An Effective Approach Towards Topology Control in Wireless Ad-Hoc Sensor Networks

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Abstract
In recent times, for improving the performance of information transmission operating over the ever-challenging wireless medium, cooperative wireless communication has received tremendous interests as an untapped means. For multiple antenna systems, cooperative communication has emerged as a new dimension of diversity to emulate the strategies designed, due to dimension, expenditure, or hardware margins a wireless mobile device may not be able to support multiple transmit antennas. Most previous works on cooperative communications are paying attention on link-level physical layer issues. Consequently, on network-level upper layer issues have the impacts of cooperative communications, such as topology organize, routing and network ability, are mainly unnoticed. In this paper, to improve the network capacity in mobile ad hoc networks (MANETs) by jointly considering both upper layer network capacity and physical layer cooperative communications a Capacity-Optimized Cooperative (COCO) topology control scheme is proposed. In order to diminish the cost of dispersed algorithms topology control is a method used in distributed computing to modify the underlying network. It is a fundamental method in dispersed algorithm. The main aim of topology control in this domain is to accumulate energy, diminish interference between nodes and widen lifetime of the network. Through simulations, we have proposed topology control scheme which can substantially improve the network capacity in MANETs with cooperative communications and we show that physical layer cooperative communications have significant impacts on the network capacity.

Keywords
Topology Control, COCO, Wireless Sensor Networks, Link-Level Layers

I. Introduction

Cooperative communication has emerged as a new dimension of diversity to emulate the strategies designed for multiple antenna systems, since a wireless mobile device may not be able to support multiple transmit antennas [1-2]. Cooperative communication allows single - antenna radios to share their antennas to form a virtual antenna array by exploiting the broadcast nature of the wireless channel, and offers significant performance enhancements [3-5]. However, recent advances in cooperative communications will offer amount of compensation in flexibility over conventional techniques [6-7].

II. Cooperative Communications

For simpler networks of more complex links cooperation alleviates certain networking problems, such as collision resolution and routing allows, rather than complicated networks of simple links [8-9]. Without a fixed infrastructure therefore, many upper layer aspects of cooperative communications merit further research, especially in mobile ad hoc networks, which can establish a dynamic network which is shown in fig. 1.

