# DSDV, AODV & DSR ROUTING PROTOCOLS IN MANET USING NS2 -A PERFORMANCE COMPARISON.

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**ABSTRACT**

Mobile Ad-Hoc network is a collection of wireless mobile (hosts) which forms a temporary network without the help of any centralized administration. It is a dynamic network not characterized by any presence of preset communications. In such a type of networking, the nodes which are connected act like a router that discovers as well as maintains the paths to other nodes ahead in the system. In MANET, nodes are able to move and coordinate with their neighboring nodes. Connections in the network can change dynamically due to mobile network. Nodes can be removed or included as required. The proposed work compares routing protocols DSDV, AODV and DSR in Mobile Ad-Hoc network by means of network simulator-NS2. Metrics such as proportion of packet delivery, throughput and end-end delay take part in performance analysis.

***Keyword :*** DSDV, AODV, DSR, throughput, Packet Delivery Ratio, end to end.

## I. INTRODUCTION

MANET is a collection of wireless mobile or hosts which forms a temporary network without the help of any fixed infrastructure or centralized administration. It is used in the communication of unbounded user i.e. mobile users. Figure 1.1 portrays how the individuality of the system topology extremely varies in a speedy and unpredicted manner. The nodes make a motion from source to destination exclusive of a constant access point, thus making the topology dynamic. Nowadays MANET has a robust and efficient operation in mobile wireless networks.

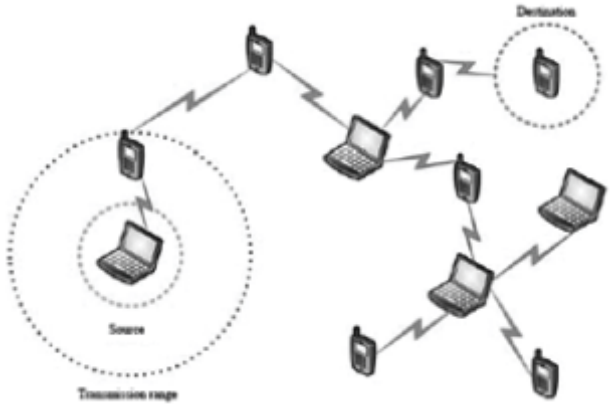


Figure1.1: Mobile Ad Hoc Network.

Since each mobile node includes routing functionality, the routing overhead is reduced by saving power for further nodes. Thus, it is evident that Ad-Hoc Networks play a significant role once the infrastructure is not accessible or costly as it can be fast deployable, with no accessible infrastructure. Typically, MANETS are used in army data transformation, in the field of health, as they give faster access to patient information from health care records, remote sensors for weather, and are also used in ICT enabled institutions with a system of virtual classrooms, and so on.

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The primary dispute is the packet routing by means of mobile nodes which is performed at frequent intervals. As mobile ad hoc network consists of wireless hosts that may move often, movement of hosts results in a change in routes. In this paper, to raise the comparison, we have employed protocols associated with routing from pro-active and reactive groups.

## II ROUTING IN MANET

Routing Protocols can be further classified into three sub-categories:

2.1. Proactive protocol. (Table-driven routing)

2.2. Reactive protocol. (On-demand routing)

2.3. Hybrid Routing Protocol.

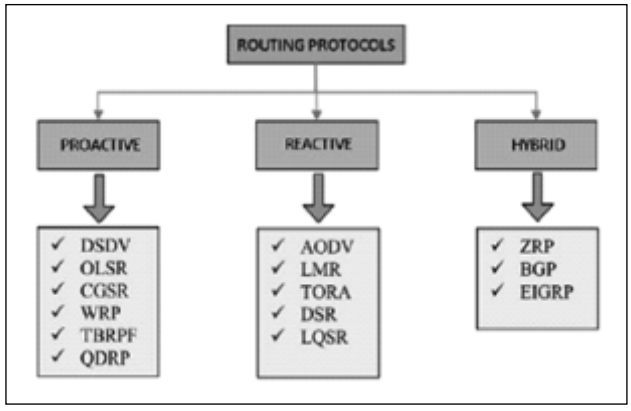


Figure 2.1: Classification of Routing Protocols.

2.1 Proactive or table-driven routing protocol The link-state routing algorithm plays a major role in Proactive routing algorithm, which frequently floods link information about its neighbors. The control packet is swapped with its neighboring nodes, so as to store the routing information. These sets of rules which uphold the process of routing comprise numerous tables. Such rules are not appropriate for huge networks, since they require preserving the information about all the nodes of the routing table. Due to this additional functionality of the routing table, over-utilization of bandwidth is realized.

