



OVERVIEW OF ROUTING PROTOCOL FOR MANET

¹Prof. Pradnya Shinde, ²Prof. Dipali Pawar

¹Assistant professor, ²Assistant Professor

¹Computer Technology Department , Sau Venutai Chavan Polytechnic, Pune, India

²Information Technology Department ,Sinhgad Institute of Techonology and Science, Narhe, India

Abstract : An ad hoc routing protocol is a standard, that controls how nodes decide which is a suitable path to route packets between computing devices in a mobile ad hoc network. In ad hoc networks, nodes are not aware of the topology of their networks. Instead, they have to discover it. Typically, a new node declares its presence and listens for declaration broadcast by its neighbors. Each node learns about others nearby and how to reach them and may announce that it too can reach them. Routing is one of the most fundamental areas of networking that an administrator has to know. Routing protocols determine how your data gets to its destination and help to make that process as smooth as possible.

Index Terms - Mobile Ad Hoc Network, Routing, Routing Protocols, AODV protocol, DSDV Protocol, ZRP Protocol.

1. INTRODUCTION

An ad hoc network is a short-range network and they are made when the device exploits a similar protocol. Ad-hoc network doesn't necessity any subscription service. With the aid of an ad-hoc network, it reduces the cost and advances the security. An Ad hoc network is a LAN where messages transfer from one node to another node instead of including on a sink station. Ad hoc networks diminished the reliance on a framework and increment the speed of the organization. Since nodes are not bound to any centralized control they are free to move about arbitrarily and hence the topology changes. Because of the clamor, the limit of every connection can change. Ad hoc network nodes depend on batteries or some other comprehensive mean vitality. MANET is a self-sorted out network of mobility nodes, without base station bolster. In this, the mobility nodal speaks with every node with the assistance of a mutual wireless channel. The most noticeable characters of MANET are mobility. Because of this, nodes can become a no. of or go away the n/w in MANET dynamically. This results in speedy exchange in topology. With a view to save the routing information available, the entire nodes necessity to know the topological modifications taking place anywhere in the n/w. Unfortunately, in large cases not all the nodes of a network are in the radio range of every node to communicate straight i.e. not within one hop. These nodes are known as central nodes by which the data is being sent with the aid of a supply relayed node to the objective node. A decentralized wireless system contains free nodes. It's ordinarily alluded to as a mobile mesh network and is a self-configurable wireless network. MANET incorporates mobile nodes and a router. A router links to multifarious hosts and wirelessly communiqué devices. These wirelessly communiqué devices are receivers or transmitters. Receiver and transmitters can have shrewd antennas of quite numerous varieties and nodes (transmitter/receiver) can be constant or mobile. In real lifestyles, these nodes mentioned these instruments which are free to move in any course similar to a mobile phone, laptop etc [1].

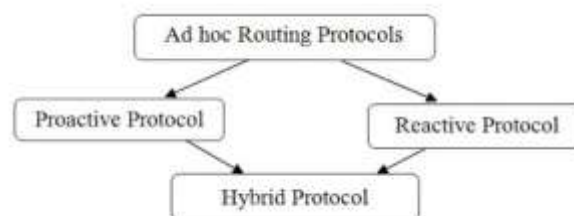


Fig 1 Classification of Routing Protocol

2. ROUTING

Routing is the way toward choosing paths during a system along which to send movement. Routing is also a critical component of system correspondence which influences the execution of any system, since different qualities of the system like throughput; dependability, and clog depend straightforwardly thereon. A perfect directing calculation is one that could convey the parcel to its goal with the least measure of postponement. It must be versatile and sufficiently clever to resolve the idea of choices on the alternatives. The routing calculations as of now getting used don't seem to be versatile, savvy, and blame prejudiced. The routing tables in them are refreshed by trading directing data firmly combined with between the routers [2].

