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Branching Router Based Multicast Routing Protocol Using MANET

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Abstract—In numerous multicast routing protocols, the multicast distribution tree is recognized by its branching points, where multicast data is distributed from one branching point to another using built-in unicast. In surviving system, the Simple Explicit Multicast (SEM) process is used. SEM is a new small group multicast protocol in which a branch message is sent to all destination. It is a proficient method to build multicast tree and transport multicast packet. To overawe the lack of Simple Explicit Multicast method a new multicast architecture with a equivalent multicast routing protocol has been suggested, for auxiliary multicast receiver mobility. In the multicast architecture, a new board entity called multicast controller (MC) is used to handle most of the multicast management-related tasks. Moreover Branching-Router based Multicast routing protocol with Mobility support (BRMM) method is proposed, for other routers in the network to construct multicast tree and deliver multicast packet with mobility support. The BRMM provides four types of signaling messages are used to established and maintain shortest path tree. In BRMM, internet service provider possess more than one multicast controller (MC) for aiding their customer in different geographic regions. BRMM guarantee the shortest path even when the BR failure happens and also supports a fast handover procedure and decreases the join latency.

I. INTRODUCTION

A network is a group of computers and other hardware constituents interrelated by communication channels that permit distribution of resources and information. Broadly, the network can be categorized into two types: wired network and wireless network. In wired network, the nodes are coupled with the help of cables. In wireless network the nodes and other network components communicate using wireless links.

Ad-hoc network

Ad hoc network derives beneath the infrastructure less network. Till now, communication of the mobile devices still be contingent on the cellular concept, in which each mobile device must communicate with base stations connected to a motionless network infrastructure, where the control and the data packets flow through it to appliance the communication. If the infrastructure is spoiled or there is no base station obtainable to the mobile device, the wireless communication can't be realized. But with the support of Ad hoc network we can converse without time or space limitations.

Mobile Ad-Hoc Network (MANET)

A mobile ad hoc network comes under ad hoc network. MANET is an independent system in which mobile hosts associated by wireless links are free to move subjectively. In MANET, nodes deed both as host and routers. The traffic categories in ad hoc networks are relatively dissimilar from those in an infrastructure wireless network.

Dynamic Traffic This arises when nodes are self-motivated and stirring around. Routes must be reassembled. This results in a reduced connectivity and network bustle in small bursts.

Peer-to-Peer Communication between two nodes, which are limited by one hop.

Remote-to-Remote: Communication between two nodes beyond a single hop which also maintain a stable route among them. This may be the consequence of numerous nodes staying within communication range of each other in a single area or conceivably moving as a group. The traffic is comparable to standard network traffic.

MANET is a self-configuring infrastructure-less network of mobile devices linked by wireless links. Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information essential to properly route traffic.

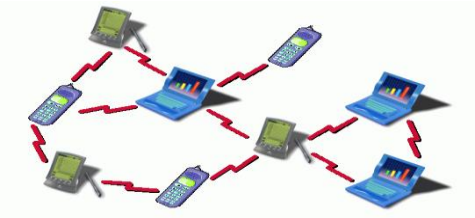

Fig: 1. Mobile Ad hoc Network

MANET is a self-configuring infrastructure-fewer networks of mobile devices related by wireless links that have been shown in Fig: 1.For each device in a MANET is free to move self-sufficiently in any direction, and will therefore adjustment in its relations to other devices frequently. Each must forward traffic isolated to its own use, and therefore be a router. The primary contest in building a MANET is furnishing each device to endlessly sustain the information required to accurately route traffic. Mobile ad-hoc networks can turn the dream of receiving connected "anywhere and at any time" into authenticity.

Usual application examples embrace a disaster retrieval or a military operation. Not bound to specific situations, these networks may equally show better performance in other places. As an example, imagine a group of people with laptops, in a business meeting at a place where no network services is present. They can easily network their machines by developing an ad-hoc network.

Multicasting

Multicasting means send a portion of data (a packet) to numerous spots at the same time. Fig: 1 shows the usual way of moving information around the Internet is by by means of unicast protocols -- tools that send packets to one site at a time. A spot that multicasts data is analogous in many ways to a television station that broadcasts its signal. The signal originates from one source, but it can scope everyone in the station's signal area.

The signal takes up some of the finite available bandwidth, and anyone who has the right equipment can refrain in. The data certificates on by those who don't want to catch the signal or don't have the right utensils.

