Multicast Multi-Path Power Efficient Routing In Mobile Adhoc Networks

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Abstract -The proposed work is aimed to provide efficient power aware routing considering real and non real time data transfer. Ad hoc networks are peer to peer, autonomous networks comprised of wireless mobile devices. The ease and speed of deployment of these networks makes them ideal for battlefield communications, disaster recovery and other such applications where fixed infrastructure is not readily available. Limited bandwidth, energy constraints and unpredictable network topologies pose difficult problems for the design of applications for these networks. We present a novel multicast routing protocol called the source grouped flooding protocol. The protocol creates multicast routes between the source and group members based on hop count distance constraints. We also propose a probabilistic data forwarding mechanism to achieve efficient data dissemination.. The main application of mobile ad hoc network is in emergency rescue operations and battlefields. This paper addresses the problem of power awareness routing to increase lifetime of overall network. Since nodes in mobile ad hoc network can move randomly, the topology may change arbitrarily and frequently at unpredictable times. The proposed work is aimed to provide efficient power aware routing considering real and non real time data transfer

Keywords : Multicast , MANET ,ADHOC Network, Multicast Communication

I. INTRODUCTION

Multicast traffic over the Internet is growing steadily with increasing number of demanding applications including Internet broadcasting, video conferences, data stream applications and web-content distributions. MANETs [3] are peer to peer networks in which all the nodes in the network have the same capability and communicate with each other without the intervention or need of a centralized access point or base-station. The mobile nodes or devices are equipped with wireless transmitters and receivers. These antennas can be omni-directional resulting in a broadcast medium or highly directional resulting in a point-to-point network.. Moreover, a packet loss is actually much more costly when network coding is employed since it potentially affects the decoding of a large number of other packets. A MANET can thus be considered as a dynamic multi-hop graph. MANETs are attractive as they provide instant network setup without any fixed infrastructure. The ease and speed of deployment of these networks makes them ideal for battlefield communications, disaster recovery, conferencing, electronic classrooms etc. The proposal in this paper presented a distributed optimal routing algorithm to balance the load along multiple paths for multiple multicast sessions.

Multipath Multicasting

The proposed scheme is multicast video in multiple paths over wireless networks. It consists of two parts. The first part is to split the video into multiple parts and transmit each part in a different path. In the latter part, employ multicast method to transmit the video packets to all the nodes. In the MANET, the nodes are prone to undergo change in their positions. Hence the source should be continuously tracking their positions.

Multicast Communication

Multicast communication is a means of achieving one-to-many and many-tomany communication. A source or a set of sources send data to a group of interested receivers. Broadcast is a special case of multicast where all the nodes in the
network are interested receivers or group members. Multicasting is an interesting and important communication paradigm as it models several application areas viz.

In an ad hoc environment, hosts generally co-operate as a group to achieve a given task, thus the MANET model is a suitable environment for the multicast paradigm. Also the multicast model improves network utilization through mass data distribution, which is ideal for bandwidth constrained networks like MANETs.

In wired/static networks, multicast routing protocols, DVMRP, MOSPF are all tree based i.e.; a tree is setup connecting all the members of the multicast group. The difference between these protocols being the approach to creating and maintaining the tree. Multicast routing protocols for ad hoc networks are either tree based or mesh based. Tree based protocols either establish a shortest path tree per source or a shared multicast tree per group connecting the group members. The tree structure is updated reactively as the network topology changes.

Distance Vector Multicast Routing Protocol (DVMRP)

DVMRP is a scheme designed for wired networks though it is also applicable to wireless environments like MANETs. DVMRP uses source flooding of data
packets to discover group members. Nodes that are not members will prune themselves from their neighbors. Thus DVMRP creates a shortest path tree between the source and the multicast group members based on the reverse shortest path forwarding mechanism (RPF).

II. METHODOLOGY

Since a MANET may consist of nodes which are not able to be re-charged in an expected time period, energy conservation is crucial to maintaining the life-time of such a node. Each source includes a broadcast sequence number in every packet. The broadcast sequence number is a combination of the source address and a counter value and uniquely identifies each packet generated by the source. When any node receives a packet which has a sequence number greater than the stored value, the packet is processed and the cache is updated. If not the packet is a duplicate and is dropped. We focus on networks where power is a finite resource. Only a finite number of messages can be transmitted between any two hosts. We wish to solve the problem of routing messages so as to maximize the battery lives of the hosts in the system.

Once the flooding group is created, a source has fresh, active routes to all multicast group members. When a source transmits a data packet, only the nodes in the flooding group for that source will forward the data packet. All duplicate data packets identified using the unique source broadcast id are dropped. The size could be large if the source and
the group members are well dispersed, which is likely in dynamic mobile networks. In this section we present a more strict distance constraint that ensures that only nodes that form the shortest paths between the source and a member will become flooding nodes.

The protocol establishes a source based mesh of nodes called the flooding group to distribute data for that source. The protocol aims to improve connectivity and data delivery amidst topology changes and node movement. It avoids the drawbacks of tree based protocols in ad hoc networks viz fragility against topology changes, non-optimal paths in the case of shared trees, tree partitions, frequent tree reconstruction etc. Also the protocol avoids excessive redundant data transmission due to multiple paths by using probabilistic data forwarding.

III. CONCLUSION

A multicast routing protocol for a MANET, should be robust against topology changes and achieve efficient data distribution. In this thesis we presented the source grouped flooding approach to multicast routing in MANETs. The scheme creates flooding groups per source based on distance constraints. The
flooding group is a per source, multiple path, mesh structure that is effective and robust against mobility.

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