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Review of Ad-Hoc on Demand Distance Vector and Optimized Link State Routing Protocol for Mobile Ad-Hoc Network

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Abstract- Ad hoc network is a collection of mobile nodes without the need of central access point. This paper provides the detail explanation of routing, its types and working of MANET Routing Protocols that are Proactive (Optimized link state routing), Reactive (Adhoc on demand distance vector) and Hybrid (Zone Routing protocol). Performance of AODV, OLSR, and ZRP protocols is taken with the help of different aspects like Network load, Throughput, Retransmission Attempts and Media Access Delay.

Keywords-MANET, Adhoc on dimand distance vector,optimized link state routing,zone routing protocol,Dynamic source routing.

I. INTRODUCTION

A mobile ad hoc network is the collection of wireless nodes that can dynamically be set up anywhere and anytime without using the pre-existing network infrastructure. MANET is a self configuring wireless network in which nodes are dynamically perform mobility related to wire line network. MANET nodes contain multiple applications and require different level of data traffic to communicate with the other nodes. Nodes in the network are mobile and they can move randomly and organize arbitrarily, so that the network topology can change quickly and unpredictably. MANET does not contain fixed network topology since nodes are in true mobility irrespective of the direction which generates great complexity in routing traffic from source to destination.

1.1 MANET Architecture

In MANET aehitecture all the available nodes are aware to all other nodes within range. The entire collection of nodes is interconnected in many different ways. The nodes in a MANET can be of varying capabilities. Mobile phones, laptop computers and Personal Digital Assistants (PDAs) these are some examples of nodes in ad-hoc networks .

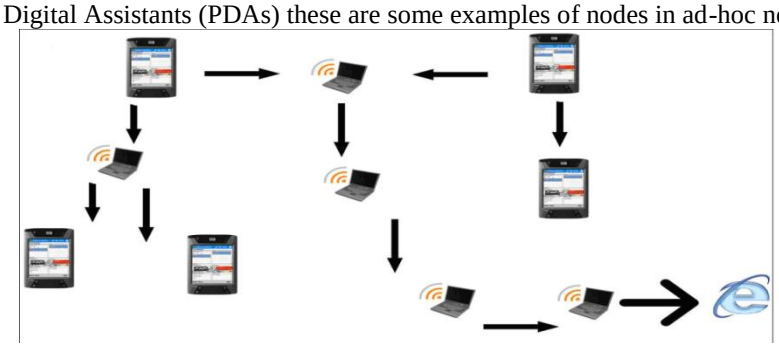

Fig.1 MANET Architecture

1.2 Routing Types

Routing has two basic types:

(1) Static routing: Routing is done by administrator manually to forward the data packets in the network and that is permanent, no any administrator can change this setting. These static routers are configured by the administrator, which means that there is no need to make routing tables by the router itself.

(2) Dynamic Routing: This routing is automatically done by the choice of the router. It can route the traffic on any route depend on routing table. Dynamic routing allows the routers to know about the networks and interesting thing is to add in this information in their routing tables.

1.3 Routing Protocol in MANET

Protocols are the set of rules through which two or more devices (mobile nodes, computers or electronic devices) can communicate with each other. When a node wants to join in a network, it discovers the topology by announcing its presence, and listening to broadcasts from the other nodes in the network. Routing Protocols in MANET are classified into following categories:

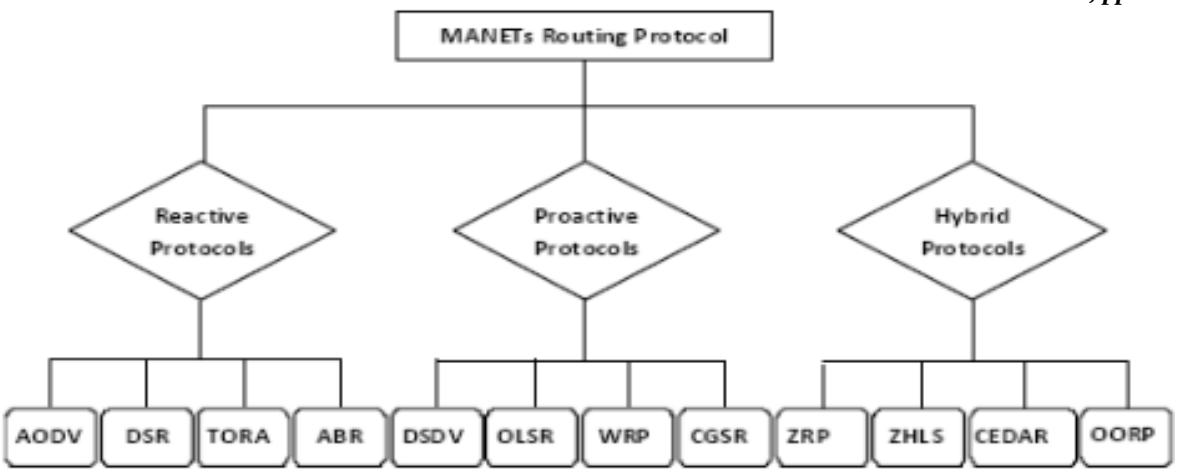

Fig 1.2 MANET Routing Categories and Protocols

A) Reactive Routing Protocols: Reactive routing protocols are the bandwidth efficient. Routes are built as and when they are needed. This is achieved by sending the route requests across the network. One of them is that it offers the high latency when finding the routes. The other disadvantage is the possibility of the network clog when flooding is excessive. In this work, we considered AODV Routing Protocol.

