ENHANCING AOMDV ROUTING PROTOCOL IN MOBILE AD-HOC NETWORKS BY USING NS-2

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Abstract: Mobile Ad-hoc networks form an instant network without fixed topology, each node acting as a host and router simultaneously. AOMDV(Ad-hoc on demand multipath distance vector routing protocol) routing protocol is enhancement of AODV routing protocol to compute multiple loop-free and disjoint paths that are used in MANET environment. In contrast to AODV, the AOMDV protocol has multipath in every route discovery process. The acquired routes serve as major and backup routes based on a minimum hop. If the route is obtained containing the nodes that have mobility away from the reachable node, then route damage can occur that causes route displacement.

Keywords- Ad-hoc networks, AOMDV, NS-2, Simulation, routing protocols, routing, LET.

Introduction: Wireless networking is a method by which homes, telecommunications networks and enterprise installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations. The use of wireless networks in recent years has become very demotic. Ad-hoc networks have no fixed routers with all nodes capable of movement and arbitrarily dynamic. These nodes can act as both end systems and routers at the same time [4,6]. Because of the limited bandwidth of wireless links in an ad hoc network, some problems are solved and some are introduced at the same time. The usefulness of RIP to ad hoc environments is restricted due to the rapid topology change. Thus the drawbacks of these protocols have to be fixed. AOMDV develops multiple paths to reduce route discovery frequency between source and destination [12].Therefore it lacks high inter-node communication and coordination between the adjacent and non-adjacent nodes.

Overview Of Routing Protocols" The routing protocols are classified into three categories, based on the time at which the routes are discovered and updated.

a. Proactive Routing Protocol (Table Driven)
b. Reactive Routing Protocol (On-Demand)
c. Hybrid Routing Protocol

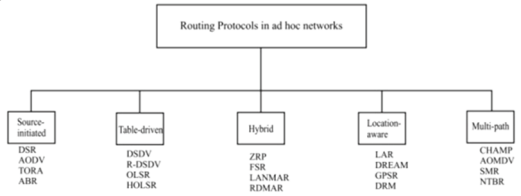

FIGURE 1 Various Routing Protocols

Proactive Routing Protocol: In proactive routing scheme every node continuously maintains complete routing information of the network. In networks which exploit a Proactive routing protocol, these protocols maintain specific routes to all the destinations regardless of whether these routes are needed or not[1,4,8] Thus every node maintains tables representing the whole topology of the network. These tables are hence updated regularly in order to maintain a up-to-date routing information. The main advantage of this protocol is that hosts can obtain route information and can very well establish a session. Proactive routing protocol includes Destination-Sequenced Distance-Vector (DSDV) protocol, Wireless Routing Protocol (WRP), Optimized Link State Routing Protocol (OLSR) etc.

Reactive Routing Protocol: Reactive protocols on the other hand finds a route on demand with the help of Route request packets. Also if communication is to be initiated by a node which has no route, then this routing protocol will try to establish the route. Thus this property which this protocol holds is very useful in resource–limited environment. These include Dynamic Source Routing (DSR) protocol, Ad hoc On-demand Distance Vector (AODV) protocol, Ad hoc on demand Multiple Distance Vector (AOMDV) protocol etc.

In Hybrid Routing protocol: Hybrid protocols combines the best efficient features of Proactive and Reactive approaches. An example of Hybrid Routing Protocol is the Zone Routing Protocol (ZRP).

Background And Related Work: In this section the related work on AOMDV routing protocol in MANET's has been discussed. The way of approaching the simulation process has also been studied to a better extent in order to increase the performance of Manets. The basic improvements made include freedom from loops in routing tables, more dynamic and less convergence time. Every node in the MANET maintains a routing table which contains list of all known destination nodes within the network along with number of hops required to reach to particular node.

- One of the examples is [2], where the authors have evaluated the performance of routing protocols in

grid environment. Similarly, in a recent work [3], authors have analyzed a routing protocol for sensor networks.

- In another work [4] mobile ad-hoc network is simulated to review its performance with reference to QOS.
- In [5], authors review the routing protocols in the domain of wimax based networks.
- Another case is of [6], where parameters like speed and tract are considered for simulation.

Module For Ns-2: The NS-2(Network simulator-2) is a discrete event driven simulator. NS-2 is suitable for designing new protocols, comparing different protocols and traffic evaluations. The goal of the ns-2 project is to create an open simulation environment for networking research that will be preferred inside the research community.

