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# Effective Transmission in Cooperative Networks with Minimum Energy

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**Abstract:** In cooperative networks, transmitting and receiving nodes recruit neighboring nodes to assist in communication. A cooperative communication protocol is proposed for the establishment of clusters and for cooperative transmission of data. The sender nodes can use larger transmission power for the same probability of bit error, thus increasing the energy consumption. This allows the sensor to use more energy. The transmission that maximizes the energy consumption and decreases the transmission reliability and therefore the reduction in error rate and the energy savings translate into increased lifetime of cooperative sensor networks.

Key words: Clustering • Cooperative Networks Energy • Efficient Protocols • Cooperative Transmissions • Sensor Networks

## INTRODUCTION

I N Wireless sensor networks, nodes have limited energy resources and, consequently, protocols designed for sensor networks should be energy. Efficient [1-8]. One recent technology that allows energy saving is cooperative transmission. In cooperative transmission, multiple nodes simultaneously receive, decode and retransmit data packets.

**Related Works:** *Cooperative* communication is an active area of research today. It enables nodes to achieve spatial diversity, thereby achieving tremendous improvement in system capacity and delay [9-13]. Due to its immense potential, extensive investigations have been directed to closely examine its performance by means of both analysis and simulation. However, the study of this new technology in an implementation-based system is very limited. In this paper, we present two implementation approaches to demonstrate the viability of realizing cooperation at the MAC layer in a real environment [14]. The paper describes the technical challenges encountered in each of the approaches, details the corresponding solution proposed and compares the limitations and benefits of the two approaches [15].

Reliability is a big challenge to any wireless transmission as wireless networks tend to drop a large proportion of frames due to channel errors. To improve reliability over the noisy wireless channels, forward error correction (FEC) schemes can be employed for wireless networks. Static and adaptable FEC algorithms can improve or degrade the performance of the wireless networks if their overheads are not matched properly to the underlying channel error, especially when the path loss fluctuates widely[16]. This paper provides a new approach of alleviating the problem from a pure medium access control (MAC) centric perspective. The new MAC protocol, called cooperative MAC (CMAC) enhances the existing IEEE 802.11e wireless local area network (WLAN) MAC protocol by introducing spatial diversity which is provided via user cooperation. We prove that this protocol greatly enhances the robustness of the WLAN operation. Additionally we compare the performance of CMAC protocol with the direct and multi-hop transmissions.

The problem of transmission-side diversity and routing in a static wireless network. It is assumed that each node in the network is equipped with a single omnidirectional antenna and that multiple nodes are allowed to coordinate their transmissions in order to

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obtain energy savings. We derive analytical results for achievable energy savings for both line and grid network topologies. It is shown that the energy savings of and are achievable in line and grid networks with a large number of nodes, respectively. We then develop a dynamic-programming-based algorithm for finding the optimal route in an arbitrary network, as well as suboptimal algorithms with polynomial complexity [17]. We show through simulations that these algorithms can achieve average energy savings of about in random networks, as compared to the noncooperative schemes.

Cooperative transmission can obtain spatial diversity without using multiple antennas, thus achieving more reliable transmission or consuming less power. To realize cooperative communication in a distributed wireless network, two key questions need to be answered, namely when to cooperate and whom to cooperate with. In this paper, we propose a distributed MAC protocol with automatic relay selection to address these questions. We show by theoretical analysis and simulation results that the proposed solution outperforms. Conventional noncooperation transmission by 8 to 10 dB, for various target outage probabilities

#### System Design



### **Implementation Phases**

- Network Construction
- Routing The Nodes
- Recruiting-And-Transmitting Nodes
- Best Path Estimation

**Network Construction:** In the network, numerous nodes are interconnected and exchange data or services directly with each other. All systems have Connection with other systems. System details are maintained in the server system [18]. It provides connection to the node whenever there is a request from another node. Choose the number of nodes and also initialize the port number. The network is created and clusters are formed. Clusters are framed by the distance, energy and time.



**Routing The Nodes:** The initial path between the source and the sink nodes is discovered as an underlying "one-node-thick" path. "one-node-thick" path is discovered, information about the energy required for transmission to neighboring nodes is computed. This information is then used for cluster establishment in the "recruiting-and-transmitting" phase by selecting nodes with lowest energy cost.



**Recruiting and Transmitting Nodes:** Recruiting is done dynamically and per packet as the packet traverses the path. When a packet is received by a cluster head of the receiving cluster, the cluster head initiates the recruiting by the next node on the "one-node-thick" path. Once this recruiting is completed and the receiving cluster is established, the packet is transmitted from the sending cluster to the newly established receiving cluster. Sender is forwarding the packets to receiver through the shortest path. And then Receiver receives the packets and arranges it using packet id.



Best Path Estimation: Every node on the path from the source node to the destination node becomes a *cluster* head, with the task of recruiting other nodes in its neighborhood and coordinating their transmissions. Consequently, the classical route from a source node to a sink node is replaced with a multihop cooperative path and the classical point-to-point communication is replaced with many-to-many cooperative communication. The path can then be described as "having a width," where the "width" of a path at a particular hop is determined by the number of nodes on each end of a hop. Each hop on this path represents communication from many geographically close nodes, called a *sending cluster*, to another cluster of nodes, termed a receiving cluster. The nodes in each cluster cooperate in transmission of packets, which propagate along the path from one cluster to the next.



#### CONCLUSION

In this paper, we proposed an cooperative communication protocol for the establishment of clusters and for cooperative transmission of data. Here we analyzed the robustness of the protocol to data packet loss and determined to utilize the energy efficiently. Up to 80% in energy savings can be achieved for a grid topology, while for random node placement our cooperative protocol can save up to 40% in energy consumption relative to the other protocols. The reduction in error rate and the energy savings translate into increased lifetime of cooperative sensor networks [19-24].

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