



## Multicast Routing Protocols: A Survey

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**Abstract-**A mobile ad hoc network is a set of mobile nodes which constructs the network dynamically without any centralized coordinators and without any existing infrastructure. In wired networks changes in network topology are not feasible which led to the invention of wireless ad hoc network. Here in ad hoc network mobile nodes establish wireless connections among themselves without any central coordinator. The connections made among them can be direct connections if the communicating nodes are within the range of each other, otherwise multihop connections are used where each node will have to forward the packet until the destination node has been reached which led to the invention of different routing protocols for both unicast and multicast communication. In this paper we are going to present the comparative analysis of different routing protocols available.

### I. INTRODUCTION

In ad hoc network portable devices establish communications without any central infrastructure. While moving mobile nodes which are without central infrastructure, raises various problems like security, routing and link break etc. There are different multicast routing protocols available which are summed up in Fig 1, these protocols further fall into two types table driven and on demand (reactive) protocols. Table driven protocols will maintain tables based on the routing information available and on demand protocols cannot prepare any table in advance but react according to the situation.

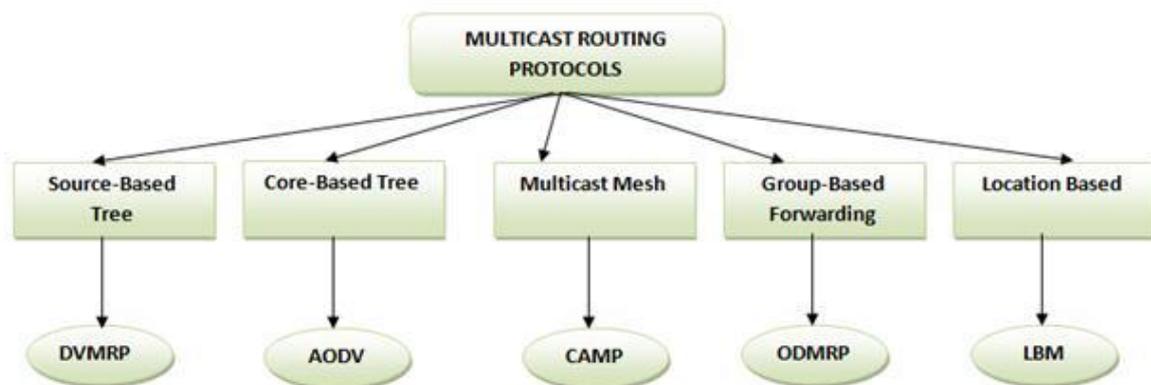


Fig 1: Classification of Multicast Routing Protocols

### II. CATEGORIES OF MULTICAST ROUTING PROTOCOLS

There are three basic categories of multicast methods:

1. Flooding: A basic method is to simply flood the network. Every node receiving a message floods it to a list of neighbors. Flooding a network acts like a chain reaction that can result in exponential growth.

2. The proactive approach pre-computes paths to all possible destinations and stores this information in the routing table. To maintain an up-to-date database, routing information is periodically distributed through the network.

3. The final method is to create paths to other nodes on demand. The idea is based on a query response mechanism or reactive multicast. In the query phase, a node explores the environment. [2]



### III. PERFORMANCE OF EXISTING AD HOC ROUTING PROTOCOLS

Multicast routing protocol for mobile networks generally categorized as source- based tree, Core based tree, Location based tree, and Stability based tree, Multicast mesh and Group based forwarding.[1]

#### A. Source Based Multicast Tree (SBT)

Here we establish a multicast tree and the purpose is to maintain the tree for each multicast source node in every group . For example, in an environment consisting of „m“ multicast groups which further consists of „n“ multicast source nodes, it results in  $(m*n)$  multicast trees.

The advantage of this scheme is each multicast packet is forwarded along the most efficient path from the source node.[2]

#### Distance Vector Multicast routing protocol (DVMRP)

DVMRP is an interior gateway protocol that is completely based upon Routing Information Protocol (RIP) which is used to support connectionless multicast data transmission to a group of hosts over a network. DVMRP uses tunnels which can multicast transmission within unicast packets and which are again reassembled into multicast data when they will arrive at their destination.[2]

#### B.Core Based Tree

This approach is more feasible than SBT described above. Here we are going to maintain only a single shared tree which can be used to connect all the multicast group members together. The only need of this approach is to select the „Core“ node which will act and that’s why it is named as core based tree and for this we need a core selection algorithm which will help to select that which node will act as core node of the tree.

