ISSN:1991-8178

Australian Journal of Basic and Applied Sciences

Journal home page: www.ajbasweb.com

Zone Based Multi-Path Routing In MANET Using ZBMR Protocol

[1]J. Kavitha and [2]Dr. S. Palaniammal

[1]*Assistant Professor, Chettinad College of Engineering and Technology, Anna University - Chennai, Department of Mathematics, Karur-639114, Tamil Nadu, India.*
[2]*Professor & Head, Sri Krishna College of Technology, Anna University - Chennai, Department of Science and Humanities, Kovaipudur, Coimbatore-42, Tamil Nadu, India.*

ARTICLE INFO

Article history:
Received 12 March 2015
Accepted 28 April 2015
Available online 5 May 2015

Keywords:
MANET, Multicast Routing, Zone Leader and ZBMR.

ABSTRACT

Background: A MANET (Mobile Ad hoc Network) is an accumulation of wireless mobile nodes which are autonomous and can dynamically self-organize that creates temporary network topology. Various potential applications of MANETs necessitate group communications among several nodes which is supported by multicasting. In order to communicate one sender with multiple receivers, group communication with multicast routing is required. However, in traditional communication data packets are dropped due to some channel noise; so the time delay is increased. Therefore, the network life time and efficiency is decreased. Objective: To overcome the above drawbacks, Zone Based Multicast Routing (ZBMR) is proposed in which set of nodes are formed as zones in which source, router and destination nodes are allocated and the packet transmission takes place through the neighbors with acknowledgement. If the acknowledgement is not obtained, retransmission of packets occurs. Results: The efficiency and network life time is increased .At last, the performance of the proposed protocol is measured write the main and most important results for your paper. Conclusion: Hence, the time delay is reduced and energy can be saved. Thus, efficiency and network life-time is increased. Finally, the performance of the entire network is evaluated.

© 2015 AENSI Publisher All rights reserved.

To Cite This Article: J. Kavitha and Dr. S. Palaniammal., Zone Based Multi-Path Routing In MANET Using ZBMR Protocol. ***Aust. J. Basic & Appl. Sci., 9(11),*** *243-248, 2015*

INTRODUCTION

MANETs does not have any pre-existing communication infrastructure and it provides several network services for various mobile users. So, MANET has gained more popularity in the field of research and academic. Pervasive computing is supported by the mobile networking which is the most important concept in communication. During past few years, there are so many advancements in both hardware and software fields that affirms the mobile networks. A Mobile Ad hoc Networks is defined as a collection of wireless and mobile nodes that are spread randomly and can create dynamic networks at anywhere and anytime with no existing network infrastructure.

The nodes of MANETs are linked by wireless links which can move freely and randomly within the network and these nodes can also acts as a router at the time of packet transmission takes place. MANETs are entirely different by considering the infrastructure wireless networks and it has several types' traffic also. These are more vulnerable to various attacks like passive and active attacks of Denial of Service attack, Wormhole Attack, Gray-hole attack Impersonation, Eavesdropping, Man- in-the- middle attack, Routing Attacks, Black hole Attack, Replay Attack and Jamming, and it provides several applications such as Military Battlefield, Commercial Sector services, Local Level applications, PAN (Personal Area Network), virtual class room and emergency relief premises. The security consequence of MANETs in group communications is a challenging task because has multiple sources and multiple destinations.

There are various attacks of malicious nodes are present during in multicasting because of exposures of routing protocols. In order to save the bandwidth and network resources, multicasting is used since it involves the delivery of single message to multiple destinations simultaneously. There are two types of multicast routing protocols are present in MANETs are Tree-based routing protocols and Mesh-based routing method in which the tree-based protocol has a single route between a source and a destination while the mesh-based method has multiple routes

Corresponding Author: J. Kavitha, Assistant Professor, Department of Mathematics, Chettinad College of Engineering and Technology, Anna University - Chennai, Karur-639114, Tamil Nadu, India.
E-mail:Kavitha.paveesh@gmail.com.

between each source and destination pair and the mesh-based routing supports frequent topology changes than tree-based routing. So, it is well suitable for various multicasting applications. Multicast routing is an effective method to actualize group communications.

