

# Parametric Estimation of Various Protocols for Routing In Manets

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**Abstract** -In Wireless communications, recent advances for MANETs (Mobile Ad-Hoc Networks) are rapidly growing which are widely used in several areas such as military, disaster recovery process etc. MANETs are the combination of nodes that moves from one place to other place. In MANETs, Routing protocols are classified into different types; they are unicasting and multicasting routing. In general protocols are defined as the step by step procedure used to find the correct path. Protocols for routing play a vital role in preventing routing attacks. This paper presents the parametric estimation of various protocols that are used for routing such as AODV (Ad-hoc On-demand Distance Vector), DSR (Dynamic Source Routing), and DSDV (Destination Sequence Distance Vector) protocols in MANETs. Further various optimization techniques can help us to find the shortest path.

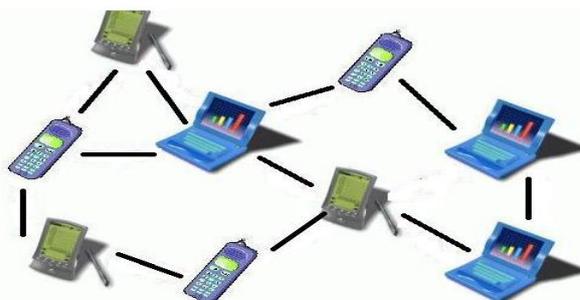
**Keywords**- AODV, DSR, DSDV, MANETs

## I. INTRODUCTION

The development of wireless communications had brought many changes in the way the people live, as the growth of wireless Communication increases, people across the world wants to move without having proper infrastructure. This provides a great demand for MANETs. Every network other than MANET possess fixed infrastructure. In general nodes in MANETs can also acts as sender

One of the major functions in this network is route discovery process [2].To develop any ad-hoc network, routing protocols plays major role. There are different types of Routing protocols, they are proactive, reactive and hybrid [3]. In other ways Reactive routing protocol is also Known as on-demand routing protocol i.e. it helps to find the routes on demand and Proactive routing protocol in other ways known as table driven routing protocol [4].

[1]. There are several applications for MANETs which include communication in military, disaster recovery process, search and rescue operations, seminar halls or conference rooms, also used in the places where meeting is going to happen. Similar to applications they also face some challenges and these challenges occur because they are infrastructure-less and also the topologies in this networks change frequently.



## B. Reactive Protocol for Routing

This protocol is also known as on-demand routing protocol. Unlike proactive it does not update the routing information regularly. At times it searches for the route whenever it is required and for this reason it is called as reactive routing protocol. Example of this category is AODV (Ad hoc on-demand distance vector), DSR (Dynamic source routing).

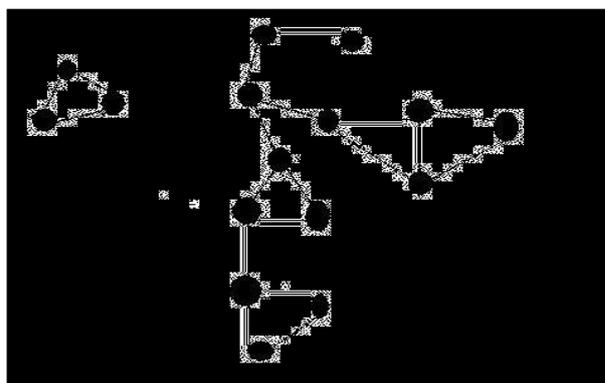


Fig 1: Structure of MANETs.

## II. MANET ROUTING PROTOCOLS

This type of protocols plays important role in MANETs. Routing protocols are the one that determines how the routes communicate with each other. In general there are different routing algorithms that they decide the way they want to move. These are again classified into three types they are proactive, reactive and hybrid [5].

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A. Proactive Protocol For Routing in MANETS

In Table driven routing protocol the nodes consists of tables that contain entire routing information. Information that is entering into the table needs to be updated regularly. Due to this reason it causes some problems. In this protocol nodes can maintain more than one table. DSDV (Destination sequenced distance vector) is one of the examples [6-7].

