www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 4 Issue 4 April 2015, Page No. 11571-11581

A Classification of various unicast and multicast Routing protocols in MANET

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Abstract :
Ad hoc network is a multi-hop wireless network, which consists of number of mobile nodes. Mobile ad-hoc networks may be used in areas with little or no communication infrastructure This paper includes various routing protocols in MANET.our work prompted classification of varoius routing protocols in unicast and multicast routing protocols in MANET and finally our review focused on different tree based routing protocols in adhoc networks. Mobile ad hoc networks are networks which routing is based on multi-hop routing from a source to a destination node or nodes. Each of these protocols is designed to perform its task as well as it is possible according to its design criteria. This Paper deals with a classification of ad hoc routing protocols. Routing in MANET is a critical task due to highly dynamic environment. In recent, several routing protocols have been proposed for mobile ad hoc networks.A range of literature relating to the field of MANET routing was identified which highlight existing protocols as well as the current thinking within the field and the directions researchers are moving in the future.
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Index Terms: Routing protocols, AODV, DSDV, and Tree based routing

1. INTRODUCTION

Ad hoc network is a multi-hop wireless network, which consists of number of mobile nodes. These nodes generate traffic to be forwarded to some other nodes or a group of nodes. Due to a dynamic nature of ad hoc networks, traditional fixed network routing protocols are not viable. Based on that reason several proposals for routing protocols has been presented. Ad hoc radio networks have various implementation areas. Some areas to be mentioned are military, emergency, conferencing and sensor applications. Each of these application areas has their specific requirements for routing protocols. Sensor applications are low or minimum energy consumption is a precondition for an autonomous operation In contrary to infrastructured networks, an ad-hoc network lacks any infrastructure. Thereare no base stations, no fixed routers and no centralized administration. All nodes may move randomly and are connecting dynamically to each other. Therefore all nodes are operating as routers and need to be capable to discover and maintain routes to every other node in the network and to propagate packets accordingly. Mobile ad-hoc networks may be used in areas with little or no communication infrastructure: think of emergency searches, rescue operations, or places where people wish to quickly share information, like meetings etc.
Manets may be mobile hosts, multi-hop routes between nodes and may not use infrastructure.

Fig 1 below is mobile adhoc networks within multi hop routes between different nodes.

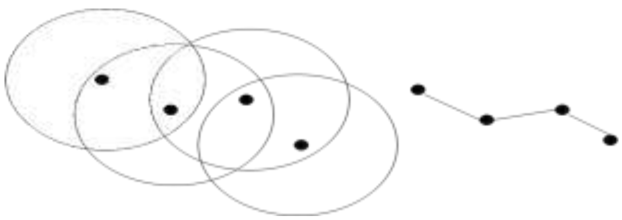

FIG 1 Mobile adhoc networks with multihop nodes.

And MANET as Dynamic topology and links formed and broken with mobility. Fig 2 below dynamic topology in MANET. Mobility results in topology and route changes and possibly uni-directional links with constrained resources like battery power, wireless transmitter range.

FIG 2: Dynamic topology in MANET

A MANET characterized by energy-limited nodes , bandwidth-constrained, variable-capacity wireless links and dynamic topology, leading to frequent and unpredictable connectivity changes. Routing in a MANET depends topology, selection of routers, location of request initiator, and specific underlying characteristics that could serve as a heuristic in finding the path Routing over ad hoc networks can be broadly classified as topology based or position-based quickly and efficiently.

2. TOPOLOGY-BASED ROUTING PROTOCOLS

Depending on the information about existing links in the network and utilize them to carry out the task of packet forwarding. They can be further subdivided as being Proactive (or table-driven), Reactive (or ondemand), or Hybrid protocols.

2.1 Proactive algorithms employ classical routing strategies such as distance-vector or link-state routing and any changes in the link connections are updated periodically throughout the network. Developed for use in wireline internet .route creation and maintance is accomplished through some combination of periodic and event triggered routing updates.periodic updates occur at specfic intervals and consists of routing information exchanges btn nodes at set of time intervals.event triggered updates transmitted whenever some event such as link addition or removal occurs.

