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A Study of Topology control in MANET

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***Abstract*— As we all know now days Mobile Adhoc Network is very popular topic for researcher to research different technique. A MANET is a dynamic multi-hop wireless network that is established by a group of mobile nodes on a shared wireless channel. With the development of mobile ad hoc networks (MANETs), there is a growing requirement of Topology Control which satisfies quality of service (QoS) like bandwidth, packet loss rate, delay, packet jitter, hop count, path reliability and power consumption . Topology control scheme can substantially improve the network capacity in MANETs .Reducing Topology Control (TC) traffic is one of the most important issues that need to be considered for routing protocols.**

***Keywords*-delay,interference, mobile ad hoc networks (MANETs), topology control algorithm**

I. INTRODUCTION

A **mobile ad hoc network** (**MANET**) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires. 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 required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. They may contain one or multiple and different transceivers between nodes. This results in a highly dynamic, autonomous topology. MANETs are a kind of Wireless ad hoc network that usually has a routable networking environment on top of a Link Layer ad hoc network. MANETs consist of a peer-to-peer, self-forming, self-healing network.

With the increasing attention and development in mobile ad hoc networks (MANETs), there is a growing demand for applications that require quality of service (QoS) provision, such as voiceoverIP(VoIP),multimedia, real-time collaborative work. Different applications often have different QoS requirements in terms of bandwidth, packet loss rate, delay, packet jitter, hop count, path reliability and power consumption. Topology control is to dynamically change the nodes transmission range in order to maintain connectivity of the communication graph, while reducing energy consumption and/or interference that are strictly related to the nodes transmitting range. A good topology not only can provide a better service for routing layer, but also can save energy, increase network capacity and satisfy the QoS requirements. In general, topology control is such a scheme to determine where to deploy the links and how the links work in wireless networks to form a good network topology, which will optimize the energy consumption, the capacity of the network, or end-to-end routing performance.

The goal of topology control is then to set up interference-free connections to minimizes the maximum transmission power and the number of required channels. It is also desirable to construct a reliable network topology since it will result in some benefits for the network performance.

Reducing Topology Control (TC) traffic is one of the most important issues that need to be considered for routing protocols. Optimized Link State Routing (OLSR) is one of the most popular routing protocols for Mobile Ad hoc Networks (MANETs), in OLSR each node disseminates TC messages throughout the MANET. To further reduce energy consumption, a popular communication scheme, cooperative communication (CC), has been recently applied in topology control. Cooperative communication exploits the broadcast nature of the wireless medium and allows additional nodes to help with message delivery. Improved network performances in energy saving, routing, and coverage extension have been reported in studies on cooperative communication.

Many academic papers evaluate protocols and their abilities, assuming varying degrees of mobility within a bounded space, usually with all nodes within a few hops of each other. Different protocols are then evaluated based on measures such as the packet drop rate, the overhead introduced by the routing protocol, end-to-end packet delays, network throughput, ability to scale, etc.

