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Prefetching Technique for Multipath Routing In Manets

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ABSTRACT: *Mobile Ad-hoc networks (MANETs) are a wireless network without any centralised infrastructure. The routing protocols are used in finding feasible path between source and destination. Two main routing protocol techniques are Proactive and Reactive. Proactive routing protocol maintains routing table for every node in the entire network. Reactive protocols use route information only when required. In reactive routing, multipath routing protocol like AOMDV has produced valuable results in routing but it uses flooding scheme to find more routes. Due to more flooding, we proposed a Prefetching technique in AOMDV routing protocol in order to reduce the amount of flooding technique. Hence, it reduces the routing overhead. To achieve efficiency of routing, this algorithm involves two steps: First, to timestamp the route entry based on the mobility of nodes. Second, it initiates the counter value in order to access the frequently used entries in route entry table when the respective route is at the time of expiring. Simulation carried out has shown that the technique is more efficient than on demand routing protocols.*

Keywords *– MANET, Timestamp, counter value, prefetching, flooding.*

I. INTRODUCTION

Mobile Ad-hoc networks (MANETs) are defined as the category of wireless networks that are capable of operating without the support of any fixed infrastructure; the routing and resource management are done in a distributed manner in which all nodes coordinate to enable communication among them. Each node can function both as network host for transmitting and receiving data and as a network router for routing packets from other nodes. The main aim of routing protocol include exchanging the route information, finding feasible path from source to destination based on certain criteria such as hop count, minimum power required and validity time of the wireless link, path breaks, correcting the broken paths with minimum power and bandwidth consumption.

The routing protocols can be classified into three major categories based on routing information update mechanism like Pro-active, Reactive and Hybrid routing protocols. In proactive, every node maintains information of the network topology in the form of routing tables by periodically exchanging routing information like DSDV (Destination Sequenced Distance Vector), WRP (Wireless Routing Protocol). Reactive protocols obtain the necessary path when it is required, by connection establishment process without any routing tables like AOMDV, DSR, AODV. Hybrid routing protocols combines the features of the proactive and reactive protocols like CEDAR (Core Extraction Distributed Ad hoc Routing Protocol), ZRP (Zone Routing Protocol). For routing within certain zone, proactive approach is used. For nodes that are located beyond limited zone, reactive approach is used.

II. ON DEMAND ROUTING PROTOCOL

On demand routing protocol exchange routing information only when a path is required by a source node to communicate with a destination.

Dynamic Source Routing Protocol

Dynamic Source Routing Protocol is an on-demand approach to constrain the bandwidth consumed in ad hoc wireless networks by eliminating the periodic table-update message required in the proactive routing approach. The basic approach in the route discovery phase is to find a route by flooding the RREQ packets in the network. The destination node, on receiving a RREQ packet, responds by sending a RREP packet back to the source, by the reverse path obtained by RREQ. The main difference from DSR compared to other on demand routing protocol uses the route cache at intermediate nodes. The route cache maintains the information

of the routes that can be extracted when required. This cache information is used by the intermediate nodes to reply to the source when they receive a RREQ packet if they have the corresponding route to the destination. The disadvantage of this protocol is the lack route maintenance when a link breaks. The source-routing mechanism employed in DSR increases the routing overhead.

Adhoc On Demand Distance Vector Routing Protocol

AODV uses on demand approach for finding routes from source to destination for transmitting data packets. It initiates the destination sequence number to identify the most recent path. The major difference between in DSR from AODV is that, uses source routing in which data packets carries the complete path to be traversed in the entire network. In AODV, the source node and the intermediate nodes stores the next-hop information in response to the flow of data packet transmission. A node updates its path information only if current Destination Sequence number received is greater than the last Destination Sequence Number stores at the node. The disadvantages of AODV leads to stale entries where the intermediate nodes can lead to inconsistent routes if the source sequence number is very old and the intermediate nodes have a higher but not the latest destination sequence number.

Adhoc On Demand Multipath Distance Vector Routing Protocol

AOMDV is an extension of on demand routing protocol which establishes multiple loop free and link disjoint paths. It is based on distance vector concept uses hop-by-hop routing approach, the difference lies in the number of route found in single route discovery. For each destination the node maintains the hop count which is the maximum hop count for all paths, used for sending route advertisements to the destination. The basic idea behind multipath routing is finding multiple paths from source to destination. AODV discards all duplicate RREQ whereas AOMDV looks for alternative route with duplicate RREQ. AOMDV floods RREQ from source to destination where it establishes multiple reverse paths both as intermediate node as well as destination. AOMDV also provides intermediate nodes with alternate path as they are found useful in reducing route discovery.

