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STUDY ON MOBILE ADHOC NETWORK ROUTING PROTOCOLS

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ABSTRACT: In Many wireless communication techniques are commercially available, such as the Wireless LAN, Bluetooth, GSM, GPRS, and CDMA. Because an all-IP network will be a trend, access to the Internet via wireless communication devices has become an important issue. Mobile Internet protocol is an extension to Internet Protocol proposed by the Internet Engineering Task Force (IETF) which enables mobile user devices to move from one network to another regardless of their location and without changing their IP address. A Mobile Ad-hoc Network (MANET) is an autonomous system of mobile hosts connected by wireless links. The ad-hoc network is a non-infrastructure architecture in which nodes can access services from another regardless where they are. Ad-hoc network is that the ad-hoc method has no fixed infrastructure, allowing nodes to communicate with one another at any time and anywhere. Therefore this survey paper reviews about internet protocol and routing protocols in MANETS.

Keywords: Mobile IP, Ad-hoc, MANET, Routing protocols.

1. INTRODUCTION

Mobile IP can be thought of as the cooperation of three major subsystems. First, there is a discovery mechanism defined so that mobile computers can determine their new point of attachment as they move from place to place with in the internet. Second once the mobile computer knows the IP address at its point of attachment and registers with an agent representing it at its home network. Lastly Mobile IP defines simple mechanisms to deliver datagrams to the mobile node when it is away from its home network. This mobility binding is maintained by some specialized routers known as mobility agents. Mobility agents of two types - home and foreign agents. The home agent, a designated router in the home network of the mobile node, maintains the mobility binding in a mobility binding table where each entry is identified by the tuple permanent home address, temporary care-of address, association life time. Figure 1 shows a mobility binding table. The purpose of this table is to map a mobile node's home address with its care-of address and forward packets accordingly [1].

Home address	Care-of Address	Lifetime(in sec)
131.193.171.4	128.172.23.78	200
131.193.171.2	119.123.56.78	150

Figure 1: Mobility Binding Table

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2. IP PACKET DELIVIERY

When IP datagrams are exchanged over a connection between the mobile node (A) and another host (server X in Figure 2), the following operations occur Server X transmits an IP datagram destined for mobile node A, with A's home address in the IP header. The IP datagram is routed to A's home network. At the home network, the

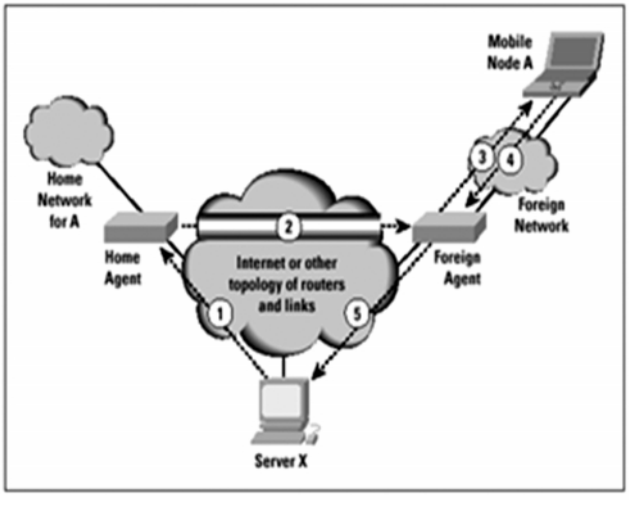

Figure 2: Mobile IP Datagram Flow

Incoming IP datagram is intercepted by the home agent. The home agent encapsulates the entire datagram inside a new IP datagram, which has the A's care-of address in the header, and retransmits the datagram. The use of an outer IP datagram with a different destination IP address is known as tunneling. The foreign agent strips off the outer IP header,

encapsulates the original IP datagram in a network-level Protocol Data Unit (PDU) (for example, a LAN Logical Link Control [LLC] frame), and delivers the original datagram to A across the foreign network. When A sends IP traffic to X, it uses X's IP address. In our example, this is a fixed address; that is, X is not a mobile node. Each IP datagram is sent by A to a router on the foreign network for routing to X. Typically, this router is also the foreign agent. The IP datagram from A to X travels directly across the Internet to X, using X's IP address.