Because 5, 10, or 100 machines can collect the identical packet, bandwidth is preserved. Also, when you use multicasting to direct a packet, you don't need to know the address of everyone who wants to receive the multicast; instead, you merely "broadcast" it for anyone who is concerned. Multi-casting is a method to propel a single data stream to numerous discerning clients diagonally different/ same network.

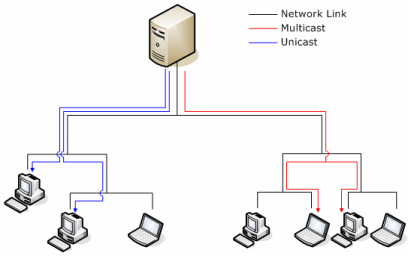

Fig: 2 Multicastings

Multi-casting within the same network

This is simple, when the multi-cast server sends the multi-cast stream to the network, those PC's which have already joined the multi-cast group get the streams and the ones that have not, reject them.

Multi-casting through multiple networks

There are multiple networks, the finest path among the source server and the destination hosts desires to be recognized (which is done using multi-cast distribution trees constructed using specialized protocols) along with finding out which PC's and consequently which networks are interested to join the multi-cast groups (if no node in a sub-network is interested in the multi-cast stream, the routers do not send multi-cast packets to that sub-network. This also can be established using certain protocol messages that are exchanged frequently between routers and hosts).

Advantages of Multi-casting

- Uses lesser bandwidth.
- There is smaller contents on the server resources as well as network resources.
- Large size real time transmissions (including multi-media, voice, video etc) can be sent by means of multi-casting.
- Multi-casting is suitable for transmission across multiple networks in a Wide Area Network (like Internet).

Common applications of multi-casting

Streaming Audio/ Video / Multi-media for a group of users on the network.

Broadcast quality Internet TV over the IP Network.

Audio/Video Conferencing, File distribution.

Streaming of recorded videos such as educational lectures, chairman key note address, minutes of meeting, etc.

Quality of Service in Multi-casting

Multi-casting is a connection-less and unreliable source of communication. If a few packets are lost during communication or receiving, they will not be resent by the source. Neither does the host appeal it. This is quite ok for real time applications like voice/ video streaming and more over some applications have safeguarding built-in for compensation of delayed multi-cast packets and smoothening out losses. Network switches can also contrivance end-to-end QoS settings for prioritizing the critical multi-cast sessions.

Multicast Routing

Multicast routing protocols build a routing tree connecting all the senders and receivers of the multicast group. There are two basic types of multicast trees: source-based trees and shared trees. In the source-based tree approach, the protocol computes an implicit spanning tree for each source in the multicast group. In the shared tree approach, a single spanning tree is shared by all the group members to send and/or receive messages. Tree for multiple sources may result in non-optimal routes and cause delays in message delivery. The primary advantage of the shared tree approach is that it conserves network resources and offers more favorable scaling characteristics than the source based approach.

II RELATED WORKS

Ion Stoica, T. S. Eugene Ng, Hui Zhang (2000), deliberate that a new multicast protocol called REUNITE. The key idea of the REUNITE protocol is to custom recursive unicast to implement multicast service. For each group, REUNITE" forms a delivery tree entrenched at a specially selected node called root. Every branching node of the tree preserves a list of receivers' addresses. A receiver R is alleged to have joined the multicast tree at node N if R's address is maintained at N. In REUNITE, a receiver's address is maintained at exactly one node in the group's delivery tree. To multicast a packet, the root sends a copy of the packet to each receiver in its list. Similarly, when a branching node forwards such a packet, it sends a copy of the packet to each receiver in its own list. This procedure continues recursively until packets reach all leaf nodes of the tree.

Ip multicast has two different components, the service model and routing protocols. In the IP multicast service model provides a powerful abstraction for applications as end hosts (senders and receivers) can utilize the service without having to keep track of the membership of the group.

In IP multicast routing protocols to maintain the membership information and to build multicast distribution trees to deliver packets from a sender to all the receivers in a groupIt does not require non-branching routers to preserve per group forwarding state. It is the only protocol that provides native support for incremental deployment, load balancing and graceful degradation when there are hot spots.

