A Study of Routing Protocol in Manet

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*Abstract-*A mobile and ad-hoc network (MANET) is set of mobile nodes which communicate over radio and do not need any infrastructure. This kind of networks is very flexible and suitable for several situations and applications. Nodes not only have to fulfill the functionality of hosts, but each node has also to serve as a router, forwarding packets for other nodes. However, the performance of such networks has to be improved before this can be realized. Here in this paper I have proposed 2 step improvements in Ant Based Routing Protocol for enhancing improvement in the network and to reduce overburden of the network.

*Keywords-*MANET, Ant Based Routing.

I.INTRODUCTION

An ad hoc network is a network that is composed of individual devices communicating with each other directly. The term implies spontaneous or impromptu construction because these networks often bypass the gate keeping hardware or central access point such as a router. Many ad hoc networks are local area networks where computers or other devices are enabled to send data directly to one another rather than going through a centralized access.

Figure1Mobile ad-hoc network

Ad hoc networks are mostly wireless local area networks (LANs).The devices communicate with each other directly instead of relying on a base station or access points as in wireless LANs for data transfer coordination. Each device participates in routing activity, by determining the route using the routing algorithm and forwarding data to other devices via this route. Ad-hoc Network Classification is as follow:

1. According to topology
- Flat Ad Hoc Networks
- Hierarchical Ad Hoc Networks
- Aggregate Ad Hoc Networks

2. According to Communication
- Single-hop Ad Hoc Network
- Multi-hop Ad Hoc Network
- Mobile Multi-hop Multimedia Ad Hoc Network (3M-Network)

3. According to Coverage Area
- BAN
- PAN
- LAN
- MAN
- WAN

4. According to node Configuration
- Homogeneous Ad Hoc Network.
- Heterogeneous Ad Hoc Network.

II. ROUTING PROTOCOLS

Routing is the act of moving information from a source to a destination in an internetwork. During this process, at least one intermediate node within the internetwork is encountered. The routing concept basically involves, two activities: firstly, determining optimal routing paths and secondly, transferring the information groups (called packets) through an internet work [9]. The later concept is called as packet switching which is straight forward, and the path determination could be very complex. Routing protocols are classified into different categories depending on their properties. Centralized vs. Distributed.
- Static vs. Adaptive
- Reactive vs. proactive
- In centralized algorithms,

All route choices are made at central node, while in distributed algorithms, the computation of the routes is shared among the network nodes another classification of routing protocols relates to whether they change routes in response to the traffic input patterns. In static algorithms, the route used by the source destination pairs is fixed regardless of traffic conditions [10-12]. It can only change in response to a node or link failure. This type of algorithm cannot achieve high throughput under a broad variety of traffic input patterns. Most major packet networks uses

some form of adaptive routing where the routes used to route between source-destination pairs may change in response to congestion [13]. Proactive protocols continuously evaluate the routes within the network, so that when a packet needs to be forwarded the route is already known and can be immediately used. Reactive protocols invoke a route determination procedure on demand only. There is need a new routing protocol for communication network which include adaptive, scalable, and secure aspects in it. Some of the cluster-based routing protocols are analyzed below inTable I. SECURITY GOALS IN MAN

1.Proactive Routing Protocols: Proactive protocols are the protocols that update routing information frequently to ensure the information is up-todate. The protocols in this category include DSDV, OLSR and WRP. They are discussed in the ensuring sub sections.

1.1. Destination-Sequenced Distance-Vector (DSDV)
This is the routing protocol which is based on an algorithm named Bellman-Ford Routing with some enhancements. When compared with other protocols, the distance vector routing is considered less robust due to bouncing effect. As per this protocol each node maintains a routing table that contains all devices in the network. It updates the table periodically. In order to ensure correct information in the routing table, it broadcasts request to all nodes so as to update the routing table. All the neighbor nodes estimate the cost of the routing at present and make a decision by comparing existing value in the route table. If there is updating required the node recomputed cost and the routing table gets updated [40].

1.2. Optimized Link State Routing Protocol (OLSR)
It is a point to point protocol that employs a link state packet for robust forwarding mechanism known as multipoint relaying. The protocol is aware of two optimizations. They are by reducing the size of control packets and by reducing the size of control packets and by reducing the number of links. Each node contains topology information. The network follows an approach known as computation of optimal route, efficient flooding and neighbor sensing. When detection of changes is made with respect to neighbors, it is known as neighbor sensing. An optimal route is computed by each node and the shortest path algorithm is applied for finding optimal path. When a transmission is needed, paths to all nodes will be available and transmission begins immediately with best possible path .

1.3. Wireless Routing Protocol (WRP)
It is a protocol which makes use of table for routing information similar to that of DSDV. It maintains routing information with each node in the network. The routing information contains the shorted path to every destination. It is a loop free routing protocol and proactive in nature. This protocol is nothing but a path finding algorithm

without count-to-infinity problem. Each node in the network is supposed to maintain four tables. They are Message Retransmission List (MRL), Link-Cost Table (LCT), Routing Table (RT) and Distance Table (DT). In case of link failure between nodes, the neighbors are informed. Its quantitative performance analysis is found in [5].