If the nodes of MANETs are highly dynamic, then the design of routing protocols becomes a challenging task than wired networks. Generally, the formal multicasting protocols do not have better scalability in the situation of overhead for link searching and management of group membership. Data exchanges and collaborative operations required multicasting which is fundamental service of networking that enables group communication and cluster based system design in a spread environment.

2. Related work:

In this section, the cluster based routing protocols and multipath protocols are discussed in order to reduce network traffic and increase energy conservation of each node.

Imran Chowdhury et.al presented an Energy Efficient and Cooperative Congestion Control Protocol (EECCCP) which provides cluster based multicast routing in MANET. It has two phases in which at first phase cooperative multicast tree is created that is rooted to the source node by adding mobile nodes which possess higher residual energy for the receivers. At second phase, an admission control approach is performed to admit or reject the cooperative multicast flow depending on the size of the output queue. At last it computes the node potential and if the node does not compensate the path potential to the destination, it chooses next highest residual energy node as a relay node.

Suryaprakash Reddy et.al presented a routing protocol named energy efficient Ordered Congestion Control (OCC) protocol that employs cross layer support. It preserves energy by detecting congestion on paths and it also tries to specify the function of MAC layer in order to detect path failure. Finally, it produced a novel strategy to find congestion at each path and relay nodes.

Karunakaran et.al proposed a Cluster Based Congestion Control (CBCC) protocol which comprises of distributed and scalable clustering mechanisms to support congestion control in mobile ad hoc network. The typical feature of this scheme: clusters are formed in a self-organized manner. It calculates the traffic rate of each path and then the source node sending rate was corrected accordingly.

M.R. Pearlman et al presented Alternate Path Routing (APR) and produced a positive effect on end-to-end delay and load balancing in Mobile Ad hoc Network. S.J. Lee and M. Gerla proposed Split Multi-path Routing (SMR) which mainly focuses on establishing and maintaining Maximally Disjoint Routes. This scheme splits the load into two paths at each session.

Yixin Dong et al proposed super node-based Reverse Labeling Algorithm which provides an interesting application on Multi-Path Transport (MPT) with multi –description network coding. It is mainly used to send image and video information through multi-hop radio network. When traffic on current path is increased, it does not diverse the traffic into other alternate paths but it concentrate on the primary path simultaneously. If the primary/current path is broken, it chooses an alternate path.

3. Proposed Protocol:

In this research, Zone Based Multipath Routing (ZMBR) protocol is proposed to increase the efficiency of the MANET. Here, network zones are split into several zones to preserve energy of each participating mobile nodes. Grouping mobile nodes into zones has been widely employed in the field of research in order to attain network scalability. The network nodes are split into several zones in which each zone has zone leader which is also called as Zone Head (ZH). Zone Head is elected by the other nodes which are otherwise known as Zone Coordinators in the zone and a node that has higher energy is elected as a ZH. The packet transmission takes place through the ZH. If a node wants to send data to other node, the ZH search path by route discovery process and then it transmits packets through that path. If the path is broken it selects another path. The ZH and Zone-coordinators may be fixed or variable. Each ZH receives signal from a common base station of the network that shown in Figure 1.

4. Route Discovery:

Zone Head involves the route discovery process. If anyone of the zone-coordinators wants to send packets to another node, the ZH initiates route discovery process. The node who wants to send packets is denoted as Source (S) and the receiving node is denoted as Destination (D). The ZH precedes the route discovery process by finding nearest neighbor to source and transmit to it. Then search another node which is nearest to that neighbor and this process continue until reach the packets to the destination. If the path is failure, ZH initiates route discovery.

