Reduction of Greedy Forwarding using Overlay Multicasting in Mobile Ad Hoc Networks

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***Abstract*—Mobile Ad-hoc Network (MANET) is a self configuring network composed of mobile nodes without any fixed infrastructure. Group communications are important in Mobile Ad hoc Networks (MANET). Multicast is an efficient method for implementing group communications. But, it is big challenge to implement the well-organized and scalable multicast in MANET due to the difficulty in group membership scheme and multicast packet forwarding over a dynamic topology. EGMP uses a virtual-zone-based structure to implement scalable and efficient group membership scheme. A zone based bi-directional tree is constructed to achieve more efficient membership management and multicast delivery. The position information is used to guide the zone structure construction, multicast tree formation, and multicast packet forwarding, which efficiently reduce the overhead for route searching and tree structure maintenance. The main aim of this paper is to improve the performance of different multicasting approaching using Two-tier Overlay Multicast Architecture. Scalable overlay multicasting architecture approach to investigate the performance of Overlay multicast approach in Internet like environments based on realistic topologies. Overlay multicast architecture achieves close to optimal average resource utilization in such environments.**

***Keywords*— Ad-hoc network, EGMP, MANET, Overlay network..**

I. INTRODUCTION

Mobile ad hoc networks have applications in a wide range of areas including disaster relief and military. It is one to many or many to many communications. In fact, some networks may need multicast routing only and not need unicast routing at all. This makes multicasting a very important feature in such networks. It is important to have a multicasting protocol that provides a high packet delivery ratio even in extreme conditions (e.g., high mobility and high traffic load). It involves the transmission of a datagram to a group of zero or more hosts identified by a single destination address, and so is intended for group oriented computing. The use of multicasting within MANETs has many benefits. It can reduce the cost of communication and improve the efficiency of the wireless channel when sending multiple copies of the same data by exploiting the inherent broadcasting properties of wireless transmission. Instead of sending data via multiple unicast, multicast decreases channel capacity consumption, sender and router energy consumption, and delivery delay, which are considered important MANET factors.

Mobile ad hoc networks do not use any fixed infrastructure. Nodes in MANET intercommunicate through single hop and multi hop paths in peer-to-peer fashion. However, there is a big challenge in enabling efficient multicasting over a MANET whose topology may change constantly. A number of unicast routing, geographic routing protocol have been proposed in mobile ad hoc network. The existing geographic routing protocol generally assume mobile nodes are aware of their own position through certain positioning system (for example GPS) and source can obtain the destination position through some type of location service. By default, the packets are greedily forwarded to the neighbour that allows for the greatest geographic progress to the destination. There are many challenges in implementing an efficient and scalable geographic multicast scheme in MANET. For example, in unicast geographic routing, the destination position information will be in the packet header to guide the packet forwarding, while in multicast routing, the destination is a group members.

A straight forward way to extend the geography –based transmission from unicast to multicast is to put the addresses and positions of all the members into the packet header, This increases the header overhead, which constrains the application of geographic multicasting only to a small group. Besides requiring efficient packet forwarding, scalable geographic multicast protocol also needs to efficiently manage the membership of a possible large group. Efficient geographic multicast protocol, EGMP, can scale to a large group size and large network size. The EGMP is designed to comprehensive and self-configured, simple and efficient for more reliable operation. Instead of addressing only a specific part of the problem, it makes a zone-based scheme to efficiently handle the group membership management structure to efficiently track the locations of all the group members without tracking to an external location server.

The zone structure is formed virtually and the zone where a node is located can be calculated based on the position of the node and reference origin. By making use of the location information, EGMP will quickly and efficiently build packet distribution paths, and reliable maintain the forwarding paths in the presence of network dynamics due to unstable wireless channels or frequent node movements.

II. METHODOLOGY

Overlay Multicasting has been proposed as an alternative approach for providing multicast services in Internet. A virtual infrastructure can be built to form an overlay network on the top of the physical Internet. Each link in virtual infrastructure is a unicast tunnel in physical network. AM Route is ad hoc multicasting protocol that uses the overlay multi Cast approach. Bidirectional unicast tunnels are used to connect the multicast group members into virtual mesh. After the mesh creation, a shared tree is created for data delivery and is maintained with in mesh.

