

## **REVIEW OF PERFORMANCE ANALYSIS OF DIFFERENT ROUTING PROTOCOLS IN MANETs**

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**Abstract-** This survey paper is about different routing protocols with their performance and characteristics. A mobile ad hoc network is a collection of interconnected nodes in which each node acts as a router and as a host because nodes are connected with each other without any access point. It is also known as ad hoc wireless network, is a self-assembling and without infrastructure network of mobile nodes which are attached wirelessly. It is very pioneering and stimulating task in networking environment. After the vast study has been done on MANETs it found that there are many issues and challenges arise due to limited resources which causes difficult to design an intelligent and effective routing approach and another challenge is topology never constant due to these nodes can move freely anywhere without any needs of routing. Congestion is also a big problem which may cause packet loss. To overcome these challenges and issues which is faced by MANETs, routing protocols have been developed.

**Keywords:** Mobile ad hoc networks, Performance analysis of routing protocols, Changes of topology, etc.

### **1. INTRODUCTION**

MANETs stands for Mobile Ad hoc Networks. A Mobile ad hoc network is a collection of wireless nodes, in which each node forwards packets to other nodes. It is a wireless network and has no centralized administration or fixed network infrastructure. Mobile ad hoc networks consist of self-healing, peer-to-peer, and self-forming networks. Each node in a MANETs can move freely in any direction and therefore changes its links to other

nodes frequently. MANETs is a collection of mobile devices such as laptops, phones etc. that can communicate with each other without an access point. Due to the absence of an access point, each node acts as a router as well as a host. MANETs can be used in many areas like battle field, natural disaster areas, military, student on campus, urgent business meeting and conferences etc. After the vast study has been done on MANETs it found that there are many issues and challenges arise due to limited resources, lack of centralized management, scalability, asymmetric link, real-time traffic support, energy balance and dynamic behavior of topology [4]. Due to rapidly changing topology, wireless links are broken and reestablished on the fly [1]. To overcome these problems, routing protocols have been developed. In this paper we have proposed the performance with their individual characteristics of the routing protocols.

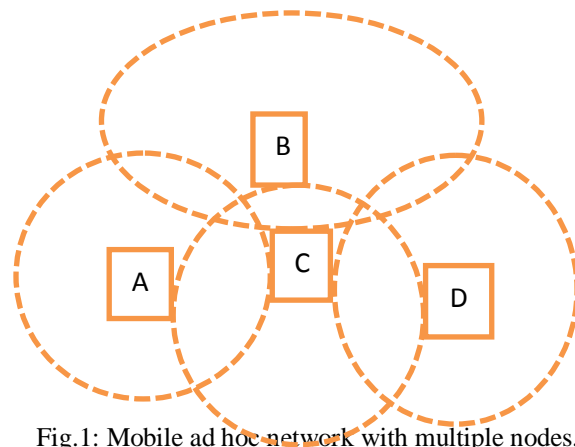


Fig.1: Mobile ad hoc network with multiple nodes.

### **1.1. ROUTING STRATEGY IN MANETs**

There are three types of routing protocols which are used in MANETs:

1. Proactive
2. Reactive
3. Hybrid

### 1.1.1. Proactive Routing

Proactive routing is also known as table driven routing protocol. In table driven routing protocol consistent and up to date routing information of all the nodes is maintained at each node. It is modified version of Bell-men ford algorithm. e.g.- Destination Sequenced Distanced Vector Routing Protocol (DSDV) and Optimized Link State Protocol (OLSR) [2].

### 1.1.2. Reactive Routing

Reactive routing is also known as on- demand routing protocol. In on-demand routing, the routes are created only when desired by the source host .This protocols always maintain the route. Table is updated only when nodetransmitted the packet to the other node.Some example of reactive routing protocols are Dynamic Source routing protocol (DSR) and ad hoc On- demand Distance Vector Routing Protocol (AODV) [2].

### 1.1. 3.Hybrid Routing

This protocols incorporates the merit of table driven and on-demand routing protocols. It is mainly used to provide hierarchical routing. Some example of Hybrid Routing Protocols are Zone Routing Protocol (ZRP), Wireless ad hoc routing protocol (WARP ).