Australian Journal of Basic and Applied Sciences, 9(11) May 2015, Pages: 243-248

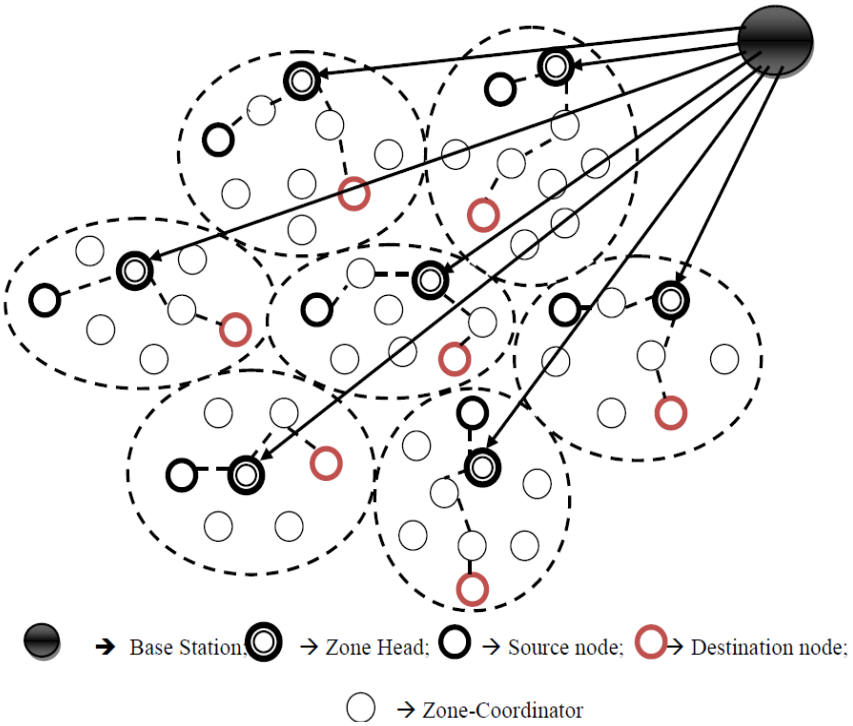

Fig. 1: Zone Arrangement and Operation Mechanism.

Algorithm for Zone Based Multicast Routing (ZBMR) Protocol:

1. Initialize the Number of Nodes N_{ix}
2. Arrange The Source and Destination Mobile Nodes (S_{ix}) (D_{iy})
3. Create The Agent(Forwarder) R_{ix}
4. Nodes are Deployed the Various Zone in Network Region Z_{ax}
5. Nodes Positions are Identified Pos_{ix}
6. Communicate the Neighbored Nodes(NE_{ix})
7. For
8. (NE_{ix} =0; NE_{ix} <n; NE_{ix} ++)
9. Begin
10. If
11. NE_{ix} <-A; // No Response from the Neighbored Nodes;
12. else
13. NE_{ix} <-B; // Receive The Acknowledgement From the Neighbor Nodes
14. end if
15. end if
16. Packets Transmission Process starts
17. For
18. Begin
19. (N_{ix} =0; N_{ix} <n; N_{ix} ++)
20. If
21. N_{ix} <=0; //Packets are Dropping
22. else
23. N_{ix} <=1; //Packets are Delivery and Receive the Acknowledgement
24. End if
25. End if
26. Reports are maintained
27. S_{ix} <- R_{ix} (D_{iy})
28. End Process

5. Description:

Set of nodes (N_{ix}) are initialized as a group called zones. Then, the source (S_{ix}), router/agent (R_{ix}) and destination (D_{iy}) nodes are allocated within the zones and the position of the nodes (Pos_{ix}) are determined like front, back, up and down. In order to initialize routing, neighbor nodes are discovered by the source and then the packets are transmitted by the sender to their neighbor to reach destination. When the packets are delivered by the neighbor it sends an acknowledgement to the sender of the packets and if the acknowledgement is not received by the sender it assumes the packet is dropped; then it retransmits the particular packet rapidly. This process is repeated until complete transmission of all packets. Moreover, the routing process takes place within the zones. So, the dropped packets can be easily detected and the time delay is reduced when compared to the traditional transmission. Hence, the efficiency and network life-

time is increased. At last, the performance of the proposed protocol is measured.

$$GM = \left(\frac{CH_1 + CH_2 + CH_3 + CH_4}{T_s.T_R.16\Pi r} \right)$$

Group Management

CH_1=Cluster head Election Based on nodes Energy level CH1,

CH_2=Cluster head Election Based on nodes Energy level CH2,

CH_3=Cluster head Election Based on nodes Energy level CH3,

CH_4=Cluster head Election Based on nodes Energy level CH4

T_S= Sending transmitting Power, T_r=Receiving transmitting power

Over all Network performance:

$$PS = \left(\frac{GM}{PS} \right)$$

GM= Group Management

PS=Path Selection

Experimental Results:

