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A STUDY ON AODV BASED CLUSTERING IN MOBILE ADHOC NETWORKS

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ABSTRACT:
A mobile ad hoc network (MANET) is a collection of wireless mobile nodes forming a temporary network without the aid of any fixed communication infrastructure. Due to partial resources frequent network partitions and unpredictable topological changes, proactive clustering schemes sustain high overheads in this environment. An on-demand, distributed clustering algorithm for MANETs based on an Ad hoc On-demand Distance Vector (AODV) routing protocol is been introduced for clustering to reduce overhead because no clusters are maintained unless they are needed. The clustering algorithm's constancy was assessed using clustering metrics such as cluster head and cluster members lifetime. This paper presents a survey on cluster-based routing protocol to improve the scalability and communication overheads using AODV routing protocol.

Keywords: *MANET; Clustering; AODV*

1.INTRODUCTION

Wireless communication between mobile users is becoming more popular than ever before due to recent technological advances in laptop computers and wireless data communication devices, such as wireless modems and LANs [1]. This has leaded to lower prices and higher data tariffs, which are the two main reasons why mobile computing continues to enjoy rapid growth. Starting from the development of the packet radio networks (PRNET) in 1970s and survivable adaptive networks (SURAN) in the 1980s to the GloMo(Global Mobile)networks.

GloMo networks in the 1990s and the current mobile ad hoc networks (MANET), the multi-hop ad hoc network has received great amount of research attention. Mobile Ad hoc Network (MANET), set of wireless mobile node forming a temporary network without the aid of any infrastructure or centralized control. Modern research area in ad hoc networks has paying attention on MAC and routing strategy. For the reason that of shared wireless broadcast medium, contention, near and for and hidden terminals are common in ad hoc networks and hence MAC demands significant improvement and routing is another issue especially in multi-hop environment.

Routing is also an interesting issue as routes are typically a multi-hop. An ad-hoc network has a certain characteristics, which imposes new burdens on the routing protocol. The most significant characteristic is the dynamic topology, which is an impact of node mobility. Each node can change its position quite frequently, which means that it needs a routing protocol that quickly adapts to topology changes.

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The nodes in an ad-hoc network can consist of laptops and personal digital assistants and are often very limited in resources such as CPU capacity, memory capacity, battery power and its bandwidth. As an alternative the routing protocols should be reactive, thus it calculates only the routes upon receiving a specific request. Generally, traditional routing protocols that are used in wired networks can't support routing in fixed wireless networks and mobile networks with fixed access points. Only one-hop routing is necessary over a link in a wireless network with fixed access points and many fixed wireless network. Routing in mobile ad hoc networks and some fixed wireless networks use multiple-hop routing. Routing protocols for these kind of wireless network should be able to maintain the paths to other nodes most of time, and must be able to handle changes in paths due to the mobility. Traditional routing cannot appropriately support routing in a MANET.

The rest of the paper is organized as follows: in section II.Routingprotocols for mobile ad hoc networks, III.Cluster based routing in MANETs IV.Literary survey, V. TableFinally, conclusions are given in section VI

2. ROUTING PROTOLOS FOR MOBILE AD HOC NETWORKS

The network layer with respect to the OSI reference model is where one performs and identifies the processes of ad hoc networks. Therefore, any improvement effort in this layer is directly visible in the upper layers. The routing protocols of ad hoc networks are generally grouped into proactive, reactive and hierarchical routing.

2.1. Proactive routing

Proactive routing protocols maintain information on all routes throughout the network even if they are not required so each node maintains routes to all nodes in the network. These protocols exchange control information between nodes on a regular basis which keeps updated routes for each node in the network. These protocols react when a new node appears or another node, is no longer within the network topology. The known protocols are: Destination-Sequence Distance-Vector DSDV and Optimized Link State Routing OLSR. The idea of proactive routing is to distribute the information periodically through the network in order to pre-calculate all possible paths.

2.2. Reactive routing

Reactive routing protocols allow updating of the tables on demand, for example, when a node wants to exchange information with another node in the network. It usually have two components: route discovery, which occurs when a node wants to communicate with a specific destination and route maintenance, used to manage the path failure caused by the mobility of the nodes. The route discovery ends when we discover the path to the destination node or when all alternatives have been sought without finding any route. Among the best known protocols are the Dynamic Source Routing and Ad Hoc Demand Distance Vector AODV. This type of routing is based on obtaining routes between nodes, evaluating them whenever necessary. When a node needs to find a route to a destination node, it must initiate a route discovery process.

2.3 Hierarchical routing

Hierarchical routing protocols divide the network into subsets of nodes called clusters, where a cluster head node is used to concentrate and distribute the information generated within the cluster. An example of this type of protocol is the Cluster Based Routing. These protocols and hierarchical routing strategies focus on the task of choosing the cluster head and cluster maintenance.

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3. CLUSTER BASED ROUTING IN MANETS

3.1 Location Based Clustering

In the location-based routing protocol, the location information of mobile node is used to limit the routing space into a smaller range. It reduces routing overhead and the broadcast storm.

3.2 Mobility Based Clustering

In a MANET node managements are done by Clustering. Cluster formation: Initially, a beacon message is send through each node to notify its presence to its neighbors. A beacon message contains a state of the node. A neighbor list is built via each node based on the received beacon messages. The clusterhead is elected based on the weight values of the nodes. The node which has the lowest weight is chosen as the CH.

3.3Neighbour Based Clustering

This hierarchy is used to perform a Route Discovery and distributes traffic among diverse multiple paths.

3.4 Cluster Architecture

The CMDSR is based on the 3-level hierarchical scheme. The 0-node is the first level of cluster. 1-cell cluster is the second level of cluster. At this point each node of the cell is 1-hop away from the ClusterHead.