#### Ad hoc On Demand Distance Vector Routing Protocol

**AODV** is suitable for both unicast and multicast routing. This protocol on on-demand reactive protocol which is based on the concept of destination sequence number in DSDV. Sequence numbers are basically used to check the staleness and freshness of the routes.

The Ad hoc On Demand Distance Vector (AODV) routing algorithm is a routing protocol designed for ad hoc mobile networks . It is an on demand algorithm, meaning that it builds routes between nodes only as desired by source nodes. It maintains these routes as long as they are needed by the sources.[2]

#### C. Multicast Mesh

In the previous two approaches we are building trees for multicast delivery structure. But in mobile ad hoc network the rate of link changes so frequently that frequent tree reconfiguration is not feasible which results in the development of a new structure which is totally mesh based.

As in a mesh each node in it can have more than one parent. Multiple paths exists and they can be used if a primary path is broken. The protocol which is using this structure is CAMP which is discussed below.

*CAMP (Core Assisted Mesh Protocol)*



This protocol works on the structure of multicast mesh where it can create a multicast mesh for each multicast group. A multicast mesh can be established by having both the sender and receiver nodes join the multicast group.

#### D. Group Based Forwarding

In this method a group of nodes is maintained instead of the links that constitutes the tree or mesh. This simplifies the processing required at each node. This group of nodes will act as forwarding nodes for each multicast group. The example of the protocol that uses this approach is ODMRP (On Demand Multicast Routing Protocol)

#### ODMRP (On Demand Multicast Routing Protocol)

ODMRP is an on-demand mesh based multicast Routing protocol, besides it is a multicast routing protocol, ODMRP protocol can make use of unicast technique to send multicast data packet from the sender nodes toward the receivers in the multicast group. The source, in ODMRP, establishes and maintains group membership.

#### Comparison of Characteristics of Protocols [2]

Parameters	DVMRP	AODV	CAMP	ODMRP
Routing Metric used	Shortest path metric	Shortest path to next multicast member	Shortest Path metric	Shortest Path metric
Routing Approach Used	Flat approach	Flat approach	Flat approach	Flat approach
How Much dependency on Unicast Routing	Not dependent	Not dependent	Dependent	Not Dependent
Routing Scheme used	Table-driven (Proactive)	On-demand (Reactive)	Table-driven (Proactive)	On-demand (Reactive)
Core Node Recovery	Not applicable	Yes	Yes	Not applicable
Use of Centralized Node	Not used	Yes	Yes	Not used
Multicast Delivery Structure	SBT	CBT	Multicast Mesh	Group Based



**Table2: Comparison Of Performance and Operations**

Parameters	DVMRP	AODV	CAMP	ODMRP
Repairing Latency	Moderate	Moderate	Low	Low
Join Member Latency	Moderate	High	Moderate	Moderate
Session Initiation Latency	Low	High	Moderate	Moderate
Use of periodic Flooding	Yes	Yes	Sometimes	Yes
Termination Procedure	None	Request to prune	Request to prune	No
Repair Procedure	Flood data packets	Node downstream	Use alternate path	Use alternate path
Member Join Procedure	All source trees	Join the existing multicast tree	Join the existing multicast mesh	Broadcast join table

#### IV. CONCLUSION

As it has been stated above there are number of protocols available for multicasting in mobile and ad hoc networks and all of them are different from each other in one way or the other. [9] Besides gaining the performance reliability still there are many factors which needs to be included to get the best performance of these protocols. Based upon the comparative analysis of the protocols discussed above it has been concluded that on-demand (reactive) protocols are far better than table-driven (proactive) protocols in the taxonomy of different routing protocols available in manet. Based upon the analysis we have discovered that there are many security risks which can be applicable to these protocols.

#### REFERENCES

- [1] Analysis of Multicast Routing Protocol for Ad Hoc Mobile Wireless Networks by Sandeep kaur , Dept of computer science , lovely professional university and Navjotpal kaur Dept of computer science Lovely professional university
- [2] Paper Title: A Quantitative Survey of Mobile Ad hoc Multicast Routing Protocols, IJETAE, V3I1.