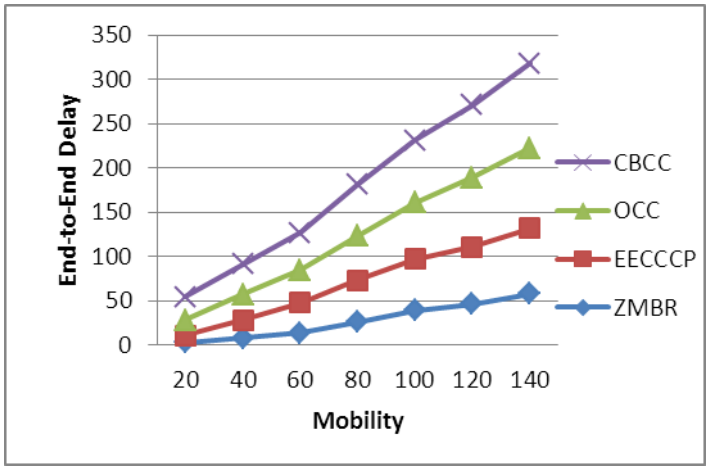

Fig. 2: Mobility Vs End-to-End Delay.

The figure 2 represents the performance CBCC, OCC, EECCCP and ZMBR protocol in terms of Mobility and End-to-End Delay in X axis and Y axis respectively. When mobility increase the End-to-End Delay also gradually increase in all four protocols. But, when compared with other three protocols, ZBMR protocol provides better performance.

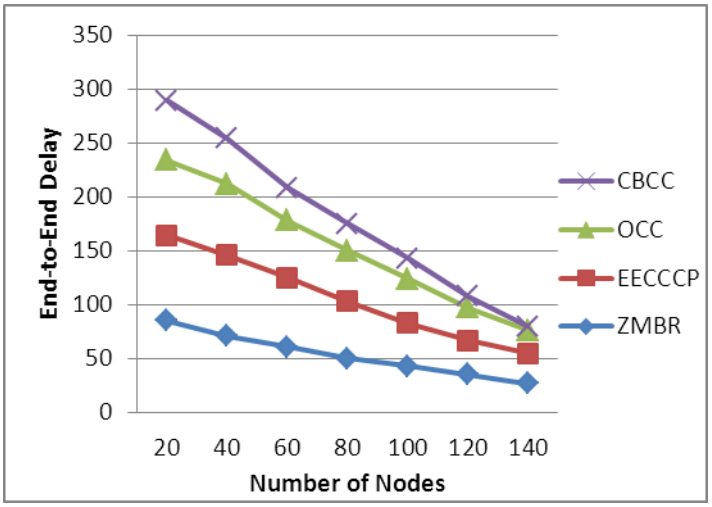

Fig. 3: Number of Nodes Vs End-to-End Delay.

The figure 3 represents the performance CBCC, OCC, EECCCP and ZMBR protocol in terms of Number of Nodes and End-to-End Delay in X axis and Y axis respectively. When Number of Nodes increase the End-to-End Delay decreases gradually in all four protocols. But, when compared with other three protocols, ZBMR protocol has reduced End-to-End Delay.

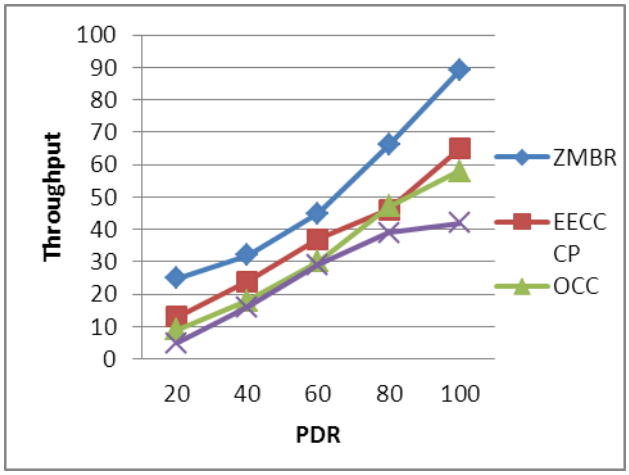

Fig. 4: PDR Vs Throughput.