## 1.2. CLASSIFICATION OF ROUTING PROTOCOLS

Routing inMANETs–Mobile Ad hoc Networks

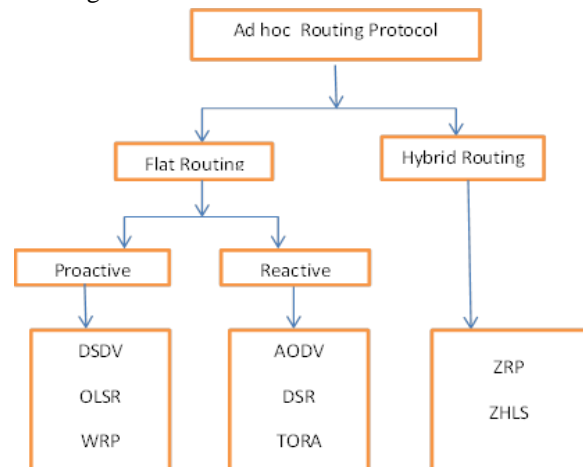


Fig.2. Classifications of Ad hoc Routing Protocols

### A. Proactive Routing

It is also known as Table-Driven routing. The table is updated every time whenever node transmit the packet from source to destination or topology changes, the information are always updated into the table. Main disadvantage of this routing protocol is unnecessary table is updated every time. e.g.- DSDV, OLSR, WRP etc.

#### 1.2.1. DSDV(Destination Sequenced Distance Vector Routing):

In DSDV every mobile stations maintained a routing table that contain the list of all available destinations. In DSDV routing the table is updated and the main advantages is that nodes can easily find out routing information [13]. Each node contain routing table which contain number of hops to reach the destination and the sequence number assign by the destination node. The sequence number is used to differentiate the routes from new ones and also avoids the formation of the loops. All the mobile station transmitted the routing table to their immediate neighbors node. The station also transmit its routing table in the significant changes has occur in its table from the least update send, so that the update table in both side that is table driven.The routing table updates can be sent in two ways:

A. Full Dump: In full dump send full routing tables to the neighbor.

B. Incremental updates: In incremental only sends updated packet to the neighbors node [7].

### 1.2.2. OLSR (Optimized Link State Routing Protocol):

In OLSR each node maintains a routing table that contain routing information of all the nodes within a network. The route is always maintained and updated whenever its require. In wireless mesh network when the packet transmits sometimes it happens same packet is transmitted several time to same receiver. Due to same packet is transmitted several time to same receiver causes overload and increased more than one time. So to overcome this problem Multipoint relay technique is used to reduce this type of problem.

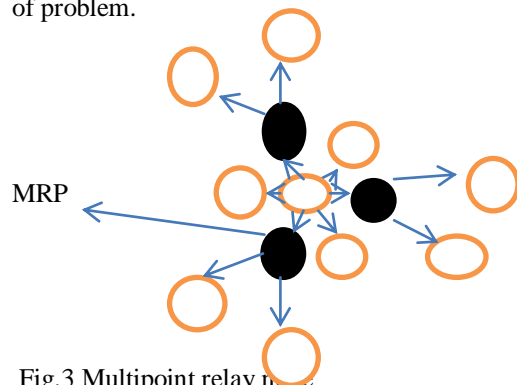


Fig.3 Multipoint relay network

Multipoint relays (MPR) is used to minimize the possible overwhelm in the network. OLSR is based on three assumptions are as follows:

1. Neighbor sensing
2. Computation of an optimal route by using the shortest – path algorithm [12].
3. Efficient flooding.

### 1.2.3. WRP (Wireless Routing Protocol)

This routing protocol is similar as DSDV routing protocol. WRP having same characteristics like it is also loop free protocol and inherit the properties of bell-man ford algorithm. This protocol avoids the count t infinity problem and also used for finding the routes between source to destination. TABLE 1 shows the comparison of proactive routing protocols.

Table1.Comparison of proactive routing protocols:

PARAMETERS	DSDV	OLSR	WRP
Routing Overload	High	Low	High
Route updates	Periodicaly	Periodicaly	Periodicaly
Loop free	Yes	Yes	Yes
Throughput	Low	Medium	Low

## B.Reactive Routing

In reactive routing protocol the routing table is not updated every time but whenever node sends a packet then routing table is updated. It is based on reply message whenever link broken down and packet is failed to send its destination then it sends reply message and then table is updated pal my. The protocols which are used in reactive routing protocol are DSR,TORA and AODV etc.

