Survey on Routing Ad-hoc networks MANET

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Abstract: -*Mobile ad-hoc network consist of wireless nodes that communicate each other by exchanging the information. Routing refers to establishing route for transferring the information from one node to another node and the protocols used is called routing protocols. The requirement of routing protocol is to send and receive information among the nodes with best suited path with the minimum delay. Correct and efficient route establishment between a pair of nodes is the primary goal of routing protocol. Many routing protocols for MANET have been proposed earlier. Performance analysis of routing protocol is a significant challenge in the research area. This paper, gives a review work done on existing protocols characteristics of MANET and comparison between them.*

Keywords: - *Hybrid, MANET, MH, Proactive, Reactive, Routing protocols*

I.   Introduction

Wireless technologies like 802.11, Bluetooth enabled mobile devices to use MANET. These are established by connecting wirelessly. MANET has various advantages over traditional network, such as reduced cost, area, infrastructure, ease of establishment .routing is performed by nods, MANET is collection of nodes which is characterized by energy limited nodes, these nodes are known as mobile hosts [MH] [1]

The interesting area in MANET is routing. Routing depends on many factors like topology, selection of routes, and location of request initiator. The most basic operation in IP layer of MANET is to successfully transfer data packets.

But the most challenging job is designing a routing protocol for MANET so that a node at least needs to know the reachability information to its neighbour for determining packet root.

In MANET routing is performed by individual nodes. To perform routing task memory is required as well as the computation power. But the mobile service limit the physical size and weight due to this there is limitation on memory available , computational resource as well as battery power.as MANET contains more nodes it require more power , memory and band width. Mobility of nodes is also major factor because network topology changes unpredictably causes broken routing links which make them recalculate the processing time, memory, power, thus it generates traffic backlogs and overhead traffic.

II.   Classification Of Routing Over Ad-Hoc Network
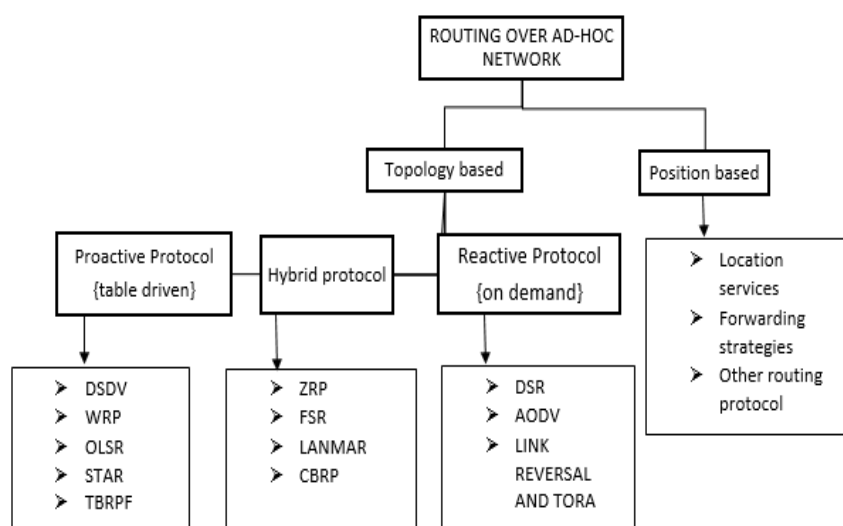
Table no 1: Classification of routing over AD-HOC

Topology-There are various type of topologies used,topologies are the way in which nodes or constituent parts are interrelated.toplogies such as mesh ,star,ring,bus,grid,circular are performed.

2.1. Topology based routing protocol .
It depends on information about existing links in the network and utilize them to carry out task of packet forwarding.

2.1.1. Proactive protocol.
These are table driven protocol. Classical routing strategies such as -Distance vector or Link state If there is any change in link connection it is updated periodically -MH in MANET should keep track of routers (possibly to destination) because on known router we can forward packet immediately
Advantages: Node experiences minimal delay it has more bandwidth than reactive.