The figure 4 represents the performance CBCC, OCC, EECCCP and ZMBR protocol in terms of PDR and Throughput in X axis and Y axis respectively. When PDR increase the Throughput also increases in all four protocols. But, when compared with other three protocols, ZBMR protocol has better Packet Delivery Ratio and Throughput.

Conclusion and Future Work:

Thus, we proposed Zone Based Multicast Routing (ZBMR) protocol which enhances the overall network efficiency by the way it increases the performance without any delay that induces this packet transmission much more ascendable and robust. There is no disruption takes place since the communication occurs within the zones. Hence, the PDR becomes increased and the traffic among the paths is also getting reduced. In ZBMR protocol, the communication takes place within the zones. So, the dropped packets can be easily detected and it retransmitted rapidly to their neighbors in order to reach the destination with minimum delay. By using the group communication only less number of transmissions is required to complete the entire transmission by the way this protocol can accomplish high succession rate with minimum latency besides it is cost effective when compared to other existing protocols. The complication concerned when sending the packets is also minimized which creates this ZBMR protocol is considerably desirable for group communication. In future, we broaden our work to render security by preceding a novel authentication protocol with the features of our current methodology.

REFERENCES

Basagni, S., I. Chlamtac and V.R. Syrotiuk, 2001. "Location Aware, Dependable Multicast for Mobile Ad Hoc Networks," Computer Networks, 36(5/6): 659-670.

Chen, K. and K. Nahrstedt, 2002. "Effective Location-Guided Tree Construction Algorithms for Small Group Multicast in MANET,"Proc. IEEE INFOCOM, pp: 1180-1189.

Corson, M.S., J.P. Maker, J.H. Cernicione, 1999. "Internet-based mobile ad hoc networking", IEEE Internet Computing, 3(4): 63-70.

Gerla, M., S.J. Lee and W. Su, 2000. "On-demand multicast routing protocol (ODMRP) for ad hoc networks," Internet draft, draft-ietf-manet-odmrp-02.txt.

Giordano, S., 2002. Mobile ad-hoc networks, in: I. Stojmenovic (Ed.), Handbook of Wireless Networks and Mobile Computing, Wiley, New York.

Imran Chowdhury, Asaduzzaman, Saki Kowsar, 2012. "An Energy Efficient and Cooperative Congestion Control Protocol in MANET", International Journal of Computer Applications (0975-8887), 58(17): 27-34.

Karunakaran, S., P. Thangaraj, 2010. "A Cluster Based Congestion Control Protocol For Mobile Ad hoc Networks", International Journal of Information Technology and Knowledge Management, 2(2): 471-474.

Lee, S.J. and M. Gerla, Split Multi-path Routing with Maximally Disjoint Paths in Ad Hoc Networks, ICC'01. Yixin Dong, Tingzhou Yang, 2002. Dimitrios Makrakis and Ioannis Lambadaris, Supernode-based Reverse Labeling Algorithm: QoS Support in Mobile Ad hoc Wireless Networks, CCECE'02, Winnipeg, Canada, 3: 1368-1373.

Mauve, M., H. Fubler, J. Widmer and T. Lang, 2003. "Position-Based Multicast Routing for Mobile Ad-Hoc Networks," Proc. ACM MOBIHOC, Poster Section.

Pearlman, M.R. *et al*, 2000. On the Impact of Alternate Path Routing for Load Balancing in Mobile Ad Hoc Network works, MobilHOC, pp: 150.

Royer, E.M. and C.E. Perkins, 1999. "Multicast operation of the ad hoc on demand distance vector routing protocol," in ACM/IEEE MOBICOM, August, pp: 207-218.

Suryaprakash Reddy, T., Dr. P. Chenna Reddy, 2012. " EOCC: Energy-Efficient Ordered congestion control using cross layer support in Mobile Ad Hoc Network routing", International Journal of Scientific & Engineering Research, 3(10): 1-9.