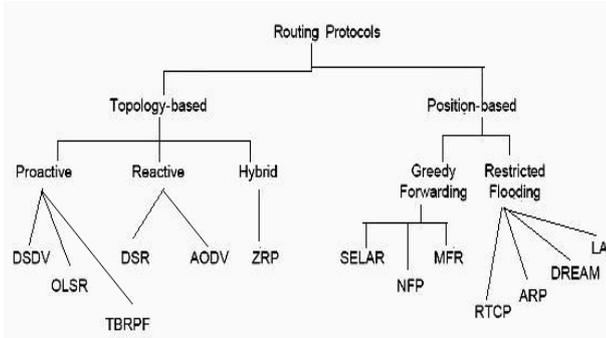


Fig 2: Position and topology based routing protocol

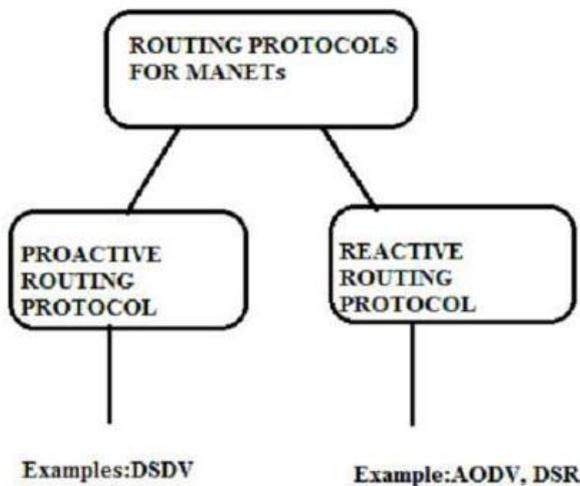


Fig 3: Classification of MANET protocols for routing.

III. VARIOUS MANET PROTOCOLS FOR ROUTING

A. AODV Routing Protocol

AODV is one of the reactive routing protocols for MANETS. The main objective of the reactive routing protocol is that routing overhead can be reduced. This type routing protocol always finds the routes on-demand i.e. whenever it is required it overflows the network with route request (RREQ). In AODV whenever a node wants to transmit some information to other node which is having no route then it generates a message called route request (RREQ) message and that will be overflowed to other nodes [8].

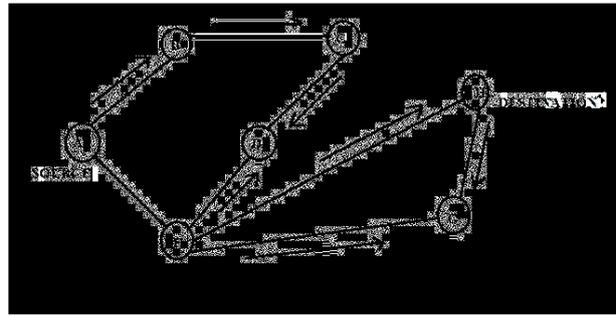


Fig 4: Process of requesting for route in AODV

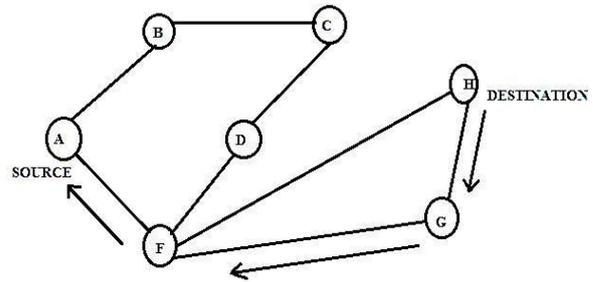


Fig 5: Route reply process in AODV

B. DSR Routing Protocol

Unlike AODV, DSR is another important routing protocol for MANETS. It also comes under reactive routing protocol i.e. the routes will be formed when the transmitting node requests for route. The name itself indicates that it utilizes a technique called source routing [8]. Now let us consider two nodes A and B, whenever node A has to send a data packet to node B, but node A doesn't know route to B then node A initiates a process called route discovery process. And source node A overflows route request (RREQ) [9-10]. Every route request has set of information that consists of senders and receivers address and a unique id that is determined by sender. By simply receiving the route in route request we can obtain route reply. If node B already knows a route to node a then route discovery is not needed.

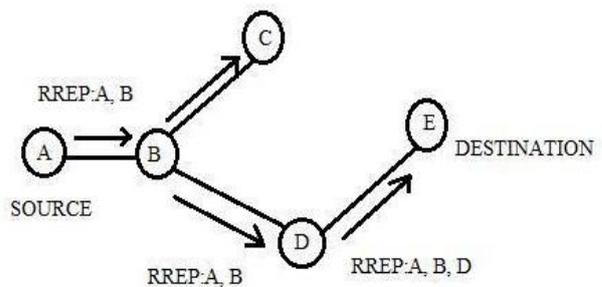


Fig 6: Process of discovering the routes in DSR.

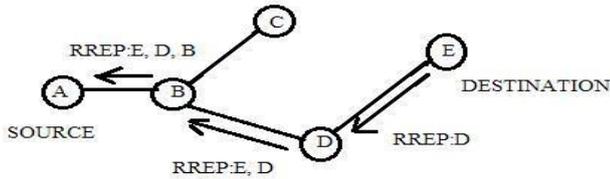


Fig 7: Route Reply process In DSR.