They mandate that MHs in a MANET should keep track of routes to all possible destinations so that when a packet needs to be forwarded, the known route can be used immediately. Proactive protocols have the advantage that a node experiences minimal delay whenever a route is needed as a route is immediately obtained from the routing table.

2.2 Reactive protocols employ a lazy approach whereby nodes only discover routes to destinations on-demand. In other words, reactive protocols adopt the opposite approach as compared to proactive schemes by finding a route to a destination only when needed. Reactive protocols often consume much less bandwidth than proactive protocols, but the delay in determining a route can be substantially large. Another disadvantage is that in reactive protocols, even though route maintenance is limited to routes currently in use, it may still generate a significant amount of network control traffic when the topology of the network changes frequently.

2.3 Hybrid protocols combine local proactive and global reactive routing in order to achieve a higher level of efficiency and scalability. The major limitation of hybrid schemes combining both strategies is that it still needs to maintain at least those paths that are currently in use. This limits the amount of topological changes that can be tolerated within a given time span

2.4 POSITION-BASED ROUTING ALGORITHMS overcome some of the limitations of topology-based routing by relying on the availability of additional knowledge. These position-based protocols require that the physical location information of the nodes be known. Typically, each or some of the MHs determine their own position through the use of the Global Positioning System (GPS) or some other type of positioning technique. The sender normally uses a location service to determine the position of the destination node, and to incorporate it in the packet destination address field. As a further enhancement, position-based routing supports the delivery of packets to all nodes in a given geographical region in a natural way, and this is called geocasting.

2.5 PROACTIVE ROUTING APPROACH:

Always maintain routes, little or no delay for route determination, Consume bandwidth to keep routes up-to-date and maintain routes which may never be used. The protocols under this are:

-Destination-Sequenced Distance-Vector Protocol:

- Wireless Routing Protocol:
- Topology broadcast based on Reverse Path Forwarding Protocol:
- Optimized Link State Routing Protocol:
- Source Tree Adaptive Routing Protocol

2.6 REACTIVE ROUTING APPROACH:

Lower overhead since routes are determined on demand, significant delay in route determination, Employ flooding and Control traffic may be bursty.The protocols under this are

-Dynamic Source Routing

- Ad Hoc On-Demand Distance Vector Protocol:
- Link Reversal Routing and TORA
- Location-Aided Routing (LAR) protocol

2.7 HYBRID ROUTING APPROACH

-Zone Routing Protocol:

-Cluster-Based Routing Protocol

- Fisheye State Routing
- Core Extraction Distributed Ad hoc Routing
- Tree-based routing protocol
- Distributed Spanning Tree protocol

3. Routing protocols in MANET

3.1 PROACTIVE ROUTING APPROACH:

1. Destination-Sequenced Distance-Vector Protocol (DSDV):

- Destination-sequenced distance-vector (DSDV) is a proactive hop-by-hop distance vector routing protocol, requiring each node to broadcast routing updates periodically.

DSDV utilizes per-node sequence numbers to avoid the counting to infinity problem common in many distance vector protocols .A node increments its sequence number whenever there is a change in its local neighbourhood i.e link addition or removal .Routing table contains for each entry

a) destination IP address
b) destination sequence number
c) next hop IP address
d) hop count and instal time

DSDV utilizes both periodic and event triggered routing updates to announce important link changes such as link removals and ensure timely discovery of routing path changes.

- Every MH in the network maintains a routing table for all possible destinations within the network and the number of hops to each destination.
- Each entry is marked with a sequence number assigned by the destination MH. The sequence numbers enable the MHs to distinguish stale routes from new ones, thereby avoiding the formation of routing loops. Routing table updates are periodically transmitted throughout the network in order to maintain consistency in the tables.

-- To alleviate potentially large network update traffic, two possible types of packets can be employed: full dumps or small increment packets. A full dump type of packet carries all available routing information and can require multiple network protocol data units (NPDUs). These packets are transmitted less frequently during periods of occasional movements. Smaller incremental packets are used to relay only the information that has changed since the last full dump.

-- The route labeled with the most recent sequence number is always used. In the event that two updates have the same sequence number, the route with the smaller metric is used in order to optimize the path.

