

A Survey on Routing Protocols Performance in MANETs

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Abstract: - *Mobile Ad Hoc Network (MANET) is collection of multi-hop wireless mobile nodes that communicate with each other without centralized control or established infrastructure. Nodes in MANETs are often collaborative for a particular task and have limited power. Congestion control and time delay is a key problem in mobile ad-hoc networks. In recent years, several routing protocols have been proposed for mobile ad hoc Networks. This research paper give an overview of these protocols by presenting their characteristics, functionality, benefits and limitations and then makes their comparative analysis so to analyze their performance.*

Keywords: AODV, MANET, route failure, malicious node.

I. INTRODUCTION

MANET [1][2] stands for Mobile Ad hoc network. Ad hoc network short-range network and they are created when device uses the same protocol. Ad-hoc network does not need any subscription service. In [3] Ad Hoc wireless network; the mobile node can move while communicating, there are no fixed base stations and all the nodes in the network act as routers. In this the mobile nodes communicate with each other with the help of a shared wireless channel. The most significant characters of MANET are mobility. This means that nodes can join or leave the network in MANET dynamically.

The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. MANETs are a kind of wireless ad hoc networks that usually has a routable networking environment on top of a Link Layer ad hoc network. The growth of laptops and 802.11/Wi-Fi wireless networking have made MANETs a popular research topic since the mid 1990s. Many academic papers evaluate protocols and their abilities, assuming varying degrees of mobility within a bounded space, usually with all nodes within a few hops of each other. Different protocols are then evaluated based on measure such as the packet drop rate, the overhead introduced by the routing protocol, end-to-end packet delays, network throughput etc.

MANET Challenges [4]

Regardless of the variety of applications and the long history of mobile ad hoc network, there are still some

issues and design challenges that we have to overcome [5]. This is the reason MANET is one of the elementary research field. MANET is a wireless network of mobile nodes; it's a self organized network. Device can communicate with every other device.

1. The scalability is required in MANET as it is used in military communications, because the network grows according to the need , so each mobile device must be capable to handle the intensification of network and to accomplish the task.

2. MANET is a infrastructure less network, there is no central administration. Each device can communicate with every other device, hence it becomes difficult to detect and manage the faults. In MANET, the mobile devices can move randomly. The use of this dynamic topology results in route changes, frequent network partitions and possibly packet losses [6].

3. Each node in the network is autonomous, hence have the equipment for radio interface with different transmission receiving capabilities these results in asymmetric links. MANET uses no router in between.

4. In network every node acts as a router and can forward packets of data to other nodes to provide information partaking among the mobile nodes. Difficult chore to implement ad hoc addressing scheme, the MAC address of the device is used in the stand alone ad hoc network. However every application is based on TCP/IP and UDP/IP.

II. LITERATURE SURVEY

This paper [7] proposes a solution for node isolation attack launched against OLSR routing protocol. In MANETs, applications are mostly involved with sensitive and secret information. In this paper he analyzes the vulnerabilities of a pro-active routing protocol called optimized link state routing (OLSR) against a specific type of denial-of-service. (DOS) attack called node isolation attack. This attack allows at least one attacker to prevent a specific node from receiving data packets from other nodes that are more than two hops away. The proposed solution called EOLSR, which is based on OLSR, uses a simple verification scheme of hello packets coming from neighbor nodes to detect the malicious nodes in the network. Proposed technique is capable of finding whether a node is advertising correct topology information or not by verifying its Hello packets, thus detecting node isolation attacks shown in fig. 1 and

fig. 2. The most important merit is that it achieves degradation in packet loss rate without any computational complexity or promiscuous listening.

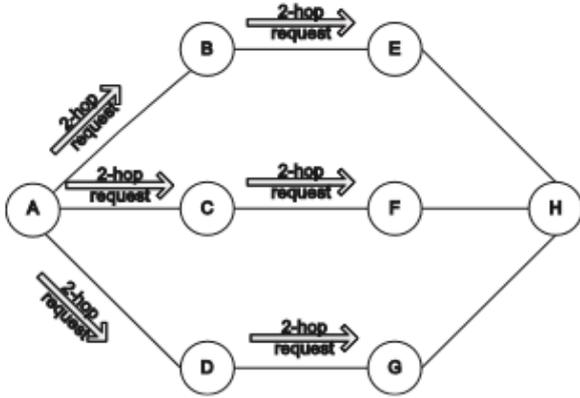


Fig. 1. A send 2-hop request to B, C, and D then B, C, and D send request to E, F, and G.