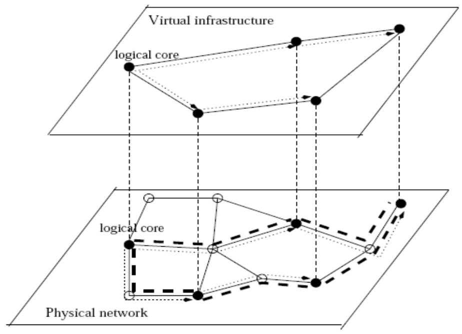

Fig 1: example of overlay network

III. ANALYSIS FROM THE EXISTING SYSTEM

Based on the proposed planning the analysis have been divided in to two parts .

A. *Efficient Geographic Multicast Protocol*

EGMP supports scalable and reliable membership management and multicast forwarding through a two-tier virtual zone- based structure. In lower layer, with reference to a predefined virtual origin, the nodes in the network self organize themselves, into a group of zones and a leader is elected in a zone to manage the local group membership. In upper Layer, the leader will act as a representative for its zone to join or leave a multicast group. This creates network wide zone-based multicast tree is built. 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. The zone-based tree is shared for all the multicast sources of a group.

B. *Zone Based Service Architecture*

ZBS is to provide services which are only served in a zone with mobile users staying in the zone. A zone means a service area covered by a service provider such as a fast food restaurant, a bakery or a professor. Therefore, a zone may have one or more services simultaneously, and to choose wanted one of those services is given to a mobile user in his location. ZBS tracks the position of mobile users and the available services in the each zone. It has the capacity to integrate existing services such as Internet service. ZBS is designed with the minimum infrastructures, voluntary will of service providers and interaction with or among users. ZBS maintains a profile for each user device to identify each user as well as Service providers' profiles information, defining services and locations of them in each zone. Figure shows a large application domain partitioned into multiple small zones such as public areas, public or private enterprise areas, and campus. Although each small zone may be indoor or outdoor, our technology can give same ability to users in any environments. The physical architecture consisting of ZSP (Zone Service Portal), IZSS(Infra-Zone Service Station), ZSS(Zone Service Station), and end user in . ZBS network has the minimum infrastructures for performing ZBS and voluntary service providers which serve their services. The ZSP and IZSS are the infrastructures which may be constructed by ZBS network agents. In EGMP, the zone structure is virtual and calculated based on a reference point. The construction of zone structure will not depend on the shape or structure of the network region, and is very simple to locate and manage a zone. The zone 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 decreases 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. Similarly, to reduce the topology maintenance overhead and support more reliable multicasting, an option is to make use of the position information to guide multicast routing. There are many challenges in designing an efficient and scalable geographic multicast scheme in MANET. In unicast geographic routing, the destination position is carried in the packet header to forward the packet forwarding, in multicast routing; the destination is a group of members. A straight-forward way to extend the geography-based transmission from unicast to multicast is to put the addresses and positions of all the members into the Packet header,the header overhead will increase significantly as the group size increases, which constrains the application of geographic multicasting only to a small group Besides requiring efficient packet forwarding, a scalable geographic multicast protocol also needs to efficiently manage the membership of a possibly large group, obtain the Positions of the members and build routing paths to reach the members distributed in a possibly large network terrain. The existing small-group-based geographic multicast protocols normally address only part of these problems. In this work, we propose an efficient geographic multicast protocol, EGMP can apply to a large group size and large network size. This protocol is designed to be simple and self-configured, simple and efficient for more reliable operation. Instead of addressing only a specific part of the problem, it makes a zone-based structure to efficiently maintain the group membership management, and takes control of the membership management structure to efficiently trace the locations of all the group members without resolving to an external location server. The zone structure will form virtually and the zone where a node is placed can be calculated based on the location of the node and with its reference origin. In topology-based cluster, where a cluster is normally formed around a cluster leader with nodes one hop or k-hop away, and the cluster will constantly change as network topology changes. There is no need to involve a big overhead to create and maintain the geography zones proposed in this work, which critical to support more efficient and reliable communications over a dynamic MANET. Making use of the location information, EGMP can quickly and efficiently build packet distribution paths, and reliably maintain the forwarding paths in the presence of network dynamics due to unstable wireless channels or frequent node movements.

