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Caching the Performance of Dynamic Source Routing Protocol for Mobile Ad Hoc Network: A Review

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Abstract- A Mobile Ad Hoc Network is an collection of mobile devices that communicate with each other with the help of wireless links and behave as a distributed manner. Dynamic source routing protocol is used to find out the performance of network .There are different aspects which are taken like Cache Size, traffic overhead, average route discovery time, route expiry time are used to analyse the performance of the network in DSR protocol.

Keywords-MANET, Dynamic source routing(DSR) protocol, Caching, Bandwidth, Routing.

I. INTRODUCTION

Mobile ad hoc network is the important topic of research. In the past few years, we have seen a fast development in the field of mobile computing because this is inexpensive, widely available wireless devices. However, current devices, applications and protocols are focused on cellular or wireless local area networks (WLANs), not taking into account the great latent offered by mobile ad hoc networking. A mobile ad hoc network is an collection of mobile devices like laptops, smart phones, sensors, etc. that communicate with each other over wireless links and behave as a distributed manner in order to provide the necessary network functionality in the absence of a fixed infrastructure.
Mobile Ad hoc Networks (MANET) are wireless networks without any fixed infrastructure, which are usually set up on a temporary basis to serve a particular purpose within a specific period of time. They are most suitable in situations where the deployment of an infrastructure is neither feasible nor cost effective.

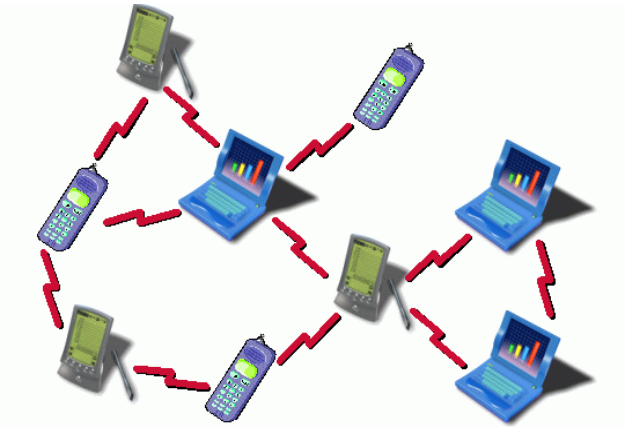

Fig.1 Mobile Ad Hoc Network

1.1 Need of MANET Routing Protocols

A mobile ad hoc routing protocol is used to discover new routes and maintain all the routes between the nodes in the network. MANET (Mobile Ad Hoc Network) is the collecting of mobile nodes which are present in random manner in the network has the ability to communicate and exchange information in proper way over the network by facilitating the intermediate nodes for their communication. The main task of a MANET protocol is to create or discover the correct and efficient routes between the nodes so that information can be delivered accurately with respect to time. Route construction should be done with less traffic and less bandwidth consumption for effective communication.

1.2 Dynamic Source Routing Protocol

Dynamic Source Routing (DSR) is a reactive, flexible and simple protocol. DSR is based on demand routing protocol and uses the concept of source routing rather than routing tables like other protocols. When source node send packets to the destination node, the different packets may follow the different routes, even they have same source and destination. DSR allow the packets to be travel loop-free and avoid the need for updating routing information in the routing tables periodically that is required in table-driven approach. The DSR protocol is composed of two main mechanisms Route Discovery and Route Maintenance.

1.3 Routing Caching

Route caching is carried out for two purposes; firstly, a cached route is readily available to the demanding node thus reducing the routing latency significantly. This is particularly important in real time communication like audio and video transmissions. Secondly, route caching avoids route discovery process and in that way reduces the control traffic that is required in searching for a new route. Route caching store the routes that have learned from the source node and avoid unnecessary route discovery operation that required each time a data packet is to be transmitted. Because that reinitiating of a route discovery mechanism in on demand routing protocols is very costly in term of delay, battery power, and bandwidth consumption due to flooding of the network, which can cause long delay before the first data packet sent. The performance of protocols mainly depends on an efficient implementation of route cache.

1.4 Applications of MANET

MANET has a large scale of usage because of its flexibility. MANET can be used in the office. A personal digital assistant (PDA) can be synchronized with a desktop in the office for the transfer of files, emails. MANET can also play an important role at home. A user‟ ad hoc device can communicate with the one at home to aid unlocking the doors, activate lights on getting home. Others application of MANET are automatic flight check-in; no waiting in line,acquiring traffic information in the car to avoid traffic congestion etc.

1.5 Displacement of MD in a Route

An established MANET comprises of a source node, intermediate node(s) and a destination node. The source node has downstream links which help in forwarding the routed packets from the source node to the destination node. The source node stores the downstream links from itself to the destination node. The source node used the stored downstream links to route packets to the destination node. The source node can migrate away from the MANET. Neighbouring MDs of the migrated source MD should be aware of the migration in order to discard the link to the migrated source MD.

