

To Increase Energy and Network Lifetime in MANETs by Using DEL-CMAC Protocol

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ABSTRACT: In Wireless sensor networks (WSNs), we deploy the sensor nodes to sensing the network data. At present, the wireless sensor networks suffering from network failures which are caused by energy consumption and we need to improve the network throughput in MANETs. In this paper, we propose a novel cross-layer DEL-CMAC protocol, for MANET (Mobile Ad-hoc Network). The design objective of DEL-CMAC is to enhance the performance of the MANETs in terms of network life and energy efficiency. A practical energy usage model is represented in this paper that takes the energy consumption on each transceiver circuitry and transmit amplifier into consideration. A distributed utility-based best relay selection approach is incorporated, that selects the most effective relay supported location information and residual energy. Moreover, associate innovative network allocation vector setting is provided to affect the variable transmitting power of the supply and relay terminals.

I. INTRODUCTION

In MANETs, the more than one node can transmit the same data through network this state of interaction is referred to as “Cooperative Communication (CC)”. It can keep extra energy and amplify the transmission insurance. Cooperative Communication (CC) approach is used for conserving the energy intake in MANETs. Cooperative communication exchange makes use of the nearby nodes for the transmission which is archived more potential to improving the transmitting efficiency in wireless sensor networks.

Traditionally the wireless transmission among a couple of nodes may be received and processed at other nodes for performance gain and thinking about the interference. CMAC named Cooperative MAC (CMAC) protocol commonly considers the realistic element of CC for the increasing a throughput. This proposed protocol mainly specializes in the MAC layer which is widely known from the preceding protocols by using thinking about the practical power version and the desires to beautify the energy efficiency and make bigger the life of the network.

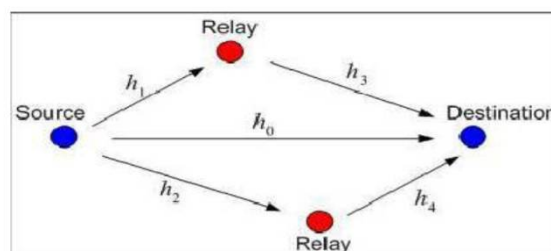


Fig1. Example for Multihop Ad-hoc Network

In wireless networks, because of communication surroundings the decline happens in the signal and conjointly the surrounding nodes within the network causes interference, decline and interference are the two major problems for getting best performance whereas delivering signals. These critical issues may be solved by as well as cooperation

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 8, August 2017

among the nodes. Cooperation is performed by choosing the intermediate node for the given source destination combine for delivering the message accurately, which is supported by conventional routing layer solutions. However, if the nodes present within the network are not coordinated to work at lower levels, it is very difficult to get the maximized performance of the network. Typically as a result of MAC and Physical layer protocols often confirm the capability of network. Cooperative communication is considered to be a good technique for energy consumption in Mobile Ad-hoc Networks, however isn't thought-about to be efficient in direct transmission. CC will offer gains in terms of the desired transmitting power because of the spacial diversity achieved via user cooperation. However, if we tend to take into consideration the additional process and receiving energy consumption needed for cooperation, CC isn't continuously energy economical compared to direct transmission. There's a tradeoff between the gains in transmittal power and therefore the losses in further energy consumption overhead. A CMAC protocols named Coop-Media Access Control was designed to perform the multi-rate capability and aimed toward mitigating the output bottleneck caused by the low data rate nodes, in order that the output may be increased. A reactive network coding aware CMAC protocol has been proposed within which, that at the same time will the work of delivering its own information and forward the info through the relay node for the supply node. A distributed CMAC protocol has been proposed to boost the time period of wireless device networks, however it is primarily based on the belief that each node will hook up with the bottom station inside one hop that is impractical for many applications. The prevailing CMAC protocols chiefly target the output sweetening whereas failing to research the energy potency or network time period whereas the works on energy potency and network lifetime typically fixate on physical layer or network layer.

II. RELATED WORK

Ernesto Zimmermann, Patrick Herhold, Gerhard Fettwe is introduced a novel cooperative diversity protocol, the detached adaptive decode-and-forward protocol and evaluated its performance from an information theoretic as well aspractical view point. Performance gains of several B can be obtained within a large usage region as well asu nder a widerangeofparameters(pathlosssexponent,requirederrorrate,spectralefficiency).

Authors advocate the lifetime maximization by using cooperative-node employment and relay deployment in twine-much less networks. By introducing cooperation protocol among nodes, each electricity benefit and area gain can be explored such that the device lifetime is improved. First, decode-and-forward cooperation protocol is employed amongst nodes. We determine which nodes ought to cooperate and what sort of power should be allotted for cooperation. An optimization trouble is formulated with an aim to maximize the minimum device lifetime beneath a BER constraint. An analytical answer for a -node cooperative network is provided. In case of more than one-node scenario, it seems that the formulated problem is NP-hard. A suboptimal algorithm is advanced to reduce the complexity of the formulated problem. By the use of the proposed suboptimal set of rules, simulation outcomes show that the minimum tool life of the two-node cooperative community may be extended to nearly similar to the lifetime of the node this is towards the destination. In case of the couple of cooperative nodes, the minimum device life of the cooperative network will increase 2 instances longer than that of the non-cooperative network.