III. 3 PREFETCHING TECHNIQUE IN AOMDV

The proposed prefetching technique of route request broadcasting in Ad hoc on demand multipath distance vector routing protocol. The route entry covers the recent source, destination and also the mostly connected by intersected path. The route entry is time stamped which are recently involved in data packet forwarding. The source broadcasts the RREQ with the route list. The timestamp assigned to each entry is selected based on the mobility of the node and assigned the value equal to the validity time for each entry in the route list. Time stamping based on mobility ensures that the entered path is valid only for a particular period of time for which the nodes are static; computes new routes before validity of route expires; replaces route which becomes invalid due to breakage of links.

3.1 ALGORITHM

//For Route Discovery

```
If source has no routes to destination
Then broadcast (RREQ) with hop count=0
If (node==source)
        Broadcast (RREQ) with route-list
Else rebroadcast (RREP)
End if
If (node==intermediate)
      Makes its entry in the route list
         Update in route-list
         Broadcast (RREQ) with route-list
         With hop count= hop count+1
End if
If (node==destination)
         Determine the entire route path entry
         Update the route list
         Stop broadcast (RREQ)
```

Reply (RREQ) based on reverse path
end if
// prefetching
if a new route is discovered and entered in route list
time stamp the route entry time
initiate route request time, validity time
for
{
periodically check route entry in the cache
}
if (route request time < counter)
if mobility is high
then
initiate selective flooding to find new path to the destination
else if(route validity time expires)
remove route table entry
end if
end loop
end if

Once the route is discovered and an entry in made is route table, we timestamp the route entry path based on the route entry time and validity time based on the mobility of nodes. In each route entry table , the path that are frequently used are listened using a counter value and only these entries are perfected before the time stamp expires by using selective flooding. If the route entry time exceeds the counter value then a new route is found before the time expires using selective flooding.

IV. SIMULATION RESULTS

Network Simulator (Version 2), widely known as NS2, is simply an event- driven simulation tool that has proved useful in studying the dynamic nature of communication networks.

Fig 1 shows the end to end delay comparison with other routing techniques in AOMDV. Average time taken by data packet to arrive in the destination includes the delay caused by route discovery process and queue in data packet transmission. Results shows that Prefetching technique proves efficient routing with fewer delay.

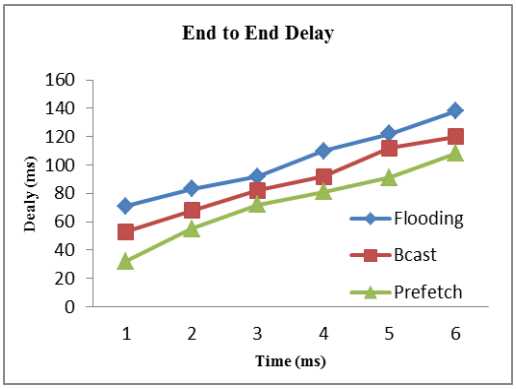

Fig1 End To End Delay

Fig 2 shows Packet Delivery Ratio is the ratio of number of delivered packets to the destination denotes the level of delivered data to the destination. The greater the packet delivery ratio determines the better performance of the protocol. Simulation Results proves that the Prefetching technique provides better performance.

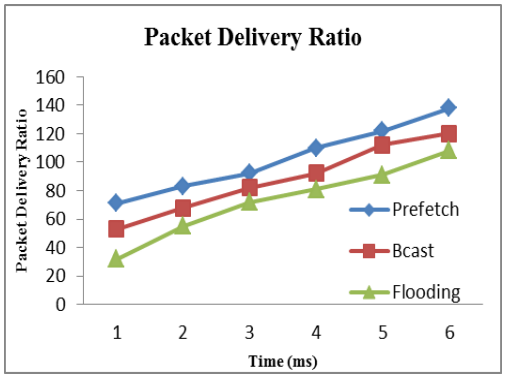

Fig 2 Packet Delivery Ratio

V. CONCLUSION

A Prefetching technique combined with time stamping of cached routes is proposed in AOMDV to reduce the amount of flooding. Simulation results shows that the proposed method is more efficient than the other methods in AOMDV. The performance of prefetching technique is better than when compared to flooding and broadcasting methods in AOMDV. The Proposed Algorithm also reduces routing overhead in order to enhance the quality of service.

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