

A study on various Routing algorithms in Mobile Ad-Hoc Networks (MANETs)

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Abstract: A mobile ad-hoc network (Manet's) consists of several mobile nodes which are connected together without any infrastructure in order to communicate with each other; these nodes are self configuring and may leave the network at any instant of time, managing and updating the routing table is one of the biggest concerns in Manet's. Since there is no fixed infrastructure there may be a loss of data through continuous flooding. Here all the intermediate nodes will act as a router in the network. Routing algorithms plays a very important role in transferring the packets over the network efficiently. In this paper we gave a brief introduction about various routing protocols present in Manet's such as proactive, reactive and hybrid routing algorithms which are widely used in Manet's.

Keywords: Mobile ad-hoc networks, routing, proactive routing algorithms, reactive routing algorithms and hybrid routing algorithms

1. INTRODUCTION

MANET (Mobile Ad hoc Network) is collection of mobile nodes or devices which are Self - configuring nodes in the network. Each node in MANET can flow freely and at any instant of time it can be connect or disconnect to different nodes in the network. Mobile nodes have many limitations such as bandwidth, varying topologies, limited energy, dynamic infrastructure and links [1]. Routing is an important term used in MANET. The dynamic topology of mobile nodes is a challenge for routing in MANET. Routing techniques in MANET are categorized in three broad ways: Proactive routing, reactive routing and hybrid routing algorithms [2]

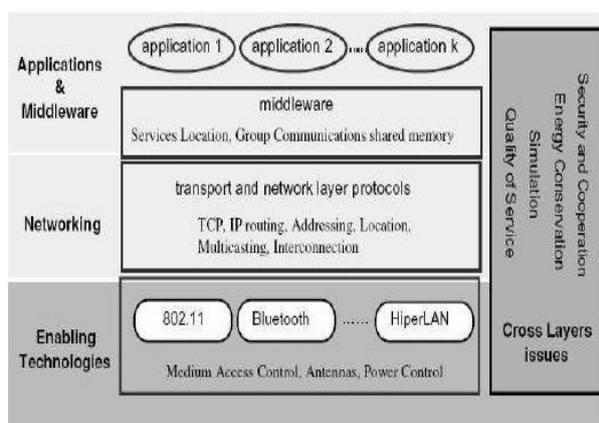


Fig 1: Architecture of MANET

2. CLASSIFICATION OF ROUTING ALGORITHMS

Routing algorithm plays a very important role in MANET and selecting the best algorithm is very crucial. Routing algorithms in MANET can be classified into three different categories

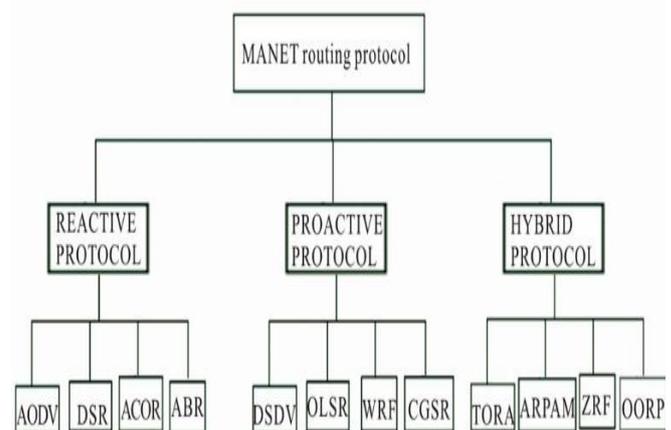


Fig 2: MANET routing protocols

Reactive routing algorithms has a flat routing structure which is on demand as per need base. Since this algorithm uses very huge flooding and in turn causes low routing overhead. This technique is not suitable for large networks and is available only when required. Reactive routing algorithms provide low bandwidth and storage capacity [1].

