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A Cluster Based Group Management Using Zone Leader Allocation In Manet

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ABSTRACT: In this paper, we proposed an algorithm for Cluster Based Zone Allocation method (CBZA) for energy conservation and packet dropping in Mobile Ad hoc Network. MANET is a self-organized, temporarily dynamic network and their nodes are mobile without using any infrastructure. However, secure communication occurs between group nodes based on cluster method. In multicast routing, group information is shared by a sender to multiple receivers through many paths which are coordinate with each other. In our method, a set of nodes are located into four regions and a Zone Leader (ZL) is allocated to every region in the network. While packet transmission takes place through the Zone Leader and this is the main process in group management. Finally, the performance of each region is calculated.

KEYWORDS**:** MANET, CBZA, Multicast Routing, Cluster

I. INTRODUCTION

Generally, a new technology improvement is produced with some of the re Requirements such as: reduction in size, low cost, consumes low power and distributed devices relatively for short or long distance communication. Wired networks are used for local processing or short distance communication and wireless networks are employed for long distance communication. [1,5]. In order to provide such necessities, Mobile Ad hoc Networks are used for wireless communication which comprises of hundreds or thousands of mobile nodes that are autonomous and that has no physical infrastructure irrespective of geographical locations; so it provides service and access information Other locations. MANETs are adaptive and self-organizing network. [2, 3, 6].

While the nodes used in MANETs must be able to detect the presence of other devices to alleviate the necessary set up for communication. The adding and removing devices cannot affect the network performance. It is a scalable network because it accommodates the addition of more nodes. By the way, it provides more flexibility. These are robust network since it has no centralized infrastructure and we can set up the network at any place regardless of time. [4].

In order to support group communication, multicast is one of the most effective method when compared to unicast that can preserve the bandwidth and energy predominately. However, the nodes used in MANETs are battery powered and consumes more power for data transmission. Mobile nodes are autonomous that are capable of operating for several years with the supply of battery power and the lifetime of the network can be defined as the operating time of the nodes without using any external interferences, like battery substitution. [8].

To sustain the network lifetime, it is necessary to concentrate on the energy consumption of the nodes and to reduce as much as possible. So, energy consumption is a major issue in such networks and this energy depends on the amount of collected data. Thus, communication becomes a vital task in MANETs. By considering the above reason, we contrived some algorithms for CBZA method to overcome such difficulties. [9].

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II. RELATED WORK

Group management plays a crucial role in wireless networks since it accomplished a special focus in success of the communication. There are numerous schemes are present and some of them are based on the traditional group management strategies. These strategies have several known limitations such as: it does not encounter any related issues along with group management and could not satisfy the essential requirements of MANETs. Moreover, it cannot maintain the energy resources in such operations. [10,11]. However it shows a poor performance in this circumstance. In Multipath Diversity Routing, the delay is increased because it selects an alternate link when the current path is not sufficient to send packets. By the way, the packet loss or packet drop is also increased. When the delay and packet loss is increased, the overall network throughput or efficiency and communication overhead is decreased. Thus, it has low latency and poor network lifetime. In order to reduce the above limitations, we use an algorithm for Cluster Based Zone Allocation method. [12].

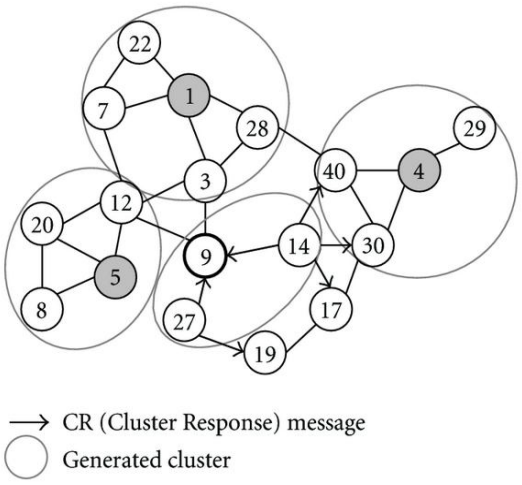

Fig 1: Cluster Formation

III. MULTIPATH DIVERSITY ROUTING

Multipath diversity routing (MDR) protocol is the new stateless multicast protocol used for transmitting the packet to the alternate link rapidly when the current path is not sufficient to send packets .i.e. in multicast routing, a set of packet is transmitted from source to destination without delay. This protocol MDR competently increases the overall network performance with no delay thereby sustain efficient transmission and make this transmission much more scalable and robust. It is the ideal approach to manage and reduce the network traffic that makes the communication living time to increase and often required for reliable and scalable transmission with no interruption occurs between the nodes in order that increases the packet delivery ratio. MDR protocol achieves high success rate and low latency as well as cost effective compared to other protocols.