3. MOBILE ADHOC NETWORKS

A MANET is defined as a collection of mobile platforms or nodes in which each node is free to move about arbitrarily. The term MANET describes distributed, mobile, wireless, multihop networks that operate without the benefit of any existing infrastructure except for the nodes themselves. A MANET is an autonomous system of mobile nodes that operates in isolation. Each node's position and transmitter and receiver coverage patterns with transmission power levels and co-channel interference levels exists only between the nodes. This MANET topology may change with time as the nodes move or adjust their transmission and reception parameters.

MANETS has the following characteristics:

- Dynamic topologies.
- Bandwidth-constrained, variable capacity links.
- Energy-constrained operation.
- Limited physical security.

4. COMPARISONS OF ROUTING PROTOCOLS

The following sections provide comparisons of the previously described routing algorithms. The next section compares table-driven protocols, and another section compares on demand protocols.

4.1. Source-Initiated On-Demand Routing Protocols

CGSR Cluster-Head Gateway Switch Routing is similar to the DSDV routing protocol. In Cluster- Head Gateway Switch Routing (CGSR) the nodes form clusters. A cluster head is selected. All nodes within the cluster heads radio transmission range

A cluster head is selected for every department. A gateway node can communicate with two or more cluster heads (Fig. 3).

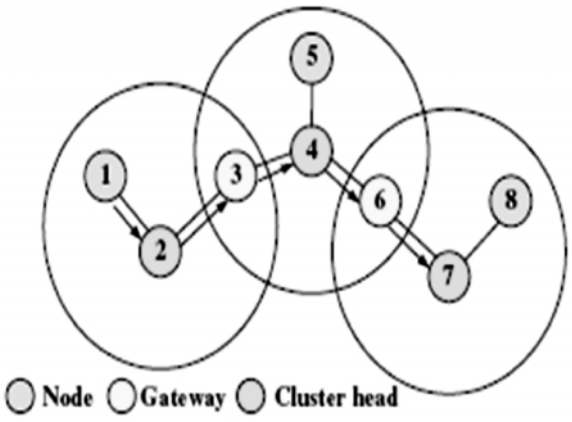

Figure 3: CGSR: Routing from Nodes 2-4, 6 and 7 form a Single Cluster

AODV Ad Hoc On-Demand Distance Vector Routing offers a pure distance-vector approach. It does not maintain a routing table. AODV is a purely "on demand" method that follows a route request and reply discovery cycle when the nodes communication with other nodes. Fig. 4 shows the AODV format. The AODV routing table will record a message with a destination sequence number (as with DSDV) to avoid a routing loop and produce the latest new routing topology [3].

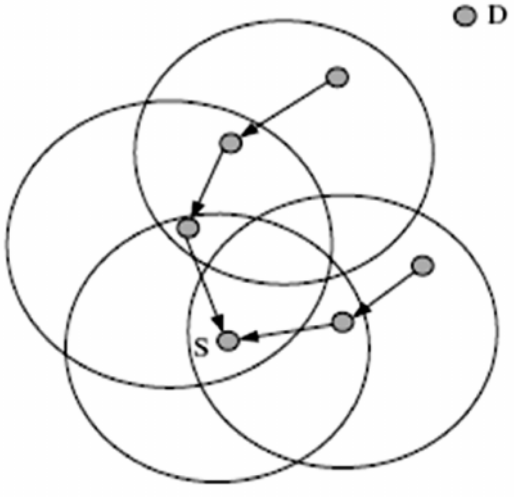

Figure 4: AODV: Reverse Path Formation

DSR The Dynamic Source Routing (DSR) protocol presented in Fig. 12 is an on-demand routing protocol based on the source routing concept. When mobile nodes request communications, the DSR protocol will search for a path. Mobile nodes are required to maintain route caches that contain the source routes of which the mobile is aware. Entries in the route cache are continually updated as new routes are learned [3,4]. The DSR protocol is similar to AODV and uses the source broadcast method as the DSR is shown in Figs. 5 and 6.

