Supporting Efficient and Scalable Multicasting Over Mobile Ad Hoc Networks

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ABSTRACT:

Multiple communications are important in Mobile Ad hoc Networks (MANETs). Multicast is an efficient method for implementing group communications. However, it is challenging to implement efficient and scalable multicast in MANET due to the difficulty in group membership management and multicast packet forwarding over a dynamic topology. We propose a novel Efficient Geographic Multicast Protocol (EGMP). EGMP uses a virtual-zone-based structure to implement scalable and efficient group membership management. A network wide zone-based bidirectional tree is constructed to achieve more efficient membership management and multicast delivery. The position information is used to guide the zone structure building, multicast tree construction, and multicast packet forwarding, which efficiently reduces the overhead for route searching and tree structure maintenance. Several strategies have been proposed to further improve the efficiency of the protocol, for example, introducing the concept of zone depth for building an optimal tree structure and integrating the location search of group members with the hierarchical group membership management. Finally, we design a scheme to handle empty zone problem faced by most routing protocols using a zone structure. The scalability and the 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, and is scalable to both group size and network size. Compared to Scalable Position-Based Multicast (SPBM) [CHECK END OF SENTENCE], EGMP has significantly lower control overhead, data transmission overhead, and multicast group joining delay.

1. Introduction:

For MANET unicast routing, geographic routing protocol shave been proposed in recent years for more scalable and robust packet transmissions. The existing geographic routing protocols generally assume mobile nodes are aware of their own positions through certain positioning system (e.g., GPS), and a source can obtain the destination position through some type of location service, an intermediate node makes its forwarding decisions based on the destination position inserted in the packet header by the source and the positions of its one-hop neighbors learned from the periodic beaconing of the neighbors. By default, the packets are greedily forwarded to the neighbor that allows for the greatest geographic progress to the destination. When no such a neighbor exists, perimeter forwarding is used to recover from the local void, where a packet traverses the face of the planarized local topology sub graph by applying the right-hand rule until the greedy forwarding can be resumed. In this section, we first summarize the basic procedures assumed in conventional multicast protocols, and then introduce a few geographic multicast algorithms proposed in the literature.

In conventional topology multicast protocols mainly include tree based protocols and mesh-based protocols. Tree structure is mainly constructed in tree based protocols for more efficient forwarding of packets to all the group members. With the help of mesh based protocols we can expand the multicast tree with additional paths which can be used to forward packets when some of the links break. In contrast, EGMP uses a location-aware approach for more reliable membership management and packet transmissions, and supports scalability for both group size and network size. the focus of our paper is to improve the scalability of location-based multicast, a comparison with topology-based protocols is out of the scope of this work.

2. Secured efficient geographic multicast protocol:

2.1 Protocol overview:

EGMP supports scalable and reliable membership management and multicast forwarding through a two-tier virtual zone-based structure. At the lower tier the nodes are divided into zone, and a leader is elected in a zone to manage the local group membership. At the upper layer, the leader serves as a representative for its zone to join or leave a multicast group as required. As result zone based, network-wide multicast tree is created. The zone leader can be elected based on the center point in the zone. The node which is present very close to the center of the zone that node can be act as a zone leader. Here the zone leader also have the mobility nature, if suppose the zone leader can change its position then again the zone leader election can be done based on the center point of the zone. Some of the notations can be used: Zone size, the length of a side of the zone square. The zone size is set to $S \leq St/\sqrt{2}$, where St is the transmission range of the mobile nodes. To reduce intra-zone management overhead intra-zone nodes.

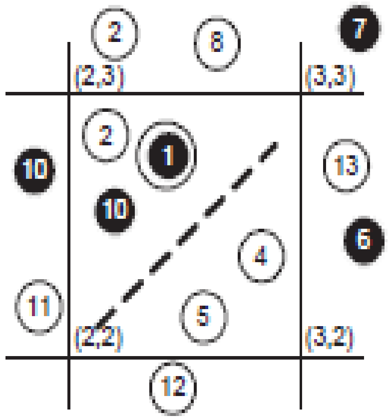

Figure1: Zone Structure and Multicast session example

Multicast group join:

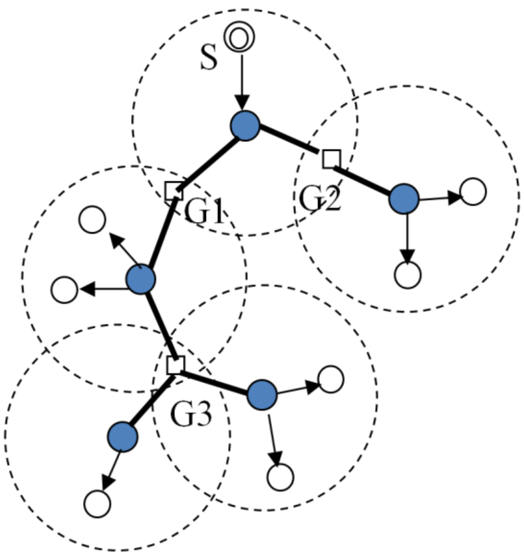

Figure 2:Multi cast group join

When a node M wants to join the multicast group G, if it is not a leader node, it sends a JOIN REQ (M; PosM; G; fMoldg) message to its zLdr, carrying its address, position, and group to join. The address of the old group leader Mold 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.