Luis Henrique M. K. Costa, Serge Fdida and Otto Carlos M. B. Duarte [2001], discuss that presents HBH (hop-by-hop multicast routing protocol). HBH adopts the source-specific channel abstraction to simplify address allocation and implements data distribution using recursive unicast trees, which allow the transparent support of unicast-only routers. An important original feature of HBH is its tree construction

algorithm that takes into account the unicast routing asymmetries. Since most multicast routing protocols rely on the unicast infrastructure, the unicast asymmetries impact the structure of the multicast trees. HBH uses IP unicast destination addresses for data packets. Data packets are replicated at HBH branching routers, in such a way that all the receivers connected to the multicast channel receive the data. Through simulation that HBH outperforms other multicast routing protocols in terms of the delay experienced by the receivers and the bandwidth consumption of the multicast trees. HBH can be incrementally deployed and that with a small fraction of HBH-enabled routers in the network HBH outperforms application-layer multicast.

Jiang Xie, Student Member, and Ian F. Akyildiz (2002), discuss that a new distributed system architecture where each FA (foreign agent) can function either as an FA or a GFA(gateway foreign agent) When an MN enters a regional network, the first FA of the subnet the MN visits will function as the GFA of this regional network . If an agent acts as a GFA, it needs to maintain a visitor list and keeps entries in the list updated according to the regional registration requests sent from other FAs within the regional network. The GFA also relays all the home registration requests to the HA. Other agents in the regional network act as the general foreign agents for the MN We also propose a dynamic location management mechanism. The number of FAs under a GFA is not fixed but optimized for each MN to minimize the total signaling traffic. The optimal number is obtained based on the incoming packet arrival rate and mobility characteristics of each user. Mobile IP enables terminals to maintain all ongoing communications while moving from one subnet to another. When a mobile node (MN) moves among subnets, its location and routes must be updated.

Mobile IP requires that an MN sends a location update to its home agent (HA) whenever it moves from one subnet to another one. This location registration is required even though the MN does not communicate with others while moving. The signaling cost associated with location updates may become very significant as the number of MNs increases. The distance between the visited network and the home network of the MN is large; the signaling delay for the location registration is long. Since the mobility and the packet arrival rate of each user are different and they may also not be constant from time to time, the optimal number of FAs is different for each user and it is adjustable from time to time. Thus, the dynamic system is able to perform optimally for all users.

III PROPOSED SYSTEM

Branching router based Multicast routing protocol with mobility support (BRMM) is proposed internet service provider may own more than one multicast controller in different geographic regions. BRMM can be protracted as an interdomain multicast routing protocol with the support of cooperation between different multicast controllers. Multicast controller may be prolonged to perform other necessary tasks if needed. Such as transmission bandwidth management, traffic scheduling.

The receiver join the multicast group and send data soon as possible. Router should immediately stop sending packets to the receiver who wants to leave the multicast group. Maintain the multicast tree, the signaling messages are necessary. Signaling message exchange should be simple and the cost should be as low as possible. Packets have unicast destination addresses. The multicast packets should be transmitted through the SPT from the source to the receiver. Strict multicast source and receiver management and multicast quality of service (QoS) can be easily deployed the direction and scope of multicast data propagation can be controllable as far as the large number of multicast data is concerned. The bounding shortest path algorithm must be used to find the shortest path from source to destination.

IV. SYSTEM DESIGN

METHODOLOGY

Multicast is a term allied with the network support for efficient data delivery to multiple interested recipients. Its service model is defined as follows: Let H be the set of all IP hosts and E_G be a subset of H, set E_G forms a multicast group with a group identifier known as its address G, if and only if: members of H may join and leave E_G at any time; members of H can communicate unidirectional with all members of E_G, using only G. This requirement suggests that a host does not need to be a member of a multicast group to send data to that particular group. Efficient multicast places the least amount of burden on network and end-host resources when compared with other methods to disseminate data to a group of recipients. The demand for multicast communication from networking applications has been growing at an accelerated pace. For instance, video conferencing, online gaming, software distribution, and so on, can all benefit from multicast. With traditional multicast routing protocols, a router on a multicast tree maintains forwarding-state information for a multicast group to determine how to forward multicast packets for the group, even if it is not a member router. Since a router may be on multiple multicast trees and the forwarding-state information for each multicast group may often change as well, scalability problem is a solemn concern.

V.SYSTEM IMPLEMENTATION

Node Formation

Fig: 3 illustrates the network formation module can construct a topology to provide communication paths for wireless ad-hoc network. Here the node will give the own details such as Node ID through which the transmission is done and similarly give the neighbor nodes details. Each node has the routing table for update its local information.