2. Wireless Routing Protocol:

The Wireless Routing Protocol (WRP) is a table-driven protocol with the goal of maintaining routing information among all nodes in the network. Each node in the network is responsible for maintaining four tables: Distance table, Routing table, Link-cost table, and the Message Retransmission List (MRL) table. Each entry of the MRL contains the sequence number of the update message, a retransmission counter, an acknowledgment-required flag vector with one entry per neighbor, and a list of updates sent in the update message. The MRL records which updates in an update message ought to be retransmitted and neighbors need to acknowledge the retransmission.

3. Topology broadcast based on Reverse Path Forwarding Protocol (TBRPF):

Topology Broadcast based on Reverse Path Forwarding is link state routing protocol.TBRPF nodes compute a shortest path tree to all network nodes.TBRPF consists two modules

a) neighbour discovery module
b) routing module neighbour

Neighbour discovery module for maintaining neighbourhood information and detects neighbours and determine the type of connectivity to each neighbour in either bidirectional or unidirectional.

Routing module for topology discovery and route computation.Each node periodically broadcasts a HELLO message to its neighbours and contains neighbour information i.e neighbour request, neighbour reply and neighbour lost category.neighbourrequest list contains address of neighbours from which nodes have recently received HELLO message.to permance routing each TBRPF node computes a shortest path source tree to each reachable node in network.

Topology Broadcast based on Reverse Path Forwarding (TBRPF) protocol considers the problem of broadcasting topology information to all nodes of a communication network. This information, together with a path selection algorithm, can be used by each node to compute preferred paths to all destinations, i.e to perform routing based on link states. TBRPF protocol is based on the extended reverse-path forwarding (ERPF) algorithm in which messages generated by a given source are broadcast in the reverse direction along the directed spanning tree formed by the shortest paths from all nodes to the source. TBRPF combines the concept of ERPF with the use of sequence numbers to achieve reliability, and the computation of minimum-hop paths based on the topology information received along the broadcast tree rooted at the source of the information.

4. Optimized Link State Routing Protocol:

Optimized Link State Routing (OLSR) protocol is a proactive protocol based on the link state algorithm. Key feature is multipoint relays to reduce overhead of network floods and size of link state updates.each node computes its multipoint relays froms its set of neighbours.

In a pure link state protocol, all the links with neighboring nodes are declared and are flooded in the entire network. OLSR protocol is an optimization of a pure link state protocol for MANETs. First, it reduces the size of control packets: instead of all links, it declares only a subset of links amongst its neighbors which serves as its multipoint relay selectors. Secondly, it minimizes flooding of this control traffic by using only the selected nodes, called multipoint relays, in diffusing its messages throughout the network. OLSR is designed to work in a completely distributed manner and thus does not depend upon any central entity. OLSR protocol performs hop-by-hop routing.

5. Source Tree Adaptive Routing Protocol:

Garcia-luna–Aceres proposed Source Tree Adaptive Routing (STAR) protocol does not use periodic messages to update its neighbors. STAR depends on an underlying protocol which must reliably keep track of the neighboring MHs. This Protocol has reduced the amount of routing overhead in network by using a least overhead routing approach (LORA), to exchange routing information. The optimum routing (ORA) approach obtains shortest path to the destination while LORA minimizes the packet overhead.

3.2 REACTIVE ROUTING APPROACH:

1. Dynamic Source Routing:

The Dynamic Source Routing (DSR) algorithm is an innovative approach to routing in a MANET in which nodes communicate along paths stored in source routes carried by the data packets. In DSR, MHs maintain route caches that contain the source routes which the MH is aware of. Entries in the route cache are continually updated as new routes. This Protocol consists of two major phases: route discovery and route mainten When a MH has a packet to send to some destination; it first consults its route cache to determine whether it already has a route to the destination. If it has a route to the destination, it will use this route to send the packet.

Initiates route discovery by broadcasting a route request packet. This route request contains the address of the destination, along with the source MH's address and a unique identification number. Each node receiving the packet checks whether it knows of a route to the destination. If it does not, it adds its own address to the route record of the packet and then forwards the packet along its outgoing links.

