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AN INTANGIBLE SURVEY ON MOBILE AD-HOC NETWORK PROTOCOLS AND LIMITATIONS

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Abstract:-

An ad-hoc network (MANET) is set of different types of mobile node. MANET is mobile so they utilize wireless connection to attach with network. MANET can be deployed at low cost in variety of application. In MANET different types of routing protocols have been recommended. These protocols can be classified into three main categories reactive (on-demand), proactive (table-driven) and hybrid routing protocols. MANET uses location-centric paradigm rather than identity-centric paradigm that are used in most of the networks. Using this paradigm is well suited for privacy in hostile and suspicious mobile ad-hoc networks. For achieving privacy and security, various protocols are proposed. This paper presents a state-of-the-art review and a comparison for typical representatives of routing protocols designed for mobile ad hoc networks. And provides criteria according to which the protocols can be compared and classified.

Keywords: - [MANET, Mobile Ad Hoc network Protocols, DSDV, AODV, OSLR]

1. INTRODUCTION

A MANET is a type of ad- hoc network that can change locations and configure itself on the fly. MANET can be a model Wi-Fi connection, or another standard, like a cellular or satellite transmission. MANET has many applications like military, communication, conference meeting, automated battlefield, creating virtual classrooms and in sensor network. The main feature of MANET restoring and self organizing and transmission through multiple hopes.

Mobile networks can be classified into infrastructure networks and mobile ad hoc networks [1] according to their dependence on fixed infrastructures. In an infrastructure mobile network, mobile nodes have wired access points (or base stations) within their transmission range. Responsibility to act as a router. Mobile ad hoc networks originated from the DARPA Packet Radio Network (PRNet) [2] and SURAN project [3]. Being independent on pre-established infrastructure, mobile ad hoc networks have advantages such as rapid and ease of deployment, improved flexibility and reduced costs.

2. LITERATURE SURVEY

In Ad-hoc networks require multi-hop routing and all nodes can potentially contribute in the routing protocols. Routing Protocols are organized as:

*** Proactive Routing Protocols:** Protocols find path between each individual node

before they plan to communicate. Similarly the routing information is updated periodically in a routing table to retain the path found. When there is a need for communication, nodes can immediately start to communicate without a delay as the path is already found.

*** Reactive Routing Protocols**: Protocols find path between a pair after they plan to communicate. Nodes do not Construct path unless a need arrives. When there is a need, nodes should find path and then only they can start to Communicate. The routing information of the active routes is only maintained.

*** Hybrid Routing Protocols:** The features of both the protocol types are combined to satisfy the requirement based on the scenario. These protocols can act as reactive or proactive in different situations like increase in network size and density.

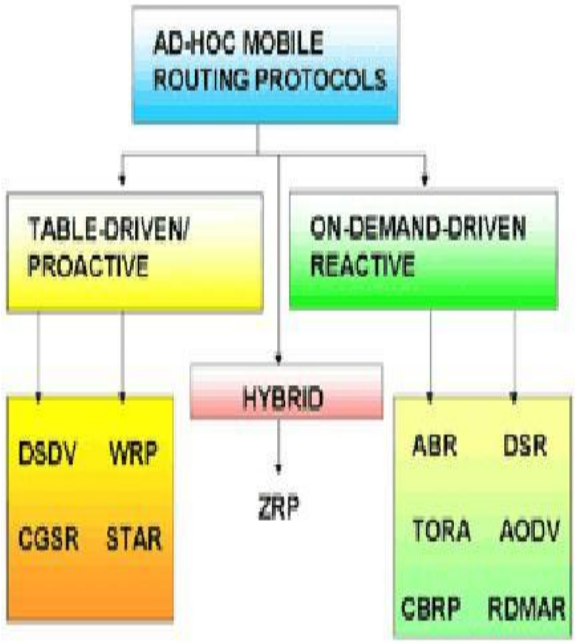

Figure 1: Manet Protocols

2.1 Dynamic Source Routing Protocol

One of the simplest and efficient routing protocols designed particularly for use in multi-hop wireless adhoc networks of mobile nodes is the Dynamic Source Routing protocol (DSR). This protocol DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration.

