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# Review Paper on the Factors Making Impact on MANET Routing Protocols

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***Abstract—A mobile ad hoc network (MANET) is a collection of wirelessmobile nodes forming a dynamic network Topology without the aid of any existing network infrastructure or centralized administration. Each node participating in the network acts as a host and as a router , means they have to forward packets and identify route as well.Despite the considerable simulation works, still more investigation is required in the performance evaluation of routing protocols for multimedia traffic especially Constant Bit Rate (CBR). In this paper, we will consider a number of research papers, in which performance and evaluation of popular routing protocols of MANET has been studied on the factors that make impact over these protocols.***

***Keywords- MANET, CBR, Routing Protocol, Traffic, Node.***

## I. INTRODUCTION

A Mobile Ad hoc Networks (MANET) represents a system of wireless mobile nodes that move arbitrarily and dynamically self-organize in to autonomous and temporary network topologies, allowing people and devices to seamlessly communicate without any pre-existing communication architecture. Such infrastructure less networks are usually needed in battlefields, disaster areas, and meetings, because of their capability of handling node failures and fast topology changes. The most important characteristics are dynamic topology, where nodes can change position quite frequently, so we require such routing protocol that quickly adapts to topology changes.

Normal routing protocol, which works well in fixed networks does not show same performance in Mobile ad-hoc Networks. In MANET routing protocols should be more dynamic so that they quickly respond to topological changes[1]. A number of protocols have been developed to accomplish this task.

Routing paths in MANET potentially contain multiple hops, and each node has the responsibility to act as router[2]. Routing in MANET has been a challenging task because of high degree of node mobility.

MANET routing protocol must have the following characteristics:

1) Keep the routing table up-to-date and reasonably small,
2) Select the best route for given destination and
3) Converge within an exchange of a small amount of messages[3].

In present paper, we have reviewed several papers based on studies of factors, which make impact on MANET routing protocols.

Thispaper is organized in three sections. Section 2 gives brief description of routing protocols and Section 3 is based on paper reviews. Section 4 describes our conclusion and future work.

## II. ROUTING PROTOCOLS

A number of mobile ad hoc routing protocols were proposed in the last fifteen years. These protocols can be categorized on the basis of their “routing strategy” because they follow to search a path “route” from a source to a destination and vice versa.

Routing protocols [3] are divided into two types; the first one is proactive routing or table driven protocols and the second is reactive or on-demand routing protocols. One fact is common for both protocol types is that each node involve in routing play an important role. Proactive routing is generally based on LS (link-state) whereas Reactive routing is based on DV (distance-vector).

All nodes in a network have the same level and have the similar functionality of routing. Flat routing is easier and efficient for small size network. The problem arise when a network becomes large in size, then the amount of routing information will be high and it will take more time for routing information to reach at remote node.

 

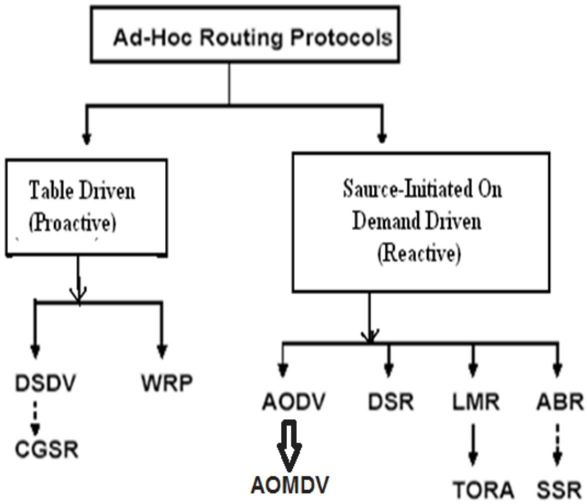

Figure 1: Classification of Routing Protocols

**2.1. AODV (Ad-hoc on demand Distance Vector)**

AODV[5] is a reactive protocol, which performs Route Discovery using control messages route request (RREQ) and route reply (RREP) whenever a node wishes to send packets to destination. To control network wide broadcasts of RREQs, the source node uses an expanding ring search technique. The forward path sets up an intermediate node in its route table with a lifetime association RREP. When either destination or intermediate node using moves, a route error (RERR) is sent to the affected source node. When source node receives the (RERR), it can reinitiate route if the route is still needed. Neighborhood information is obtained from broadcast Hello packet. As AODV protocol is a flat routing protocol it does not need any central administrative system to handle the routing process. AODV tends to reduce the control traffic messages overhead at the cost of increased latency in finding new routes. The AODV has great advantage in having less overhead over simple protocols which need to keep the entire route from the source host to the destination host in their messages. The RREQ and RREP messages, which are responsible for the route discovery, do not increase significantly the overhead from these control messages. AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RRER message. The Hello messages, which are responsible for the route maintenance, are also limited so that they do not create unnecessary overhead in the network. The AODV protocol is a loop free and avoids the counting to infinity problem, which were typical to the classical distance vector routing protocols, by the use of the sequence numbers [6].

