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GROUP MANAGEMENT IN MOBILE ADHOC NETWORKS

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ABSTRACT

In this study, 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

1. 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 (Tseng *et al*., 2011; Mohseni *et al*., 2011). 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 (Taneja and Kush, 2010; Director, 2007; Bakht, 2011).

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 (Deng *et al*., 2002).

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 (Almeroth, 2000).

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

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becomes a vital task in MANETs. By considering the above reason, we contrived some algorithms for CBZA method to overcome such difficulties (Bhattacharyya, 2003).

2. 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 (Cain *et al*., 2002; Deering *et al*., 1996). 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 (Deering *et al*., 1999).

3. 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.

4. ALGORITHM FOR CLUSTER BASED ZONE ALLOCATION MTHOD (CBZA)

1. Initialize the source model S_{ix}
2. Collections of coordinator nodes CN_i
3. Zones are formulated into four regions R_g
4. Zone leader election Z_L
5. Zone member Z_M
6. $R_g <= Z_{L1}+Z_{L2}+Z_{L3}+Z_{L4}$
7. Step: 1
8. Zone leader election Z_{L1} process
9. $Z_M <= S_{ix}+CN_i$
10. $Z_L <= Z_M + Z_{Routing}$
11. For (N = 0; N<25; N++)
12. End process
13. Calculate Z_{L1} performance
14. Step: 2
15. Zone leader election Z_{L2} process
16. $Z_M <= S_{ix} + CN_i$
17. $Z_L <= Z_M + Z_{Routing}$
18. For (N = 0; N<25; N++)
19. End Process
20. Calculate Z_{L2} performance
21. Step: 3
22. Zone leader election Z_{L3} process
23. $Z_M <= S_{ix} + CN_i$
24. $Z_L <= Z_M + Z_{Routing}$
25. For (N = 0; N<25; N++)
26. End process
27. Calculate Z_{L3} performance
28. Step: 4
29. Zone leader election Z_{L4} process
30. $Z_M <= S_{ix} + CN_i$
31. $Z_L <= Z_M + Z_{Routing}$
32. For (N = 0; N<25; N++)
33. End process
34. Calculate Z_{L4} performance
35. Calculate overall network performance $R_g <= Z_{L1}+Z_{L2}+Z_{L3}+Z_{L4}$

End.

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.

In general case of network infrastructure requires nodes in which source and destinations are allocated. Then, a particular node will act as a router or agent. In group management, set of nodes are formatted at particular region or four regions. Each region has a Cluster Head (CH) and Cluster members. The election for allocating the cluster head at each region is conducted among the nodes at the cluster and a particular node will elected as a cluster head by considering its energy level which is called the value of threshold. Other than cluster head remaining nodes will be act as coordinators/neighbors. When the routing process takes place along the network, each cluster members are organized with each other then Postulation and Reaction process is executed by the coordinator nodes. Finally, cluster head will involve the packet transmission like entering and exceeding packets because these packets are passed through the CH. Then, the above process is repeated with above same procedure discussed in **Fig. 1-3**.