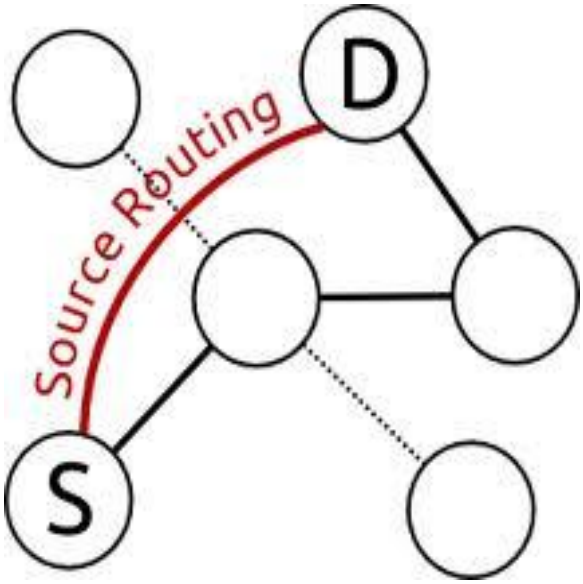

Figure 2: Dynamic Source Routing Protocol

DSR protocol is consists of two mechanisms: one is Route Discovery and the other is Route Maintenance. These two mechanisms work together to allow mobile nodes to discover and Maintain source routes to arbitrary destination nodes in the adhoc network. By the use of source routing, it allows packet routing to be trivially loop-free.

2.2 Destination-Sequenced Distance-Vector Routing (DSDV)

A Mobile ad-hoc network or MANET is the cooperative engagement of a collection of Mobile Hosts without the required intervention of any centralized Access Point. A MANET's basic design idea is to operate each Mobile Host as a specialized router. This router periodically advertises its view of the interconnection topology with other Mobile Hosts within the network. Using this idea a new sort of routing protocol is developed. So, the investigated modifications to the basic Bellman- Ford routing mechanisms, as

specified by RIP are used for dynamic and self-starting network mechanism. This mechanism is required by users wishing to utilize adhoc networks.

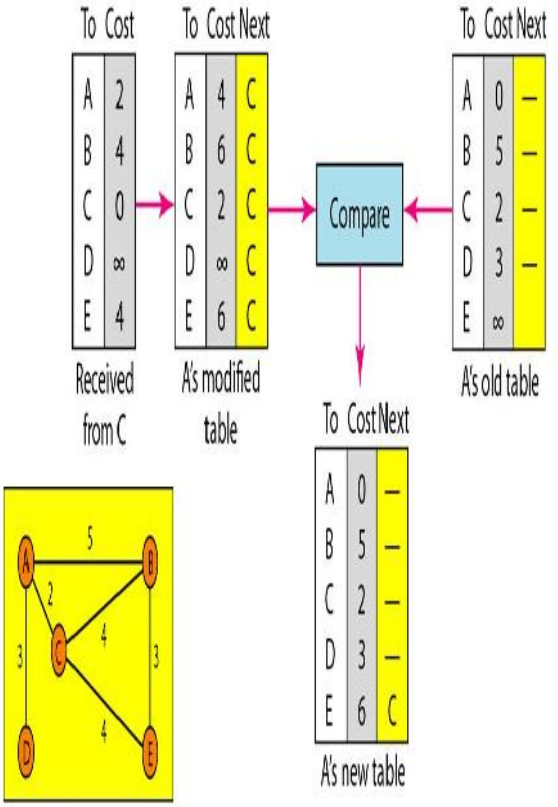

Figure 3: Distance-Vector Routing (DSDV)

2.3 Adhoc on Demand Distance Vector Routing (AODV)

A novel algorithm for the operation of adhoc Networks is the Adhoc on Demand Distance Vector Routing (AODV). Each Mobile Host operates as a specialized router and routes are obtained as needed (i.e., on demand). The routes are obtained with little or no reliance on periodic advertisements routing algorithm is quite suitable for a dynamic self-starting network as required by users wishing to utilize adhoc networks AODV provides loop free routes even while repairing broken links.

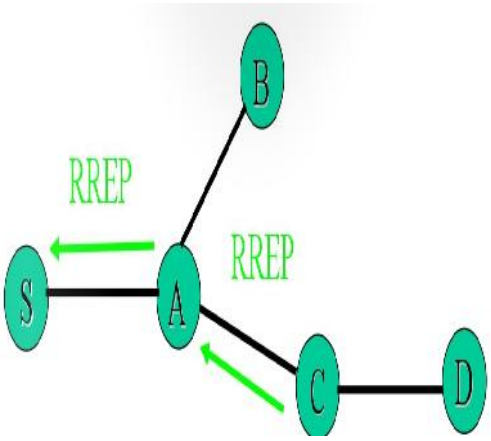

Figure 4: Adhoc on Demand Distance Vector Routing

2.4 Optimized Link State Protocol (OSLR)

Optimized Link State Protocol (OLSR) is proactive routing protocol, so the routes are always immediately available when needed. OLSR is an optimization version of a pure link state protocol. So the topological changes cause the flooding of the topological information to all available hosts in the network. To reduce the possible overhead in the network protocol uses Multipoint Relays (MPR). The idea of MPR is to reduce flooding of broadcasts by reducing the same broadcast in some regions in the network, more details about MPR can be found later in this chapter. Another reduce is to provide the shortest path. The reducing the time interval for the control messages transmission can bring more reactivity. OLSR uses two kinds of the control messages: Hello and Topology Control (TC). Hello messages are used for finding the information about the link status and the host's neighbor's. With the Hello message the Multipoint Relay (MPR) Selector set is constructed which describes which neighbor's has chosen this host to act as MPR and from this information the host can calculate its own set of the MPRs. the Hello messages are sent only one hop away but the TC messages are broadcasted throughout the entire network.

