



## Comparison of DSR and OLSR Routing Protocols in MANET

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**Abstract:** *Mobile Ad hoc Network (MANET) is a collection of mobile nodes that are arbitrarily located so that the interconnections between nodes are dynamically changing. MANET is the special type of wireless network, where mobile nodes are connected through wireless interfaces forming a temporary network. They don't need fixed infrastructure. The mobility and scalability brought by wireless network made it possible in many applications. All the contemporary wireless network, MANET is the most important and unique applications. On traditional network architecture, MANET does not required a fixed network infrastructure; every single node work as transmitter and receiver. Nodes directly communicate with each other when they are in same range. Otherwise they relay a message to neighbor node. Due to higher mobility in nodes and dynamic infrastructure of MANETS, Routing is important issue in ad hoc networks. There are many routing protocol in MANETS like AODV, TORA, DSDV, OLSR, DSR etc. This research paper make a comparison of OLSR and DSR routing protocol based on the performance metrics.*

**Keywords:** *mobile Ad-hoc network (MANET), Dynamic Source Routing (DSR), Optimized Link State Routing (OLSR)*

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### I. INTRODUCTION

Mobile Ad hoc Network (MANET) is a collection of mobile nodes which have both transmitter and receiver that communicate with each other in bidirectional wireless links either in directed or in directed way. A mobile Ad hoc network (MANET) is a self-configuring network that does not required any pre-existent Infrastructure, which minimizes their deployment time as well as cost. As each node in this network is free to move which makes the network to change its topology continuously. These infrastructure-less mobile nodes in ad hoc networks dynamically create routes among themselves to form own wireless network on the fly. Mobile Ad-Hoc Network (MANET) is one of the most active research topics during the last ten years. With the advances in wireless technologies and development of mobile devices, ad hoc networks will play an important role in enabling present and future communication. For both video and data communication, mobile radio technologies has experienced a rapid growth. A MANET is a dynamic wireless network formed by a set of mobile hosts which communicate among themselves by means of the air without any pre-existing infrastructure. Each node in the MANET can act as a router as well as host. In order to maintain connectivity in a mobile ad-hoc network all participating nodes have to perform routing of network traffic.

#### Characteristics of MANET

- Dynamic Topology
- Energy Constraints updating
- Limited Physical Security.

In MANET, each node acts as both host and router. That is it is self-directed in behavior. MANETs are competent of multi-hop routing. The nature of network topology is dynamic. Mobile nodes are differentiated from others with less memory, power and light weight features. The reliability, efficiency, stability and capacity of wireless links are often lesser when compared with wired links.

#### ADVANTAGES OF MANET

**Router Free** - Connecting to the internet without the need for a wireless router is the main advantage of using an ad hoc network.

**Fast Installation** - The level of flexibility for setting up MANET is high.

**Mobility** - The wireless mobile nodes can move at the same time in different directions. Performance simulations show that there is a threshold level of node mobility such that protocol operation begins to fail.

**Fault Tolerance** - MANET supports connection failures, because routing and transmission protocols are designed to manage these situations.

**Connectivity** - The use of centralized points or gateways is not necessary for the communication within the MANET, due to the collaboration between nodes in the task of delivering packets.

**Speed** - Creating an ad hoc network from scratch requires a few settings changes and no additional hardware or software.

**Cost** - MANET could be more economical in some cases as they eliminate fixed infrastructure costs and reduce power consumptions at mobile nodes.

The main goal of Ad Hoc routing is to send data packets among nodes distributed randomly in the network. Since mobile ad hoc networks have random topology, routing in such networks is a tough task. There is so much work has been done on routing in ad hoc networks. Routing is the process of finding a path from a source to destination. The broadcasting is usual and a common operation in ad-hoc network. It consists of diffusing a message from a source node to all the nodes in the network. Broadcast can be used to diffuse information to the whole network. It is also used for route discovery protocols in ad-hoc networks. The routing protocols are classified as follows: -

- 1) Proactive (Table-Driven) Routing Protocol
- 2) Reactive (On-Demand) Routing Protocol
- 3) Hierarchical Routing Protocol
- 4) Hybrid Routing Protocol

**Proactive (or Table-driven) routing protocols** maintain routing information about each node in the network. The information is updated throughout the network periodically or when topology changes. Each node requires storing their routing information. For example DSDV.

**Reactive or On-demand routing protocols** look for the routes and are created as and when required. When a source wants to send to a destination, it invokes the route discovery mechanisms to find the path to the destination. For example: Ad-Hoc On-demand Distance Vector (AODV), Dynamic Source Routing (DSR).

**Hierarchical routing protocol** Nodes are organized in clusters, Cluster head “controls” cluster, one or multiple levels of hierarchy.

**Hybrid routing protocol**, Proactive for neighborhood, Reactive for far away (Zone Routing Protocol), for Proactive for long distance, reactive neighborhood.

## II. ROUTING PROTOCOL DYNAMIC SOURCE (DSR)

The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. Dynamic Source Routing is a routing protocol for wireless mesh networks and is based on a method known as source routing. DSR contains two phases: Route Discovery and Route Maintenance. Route Discovery phase involves finding a path and Route Maintenance phase involves maintaining a path. It is On-Demand Routing protocol as the process to find a path is only executed when a path is required by a node. Basic Assumptions in DSR are:

- All nodes are willing to forward packets for other nodes in the network.
- The diameter of an ad-hoc network will not be too larger.
- Packet header will be bigger than payload if route is very longer.
- The node’s speed is moderate.
- Local route cache will become stale soon if node’s speed is high.
- No energy saving.