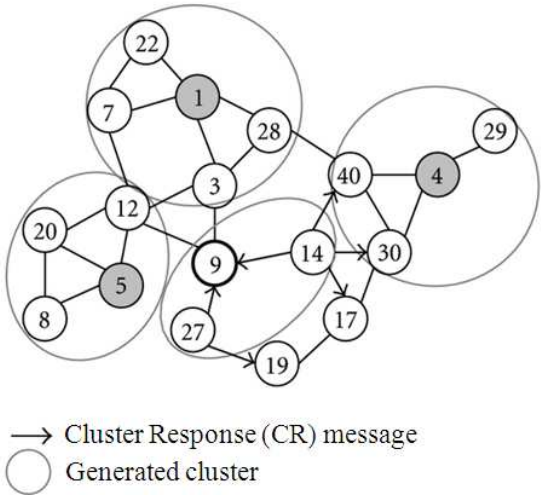

Fig. 1. Cluster formation

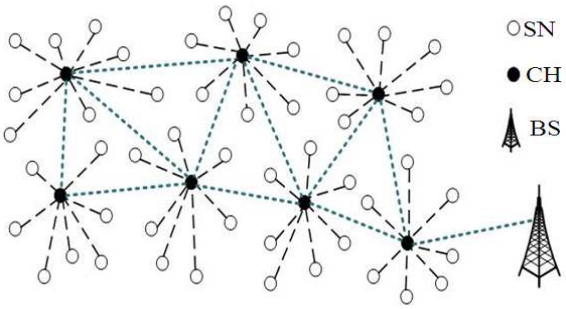

Fig. 2. Data exchange using routing process

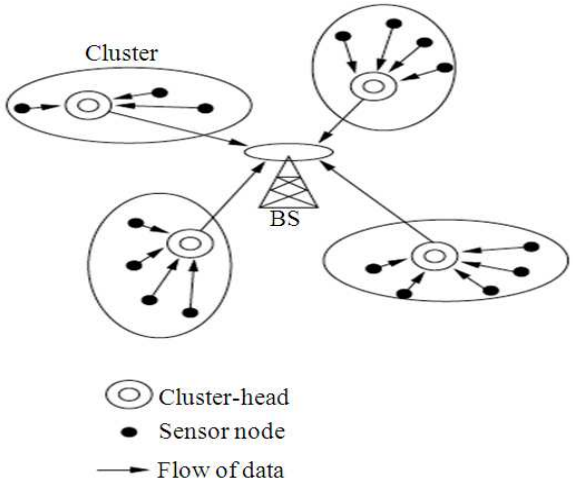

Fig. 3. Zone formation cluster allocation

Table 1. Parameters comparision

S. no	Parameter	MDR	CBZA
1	Total no 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
5	Bandwidth ratio	0.9e6	2e6
6	Data rate	0.96e6	2.0e6
7	Mobility	Dynamic	Dynamic
8	Density rate	0.2	0.5

In **Table1** the network parameters and it existing and proposed components was discussed, Generally total number of nodes are used in MDR (20) and CBZA (100), Second stage total number of packet are travelling calculations in MDR and CBZA, Third one is coverage area was discussed using for unidirectional antenna which purpose of 360 degree coverage, Transmitting Mode is used in MDR (Path selection mode) and Cluster Based Zone splitting modes (CBZA), bandwidth and data rate was discussed, both protocol mobility was Movements based Such as dynamic mode. Finally density rate was calculated. 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

5. RESULTS

The Performance of the Enter network Comparison graph is show as **Fig. 4-9**.