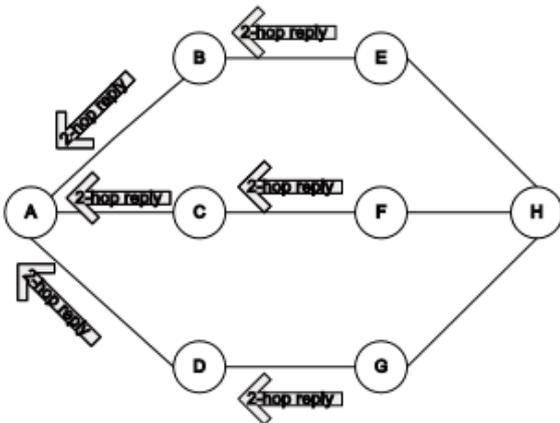


Fig. 2. E, F, and G send 2-hop reply to A through B, C, and D.

In this paper [8], he showed that the addition of probabilistic relay into AODV and AOMDV clearly improved their performance. Vehicular ad hoc networks (VANETs) are the specific class of Mobile ad hoc networks (MANETs). Since vehicles tend to move in a high speed, the network topology is rapidly changed. Thus vehicle's connectivity problem is one of the interesting issues in VANETs. Both AODV-PR and AOMDV-PR outperform their original form. AOMDV is designed to overcome a connectivity problem due to highly dynamic network topology. It provides multipath for data packets delivery from the source to the destination. Although AOMDV outperforms AODV in packet delivery ratio, AOMDV's multipath establishment and maintenance generate more control packets than AODV's unipath. However increasing the vehicle speed will degrade their performance. Thus in this paper, he added probabilistic relay, which enables adjacent vehicles

to probabilistically relay unsuccessful data packet transmission, into IEEE 802.11 as a MAC standard model and combined AODV with probabilistic relay (AODV-PR) and AOMDV with probabilistic relay (AOMDV-PR). Probabilistic relay allows vehicle to exploit the advantages of sender diversity by leveraging adjacent vehicles to deal with retransmission of undelivered unicast packet. However, multipath of AOMDV generates lower RREQ than AODV during our simulation. It clearly stated that the availability of multipath in AOMDV reduces the frequent route discovery due to disconnected link under highly dynamic environments. It can switch into another path if the main path is broken. Meanwhile, AODV only has unipath to reach the destination. Thus, route discovery needs to be executed if the path is broken. In short, probabilistic relay helps routing protocols to improve their PDR while it can keep almost the same amount of routing overhead.

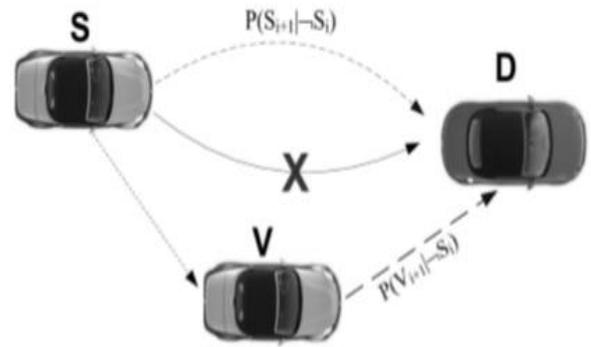


Fig. 3

MANETs are a group of wireless computers which do not have pre-existing infrastructure in the form of communication network. Administration of these kinds of networks are not dependent on any special user. There are many problems in the creation of MANETs. Such as routing in wireless media, power consumption, transportability and efficiency. A simulation was carried out to evaluate the efficiency of the seven MANET routing protocols (DSR, AODV, DSDV, TORA, FSR, CBRP and CGSR) so that an engineering methodology could be constructed depending on requirements, restrictions and availabilities. In this paper[9] he has studied about MANETs, and discussed some of the most important routing protocols. Different results were given by changing the selected parameters. Based on these results, the DSR and AODV protocols have shown better performance than other protocols. From the detailed simulation results and analysis, a suitable routing protocol can be chosen for a specified network and goal. TORA has had the worst result and DSDV has fixed behavior in all scenarios due to its table driven specification.

