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Study of Ad-hoc Routing Protocols AODV, DSR and ADSR: Review

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Abstract- Mobile ad-hoc network (MANET) is network of mobile nodes, in which each node act as a router. As nodes in mobile ad-hoc network are mobile, so it does not has fixed infrastructure and no fixed topology that is, it has dynamic topology of the network so the path of the data transmission is get changed continuously, so there is need of efficient dynamic routing protocols. The different protocols are proposed by researchers to finds the route efficiently. In this paper, we study some of three routing algorithms like ad-hoc on demand distance vector (AODV), dynamic source routing algorithm (DSR) and advanced dynamic source routing (ADSR) proposed by the researchers.

Index Terms- MANET, AODV, DSR, ADSR**.**

1. INTRODUCTION

Mobile Ad-hoc Network is self-autonomous wireless network of mobile nodes. These networks have no fixed access points while every node could be router. All nodes are mobile, capable of movement and can be connected dynamically. These networks are self-configurable and autonomous systems consisting of routers and hosts. These nodes are constrained in power consumption, bandwidth, and computational power. MANETs lack central administration and prior organization, so the security issues are different and thus requires different security mechanisms than in conventional networks. Wireless links in MANETs make them more prone to attacks. It is easier for hackers to attack these networks easily and thus gain access to confidential information. They can also directly attack the network to delete messages, add malicious messages, or masquerade as a node. This violates the network goals of availability, integrity, confidentiality, authenticity and authorization. MANET require an extremely flexible technology for establishing communications in situations which demand a fully decentralized network without any fixed base stations, such as battlefields during wars, military applications, and other emergency search and rescue situations at the time of disasters. Routing in ad-hoc networks faces additional problems and challenges when compared to routing in traditional wired networks[1].MANETs offer several advantages over traditional networks including reduced infrastructure costs, ease of establishment and fault tolerance, as routing is performed individually by nodes using other intermediate network nodes to forward packets, this multi-hopping reduces the chance of bottlenecks, however the key MANET attraction is greater mobility compared with wired solutions[1][2].

2. ROUTING PROTOCOLS IN AD-HOC

Routing is the key challenge in mobile ad hoc networks and challenge becomes more difficult and complicated when the size of network increase. Routing protocols are classified into different categories according to manner in which they are reacting to network when network topology changed. Routing protocol classified into proactive protocol and reactive (on demand) and several protocols exist as hybrid protocol[3].

Reactive protocol*:* Reactive protocols only finds route when there is a need to send data. The source node will start routing by transmitting route requests throughout the network. The sender will then wait for the destination node or an intermediate node (that has a route to the destination) to respond with a list of intermediate nodes between the source and destination[7].

Proactive protocol: Proactive protocols are table-driven and will actively determine the layout of the network. Through a regular exchange of network topology packets between the nodes of the network, a complete picture of the network is maintained at every single node [7].

In this paper we review the different routing protocols proposed by the researchers like Ad-hoc on demand distance vector(AODV), dynamic source routing(DSR) and advanced dynamic source routing(ADSR).

2.1. *Ad-hoc on demand distance vector*

Ad-hoc on demand distance vector is on demand version of Dynamic Destination-Sequenced Distance-Vector (DSDV) protocol[9].In AODV[14], when a source has data for a destination , it first checks if a route exists in its cache (similar to DSR). If a route does not exist, source broadcasts a RREQ for destination. A receiving node will rebroadcast the RREQ if it is not destination, it does not have a cached route to destination, it is the first time that this RREQ is received, and the TTL field is not equal to zero. It will also record the identity of the one-hop neighbor that broadcasted the RREQ. Once the RREQ reaches the destination, it replies with a RREP message. This message is unicasted to the one-hop neighbor of destination that transmitted the RREQ. In the same manner, the RREP will be unicasted back to the source, using the recorded one-hop neighbors that originated the RREQ. The RREQ forwarding process of AODV is similar to that of DSR. The only difference is that RREQ does not contain any path information. Intermediate nodes record the identify of the upstream neighbor during the RREQ phase and downstream neighbor during the RREP phase. Each RREQ is also broadcasted only once, and hence, any other RREQ that arrives later from other directions will be discarded. Once destination is found, a RREP will be unicasted to S, with each node forwarding the RREP to the recorded upstream neighbor .AODV typically finds the shortest path[3][4][5][6].