### 1.3.1. AODV (Ad hoc On-demand Distance Vector Routing)

In AODV routing,to find the path to the destination the source broadcast a route request packet. The neighbors, in turn broadcast a packet to their neighbors. It reaches on internally node that has a recent route information about the destination through which it reaches to destination. A node discards a route request if it has already seen. The sequence number is used by route request to confirm that the route are loop free and to also make sure that the route request they reply with latest information about the destination .When the node send a packet to its neighbors, It also records in its table the node from which the request came. This information is used to construct the reverse path for the route reply packet [3]. As the route reply packet transverse back to the source, the nodes along the path enters and forward route into their tables. When the link broken down between two nodes then it sendroute error message to all the nodes that are present within the network [10]. After forwarding the route error message the table will be updated. Hence AODV performs better than the DSDV in case of packet delivery ratio and routing overhead. But it does not perform well in end to end delay.

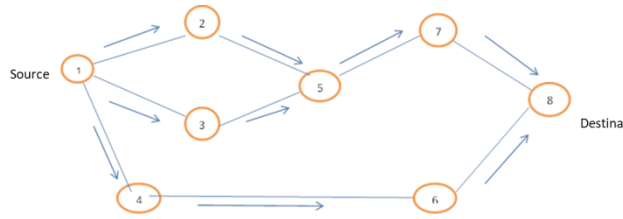


Fig.4.Path Discoveries in AODV

### 1.3.2. DSR(Dynamic Source Routing)

In Dynamic source routing, source route on demand protocol [4]. DSR has two phases 1) Route discovery 2) Route Maintenance. Each node in DSR has its own route cache [6]. When two source node want to send a packet to a destination. It looks up its route cache to determine whether it contains route to the destination or not. If it's find that an unexpired route to the destination exist. Then it uses this route to send the packet. But if it found that it does not contain route then it initiates the route discovery process by broadcasting a route request packet. The route request packet comprises the source, destination address and unique id. Each transitional node checks whether it's discern of an route to the destination. If it does not know then it add on its address to the route record of the packets and send the packet to its neighbors .To limit the number of route request created, a node process only those route request packet which have not seen earlier and its address is not present in route record of the packet.DSR uses two type of packet for route maintenance are 1)Route Recover Packet 2) Acknowledge Packet .The advantage of DSR it reduces the overhead of route maintenance and route caching can further reduceroute discovery overhead [9].

### 1.3.2. TORA (Temporally Ordered Routing Algorithm Protocol)

TORA creates a route from source to destination. It always maintains a route and remove all the invalid routes so that it give better performance. It ever contains a QUERY packet. To create a route first of all source node sends a QUERY packets to all its neighbors. This QUERY packet is retransmitted through network until packet is reachable to the destination or intermediate nodes which always has routes from source to destination.The QUERY packet is received by destination node and sends the

UPDATE packet to the source node. Table 2 shows comparison of reactive routing protocols.

Table2. Comparison of reactive routing protocols:

PARAMETERS	DSR	TORA	AODV
Throughput	Low	Low	High
Periodic	No	No	No
Cashing overhead	High	Medium	Low
Route creation	By source	Locally	By source
Routing overhead	High	High	High

### C. Hybrid routing

In Hybrid routing protocol it uses two kinds of zone first is inter zone and second is intra zone inside a network. It uses proactive routing for setup the route and also use reactive routing for communication between the neighborhood node which is also known as zone [10].some other hybrid routing protocols are ZRP,ZHLS etc.

### 1.3.3. Zone Routing Protocol (ZRP)

This protocol is hybrid. This protocol subdivided the nodes into sub network or the zones, and it also divides the class of zone into two parts inter zone and intra zone.(1) Intra zone is used for determined speed up communication between the nodes.(2) Inter zone is always shorten or minimize the unnecessary communication between the nodes [5].

### 1.3.4. ZHLS

It is based on hierarchical symbol of the network[11]. where network is partitioned into zones. In ZHLS each node has its zone id and individual node id , hence network have two level of system (1) node level (2) zonelevel, and also having two kinds of link state protocol (1)NODE LSP (2)ZONE LSP. Source node first checks intra zonerouting table before sending the packet to the destination, whether the destination node lies in its zone or not ,if lies in its zone then routing information is already present in that location and if does not lies in its zone then source node broadcast the message to find out the location through gateway nodes, and the node

response with unique id and zone id .It has its own zone id and unique id hence routing overhead is low in it as compare to AODV and DSR. Table 3 shows the comparison of hybrid routing protocols.

