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An Assessment on Proactive Routing Protocols in MANET

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Abstract: Today, people have large access to the Internet through mobile and Wi-Fi networks. On-demand video streaming has been the Internet's most dominant technology. The provision of Internet services through MANETs attracts both researchers and consumers, in particular video transmission. Ad hoc design and infrastructure-free distribution features make the MANETs more complex to provide video streaming on demand. Because nodes in a MANET normally have limited transmission ranges, some nodes cannot communicate directly with each other. Hence, routing paths in mobile ad hoc networks potentially contain multiple hops, and every node in mobile ad-hoc networks has the responsibility to act as a router. This paper is a survey of active research work on routing protocols for MANET.

Keywords: MANET, Proactive and Reactive routing protocols, Uni-casting, Multicasting

I. Introduction

Active research work for MANETs is carrying on mainly in the fields of Medium Access Control (MAC), routing, resource management, power control, and security. Because of the importance of routing protocols in dynamic multihop networks, a lot of MANET routing protocols have been proposed in the last few years. Considering the special properties of MANET, when thinking about any routing protocol, generally the following properties are expected, though all of these might not be possible to incorporate in a single solution.

- A routing protocol for MANET should be distributed in manner in order to increase its reliability.
- A routing protocol must be designed considering unidirectional links because wireless medium may cause a wireless link to be opened in uni-direction only due to physical factors.
- The routing protocol should be power-efficient.
- The routing protocol should consider its security.

II. Classification of MANET routing protocols

Within MANET networks, the protocols are divided into three groups that are applicable in this technology, which are proactive, reactive and hybrid, each one has its own characteristics for decision-making [32].

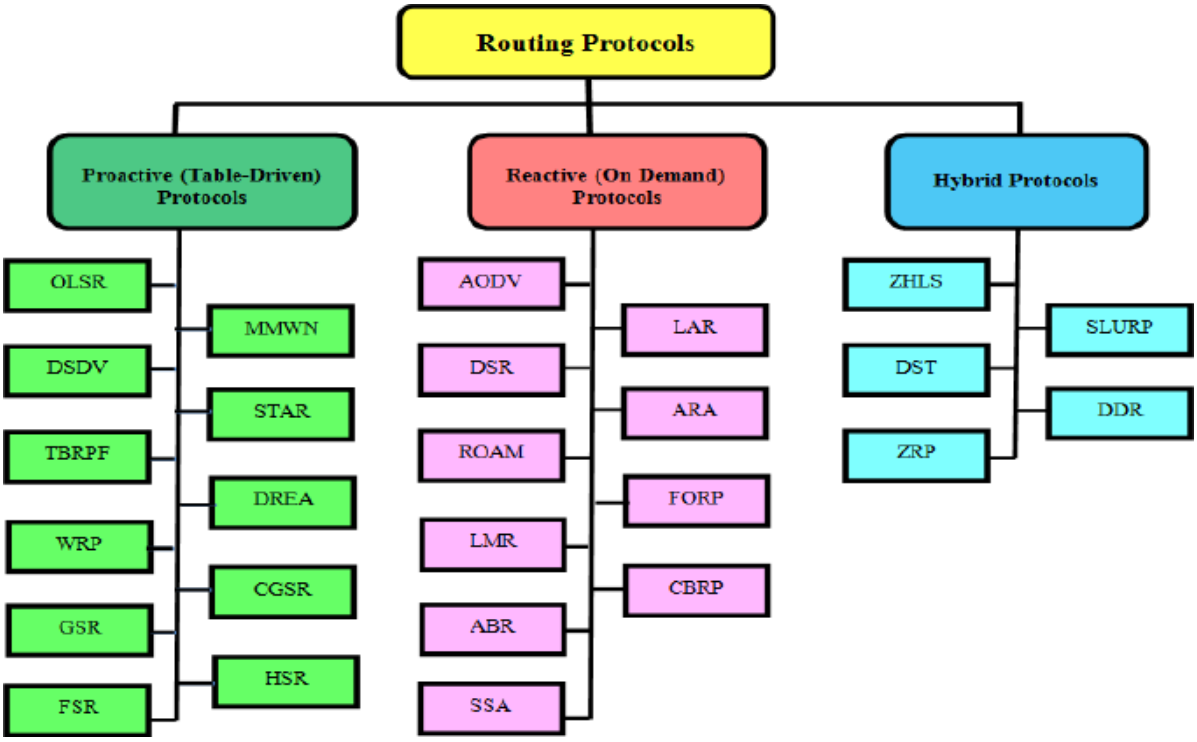

Figure 1: MANET Routing Protocols Classification

Table 1.1: Comparison of Different Types of Routing Protocols in MANET

S. No.	Parameter	Proactive Routing protocol	Reactive Routing protocol	Hybrid Routing protocol
1.	Network Structure	Smooth and hierarchical	Smooth	Smooth and hierarchical
2.	Topology Dissemination	Periodical	On-Demand	Both
3.	Storage requirements	High	Usually lower than proactive	Medium
4.	Route formation delay	Minimum	Maximum	Medium
5.	Route availability	Always available	Available when needed	Routes are available in intra zone