2. AdHoc On-Demand Distance Vector Protocol:

The Ad Hoc On-Demand Distance Vector (AODV) routing protocol is basically a combination of DSDV and DSR. It borrows the basic on-demand mechanism of Route Discovery and Route Maintenance from DSR, plus the use of hop-by-hop routing, sequence numbers, and periodic beacons from DSDV. AODV minimizes the number of required broadcasts by creating routes only on-demand basis, as opposed to maintaining a complete list of routes as in the DSDV algorithm. It supports only symmetric links with two different phases:

• Route Discovery, Route Maintenance; and
• Data forwarding.It broadcasts a route request (RREQ) packet to its neighbors, which then forwards the request to their neighbors, and so on, until either the destination or an intermediate MH with a route to the destination is reached. AODV utilizes destination sequence numbers to ensure all routes are loop-free and contain the most recent route information. Each node maintains its own sequence number, as well as a broadcast ID. AODV is designed for unicast routing only, and multi-path is not supported. The benefits of AODV protocol are that it favors the least congested route instead of the shortest route and it also supports both unicast and multicast packet transmissions even for nodes in constant movement. It also responds very quickly to the topological changes that affects the active routes. AODV does not put any additional overheads on data packets as it does not make use of source routing.

The below fig 3 explains Source broadcasts a route request packet (RREQ)

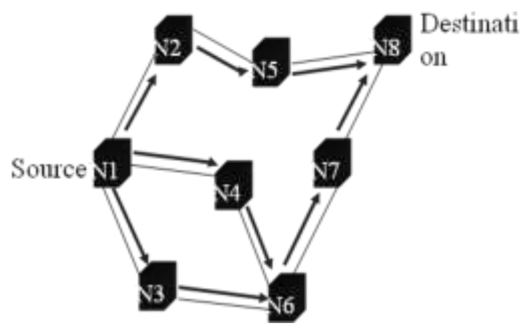

Fig 3 .RREQ

Destination (or intermediate node with "fresh enough" route to destination) replies a route reply packet (RREP) in fig 4 below.

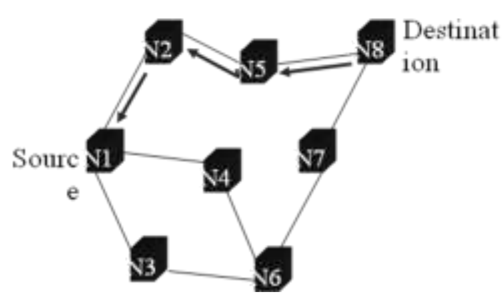

FIG 4. RREP

3. Link Reversal Routing and TORA:

Temporally Ordered Routing Algorithm (TORA) is a highly adaptive loop-free distributed routing algorithm based on the concept of link reversal. A key design concept in TORA is that it decouples the generation of potentially far-reaching control messages from the rate of topological changes. Such messaging is typically localized to a very small set of nodes near the change without having to resort to a complex dynamic, hierarchical routing solution. Route optimality (shortest-path) is considered of secondary importance, and longer routes are often used if discovery of newer routes could be avoided. TORA is also characterized by a multi-path routing capability.

TORA is proposed to operate in a highly dynamic mobile networking environment

The protocol performs three basic functions:

• Route creation,
• Route and
• Route erasure.

One of the benefits of TORA is that the multiple routes between any source destination pair are supported by this protocol. Therefore, failure or removal of any of the nodes is quickly resolved without source intervention by switching to an alternate route.

4. Location-Aided Routing (LAR) protocol:

It is based on flooding algorithms such as DSR. The goal of LAR is to reduce the routing overhead by the use of location information. LAR is a reactive protocol which is based on the DSR. In the LAR routing technique, RouteRequest and RouteReply packets similar to DSR and AODV are being proposed. When using LAR, any node needs to know its physical location by using the Global Positioning System (GPS). LAR designates two geographical regions for selective forwarding of control packets, namely, Expected Zone and Request Zone. The request zone is fixed from the source, and nodes which are not in the request zone do not forward a Route Request to their neighbors. The source or an intermediate node will forward the message to all nodes that are closer to the destination than the node itself. The Expected Zone is the region in which the destination node is expected to be present.