C. DSDV Routing Protocol

DSDV is one among the protocols of proactive routing which is also called as table driven routing for mobile ad-hoc networks. It is based on the algorithm called bell-Mann ford algorithm. The main objective of this algorithm is to solve the loop problem that occurs while routing takes place. This protocol consists of routing table at every entry the routing table consist of sequence numbers, destination address, next hop address and this seq. no can be even or odd [11-12].

Above example shows how information is transmitted from source node to destination node. Two tables show the information at node K before and after updating. Table consists of several information such as destination, next hop address, metric and seq. no. Tables show the movement of nodes.

Example of DSDV:

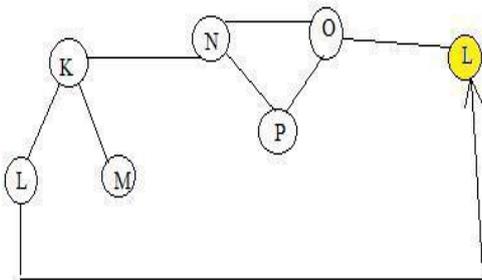


Table I. Table at Node K before updating

Destination	Next Hop	Metric	Seq. No
K	K	0	S206_K
L	L	1	S335_L
M	M	1	S199_M
N	N	1	S568_N
O	N	2	S768_O
P	N	2	S47_P

Table II. Table at Node K after updating

Destination	Next Hop	Metric	Seq. No
K	K	0	S305_K
L	N	3	S425_L
M	M	1	S298_M
N	N	1	S688_N
O	N	2	S869_O
P	N	2	S165_P

IV. RESULTS AND DISCUSSION

The objective of this paper is to estimate the various parameters of routing protocols for MANETs. The performance of routing protocols can be estimated by the following parameters such as overhead, packet delivery ratio, delay and packet drop etc. performance of the various routing protocols can be estimated by this parameters and these parameters are implemented by using the simulator tool NS2(Network simulator).

A. Parametric Analysis a.

Overhead

In general routing overhead occurs due to the sharing of same amount of bandwidth between the routes and the data packets. For a protocol in order to maintain best performance it should not be over headed.

$$\text{Routing Overhead} = \text{Routing Packets.}$$

b. Packet Delivery Ratio

We can estimate the performance of different protocols using parameter called packet delivery ratio.

$$\text{Packet delivery ratio} = \frac{\text{total no of data packets that are successfully received}}{\text{total no of data packets that are transmitted}}$$

c. Delay

Delay is one of the important parameter in wireless communication. It is measured in terms of seconds. It is generally defined as the time taken by the node to reach the destination node. Delays are again classified into different types.

$$\text{Delay} = \frac{\text{Time taken by source node}}{\text{Time taken by destination node.}}$$

## d. Packet Drop

Packet drop is usually defined as packet loss, when one of the packets which are travelling from source node to destination node and in that process if any node failure occurs then packet loss takes place. Packet drop = no of packets send-no of packets received

Below figures shows the comparison of three different routing protocols in MANETs such as AODV, DSR, DSDV.

S. No	Parameter	Value
1.	Simulator	NS2
2.	Routing protocol	AODV, DSR, DSDV
3.	Model of Antenna	Omni
4.	MAC type	802_11
5.	Simulation start Time	10
6.	Simulation end Time	250

Table III. Simulation Metrics

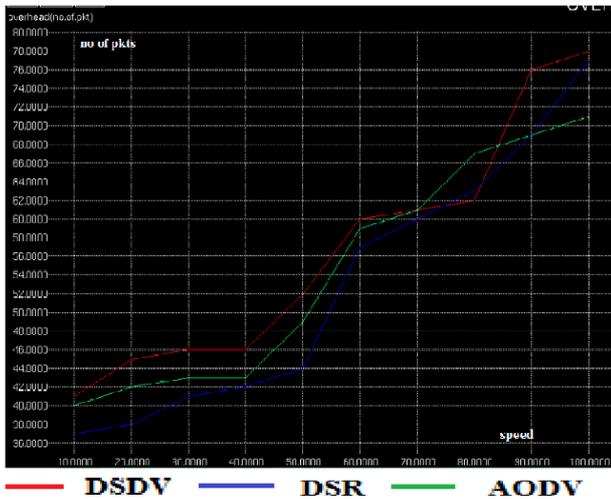


Fig 8: Overhead in routing protocols for MANETs

The overhead performance comparison of AODV, DSR, DSDV routing protocols is shown in the above figure. From this we can conclude that DSDV protocol is having more overhead compared to other protocols, since it is updated at each and every stage.

