Volume 2, Issue 3, March 2012 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

A Survey on Mobile Ad Hoc Networks Using Efficient Geographic Multicasting Protocol without Core Zone

[1]K.Rama Devi,
M.tech Student, Dept. of CSE
Sree Vidyanikethan Engg.Coll.
A.Rangampet, Tirupati,
Email-id: kramadevi.cse@gmail.com.

[2]N.Papanna,
Assistant Professor, Dept. of CSE,
Sree Vidyanikethan Engg.Coll.
A.Rangampet, Tirupati,

Abstract — **Group Communications are important for mobile ad hoc networks multicasting is an efficient method for implementing group communications. In this project, we analyze the implementation of efficient and scalable multicasting in MANET due to the difficulty in group membership management and multicast packet forwarding over a dynamic topology .we propose a novel Efficient Geographic Multicasting protocol(EGMP). EGMP uses a virtual- zone-based structure to implement scalable and efficient group membership management . the scalability and efficiency of EGMP are evaluated through simulations and quantitative analysis . Our simulation results demonstrate that EGMP has high packet delivery ratio, and low control overhead and multicast group joining delay under all test scenarios. Compared to SPBM, EGMP has significantly lower control overhead, data transmission overhead , and multicast group joining delay .**

KeyWords: **Routing, Wireless networks ,mobile ad hoc networks , multicast , Protocol**

I. Introduction

Group communications are important in mobile ad hoc networks(MANET). Example applications include the exchange of messages of messages among a group of soldiers in a battlefield ,communications among the firemen in a disaster area, and the supporting of multimedia games and teleconferences . with one-to-many or many-to-many transmission pattern ,multicast is an efficient method to realize group communications .However ,there is a big challenge in enabling efficient multicasting over a mobile ad hoc networks whose topology may change constantly.

The conventional MANET multicast protocols can be divided into two main categories , tree-based and mesh -based .The tree –based protocols (e.g., MAODV,
AMRIS MZRP and MZR). The mesh-based protocols (e.g., FGMP, Core-Assisted Mesh protocol , and ODMRP) are proposed to enhance the robustness with the use of redundant paths between the source and destination pairs at the cost of higher forwarding overhead .Furthermore ,these conventional multicast protocols generally do not have good scalability due to the overhead for route searching ,group membership management, and tree/mesh structure creation and maintenance over the dynamic topology of MANET.

For MANET uni-cast routing, geographic routing protocols have been proposed in recent years for more scalable and robust forwarding. the protocol proposed in with the algorithm described earlier in achieves a fully stateless routing. They assume mobile nodes are aware of their own position through certain positioning system (e.g.,GPS), and a source can obtain the destination's position through some kind of location service . By default , the packets are greedily forwarded to the neighbor that allows for the greatest geographic progress to the destination . When no such neighbor exists, perimeter forwarding is used to recover from the local void , in which the packets traverse the face of the planarized local topology subgraph by applying the right-hand rule until greedy forwarding can be resume. Since the forwarding decisions are only based on the local topology ,geographic routing are more scalable and robust in a dynamic environment

Our contributions in this work include:

We design a scheme to handle inter zone and intra zone transmission topology for supporting efficient and scalable multicasting for mobile ad hoc networks in multicast forwarding.

1) We make use of position information to implement hierarchical group membership management , and combine location service with hierarchical membership management to avoid network-range location searches for the group members , which is scalable and efficient . with location guidance and our efficient membership management structure , a node can join or leave the group more quickly.
2) Introducing an important concept zone depth ,which is efficient in guiding the tree branch building and

tree structure maintenance ,especially in the presence of node mobility . With nodes self -organizing into zones ,zone-based bidirectional-tree-based distribution paths can be built quickly for efficient multicast packet forwarding.

3) We introduce an important concept zone-depth ,which reflects the relationship between a member zone and zone where the root of the tree exists. The zone depth is efficient in guiding the tree branch building and tree structure maintenance, especially in the presence of node mobility.
4) Evaluating the performance of the protocol through quantitative analysis an extensive simulations. Our analysis results indicate that the cost of the protocol defined as the per node control overhead remains constant regardless of the network size and the group size .Our simulation studies confirm the scalability and efficiency of the proposed protocol.

II. Efficient geographic Multicast Protocol

In this section, we will describe the EGMP protocol in details .We present the zone structure building process and the zone-supported geographic routing strategy we introduce the processes for the multicast tree creation, maintenance and the multicast packet delivery.

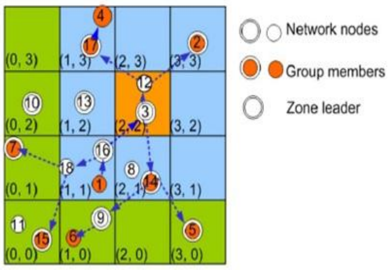

fig.1.zone structure and multicast session example

EGMP uses a two-tier structure. The whole network is divided into square .The whole network is divided into square zone. In each zone, a leader is elected and serves as a representative of its local zone on the upper tier. . The leader collects the local zone's group membership information and represents its associated zone to join or leave the multicast sessions as required . As a result , a network-range core –zone –based multicast tree is built on the upper tier to connect the member zones. For efficient and reliable management and transmissions, location information will be integrated with the design and used to guide the zone construction, group membership management, multicast tree construction and maintenance and packet forwarding.