2.1.1.1. DSDV (Destination sequenced distance vector routing)
It is proactive distance vector routing protocol proposed by [1], it is hop by hop distance vector.in this each node broadcast update periodically. It is based upon the Bellman-Ford algorithm to calculate the shortest number of hops to the destination [2].It maintains routing table for all possible destinations within the network and number of hops to destination. Each DSDV node maintains a routing table which stores; destinations, next hop addresses and number of hops as well as sequence numbers; routing table updates are sent periodically as incremental dumps limited to a size of 1 packet containing only new information [3].

To alleviate traffic two type of packets are employed full dump and small increment [1]. If a route update with a higher sequence number is received it will replace the existing route thereby reducing the chance of routing loops, when a major topology change is detected a full routing table dump will be performed, this can add significant overhead to the network in dynamic scenarios [1].

2.1.1.2. WRP (Wireless routing protocol)
WRP is table driven protocol [murthy 1996] [1] it maintains routing information among all nodes .tables formed are distance table, routing table, link cost message retransmission list MRL [1].
MRL contains.
1. Sequence number of update message
2. Retransmission counter
3. Acknowledgement required flag vector with 1entry per neighbor
4. List of updates sent in update messages.
WRP belongs to path finding algorithm.
In WRP MH[8] learn about existence of their neighbor via acknowledgement or message ,if MH doesn't send any message within time period it must send hello message to ensure connectivity. It eliminate loop situation and provide faster route.

2.1.1.3. TBRPF
It is based on extended reverse path forwarding algorithm [Dalal 1978] [1].

In this the generated message is broadcasted in reverse direction along the directed spanning tree formed by shortest path from all nodes.

In these protocols, each link-state update is sent on every link of network.Toplogy broadcast based on reverse path forwarding protocol [Bellular 1999] [1], it considers the problem of broadcasting TBRPF combines with concept of ERPF which results in use of minimum hop paths based on topology information .The use of minimum hop trees result in less frequent changes in broadcast trees and therefore less communication cost to maintain the tree.

2.1.1.4. OLSR
It is based on link state algorithm [jacquet 2001].It is optimization of pure link state protocol for MANETs.
-It reduces the size of control packet.
-Instead of all links it declares only subset of links.
-neighbors serve as multipoint relay.
-minimizes flooding by using selected node which results in reduction of traffic.
The protocol keeps the route of all destination which make it beneficial for traffic pattern with large subset of MH are communicating with each other and <source, destination>pair is changing continuously. OLSR is designed to work in distributed manner each node send message periodically, it doesn't need in order delivery of messages each control message contains a sequence number of most recent information therefore reordering van be done at receiving end. OLSR perform hop by hop routing.

2.1.1.5. STAR

Source Tree Adaptive Routing protocol [Garcia –Luna-Aceves 1999] does not use periodic message to update neighbors

STAR creates the same routing performance as the other proactive protocol and still be equal in bandwidth efficiency to obtain this result routes are allowed to be non-optimal to save bandwidth. STAR depend on underlying protocol must keep track of neighbour MH.

2.1.2. Reactive routing protocol

In this nodes, only discovers the route to destination on demand. Unlike proactive it doesn't need to know or save the route before in the memory. It consumes less bandwidth than proactive, its disadvantage is that even though route maintenance is limited it still may generate network control traffic

2.1.2.1. DSR (DYNAMIC SOURCE ROUTING)

This protocol consist of two major phase
1.   Route discovery
2.   Route maintenance
        The reactive DSR Protocol was developed by [9].MH first checks whether it has route to destination, it has packet to send to some destination but if it doesn't have such route it first initiates route discovery.it sends route request package contain address of destination along with source MHs address and unique identification number. DSR addresses mobility issues through the use of packet acknowledgements; failure to receive an acknowledgement causes packets to be buffered and route error messages to be sent to all upstream nodes. Route error messages trigger the route maintenance phase which removes incorrect routes from the route cache and undertakes a new route discovery phase.

