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ROUTING PROTOCOLS AND PRIVACY PRESERVING CLUSTER BASED PROTOCOLS IN WIRELESS NETWORKS: A TECHNICAL REVIEW

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ABSTRACT

Privacy preserving based clustering in mobile ad hoc networks (MANETs) has many benefits evaluated to the conventional networks. But the highly dynamic and unbalanced environment of Manets creates it complicated for the cluster based routing protocols to separate a mobile network into clusters and determination of cluster heads for every cluster. In this paper, we analyze and compare some of existing mechanisms on clustering in Manets. We classify the facility as location based, mobility based. We also present the merits and demerits of these techniques and suggest a best clustering approach based on the observation.

Keywords - MANET, CBRP, Cluster Head, Routing Protocols, Wireless Networks.

I.INTRODUCTION

In current years a group of wireless nodes that self-configure to structure a network without the assist of any established communications is called mobile Ad hoc network (MANET) [1]. They can be also defined as a set of mobile nodes that intercommunicate on collective wireless channels.

Mobile ad hoc networks (MANETs) have been a significant class of networks, providing communication support in assignment serious scenarios including battlefield and planned missions, search and rescue processes, and disaster release operations. Cluster communications has been necessary for several applications in MANETs. The representative number of users of MANETs has continuously increased, and the applications sustained by these networks have become increasingly resource intensive. This, in turn, has enlarged the importance of bandwidth competence in MANETs. It is an essential for the medium access control (MAC) protocol of a MANET not just to adjust to the dynamic environment but also to efficiently control bandwidth utilization.

Wireless ad hoc networks have caught the attention of the research community in recent years. These networks are composed of mobile nodes that integrate sensing, wireless communication, and computation. Each node has limited processing capability, storage capacity, and communication bandwidth. Unlike the Internet, sensor networks are generally application specific, in which multiple nodes cooperate to fulfill a common task.

The mobile nodes are towards the inside or exiting the network have routing abilities which permit them to generate multi hop pathways linking node which are not inside radio range [2]. The individuality of MANETs like no fixed network communications, dynamic network design, mobility of nodes and recurring node failure, low battery power distinguish between from additional wireless networks. Therefore routing in MANETs became one of the majority demanding tasks [3]. Routing in networking is procedure of choosing the paths in a network

to send network traffic. Routing in ad hoc networks is unusual compared to regular wired networks. A serious computational load on mobile computers makes to employ of conventional routing protocols difficult in a dynamic network. [4]. Therefore, requires to intend a novel routing protocol which seamlessly adjust to changing network topology was predictable [5].The routing protocols can be separated into three categories: proactive (table driven routing protocols), reactive (on-demand routing protocols), and hybrid.

In the proactive routing method, every node occasionally preserves single or additional tables to accumulate consistent and up-to-date routing information from one to each other node in the network [6]. In Reactive routing the assessment of routes are done merely when it is an essential. When a node needs to search a path to another destiny node the suitable route is found through a discovery process. Links are preserved simply when they are needed [4]. The Hybrid Routing Protocol proactively preserves paths to the target node within simply a local network consisting of numerous neighboring, nodes, usually referred to as a group, while reactively acquiring routes beyond the cluster [5].

The objective of the paper is to provide introduction to Wireless networks and Privacy preservation and protection for cluster based routing protocol (CBRP) In MANET algorithms, its components and current work reported on privacy preserving soft cluster based routing protocol in wireless adhoc network system. If the overall processing of selecting paths in a network to send packets directly to increase the energy and throughput in the network. Therefore currently researchers are trying to develop innovative and automated methods using Routing in ad hoc networks is different compared to normal wired networks.

The rest of the paper is organized as follows: Routing in MANETS is described in Sect. 2. In Sect. 3, Privacy Preserving Based Cluster Routing in MANETS is described. The conclusion is in Sect. 4.

II.ROUTING IN MANETS

In this section we present some of existing works on survey of routing protocol methods in MANETs
Murthy, Shree; Garcia-Luna-Aceves presented Wireless Routing Protocol (WRP) [7] is based on a path-searching algorithm which considerably decreases the amount of cases in which routing loops can arise. A method has been proposed for the dependable substitute of revise messages as part of WRP. The WRP has been established to be accurate and WRP's difficulty has been analyzed. The presentation of the routing algorithm in WRP has been evaluated with that of an ideal topology broadcast algorithm (ILS), DUAL and DBF for extremely dynamic environment through simulations. The simulation consequences show that WRP presents about 50% development in the meeting time as compared to DUAL.