1. Dynamic Source Routing (DSR): One of the most generally referred routing algorithms is the DSR protocol. has two basic mechanisms for its operation, namely; route discovery and route maintenance.

B) Proactive Routing Protocols: Proactive routing protocols build and maintain routing information to all of the nodes. Proactive routing protocols are not a bandwidth efficient. This is due to the control messages that are broadcasted even when that there is no data flow. One of the main advantages is the fact that nodes can easily get routing information and it's easy to establish a session. In this work we have considered OLSR routing protocol.

1.Destination-Sequenced Distance Vector Routing (DSDV): The DSDV protocol is a distance vector protocol is that implements a number of customizations to make its operation more suitable for MANET.

2.Optimised Link State Routing (OLSR): The Optimised Link State Routing (OLSR) protocol is variation of the traditional link state routing, customized for improved operation in ad hoc networks.

3.Cluster-head Gateway Switch Routing (CGSR): The CGSR protocol is clustering scheme that uses a distributed algorithm called as the Least Cluster Change (LCC).

4.Global State Routing (GSR): The GSR is based on the traditional link state algorithm with an improved way of information issemination.

C) Hybrid Routing Protocols: Hybrid routing protocol is that it combines the advantages of both proactive and reactive routing protocols, the routing is initially established with some of the proactively prospected routes and then serves the demand from additionally activated nodes through reactive flooding. In this work we have considered ZRP Routing Protocol.

1. Zone Routing Protocol (ZRP): ZRP utilises the fact that the node communication in ad hoc networks is mostly localised, thus the changes in the nodes topology within the area of a node are of primary importance.

2. Fisheye State Routing (FSR): FSR is similar to link state routing, because it maintains the routing table at each node. The only difference is the way these tables are maintained.

3. Landmark Ad hoc Routing (LANMAR): This protocol combines the properties of link state and distance vector algorithms and builds subnets of groups of nodes which are likely to move together. A "landmark" node is elected in each subnet, similar to the FSR.

II. LITERATURE REVIEW

The review process was adopted by surveying the research in last 10 years (2005-2013) for extraction of information about some issues.

C. Liu et al. [1] have presented an important and essential issue for mobile ad hoc networks- routing protocol design that is a major technical challenge due to the dynamism of the network. Routing is an essential component of communication protocols in mobile ad hoc networks. The design of the protocols are driven by specific goals and requirements based on respective assumptions about the network properties or application area. The survey tries to review typical routing protocols reveal the characteristics and trade-offs.

Shobha K.R. et al.[2] 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.[3] 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.

Ravinder Ahuja et al. [4] evaluated performance of three types of routing protocols (AODV, OLSR and ZRP) based on random waypoint mobility model. In this paper they analyze and compare the performance of protocols using opnet 4.5 from scalable network. These routing protocols were compared in terms of Packet delivery ratio, Average end-to end delay and Throughput when subjected to change in no. of nodes and pause time. Simulation results show that Reactive protocols better in terms of packet delivery ratio and throughput.

Zeyad Ghaleb et al. [5] has given the evaluation of proactive routing protocol -Routing Information Protocol (RIP) and reactive routing protocol-Dynamic Source Routing (DSR).The performance of these routing protocols will be measured based on the throughput, delay, average jitter and energy consumption metrics.The routing information protocols (RIP) have better evaluation performance compared to DSR in the scenario.

Razan Al-Ani et al. [6] simulated and evaluated the AODV, OLSR, ZRP, TORA and DSR routing protocols to analysis the performance on basis of Throughput, Delay, and Network load. They created a network which consists of mobile nodes, one fixed WLAN server running ZRP and RX group config node to speed up simulation time. All nodes are configured to work with 5.5 Mbps data rate and FTP application type was chosen for all nodes with multiple FTP sessions. They ran four scenarios for each type of routing protocol. Each scenario was run for 30 min. According to their results OLSR routing protocol performs better than others in both delay and throughput.

Sangeeta Biswas et al.[7] 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.

III. CONCLUSION

We evaluated the four different ad hoc routing protocols with respect to their routing overhead, packet delivery ratio, throughput and packet end-to-end delay. OLSR outperforms AODV, TORA and DSR in throughput and packet end-to-end delay performance metrics used in this research. It also outperforms all other protocols in the packet delivery ratio when deployed in low mobility and high load networks. OLSR has the worst performance in the routing overhead. It is therefore well suited for high capacity networks.

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