Effective Video Broadcasting using Wireless Network through EOLSR

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Abstract*— As the technology of mobile ad hoc networks (MANETs) develops, several new kinds of applications in this field emerge. The group-oriented services that take advantage of the broadcasting nature of wireless networks are of much importance. Therefore, broadcasting/multicasting protocols in MANETs are receiving increased attention. If a node wants to do video broadcast it can select the video and transmit in the transmission our (data) video is divided (splitting) small packets these packets are less weight, due to that packets are easily move in the wireless network with less time when compare to previous one. After reaching all packets to the destination we are going to merge the packets according to the sequence number which is already allocated while doing the splitting with help of Selective repeat algorithm we can achieve it. Furthermore we use low complexity algorithm's (approximation algorithm) for selecting the most energy efficient distribution for the entire set of directed acyclic graph (DAG). The flow selection and resource allocation optimization problem. The flow selection and resource process is adapted in each video layer. Energy efficiency is a critical issue in MANETs and sensor networks where power of nodes is limited and difficult to recharge. This issue is essential in the design of new routing protocols since each node acts not only as a host but also as a router. We propose a new energy-efficient broadcast protocol, called EBOLSR, which adapts the EOLSR protocol to the broadcasting domain. The EBOLSR protocol has less energy consumption and longer network lifetime than existing system.

***Index Terms*— Wireless Network, MANET, Video Streams, OLSR.**

I. INTRODUCTION

A mobile ad hoc network (MANET) is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. Due to the inadequate broadcast range of wireless network interfaces, to communicate with nodes outside its transmission range, a node needs multiple hops to forward packets to the destination across the network. Since there is no stationary infrastructure such as base stations, each node operates not only as a host but also as a router. Hence, a routing protocol for MANETs runs on every node and is affected by the resources at each mobile node. Considering typical characteristics of a MANET, such as a lack of infra- structure, dynamic topologies, constrained band- width, constrained energy and so on, a good routing protocol should minimize the limited resources and meanwhile maximize the network efficiency.

In recent years, a variety of routing protocols have been proposed for MANETs. Such protocols can be classified as proactive or reactive, depending on whether they keep routes continuously updated, or whether they react on demand. They can also be classified as unicast routing, broadcast routing and multicast routing, according to the type of applications. Unicast routing supports communications between one source and one destination. Dynamic Source Routing (DSR) [1], Ad Hoc On-demand Distance Vector (AODV) [2], Destination Sequenced Distance Vector (DSDV) [3], Optimized Link State Routing (OLSR) [4] protocol and so on are the typical unicast routing protocols proposed for MANETs. Multicasting is the transmission of data packets to more than one node sharing one multicasting address. The receivers form the multicast group. Actually, there could be more than one sender sending to a multicast group. Typical multicast protocols include On-Demand Multicast Routing Protocol (ODMRP) [5], Multicast Ad-Hoc on- Demand Distance Vector (MAODV) [6] and Ad hoc Multicast Routing (AMRoute) [7] and so on. Broadcasting is a special case of multicasting, which supports sending messages to all nodes in the network.

II. RELATED WORK

The multicast/broadcast services are critical in applications characterized by the close collaboration of teams with requirements for audio and video conferencing and sharing of text and images. Additionally, most routing protocols in MANETs rely on the broadcast function to exchange essential routing packets between mobile nodes and need the multicast function to make more efficient use of network bandwidth for some particular multimedia applications. Hence, broadcast and multicast are important operations for mobile nodes to construct a routing path in MANETs.

A Multicast Protocols

Multicasting is the transmission of data packets to more than one node sharing one multicasting address. It is intended for group-oriented computing. Several multicast routing protocols have been proposed for MANETs, which can be classified as unicast-based, tree-based, mesh-based, or hybrid protocols, according to how distribution paths among group members are constructed.

B Protocols Classification

• Unicast-based multicast protocols Some primitive broadcast/multicast protocols are just unicast-based. That is, for a source to send to N destinations, the protocol basically set up N unicast connections to achieve the function of multicast. Since few recent research focuses on this type of multicast protocols, we will not describe more about it, and will focus on the following two kinds of multicast protocols.