Table3. Comparison of hybrid routing protocols:

INFORMATION OF ROUTE STORED IN	Inter zone table and intra zone table	Inter zone table and intra zone table
STRUCTURE	Hierarchical	Flat
ROUTES	Multiple	No multiple
ADVANTAGE	Unique node id	Reduced transmission
PERFORMANCE METRIC	Shortest path	Shortest path

#### 1.4.CONCLUSION

In this survey paper we have Purposed the performance or behavior of routing protocols on the basis of comparative study. Protocols are divided into three types are (1 ) Proactive routing protocol (2) Reactive routing protocol and (3) Hybrid routing protocol. Each protocol has its individual characteristics with their uniqueness. The main problem of routing protocols are to find out which routing protocol is better in case of huge network for transmitting packet or which one is not. Because routing protocols are increased day by day and no one protocol is completely perform better in all performance metric. In future work we will compare and calculate the performance analysis of various routing protocols in MANETs and find out which routing protocols among (AODV,DSDV AND DSR) perform better by using network simulator. The performance of routing protocols are distinguished on the basis of these metrics like end to end delay, route updates, packet delivery ratio and Number of dropped packets etc. by using NS2 simulator.

#### REFERENCES

[1] A. K. Gupta and H. Sadawarti, "Secure Routing Techniques forMANETs," "International Journal of Computer Theory and Engineering",vol. 1 no. 4, pp. 456-460, October 2009.  
[2] C. E. Perkins, "Ad hoc Networking", Pearson Publication.

[3]Ankur O. Bang and Prabhakar L. Ramekin, "History Challenges andApplications" Vol 2, Issue 2013.  
[4] Y. Hu, A. Perrig and D. Johnson, Ariadne: A Secure On-demandRouting Protocol for Ad Hoc Networks, "in Proceedings of ACMMOBICOM'02", 2002.  
[5] Alam, M.R., Chan and K.S. RTT-TC: "A topological comparisonbased method to detect wormhole attacks in MANET". 2010 12th IEEEInternational Conference on Communication Technology (ICCT), pp.991-994.  
[6] A. K. Gupta, H. Sadawarti, and A. K. Verma, "A Review of RoutingProtocols for Mobile Ad Hoc Networks," "SEAS Transactions onCommunications", ISSN: 1109-2742, Issue 11 Vol.10, November 2011, pp.331-340.  
[7] P. Papadimitratos and Z. J. Haas. "Secure routing for mobile ad hocnetworks," "SCS Communication Networks and Distributed Systems Modeling and Simulation Conference (CNDS 2002)", Jan 2002.  
[8] A. K. Gupta, H. Sadawarti, and A. K. Verma, "Performance analysis of AODV, DSR & TORA Routing Protocols," "IACSIT InternationalJournal of Engineering and Technology", vol.2, vo.2, April  
[9] A. Boukerche, B. Turgut, N. Aydin, M. Z. Ahmad, L. Bölöni, andD.Turgut, "Routing protocols in ad hoc networks: A survey," "Elsevier Computer Networks", 55 (2011) 3032–3080.  
[10] C. E. Perkins and P. Bhagwat, "Highly Dynamic DestinationSequenced Distance-Vector (DSDV) for Mobile Computers," "Proc. ACMConf. Communications Architectures and Protocols", London, UK, August1994, pp. 234-244.  
[11] T. H. Clausen et al., "The Optimized Link-State Routing Protocol.Evaluation through Experiments and Simulation," "Proc. IEEE Symp. Wireless Personal Mobile Communications 2001", Sept. 2001.  
[12]P. Pap adimitratos and Z. J. Haas. "Secure routing: Secure DataTransmission in Mobile Ad Hoc Networks," "Proc. ACM Wksp. WirelessSecurity 2003", Sept. 2003, pp. 41-50. International Journal of Information and Electronics Engineering, Vol. 1, No. 3, November 2011  
[13] H. Dang, W. Li, and D. P. Agrawal, "Routing security in wireless adhoc networks," "IEEE Communications Magazine", 0163-6804, pp. 70-75,October 2002.