In EGMP ,the zone structure is virtual and calculated based on a reference point . Therefore, the construction of zone structure does not depend on the shape of the network region, and it is very simple to locate and maintain a zone. The zone is used in EGMP to provide location reference and support lower –level group membership management . A multicast group can cross multiple zones. With the introduction of virtual zone , EGMP does not need to track individual node movement but only needs to track the membership change of zones , which significantly reduces the management overhead and increases the robustness of the proposed multicast protocol . We choose to design the zone without considering node density so it can provide more reliable location reference and membership management in a network with constant topology changes.

A. Zone-Supported Geographic Forwarding :

With a zone structure , the communication process includes an intrazone transmission and an interzone transmission. In our zone structure , as nodes from the same zone are within each other's transmission range and aware of each other's location , only one transmission is required for intra zone communications. transmissions between nodes in different zones may be needed for the network-tier forwarding of control messages and data packets.

In EGMP , to avoid the overhead in tracking the exact locations of a potentially large number of group members , location service is integrated with zone – based membership management without the need of an external location server. In previous ,the underlying geographic unicast protocol(e.g,, GPSR) will forward the packet to node 18 greedily as it closer to the destination . The perimeter mode may be used to continue the forwarding. This still cannot guarantee the packet to arrive at node 7 , as the destination is a virtual reference point . Such a problem is neglected by the previous geographic protocols that use a region as destination(e.g.,[7]) .

B. Multicasting Tree Construction

In this section, we present the multicasting tree creation and maintenance schemes. In EGMP ,instead of connecting each group member directly to the tree, the tree is formed in the granularity of zone with guidance of location information , which significantly reduces the tree management overhead. With a destination location , a control message can be transmitted immediately without incurring a high overhead and delay to find the path first, which enables quick group joining and leaving . In the following description ,except when explicitly indicated , we use G,S, and M, respectively , to represent a multicast group , a source of G and a member of G.

C.Multicast Group Join

When a node M wants to join the multicast G, if it is not a leader node , it sends a JOIN-REQ(M,Pos_M , G,{M_{old}

© 2012, IJARCSSE All Rights Reserved

})message to its zLdr , carrying its address , position, and group to join.The address of the old group leader M_{old} is an option used when there is a leader handoff and a new leader sends an updated JOIN-REQ message to its upstream zone .If M did not receive the NEW-SESSION message or it just joined the network.

D.Packet Sending from the source

After the multicast tree is constructed , all the source of the group could snd packets will be forwarded along the tree .In most tree-based multicast protocols , a data source needs to send the packets initially to the root of the tree. The sendinf of packets to the root would introduce extra delay especially when a source is far away from the root. Instead, EGMP assumes a bi-directional tree –based forwarding strategy , with which the multicast packets can flow not only from an upstream node/zone down to its downstreamnode/zones , but also from a downstream node/zone up to its upstream node/zone.

E. Multicast Data Forwarding

Maintain the multicast table , and the number zones normally cannot be reached within one hop from the source .When a node N has a multicast packet to forward to a list of destinations(D1;D2;D3;:) , it decides the next hop node towords each destination using the geographic forwarding strategy .After deciding the next hop nodes , N inserts the list of next hop nodes and the destinations associated with each next hop node in the packet header.

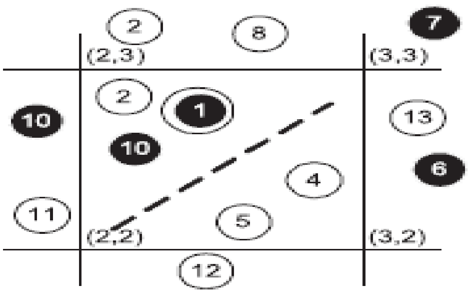

fig. 3.multiple clusters in one zone.

An example list is (N1;D1;D3;N2:D2;:) where N1 is the next hop node for the destinations D1 and D3 , and N2 is the next hop node for D2.Then N broadcasts the packet promiscuously . Upon receiving the packet , a neighbor node will keep the packet if it is one of the next hop nodes or destinations , and drop the packet otherwise. When the node is associated with some downstream destinations , it will continue forwarding packets similarly as done by node N.

F. Multicast Route Maintenance and Optimization

In the zone structure , due to the movement of nodes between different zones , some zones may become empty . It is critical to handle the empty zone problem in a zone – based protocol . Compared to managing the connections of individual nodes , however , there is much lower rate of zone membership change and hence a much lower overhead in maintaining the zone- based tree.When a member node moves to a new zone , it must rejoin the multicast tree through the new leader. When a leader is moving away from its current zone , it must handover its multicast table to the new leader in the zone , so that all the downstream zones and nodes will remain connected to the multicast tree .

