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Lifetime of MANET Networks Increased Using Cooperative DEL-CMAC Protocol by Parallel Communication

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Abstract: ***Cooperative communication, which utilizes nearby terminals to relay the overhearing information to achieve the diversity gains, has a great potential to improve the transmitting efficiency in wireless networks. To deal with the complicated medium access interactions induced by relaying and leverage the benefits of such cooperation, an efficient Cooperative Medium Access Control (CMAC) protocol is needed. In this paper, we propose Distributed Energy-adaptive Location-based CMAC protocol, namely DEL-CMAC, for Mobile Ad-hoc networks (MANETs). The design objective of DEL-CMAC is to improve the performance of the MANETs in terms of network lifetime and energy efficiency. By proposing parallel communication among the neighboring nodes the through put and the network lifetime of the MANET networks can be achieved.***

Keywords: parallel communication, throughput increase, , network lifetime, asynchronous gap, cooperative communication.

1. Introduction

A Mobile Ad-hoc NETwork (MANET) is a self-configured network of mobile terminals connected by wireless links. Mobile terminals such as cell phones, portable gaming devices, PDAs (Personal Digital Assistants) and tablets all have wireless networking capabilities. By participating in MANETs, these terminals may reach the Internet when they are not in the range of Wi-Fi access points or cellular base stations, or communicate with each other when no networking infrastructure is available. MANETs can also be utilized in the disaster rescue and recovery described in One primary issue with continuous participation in ANETs is the network lifetime, because the aforementioned wireless terminals are battery powered, and energy is a scarce resource.

Cooperative Communication (CC) is a promising technique for conserving the energy consumption in MANETs. The broadcast nature of the wireless medium (the so-called wireless broadcast advantage) is exploited in cooperative fashion. The wireless transmission between a pair of terminals can be received and processed at other terminals for performance gain, rather than be considered as an interference traditionally. CC can provide gains in terms of the required transmitting power due to the spatial iversity achieved via user cooperation. However, if we take into account the extra processing and receiving energy

Consumption required for cooperation, CC is not always energy efficient compared to direct transmission. There is a tradeoff between the gains in transmitting power and the losses in extra energy consumption.

2. Related Work

MANETs whose lifetime depends on their battery usage. Its applications such as the Videogames, PDAs Defense organizations. Considering the network (MANETs) deployed in the military regions, where the infrastructure would be poor, if DEL-CMAC protocol is implemented then , by parallel communication among the nodes in the network will increase the network lifetime. Even a little save in the battery will be of great use. Likewise if deployed on the larger networks like MANETs, a definite increase in the lifetime of the network can be achieved. The purpose of the paper is to improve the network lifetime of the MANETs by providing parallel communication among the neighboring nodes in the network.

By achieving parallel communication among the nodes, the throughput will increase and thereby instead of single transfer of the packets, multiple packets can be transferred. Different packets can be transferred simultaneously leading to an efficient data transmission The basic premise is to implement e protocol to provide parallel communication among the nodes in the network. Compared with existing mac protocol , the asynchronous gap that is generated is not put to use, thereby there will be a normal rate of packet transmission and since the MANETs rely on their battery single transmission and its delay will use most of the battery life and the lifetime of the network will be reduced. By proposing the implementation of the DEL-CMAC protocol the protocol makes sure that the asynchronous gap is utilized and the packets can be sent across the neighboring nodes and during this gap multiple packets can be transferred parallel.

The existing cmac protocols mainly focus on the throughput enhancement while failing to investigate the energy efficiency or the network lifetime. While the works on the network lifetime generally fixate on the physical layer or the network layer. Our focus is on the MAC layer, and is distinguished from the previous protocols. Zhu et al have proposed a CMAC protocol for wireless adhoc networks however; beneficial cooperation considering signaling overhead is not addressed. H.Shan designed a busy tone

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based cross layer CMAC protocol to use busy tones to help avoiding collisions in the cooperative scenario at the cost and implementation complexity .A network coding aware CMAC protocol has been proposed by Wang et al in which relay node can forward the data for the source node, while delivering its own data simultaneously, but the network lifetime is not addressed.

C. Zhai proposed a distributed CMAC protocol to improve the lifetime of the wireless sensor networks, but it's based on the assumption that every node can connect to the base station within one hop, which is impractical for most applications .ion (DCF) ,

A novel distributed energy adaptive location based CMAC protocol namely, DEL_CMAC for MANETs is designed based on the IEEE 802.11 Distributed Coordination Function (DCF), which is widely used standard protocol for most wireless sensor networks.

Moh et al have designed a Cmac protocol named cd-mac which lets relay transmit simultaneously with the source using the space time coding technique. Shan et al have explored a concept of cooperation region, whereby beneficial cooperative transmissions can be identified. however energy consumption is not evaluated for both of them.

By implementing the proposed protocol, the neighbouring nodes parallelly communicate with them and the status of the nodes will be globally updated across to all other nodes. By doing this all other nodes in the the network will be updated with the current status of the nodes and congestion can be avoided.

3. The Proposed System

Once the connection is established among the neighboring nodes RTS, CTS, signals are exchanged. After the connection establishment the status ACL is being updated to the neighbouring nodes. During this time an asynchronous ga is generated, in which the actual message will be transferred. This is where the parallel communication takes place.

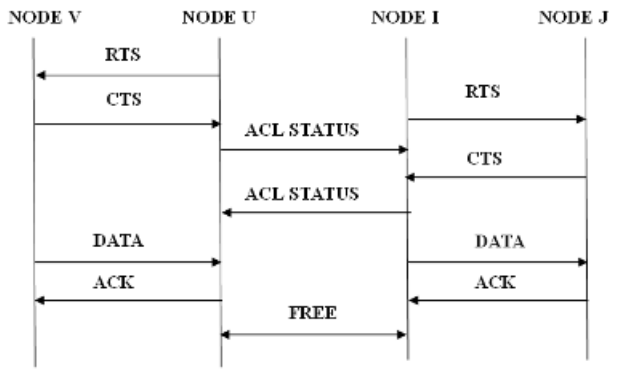


Figure 1: Sequence Diagram of the proposed protocol.
RTS- request to send
CTS- clear to send
ACL –acknowledgment status
ACK-acknowledgment

After the asynchronous gap generated the nodes transfer the data across the network. If the node is free it accepts the signal request and message is transferred else a busy tone will be displayed, however all other by this time will be updated about the other nodes in the network.

The throughput in this case will be gradually increased leading to a more efficient and capable network .Most of the MANETs networks are battery based , if the throughput is increased then the message that are being transferred will be relatively fast. Likewise, the overall network lifetime can be increased. The drawbacks in the mac protocol were though the async gap was generated it was not put to use. Here we try and achieve that during this async gap we transfer the messages parallelly.

4. Conclusion

By proposing this efficient distributed mac protocol the network lifetime and the throughput of the MANETs will be increased.
Since the applications where MANETs are used require a better and more efficient network lifetime. As a Future enhancement of this paper we can implement this on the larger networks and prove that it can effectively work on the larger network.

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