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Analysis And Performance Ratio Of Various Routing Protocol Using Ns

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Abstract: *Adhoc network is a collection of wireless mobile nodes, forming a temporary network without a fixed base station infrastructure and centralized management . The typical areas of mobile adhoc network applications include battlefield , emergency , search rescue and data acquisition in remote areas. The network topology changes frequently due to arbitrary movement of mobile nodes which acts as both hosts and routers . the topology of adhoc network depends on the transmission power of the nodes and the location of mobile nodes, which change from time to time. Routing protocols are used to provide connectivity to other nodes and also responsible for communication. Adhoc networks has two major problems , link failure and node mobility. The comparative analysis of various routing protocols is mentioned .*
The Adhoc On demand Distance Vector(AODV) routing protocol is one of several published routing protocols for mobile adhoc networking , it is reactive protocol.
Adhoc on demand multipath distance vector (AOMDV) is an extension to the AODV protocol for computing multiple loop free and link disjoint path. It finds multiple roots from source to destination . it chooses the best route which has lower hop count as primary path and rest of the paths are secondary paths for back up.
Destination Sequence Distance Vector(DSDV) is adapted from conventional routing information protocol(RIP) to adhoc network routing . Nodes have routing tables listing the number of hops to each destination . Routing information is broadcasted periodically and incrementally.
Dynamic Source Routing(DSR) is designed for MANETs. DSR doesn't need any network infrastructure . Nodes may easily cache routing information for future use. DSR is simple and efficient routing protocol designed specifically for use in multihop wireless adhoc networks of mobile nodes. DSR allows the network to be completely self organizing and self configuring, without the need for any existing network infrastructure and administration.

Keywords— Adhoc On demand Distance Vector, *Adhoc on demand multipath distance vector*, *Destination Sequence Distance Vector, Dynamic Source Routing.*

I. INTRODUCTION

An adhoc wireless network consist of mobile networks which creates an underlying architecture for communication without the help of traditional fixed position routers. There are different protocols for handling the routing in mobile environment. Routing protocols are divided into two categories based on how and when routes are discovered , but both find the shortest path to the destination. The routing protocols for adhoc wireless network should be capable to handle a very large numbers of host with limited resources such as bandwidth and energy. The main challenge for the routing protocols is that they must also deal with the host mobility, meaning that the host can appear and disappear at the various locations . Thus , all the host of the adhoc network acts as routers and must participate in the route discovery and maintenance of the routes to the other host. Routing protocols are divided into two categories namely proactive routing protocol and on demand routing protocol. The routing protocol needs to have following qualities in order to be effective, distributed operation loop freedom, demand based operation , proactive operation, security ,sleep period operation, unidirectional link support.

II. LITERATURE

"Comparing AODV and OLSR routing protocols", Aleksandr Huhtonen, Helsinki University of Technology.

In this paper the characteristics of adhoc network were introduced and was explained how does it differ from the original fixed wired network. The characterization was given for the adhoc routing protocols. The comparison chapter were made from the possible protocols advantages. Also , the chapter included some results from the papers which compared various protocols.

"AODV Routing Implementation for scalable wireless Adhoc Networks simulation", Clifton Lin.One of the goals in simulating AODV is to determine how well it scales. Each AODV router is essentially a state machine that process incoming request from the SWANS network entity. When the network entity needs to send the message to the another node, it calls upon AODV to determine next hop.

"Performance evaluation and comparison of AODV and AOMDV", S.R.Biradar, Kaushik Majumdar, Subir Kumar Sarkar, Puttamadappa, Sikkim Manipal Institute Of Technology, Majitar.This paper evaluated the performance of AODV and AOMDV using NS2 , comparison was based on of packet delivery fraction , routing overhead incurred, average end to end delay and number of packets dropped. We conclude that AOMDV is better than AODV.

"Destination Sequenced Distance Vector(DSDV) protocol", Guoyou He, Networking laboratory Helsinki University of Technology.DSDV is an adaptation of classical distance vector routing protocol to adhoc networks. In DSDV two routing tables are maintained at each of the nodes , one of them is the routing table , which contains a complete list of addresses of all other nodes. Many improvements of DSDV have been developed.