II.MOBILE AD HOC NETWORKS WITH COOPERATIVE COMMUNICATIONS

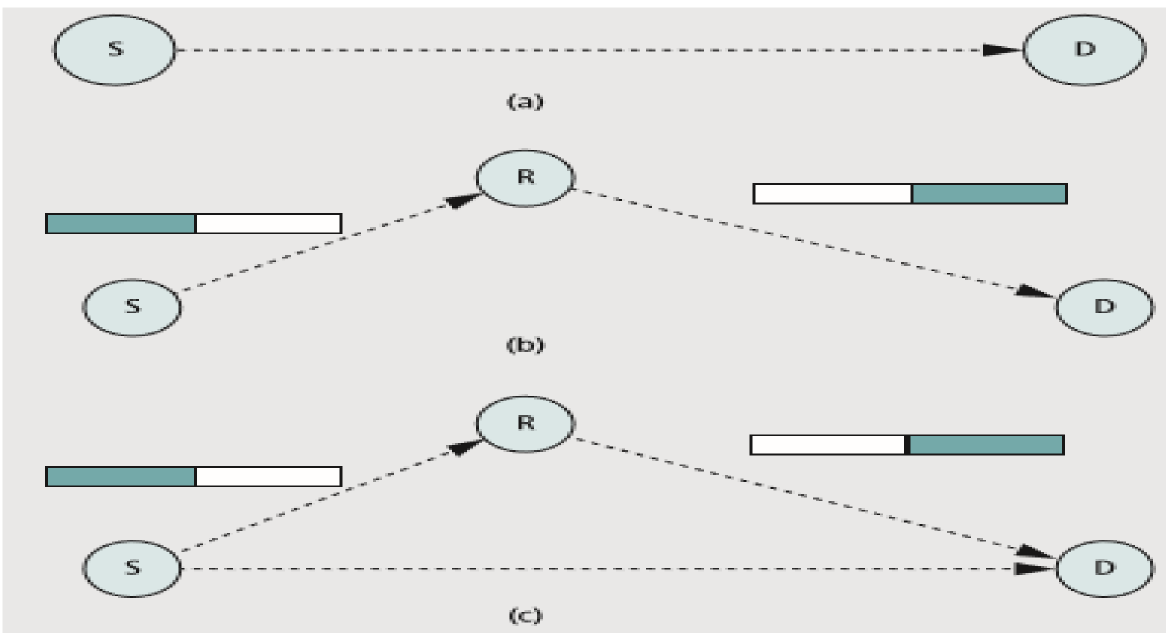
In this section, we first introduce cooperative communications. Then the topology control problem in MANETs with cooperative communications is presented.

2.1 COOPERATIVE COMMUNICATIONS

Cooperative communication typically refers to a system where users share and coordinate their resources to enhance the information transmission quality. It is a generalization of the relay communication, in which multiple sources also serve as relays for each other.

In a simple cooperative wireless network model with two hops, there are sources, a destination, and several relay nodes. The basic idea of cooperative relaying is that some nodes, which overheard the information transmitted from the source node, relay it to the destination node instead of treating it as interference. Since the destination node receives multiple independently faded copies of the transmitted information from the source node and relay nodes, cooperative diversity is achieved.

With physical layer cooperative communications, there are three transmission manners in MANETs: direct transmissions (Fig. 1a), multihop transmissions (Fig. 1b) and cooperative transmissions (Fig. 1c). Direct transmissions and multi-hop transmissions can be regarded as special types of cooperative transmissions. A direct transmission utilizes no relays while a multi-hop transmission does not combine signals at the destination.



2.2 TOPOLOGY CONTROL WITH COOPERATIVE COMMUNICATION IN MANET

Two constraint conditions need to be taken into consideration in the proposed COCO topology control scheme. One is network connectivity, which is the basic requirement in topology control. The end-to-end network connectivity is guaranteed via a hop-by-hop manner in the objective function. Every node is in charge of the connections to all its neighbors. If all the neighbor connections are guaranteed, the end to-end connectivity in the whole network can be preserved. The other aspect that determines network capacity is the path length. An end-toend transmission that traverses more hops will import more data packets into the network. Although path length is mainly determined by routing, COCO limits dividing a long link into too many hops locally. The limitation is two hops due to the fact that only two-hop relaying is adopted.

III. MULTIPOINT RELAYS (MPR) SELECTION ALGORITHM

MPR algorithm reduce the number of forwarding TC messages by selecting MPR nodes which may forward less TC messages, the decision to select such MPR nodes is extended to three hops rather than two hops as in original MPR selection algorithm.

The key idea of our scheme is to give more opportunities to nodes for selecting a best MPR set even in the case of particular condition (same reachability and degree). So, if the selected MPR nodes have higher number (Absorbed Degree) of neighbor's nodes that absorbs TC messages then the number of TC messages forwarded may be less. Thus, a node which absorbs the TC messages from its neighbor (candidate to be MPR) is a node that does not broadcast the TC messages received from this neighbor. This node can be:
1. Isolated (from the two hop neighbors of the node candidate to be MPR): not have links to the two hop neighbors of node candidate to be MPR, however it may have a link to the node source performing the MPR selection computation.
2. Not MPR: not previously elected by the node candidate to be MPR.
Parameters are considered in MPR algorithm as Follows.

- Number of TC messages: is the total number of topology control messages flooding in the whole network
- Number of TC packets: is the total number of topology control packets flooding in the whole network.
- Routing cost: is the ratio between the number of routing packets sent and the number of data packets received by destinations;
- Packet delivery ratio: is the ratio between the number of received data packets by the destination and those sent by the CBR sources.
- End to end delay: is time elapsing from the sending of a packet by the source until it is received by the destination.
- Collision: is the number of packets collided in the network.