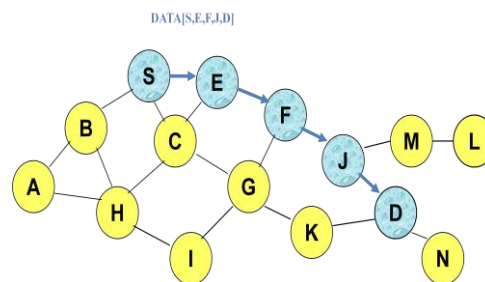


Fig1.DSR route Discovery

When S sends a data packet to D, the entire route is included in the packet header.

Intermediate nodes use the source route embedded in the packet’s header to determine to whom the packet should be forwarded.

Different packets may have different routes; even they have the same source and destination.

## III. OPTIMIZED LINK STATE ROUTING PROTOCOL (OLSR)

Optimized Link State Routing Protocol is a proactive routing protocol where the routes are always immediately available when needed. OLSR optimize the reactivity to topology changes by reducing the maximum time interval for periodic control message transmission. OLSR is a proactive routing protocol for mobile ad hoc networks. The protocol inherits the stability of a link state algorithm and has the advantage of having routes immediately available when needed due to its proactive nature. OLSR is an optimization over the classical link state protocol, tailored for mobile ad hoc networks. The protocol inherits the stability of a link state algorithm and has the advantage of having routes immediately available when needed due to its proactive nature. OLSR is an optimization over the classical link state protocol LSR is designed to work in a completely distributed manner and does not depend on any central entity. The protocol does NOT REQUIRE reliable transmission of control messages: each node sends control messages periodically Protocol Functioning. AODV defines three types of control messages for route maintenance:

**RREQ** - A route request message is transmitted by a node requiring a route to a node. As an optimization AODV uses an expanding ring technique when flooding these messages. Every RREQ carries a time to live (TTL) value that states for how many hops this message should be forwarded. This value is set to a predefined value at the first transmission and increased at retransmissions. Retransmissions occur if no replies are received.

**RREP** - A route reply message is unicasted back to the originator of a RREQ if the receiver is either the node using the requested address, or it has a valid route to the requested address. The reason one can unicast the message back, is that every route forwarding a RREQ caches a route back to the originator.

**RERR** - Nodes monitor the link status of next hops in active routes. When a link breakage in an active route is detected, a RERR message is used to notify other nodes of the loss of the link. In order to enable this reporting mechanism, each node keeps a "precursor list", containing the IP address for each its neighbor that are likely to use it as a next hop towards each destination.

### Core Functioning of OLSR

The core functionality of OLSR specifies the behavior of a node, equipped with OLSR interfaces participating in the MANET and running OLSR as routing protocol. This includes a universal specification of OLSR protocol messages and their transmission through the network, as well as link sensing, topology diffusion and route calculation. Specifically, the core is made up from the following components: Packet Format and Forwarding A universal specification of the packet format and an optimized flooding mechanism serves as the transport mechanism for all OLSR control traffic.

### Link Sensing

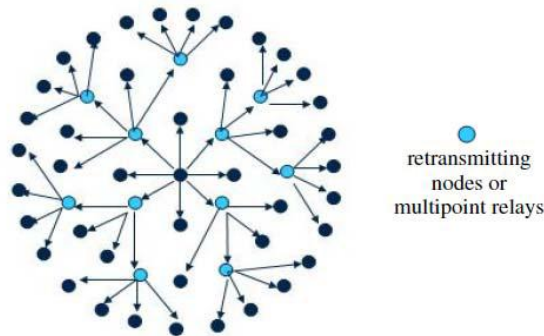
Link Sensing is accomplished through periodic emission of HELLO messages over the interfaces through which connectivity is checked. A separate HELLO message is generated for each interface and emitted in correspondence with the provisions in Resulting from Link Sensing is a local link set, describing links between "local interfaces" and "remote interfaces" i.e., interfaces on neighbor nodes.

### Neighbor detection

Given a network with only single interface nodes, a node may deduct the neighbor set directly from the information exchanged as part of link sensing: the "main address" of a single interface node is, by definition, the address of the only interface on that node. In a network with multiple interface nodes, additional information is required in order to map interface addresses to main addresses this additional information is acquired through multiple interface declaration (MID) messages.

### Multipoint Relays

Multipoint relay minimize the flooding of broadcast packets in the network by reducing duplicate retransmissions in the same region. Each node select a set of nodes in its neighborhood, which retransmits it packets. This set of selected neighbor nodes is called multipoint relay of that node. The neighbor of any node which are not in MPR set, read and process the packet received from the node.



## IV. COMPARISON OF THE DSR AND OLSR AD- HOC ROUTING PROTOCOL

Protocol property	DSR	OLSR
Reactive	Yes	No
Multicast	No	Yes
Distributed	Yes	Yes
Periodic Broadcast	No	Yes
QoS support	No	Yes
Unidirectional Link support	Yes	Yes
Routes Maintained	Route Cache	Route Table

## V. CONCLUSION

In this paper, a performance comparison of DSR and OLSR routing protocol for mobile ad-hoc networks is presented as a function of pause time. Performance of DSR and OLSR routing protocol is evaluated with respect to four performance metrics such as average end to end delay, packet delivery ratio, throughput and average jitter. OLSR shows best performance than DSR in terms of average end-to-end delay and average jitter. OLSR protocol is adapted to the network which is dense and where the communication is occurs between large numbers of nodes.

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