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SECURE DATA DELIVERY USING GEOGRAPHIC MULTICAST ROUTING

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***Abstract*- In MANET group communication is an important characteristic which can be implemented through Multicasting. MANET has a dynamic topology through which the mobile nodes keep changing their location and thus it doesn't have a fixed infrastructure, this makes forwarding and membership a tedious work. EGMP (Efficient Geographic Multicast Protocol) is a virtual-zone-based structure that is used to implement the efficient group membership management. The zone honcho takes the responsibilities of all the nodes up-to-date information and when there is a data loss to a particular crashed node it buffers the data packet and sends the packets when the respective node has been recovered. We enhance the data delivery by keeping the data more secure through some encryption technique. Finally, we try to encrypt the data through a PGP framework and so that the intermediates' cannot view the message. Thus the data loss has been decreased and it enhances the packet delivery ratio (PDR).**

Index Terms - Multicasting, Geographic routing, PGP.

I. INTRODUCTION

MANET is an infrastructure-less network in which the mobile devices interact with each other through a wireless communication capability. It exhibits a dynamic topology in which the mobile nodes keep moving from one place to the other and due to this there may be loss in the battery power of the nodes. Each mobile node acts as a router which helps in forwarding the data packets. When the packets are being forwarded if a node loses the battery power, it may lead to loss in data. So we must be careful in transmitting the data, the transmission can be unicast and multicast. Multicast is delivery of messages to a group of users simultaneously in a single transmission. There is at least one source and several destinations in a group, the router will forward the packets through many interfaces. There is an increasing demand for the group communication which is majorly used in multimedia applications and military/disaster zones. The multicast is used in achieving the group communication.

Enabling multicasting is a challenge due to the dynamic nature of network topology, limitation of network scalability and energy constraint. Basically there are two types of multicast routing protocols: tree-based and mesh based protocols. In tree-based multicast protocols they maintain a single path between the source-destination pair which increases the efficiency of multicasting. Mesh-based multicast routing protocol is used to establish a mesh of paths that connect the sources and destination.

In tree-base multicast routing there are basically two types: source-based multicast routing protocol and shared-based multicast routing protocol. In source-based multicast routing protocol each source node maintains a tree, but in shared-based multicast routing protocol a single tree is shared among all the source nodes. When there is an increase in a number of source nodes, in the source-based multicast protocol there may be a need for many multicast trees and this may lead to high consumption in the bandwidth but whereas in mesh-based multicast routing protocol even though there is a increases in nodes the same tree is used and thus it might reduce the memory required when comparing to the source-based protocol.

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II. CONVENTIONAL MULTICAST PROTOCOLS

The conventional multicast protocols such as tree-based and mesh-based multicast protocols are that which requires a local-range and network-range flooding. The major drawback of tree-based protocol is that they are not robust in the highly moving mobile nodes. There may be a data loss in these protocols due to loop formation which causes a serious congestion. The protocol which causes the loop formation is AMRoute which is a source-tree based routing protocol. When there is an increase in network range it can cause control overhead. So a protocol with no network-range flooding is constructed which results in an efficient membership management and scalability.

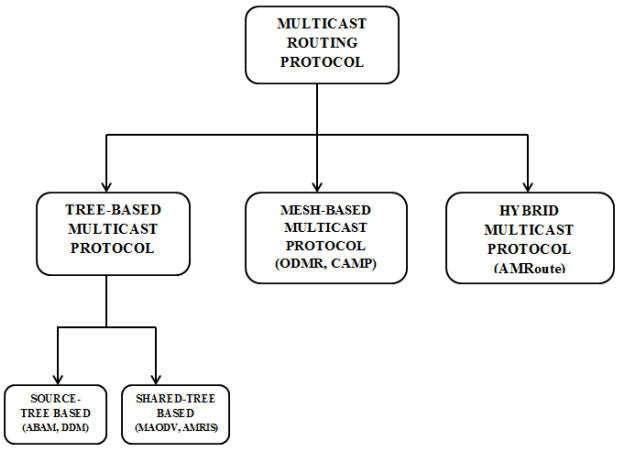

Fig1: Multicast routing protocols

III. GEOGRAPHIC MULTICAST PROTOCOL

Geographic routing is used to transfer a message to destination with their position information rather than the network address. It uses GPS (Global Positioning System) to collect the location information of each node. Each node must be aware of their own location and that a source node must be aware of the destination location and directly send the packets without route discovery process.