There are three types of routing protocols are used in MANET and they are:

1. Proactive Routing Protocol (Table Base)
2. Reactive Routing Protocol (Demand Base)
3. Hybrid Routing Protocol [5].

3. PROACTIVE ROUTING PROTOCOL

Routing is the way toward choosing paths during a system along with In proactive protocol, each node of the network maintains a single or multiple routing tables that are regularly updated and which is used to store routing information. Each node will send a broadcasting message to all the other nodes in the network in order to detect the changes in their network topology .proactive routing protocol is also called table-driven routing protocols. Proactive protocol lowers the amount of traffic overhead because packets are forwarded only to known routers. this is often improper for top powerful systems in light of the particular indisputable fact that directing tables are ceaselessly refreshing with a change in topology, Proactive protocol lowers the amount of traffic above because packets are forwarded only to known routers. [4]

3.1 DSDV (Destination-Sequenced Distance-Vector Routing):

In DSDV routing protocol, each node keeps a record of route information in the form of the routing table, in which all the conceivable goals inside the network to reach every destination are notified. The routing table consists of the destination's IP address, next hop, Number of Hops required to reach the destination, sequence number. Each route entry is marked with a specific sequence number. A sequence number that identifies the update continuously [4].If there are any changes for routing information the updates are transmitted immediately either periodically and event-driven. Each node receives the route information with the most recent sequence number from other nodes and updates its table. The node looks at its routing table to determine the shortest path to reach all the destinations. Each node constructs another routing table based on the shortest path information..New Routing table will be broadcast to its neighbors' nodes updates its routing table.

3.2 WRP: (Wireless Routing Protocol) .

WRP maintains four different tables, Distance Table, Routing Table, Link-Cost Table, Message Retransmission List(MRL). WRP utilizes an upgraded form of the distance vector routing protocol, which utilizes the Bellman-Ford calculation to figure ways. As a result of the portable idea of the hubs inside the MANET, the convention presents components which lessen course circles and guarantee dependable message trades [3].MRL maintains a list of which neighbors are yet acknowledged an update message so that they will be transmitted, if necessary. WRP utilizes periodic update message transmissions to the neighbors of a node. The nodes within the response list of update message (which is made using MRL) should send acknowledgments. If there is not any change from the last update, the nodes within the response list should send an idle Hello message to substantiate connectivity. A node can decide whether to update its routing table after receiving an update message from a neighbor and always it consider for a better path using the new information. If a node gets a far better path, it relays back that information to the primary nodes so that they'll update their tables. After receiving the acknowledgment, the primary node updates its MRL. Thus, anytime the consistency of the routing information is checked by each node during this protocol, which helps to eliminate routing loops and always tries to go looking out the best solution for routing within the network.

3.3 OLSR (Optimized Link State Routing Protocol):

The OLSR is a proactive link-state routing protocol, which uses hello and topology control (TC) messages to search out and all through grow to interface state data within the course of the versatile specially appointed system. Singular hubs utilize this topology data to process the next bounce goals for all nodes within the system utilizing the most limited jump sending ways. OLSR reduces the control traffic overhead by using Multipoint Relays (MPR), which is the key idea behind OLSR.

4. REACTIVE ROUTING PROTOCOL (DEMANED BASE)

On-demand routing is a mainstream routing class for remote specially appointed routing. It obtains the necessary path when required. It does not start route discovery by itself until it has been requested when source node requests for finding a route. The outline takes after the possibility that every node tries to decrease routing overhead by only sending routing packets when communication is asked. Common for most on-demand routing protocols are the course disclosure stage where packets are overflowed into the network looking for an ideal way to the destination node in the network. Some Reactive MANET Protocols include:

4.1 ABR (Associativity-based routing):

ABR is a source that started on-demand routing protocol. It is free from circles, gridlock and packet copies. It only keeps up routes for sources that want routes. Be that as it may, ABR does not utilize route re-construction in view of the backup way to go information put away in the middle of the road nodes (in this way maintaining a strategic distance from stale routes). Also, routing decisions are performed at the destination and only the best route will be chosen and utilized while all other conceivable routes stay aloof [1].

4.2 TORA (Temporally Ordered Routing Algorithm):

TORA is a highly adaptive, effective, loop-free, scalable routing protocol based on a link reversal algorithm. TORA exhibits multipath routing capability and uses a "link reversal" model in route discovery. Link is established between two nodes creating a Directed Acyclic Graph (DAG) of the route from the source node to the destination. TORA works in three main phases: Route creation, Route maintenance, route erasure. TORA is issued execution, in that routers need only maintain information about adjacent routers (i.e., one-hop knowledge) like a distance-vector routing approach. TORA maintains state on a per-destination basis. The destination-oriented nature of the routing structure in TORA supports a mix of reactive and proactive routing on a predestination basis. During reactive operation, sources initiate the establishment of routes to a given destination on-demand.[8]