**2.2. DSR (Dynamic Source Routing)**

Dynamic Source Routing Protocol is a reactive routing protocol and is called on demand routing protocol [5]. It is a source routing protocol that is why it is a simple and an efficient protocol. It can be used in multi hop wireless ad hoc networks. The DSR network is totally self organizing and self configuring. The protocols is just compose of two mechanisms i.e. route discovery and route maintenance.

The DSR regularly updates its route cache for the sake of new available easy routes. If some new available routes were found the node will directs the packet to that route. The packet has to know about the route direction. So the information about the route was set in the packet to reach its destination from its sender. This information was kept in the packet to avoid periodic findings it has the capability to find out its route by this way. DSR has two basic mechanisms for its operation i.e. route discovery and route maintenance. In route discovery, it has two messages i.e. route request (RREQ) and route reply (RREP). When a node wishes to send a message to a specific destination, it broadcast the RREQ packet in the network. The neighbor nodes in the broadcast range receive this RREQ message and add their own address and again rebroadcast it in the network. This RREQ message if reached to the destination, so that is the route to the specific destination. In the case if the message did not reached to the destination then the node which received the RREQ packet will look that previously a route used for the specific destination or not.

Each node maintains its route cache which is kept in the memory for the discovered route. The node will check its route cache for the desired destination before rebroadcasting the RREQ message. By maintaining the route cache at every node in the network, it reduces the memory overhead which is generated by the route discovery procedure. If a route is found in that node route cache then it will not rebroadcast the RREQ in the whole network. So it will forward the RREQ message to the destination node. The first message reached to the destination has full information about the route. That node will send a RREP packet to the sender having complete route information.

The DSR protocol [7] is composed of following two mechanisms which work together to allow the discovery as well as the maintenance of source routes in the ad hoc network:

Route Discovery is a mechanism in which a node S which is wishing to send a packet to a destination node D obtains a source route to D. The route Discovery is used only when S tries to send a packet to D but does not already know a route to D.

Route Maintenance is another mechanism by which a node S is capable to detect, while using a source route to D, while the network topology has been changed such that it can no longer utilize its route to D as a link along with the route no

longer works. When Route Maintenance specifies a source route has been broken, S can attempt to employ any other route which happens to know to D, or may invoke the Route Discovery again to discover a new route. The Route Maintenance is used only when S is really sending packets to D.
Route Discovery as well as Route Maintenance each operates completely on demand. Particularly, unlike other protocols, DSR does not require periodic packets of any kind at any level within the network. For example, the DSR does not employ any kind of periodic routing advertisement, the link status sensing or neighbor detection packets, and it does not rely on all these functions from any underlying protocols within the network. This completely on-demand behavior as well as the lack of periodic activity simply allows the number of overhead packets to scale all the way down to zero, in case when all nodes are about stationary with respect to each other and all the routes required for current communication have already been discovered.
As all the nodes begin to move more or as the communication patterns change, routing packet overhead of DSR routinely scales to only which needed to track various routes currently in use. In response to a single Route Discovery, a node may learn as well as cache multiple routes to any destination. This permits the reaction to several routing changes to be much more rapid as a node having multiple routes to a destination may try another cached route in case the one it has been using should not succeed. The caching of numerous routes also avoids the overhead of requirement to perform a novel Route Discovery every time a route in use breaks. The operation of Route Discovery as well as Route Maintenance in DSR, are designed to allocate uni-directional links as well as asymmetric routes to be easily supported. In wireless networks, it is probable that a link between any two nodes may not work similarly well in both directions, due to differing antenna or the propagation patterns or various sources of interference.
DSR allows different uni-directional links to be used when essential, hence improving overall performance as well as the network connectivity in the system [7]. DSR also supports an internetworking between different types of wireless networks and allowing the source route to be composed of hops over a grouping of any types of networks available. For instance, a number of nodes in the ad hoc network may have only short-range radios, even as other nodes have both short-range as well as long-range radios; a combination of all these nodes jointly can be considered by DSR as a single ad hoc network. Additionally, the routing of DSR has been incorporated into standard Internet routing, where a "gateway" node connected to the Internet also makes participation in the ad hoc network routing protocols and has been integrated into Mobile IP routing.