Reactive or On-demand Routing Protocol

It reduces overhead which is presented in proactive protocols. It uses distance-vector routing algorithm and sets up the route to give target point, if, and only if, a node requests it by establishing the route detection procedure. Some of them in MANET are DSV, TORA, AODV and DSR protocols.

Table2.1. Comparison chart of proactive and reactive routing protocols.

| **characteristic** | **Re - Active** | **Pro - Active** |
|---|---|---|
| **Routing Structure** | Mostly Flat | Both Hierarchical & Flat |
| **Routinginformation** | Available when required | Always available |
| **Route Acquisition** | On demand | Table driven |
| **Routing Overhead** | Low | High |
| **Bandwidth Requirement** | Low | High |

I. ROUTING PROTOCOL

As far as the routing is concerned, each protocol has its specific Pros and Cons.

The proposed work has chosen 3 routing protocols namely, DSDV, AODV and DSR for the evaluation.

3.1. DSDV (Destination Sequence Distance Vector)

It is one of the hands-on procedures intended for MANETs. Count to infinity problem is the major disadvantage as each system in the web is not conscious of other system existing in the link. Thus, every node broadcasts its routing table to its neighbors. The table

exists with subsequent hops, target and the length between each of them.

The order number of the terminus node is provided with all routing pass so as to resolve the problem cited above. It also ensures loop-free routing. In order to preserve the uniformity of channeling, a table of the routing data communicates decurrently. The entry in the table comprises the target, subsequent hop, hop total, i.e. space and target order number. The table explores 2 appraisals for the reduction of transportation overhead. They are: (i) full dump update and (ii) incremental update. An incremental update precedes distinct N/W Data Packet Unit (NDPU), whereas a complete dump update precedes several NDPUs. As availability of route to destination is present all the times, it apprises its channeling table and transmits it to the adjacent nodes, if the route flops. Hence, a smaller amount of interruption is concerned with the procedure of setting the route. The primary drawback of DSDV is that it experiences too much control overhead due to the recurrent revision of busted links. This may block the bandwidth.

3.2. AODV (Ad-hoc On-demand distance vector)

AODV is ad-hoc on demand distance vector routing protocol. It is reactive type of routing protocol in which route is discovered only when a node wants to send information to other node. AODV protocol is used to send information from one node to another node which is mobile, i.e. they can move from their positions. There are two major steps through which data can be transferred and those steps are Route Discovery and Route maintenance.

AODV uses three types of messages: Route Error (RERR), Route Reply (RREP) and Route Request (RREQ). Route request message is generated by the source node and it broadcasts the RREQ message to all the neighboring nodes, and the neighboring nodes forward this message to other nodes till it reaches the destination node. When any intermediate node receives the packet from any of its neighboring nodes, it copies the address of that node before forwarding the message to other node thus creating a reverse path communication. It uses a broadcast route discovery algorithm and unicast for route reply massage.

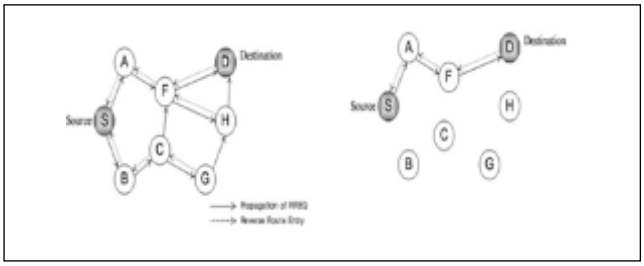


Fig 3.1 AODV (a) Propagation of RREQ (b) Route Determination from Source to Destination

**3.3. DSR (Dynamic Source Routing)**

As far as the source routing is concerned, the DSR is one of the finest models which encompass on-demand protocols for routing. Moreover, it particularly brings into play the networks, namely ad-hoc and multi-hop of the mobile nodes. It is tolerant towards the independent and systematic construction of nodes. It does not use any periodic routing messages like AODV, thereby reducing network bandwidth overhead, conserves battery power and avoids large routing updates, but to identify the connection breakdown, it requires assistance from the MAC layer. The dynamic source routing possesses 2 routing techniques, namely Maintenance and Discovery, which function jointly to permit nodes for discovering and maintaining the basis paths to random ends in the network. It possesses the sole benefit by the asset of basis routing. As the packet

itself is a route part, the life span of the route loops is either short or long. Hence they are not eligible to be molded as they can be instantaneously identified and removed. This feature unwraps the protocol to a range of valuable optimizations. The assurance of the shortest path is not delivered either by AODV or by DSR. The basis node always originates request of the route, as the target node alone can react to route demands. Moreover, initial route may be the shortest.