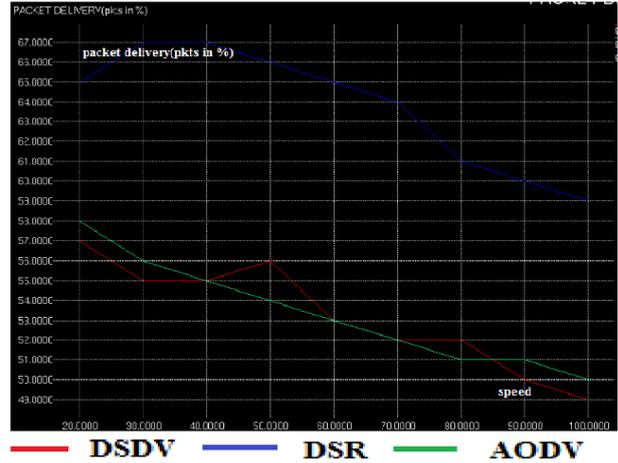


Fig 9: Packet delivery ratio

Above figure shows the estimation of AODV, DSR, DSDV protocols based on packet delivery ratio parameter. We can conclude that the packet delivery ratio of DSR is more compared to the other routing protocols.

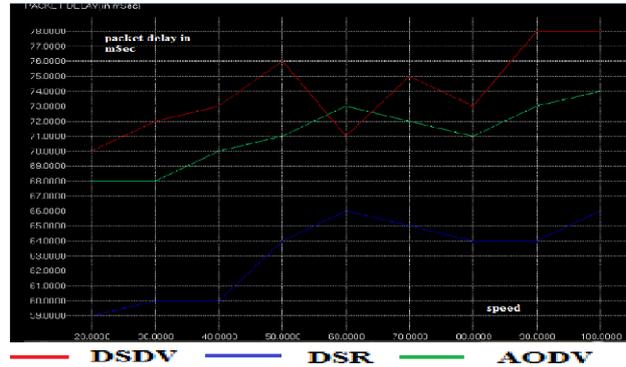


Fig 10: Delay in routing protocols for MANETs

Above figure shows the estimation of protocols based on the delay parameter. From this we can conclude that the delay factor is more in DSDV compared to other two protocols. After DSDV delay is more for AODV followed by DSR.

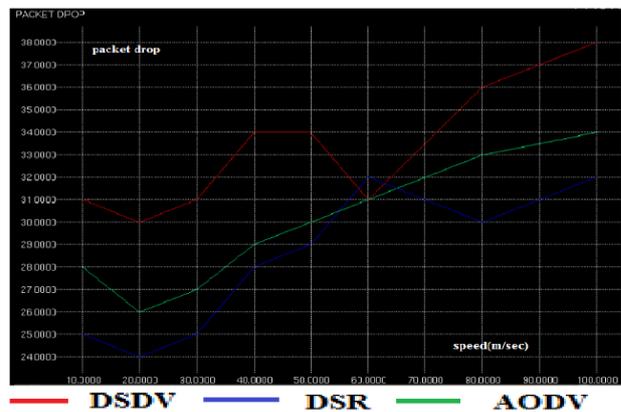


Fig 11: Packet drop in routing protocols

Above figure shows the estimation of various protocols based on packet drop parameter. From this we can conclude that the packet drop is more in DSDV compared to other two protocols.

**V. FUTURESCOPE**

This paper can be extended further by applying various optimization techniques such as ant colony optimization, bee colony optimization etc. optimization techniques can help us to find the best path.

**VI. CONCLUSION**

In this paper we have presented various parametric measures by varying the number of nodes for various protocols for routing such as AODV, DSR and DSDV. Parametric estimation of various routing protocols are presented using NS2 simulator. By this we can say that the performance of AODV is best in maintaining connection between nodes and DSR performance is better in short range cases and DSDV performance is not up to that extent compared to other two protocols. Below table shows the comparison of three protocols using different parameters.

S.N	PERFORMANCE ESTIMATION	AODV	DSR	DSDV
1	Proactive	No	No	Yes
2	Reactive	Yes	Yes	No
3	Protocol type	Distance vector	Distance vector	Distance vector
4	Delay in route finding process	High	Less	No
5	Route recovery process	Yes	No	Yes
6	Packet delivery ratio	Very good	Poor	Good
7	Overhead Routing	Low	Moderate	High
8	Consumption of Bandwidth	Less	Less	More
9	Multicasting	No	Yes	No
10	Scalability	Yes	Yes	No

Table IV. Parametric estimation of various protocols

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