Efficient Geographic Multicast Protocol (EGMP) is used to overcome the limitations of the conventional multicast routing protocols. It doesn't have a periodic network range flooding which helps in improving the group membership management. It is virtual zone related structure that is used to implement a group membership management. A zone based bi-directional tree is constructed which is used in efficient multicast delivery and group communication. The position information of nodes are used in building the zone-based structure and this can be future enhanced by using them to design a virtual zone structure for efficient group communication, that enables the nodes to join and leave the group/cluster quickly. It uses a two-tier structure. At the lower layer, all the nodes in self-organizing network will group themselves into zones. Each zone has a zone honcho who maintains all the information about the zone members. Zone honcho is at the upper layer serving as a leader for all members to join and leave the zone. When there is a node crash due to the mobility, the data that is being forwarded are buffered by the zone honcho and that when a node recovers from the crash the data is being send to the node which recovered, by this we are able to reduce the data loss.

The tree is formed in EGMP based on the granularity of zone with support of location information. The EGMP can be further extended when group members combine the location service with membership management so that the overhead in the location service is reduced. Through this we can achieve a better packet delivery ratio.

IV. SECURE DATA DELIVERY

The sender can transmit their packets along the tree which has been constructed. The data is send to the intermediate nodes and then finally it reaches the destination, so to keep the data secure we introduce an encryption scheme PGP (Pretty Good Privacy) which is a public key scheme that is used in protecting the messages. The destination decrypts the packet and gets the original message. PGP framework employs AES (Advanced Encryption Standard) and RC4. AES is a block cipher which is extremely secure. RC4 is stream cipher which is very fast and it is a trademarked old and simple encryption scheme. Since it uses two encryption schemes it is called the hybrid encryption.

When the data is transmitted from source to destination it uses the two mentioned cryptography scheme through which we encrypt and decrypt the data using the public and the private key available. Hence we can ensure that the packets are not hacked or viewed by the intruder. This makes the data transmission more secure and thus we can deliver the data with higher rate.

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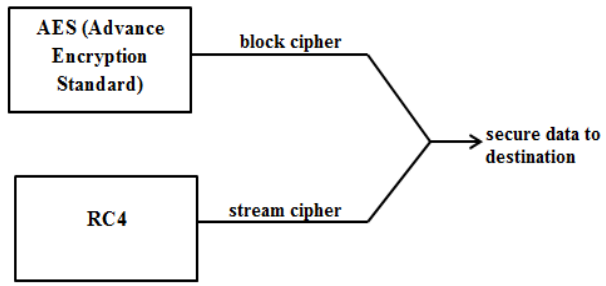

Fig2: PGP framework

Algorithm for securing data delivery

Notations:

S: source node

G: group name

D: destination

*/*source node starts the transmission*/*

sendData (S,D)

Begin

if(!ingroup)

*/*the node is joined in to the zone for data transmission*/*

Join(G);

*/*data is encrypted and send to the destination*/*

Pgp();

elseif

Pgp();

Endif

End

V. CONCLUSION

Efficient geographic multicast protocol is designed reduces the location overhead by employing the combination of location service along with the membership management. When the packet transmission is done in multicast they employ multi-hops and this requires a data to be kept more secure, here we implement a PGP framework and encrypt our packet so that only the destination node can view the messages through decryption. Compared to the other multicast protocol, the geographic multicast protocol uses the location information which arbitrarily reduces the maintenance overhead and the tree is quickly constructed even though the mobility is high. Thus through EGMP we can achieve the scalability and enhance the Packet delivery.

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