3.3 HYBRID ROUTING APPROACH

1. Zone Routing Protocol:

ZRP can be said to be a neighbor selection based protocol. A node employing ZRP proactively maintains routes to destinations within a local neighborhood, which is referred to as a routing zone and is defined as a collection of nodes whose minimum distance in hops from the node in question is no greater than a parameter referred to as zone radius. Each node maintains its zone radius and there is an overlap between neighboring zones.

ZRP has three sub-protocols

a) Intrazone Routing Protocol (IARP)
b) Interzone Routing Protocol (IERP)
c) Bordercast Resolution Protocol (BRP)

The ZRP maintains routing zones through a proactive component called the Intrazone routing protocol (IARP) which is implemented as a modified distance vector scheme. On the other hand, the Interzone routing protocol (IERP) is responsible for acquiring routes to destinations that are located beyond the routing zone.

The IERP uses a query-response mechanism to discover routes ondemand. The IERP is distinguished from the standard flooding algorithm by exploiting the structure of the routing zone, through a process known as bordercasting. The ZRP provides this service through a component called Bordercast resolution protocol (BRP). The below diagram shows zone routing protocol.

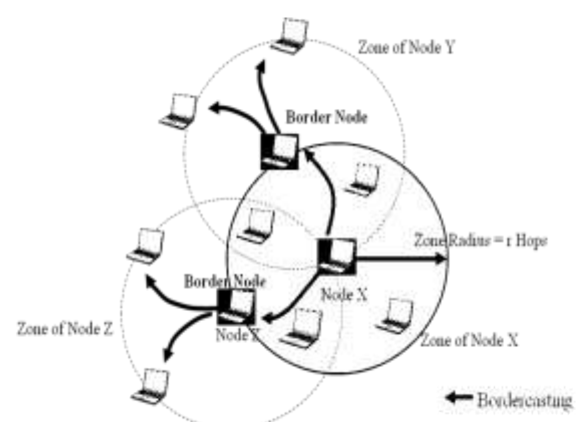

FIG 5: zone routing protocol

2. Cluster-Based Routing Protocol:

The Cluster-Based Routing Protocol (CBRP is a partitioning protocol emphasizing support for unidirectional links. Clusters are defined by bi-directional links, but inter-cluster connectivity may be obtained via a pair of unidirectional links. Each node maintains two-hop topology information to define clusters. Each cluster includes an elected cluster head, with which each member node has a bi-directional link. When a source has no route to a destination, it forwards a route request to its cluster head. The cluster infrastructure is used to reduce the cost of disseminating the request. When a cluster-head receives a request, it appends to the request packet its ID, as well as a list of (non-redundant) adjacent clusters, and rebroadcasts it. Each neighboring node which is a gateway to one of these adjacent clusters unicasts the request to the appropriate cluster head.

When the request reaches the destination, it contains a loose source routing specifying a sequence of clusters. When the route reply is sent from the destination back to the source, each intermediate cluster head writes a complete source route into the reply, optimizing that portion of the route based on its knowledge of cluster topology. Therefore, routes need not pass through cluster heads. When the complete source route is received at the source, it is used for data traffic.

3. Fisheye State Routing:

The Fisheye State Routing (FSR) protocol introduces the notion of multi-level fisheye scope to reduce routing update overhead in large networks. Nodes exchange link state entries with their neighbors with a frequency that depends on distance to destination. From link state entries, nodes construct the topology map of the entire network and compute optimal routes

4. **Core Extraction Distributed Ad hoc Routing (CEDAR)**

CEDAR partitioning protocol, integrates routing with QoS support.Each partition includes a core node called dominator node. A Dominator set (DS) of a graph is defined as a set of nodes in the graph such that every node is either present in DS or is a neighbor of some node present in DS. The core nodes use a reactive source routing protocol to outline a route from a source to a destination. CEDAR has three key phases:

1. The establishments and maintenance of self-organizing routing infrastructure (core) for performing route computations
2. The propagation of the link-states of high-bandwidth and stable links in the core
3. A QoS route computation algorithm that is executed at the core nodes using only locally available state.

