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## A review of evaluation of the Routing Protocols in MANETs

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**Abstract – Mobile Ad hoc Network (MANET) is a connection less network consisting of collection of mobile hosts. The mobile nodes have limited energy and limited range. The topology of the MANET is flexible it change from time to time, as the nodes in the network are mobile. There are a number of issues which affect the reliability of Ad-hoc networks and limit their viability for different scenarios; lack of centralized structure within MANET requires that each individual node must act as a router and is responsible for performing packet routing tasks; this is done using one or more common routing protocols across the MANET therefore the routing in MANETs is a key issue. The major reason for this is the constant change in network topology because of high degree of node mobility. A number of protocols have been developed to accomplish this task. In this paper we will investigate and compare the performance of FSR, DSR, ZRP routing protocols on basis of various parameters.**

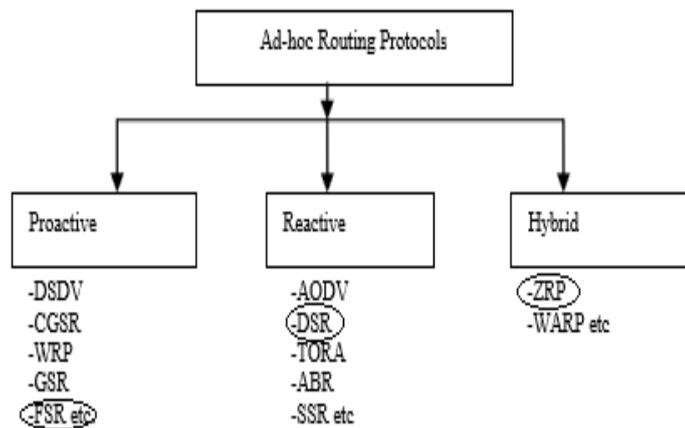
**Keywords- DSR; MANET; GSR; FSR; ZRP**

### I. Introduction

A mobile ad hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. MANETs are vigorous in nature, they are used in many situations. MANETs are used in disaster situations, where we cannot afford to develop a wired network. Presently vast work has been done in the routing protocols used in MANETs. In this paper we aim to assess the performance of Fisheye State routing algorithm (FSR), Dynamic Source routing (DSR), Zone Routing protocol (ZRP). The routing protocols in MANETs are classified into three categories: proactive (table driven), reactive (demand driven), hybrid routing protocols. In this paper we have chosen each category routing protocol. Our aim is to compare all the Routing protocols based upon parameters.

### II. Types of routing protocols

Fig. 1 Classification of routing protocol



#### 2.1 Proactive Routing Protocols

The Proactive Routing protocol is also called table driven protocol. In Proactive Routing each node updates and maintains its routing protocol every time the topology changes in the network. Therefore it is obscure task to store and maintain entries of each node. So this routing is not appropriate for large networks. Most proactive routing protocols proposed for mobile ad hoc networks have inherited properties from algorithms used in wired networks [1].

- i. **Fisheye State Routing (FSR)** - FSR is built on top of Global state routing (GSR)[1]. FSR is an implicit hierarchical routing Protocol [8]. The uniqueness of FSR is that it uses a distinct structure of the network called the “fisheye.” In this his algorithm node does not contain the information about the all updated network nodes, but it maintains the accurate information about the neighbour nodes. In this way this protocol reduces the traffic amount.