- **Hello**
- **TC-Topology Control**
- **MID- Multiple interface Declaration**

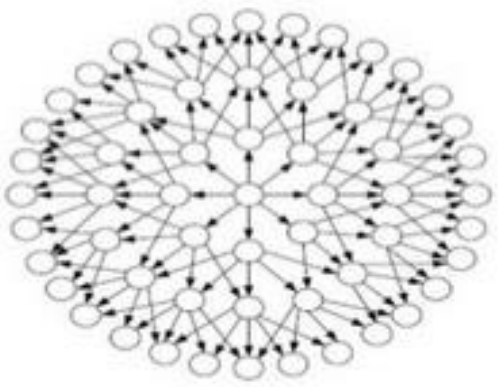

Figure 5: Optimized Link State Protocol (OSLR)

3. Limitations of traditional routing approaches

Routing is a fundamental issue for networks. A lot of routing algorithms have been proposed for wired networks and some of them have been widely used. Dynamic routing approaches are prevalent in wired networks. Distance Vector routing [4] and Link State routing [4] are two of the most popular dynamic routing algorithms used in wired networks. Distance Vector routing protocols are based on the Bellman-Ford routing algorithm. In Distance Vector routing, every router maintains a routing table (i.e. vector), in which it stores the distance information to all reachable destinations. A router exchanges distance information with its neighbors periodically to update its routing table. The distance can be calculated based on metrics such like hop number, queue length or delay. If multiple paths exist, the shortest one will be selected. The main drawback of Distance Vector routing algorithm is the slow convergence. Slow convergence leads to the "count-to-infinity" problem, i.e., some routers continuously increase the hop count to particular networks. The well-known Routing Information Protocol (RIP) [5] is based on Distance Vector Routing. In Link State routing algorithm, each node periodically notifies its current status of links to all routers in the network. Whenever a link state change occurs, the respective notifications will be flooded throughout the whole network. After receiving the notifications, all routers re-compute their routes according to the fresh topology information. In this way, a router gets to know at least a partial picture of the whole network. In Link State routing, different metrics can be chosen, such like number of hops, link speed and traffic congestion. Shortest (or lowest cost) paths are calculated using Dijkstra's algorithm. Open Shortest Path First (OSPF) [6] is an example of a link-state routing protocol. In wired networks, Distance Vector and Link State routing algorithms perform well because of the predictable network properties, such as static link quality and network topology. However, the dynamic features of mobile ad hoc networks deteriorate their effectiveness. In mobile ad hoc networks, when using a Distance Vector routing or Link State based routing protocol designed for wired networks, frequent topology changes will greatly increase the control overhead.

Without remedy, the overhead may overuse scarce bandwidth of mobile ad hoc networks. Additionally, Distance Vector and Link State routing algorithms will cause routing information inconsistency and route loops when used for dynamic networks.

Multicast is required by applications in which subsets of nodes have common interests for specific information. In such scenarios, multicast out-performs unicast due to the saving of bandwidth and computing resource. Multicast routing, together with multicast addressing and dynamic registration, provides supports for multicast in wired networks. The multicast routing avoids multiple transmissions of the same message to receivers belonging to the same subset. Many multicast routing schemes have

been proposed for wired networks, both Internet and ATM.

Parameters	DSR	DSDV	AODV	OSLR
Average end to end delay	Degrade when number of nodes increase in the networks	Least and remains constant as the number of nodes increase in the networks	Degrade with number of nodes increase	Better performance with less number of connections
Throughput	At speed 30 m/s throughput increases better than DSDV	Least Very low when compared with DSR and AODV	Best	High
Routing message	Low, Increases with an increase in the number of nodes	Very high for a slight increase in the number of nodes	Increases proportionally with an increase in the number of nodes	Increases with an increase in the nodes

Table 1: COMPARISON OF DIFFERRENT ROUTING PROTOCOLS

CONCLUSION

There are many protocols in existence for the MANET. Each has a different working principle pertain to an environment. Working principle of few routing protocols are discussed here. From the study it is observed that no single protocol is best amongst all, as each has better performance over the other at a particular metric and time. Advantages and disadvantages of those protocols are compared in a table for better understanding of the protocols, which helps in selecting a protocol suitable for the environment and the scenario. In future, the performances evaluation of reactive proactive and hybrid protocols like AODV, OLSR and ZRP under different attacks can be evaluated by using different type of parameters and different security mechanism is developed to prevent routing protocols from the different type of attacks.

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