On Demand Routing Protocols in Mobile Ad-hoc Networks: Literature Review

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Abstract— Routing in MANETs may be a difficult task and has received an amazing quantity of attention from researchers round the world. To beat this downside variety of routing protocols are developed and also the number remains increasing day by day. These protocols principally belong to a few classes particularly proactive, reactive and hybrid. This paper provides an outline and comparison of a number of the protocols by presenting their characteristics, practicality, advantages and limitations.

Keywords- MANET; Reactive Protocols; DSR; LAR; AODV; Survey

I. INTRODUCTION

Mobile Ad-Hoc Network is associate infrastructure less, self-organizing, self-configuring, self- maintaining network designed by a collection of wireless mobile nodes, wherever all the mobile hosts take half in the method of forwarding packets. The network is redistributed, wherever all network activity as well as discovering the topology and delivering messages should be dead by the nodes they, i.e., routing practicality are going to be incorporated into mobile nodes.

A routing protocol is required whenever a packet desires to be transmitted to a destination via range of nodes and varied routing protocols are projected for Ad-Hoc networks. Many routing protocols are planned to attain a specific level of routing operation for MANET. The classes of Routing Protocols are given below:

A. Proactive Routing Protocol (Table-Driven): This type of protocols maintains a listing of destinations and their routes at every node. The proactive Routing protocols use link-state routing algorithms which regularly flood the link info about its neighbors. The most disadvantages of such algorithms are that overhead concerned in maintaining the routing table is high.

B. Reactive Routing Protocol (On Demand): The reactive routing protocols are supported some variety of query-reply dialog. Routes are discovered on demand and aren't famous before hand as in proactive protocols. So the overhead of maintaining routing table is reduced.

C. Hybrid routing protocol: The routing is at first established with some proactively prospected routes. So serves the demand from in addition activated nodes through reactive flooding. Measurability is that the vital feature provided by these protocols.

II. REACTIVE ROUTING PROTOCOLS (ON DEMAND)

Reactive protocols are information measure economical and cut back cupboard space because it doesn't have to keep supererogatory configuration info up-to-date. The common reactive routing protocols utilized by MANET are DSR, AODV, LAR, TORA, FORP, ABR, SSA, LMR, move and PLBR.

The reactive or on-demand routing protocols are supported Query-Reply topology during which they are doing not arrange to unceasingly maintain the up-to-date topology of the network. Once a route is desired, a procedure is invoked to search out a route to the destination node. The foremost goals of on demand or reactive routing protocols are to attenuate the network traffic overhead.

A. Ad-Hoc on demand distance vector routing protocol (AODV)

The Ad-hoc On-Demand Distance Vector (AODV) algorithmic program permits dynamic, self-starting, multihop routing between taking part mobile nodes wish to ascertain associated maintain an ad-hoc network. AODV permits mobile nodes to get routes quickly for brand new destinations, and doesn't need nodes to keep up routes to destinations that aren't in active communication.

B. Dynamic supply routing protocol (DSR)

Dynamic supply routing protocol (DSR) is associate on-demand routing protocol that uses "source routing". It's composed of the 2 main mechanisms of "Route Discovery" and "Route Maintenance". DSR doesn't need broadcasting of periodic packets of any kind at any layer at intervals the network.

C. Location-Aided Routing (LAR)

The goal of LAR is to scale back the routing overhead by the employment of location information. Position information is going to be utilized by LAR for limiting the flooding to a particular space. Once exploitation

LAR, any node has to grasp its physical location by exploitation the worldwide Positioning System (GPS). LAR designates 2 zones for selective forwarding of management packets, namely, Expected Zone and Request Zone. The request zone is mounted from the supply, and nodes that aren't within the request zone don't forward a Route Request to their neighbors. The supply or associate intermediate node can forward the message to any or all nodes that are nearer to the destination than the node itself. The Expected Zone is that the region during which the destination node is anticipated to be gift. LAR uses flooding.