IV. TOPOLOGY CONTROL FOR K-CONNECTIVITY

In most research on fault-tolerant networks, k-connectivity is used as the metric of fault-tolerance. Between any two nodes in a k-connected network, there exist at least k distinct paths which share no mutual nodes. Therefore, the failure of any k-1 nodes will not disconnect the network, i.e., the network can tolerate up to k-1 node failures.

A distributed topology control scheme, k-Fault Tolerant topology control using Cooperative Communication (kFTCC), is proposed to address the formulated topology control problem. k-FTCC aims to achieve 3 goals: 1) it uses a CC scheme to reduceenergy consumption; 2) it maintains the k+1connectivity of the network; 3) it can construct a t-spanner of the original graph G .

V. LITERATURE SURVAY

Paper	Load Analysis	Simulation	Network Capacity	Focused Qos
[1]	More	Yes	High	Delay,Interference
[2]	More	No	High	Traffic control,Channel control
[3]	Not available	Yes	Moderate	High speed Packet delivery
[4]	Less	Yes	Moderate	Fault Tolerance,energy efficiency
[5]	Not Available	No	Less	Less routing overhead and storage overhead

VI. CONCLUSION

The goal of topology control is then to set up interference-free connections to minimizes the maximum transmission power and the number of required channels. It is also desirable to construct a reliable network topology since it will result in some benefits for the network performance. This paper consider topology control in delay constrained environment, which is contradictory to the objective of minimizing interference.The paper focus on the delay-constrained topology control problem, and take into account delay and interference jointly.. There is a growing requirement of Topology Control which satisfies quality of service (QoS) like bandwidth, packet loss rate, delay, packet jitter, hop count, path reliability and power consumption.Topology control scheme can substantially improve the network capacity in MANETs.In most research on fault-tolerant networks, k-connectivity is used as the metric of fault-tolerance. Overheads due to topology changes and the implicit restriction to point-to-point control messages meant that extensive effort had to be expended in "fixing" them to fit the intricacies and opportunities offered by wireless environments.

VII. FUTURE ENHANCEMENT

There should be the protocol which avoids waste by bandwidth caused by traffic control messages (used for routing table information updating).
To derive the network capacity in a MANET with cooperative communications, we need to obtain the link capacity and inference model ,so it will be time consuming so there should be the model which is not time consuming.
The decision to select such MPR nodes is limited to three hops here visiblity more than three node can be achieved to reduce the TC messages and packets.
Investigation of the possibility of using other CC schemes in fault-tolerant topology control can be done.

REFERENCES

[1] T.Kirankumar and B. Bhavani, "A Sustainable Automated System for Elderly People Using Voice Recognition and Touch Screen Technology," International Journal of Science and Research (IJSR), vol. 2, pp. 265-267, August 2013.

[2] Arthi.J.E and M.Jagadeeswari, "Control of Electrical Appliances through Voice Commands," IOSR Journal of Electrical and Electronics Engineering, vol. 9, pp. 13-18, February 2014.

[3] Parameshachari B D, Sawan Kumar Gopy, Gooneshwaree Hurry and Tulsirai T. Gopaul., "A Study on Smart Home Control System through Speech," International Journal of Computer Applications, vol. 69,pp. 30-39, May 2013.

[4] NorhafizahbtAripin and M. B. Othman, "Voice Control of Home Appliances using Android," in International Conference on Electric Power, Electronic, Communication, Control, And Informatic Systems, Malang ,pp. 142-146, August 2014.

[5] Jia-Ren Chang Chien, Cheng-Chi Tai, "The Information Home Appliance Control System—A Bluetooth Universal Type Remote Controller," in Proceedings of the 2004 IEEE. International Networking, Sensing & Control. Taipei, Taiwan, vol. 1, pp. 399-400, March 21-23. 2004

[6] https://en.wikipedia.org/wiki/Resistive_touchscreen

[7] http://www.electroschematics.com/7642/pic16f877a-datasheet/

[8] https://in.mathworks.com/matlabcentral/fileexchange/36398-speech-recognition-using-mfcc-and-lpc?requestedDomain=www.mathworks.com