This destination node, which has also an upstream links to the source node, stores these links for subsequent usage and it can also leave MANET at any time. A neighbouring MD should be aware of the destination node migration so as to remove the stored link to this destination 9 node. Also, the intermediate node(s) can still leave the network thereby creating a link failure. A new route has to be established in order to route packets from the source node to the destination node. This new route is achieved by broadcasting over the wireless medium, another intermediate node routing the packets to the destination node. This tends to consume bandwidth and increase the overall network control traffic.

II. LITERATURE REVIEW

The review process was adopted by surveying the research in last 10 years (2003-2013) for extraction of information about some issues.

Shukla et al.[1] proposed new route cache maintenance in DSR protocol in order to improve the performance of the DSR protocol. This was achieved by allowing nodes to learn about the route caches of neighbors' nodes, instead of sending route error packets to the source, due to link failure, before forwarding the packet to the destination.

T.C. Huang et al.[2] proposed two mechanisms to improve cache performance of DSR: RERR-Enhance mechanism and hierarchical link cache structure, the average end to end delay and routing overhead is improved with these mechanisms. The route cache is used in DSR protocol to store all the routes are learned from the source node and to avoid unnecessary route discovery process.

Shobha K.R. et al.[3] presents an analysis of the effect of intelligent caching in non clustered network, using on demand routing protocol. In Intelligent Caching technique a node not only saves the path discovered during route discovery for itself but also for others who are located close to it. This technique reduces the number of route request packets unnecessarily circulating in the network, when the path it requires is present in its neighborhood. This technique drastically increase the available memory for caching the routes discovered without affecting the performance of the DSR protocol in any way except for a small increase in end to end delay.

Emmanouil et al.[4] developed an algorithm that estimate the lifetime of all routes in the network, and optimize TTL setting in real time for every newly discovered cached route. TTL increase the throughput, total transmission delay is reduced, the route cache' erroneous information content is decreased. To avoid performing route discovery mechanism before each data packet is sent, DSR needs to formerly cache the routes discovered.

J. Chen et al.[5] proposed Tiding Active Packets (TAP) mechanism. TAP is composed of the Active Packets and Route Error (RERR) flooding to update the stale routes in the cache of DSR protocol. As stated in Tiding Active Packets has three phases: first phase is the Topology Collection, in which, Active Packet makes two visits to all the nodes. In the first visit, Active Packet travels to each node to collect the information of the neighbor nodes. After finished the information collection by Active Packet, its starts the second visit, through which, all the nodes get all the topology information from Active Packet and use this information in the route discovery process. Second phase is the Path Calculation that represents a node that calculates its path from the source to the destination before it needs to forward a data packet. Third

phase is the Topology Maintenance, in which a node has responsibility to ensure the transmission of data packet successfully to the next hop by using a local data cache. Tiding Active Packets mechanism have tested with low mobility 0 m/s to 1 m/s only, and low load traffic network. However, with high mobility environments and high load network traffic, a route cache may contain stale routes that can affect the performance of DSR protocol.

Sangeeta Biswas et al.[6] presented a detailed study of DSR protocol. The DSR is a simple and robust routing protocol designed specifically for use in multi hop wireless ad-hoc networks. DSR is passed on source routing, which means that the originator of each packet determines an ordered list of nodes through which the packet must pass while traveling to the destination.

Naseer Ali Husieen et al.[7] described that with high mobility situations and high load network traffic stale routes will be generated. These stale routes can mainly affect the performance of DSR protocol which cause long delay, increase the packet loss, increase the overhead and reduce the efficiency of protocol. Therefore efficient mechanism for updating the route in the cache of DSR protocol is needed.

Fenglien Lee et al.[8] developed an efficient on-demand routing algorithm, called OCR-"On-Demand Cache Routing Algorithm", for route discovery and management, and mobility handling. They applied the content-addressable and LRU replacement features in L-1(level one or primary) or L-2(level-2 or secondary) caches for route table creation, updating, and maintenance. The OCR algorithm with double-level route caches solved most problems in on-demand routing, such as route tables in "slow" main memory, long connection setup delay, broken link repairing, huge routing overhead for long routes, lengthy data packet in source routing , sending beacons periodically, control overhead for complicated IDs in data packets, to setup TTL(time to live) in a packet or route path, and to update the stale routes in the route table or cache frequency.

III. CONCLUSION

It is find from our simulation results that if number of nodes increases in a network , the routing traffic increases and the average end-to-end delay but the lower the route discovery time. In order to reduce the incurrence of high routing overhead traffic and average end-to-end delay, a high capacity cache should be used when the number of nodes in a MANET is high. This increases the performance of the protocol.

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