6.	Communication overhead	High	Low	Medium
7.	Types of protocols	DSDV, OLSR, WRP, OSPF	AODV, DSR, TORA, ABR	ZRP

III. PROPOSED PROACTIVE ROUTING PROTOCOLS: MAJOR FEATURES

A. Dynamic Destination- Sequenced Distance-Vector Routing Protocol (DSDV)

DSDV[1] is developed on the basis of Bellman–Ford routing[2] algorithm with some modifications. In this routing protocol, each mobile node in the network keeps a routing table. Each of the routing table contains the list of all available destinations and the number of hops to each. Each table entry is tagged with a sequence number, which is originated by the destination node. Periodic transmissions of updates of the routing tables help maintaining the topology information of the network. If there is any new significant change for the routing information, the updates are transmitted immediately. So, the routing information updates might either be periodic or event driven. DSDV protocol requires each mobile node in the network to advertise its own routing table to its current neighbors. The advertisement is done either by broadcasting or by multicasting. By the advertisements, the neighboring nodes can know about any change that has occurred in the network due to the movements of nodes.

B. Wireless Routing Protocol (WRP)

WRP[3] belongs to the general class of path-finding algorithms [2,4,5], defined as the set of distributed shortest path algorithms that calculate the paths using information regarding the length and second-to-last hop of the shortest path to each destination. WRP reduces the number of cases in which a temporary routing loop can occur. For the purpose of routing, each node maintains four things: 1. A distance table 2. A routing table 3. A link-cost table 4. A message retransmission list (MRL). A node can decide whether to update its routing table after receiving an update message from a neighbor and always it looks for a better path using the new information.

C. Cluster Gateway Switch Routing Protocol (CGSR)

CGSR [6] considers a clustered mobile wireless network instead of a ‘‘flat’’ network. For structuring the network into separate but interrelated groups, cluster heads are elected using a cluster head selection algorithm. By forming several clusters, this protocol achieves a distributed processing mechanism in the network. However, one drawback of this protocol is that, frequent change or selection of cluster heads might be resource hungry and it might affect the routing performance. CGSR uses DSDV protocol as the underlying routing scheme and, hence, it has the same overhead as DSDV. However, it modifies DSDV by using a hierarchical cluster-head-to-gateway routing approach to route traffic from source to destination. Gateway nodes are nodes that are within the communication ranges of two or more cluster heads. A packet sent by a node is first sent to its cluster head, and then the packet is sent from the cluster head to a gateway to another cluster head, and so on unti

lthe cluster head of the destination node is reached. The packet is then transmitted to the destination from its own cluster head.

D. Global State Routing (GSR)

In GSR protocol [7], nodes exchange vectors of link states among their neighbors during routing information exchange. Based on the link state vectors, nodes maintain a global knowledge of the network topology and optimize their routing decisions locally. Functionally, this protocol is similar to DSDV, but it improves DSDV in the sense that it avoids flooding of routing messages.

E. Fisheye State Routing (FSR)

FSR [8] is built on top of GSR. The novelty of FSR is that it uses a special structure of the network called the ‘‘fisheye.’’ This protocol reduces the amount of traffic for transmitting the update messages. The basic idea is that each update message does not contain information about all nodes. Instead, it contains update information about the nearer nodes more frequently than that of the farther nodes. Hence, each node can have accurate and exact information about its own neighboring nodes.

F. Hierarchical State Routing (HSR)

HSR [9] combines dynamic, distributed multilevel hierarchical clustering technique with an efficient location management scheme. This protocol partitions the network into several clusters where each elected cluster head at the lower level in the hierarchy becomes member of the next higher level. The basic idea of HSR is that each cluster head summarizes its own cluster information and passes it to the neighboring cluster heads using gateways.

G. Optimized Link State Routing (OLSR)

OLSR [12] protocol inherits the stability of link state algorithm. This protocol performs hop-by-hop routing; that is, each node in the network uses its most recent information to route a packet. Hence, even when a node is moving, its packets can be successfully delivered to it, if its speed is such that its movements could at least be followed in its neighborhood. The optimization in the routing is done mainly in two ways. Firstly, OLSR reduces the size of the control packets for a particular node by declaring only a subset of links with the node’s neighbors who are its multipoint relay selectors, instead of all links in the network. Secondly, it minimizes flooding of the control traffic by using only the selected nodes, called multipoint relays to disseminate information in the network. As only multipoint relays of a node can retransmit its broadcast messages, this protocol significantly reduces the number of retransmissions in a flooding or broadcast procedure.

IV. CONCLUSION

In this research about MANET networks, concepts, operation of their applicable protocols and simulation will be included, in order to know the processes that are carried out according to their metrics to obtain the best route, which is established for the transmission of data, since they influence its performance according to its application in the social field, such as commercial or military applications.

V. SCOPE FOR FUTURE RESEARCH

More and more efficient routing protocols for MANET might come in front in the coming future, which might take security and QoS (Quality of Service) as the major concerns. So far, the routing protocols mainly focused on the methods of routing, but in future a secured but QoS-aware routing protocol could be worked on. Ensuring both of these parameters at the same time might be difficult. A very secure routing protocol surely incurs more

overhead for routing, which might degrade the QoS level. So an optimal trade-off between these two parameters could be searched. As there is a pressing need to conserve scarce bandwidth over wireless media, it is natural that multicast routing should receive some attention for ad hoc networks. Considering all these, in future the routing protocols might especially emphasize the support for multicasting in the network

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