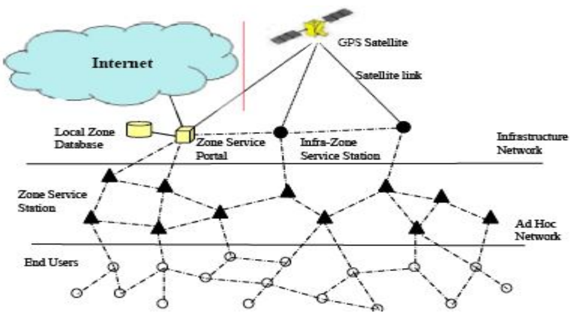

Fig2: Zone based structure

ZSP maintains LZD (Local Zone Database) for keeping the profiles for identifying each end user and service provider. IZSS makes the ZBS network robust and secure helps service providers and end users to locate them. Infrastructure nodes are secure, fault tolerant and static systems. Their power is supplied by wall power. Generally the deployment of the infrastructure devices which are high complex systems has to be pre-planned. On the other hand, the ZSS is an object for serving its services,i.e the service provider. End users interact with the ZBS system through ZBS client devices which are typically wireless multimedia handheld units. The ZSS of users is mobile, battery power supply, and low computing device. The maintenance of above architecture is very easy, the energy performance of the end users is excellent, and the network is very stable because of the hierarchical structure.

IV. *PROPOSED SYSTEM*

From the above analysis a latest system was proposed to avoid the disadvantages such as the greedy forwarding by the intermediate nodes which eventually reduces the performance of the network.In the proposed overlay multicasting, the end users pick their own messages from source (child node) to destination. There are two types of multicasting approaching, they are

- Application Overlay Multicasting
- Scalable Overlay Multicasting

A. *Application Overlay Multicasting*:

End hosts overlays greedily select their parents. Optimize its own performance goals – Not considering system-wide criteria.

B. *Scalable Overlay Multicasting:*

The results show that unlike the theoretical worst case, it achieves close to optimal average resource usages, when the network level routing is static and take minimum delay time.

C. *Advantages of the proposed system*

There is no need to use the inter domain router and switches. Reduce end to end latency, and Increases the end to end throughputs.

V. LITERATURE SURVEY

Unicast: The most common theme of an IP address is a unicast address. It refers to a single sender or a single receiver, and can be used for both sending and receiving the messages. unicast address is maintained with a single device or host, but it is not a one-to-one communication. Some individual PCs have several different unicast addresses, each for its own distinct purpose. Sending the same data to different unicast addresses requires the sender to send all the data many times over, once for each recipient.

Multicast: A multicast address is associated with a group of accepted receiver. Addresses 224.0.0.0 to 239.255.255.255 are designated as multicast addresses. This range was formerly called "Class D." The sender sends a single datagram (from the sender's unicast address) to the multicast address, and the intermediate routers will take many copies and send them to all receivers that have registered their interest in data from that sender.

Overlay Multicasting has been proposed as an alternative approach for providing multicast services in Internet. A virtual infrastructure will built to form an overlay network on the top of the physical Internet. Each link in virtual infrastructure is a unicast tunnel in physical network. AM Route is ad hoc multicasting protocol that uses the overlay multi Cast approach. Bidirectional unicast tunnels are used to connect the multicast group members into virtual mesh. After the mesh creation , a shared tree is created for data delivery and is maintained with in mesh.

VI. CONCLUSIONS

This paper improves the performance of different multicasting approaching using Two-tier Overlay Multicast Architecture. In this paper, we use a Scalable overlay multicasting approach to investigate the performance of Overlay multicast approach in Internet like environments based on realistic topologies. There is no need to use the inter domain router and switches. Reduce end to end latency, and Increases the end to end throughputs Overlay multicast architecture achieves close to optimal average resource utilization in such environments. However, such performance benefits come at the expense of significantly increased congestion on certain links. Moreover, the adaptive nature of overlay architecture can significantly increase the effectiveness of scalable multicasting by using overlay networks. This paper can be made as an application like the place where the multiple systems are present and in this case we can change the format from tree topology to mesh topology such that resources will be completely utilised and also eventually delay will be reduced and this can be scalable to group size and network size.

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