The complexity implicated while transmitting the packets is also get reduced competently so that it is suitable for dynamic networks. The packet delivery ratio is increased in a more efficient way and thus the end to end delay in the network is reduced to a large extent. RB Multicast routing is the stateless protocol that needs no costly state maintenance in order that communication overhead occurs between the link, that can be reduced by this protocol and the results are simulated. This protocol transmits the packet to the multicast destination without any interruption since it considers the energy efficiency of the path and makes the path for long-lived. This protocol is completely differing from previous protocols in order of transmitting the alternate path in a stateless multicasting. Since it is the energy efficient routing does not make corruption over the link and there is no need of virtual nodes. The goal of this approach is to sustain the immediate packet delivery which helps to reduce the maintenance overhead and increase the communication with low communication cost. MDR protocol makes the path to long-lasting for sequence

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transmission of packet to the destination. The usage of this protocol is to maintain the multicast path when the current link terminates the transmission. Thus packet forwarding is more stable and efficient than the other protocols which make MDR the well suitable protocol for multipath propagation.

IV. CLUSTERING

Any device with a microprocessor can in principle be an ad hoc network node. Supporting a large number of heterogeneous users is thus a requirement for future ad hoc networks. In a large network, flat routing schemes produce an excessive amount of information that can saturate the network. In addition, given the nodes heterogeneity, nodes may have highly variable amount of resources, and this naturally produces a hierarchy in their roles inside the network. Nodes with large computational and communication power, and powerful batteries are more suitable for supporting the ad hoc network functions (e.g., routing) than small embedded-systems.

Cluster-based routing is an interesting solution to address nodes heterogeneity, and to limit the amount of routing information that propagates inside the network. The basic idea behind clustering is to group the network nodes into a number of overlapping clusters. This enables the aggregation of the routing information, and consequently increases the routing algorithms scalability. Specifically, clustering makes possible a hierarchical routing in which paths are recorded between clusters (instead of between nodes); this increases the routes lifetime, thus decreasing the amount of routing control overhead. Clustering was introduced in 1980s to provide distributed control in mobile radio networks. In its original definition, inside the cluster one node is in charge of coordinating the cluster activities (clusterhead). Beyond the clusterhead, inside the cluster, we have ordinary nodes that have direct access only to this one clusterhead, and gateways, i.e., nodes that can hear two or more clusterheads. A simple clustering distributed algorithm is based on the nodes_ identifier (ID). By assuming that a distinct ID is associated to each node, the node with the lowest ID (in a neighborhood) is elected as the clusterhead. This guarantees that two clusterheads cannot hear each other. As all nodes in the cluster can hear the clusterhead, all inter-cluster communications occur in at most two hops, while intra-cluster communications occurs through the gateway nodes. Ordinary nodes send the packets to their clusterhead that either distributes the packets inside the cluster, or (if the destination is outside the cluster) forwards them to a gateway node to be delivered to the other clusters. By replacing the nodes with clusters, existing routing protocols can be directly applied to the network. Only gateways and clusterheads participate in the propagation of routing control/update messages. In dense networks this significantly reduces the routing overhead, thus solving scalability problems for routing algorithms in large ad hoc networks.

V. OVERVIEW OF MDR AND CBZA

In Multipath Diversity Routing (MDR), when the current path is failure it chooses the alternate link for packet transmission but in Cluster Based Zone Allocation method (CBZA), zones are formed and packet transmission over routing process. In MDR, packet loss is increased because of the link failure and packet delivery ratio is decreased. Then, end to end delay became very high. So, overall packet transmission time gets increased and overall network efficiency is reduced. In CBZA, when the zones are formed it splitted into four regions. The packet transmission takes place into the regions and when the transmission in first region is completed then only next region starts its transmission. Each region has a Cluster Head (CH) which controls the packet transmission and reception through it. If the packet is lost, we can easily identify the lost packet in this method. But in MDR, the detection of lost packet is somewhat critical process. CBZA has low packet loss when compared to MDR. So, the end to end delay and packet transmission time is reduced. By the way, we can increase the network throughput or efficiency.

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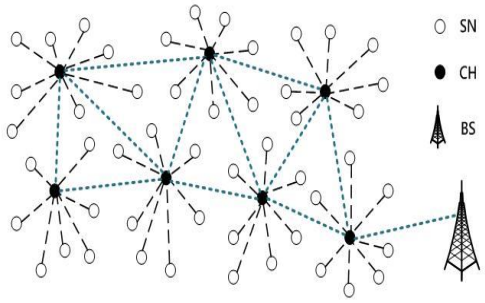

Fig 2: Data Exchange Using Routing process

Normally in network infrastructure, nodes are deployed and source and destinations are allocated. Then, a single node will act as a router or agent. In group management, set of nodes are initialized at particular region or four regions. Each region has a Zone Leader (ZL) and zone members. Zone Leader election is conducted among the nodes in the zone and a particular node will elected as a Zone Leader depending on its energy level which is called threshold value. Except the Zone Leader other nodes will behave as neighbors or coordinators. When the routing process/packet transmission is commenced through the network, every zone members are coordinated with each other and Request/Response process is performed by coordinators. Finally, every packet transmission like entering and exceeding packets is operated by the Zone Leader because they are passed through it. Then, the above process is repeated as the same.