3.5 AI Based Clustering

This mechanism selects the clusterhead using fuzzy relevance for clustering in wireless mobile ad hoc sensor networks. In this network the Fuzzy relevance based clusterhead selection algorithm (FRCA) efficiently cluster's and manages the sensors using fuzzy information of node status.

4. STUDY ON RELATED WORKS:

P.Basuet al[2]., propose a distributed clustering algorithm and MOBIC, based on the use of this mobility metric for selection of clusterheads, and demonstrate that it leads to stable cluster formation than the Lowest-ID clustering algorithm which is a well-known clustering algorithm for MANETs. It shows reduction of as much as in the number of clusterhead changes owed to the use of the proposed technique. In MANET it uses scalable cluster-based services, the network performance metrics for example throughput and delay are tightly coupled with the frequency of cluster reorganization.

Ian D. Chakeres et al[3], presented a distributed and secure method to compute a global trust values based on its Power iteration. By means of having peers use those global trust values to choose the peers from whom they download, the network effectively identifies the malicious peers and isolates them from the network.

John Broch et al[4], presented an event triggers which is required for proper operation. The design possibilities and the decisions used for the Ad hoc On-demand Distance Vector (AODV) routing protocol implementation.

Lakshmi Ramachandran et al[5], proposed a 2-stage distributed O(N) randomized algorithm for an N node complete network, that always discovers the minimum number of star-shaped clusters, which have maximum size, nd presented a complete deterministic O(N) distributed algorithm for the same model, which achieves the same purpose. It describes in detail, how these algorithms can be smeared to Bluetooth for efficient scatter net formation.

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Mainak Chatterjee, Sajal K. Das Et Al[6], proposed an On-demand distributed clustering algorithm for multi-hop packet radio networks. These types of networks also known as adhoc network which is dynamic in nature due to the mobility of nodes. The association and dissociation of the nodes to from clusters perturb the stability of the network topology, and therefore a reconfiguration of the system is often unavoidable. Yet, it is vibrant to keep the topology stable as long as possible. The clusterheads, forms a dominant set in the network, determines the topology and its stability. Weight-based distributed clustering algorithm(WCA) takes into consideration the perfect degree, transmission power, mobility, and battery power of mobile nodes. The time required to identify the cluster heads depends on the diameter of the underlying graph. The number of nodes in a cluster around a pre-definedthreshold to simplify the optimal operation of the medium access control (MAC) protocols. The non-periodic procedure for the clusterhead election is invoked in on-demand, and is aimed to reduce the computation and communication costs. The clusterheads operating in “dual" power mode, connects the clusters which helps in routing messages.

Mario Gerla et al. [7] proposed network supports multimedia traffic and relies on time division and code division access schemes. Here the radio network is not supported by a wired infrastructure. Accordingly, it can be instantly deployed in areas where there is no infrastructure at all. By means of using a distributed clustering algorithm, nodes are organized into clusters. These cluster heads act as a local coordinators resolve channel scheduling, and enhance the spatial reuse of time slots and codes. Likewise, to guarantee bandwidth for real time traffic, this architecture supports virtual circuits and distributes bandwidth to circuits at call setup time. The networks are scalable to large numbers of nodes, and can handle the mobility.

Matthias R. Brust et al. [8] proposed a weighted clustering algorithm optimized to avoid needless clusterhead re-elections for stable clusters in mobile adhoc networks. This proposed localized algorithm deals with the mobility, however it does not requires a geographical, speed or else distances information.

PetteriKuosmanen et al.[9] designed a protocol to perform its task as well as it is possible according to its design criteria. The protocol which is chosen must cover all states of a specifiednetwork and never is allowed to consume too much network resources by protocol overhead traffic. It deals with a classification of adhoc routing protocols and also presented some specified protocols according to the classification. The prominence of this paper is not to present protocols in detail but to present the main articles of wide variety of different protocols and estimate their suitability and tradeoffs.

Seema Bandyopadhyay et al[10], proposed a distributed and randomized clustering algorithm to organize the sensors in a wireless sensor network into clusters. The algorithm extended to generate a hierarchy of clusterheads and observes that the energy savings increases with the number of levels in the hierarchy.

In [11], Yu-Chee Tseng, Wen-Hua Liao, Shih-Lin Wu have proposed that the Ad-hoc routing where a route is needed for some destination, the protocol starts the route location. Then the source node sends a route request (RREQ) message to its neighbours, if those nodes do not have any information about the destination node, then they send the message to all neighbours and so on, if any neighbour node takes the information about the destination node, the node sends route reply message to the route request message initiator.

D. Xu, M. Chiang, and J. Rexford[12], proposed the performance loss of joint congestion control and routing when routing is restricted to single-path routing as compared to the case where users can use multiple paths. It demonstrates that the total number of paths needed to achieve the optimal multipath utility is no greater than the sum

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of the number of links and the number of users. Furthermore, the average performance loss diminishes as the number of users tends to infinity.

Zheng Kai et al. [13] proposed an AODV based clustering routing protocol (called AODV-clustering) which can effectively solve the routing problem and also keep the merits of AODV. The protocol works on AODV method and then it changes to clustering routing protocol gradually. The paper introduced this protocol and simulation using JiST/SWANS, which is a new simulator for mobile adhoc networks, and also presented a simulation based evaluation, the result confirmed the efficiency of the design

5. CONCLUSION

In this study paper, an effort has been made to concentrate on AODV –based routing protocols. The scheme is used for Clustered networks. The algorithm builds stable clusters with low communication Integrated routing and message delivery in overhead due to localized, distributed and reactive nature

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