The dynamic source routing protocol for mobile ad hoc networks had proposed in [8] it permits the mobile nodes to dynamically determine a origin route diagonally multiple network hops to several targets in the ad hoc

network. When using source routing, every message to be routed transmits in its header the absolute, ordered list of mobile nodes through which the message have to pass. A key benefit of source routing is that middle hops do not require to preserves routing information in order to path the messages they obtain, since the packets themselves previously enclose all of the necessary routing information.

In [9] authors presented a new soft state wireless hierarchical routing protocol – Hierarchical State Routing (HSR). This method HSR is for huge, mobile wireless networks with collection mobility. The method is an addition of the conventional table driven routing methods, but advances scalability by falling update traffic O/H. It offer the following advantages over the on demand methods: (a) lower latency for admission to non frequently used targets; (b) lower control traffic O/H in dense traffic conditions (avoiding the overflow type search for each target); (c) QoS advertising preceding to association establishment.

Source-tree routing in wireless networks [10] has residential to examine its presentation in wireless networks with broadcast radio links. Routers in STAR communicate to the neighbors their origin routing trees also incrementally or in atomic updates. Source routing trees are particular by conditioning the path constraints of every path belonging to the paths used to attain each target. Therefore, a router distributes link-state renews to its neighbors for simply those paths along links used to reach targets.

In [11] authors proposed Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers is to control every Mobile Host as a particular router, which occasionally advertises its observation of the interconnection topology with additional Mobile Hosts within the network. These quantities to a novel sort of routing protocol. To create it appropriate for a dynamic and self-starting network method as is necessary by users wishing to exploit adhoc networks.

Optimized Link State Routing protocol for Ad Hoc Networks [12] is proactive or table driven in personality, hence it favors the networking situation where this all-time-kept information is used additional and further, and where paths requests for novel targets are very common. The protocol also goes in kindness of all the requests which do not permit long delays in transmitting data messages. OLSR protocol is modified to the network which is dense, and where the message is unspecified to happen frequently connecting a huge numbers of nodes.

In [13] authors discussed how to carry QoS routing in OLSR (optimized link state routing protocol, one of the individual routing protocols below learn by the IETF MANET Working Group). They developed a heuristics that permit OLSR to search the highest bandwidth path, show through simulation that these heuristics do progress OLSR in the fixed network case, and lastly, to proved that for ad-hoc network form, two of the heuristics are certainly optimal (i.e., assurance that the highest-bandwidth link connecting every two nodes is found).

In [22] authors discussed the AODV-BR: backup routing in ad hoc networks. Mobile nodes in ad hoc networks communicate with individual another via message radios on wireless multi-hop paths. Since node mobility and power restrictions, the network topology modifies frequently. Routing protocols consequently participate a

significant function in mobile multi-hop network infrastructures. A trend in ad hoc network routing is the reactive on-demand attitude where routes are recognized only when necessary. Most of the protocols in this group, though, use a particular path and do not operate multiple alternate paths. They proposed a technique to advance existing on-demand routing protocols by generates a mesh and provide multiple alternate routes.

In [23] authors presented and verified a ROAM, an on-demand routing algorithm that preserves multiple loop-free routes to targets. Every router preserves admissions only for those targets for which data flows during the router which decreases storage space requirements and the sum of bandwidth wanted to preserve accurate routing tables. In ROAM, paths are recognized and preserved on demand using circulates calculations. A router does not send informs for active targets, unless its reserve to them boosts beyond a given threshold. ROAM preserves a condition that informs routers when a target is inaccessible and avoids routers from sending redundant investigate packets attempting to search paths to an inaccessible target. ROAM is revealed to join in a restricted time after a random series of topological changes and is exposed to be loop-free at each instant. The time and communication difficulties of ROAM are analyzed.

Table 1: Gives brief summary of different routing protocols with different merits and demerits and their efficiency.