• Tree-based multicast protocols Tree- based multicast routing protocols can be further divided into source-tree-based and shared-tree based schemes, according to the number of trees per multicast group. In a source-tree-based multicast protocol, a multicast tree is established and

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maintained for each source node of a multicast group, and shared-tree-based multicast protocols use a single shared tree for all multicast source nodes. In the source-tree-based multicast protocol, each multicast packet is forwarded along the most efficient path, i.e. the shortest path, from the source node to each multicast group member, but this method incurs a lot of control overhead to maintain many trees. For the shared-tree-based multicast protocol, it has lower control overhead since it maintain only a single tree for a multicast group and thus is more scalable. Adaptive Demand-driven Multicast Routing (ADMR) [12] is source-tree-based and Multicast Ad Hoc On-Demand Distance Vector (MAODV) [6] is a shared-tree-based multicast protocol developed for MANETs.

C Simplified Multicast Forwarding (SMF)

In MANETs, unicast routing protocols can provide effective and efficient mechanisms to flood routing control messages in the wireless routing area. One such solution is the Simplified Multicast Forwarding (SMF) specification designed within the Internet Engineering Task Force (IETF) [8].

D Broadcast Methods

Broadcasting is the process in which a source node sends a message to all other nodes in the network, and it is a special case of multicasting. Since even unicast and multicast routing protocols often have a broadcast component, broadcasting is important in MANETs. For instance, protocols such as DSR [1], AODV [2], Zone Routing Protocol (ZRP) [5] and Location Aided Routing (LAR) [6] use broadcasting to establish routes. Broadcasting methods have been categorized into four families utilizing the IEEE 802.11 MAC specifications [7].

E Selective Repeat Sequence

Selective Repeat is one of the automatic repeat-request (ARQ) techniques. With selective repeat, the sender sends a number of frames particular by a window size even without the need to wait for individual ACK from the receiver as in stop- and-wait. However, the receiver sends ACK for each frame independently, which is not like increasing ACK as used with go-back-n. The receiver accepts out-of-order frames and buffers them. The sender independently retransmits frames that have timed out. It may be used as a protocol for the delivery and acknowledgement of message units, or it may be used as a procedure for the delivery of subdivided message subunits. When used as the procedure for the release of messages, the sending process continues to send a quantity of frames specified by a window size even after a frame loss. Unlike Go-Back-N ARQ, the receiving process will continue accept and acknowledge frames sent after an preliminary error; this is the general case of the sliding window protocol with both broadcast and receive window sizes greater than 1.

The receiver method keeps track of the sequence number of the initial frame it has not received, and ends that quantity with every acknowledgement (ACK) it sends. If a frame from the sender does not arrive at the receiver, the sender continues to send ensuing packet until it has empty its window. The receiver continues to fill its receiving window with the consequent frames, replying each time with an ACK containing the sequence number of the earliest missing frame. Once the sender has sent all the frames in its window, it re-sends the frame numeral given by the ACKs, and then continues where it left off. The size of the sending and receiving windows must be identical, and half the maximum series number (assuming that sequence numbers are numbered from 0 to (n−1) to avoid miscommunication in all cases of packets being dropped. To identify this, consider the case when all ACKs are destroyed. If the receiving window is bigger than half the maximum series number, some, possibly even all, of the packages that are resent after timeouts are duplicates that are not predictable as such. The sender moves its window for every packet that is acknowledged.

III PROPOSED SYSTEM

In this paper, we use energy-efficient routing information for the following reasons:

A Energy Efficient Broadcast OLSR (EBOLSR)

Since EBOLSR extends the OLSR protocol, which uses the multipoint relaying method, the broadcast algorithm in our protocol belongs to the neighbor knowledge method. From the energy perception, we adapt the multipoint relay selection algorithm in EOLSR, which aims to maximize the network lifetime,. The network lifetime can be define in several ways, such as the time to the first node failure due to battery outage, the time to the unavailability of application functionality, or the time to the first network partitioning. However, most researchers consider the network lifetime as the time to the first node failure.