QoS routing in CEDAR is achieved by propagating the bandwidth availability information of stable links in the core sub-graph. To propagate the link information, slowmoving increase-waves and fast moving decrease waves are used, which denotes increase of bandwidth and decrease of bandwidth respectively.

5) Tree-based routing protocol

Without the need of a root node this strategy tree are construct periodic beaconing messages, which is exchanged by neighboring nodes only. These trees within the network form a forest with the created gateway nodes acting as links between the treesin the forest. These gateway nodes are regular nodesbelonging to separate trees but within transmission rangeof each other. The below fig 6 shows is tree based routing from source node.

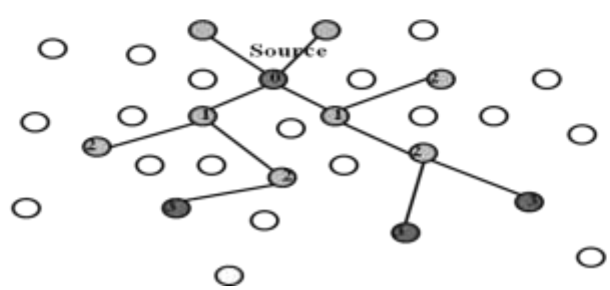

FIG 6: tree based routing in MANET

The character tics of tree based routing protocol is

a) A packet traverses each hop and node in a tree at most once

b) Very simple routing decisions at each node
c) Tree structure built representing shortest paths amongst nodes, and a loop-free data distribution structure
d) Even a link failure could mean reconfiguration of entire tree structure, could be a major drawback
e) Consider either a shared tree or establish a separate tree per each source

For separate source trees, each router in multiple router groups must maintain a list of pertinent information for each group and such management per router is inefficient and not scalable.

For shared trees, there is a potential that packets may not only not traverse shorter paths, but routed on paths with much longer distances

A zone naming algorithm is used to assign aspecific zone ID to each tree with in the network. DDR algorithm comprise of the following sixphases: (i) preferred neighbor election; (ii) intra-tree clustering; (iii) inter-tree Clustering; (iv) forest construction; (v) zone naming; and (vi) zone partitioning. To determine routes, hybrid ad hoc routing protocols (HARP) is used. HARP uses the intra-zone and inter-zone routing tables created by DDR to determine a stable path between the source and the destination. The advantage of DDR is that unlike ZHLS, it does not rely on a static zone map to perform routing and it does not require a root node or a cluster-head to coordinate data and control packet transmission between different nodes and zones.

Tree based routing based protocol divide into two types

1) Source-Tree based Multicast Protocols
   (i) Minimum hop-based,
   (ii) Minimum link based
   (iii) Stability based
   (iv) Multli cast Zone based protocol

2) Shared-Tree based Multicast Protocols
   i) Cluster based
   ii) Session specfic
   iii) IP multicast based

A) Source-Tree based Multicast Protocols

i) Minimum-hop based Multicast Protocols:

Used for minimum hop path between source node and reciever node of multi cast group.MAODV (multicast extension adhoc on demand distance vector protocols) is an example of minimum hop based multicast protocol.

ii) Minimum link absed multicast Protocols:

Aim for overall minimum no of links in multicat tree connecting a source node to all reciever nodes of multicast group.Bandwidth efficient multicast routing protocl (BEMRP) is an example of minimum link based multi cast protocols.

iii) Stability based Multicast Protocols:

The stability-based multicast protocols aim for a long-living tree connecting the source node to the receiver nodes of the multicast group. at the time of joining the tree, each receiver node selects the most stable path to the source node that minimize the number of tree reconfigurations. In order to determine stable paths and trees, routing protocols use metrics that are a measure of the longevity of the links in the network. Associativity-Based Ad hoc Multicast (ABAM) routing protocol is example.

iv) Multicast Zone-based Routing Protocol (MZRP):

MZRP is the multicast extension of the unicast Zone Routing Protocol (ZRP) a hybrid of both proactive and reactive routing strategies. There exists multiple zones in the network and often these zones overlap with each other. A border node is the node that is part of more than one zone. ZRP employs proactive routing for intra-zone communication and a combination of proactive and reactive routing protocols for inter-zone communication