Table 1: Comparison of different routing protocols with different merits and demerits and their efficiency

Routing Protocols	Merits	Demerits	Efficiency
Wireless Routing Protocol (WRP)	It uses the Bellman-Ford algorithm to calculate paths.	It requires large amount of memory and periodic control message consumes power and bandwidth	82%
Dynamic Source Routing (DSR)	To find routes to all other nodes in the network as required by the table-driven approach	The routing overhead is directly proportional to the path length.	92%
Hierarchical State Routing (HSR)	Using hierarchy information reduces the routing table size	The process of leader election in every cluster makes it quite problematic for ad hoc networks	79%
Global state routing protocol (GSR)	It reduces the control overhead as it avoids flooding for disconnects/reconnects. A bandwidth function can be used to realize QoS routing	The large size of the routing message. For each update, a considerable amount of bandwidth is consumed	79%
Source Tree Adaptive Routing Protocol (STAR)	For static or slow moving nodes, (low mobility patterns) STAR works very well.	For high mobility patterns, or fast moving nodes STAR does not work very well.	82%
Optimized Link State Routing (OLSR)	It had less average end to end delay	OLSR need more time re-discovering a broken link	92%
Destination	It is quite suitable for creating	It is not suitable for highly	80%

Sequenced Distance Vector (DSDV)	ad-hoc networks with small number of nodes and solve the routing loop problem	dynamic networks	
Location-Based Routing protocol	It uses a greedy forwarding mechanism to forward a data packet from source to destination. Greedy approach forwards packets to the neighbour, which is closest to the destination.	The nodes can suffer from a bottleneck problem.	77%
Cluster-based Inter-domain Routing (CIDR)	An efficient hybrid routing protocol in ad hoc networks with unidirectional links.	Cluster based inter-domain routing for mitigating scalability problems.	73%
Location Enhanced Cluster Based Routing Protocol (LECBRP)	Clustering and location estimation helped to reduce the control overhead.	It doesn't divides the space around the CH based on the service to mobility ratio.	Overhead percentage during 9,000 sec. for 50, 100, 150, 200, 250, 300 nodes
Cluster-Based Multipath Routing protocol (CBMRP)	It uses clustering's hierarchical structure diverse to decrease routing control overhead and improve the networks scalability.	It doesn't dynamically distribute traffic into multiple paths algorithm and error correction packet segmentation	78%
Ad hoc On-demand Multipath Distance Vector (AOMDV) routing protocol.	It chooses energy efficient paths, the transmission is reliable and stable.	Network utility maximization problem	80%
Split Multipath Routing (SMR) protocol	It utilizes multiple routes of maximally disjoint paths.	Source can simply use other available routes without performing the route recovery process.	76%
AODV-BR: Backup Routing Protocol	A node promiscuously "overhears" packets that are transmitted by their neighboring nodes.	AODV-BR cannot deliver more data packets than AODV.	89% Packet Delivery ratio.
Labeled distance routing protocol (LDR)	It constitutes both an advertisement of route to the node issuing the RREQ and Solicitation for a route to another node.	-	-

In this Table 1 represents many routing protocols with different merits and demerits and their efficiency. According to these efficiencies OLSR and DSR reaches 92 percent. Based on this survey, in future we develop an enhanced cluster based routing protocols with privacy preserving manner.

III.PRIVACY PRESERVING BASED CLUSTER ROUTING IN MANETS

In this section we present some of existing process of dividing the network into interconnected substructures is called clustering and the interconnected substructures are called clusters.

A. Location Based Clustering

In the location-based routing protocol, the position information of mobile nodes are used to confine routing space into a minor range. It decreases routing overhead and broadcast storm. [14].

In [14] Tzay-Farn Shih and Hsu Chun Yen have proposed a cluster-based protocol reduces the amount of nodes contribute in routing. Calculating route by Dijkstra algorithm also decreases a group of routing traffic and path setup time. In CLACR, the routing messages and data messages are broadcasted by unicast, which decreases the likelihood of conflict and diminishes broadcast storm difficulty. In order to preserve a shorter path, CLACR uses a dynamic route preservation and optimization algorithm to revise route dynamically.
Cluster-based Inter-domain Routing (CIDR) Protocol for MANETs [15] proposed cluster-based inter-domain routing (CIDR) protocol attains an efficient communications among MANETs and attains scalability in huge networks by using the clustering method. The cluster head promotes to neighbors and the break of the network its cluster information. The promotion protocol plays the position of BG Protocol. In the CIDR protocol, messages to distant nodes are routed via cluster-head advertised paths, and messages to restricted destinations are routed using the local routing technique. The experiments have shown that the proposed inter-domain routing has attained the scalability in huge network, the robustness to mobility, and the independency of fundamental intra-domain routing protocols.