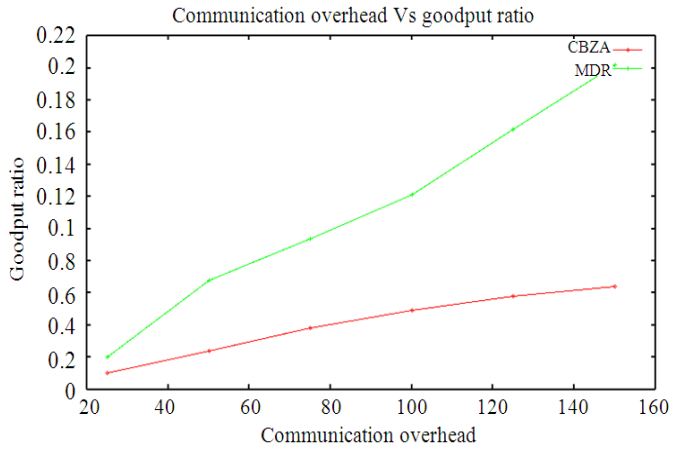

Fig. 4. Compare the performance between communication overhead Vs throughput

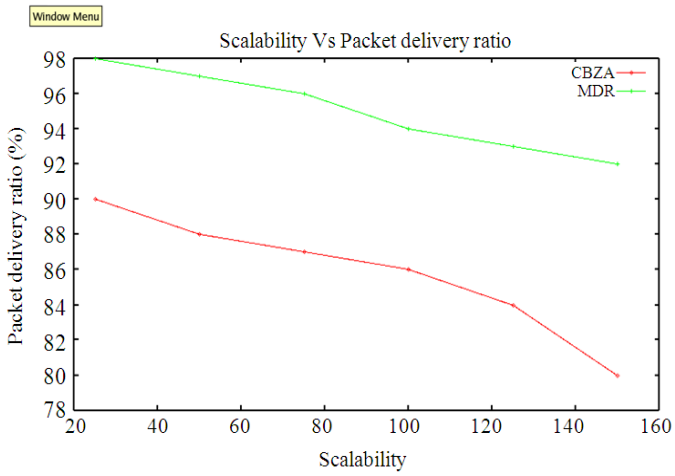

Fig. 5. Compare the performance between scalability Vs PDR

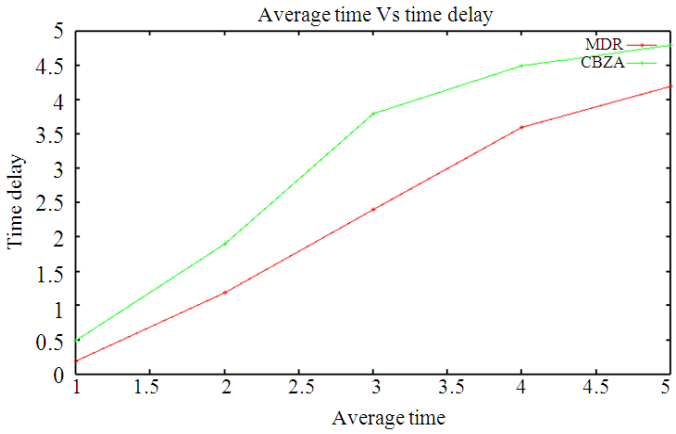

Fig. 6. Compare the performance between average time Vs delay

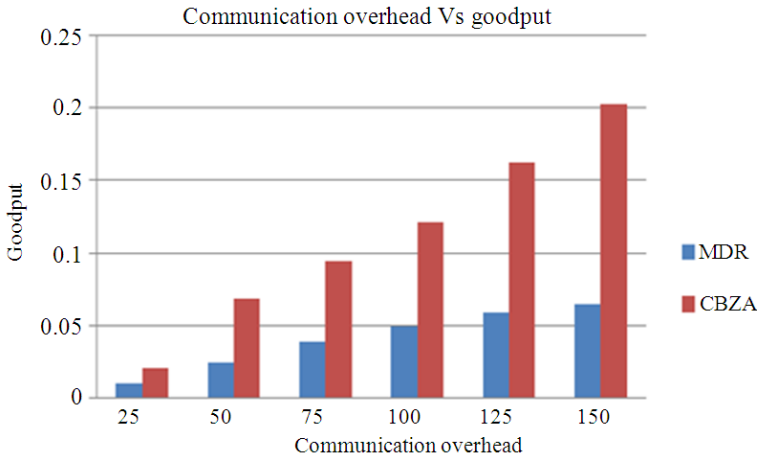

Fig. 7. Compare the performance of MDR VS CBZA

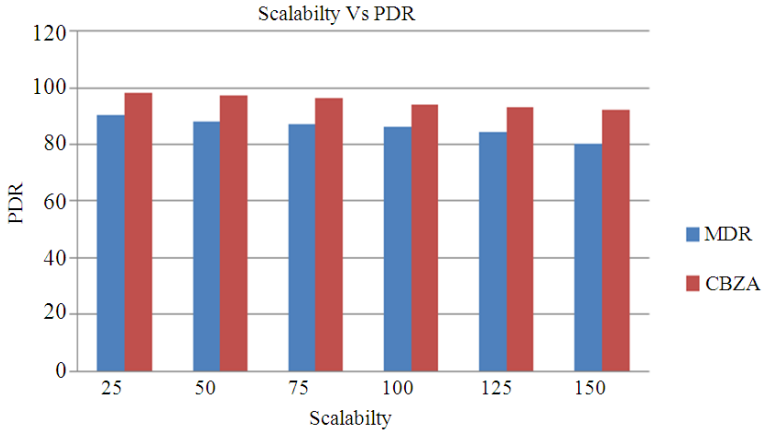

Fig. 8. Compare the performance of MDR VS CBZA For scalabilty

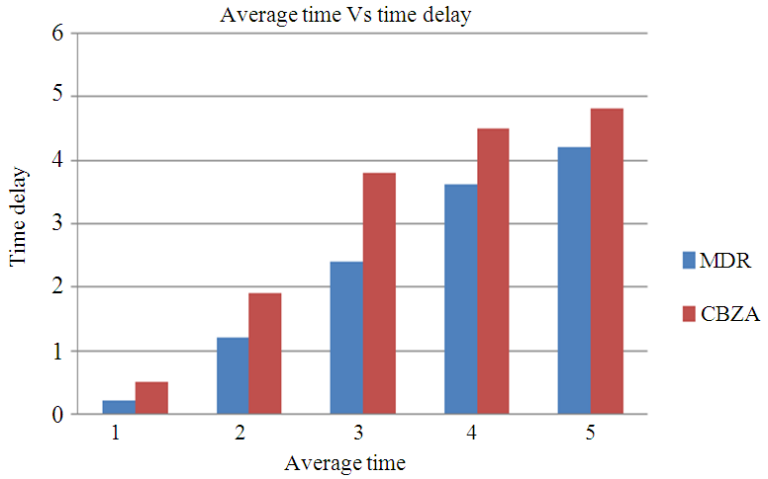

Fig. 9. Compare the performance of MDR VS CBZA For scalabilty

6. 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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