B)Shared-Tree based Multicast Protocols:

Shared tree-based protocols construct a single tree that is rooted at a central control point called the Rendezvous Point (*RP*).

i) Cluster-based Shared-Tree Wireless Multicast Protocol (ST-WIM):

Shared-tree wireless multicast protocol (ST-WIM) is based on sparse PIM, a unicast protocol for wired networks. ST-WIM is portable to different wireless platforms as it is independent of the underlying wireless routing protocol.

ii)Session-specific Ad hoc Multicast Routing Protocol utilizing Increasing Id Numbers (AMRIS):

AMRIS provides a unique session-specific multicast session member id to each participant.

AMRIS uses the underlying MAC layer beaconing mechanism to detect the presence of neighbors.

iii) IP Multicast Session-based Ad hoc Multicast Routing Protocol (AMRoute):

The adhoc multicast routing protocol (AMRoute) is an attempt to enable the use of IP multicast in MANETs. AMRoute make use of the underlying unicast routing protocol to detect network dynamics while it takes care of the frequent tree reconfigurations.

5.1) Source-initiated Mesh-based Multicast Protocols:

Mesh is a set of nodes in the network such that all the nodes in the mesh forward multicast packets via scoped flooding. Mesh based protocols can be either source-initiated or receiver-initiated.

A) On-Demand Multicast Routing Protocol (ODMRP):

ODMRP is a mesh-based multicast routing protocol based on the notion of a forwarding group. Multicast group membership and routes are established and updated by the source in an on-demand basis. This leads to reduction in channel/ storage overhead and an increase in scalability. ODMRP to be the most advantageous and preferred protocol in mobile wireless networks. ODMRP can also operate independently as an efficient unicast routing protocol.

And as following characteristics'

a) Mesh-based protocol employing a forwarding group concept

b) Only a subset of nodes forwards the multicast packets

c) A soft state approach is taken in ODMRP to maintain multicast group members

d) No explicit control message is required to leave the group

e) The group membership and multicast routes are established and updated by the source on demand

f) If no route to the multicast group, a multicast source broadcasts a Join-Query control packet to the entire network

g) This Join-Query packet is periodically broadcasted to refresh the membership information and updates routes

After establishing a forwarding group and route construction process, a source can multicast packets to receivers via selected routes and forwarding groups

To leave the group, source simply stops sending Join-Query packets

If a receiver no longer wants to receive from a particular multicast group, it does not send the Join-Reply for that group

B) Neighbor Supporting Multicast Mesh Protocol (NSMP):

NSMP is an efficient mesh-based multicast routing protocol that reduces the number of control message broadcasts as much as possible. NSMP resorts to network wide flooding only during initial route establishment and during network partition repair.

5.2) Receiver-initiated Mesh-based Multicast Protocols:

Receiver-initiated mesh protocols are more robust to node mobility as they attempt to maintain a shared mesh involving all the source nodes of the multicast group. The multicast source nodes forward packets on the reverse shortest path from the receiver nodes to the source.

5. Distributed Spanning Tree protocol:

In this approach, the source sends the control packets to the tree edges till each of them reaches a leaf node. When a packet reaches the leaf node, it is forwarded to a shuttling level. The nodes in the network are grouped into a number of trees. Each tree has two types of nodes; route node, and Internal node. The root controls the structure of the tree and whether the tree can merge with another tree, and the rest of the nodes within eachtree are the regular nodes. Each node can be in one three different states; router, merge and configure depending on the type of task that it trying to perform. DST proposes two strategies to determine a route between a source and a destination pair.

5. CONCLUSION

This paper, we present a general view of different unicast and multicast routing protocols in mobile adhoc networks.The comarison we have presented between routing protocols indicates the design of secure adhoc routing protocols. Multicast tree-based routing protocols are efficient and satisfy scalability issue. Mesh-based protocols provide more robustness against mobility and save the large size of control overhead used in tree maintenance. Our initial work discussed a pair of survey papers from which we identified early reactive and proactive and hybrid MANET routing protocols.our review focused on different tree based routing protocols and varoius classification of different routing protocols in MANETS.

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