2.2. *Dynamic source routing*

The dynamic source routing (DSR) is a reactive routing protocol, which is suitable for medium size multi-hop mobile ad hoc network . This protocol restricts the bandwidth consumed by control packet by eliminating the periodic table update messages required in table-driven approach. The DSR works well in high rates of mobility and it has very rapid recovery mechanism, when routes in network changes. The protocol purely works on on-demand basis. It also allows the source node to choose multiple routes to destination for balancing the load. Its process contains two mechanism "Route discovery" and "Route maintenance". The fundamental method of route structure in DSR is to flood 'Route Request' packet in network. When destination node receives 'Route Request' packet it replies back to source by sending 'Route Reply' packet, which contains the route traversed by the 'Route Request' packet received[10] DSR protocol is a group of two main mechanism which work together to allow the discovery and maintenance of source routes in the ad-hoc network [11]. When a source has packets for a destination ; it checks whether a route exists in its cache. If a route does not exist, source broadcasts a Route Request (RREQ) message. This message contains the source ID, destination ID, and the time-to-live (TTL) for this request. Any intermediate node that receives the RREQ, appends its identity to the RREQ message and rebroadcasts the RREQ while decreasing TTL field by one. If a receiving node is the destination (or has a route to the destination), destination responds to source with a route reply (RREP) message containing the entire path PSD between source and destination. The RREP follows the reverse path from the one indicated in the received RREQ. Note that because of the flooding nature of the route discovery process, the destination can receive RREQs indicating multiple paths from the source. It can then choose the path that satisfies the selection metric, which is typically the smallest number of hops (indicated by the smallest number of intermediate nodes in the RREQ). source node broadcasts RREQ to its neighbor's n1 and n3. If destination is not found, intermediate nodes will further broadcast this RREP to their neighbors, until destination is found or another node has a route to destination. During the process of RREQ forwarding, each intermediate node adds its identification number to the RREQ. Each RREQ is broadcasted only once by each node, and hence, any other RREQ that arrives later from other directions will be discarded. Once RREQ arrives at destination, it replies with a RREP, which traverses the reverse path indicated by the RREQ. This path is also typically the shortest[12][14].

2.3. *Advanced dynamic source routing*

Advanced Dynamic Source Routing (ADSR) protocol is extends DSR protocol by flooding the RREQ for Mobile Ad-hoc Network[9]. Purpose of this routing protocol is to control the congestion in the network and reduce the route reply storm, by which the throughput of the network gets improved. This routing protocol also reduced the energy/power consumed by the nodes participating in the data transmission between source node and destination node[8].

To established path between source to destination used ADSR algorithm. ADSR is also same as DSR. But in ADSR extra field must be added into conventional RREQ in DSR protocol. When source node floods RREQ it appends its location, speed and direction into the control packet. ADSR includes discovery and routing maintenance phase. Routing discovery and routing maintenance monitor predict the future information about available path. When a source initiate routing request to a destination, first check its

routing catch. If path is exist then source select most suitable path to send data packets[9].

When the destination node receives RREQs packets, it will obtain all feasible paths meeting the delay requirement. It begins to send RREP to the source and the link stability time will be copied in RREP. When the source receives RREP, it calculates the end-to-end delay of each route and stores it to routing cache. Thus each routing cache includes corresponding link stability time and delay. Finally, the source will select the best route among all feasible paths and use it to send data packets. Once the source node receives a RREP, it will delete the corresponding routes from its own routing cache. Then it checks whether there are other routes to destination in the routing cache. Among all of the feasible routes found, it selects the best route to send packets [9].

3.CONCLUSION

In this paper, we study the basic work of three ad-hoc routing protocols AODV, DSR and ADSR proposed by researchers. This paper shows three different techniques of finding routes in mobile ad-hoc network for transferring of data packets from source to destination. The comparative study of this proposed works helps us to find limitations and advantages of the system.

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