III. ON DEMAND PROTOCOLS: REVIEW

A. Location-Aided Routing (LAR)

Neelima Parsendia et al. analyzed the performance of dropped packets in LAR in 2012. Protocol has two zones namely expected zone and request zone. When communication starts between sources to destination, the node is not within expected zone; packet is dropped. Therefore, packet is lost or destroyed. Due to this issue, paper proposed a method for dropped packet which randomly checks exactly how many packets is dropped during transmission. In result, LAR has maximum possibility to retransmission. [1]

A.Boomarani Malany et al. depicted and explained Throughput and Delay Comparison of routing protocol in 2009. This work focused only on the network throughput and delay. The work can be extended by nitty-gritty study of routing protocols in a fault tolerant approach with proper simulation set up with parallel real time environment for mobile and wireless ad hoc networks. [2]

I. Sumaiya Thaseen and K. Santhi presented the performance comparison of three dissimilar routing protocols in 2012. In ad-hoc Networks, nodes are moving arbitrarily. So the network may experience rapid and randomly topology changes. Protocols were compared and simulated the results. In LAR, route requests packets propagate in the request zone only and provide the better result. [3]

M. Joa-Ng and I-Tai Lu was explained a new global positioning system (GPS)-based routing protocol for ad hoc networks, called zone-based hierarchical link state (ZHLS) routing protocol in 1999. Unlike other hierarchical protocols, there is no cluster head in this protocol. In this protocol, the network is divided into non overlapping zones. Each node only knows the node connectivity within its zone and the zone connectivity of the whole network. [4]

G. Pei et al. was described the Fisheye State Routing (FSR) algorithm for ad hoc networks in 2000. In routing, store and update have an overhead problem. For that, it introduces the notion of multi-level "scope" to reduce routing update overhead in large networks. A node stores the Link State for every destination in the network. [5]

Z. J. Haas. Was proposed a routing protocol for ad hoc networks in 1997. There is no adjusting control in routing operation. The protocol is a hybrid of proactive and reactive schemes, allowing adjustment of its operation to the current network operational conditions. In particular, it is suitable for highly versatile networks, characterized by large range of nodal mobility's and large network diameters. [6]

Priyanka et al. was performed a New Approach of Location Based Routing in 2013. Establishing communication among mobile nodes is a great challenge in itself, resulting in network overloading & discarding of data packets. This paper focused has been put on the strategy to address the packet drop ratio which is an integral and important factor of communication in MANETs by minimizing the request zone. In Future, using some other mechanisms for energy consumption. [7]

B. Ad-hoc on Demand distance Vector Protocol (AODV)

K. Lakshmi et al. analyzed and improved the security of one of the popular routing protocol. This work focused specifically, is on ensuring the security against the Black hole Attack. The proposed solution is that capable of detecting and removing black hole nodes in the MANET at the initial stage itself without any delay. [8].

Salman Bhimla and Neeru Yadav was described the Ad hoc On-Demand Distance Vector (AODV) outing protocol in 2012. Low Bandwidth capacity in network is a critical problem. Due to that problem , this protocol is intended for use by mobile nodes in an ad hoc network. It allows mobile nodes to respond to link breakages and changes in network topology in a timely manner. The operation of AODV is loop-free and it enables dynamic, multihop, self-starting routing for all participating mobile nodes. It has low overhead that makes it suitable for low bandwidth and low power network. [9]

Pankaj Sharma and Yogendra Kumar Jain were proposed the TAODV in 2012. The trusted routing protocols for MANET called TAODV. Due to computation overhead, here extended the routing table and the routing messages of ADOV with trust information which can be updated directly through monitoring in the neighborhood. The computation overhead can be largely reduced, and the trust worthiness of the routing procedure can be guaranteed as well. [10]

Dr. Aditya Goel and Ajaii Sharma was described Performance Analysis of AODV with ACO Algorithms in 2010. A protocol performing in high load and high mobility means, result efficiency is difficult task. Due to this constraint, The Optimized-AODV protocol, incorporates path accumulation during the route discovery process in AODV to attain extra routing information. This model improves the performance of AODV under conditions of high load and moderate to high mobility. [11]

Durgesh Wadbude and Vineet Richariya proposed an efficient secure AODV routing protocol in 2012. Security is the major issue in Ad hoc Networks. For that issue, proposed an efficient secure AODV routing protocol. The proposed routing algorithm provides a better level of security and performance than existing works. [12]