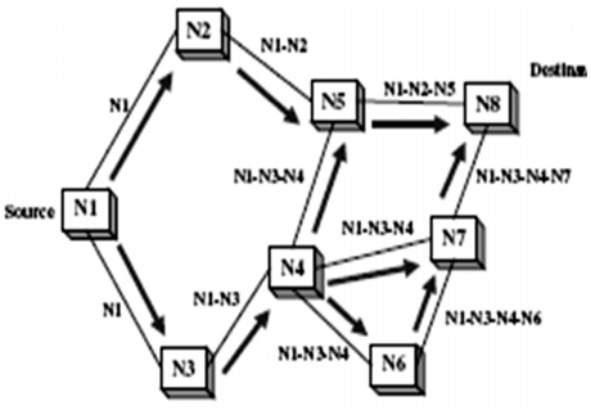

Figure 5: DSR: Route Request

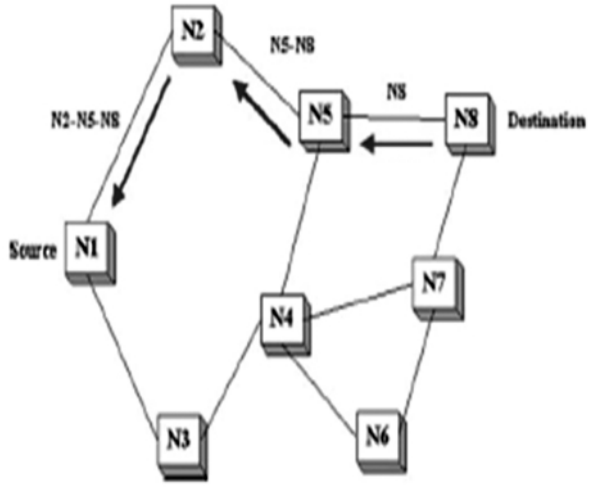

Figure 6: DSR: Route Reply

TORA The Temporally Ordered Routing Algorithm (TORA) is a highly adaptive loop-free distributed routing algorithm based on the link reversal concept. TORA is designed to operate in a highly dynamic mobile networking environment. There are three steps in the TORA protocol: Route Creation, Route Maintenance and Route Erasure [3]. During the route creation and maintenance phases, the nodes use a "height" function. This algorithm does not make changes to other routes when the topology is modified, as shown in Fig. 7.

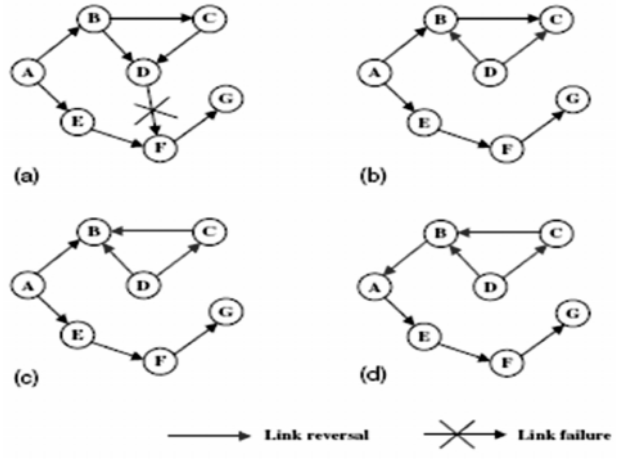

Figure 7: TORA: Route Maintenance
(A: source, G: Destination)

Comparisons of the three protocol characteristics:

Table 1

	Proactive (table-driven)	Reactive (on-demand)
Routing protocols	DSDV	AODV,DSR, TORA
Route acquisition delay	Lower	Higher
Control overhead	High	Low
Power requirement	High	Low
Bandwidth requirement	High	Low

5. CONCLUSION

This paper presented a survey of routing protocols designed for MANETs. We provided the classification between proactive and Reactive protocols by giving their performance in various aspects. To design a MANET routing protocol with multiple metrics is a challenge task, especially as the network topology and traffic are changing all the time. We may consider not limiting the mobile nodes to a single predefined routing protocol, instead we let each node decide which protocol to choose based on the environment around it at that time where it is called active adhoc routing. Since there are many routing protocols, we can't say which is best algorithms results depends on situation and given parameters. We plan future investigations to find better algorithm implementing swarm intelligence doing simulation.

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