III. .PERFORMANCE EVALUATION

A. Simulation Environment

We simulated EGMP protocol within the global mobile simulation(Glomosim) library . The nodes are randomly distributed in the ared of 3000m*1500m with a default node density 50 nodes/km2 .We use IEEE as the MAC layer protocol.

B.Parameters and Metrics

We studied the following metrics for the multicast performance evaluation:

1)*Packet Delivery Ratio*: the ratio of the number of packets received and the number of packets expected to be received .So for the multicast packet delivery , the ratio is the total number of received packets over the multiplication of the group size and the number of originated packets.

2) *Number of transmissions per node every second*

The average number of transmissions of the multicast packets including the data packets and control messages per node every second during the multicast session. This metric studies the efficiency of the protocol including the efficiency for the data delivery and the efficiency for multicast structure building and maintenance.

3) *Average path length*

The average number of hops traversed by each delivered data packet.

4) *Joining Delay* The time interval between the first JOIN-REQ sent our and the JOIN- REPLY received.

IV . CONCLUSION

We have designed an efficient and robust geographic multicast protocol for MANET in this paper. This protocol uses a zone structure to achieve scalability, and relies on underneath geographic unicast routing for reliable packet transmissions. We build a zone – based bi-directional multicast tree at upper tier to achieve more efficient multicast membership management and delivery, and a zone at lower tier to realize the local membership zone management. We also develop a scheme to handle the empty zone problem which is challenging for the zone- based protocols.. The position information is used in the protocol to guide the zone

© 2012, IJARCSSE All Rights Reserved

structure building , multicast tree construction and multicast packet forwarding..As compared to traditional multicast protocols , our scheme allows the overhead in tree structure maintenance and to the topology change more quickly . simulation results show our protocol can achieve higher packet delivery ratio in a large – scale network. They are going to enhance our protocol without the help of core zone , to achieve more optimal routing and low control overhead.

REFERENCES

[1] E.M.Royer and C.E.Perkins, "Multicast Operation of the Ad hoc on- Demand Distance Vector Routing Protocol " proc.ACM/IEEE mobicom, PP. 207 – 218 , AUG.1999.

[2] C.Wu, Y.Tay , and c-k.Toh , " Ad Hoc Multicast Routing Protocol Utilizing Increasing Id-Numbers (AMRIS) Fuctional Speccification ", Internet draft , Nov.1998.

[3]V.Deverapalli and D.Sidhu , "MZR: A Multicast Protocol Mobile Ad Hoc Networks ", proc.IEEE Int'l Conf .Comm(ICC'01),2001.

[4] M.Gerla , S.J .Lee , and W.Su, "On –Demand Multicast Routing (ODMRP) for Ad Hoc Networks ," Internet draft , draft –ietf –manet –odmrp -02 .txt ,2000.

[5] C.-C Chiang , M.Gerla , and L.Zhang , " Forwarding Group Multicast Protocol for Multihop Mobile Wireless Networks ",ACM J.Cluster Computing , Special issue on mobile computing Vol .1 ,no.2,pp.187-196, 1998.

[6] M.Transfer , H. Fubler , J.Widmer , and W. Effelsberg , "A Hierarchical Approach to Position –Based Multicast for Mobile Ad-Hoc Networks ," Wireless Networks , vol.13 , no.4,pp.447-460, Aug.2007.

[7] S.M.Das , H. Pucha and Y.C .Hu, " Distributed Hashing for Scalable Multicast in wireless Ad Hoc Network", IEEE Trans.Parallel and Distributed Systems, vol.19,no.3,pp.347-362,Mar.2008.

[8] X. Xiang znd X.Wang , " An Efficient Geographic Multicast Protocol for mobile Ad –Hoc networks", IEEE Int'l Symp.World of Wireless , Mobile and Multimedia Networks (WoWMoM), june 2006.

[9] T.Camp and Y.Liu, " An Adaptive Mesh- Based Protocol for Geocast Routing ," J. Parallel and Distributed Computing vol.63,no.2 ,PP.196-213,2003.

[10] B.Karp and H.T.Kung , " Greedy Perimeter Stateless Routing for Wireless Networks,"Proc.ACM/IEEE MobiCom , P.243 – 254 , Aug.2000.

[11] C. de Morais Cordeiro, H. Gossain, and D. P. Agrawal. Multicast over wireless mobile ad hoc networks: Present and futuredirections. IEEE Network, pages 52–59, January/February 2003.

[12] H. Du, H. Hassanein, and C. Yeh. Zone-based routing protocol for high-mobility manet. IEEE CCECE 2003. Canadian Conference on, 2:4–7, May 2003.

© 2012, IJARCSSE All Rights Reserved