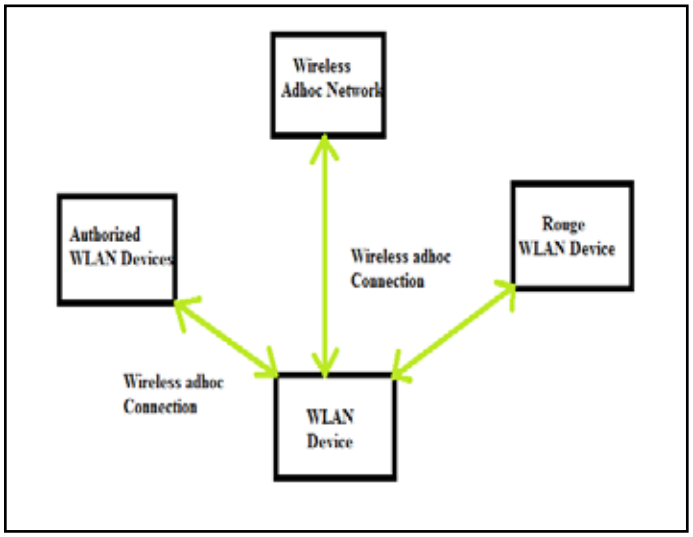

Fig. 1: Wireless Ad-Hoc Network

For transmitting and receiving data a node in mobile ad hoc networks (MANETs) can function both as a network router for routing packets from the other nodes and as a network host [10]. Mobile infrastructure is not available ad hoc networks are particularly useful when a reliable fixed. Due to the lack of centralized control, to achieve a common goal ad hoc network nodes cooperate with each other. The major activities involved in self-organization are neighbor discovery, topology organization, and topology reorganization. The nodes in the network and the connections between them network topology describes the connectivity information of the entire network. For the overall performance of a mobile ad hoc network topology control is very important. Using topology control, to establish logical data links and dynamically adjust it's transmit power accordingly a node carefully selects a set of its neighbors, so as to achieve high throughput in the network while keeping the energy consumption low. In this article, we study the topology control issues in mobile ad hoc networks with cooperative communications considering both upper layer network capacity and physical layer cooperative communications. To improve the network capacity in mobile ad hoc network by jointly optimizing transmission mode selection we propose a Capacity-Optimized Cooperative topology control scheme, relay node selection, and interference control in ad hoc networks with cooperative communications.

III. Organizing Topology for Enhancement of Network Ability With Cooperative Communications

Through simulations, the proposed topology control scheme can substantially improve the network capacity in mobile ad hoc network with cooperative communications we show that physical layer cooperative communications have significant impacts on the network capacity. The topology control problem in ad hoc network is introduced in cooperative communications. The proposed COCO topology control scheme and network capacity are presented. We give the simulation results and discussions.

Finally, we conclude this study. To enhance the information transmission quality cooperative communication typically refers to a system where users share and coordinate their resources. It is a generalization of the relay communication for each other in which multiple sources also serve as relays. To enhance communication between the source and destination early study of relaying problems appears in the information theory community. It is difficult for some wireless mobile devices to support multiple antennas due to the size and cost constraints although multiple-input multiple-output systems have been widely acknowledged. To exploit the spatial diversity and reap the benefits of MIMO systems recent studies show that cooperative communications allow single antenna devices to work together such as resistance to desertion, high throughput, low transmitted power, and flexible networks. From the source node the basic idea of cooperative relaying is that some nodes, which overheard the information transmitted, relay it to the destination node instead of treating it as interference. From the source node and relay nodes, cooperative diversity is achieved since the destination node receives multiple independently faded copies of the transmitted information. Their antennas can employ a space-time code in transmitting the relay signals as if multiple nodes are available for cooperation. Hence it can reduce the interference and increase the connectivity of wireless networks as it is shown that cooperation at the physical layer can achieve full levels of diversity similar to a Multiple-Input Multiple-Output (MIMO) system. On physical layer issues mainly previous works about cooperative communications are focuses such as decrease outage possibility and rising outage ability, which are only link extensive metrics. However, for the overall network performance from the network's point of view, it may not be sufficient such as the whole network capacity.

IV. Results

The presentation of the proposed system is demonstrated by the use of computer simulations by the consideration of MANET which changes the quantity of nodes in the simulation. The performance of the proposed system is measured with that of an existing well-known topology control system believes multi-hop communication devoid of cooperative communications and preserves the minimum quantity of interference pathway for every neighbor connection nearby. The actual topology consists of links which are existing between ends of the nodes when they are accessible within the range through which they are communicated. The dark colored lines indicates the conventional undeviating communication and multi-hop trans- missions, where as the dash lines indicate links concerned to the cooperative communications in the topology control system of COCO. Several links in the net-work are concerned to cooperative communications for making the most of the network capacity of the MANET. COCO system has the maximum network capacity in spite of of the quantity of nodes in the net- work. LLISE conserves all the edges on the smallest amount of the interference path for every link in the resultant topology as a result reduce the interference to get better network capacity.

V. Conclusion

Physical layer cooperative communications, topology control, and network capacity in mobile ad hoc network is introduced in this paper. With cooperative communications, to improve the network capacity of MANETs, a Capacity Optimized Cooperative (COCO) topology control scheme that considers both upper layer network capacity and physical layer relay selection in cooperative communications is introduced in this paper. With cooperative communications, the physical layer cooperative communications techniques have considerable impacts on the network capacity have shown the results and the proposed topology control scheme can significantly develop the network ability in MANETs. Future work is in progress to consider dynamic traffic patterns in the proposed scheme to further improve the performance of MANETs with cooperative communications.

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