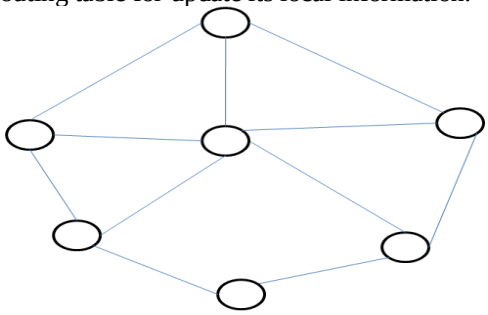

Fig: 3 Netwok Formation

Multicast Controller

MC is used to manage the multicast service. MC has some of the roles such as multicast address management, authentication of multicast service, group membership management. MC is preserved by an internet service provider (ISP). Isp may own more than one MC for serving their customers in different geographic regions. MC perform other two roles also transmission bandwidth management and traffic scheduling.

Multicast Address Allocation

Multicast source is a gratified server that propels multicast information in a relatively fixed period. Multicast controller (MC) realizes the allocation and reclamation of multicast address denoted by multicast identifier (MI). MC allocates specific MI when a multicast service is entreated for creation.

MI role is

- Source address
- Group id
- Type of service such as video conferencing etc
- Priority

Multicast source management

Access router (AR) at the source node is the first router to headlong the multicast packets from the source. AR of the source can custom a configuration file containing

(i) Authentication result
(ii) Service duration time
(iii) Service type
(iv) Filter the packets to manage the multicast source

Before the multicast service is created multicast source submit a request to its AR, AR receive the request and redirect to MC. MC Assigns an MI and a permitted duration time for this source. MC returns the authentication result to AR, AR will return the result in its configuration file and transmit data to receiver with the help of branching routers.

Multicast receiver management

Authorized and authenticated receivers only receive the data. When the data reach receiver then receiver sends leave massage then AR stops forwarding the traffic to the receiver and reports the leave message and accounting information to MC.

Multicast Join Process

Fig: 4 illustrates the multicast join process. Receiver wants to subscribe a multicast group then sends a join message to the attached Access Router. AR receives the join message and it recognizes that a receiver as a mobile node. AR sends the request to source through branching router. Sources receives the message and verify whether the AR and branching router is identical if no then AR act as branching router. Source send tree message to AR. All downstream branching router and upstream branching router list refresh when this AR added.

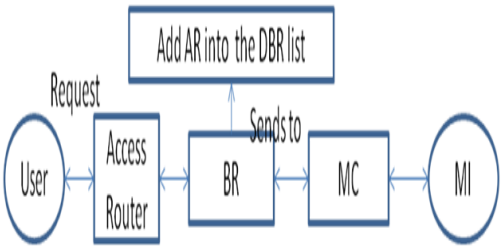

Fig: 4Multicast join proces

Multicast Leave Process

When the mobile node wants to leave the multicast group then sends a leave message to attached Access Router shown in Fig: 5.AR stops the packet transmission to the mobile node and sends another leave message to MC.

If there is no attaching node in the multicast group then send leave message to its upstream branching router (UBR). UBR receives the leave message and delete AR from his downstream branching router (DBR) list.

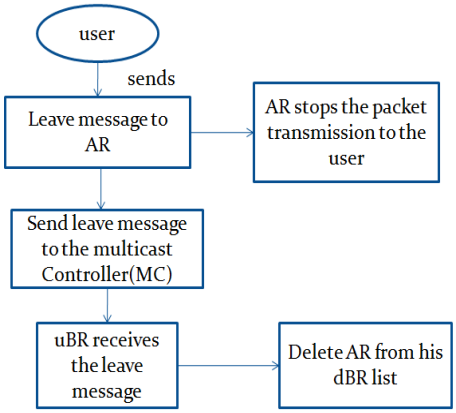

Fig: 5 Multicast leave process

Packet delivery

Source starts sending packets are shown in Fig: 6.The packet is directly forwarded to DBR of the source in unicast manner. When the subsequent DBR receive the packet, the same operation is repeated. Router thus forwards the packet to destination in a unicast manner.

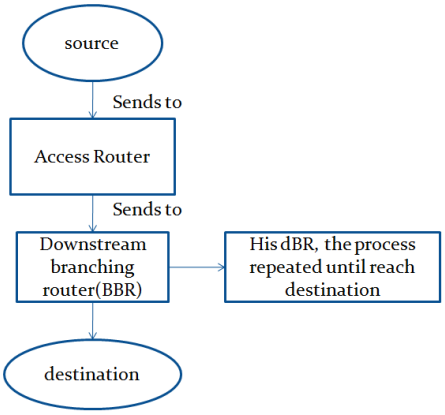

Fig: 6 Packet delivery

Mobility support

When the mobile node moves from Access Router 1(AR1) from AR2, branching router based Multicast routing protocol with mobility support (BRMM) employs a link layer (L2) movement detection to predict the Mobile nodes next location. Mobile node enters an overlapped area of the boundary points. L2 receives a new access point (AP). Mobile node notifies the present Access Router i.e. AR1 and send MAC address to the new Access Point (AP).