Packet sending from the source:

After the multicast tree is constructed, all the sources of the group could send packets to the tree and the 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. If this scheme is used and node 5 in Fig. 1 is a source, node 5 needs to unicast the packets initially to root zone (2, 2). The sending 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 downstream nodes/zones, but also from a downstream node/zone up to its upstream node/zone.

3. RELATED WORK:

3.1 Framework Setup:

Routing in a communication network is the process of forwarding a message from a source host to a destination host via intermediate nodes. A wireless ad hoc network consists of mobile nodes (MNs) with wireless communication capabilities for specific sensing tasks. Modify mobility and driver partition which apt to node placement under zone process thus creates the framework for our proposed protocol. Mobility describes the node movement and the driver initializes position of each and every nodes. Each and every protocol developed under three states which are initialization, packet event section and finalization. Some more function which consists of edge calculation, report generation etc... We implemented the MEGMP protocol using Global Mobile Simulation (GloMoSim) library. The simulations were run with 32 nodes randomly distributed in an area of 950m x 950 m. The nodes moved following the modified random waypoint mobility model. The moving speed of nodes are uniformly set between the minimum and maximum speed values which are set as as 1 m/s (with pause time as 100 seconds) and 20 m/s, respectively, except when studying the effect of mobility. Each simulation lasted 200 simulation seconds. A simulation result was gained by averaging over six runs with different seeds. We focus on the studies of the scalability and efficiency of the protocol under the dynamic environment and also in consideration with the energy and power utilization of nodes. The performance of the proposed MEGMP algorithm is evaluated via glomosim simulator. Performance metrics are utilized in the simulations for performance comparison: Packet arrival rate: The ratio of the number of received data packets to the number of total data packets sent by the source.

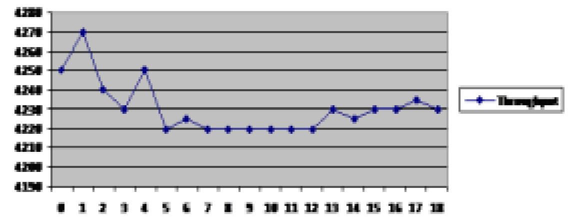

Figure 3. Packet arrival rate of Proposed Protocol

4. CONCLUSION:

The scalability of EGMP is achieved through three-tier virtual zone based structure. A zone based bidirectional multicast tree is built which is guided by location information. The position information is used to guide zone structure building, multicast tree structure, and multicast packet forwarding. EGMP has a high packet delivery ratio and low control overhead over other protocols**.**

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. C. Wu, Y. Tay, and C.-K. Toh, "Ad Hoc Multicast Routing Protocol Utilizing Increasing Id-Numbers (AMRIS) Functional Specification," Internet draft, Nov. 1998.

2. K.Ashok Chakravarthi,Khalim Amjad Meerja,S.V.Achuta Rao“Manageable and Economical Connection of Centralized Repository Servers Using Server Ports” International Journal of Computer Science and Information Technologies, Vol. 3 (6), 2012,5331-5333.

3. Dan Li, Member, IEEE, Chuanxiong Guo, Haitao Wu, Member, IEEE, Kun Tan, Member, IEEE, Member, ACM,Yongguang Zhang, Songwu Lu, and Jianping Wu, Senior Member, IEEE, Scalable and Cost-Effective Interconnection of Data-Center Servers Using Dual Server Ports, IEEE/ACM TRANSACTIONS ON NETWORKING, VOL. 19, NO. 1, FEBRUARY 2011

4. Gavin holland, Nitin vaidya, **“Analysis of TCP Performance over Mobile Ad Hoc Networks”** Kluwer Academic Publishers. Manufactured in The Netherlands**,**Wireless Networks 8, 275–288, 2002.

5. M. Garetto and E. Leonardi, “**Restricted Mobility Improves Delay-Throughput Trade-offs in Mobile Ad-Hoc Networks,**"submitted for publication, available at http://arxiv.org/abs/0807.1228.