III. Ad Hoc on Demand Distance Vector (AODV)

AODV is the on-demand (reactive) topology-based routing protocol 9 in which backward learning procedure is utilized in order to record the previous hop (previous sender) in the routing table. In the backward learning procedure, upon receipt of a broadcast query (RREQ)10 which contains source and destination address, sequence numbers of source and destination address11, request ID and message lifespan, the address of the node sending the query will be recorded in the routing table. Recording the specifications of previous sender node into the table enables the destination to send the reply packet (RREP) to the source through the path obtained from backward learning. A full duplex path is established by flooding query and sending of reply packets. As long as the source uses the path, it will be maintained. Source may trigger to establish another query-response procedure in order to find a new path upon receiving a link failure report (RERR) message which is forwarded recursively to the source12. Being on-demand to establish a new route from source to destination enables AODV protocol to be utilized in both unicast and multicast routing13. Figure 1 illustrates the propagation of RREQ packet and path of RREP reply packet to the source.

Multiple RREP messages may be delivered to the source via different routes but updating the routing entries will occur under one condition which is if the RREP has the greater sequence number. A message with higher sequence number represents the more accurate and fresh information. Several enhanced approaches were proposed to eliminate the large overhead and high latency (End-to-End Delay) which result in encountering high amount of packet loss occur in AODV routing protocol. Literature14 offers to utilize some specific parameters such as velocity and movement direction that could be obtained by GPS device in addition to deployment of sets of on-board sensors in order to make the routing stabled. Selecting nodes with more stable link in route discovery procedure at the first step and selecting the most stable route in route selection procedure at the second step, could be considered as the two major steps in AODV enhancement project. AODV with Broadcasting Data packet (AODV-BD) 15 is proposed to reduce the end-to-end delay by establishing the route to the destination by having data packets broadcasted to destination. This approach sets up the routing along with sending data packets which decreases the delay. However, broadcasting data to the destination violates the integrity of data packet forwarding along with huge amount of bandwidth occupancy.Improved AODV (IMAODV)16 is proposed to eliminate the delay and routing overhead by improving the route discovery process in AODV routing protocol. In IMAODV approach, the AODV route discovery process and Dynamic Source Routing (DSR) process are merged accompanied with appending node`s address on RREQ to achieve less handover latency.Literature17 proposed a scheme in which each node is offered to maintain an alternative route to the specified destination. Therefore, upon primary route failure, the sender is able to use the alternative route, by which the end-to-end delay, routing overhead and route discovery frequency will be improved. A combination of DSR and AOMDV routing protocols is proposed in Sutariya D. and Pradhan S.18 results in proposing another scheme called Improved AODV (IAODV) in which source routing is limited up to two hops along with backing up route between source and destination.

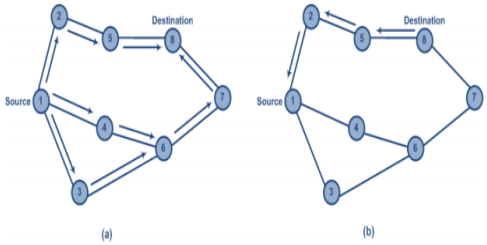

Figure-1
(a) Propagation of the RREQ, (b) RREP Path to the Source

IV. Ad Hoc on-demand Multipath Distance Vector (AOMDV)

AOMDV is designed to calculate multiple paths during the route discovery in highly dynamic ad hoc networks where the link breakage occurs frequently due to high velocity of vehicles. In AODV routing protocol, a route discovery procedure is needed after each link failure. Performing such procedure results in high overhead and latency. Thus, this defect is overcome by having multiple paths available. In AOMDV, performing the route discovery procedure will be done after all paths to either source or destination fail. In AOMDV routing protocol, it is endeavored to utilize the routing information already available in the underlying AODV protocol. However, little additional modification is required in order to calculate the multiple paths. The AOMDV protocol includes two main sub-procedures:

Calculating multiple loop-free paths at each node: In AODV routing protocol, route discovery procedure defines an alternate path to either source or destination potentially. Each copy of the RREQ packet received by a node, introduce an alternate path back to the source. However, utilizing all such copies to establish routes will result in routing loops. Therefore, in order to overcome such defect, a similar invariant is maintained as it is defined in single path case. However, the major disparity is the multiple next-hop routes obtained by multiple route advertisement are accepted and maintained as long as the invariant is complied. A possible drawback is that various routes to the same destination may have different hop-counts. Therefore, route identification is required to determine which of these hop-counts is advertised to others due to impossibility of advertising different hop count to different neighbors with the same destination sequence number.