In [16] presented Location Enhanced Cluster Based Routing Protocol (LECBRP) utilizes local location information attained by smart antennas to determine routes and make routing assessment for the clustered MANETs. It gives the advantages of both clustering and local position. As a cluster-based protocol, LECBRP presents a structure for ad hoc networks which creates it additional scalable. Both clustering and location assessment helped to decrease to manage overhead. Simulations demonstrate that this novel protocol advances the performance of ad hoc networks.

In [20] presented Ad hoc On-demand Multipath Distance Vector (AOMDV) routing protocol to resolve the Load balancing and network blocking are the major problems in Mobile Ad-hoc Networks (MANET) routing. The majority of the previous routing protocols give solutions to load balancing or blocking or fault-tolerance,

independently. The algorithm for searching multi-path routes calculates fail-safe multiple routes, which present all the middle nodes on the most important path with multiple routes to target. The fail-safe multiple routes include the mobile nodes with least load and more battery power and outstanding energy. When the standard load of a node alongside the path increases past a threshold, it distributes the traffic over displace multi-path routes to reduce the traffic load on a congested link.

B. Mobility Based Clustering

A Dynamic Clustering Algorithm for MANETs by adjusting Weighted Clustering Algorithm with Mobility Prediction [17] proposed a customized method that uses Weighted Clustering Algorithm (WCA) for cluster design and Mobility Prediction for cluster conservation. In a MANET node organization is done by Clustering.

Cluster formation: At first, a hello message is send by every node to inform its occurrence to its neighbors. A beacon packet contains the state of the node. A neighbor listing is built by every node based on the predictable beacon packets. The cluster head is selected support on the weight significances of the nodes. The node with the lowest weight is chosen as the CH.

Maintenance: It has two separate kinds of operations like the battery power threshold property and the mobile node group to the exterior of its cluster boundary.

Mobility prediction: The development in the weighted clustering algorithm is to appropriate the use of mobility calculation in the cluster maintenance phase.

C. Neighbor Based Clustering

In [18], A Cluster-Based Multipath Routing (CBMRP) for MANET presented to circumvent blocking, which optimizes bandwidth using and progress the distribution rate of channel. It uses clustering's hierarchical structure different to reduce routing control overhead and recover the networks scalability. It stability the network load, dynamically compact with adjusts of network topology and advance dependability. These benefits make it emerge to be an ideal routing approach for MANETs. Though, these benefits are not simply explored because the data message that is disjointed into smaller blocks necessity be reassembled at the target node, it maybe leads to error and raise control overhead.

In [19], authors proposed an Efficient Cluster-Based Routing Algorithm in Ad Hoc Networks with Unidirectional Links. It supports unidirectional network locations, where the connectivity is improved by managing and exploiting unidirectional links. The preservation of together clustering and routing are also argued to adjust topology modify. The proposed protocol is appropriate for intermediate to huge networks with small to medium mobility. The outcomes demonstrate that the method has better performances, fewer amounts of role changes and cluster switches, which present better stability in mobile network environment.

In [21], authors proposed a Split Multipath Routing (SMR) with Maximally Disjoint Paths in Ad hoc Networks. An on-demand routing method called Split Multipath Routing (SMR) that creates and exploits multiple paths of maximally disjoint routes. Providing several paths helps reducing path recovery process and control message overhead. The SMR protocol uses a per-packet distribution method to allocate data messages into multiple routes of dynamic sessions. This traffic distribution competently utilizes available network resources and avoids mobile nodes of the path from being jam-packed in heavily loaded traffic situations.

IV.CONCLUSION AND FUTURE ENHANCEMENT

The literature review revealed that lot of research has been done on various routing protocols and privacy preserving Cluster based routing methods. The major problem for tackling with complex task is inclusion of knowledge in highly dynamic networks. Based on the comparison of a variety of clustering techniques for MANET and the discussion of location based clustering approach in the previous section, we can conclude that the mobility based clustering approach is the mostly used technique for cluster head selection and the common parameters for weight estimation include node degree, transmission power, mobility, distance and residual battery power. Further efficiency can be increased by combining multiple routing methods, but it results in heavy increase of computation time. Comparison of routing protocols has been reviewed in this paper and merits and demerits are described based on application.

In future enhancement the combination of new cluster based routing protocol (CBRP) In MANET using privacy preservation manner (including inside and outside cluster) has provided new direction for researchers to develop many new and improved techniques for wireless adhoc network.

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