2.1.2.2. AODV

        It is combination of DSDV and DSR .It obtains or perform route discovery and route maintenance from DSR and hop by hop from DSDV.AODV reduces number of broadcast ,maintains complete list of routes as in DSDV algorithm AODV is extension of DSR.It is pure on demand acquisition system the route are create when needed so called on demand.

A broadcast route discovery mechanism
RREQ route request - packet broadcasting to find a route
RREP Route reply packet- is used to set up forward path
Dynamic establishment of route table entries-Nodes lie on active paths only maintain routing information
Maintenance of timer based state –A routing table entry is expired if not use recently
Destination sequence number-it prevents routing loops and avoids old and broken routes.
Every node maintain two counter-
1. Sequence number
2. Broadcast id: increment whenever the source issues a new RREQ
RREQ packet<source addr, source seq, broadcast Id, dest addr, dest seq, hop count>
Destination replies unicasting RREP <source addr, dest addr, dest seq, hop count, lifetime>
Intermediate node
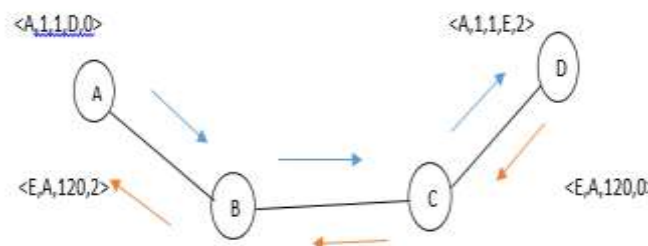It discards duplicate packet and sends RREP if it has active route with higher sequence number

Figure no 1: RREQ and RREP route of AODV

In the Fig no 1 we get to know A sends RREQ to destination D as defined above RREQ Id.as it moves further it increases its hop count till it reaches destination.E then sends RREP route reply to A thus hop count increases along the route.

2.1.2.3. Link reversal routing & TORA

The temporal ordered routing algorithm [8]. Is adaptive loop free distributed routing algorithm it is based on concept of link reversal? The concept behind TORA is it decouples the message from rate of topological changes. It is characterized by multipath routing capability. It is proposed to operate in highly dynamic mobile networking environment.
Its protocol performs three basic functions
1. Route creation
2. Route maintenance
3. Route erasure
Node with greater height can only send data to downstream node with low height.

2.1.3. Hybrid protocol

It combines local proactive and global reactive routing. It needs to maintain those path that are currently in use. Hybrid routing can be classified as
1. Zone routing protocol (ZRP)
2. Fisheye state routing (FSR)
3. Landmark routing for MANET (LANMAR)
4. Cluster based routing protocol (CBRP)

2.2. Position based

It overcame some of the limitations of topology based routing by relying on availability of additional knowledge. It requires physical location information of node.MH determined position using GPS or other positioning technique. Sender normally uses location service technique to determine destination node and incorporate packet destination address. Routing process is based on destination location available in packet and location of forwarding nodes neighbour.

2.2.1. Location service
1.   Distance routing effect algorithm for mobility
2.   Quorum based location service
3.   Grid location service
4.   Home zone

2.2.2. Forwarding strategies
1.   Greedy packet forwarding
2.   Restricted directional flooding
3.   Hierarchy routing
4.   Other position based routing

2.2.3. Other routing protocol
1.   Signal stability router
2.   Power aware routing
3.   Associativity based routing
4.   QoS routing

III.   Conclusion

In this paper we have identified and reviewed a range of literature on the topic of MANET routing protocols. We have discussed reactive and proactive MANET routing protocols and also overviewed hybrid routing and position based routing protocol. Our review focuses upon protocols developed by Perkins, namely the Destination Sequenced Distance Vector (DSDV) and Ad-hoc On-demand Distance Vector (AODV) which researchers claim is the most popular MANET routing protocol.

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