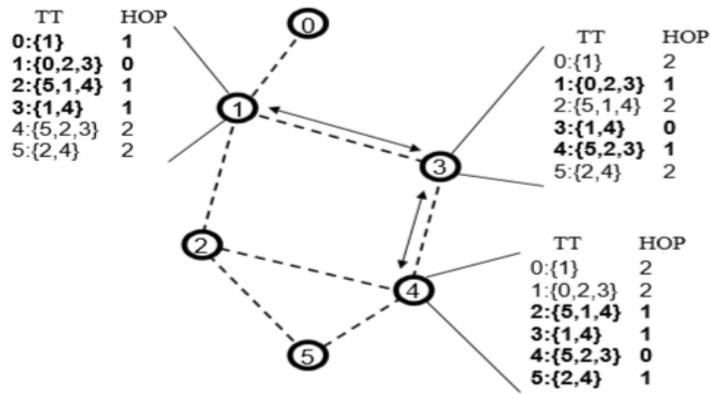


Fig. 2 Message reduction using fisheye

The neighbour entries are propagated to the node with the highest frequency. Referring to Fig. 2, entries in bold are exchanged most frequently. The rest of the entries are sent out at a lower frequency. As a result a considerable fraction of link state entries are suppressed in a typical update, thus reducing the message size [8].

### 2.2 Reactive Routing Protocol

Reactive routing protocols are acquiring routing information only when it is needed they are on-demand protocol. In reactive routing, a route determination process is invoked on demand when a source node request for a route to destination node [9].

- i. Dynamic Source routing (DSR)

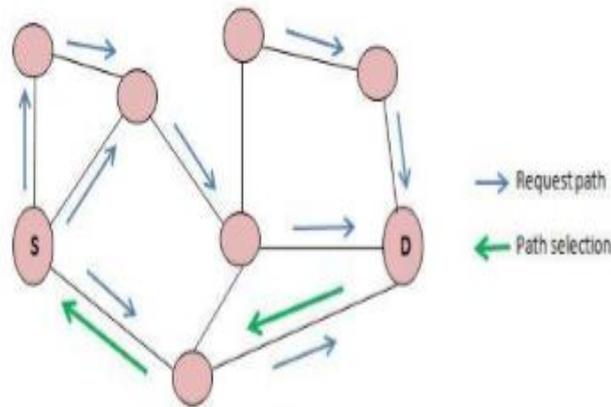


Fig 3. Dynamic source routing

DSR is a type of reactive routing protocol. DSR is composed of two main mechanisms route discovery and route maintenance.

**Route Discovery:** It is the method in which the source node receives the end node source destination path. In DSR to further reduce the cost of route discovery, the RREQs are initially broadcasted to neighbours only by zero-ring search, and then to the entire network if no reply are received. When an intermediate node forwarding a packet detects through Route Maintenance that the next hop along the route for that packet is broken, if the node has another route to the packets 's destination it uses it to send the packet rather than discard it [7].

**Route maintenance:** In route maintenance a routing entry contains all the intermediate nodes information not only the next node information. The source node has entire routing path, and the packet is sent through that routing path. If the source node does not have entire routing path, then it execute route discovery mechanism by sending the route request (RREQ) packets in the network. Then in reply the route reply (RREP) packet is send by the node which has path to destination node.

### 2.3 Hybrid Routing

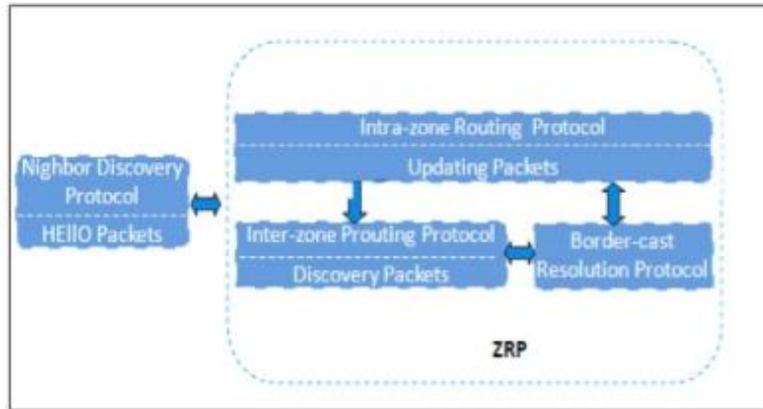
Hybrid protocol is association of the advantage of the both proactive and reactive routing protocol. Hybrid protocol is turned-out to overcome the limitations of both Proactive and Reactive protocol.