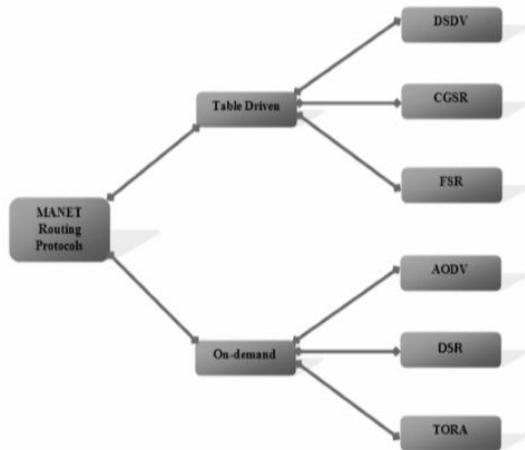


Fig. 4 MANET routing protocols

This paper[10], a new routing protocol for MANET environment is proposed based on Ant Colony Optimization principle coupled with other intelligent techniques. Routing in MANET is extremely challenging because of MANETs dynamic features, its limited bandwidth and power energy. MANET nodes operating on battery try to pursue the energy efficiency heuristically by reducing the energy they consumed. he propose an energy efficient routing algorithm for MANETs based on ACO for minimizing energy consumption of the nodes and prolong the life of the overall communication system shown in fig. 5. The proposed ABIRP algorithm improves the Energy efficiency, robustness and reliability. The efficiency of proposed routing protocol ABIRP is shown to better than other demand routing protocols AODV.

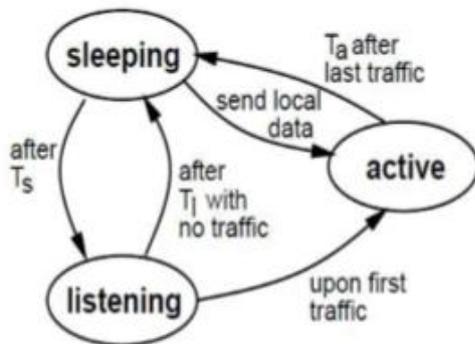


Fig. 5. Life of the overall communication system

In this paper [11], we proposed an adaptive Hello interval to reduce battery drain through practical suppression of unnecessary Hello messaging. Periodic Hello messaging is a widely used scheme to obtain local link connectivity information. However, unnecessary Hello messaging can drain batteries while mobile devices are not in use. In proposed method, Based on the event interval of a node, the Hello interval can be enlarged without reduced detectability of a broken link, which decreases network overhead and hidden energy consumption.

The Route error tolerant mechanism of AODV has been proposed in this paper [12]. The ultimate goal of this paper is to improve the route error tolerant mechanism of Adhoc On demand Distance Vector Routing Protocol (AODV) for the dynamic MANET system. In traditional AODV, if the route error occurs at the middle of transmission means the source node reconstruct the route to start the transmission from the beginning. So, the vast delay is occurred in the network and also AODV does not consider the presence of malicious node while constructing the route. However, in the proposed scheme the RERR of AODV sent to the forwarder node as shown in fig. 6. Then that node itself reconstructs the route by broadcasting the RREQ packets to the neighbor nodes. So, the proposed scheme improves the performance of traditional AODV in terms of throughput and packet loss.

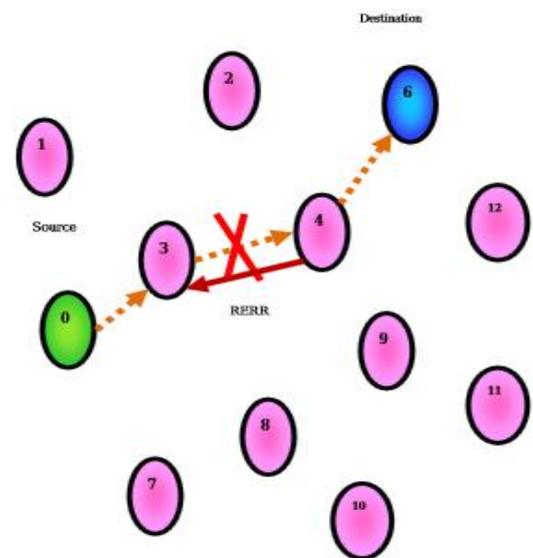


Fig.6 Link failure occur at the middle of transmission

III. CONCLUSION

MANETs is an emerging technological field and hence is an active area of research. In this paper, we have reviewed a broad range of routing protocols designed for MANETs. We find that different protocols give different performance capabilities with respect to different metrics, like message congestion, message delay, complexity etc. but there, no one was discussing about use of old version of routing table, every approaches are unique with respect to improvement. We have analyze that if we make some small effort in the direction of 2 version of routing table in MANET, then we will get huge amount of benefits. That's why if any intermediate node getting RERR message from any node so for establishing new route it will send RREQ message to all its neighbors and it will make delay. but if after getting RERR message if node check own old version of routing table and in old version of routing table path has not destroyed yet for that destination then it may useful. So not for all but in many cases definitely it will work.

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