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High QOS and Energy Minimization of Multicast in MANET

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Abstract: *Mobile ad hoc network (MANET) is a self-configuring infrastructureless network of mobile devices connected by wireless. This paper focuses a new power aware routing and grouping multicast algorithm to increase the lifetime of node and network within the mobile ad hoc network. Here multicasting from the source to a group of destination nodes is done by considering two metrics, namely residual battery capacity of the node and relay capacity of the node. This algorithm is used to reduce the energy consumption of all nodes in mobile ad hoc network. In proposed model the lifetime of the node and network is increased and the packet loss is identified.*
Keywords: *MANET, residual battery capacity, relay capacity.*

I. INTRODUCTION

A. Mobile Ad hoc Network

An ad hoc network is a network in which the locations of the switches, hubs or routers can be mobile, the number of routers available at the moment can increase or decrease, and the accessible routing paths can change. MANET is a self configuration wireless ad hoc network of mobile nodes. When the nodes are assumed to be able of moving, moreover on their own or carried by their users. The nodes that form the network rely on wireless communication to collaborate with each other. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly direct traffic. Such networks may work by themselves or may be connected to the larger Internet. A MANET consists of mobile devices. The mobile nodes are formed as a network without help of central management. Each node has a router or a switch connected by the wireless communication. The MANET organization depends upon the location, connectivity, service discovery capability, and ability of the nodes to search and route messages using nearest node or nearby nodes. The power failure of a node will affect node itself, but also its capability to forward data packets on behalf of others. For this cause, many researchers have been devoted to design an energy-aware routing protocol for MANETs. In MANET, many different power-aware-routing algorithms have been proposed to conserve node energy. Several recent studies tried to increase the node lifetime and network lifetime by using the power aware metrics.

B. Multicasting

Multicasting is a fundamental issue in any telecommunication network including wireless ad hoc networks. It is an efficient mechanism for one to many contact, and is typically implemented by creating a multicast tree. In multicast communication, the address of the source is a unicast address, but the address of the destination is a group address, a group of one or more destination networks in which there is at least one member of the group that is interested in receiving the multicast datagram. The group address defines the members of the group. Multicasting starts with a single packet from the source that is duplicated by the routers. The destination address in each packet is the same for all duplicates. Due to cruel battery power and transmission bandwidth limitations in wireless ad hoc networks, it is essential to enlarge efficient multicast protocols that are optimized for energy consumption, thereby significantly improving network performance.

II. RELATED WORK

There are several algorithms and methods have been proposed in MANET and Multicast. The new heuristic Embedded Wireless Multicast Advantage algorithm is planned [1]. In this model each node can decide to transmit at different power levels, which do not go over some peak value. The connectivity of the network depends on the transmission power. There are two approaches used to construct multicast tree. The first one is the use of Source Based Trees, which are rooted at the sender and which are designed to minimize the number of transmissions needed to reach all of the members of the multicast group. The second is the use of Core-Based Trees under which the same tree is used for all communication within the multicast group [3]. The path determination scheme of the PCHMR algorithm [4] not only relies on the hop counts but also on the received power strength of the neighborhood nodes. Shortest-cost routing algorithm reduces the cost/packet of routing packets by 5-30% over

shortest-hop routing [5]. By introducing static and dynamic assignments operating modes, lifetime of a multicast connection in a wireless network of energy constrained nodes has been maximized [6]. A new geographic routing protocol which takes into account the probability of error transmission to achieve a high delivery ratio while reducing the energy consumed to the minimum possible for Wireless Sensor Networks [9]. The Broadcast Incremental Power (BIP) algorithm which has been adapted it to multicast operation by introducing the Multicast Incremental Power (MIP) algorithm. These algorithms make use of the broadcast nature of the wireless communication atmosphere, and address the need for energy efficient operation. S-REMiT employs a more realistic energy consumption model for wireless communication proposed [11]. The main objective of Multicast Ad-hoc On-Demand Distance Vector (MAODV) Routing Protocol is providing communication capability with unicast, multicast and broadcast to all nodes in MANET [17]. To establish multicast communication between portable computers or any battery high-powered nodes in MANET, MAODV Routing Protocol is proposed.