## III. PAPER REVIEWS

Chandrakaret. al. [4] studied the effect of data flow over the quality of services during data transmission in AODV and DSR Routing protocols. In this they have measured various performance metrics like PDR, Throughput, Drop Packets and End-to-End delay with increasing simulation time in an area of 1000m X 1000m network size using network simulator NS2.35. Their results shows that AODV perform better than DSR in case of throughput, while in case of other metrics, means PDR, Drop Packets and End-to-End delay DSR perform well over the AODV protocol. The state the overall performance of DSR is better than the AODV protocol with increasing simulation time.
Varshneyet. al. [5] studied various protocols such Dynamic Source routing (DSR), Location Aided Routing (LAR1) and Fisheye State Routing (FSR) with increasing pause time. The performance of these routing protocols has been measured on the average jitter, average end -to-end delay and throughput parameters. The results obtained after simulation represents that average end-to-end delay and average jitter is less in DSR protocol in comparison to LAR1 and FSR protocol. The FSR protocol shows better throughput than the DSR and LAR1 protocols. In case of LAR1 and FSR protocols, average jitter and end to end delay in LAR1 protocol is less than FSR protocol, while LAR1 protocol have higher throughput than DSR protocol.
Kumar et. al. [6], measured and analyzed the performance of various routing protocols in mobile ad hoc network using GloMoSim simulator. They examined the performance parameters PDR, throughput, End to End delay, routing overhead and packet drop ratio with respect to increasing network size and increasing mobility. Their results indicate that the throughput is increases as the size of network is increased and mobility of nodes is decreased. Average End to End delay is increased with increase in size of network as well as increase in mobility of nodes. The PDR is decreased with increasing network size and increased with increasing mobility. The packet drop ration and routing overhead are increases as the size of network is increased.
Singh [7], analyzed several MANET routing protocols with increasing node density using OPNET modeler. In this paper, he measured the performance of OLSR, AODV and ZRP routing protocols with 20, 40, 60 and 80 nodes for performance metrics like network load, data drop, delay, retransmission and throughput. The result obtain indicate that the overall performance of OLSR protocol is better than ZRP and AODV protocol, while AODV protocol performance is less in comparison to OLSR and ZRP with increasing number of nodes.
Goswamiet. al. [8], measured the performance of AODV and DSDV mobile ad hoc network protocols with respect to increased node density and increased pause time. The results obtained by themindicate that the performance of AODV and DSDV protocols decreases significantly with high node density. It is also observed that AODV perform better than DSDV in case of low node density, while DSDV perform well over AODV in case of high node density.
Mannan and Khurana [9] reviewed several papers on reactive routing protocols in mobile ad hoc networks. They analyzed that functionality of network is an important issue in MANET. They find that the availability of network services, issues related with their confidentiality and data integrity can play important role in the performance of MANET routing protocols.

Pouraniket. al. [10] evaluated the performance of reactive routing protocol AODV and proactive routing protocol DSDV of MANET on the basis of packet send rate. They have measured the performance metrics throughput, End to End delay and packet delivery ratio under different scenarios. The result obtained state that at low send rate the AODV protocol perform better than the DSDV protocol, while as the send rate is progressed, the DSDV protocol performed well over the AODV protocol.

Singh et. al. [11], studied impact of CBR traffic model in routing protocols used in MANET using GloMoSim simulator. Their paper focused on suitability and tradeoffs of routing protocols rather than details of their working. They suggested the scenarios for best suited protocols. The performance of DSR and AODV is significantly better in terms of throughput and collision metrics. When CBR links are increased, AODV perform better than other protocols.

## IV. CONCLUSION AND FUTURE WORK

After reviewing these papers, we obtained that most of the studies was done on the factors increasing node numbers, increasing node density and varying speed or pause time etc. Only one paper is focuses on the factor data send rate, where effect of this factor has been measured over AODV and DSDV protocols. This will motivate us to evaluate and measure the impact of packet send rate over two reactive routing protocols AODV and DSR in near future. We will also consider various parameter metrics like average throughput, average end-to-end delay, number of drop packets and packet delivery ratio in it.

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