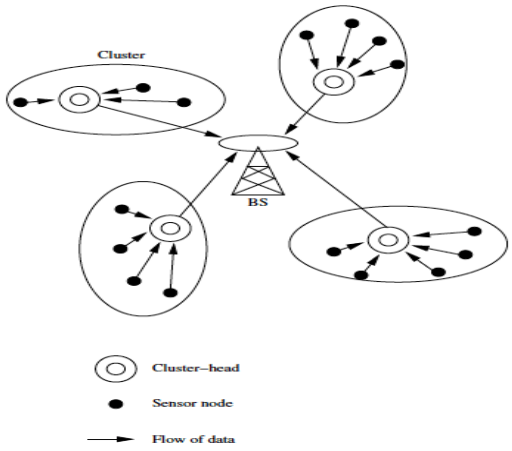

Fig 3: Zone Formation Cluster Allocation

TABLE I. PARAMETERS COMPARISION.

S.No	Parameter	MDR	CBZA
1	Total Number of Nodes	20	100
2	Total No Packets	1000	2500
3	Antenna type(BS)	Omni Directional	Omni directional
4	Transmission Mode	Path Selection Process	Region Splitting

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5	Bandwidth ratio	0.9e6	2e6
6	Data Rate	0.96e6	2.0e6
7	Mobility	Dynamic	Dynamic
8	Density rate	0.2	0.5

VI. EXPERIMENTAL RESULTS

The Performance of the Enter network Comparison graph is Show as Figures,

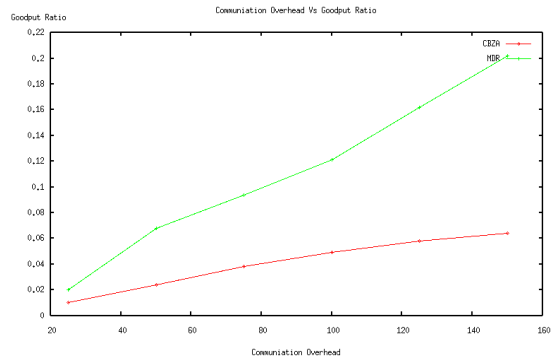

Fig 4: Compare the Performance between communication Overhead Vs Throughput

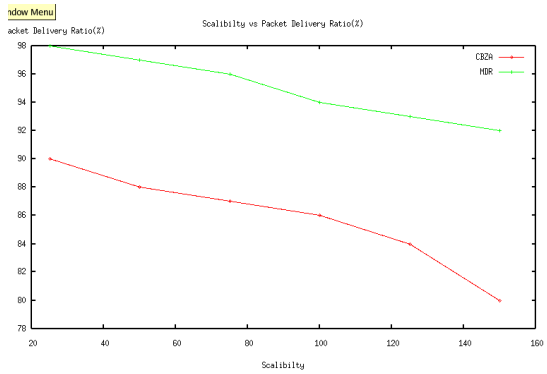

Fig 5: Compare the Performance between Scalability Vs PDR

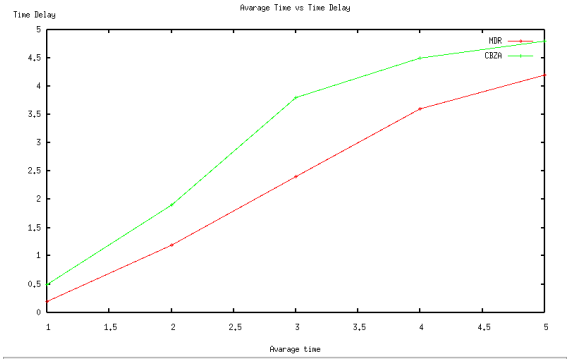

Fig 6: Compare the Performance between Average time Vs Delay

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VII. CONCLUSION

Thus, we proposed an algorithm for Cluster Based Zone Allocation method (CBZA) and it is a group management process used in MANETs and multicast routing. In CBZA method, packet transmission occurs into the zones so that the packet loss or packet drop is reduced and network error can be easily identified. By splitting zones, the energy consumption and network traffic is reduced; the network lifetime is increased to reasonable times. When compared to MDR protocols this algorithm provides higher throughput and by the way overall network efficiency is increased.

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