Amandeep and Gurmeet Kaur described the performance of on demand protocol in 2012. AODV is preferred because it minimizes the routing overhead than the other protocols and hence enhancing the performance of the network. [13]

Patil V.P proposed the efficient AODV routing Protocol in 2012. The main causes for link break are mobility between nodes such as node failure and node power off. Quality of Service (QoS) is one of the main issues for any network due to bandwidth constraint and dynamic topology. The objective of this paper is to enhance the network performance of AODV, when frequent link failure in network due to mobility of the nodes in the network. [14]

C.Dynamic Source Routing (DSR) protocol

Ioannis Broustis et al. proposed a Comprehensive Comparison of Routing Protocols for Large-Scale networks in 2006. Efficient routing algorithms can provide significant benefits in ad hoc networks, including larger throughput, lower average end-to-end delay, fewer lost data packets and generally an improved network performance. [15]

Parul Sharma et al. described the performance Analysis of three routing protocols in 2012. The protocols have to be chosen according to network characteristics, such as density, size and the mobility of the nodes. Most of the previous research on MANET routing protocols have focused on simulation study by varying various parameters, such as network size, pause times etc. The performance of these routing protocols is analyzed in terms of their Packet Delivery Fraction, Average End-to-End Delay and their results are shown in graphical forms. [16]

Rajendra V. Boppana and Anket Mathur exposed the Dynamic Source Routing (DSR) protocol in 2005. It is a simple and robust routing protocol designed for use in multi-hop wireless ad-hoc networks of mobile nodes. Several of the optimizations proposed in the protocol tend to hurt the performance, especially in the case of high node mobility and low traffic load. This issue has been studied extensively, and DSR is shown to perform better with certain optimizations turned off. Suggested three simple and intuitive changes to the routing protocol and presented 2k factorial analyses of the simulation data. [17]

Tuteja A et al. explained the Comparative Performance Analysis of DSDV, AODV and DSR Routing Protocols in 2010. In such networks, nodes are able to move and synchronize with their neighbors. Due to mobility, connections in the network can change dynamically and nodes can be added and removed at any time. Compared the protocols DSDV, AODV and DSR using network simulator NS2.34 for better results. [18]

Dependra Dhakal and Kiran Gautam presented a survey with an objective to compare the protocols in 2013. The objective of this survey is to review the AODV and DSR protocols based on the performance metrics such as mobility pattern, packet delivery ratio, average end to end delay, throughput, packet drop, node density and in different test environments. AODV and DSR have been mostly studied through simulation, while fewer implementations of these protocols have been done on real network. [19]

Pallavi Khatri and Aamir Mohammed were proposed trust based DSR Routing Protocol in 2013. This work proposed a trust based routing protocol which helps in evaluating the most trusted route from source to destination and helps in reducing the number of dropped packets by a node. This method works on the basis of positive or negative acknowledgement after a packet transmission. Nodes in the network have to rely on their own battery power for this with no direct benefit. [20]. Table 1 represented the performance and comparison of AODV, LAR and DSR Protocols.

Table 1. Comparison between the on demand Protocols

Parameters	AODV	DSR	LAR
Route Selection	Shortest and Updated Path	Shortest and Updated Path	Link reversal
Route Computation	Broadcast	Route Error	Broadcast
Route	Single	Multiple	Multiple
Route Discovery and Maintenance	Global	Global	Maintenance-Local Discovery-Global
Topology Structure	Flat	Flat	Flat
Broadcast	Full	Full	Full
Routing	Hop by hop	Source	Hop by hop
Method	Unicast	Unicast	Broadcast
Loop Free	Yes	Yes	No
Special nodes	No	No	Time Sync

IV. CONCLUSION

In this paper, reviewed and compared the routing protocols in mobile ad hoc networks. Each routing protocol has unique features. Classification of routing protocols on the basis of routing information updates mechanism, highlighting their characteristics and done comparative analysis for mobile ad hoc networks routing protocols viz. LAR, DSR and AODV etc. The comparison the routing protocols indicates that the design of a secure ad hoc routing protocol constitutes a challenging research problem against the existing solutions.

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