- i. The Zone Routing Protocol (ZRP)

The Zone Routing Protocol (ZRP) combines the qualities of the proactive and reactive approaches by maintaining an up-to-date topological map of a zone centred on each node [9].

ZRP uses proactive approach for routing inside the zone i.e. intra-zone routing protocol (IARP) and reactive approach for routing outside the zone i.e. inter-zone routing protocol (IERP) [2]. Fig. 4 represents the Architecture of ZRP

Fig. 4 ZRP



**ROUTING IN ZRP:** In the route discovery mechanism the source initiates the route discovery, it first checks whether the destination is inside or outside the zone. If the destination node is within the zone, the packet is routed using proactive approach and if the destination node is outside the zone, reactive routing is used. Reactive approach for routing the packet to the destination outside the zone includes two phases: route discovery phase and route reply phase. In route discovery phase, using Border cast Resolution Protocol (BRP), the source node sends a RREQ (route request) packet to its peripheral nodes. If the node receiving the RREQ packet knows the destination sends a route reply to the source, otherwise the process continues by bordercasting the packet. A node that can provide a route to the destination node sends a route reply to the source node [2].

Table 1 PARAMETRIC COMPARISION OF ALL THE PROTOCOLS

PARAMETERS	REACTIVE PROTOCOL	PROACTIVE PROTOCOL	HYBRID PROTOCOL
Routing Philosophy	Flat	Flat\Hierarchical	Flat\Hierarchical
Routing scheme	On demand	Table driven	Combination of both
Topology dissemination	Periodical	On demand	Both
Route latency	Always available	Available when needed	Both
Communication Overhead	High	Low	Medium
Scalability	Suitable for small Networks	Low	Designed for large Networks
Storage capacity	Low	High	Depend on the zone, Inside the zone the Capacity in high
Types	AODV, DSR, TORA	DSDV, WRP, FSR	ZRP, WARP

Table 2 CHARACTERISTIC SUMMERY OF FSR, DSR, ZRP

PROTOCOL	FISHEYE STATE ROUTING	DYNAMIC SOURCE ROUTING	ZONE ROUTING PROTOCOL
Category	Proactive protocol	Reactive protocol	Hybrid protocol
Metrics	Scope range	Newest path, shortest Path	Shortest path
Route recovery	Notify source	Notify source, local repair	Start repair at failure point
Route repository	Routing table	Routing table	Interzone and Intrazone table
Broadcasting	Simple	Simple	Simple
Multiple path	Yes	No	Yes
Communication overhead	Low	High	Medium
Feature	Update are localised	Only keep track of next hop	Routing range defined In the hop

### III. Conclusion

Routing is very essential component in MANETs. These are dynamic networks where topology is changing very rapidly. Every time the topology changes the source to destination path also change, so our routing protocol must able to handle the all challenges of routing. We have discussed the three type of routing protocols. The proactive, reactive and hybrid routing protocol, with the help of taking example of each protocol. The FSR shows least communication than DSR and ZRP. The FSR perform well for static network, where as DSR perform better for dynamic networks. The ZRP protocol is suitable for large networks, for small networks FSR is better. ZRP is not an independent protocol but rather a routing framework. Further, any evaluation of the ZRP version with support for unidirectional links could not be found. Nevertheless tests made in verify that ZRP with proper configuration of radius performs more efficiently than traditional routing protocols without need for centralized control. It is especially well adapted to large networks and diverse mobility patterns [8]. overall answer of our research paper is that, the mobility, traffic pattern and the network size plays a key role in choosing the protocol. It is quite natural that one particular solution cannot be applied for all sorts of situations and, even if applied, might not be optimal in all cases. Often it is more appropriate to apply a hybrid protocol rather than a strictly proactive or reactive protocol as hybrid protocols often possess the advantages of both types of protocols [1].

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