AODV (Ad Hoc On-Demand Distance Vector)

It is an on demand routing protocol in which the source node establish a connection with the destination node on request. It supports both unicast and multicast flooding. In AODV the each source node maintains the information about the destination until it is required and when the communication needs to take place the source node sends the route request packet to the destination by fetching the address present in the source node routing table and this is done by flooding route request to all the nodes in the network and each intermediate node sends the packet to the destination, once the route request packet is reached the destination it sends back the reply packet or acknowledgement to the source and then the communication takes place.

DSR (Dynamic Source Routing)

This algorithm is similar to AODV which uses on demand route request from the source to destination but follows source routing instead of depending on the routing table of each intermediate node. This technique mainly based on the source routing in which all the routing information is maintained and dynamically updated at the mobile nodes. This technique has only two phases ie Route Discovery and Route Maintenance. The route reply message or acknowledgement will be generated only if the packet is received by the correct destination. In order to send route reply the destination must have the route to the source, based on the information about all the nodes the routing table is updated [2].

ACOR (Admission Control enabled On-demand Routing)

This routing algorithm provides QoS ie quality of service support to all the mobile nodes in the network. In this technique an up to date routing table is not maintained and the route is established with QoS requirements on demand. The technique used in ACOR is very simple in which each node contain a QoS parameter which is obtained by the local function. When the node receives the request transmits the global cost function to the requested QoS node. This global function is used to route from the source to destination to represent an end to end route quality and then the global cost function sends back the route reply to the source.[1111]

Associatively based long-lived Routing (ABR)

This algorithm is based on the concept of associatively which is very simple, makes use of bandwidth efficiently. This protocol uses both the point to point and broadcast routing approach and the route is explicitly selected before it is been

used. This technique does not maintain any alternative route information because packet loss is been avoided and the problems associated with the route is not there. ABR improves the throughput and overall reduction in the power.[22222]

Proactive routing algorithms are both flat and hierarchical routing structure and follows table driven approach for routing. Since it is table driven routing it causes very low latency and has high overhead, the routing table is always available whenever the topology of the network changes dynamically. Proactive routing algorithms have high bandwidth and storage requirements.

Destination-Sequenced Distance Vector (DSDV)

In this technique each node will maintain a separate routing table which consists of entry of each and every possible destination and this is achieved by exchanging their routing table with all the neighbors present in the network periodically. Once the routing table information is obtained each node updates their respective routing table. The entry in each node routing table consists of a) The destination ID b) The next hop on the way to destination c) Distance from the source to the destination d)Sequence number of the current route to the destination.

Optimized Link State Routing protocol (OLSR)

This technique uses the concept of multi point relays, these are the selected nodes which broadcast the messages at the time of flooding and this technique reduces the message overhead when compared to other techniques. Here the node which is selected as multi point relays will receive the link state information and these MPRs is responsible for selecting the route from the source to the destination. It does not increase the number of routes which is been created. The main advantage of this technique is that each node will have all possible routes to the destination within the network, having this information each node can find the optimal route to the destination.

Cluster-Head Gateway Switch Routing Protocol (CGSR)

This protocol is table driven routing protocol in MANET in which a cluster is been made which consists of some set of nodes known as cluster members within a given geographical area. Each cluster will have a cluster head which acts as a controlling authority and is responsible for all the communication in the cluster. Whenever any node wants to send some information to other node, it has to first send the message to the cluster head and then the cluster head will transfer the packet to the respective cluster member in the network. If the destination node is present in the other network

then the cluster head will communicate with the other cluster head and then the message is broadcasted to the destination node in a particular cluster.

Hybrid routing algorithms follows a hierarchical routing structure, here route acquisition is both table driven and on demand. The latency is zero inside and low outside which is similar to reactive protocols which are designed for large networks. Hybrid routing algorithms have medium bandwidth and storage requirements. All the routing protocols are the combination of proactive and reactive techniques such as TORA, ARPA, ZRF, and OORP.

3. CONCLUSION

This paper gives us a brief overview of various routing algorithms in MANET. Here the algorithms are classified into three different categories such as reactive, proactive and hybrid routing protocols and each algorithm has its own advantages and limitations. It is very difficult to say which algorithm is better but as per my point of view AODV is one of the efficient techniques.

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