CHAPTER 4

PROPOSED SYSTEM

4.1. Introduction

A mobile Ad hoc network consists of mobile nodes forming a dynamic autonomous system without using any physical infrastructure. In Mobile Ad hoc Networks (MANETs) traditional routing protocols uses flooding technique to propagate the destination, which may cause an overhead in the network. Recent proposals have resolved this issue in various methods.

Ad hoc On demand Distance Vector Protocol (AODV) and Distributed Source Routing Protocol (DSR) are the two most popular reactive routing protocols for Ad hoc networks. AODV and DSR include the same two routing phases (route discovery and route maintenance). AODV uses sequence numbers for every node, in order to ensure that the selected paths will not include loops and the routing information is still valid. [74]

DSR employs source routing: the sender of a packet determines the list of nodes which will be traversed by the packet. The sender adds this path in the packet header. Each node in the path should transmit the packet to the next node in this path until it reaches the destination node [75].

In DSDV (Destination-Sequenced Distance-Vector Routing), a protocol guarantees loop free paths to each destination. It associates to each route entry a sequence number indicating its freshness [76].
OLSR (Optimized Link State Routing Protocol) is a proactive link state protocol, uses the concept of Multipoint Relays (MPR) to reduce broadcasting overhead [77].

To minimize overhead, TBRPF (Topology Broadcast Based on Reverse Path Forwarding) nodes use periodic and differential updates to flood only part of their source trees. As MANET is dynamic environment proactive protocol require regular update but the drawback is, some routes are never used, but they exist in the routing table. Reactive protocols reduce the routing load as compared to the proactive protocols. This technique does not require constant broadcast messages, but causes additional delay since the routes are not usually available [78].

As traditional routing protocol uses the flooding technique for locating the destinations, it causes an overhead in the network. MPR (Multi Point Relay algorithm) is introduced in the AODV protocol [MPRAODV] to reduce the number of messages broadcasted during the flooding phase and enhances the packet delivery performance [79].

AOMDV (Ad hoc On demand Multipath Distance Vector Protocol) is a multipath routing protocol and it searches for alternate paths if the current route breaks by flooding the network. [80]

In Dynamic MPR each node maintains both a Neighbor Set and a 2-hop Neighbor Set to calculate Multipoint Relay list (MPR), thus the resulting protocol is hybrid. Each node observes the neighborhood changes to detect its mobility. It calculates periodically entity changes after reception of all Hello messages [81]

In Path accumulation, all discovered paths between source and destination nodes are appended. Hence, at any intermediate node the RREQ packet contains a list
of all nodes traversed. Each node receiving these control messages, updates its routing table. It adds paths to each node contained in these messages [82].

Multipath finds multiple paths between a source and a destination in a single route discovery. Single path protocol like AODV initiates a new route discovery when it detects one path failure to the destination. In contrast, Multipath AODV initiates a new route discovery when all these paths fail or are obsolete. AODV-multipath minimizes the number of common links between a source and a destination [83].

Multipath and MPR based AODV routing protocol integrates dynamic MPR and multipath. MMDV is a hybrid routing protocol. It sends proactively Hello messages to store routes for two hop neighbor nodes and compute MPR lists. It computes all other routes only when needed (reactively). Moreover, MMDV finds multiple and “disjoint” paths between a source and a destination in a single route discovery process [84].

In literature, different Multi Point Relay (MPR) based protocols were developed for reducing the overhead during data transmission. In Multipath and MPR based AODV routing protocol (MMDV) higher packet delivery fraction could be achieved because of availability of routes to all destinations in the two hops and availability of alternate routes to send packets when one route fails.

MMDV initiates route discovery whenever a route is needed by a source node or whenever a node wishes to join a multicast group. The DynMPR feature in MMDV allows only the source node to go in search of destination node. To reduce time taken for route discovery process a Modified DynMPR is proposed. It allows both the source node and the destination node to select a subset of MPR nodes to propagate in search of each other at same time. In the use of modified DynMPR, the route discovery is made
very fast and the flooding overhead will be reduced which leads to decrease in delivery time and increase in delivery ratio.

4.2. Aim and Scope of Research

The main aim of this research is to modify the Dynamic MPR feature in Multipath and MPR based AODV (MMDV) protocol to obtain Enhanced Multipath and MPR based AODV (EMMDV) protocol. Here, an algorithm with the newly developed concept of “backward navigation from destination node” is proposed. This method allows the source and destination node to become active and create the link between them through the intermediate nodes.