AOMDV invariant is built based on new definition of advertised hop-count. According to the node i and the destination d, the advertised hop-count is defined as the maximum hop-count of the multiple paths for d available at i. by utilization of the maximum hop-count, the advertised hop count may not be changed for the same sequence number. Alternate routes with lower hop-counts could only be accepted by applying this protocol which is necessary to guarantee loop-free paths. Table 1 depicts the structure of routing table entries for AODV and AOMDV.

V. Dynamic Source Routing (DSR)

DSR22 is a reactive routing protocol in which the primary aspect is to store the whole path from source to destination in the routing table instead of having the next hop stored (AODV routing protocol). Therefore, the packet header must include all nodes through which the packet must travel to be delivered to the destination. Similar to AODV, the RREQ and RREP are used to perform the route discovery and delivering the reply message back to the source. In this protocol, the RREQ message rebroadcast method is used if the node receiving the RREQ message does not have the destination information in its routing table. However, in DSR routing protocol, cache route mechanism is used in case of link breakage. For instance, suppose the source node S has route <S, A, B, C, D> to destination node D, and the link <C, D> encountered a failure due to node`s movement. In such scenario, the source node S looks up in its cache route for another route to destination node D. It is noted that other routes to destination node were maintained in cache route due to overhearing the RREQ message by intermediate nodes via various routes.

The cache route mechanism results in boosting up the data transmission. Upon receiving the RERR message by the source node, the new route discovery procedure will be initiated. The RERR message will be originated and sent to the source by the very first node which is closer to the source than others. Thereafter, the source applying piggyback strategy based on the RERR message received and the new RREQ message will be broadcasted to all the nodes used to deploy the failed link. Figure 2 illustrates the transmission of pair of <RREQ, RREP> while performing the route discovery procedure until receiving the reply message.Dashed lines represent the route stored in cache route memory for further utilization when the link breakage happens. Figuratively, the size of the packets in the DSR routing protocol increases due to adding any arrived node

specifications into packet header. This can be considered as a possible drawback when the number of nodes increases. Another issue that must be taken into account is being.

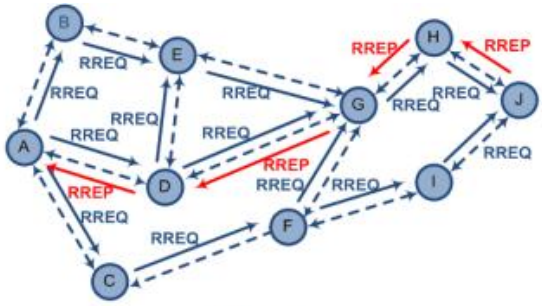

Figure-2
Route Discovery Procedure in DSR Routing Pprotocol

VI. Destination Sequenced Distance Vector(DSDV)

The aforementioned discussed routing protocols are all reactive protocols in which the routes are established on demands. DSDV 23 is a proactive routing protocol which maintains the route to the destination before it is required to be established. Therefore, each node maintains a routing table including next hop, cost metric towards the destination node and the sequence number generated by the destination node. Nodes exchange their routing tables periodically or when it is required to be exchanged. Thus each node is able to utilize the updated list of nodes to communicate with. Due to being aware of the neighbor`s routing table, the shortest path towards the destination could be determined. However, the DSDV mechanism incurs large volume of control traffic in highly dynamic networks such as VANET which results in experiencing a considerable amount of bandwidth consumed. In order to overcome the mentioned shortcoming, two update strategy in proposed; i. full dump strategy which is infrequently broadcasting the whole routing table, and ii.incremental dump which is exchanging the minor changes since the last full dump exchange. Figure 3 and table 4 illustrate the DSDV scenario and the possible routing table to be forwarded towards the neighbors.

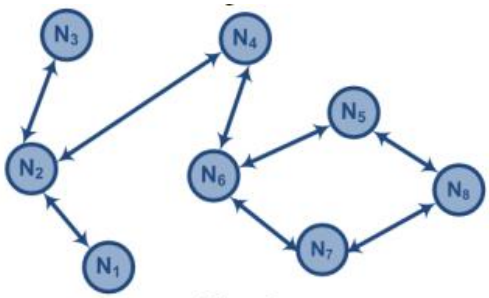

Figure-3
DSDV Structure Scenario

VII. Conclusion

The comparative analysis of various routing protocols is performed .Routing Protocol like the Adhoc On demand Distance Vector(AODV) routing protocol, Adhoc on demand multipath distance vector (AOMDV),Destination Sequence Distance Vector(DSDV),Dynamic Source Routing(DSR) are studied along with advantages & disadvantages.

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