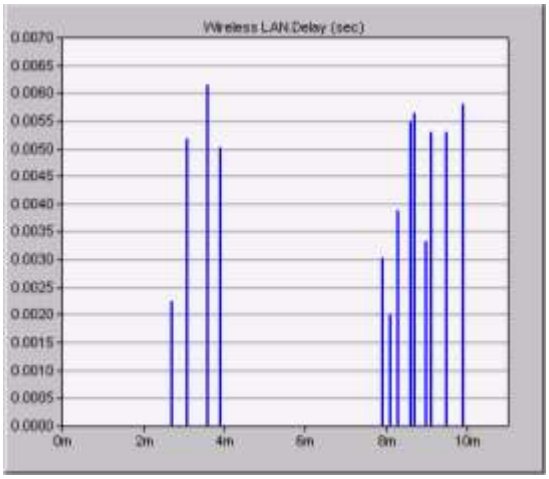

Fig 3 Delay for DSR Protocol in second

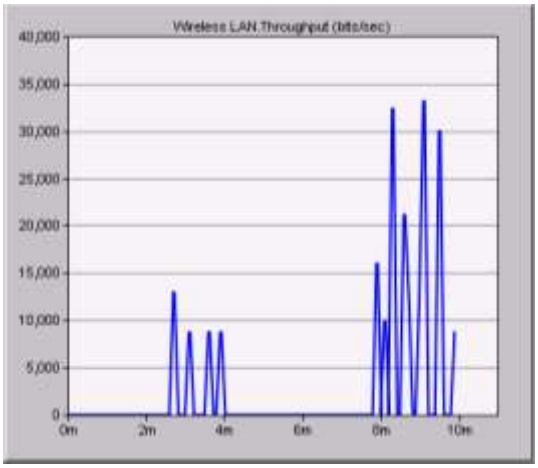

Fig 4 Variation of Throughput in bits per second

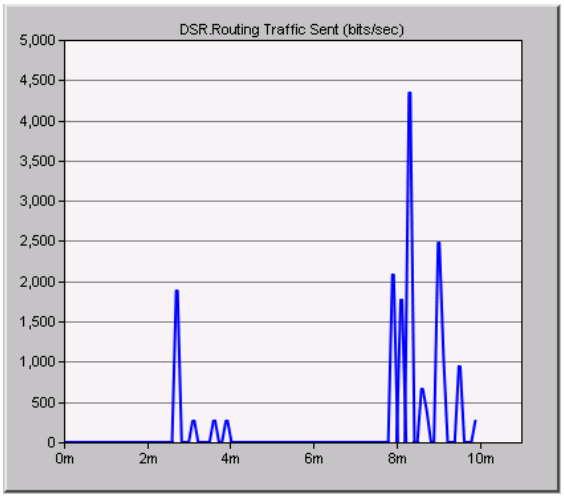

Fig 5 Total Traffic sent bits per second for DSR Protocol

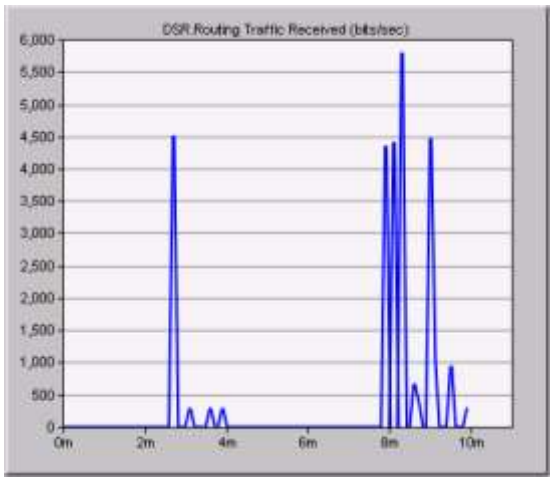

Fig 6 Total Traffic received in bits per second for DSR Protocol

Table 1 shows the values of various performance parameters of DSR protocol.

S.No.	Parameter	Value
1	Data Traffic Sent (packet per second)	13
2	Date Traffic Received (packet per second)	13
3	Data Packet Delay (seconds)	0.0062
4	Throughput (bits per second)	34000
5	Data Traffic Sent (bits per second)	4800
6	Data Traffic Received (bits per second)	5800

IV Conclusion

These results provide a baseline performance evaluation of MANET protocols in a scenario with minimal traffic source and limited. The DSR protocols provide more consistent performance in terms of delay, which makes them more appropriate for real time applications. Furthermore it remains to be seen if these protocols provide an advantage when the scenario becomes more complex with additional traffic and nodes. This will be the focus of our future work.

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