1.4. Fisheye State Routing (FSR) It maintains accuracy distanced path and its quality information pertaining to its immediate neighbor. As the node distance increase, the amount of detail stored will be reduced. It can effectively reduce the size of update messages. This is achieved by updating network information to neighbors from time to time. It is more scalable with large networks [40].

2. Reactive Routing Protocols

2.1. Ad-Hoc On-Demand Distance Vector (AODV)
As the name implies, Ad Hoc On Demand Distance Vector is a routing protocol which is widely used in MANETs. It is also used in other mobile networks. It was the result of combined effort of many universities such as University of Cincinnati, Santa Barbara and University of California. In this protocol a node sends packets to a particular destination only on-demand. And it maintain routes to destination till they need by the source, it's capable of both unicast and multicast routing.

In AODV, each and every node maintains a table, which contains information about their neighbors to send packets to reach their destination safely. The main key feature of AODV is it ensures the freshness of routes. An ad-hoc network is a collection of mobiles nodes without any interference of access point or existing infrastructure. The AODV uses routing algorithm which is useful for networks where nodes are automatically configured. This protocol is capable of providing loop-free route even in the case of broken links without the need for route advertisements that are made periodically. It also uses symmetric links between neighbor nodes. Nodes do not lie on the active paths. They also do not maintain routing information and do not involve in routing table exchange performed frequently.

2.2. Dynamic Source Routing (DSR)
DSR is one of the on-demand protocols that are best used to reduce bandwidth consumption by the control packets. This protocol eliminates the need for updating routing protocol from time to time. Therefore there is not concept of periodic updates. Route discovery and route maintenance are the two important parts of the protocol. Cache memory is used to discover recently used paths. When a node wants to sent a packet, it searches for it in cache. If found, that path is used to transmit data. If not found a route request is sent by the sender to know path for the destination. This process continues until a route is discovered.

2.3. Temporally– Ordered Routing Algorithm (TORA)

This protocol is loop free, highly adaptive and distributed routing algorithm. This algorithm is based on the link reversal concept. It makes use of Direct Acyclic Graph (DAG) for defining upstream and downstream routes. With more number of nodes in network, the TORA protocol provides better route aid. It is relatively complicated protocol but supports control messages in case of link failures. In contrast to other protocols TORA will be able to recover point of failure directly. It exhibits high overhead for small networks.

3. Hybrid Routing Protocols

These are the protocols that employ different aspects of proactive and reactive protocols. The hybrid protocols that leverage good features of both proactive and reactive protocols are ZRP, ZHLS, DST, and DDR. The following sub sections provide more details of them.

3.1. Zone Routing Protocol (ZRP)

It is the routing protocol which considers nodes into different sub networks or zones. It combines the good features of both on-demand and proactive routing protocols for best performance. At zone level proactive routing is employed for high speed communication. However, the inter-zone communication needs to use on-demand approach.

3.2. Core Extraction Distributed Ad Hoc Routing (CEDAR)

It is a protocol with partitioning and it has integrated QoS support. Each partition has a Dominator Node (DN). A graph is built with a Dominator Set (DS) that contains all dominators of all partitions. A reactive routing protocol is employed for core nodes.

3.3. Distributed Dynamic Routing Algorithm Protocol (DDR)

It is a tree-based routing protocol that does not need root node. Periodic beaconing messages are used to construct trees. And these messages are periodically exchanged among neighboring nodes. Within a given network, these trees form a forest with gateway nodes that act as links between them. The gateway nodes are also regular nodes but they belong to separate trees and they are within the range of transmission of other nodes.

3.4. Zone Based Hierarchical Link State Routing Protocol (ZHLS)

This protocol is based on hierarchical structure. According to this protocol, the network is divided into multiple parts or zones without overlapping. Each node is identified by both zone ID and node ID. Therefore, the network contains two level structures for its topology. It also exhibits two types of link state updates. They are known as node level and zone level link state updates. A node level LSP is broadcasted to the other nodes of the zone periodically.

III. CONCLUSION

In this paper we study routing protocols in MANET. Since MANETs are convenient networks in emergency situations, the nodes in the network are resource constrained. In this context, the life time of network is less and that time is valuable for having emergency communications. Efficiency of routing protocols plays a role in having robust communications and also reduces resource consumption significantly. This leads to the increase of network lifetime. Though there are many existing protocols for routing in MANET, there is ever need for optimizing them.

Therefore there is much research interest in this area. As the existing protocols for routing have been classified into different categories like reactive, proactive and hybrid routing protocols, it is essential to have insights about them with good technical know how for expert decision making. However, it is quite difficult to determine which routing protocol is best in given scenario. Towards this end, in this paper, we review the present state of-the-art of MANET routing protocols, their merits and demerits in the context of different categories of MANET protocols based on their routing information maintenance. This paper throws light into the merits and demerits of the proactive, reactive and hybrid protocols. This research will be extended further to evaluate route discovery and route maintenance with respect to MANET protocols.

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