AODV, DynMPR feature and Multipath feature have given rise to Multipath and MPR based AODV (MMDV) protocol. Modified Dynamic Multi Point Relay (MDMPR) protocol helps to improve the route discovery process and reduce the overhead. Trigger Agent (TA) is key initiative which burst the process thread on destination node and it is propagating till Meeting Point (MP). This proposal is obtaining more efficiency than MMDV.

The proposed approach was simulated in NS-2 simulation environment and the results were analyzed based on the performance of the MMDV and EMMDV protocol.

4.3. Proposed Methodology

In this Research, the new algorithm is developed with the concept of “backward navigation from destination node”. In this method both source and destination nodes are become active and create the link between them through the
intermediate nodes. Once the route is established, the overall activities in the network are updated to the master list table.

**Master List**

Master List maintains all the current active nodes and the discovered routes throughout the network. The protocol informs Master list that the source node wants to bridge with the destination node. The protocol starts to establish a link with the intermediate nodes to reach the destination node. Through the assistance of Master list, the protocol can easily identify the presence of the destination node, and the protocol instructs the destination node to travel towards the source node.

**Routing Table**

A routing table, or Routing Information Base (RIB), is a data table stored in a router or a networked computer that lists the routes to particular network destinations, and in some cases, metrics (distances) associated with those routes. The routing table contains information about the topology of the network immediately around it.

Here, the protocol wants to create a route between the source and destination to transfer the data packets. At first, the source node informs the master list and sends the RREQ message towards the destination node with routing table information.

The master list finds the destination node location and informs about the source node. The destination node finds paths to reach the source node. At certain level, both the source and destination node contacts each other. At this level, the routing path and the target node with master list are confirmed. After confirmation the destination node sends the RREP message to the source node. Finally, a route will be created between the source and destination nodes.

**EMMDV Protocol routing Architecture**
The Architecture of the proposed Enhanced Multipath and MPR based AODV (EMMDV) protocol contains three processes namely Trigger Agent (TA), Destination-To-Source (DTS), and Meeting Point (MP). In Fig.4.1 the Trigger Agent (TA) contains process thread which informs core router to search whether destination node is within its range. If meets the criteria, the Trigger Agent (TA) tries to propagate and burst the process thread in destination node.

The initiated process thread invokes the Destination-To-Source (DTS) scheme which will terminate the process prioritized by Meeting Point (MP). The Meeting Point (MP) contains hand shaking mechanism; it transforms the Destination-To-Source (DTS) path to regular MPR travelling from source to destination and kills the Destination-To-Source (DTS) process thread. Thereby it reduces the propagation time and improves delivery ratio.

Initially, the source node selects its MPR set, which will enable each node in the set to reach out to all the neighbors within the two-hop range. As well as the destination node will select its own MPR set to reach out its two-hop neighbors.

Whenever the connection is needed between source and the destination, the MMDV protocol flood the RREQ to their neighbors in the MPR set, the other nodes that are not in the MPR set can read the message, but not retransmit the message. CR (Core router) acts as a central medium which contains information about all connected nodes.
Core router (CR) is nothing but Internet Gateway (IGW). In our proposal, Core router (CR) first searches whether the destination signature is present in the current network. If available, the Core router (CR) sends the message to destination about source node and executes the Trigger Agent (TA) from destination to source else it discards the TA. Thus source node searches destination node through Dynamic Multipoint Relay (DynMPR) based flooding method; similarly destination also searches for source node. Parallel execution of this architecture helps to reduce the discovery time and improve the packet delivery ratio (PDR).
4.4. Summary

MMDV is an improvement of AODV protocol providing for multipath and MPR based flooding. This protocol consists of both proactive and reactive components. In a proactive phase, nodes compute their MPR lists and compute paths to their two hop neighbors. In a reactive phase, nodes compute two paths for each destination. MMDV protocol finds the path between the source and destination based on DynMPR feature and Multipath concept.

In Dynamic MPR each node maintains both a Neighbor Set and a 2-hop Neighbor Set to calculate Multipoint Relay list (MPR). Multipath finds multiple paths between a source and a destination in a single route discovery.

A Modified Dynamic Multi Point Relay (MDMPR) is proposed in order to improve the route discovery process and reduce the overhead. Trigger Agent (TA) is key initiative which burst the process thread on destination node and it is propagating till Meeting Point (MP). This proposal (EMMDV) is obtaining more efficiency than MMDV.