- It should be aligned with the simulation needs of modern networking research.
- It should encourage community contribution, peer review, and validation of the software.

NAM: Project Editor is used to develop network models. Network models are made up of subnets and node models. This editor also includes basic simulation and analysis capabilities. The Project Editor is the main staging area for creating a network simulation. From this editor, you can build a network model using mode l from the standard library, choose statistics about the network, run a simulation and view the results. It is also possible to create node and process models, build packet formats, and create filters and parameters, using specialized editors that you can access from the Project Editor

Nam is a Tcl based animation tool that is used to visualize the ns simulations and real world packet trace data. The first step to use nam is to produce a nam trace file. The nam trace file should contain topology information like nodes, links, queues, node connectivity etc as well as packet trace information.

Nodes are initiated and created from the ``n'' trace event in trace file. Each node demonstrates and represents a host or a router. Nam terminates if there are duplicate definitions of the same node. Attributes specific to node are colour, shape, label, label-colour, position of label and adding/deleting mark on the node. Each node can have 3 shapes: circle (default), square, or hexagon. But once created, the shape of a node cannot be changed during the simulation. Different node may have different colours, and its colour may be changed during animation. The following OTcl procedures are used to set node attributes, they are methods of the class Node:

$node color [color] ;# sets color of node
$node shape [shape] ;# sets shape of node
$node label [label] ;# sets label on node
$node label-color [lcolor] ;# sets color of label
$node label-at [ldirection] ;# sets position of label
$node add-mark [name] [color] [shape] ;# adds a mark to node
$node delete-mark [name] ;# deletes mark from node

The nam trace format defining node state is:
n -t time -a src-addr -s src-id -S state -v shape -c color -i l-color -o color "n" denotes the node state. Flags "-t" indicates time and "-a" and "-s" denotes the node address and id. "-S" gives the node state transition.

Routing Process In AOMDV : In AOMDV, only the first copy of the RREQ is used to form reverse paths; the duplicate copies that arrive later are simply discarded. Note that some of these duplicate copies can be gainfully used to form alternate reverse paths. Thus all duplicate copies are examined for potential alternate reverse paths, but reverse paths are formed only using those copies that preserve loop-freedom and link-disjointness among the resulting set of paths to the source.

The Phases of AOMDV routing are:-

• Route discovery phase
• Route maintenance phase
• Data handling phase

- **Route Discovery Phase:** It adopts a somewhat looser policy for generating a RREP. The destination generates a RREP in response to every RREQ copy that arrives via a loop-free path to the source, even though it forms reverse paths using only RREQ copies that arrive via loop-free and disjoint alternate paths to the source. This is done because of the following reason. The RREQ flooding mechanism, where each node locally broadcasts a RREQ once, suppresses some RREQ copies at intermediate nodes and duplicates other RREQ copies.
- **Route Maintenance Phase:** Route maintenance in multipath AODV is a simple extension to AODV route maintenance, and also uses RERR packets. A node generates or forwards a RERR for a destination when the last path to the destination breaks[7,9]. Multipath protocol also includes an optimization to salvage packets forwarded over failed links by re-forwarding them over alternate paths. This is similar to the packet salvaging mechanism in DSR. The timeout mechanism similarly extends from a single path to multiple paths
- **Route Failure Handling Phase:** This phase is responsible for generating alternative routes in case the existing route fails. Every packet is associated with acknowledgement; hence if a node does not receive an acknowledgement, it indicates that the link is failed. On detecting a link failure the node sends a route error message to the

previous node and deactivates this path by setting the pheromone value to zero. The previous node then tries to find an alternate path to the destination. If the alternate path exists, the packet is forwarded on to that path else the node informs its neighbours to relay the packet towards source.

Conclusion: In this paper the initial simulation process which has to be carried out in simulating the AOMDV routing protocol which is an extension to the AODV protocol has been discussed for computing multiple loop-free and link disjoint paths. The routing entries for each destination contain a list of the next-hops along with the corresponding hop counts. All the next hops have the same sequence number.

This helps in keeping track of a route. For each destination, a node maintains the advertised hop count, which is defined as the maximum hop count for all the paths, which is used for sending route advertisements of the destination. Each duplicate route advertisement received by a node defines an alternate path to the destination.

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