V RESULTS

Initial Node Setup

The network formation module can construct a topology to provide communication paths for wireless ad-hoc network as shown in Fig.

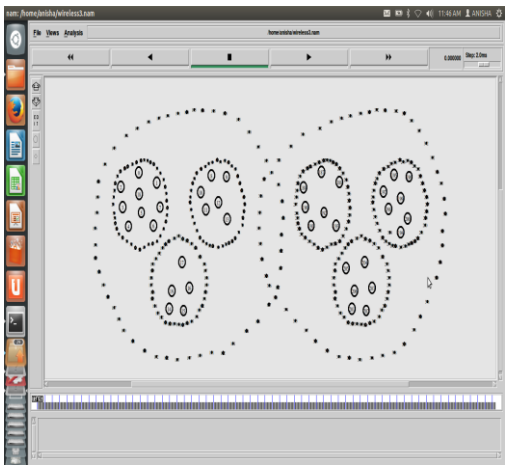

Fig: 7 Initial Node Setup

Joining Process

Figure illustrate, if receiver wants to subscribe a multicast group then sends a join message and if it get response then that receiver must be the member of that group.

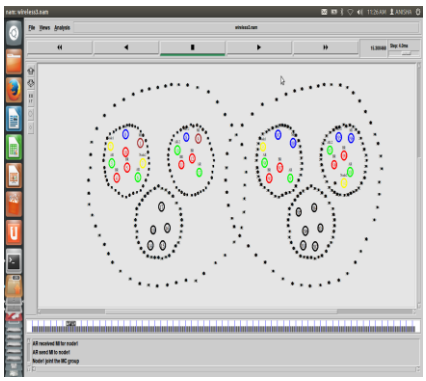

Fig: 8 Joining Process

Packet Delivery

Source starts sending packets; a packet is directly forwarded to DBR of the source in unicast manner as shown in Fig. When the subsequent DBR receive the packet, the same operation is repeated. Router thus forwards the packet to destination in a unicast manner.

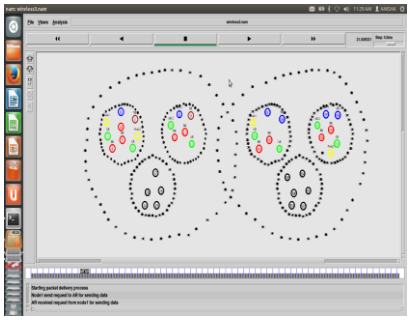

Fig: 9 Packet Delivery Leaving Process

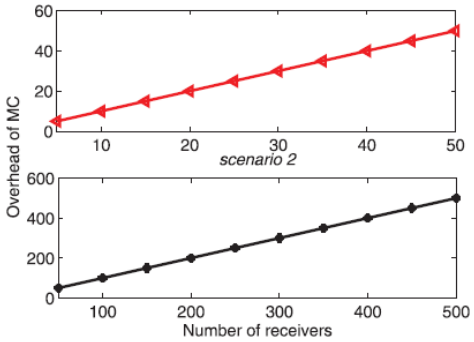

Fig: 10 Overhead of MC: Number of signaling messages processed by the MC versus number of receivers.

CONCLUSION & FUTURE WORK

In the proposed a novel multicast approach, BRMM, which uses an effective technique to paradigm multicast tree and distribute multicast packets with mobility support. BRMM uses four types of messages to build and conserve the multicast tree. To make the multicast more manageable, secure, and manageable, the MC has been introduced to provision the multicast management. The tree construction process in BRMM is dissimilar to that in NBM. On the other hand, owing to the temporary multicast state preservation in the nearest BR, BRMM declines the join latency significantly.

BRMM can also guarantee the shortest path even when the BR failure happens. In addition, BRMM supports a fast handover procedure and optimized join process. Our results have shown that the temporary state used in BRMM speeds up the multicast join process and supports the mobility of multicast receivers with a better performance. Besides, the SPT can always be established and maintained with a lower signaling cost.

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