4.3 CBRP (Cluster Based Routing Protocol):

CBRP is cluster-based routing in which the head node gathers data from all other nodes in the cluster. In CBRP, routing is done via source routing. When nodes enter any network, it has an undecided state. Firstly node start timer and broadcast HELLO message, when cluster-head receives this HELLO message, it replies immediately with a triggered HELLO message. After receiving an answer by the node, it changes its state into the member state. But when the node gets no message from any cluster-head, it makes itself as a cluster-head, but only when it has the bidirectional link to one or more neighbor nodes. Otherwise, if there is no link between any other nodes, then it stays in the undecided state and repeats the procedure with sending a HELLO message again. Each node has a neighbor table. For each neighbor node, the node keeps the status of the link and state of the neighbor in the neighbor table. In the same cluster, A cluster head keeps the information about all of its members. It also has a cluster adjacency table, which contains information about the neighboring clusters.

4.4 DSR (Dynamic Source Routing):

DSR allows the network to be everywhere self-organizing and self-configuring, without the prefer for any actual network infrastructure. It discovers the route between source and destination. This protocol is based on Source Router it means Sender knows the complete path. DSR protocol is made of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to the arbitrary destination. In Dynamic Source Routing, beginning node generates Route Request (RREQ), which is sent over data packet and It specifies source node as well as the destination. Afterward, the flooding algorithm is used to send the packet in MANET. Each node receives the RREQ packet and does not know about the path to the destination so combine its name on the list which is placed on the packet's header then broadcast packet. If each node cannot transmit the data packet to other nodes in the MANET, then a Route Error (RERR) data packet is generated and re transmitted it on the route [15]

4.5. AODV (Ad Hoc on Demand Distance Vector)[8]

AODV is a variation of Destination-Sequenced Distance-Vector (DSDV) routing protocol which is collectively based on DSR and DSDV. It operates on two phases Route Discovery and Route Maintenance. Source Node will not carry the complete path. Each node only knows its previous and Next-hop information. AODV is able to both unicast and multicast routing. AODV protocol builds routes between nodes only as desired by source nodes and maintains these routes as long as they are needed by the source. The main feature of AODV is the maintenance of time-based states in each node: a routing entry not recently used is expired. If a route is broken the neighbors can be notified. Route discovery depends on query and reply cycles, and route information is stored in all intermediate nodes along the route in the form of route table entries. Control packets are used to achieve above task are as follows: routing request message (RREQ) is broadcasted by a node requiring a route to another node, routing reply message (RREP) is unicast back to the source of RREQ, and route error message (RERR) is sent to inform other nodes of the loss of the link. HELLO, messages are used for determining and monitoring links to neighbors[6].

5. HYBRID ROUTING PROTOCOL

Hybrid protocols are the combination of Distance vector Routing Protocol and Link state Routing Protocol features. Hybrid routing protocols able to maximize the profit of proactive routing and reactive routing by utilizing proactive routing in small networks (in order to decrease delay), and reactive routing in large scale networks.

5.1 Zone Routing Protocol (ZRP):

The ZRP is based on two procedures. the Intrazone Routing Protocol (IARP) and the Interzone Routing Protocol (IERP). The Zone Routing Protocol (ZRP) separates the whole network into covering zones of variable size. In ZRP, the nodes control a routing zone, which defines a collection of nodes that each node is required to maintain network connectivity proactively. Consequently, for nodes that lie outer the routing zone, routes are immediately accessible. For nodes that are outside of the routing zone, routes are determined on-demand (i.e. reactively) and it can use any on-demand routing protocol to verify a route to the required destination.

6. CONCLUSION

In this paper, we have a survey on the classification of routing protocols in mobile ad hoc networks. The protocols are divided into three main categories: (i) source-initiated (reactive or on-demand), (ii) table-driven (pro-active), (iii) hybrid protocols. For each of these classes, we reviewed representative protocols. While there are still many challenges facing Mobile ad hoc networks related to routing and security. Each routing protocol has unique features. We have to choose a suitable routing protocol. We hope that the classification presented in this paper will be helpful and provide researchers a platform for choosing the right protocol for their work. At last, we have provided the overall features of all routing protocols and described which protocols may perform best in large networks.

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