1) EBOLSR

• In the energy model of our network, transmission power of each node is fixed.

• In our network, all information needs to be delivered, such as push-to-talk voice streams, and nodes are on all the time.

• Broadcasting requires more nodes in the network to participate in the transmission, so reducing the number of rebroadcasting nodes can optimize network flooding, reduce the energy consumed and increase the network lifetime.

• Multi-hop transmissions are energy consuming and reducing the energy spent in the transmission of a packet from its source to all nodes increases network lifetime. Most of the work in the fixed power approach aims at reducing the overall number of retransmissions during a broadcast. Conversely, most existing work in this field only considers how to save energy with the minimum relaying set, but does not consider nodes' residual energy. As far as we know, few explore on energy-efficient broadcast focused on fixed transmission power of each node, we therefore propose and implement a new energy-efficient broadcast routing protocol

• Each state operates at different power levels and that level is fixed for all nodes in the network. When a transmitter transmits one packet to next hop, because of the shared nature of wireless medium, all its neighbors receive this packet even if it is intended to only one of them. In The OLSR, routing protocol has been standardized by the IETF [4]. However, this protocol does not consider energy. [10]

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Proposed a new energy-efficient unicast routing protocol, EOLSR, which extends OLSR in order to make it energy efficient. EOLSR is designed to maximize the network lifetime by selecting the path with the minimum cost.

2) Energy Consumption Model

Each node's radio can be in one of the following three states:

Transmitting : node is transmitting message with transmission power Pt,

Receiving: node is receiving message with reception power Pr,

Idle: when no message is being transmitted,the nodes stay idle and keep listening the medium with Pidle,

Since transmission is more expensive than receiving, and nodes in idle state consume the least energy, we therefore have the following power condition: Pidle< Pr< Pt.

Based on the multipoint relaying strategy in EOLSR, we propose a new energy-efficient broadcast protocol, EBOLSR, which aims at increasing the network lifetime for broadcast communication.

IV CLUSTER ALGORITHM

We use a k-means clustering algorithm to group the mobile stations according to the physical MS locations: After grouping the mobile stations, choose the clusterheads as the closest Mobile station (MS) in each cluster to the BS, perform an optimal flow selection on each group separately using the clusterhead as the source, use the BS to multicast to all clusterheads and use the optimal flow within each cluster/group.

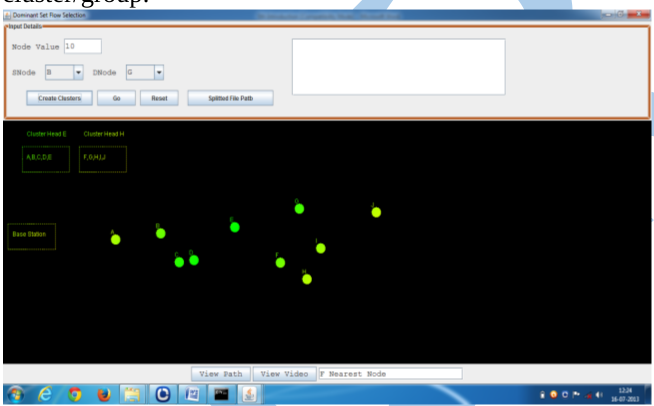

fig1 :clustering all MS nodes

V SHORTEST PATH ROUTING

Kruskal's is most efficient shortest path routing algorithm for transmission of multimedia file in wireless networks. This approach has better performance when edges are high in a network. And also It consider only the edges in directed acylic graph for transmission of file .

The algorithm maintains a forest of trees an edge is accepted it if connects vertices of distinct Trees.