III. Proposed Model

A. Motivation

MANET may be a self configuration network consisting of mobile nodes like portable computers with no existing infrastructure. MANET is the network that formed by battery powered nodes dynamically. Here the communication in MANET has been done by multicasting. Multicasting is the type of communication between one source to several destination nodes. During the data transmission from one source node to multiple destination nodes there is a possibility of communication failure because of low battery of some nodes. Frequently recharging the batteries and replacement of batteries are impossible. This paper focuses on increasing life time of the node and the network by introducing two metrics namely relay capacity and residual battery capacity of the node. It is also identifying packet loss during transmission of packets using Expected transmission Count (ETX) method.

B. Power Aware Routing and Grouping Multicast Algorithm

The Power aware routing and grouping multicast algorithm used to increase the lifetime of node and network in the mobile ad hoc network by considering two metrics, namely residual battery capacity of the node and relay capacity of the node to do multicasting from the source to a group of destination nodes. The data packets are transmitted from the source to group of destination nodes by constructing multicast tree within the transmission range.

There are two cases.
Case 1: If source wants to send multicast packets, then it chooses a node with more residual battery capacity within the transmission range of MANET.
RBC(t) = x – y – z – m
Here RBC is the residual battery capacity of the node and x is initial battery of node. y is number of packets transmitted by the node. z is number of packets received by the node and m is number of packets transmitted by the node as intermediate node.
Case 2 : If all intermediate nodes have equal residual battery capacity, then it chooses a node which contains more relay capacity. Relay capacity of the node is calculated by adding number of packets transmitted by the node as the source and number of packets transmitted by the node as intermediate node.
Multicast tree will be constructed based on the lifetime of the node and relay capacity of the node.

C. Modules

There are five modules namely Network Construction Module, Table Management Module, Packet Multicast Module, Power Prediction Module, Packet loss identification module.

1)Network Construction Module

The network construction module takes care of creating overlay node, creating multicast tree with the nodes within the transmission range and the description of joining the nodes in the multicast tree. It also adds the number of nodes in the multicast group members of the according to the node id of the particular node. At the end of this module the MANET has been created by creating multicast tree with the group of nodes.

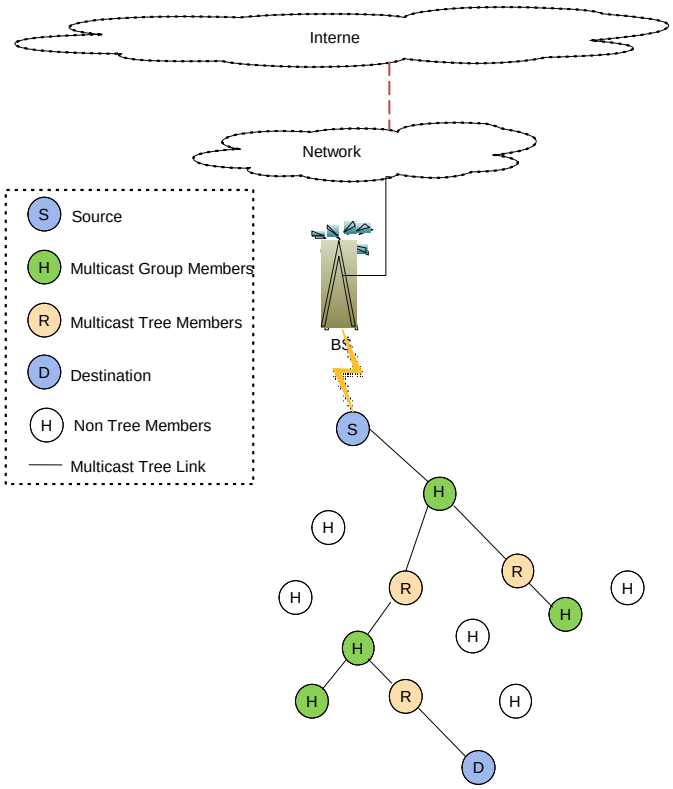

Fig 1 System Architecture

2) Table Management Module

The table management module consists of three tables namely Neighbor Node Table, Routing Table and Group table.

***Neighbor Node Table*:** In neighbor node table each node keeps information of other nodes that are within the transmission range. This table contains node id, node position, lifetime of battery and relay capacity information of each neighboring node.