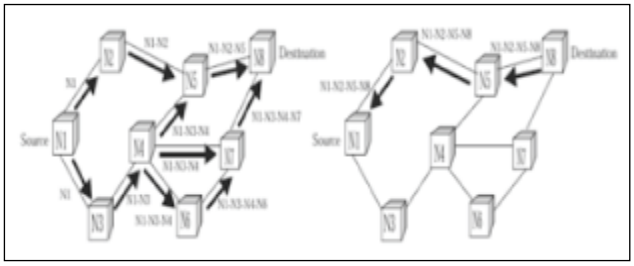

Fig 3.3 DSR(a) Building of route record during discovery (b) Propagation of route reply with routing

## II. PERFORMANCE METRICES

### 4.1. End-to-End Delay

The problem of buffering generates latency in route discovery. In turn it creates an interface queue. This can be calculated as: Time of first packet broadcasted from starting place minus the time at which the same reached the destination.

### 4.2. Proportion of Packet Delivery

The following formula estimates the proportion of data packets received by the targets to those established by the beginning point:

PDR = Number of packets received by destination
Number of packet sent by source

### 4.3. Throughput

It is manipulated with the sum of constructive packets acknowledged at every target node at an assured time. The simulation of the proposed system in NS2 takes the following steps of fixing a rectangular area where the nodes are randomly placed. Simulation parameters that are taken for implementation are given below:

| PARAMETERS | VALUES |
|---|---|
| Routing Protocol | AODV, DSDV,DSR |
| Transmission Range | 30m |
| Mobility model | Random waypoint |
| Number of Nodes | 50 |
| Idle Degree | 10s |
| Maximum Speed of Node | 2-10m/s |
| Maximum Displacement | 1-10m |

The mobility of nodes follows an arbitrary waypoint representation, where every node moves toward a randomly selected location at a speed uniformly distributed between 0 to a maximum speed, and then pauses for a configured time, before selecting a random location and repeating the same process.

## III RESULT AND DISCUSSION

Fig 5.1 portrays the outcome of different routing protocols with their delays in transmission and comparison with DSDV, AODV and DSR respectively using 50 nodes. It is evident that AODV is better than the other.

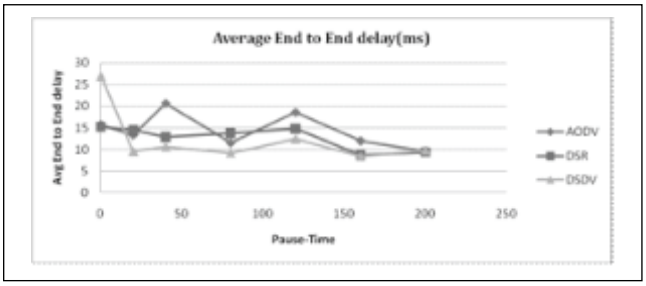


Fig 5.3 shows the result of throughput of different routing protocol and comparison for DSDV, AODV, and DSR respectively using 50 nodes. It shows AODV is better than the other two.

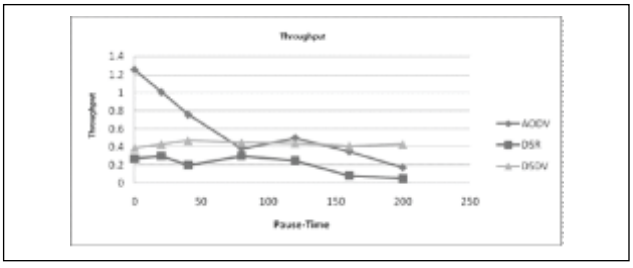


*Fig. 5.3. Throughput*

| Parameters | AODV | DSDV | DSR |
|---|---|---|---|
| Delay from source to destination | Lower than DSR | Higher than AODV | Low |
| Ratio of Packet Delivery | High | Low | Low |
| Throughput | High | Low | High than DSDV |

## IV CONCLUSION AND FUTURE ENHANCEMENT

When comparing with other protocols, the AODV performs well considered with packet delivery, end-to-end delay and throughput. Furthermore, the dynamic source routing is appropriate for networks with a reasonable movement level. As far as the overhead is concerned, it is apt for short bandwidth and small network power. The major benefit is its excellent support for multiple routes and multicasting. The AODV protocol, along with metrics such as power consumption, reliability and quality of service, can be suggested as future enhancement.

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