We need a data structure that maintains a partition, i.e., a group of disjoint sets with the following operations

- find(u): return the set storing u

- union(u,v): replace the sets storing u and v with their union

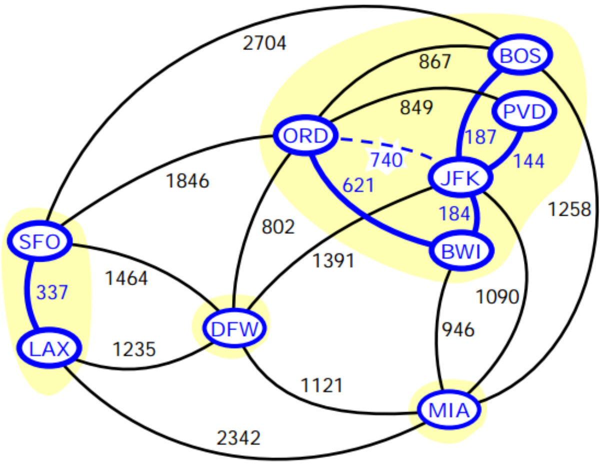

Fig 2a : graph

a) Representation of a Partition

• Each set is stored in a sequence

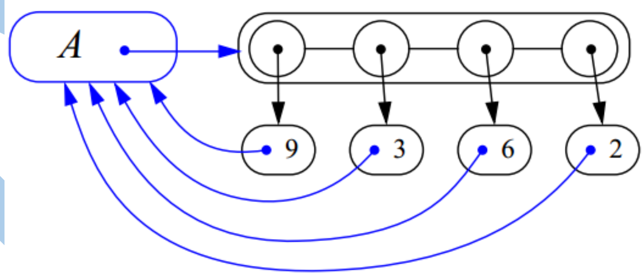

Fig 2b: Representation of partition

• Each element has a reference back to the set operation find(u) takes O(1) time in operation union(u ,v), we shift the elements of the smaller set to the sequence of the larger set and update their references

• The time for operation union (u,v) is min(nu , nv),where nu and nv are the sizes of the sets storing u and v . Whenever elements are processed, it goes into a set of size at least double therefore each element is processed at most log n times.

b) Pseudo Algorithm Kruskal(G):

Input: A weighted graph G.

Output: A minimum spanning tree T for G. let P be a partition of the vertices of G, where each vertex forms a different set

let Q be a priority queue storing the edges of G and their weights

T ← Ø

While Q ≠ Ø do

(u,v) ← Q.removeMinElement ()

if P.find(u) ≠ P.find(u) then

add edge (u,v) to T P.union (u,v)

return T

Running time: O ((n+m) log n)

VI ANALYSIS

Compare Prim and Kruskal

- Both have the same output → MST
- Kruskal's starts with forest and merge into a tree
- Prim's always stays as a tree
- If you don't know all the weight on edges → use Prim's algorithm
- If you only need incomplete solution on the graph → use Prim's algorithm

Complexity

Kruskal: O (NlogN) Comparison sort for edges Prim: O (NlogN) Search the least weight edge for every vertices

Analysis of Kruskal's Algorithm

Running Time = O(m log n) (m = edges, n= nodes)

Testing if an edge creates a cycle can be slow unless a complicated data structure called a "union-find" structure is used. It usually only has to check a small fraction of the edges, but in some cases (like if there was a vertex connected to the graph by only one edge and it was the longest edge) it would have to check all the edges. This algorithm works most excellent, of course, if the number of edges is kept to a minimum.

VII CONCLUSION

The goal of this project is to explore energy-efficient protocols in broadcasting scenarios and compare a suitable protocol with three other broadcast protocols in Wireless network. We adopted the multipoint relay selection strategy based on residual energy in the EOLSR protocol and use it in the broadcasting scenarios. This EMPR selection strategy takes into account the energy dissipated in transmission and reception up to 1-hop from the transmitter and was verified to prolong the network lifetime and increase the packet delivery rate when combined with the proposed unicast routing strategy. The select repeat sequence approach helps in faster distributing and merging the media file packets at both source and destination ends. The future work in the design of energy-efficient broadcast routing protocols in wireless should try to reduce the transmission redundancy and overall network overhead, and thus achieve the minimum energy consumption and the maximum network lifetime.

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