***Routing Table*:** This table keeps the current route, which is used by the node to transmit packets. This table contains sequence number, source number, destination number, route expire time. The destination sequence number tracks the originality of a route for proposed destination. If a source node wants to communicate with the destination node, then it looks for a route in its routing table. If a legal route is not found, then the source uses RREQ packet. The node receiving RREQ packet and then sends a RREP packet to source, if it has path to the destination. Otherwise the node broadcasts RREQ packet to the neighboring nodes. After receiving it, source selects the shortest path among all the nodes and adds this as an entry into the routing table.

***Group Table*:** The group table keeps information of a list of group members. Each entry in the table contains the multicast group address, group leader address, group sequence number, hop count to group leader and next hop.

3) Packet Multicast Module

This module is responsible of collecting the information of multicast group members, identifying multicast group members and send multicast packets to the legal path which is used to identifying the destination and sending multicast packets to the same node.

4) Power Prediction Module

This module is responsible for calculating the power transmission ratio for every node in the multicast tree after sending packets. It also predicts the power usage during each transmission and calculate the remaining battery power of each node in the multicast tree to increase the lifetime of the node and the network.

5) Packet loss Identification Module

This module is responsible for identifying packet loss during each transmission of packets. Packet loss has been identified using ETX algorithm. It also identifies the path in which the packet loss is happened. By identifying the packet loss in the particular path may avoid the further transmission at the particular path. So, we can avoid the packet loss during the transmission of packets at the second time.

IV. CONCLUSION

The main intend contains in the MANET is that the mobile nodes are energy constrained. The multicast algorithms are developed to decrease the energy consumption of all nodes in the network. The proposed model has differed from the existing algorithms. It is addressed with few restrictions against the power-aware metrics in the multicast algorithms. It is also argued that the proposed algorithm exhibits more life time of the node and network, throughput as compared to others. Extending network lifetime has been done by finding multicast that tends to minimize the deviation of remaining energy of all the nodes. The power aware routing and grouping multicast protocols tend to create further control traffics. The basic mechanism in this work is highly extensible and supports Quality of Service for the MANETs.

REFERENCES

[1] M. Cagalj, J. P. Hubaux, C. Enz, "Minimum-energy broadcast in wireless networks: NP-completeness and distribution issues," in Proc. ACM 8th Annu. Int. Conf. Mobile Comput. Netw., 2002, pp. 172–182.
[2] I. Kang and R. Poovendran, "Maximizing static network lifetime of wireless broadcast ad hoc networks," in Proc. IEEE Int. Conf. Commun., May 2003, pp. 2256– 2261.
[3] J. E. Wieselthier, G. D. Nguyen, and A. Ephremides, "Algorithms for energy-efficient multicasting in static ad hoc wireless networks," J. Mobile Netw., vol.6, no.3, pp. 251–263, 2001.
[4] W. H. Cheng, C.-Y. Wen, and K.T. Feng, "Power controlled hybrid multicast routing protocol for mobile ad hoc networks," in Proc. IEEE Veh. Technol. Conf., May 2006, pp. 1087–1089.
[5] S. Singh, M. Woo, and C. S. Raghavendra, "Power-aware with routing in mobile ad hoc networks," in Proc. ACM MOBICOM, 1998, pp. 368–369.
[6] B. Floréen, P. Kaski, J. Kohonew, and P. Orponen, "Multicast time maximization in energy constrained wireless networks," in Proc. Workshop Found. Mobile Computing, 2003, pp. 50–58.
[7] W. Liang, "Approximate minimum-energy multicasting in wireless ad hoc networks," IEEE Trans., Mobile Comput., vol. 5, no. 4, pp. 377–387, Apr. 2006.
[8] J. A. Sanchez and P. M. Ruiz, "Improving delivery ratio and power efficiency in unicast geographic routing with a realistic physical layer for wireless sensor networks," in Proc. 9th EUROMICRO Conf. Digital Syst. Design, Archit., Methods Tools, 2006, pp. 591–597.
[9] J. E. Wieselthier, G. D. Nguyen, and A. Ephremides, "On the construction of energy-efficient broadcast and multicast trees in wireless networks," in Proc. IEEE 9th Annu. Joint Conf. IEEE Comput. Commun. Soc., Mar. 2000, pp. 585–594.
[10] B. Wang, and S. K. S. Gupta, "S-REMiT, an algorithm for enhancing energy efficiency of multicast trees in wireless ad hoc networks," in Proc. IEEE GLOBECOM, May 2003, pp. 3519–3524.

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