Josh Broch, David A. Maltz, DavidB.Johnson, present the effects of a detailed packet-stage simulation evaluating 4 recent multi-hop wireless adhoc community routing protocols. These protocols, DSDV, TORA, DSR, and AODV, cowl more than a few design picks, including periodic classified ads as opposed to on-demand course discovery, use of feedback from the MAC layer to suggest a failure to ahead a packet to the following hop, and hop-through-hop routing as opposed to supply routing. They simulated each protocol in adhoc networks of fifty cell nodes transferring approximately and communicating with each other, and provided the results for a number node mobility rates and movement speeds. Each of the protocols studied performs well in a few cases yet has certain drawbacks in others. DSDV plays pretty predictably, turning in honestly all data packets when node mobility rate and movement pace are low, and failing to converge as node mobility increases.

III. DEL-CMAC PROTOCOL

In this paper, we are implementingDEL-CMAC protocols for MANETs. DEL-CMAC protocol has been supported this planned work the DEL-CMAC comprises the following equivalent to a relay that's concerned in a handshaking method, optimum power allocation theme, a distributed effectiveness-based best relay selection approach, and an innovative

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Vol. 6, Issue 8, August 2017

Network Allocation Vector setting. The contributions of the planned work are summarized as follows. The planned DEL-CMAC protocol mainly focuses an increasing the network life times it considering to overheads and interference due to cooperation and energy consumption.

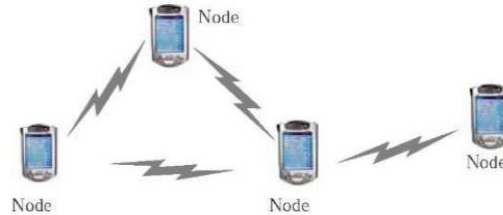


Fig2: Architecture

In this proposed framework, packet transmission starts from the source node towards the destination node the other nodes within the network become the relay nodes. The transmission mechanism takes place from supply to destination with none relay but because of amendment in topology, the distance between the supply and therefore the destination will increase that consumes a lot of power because of a lot of noise within the network. During this condition cooperative transmission occurs that uses relay nodes present between the source and the destination the transmission either occurs in one hop link or in multi hop links with multiple relays. For cooperative transmission relay choice is very important aspect. Among multiple relays the most effective relay is chosen based on the residual energy and reduce timer. The use of relay nodes is appropriate only if direct transmission fails. In the system, wireless network topology is considered with highly mobile network. Further, a single-hop and multi-hop scenario are thought-about. The most focus is on cooperative transmission for multi-hop network with multiple relays.

A multi-hop network includes of one or more single hop network within it. A single-hop network include a source, a destination and a relay node wherever as a multi-hop network consists of a supply, a destination and multiple relays. As relays are considered so power allocation and relay choice each are major task, that isn't potential only with the physical layer properties, thus cross layer approach is proposed wherever relay choice is in MAC layer and power allocation in physical layer. The relay choice and power allocation are combined to form a theme known as RTS-CTS signaling scheme that provides full diversity further as prolongs the period of time of network. Cross-layer is that the approach that integrates the functionalities of higher layer. The strategy here is, the destination decodes the signal received either from the supply or from relays rather than combining along. A Decode-and-Forward (DF) scheme is used because the relaying scheme in conjunction with the construct of cooperative variance. If the quantity of relays between source and destination then cooperative diversity provides improved reliability further as power consumption is reduced.

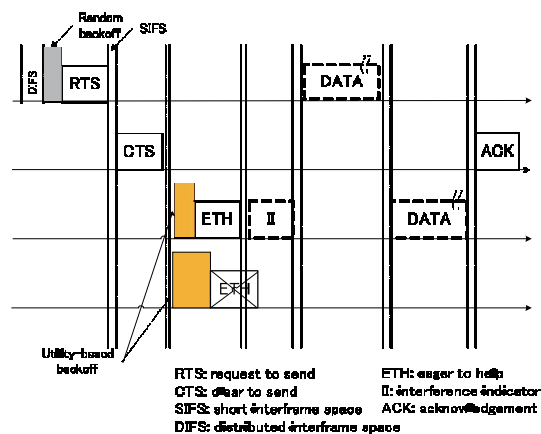


Fig3 :The frame exchanging proces of DEL,CMAC.

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Vol. 6, Issue 8, August 2017

improvement with cooperative diversity is employed to boost the network lifetime of MANET by reducing the facility consumption, preserving energy further as minimizing the delay degradation. The channel model used here is very common in several cooperative networks, wherever the channels are quasistatic Rayleigh attenuation channel and therefore the noise that's assumed is additional White Gaussian Noise (AWGN). This implies that the coefficients of the channels might change from one frame to a different however it remains constant throughout one complete frame. All the channel coefficients don't seem to be the least bit dependent on the advanced Gaussian random variables having meant as zero and unit variance. The noise term is given as N_0 . The SNR value is considered to search out the share of noise within the environment and once the information packets are considered the packets are send in digital kind as a result of rewrite and forward theme is employed thus bit-error- rate is considered with every packet.

Protocol Description

The frame exchanging process of DEL-CMAC is shown in Fig. 3. Similar to the IEEE 802.11 DCF protocol, the RTS/CTS handshake is used to reserve the channel at first. As we know, the cooperative transmission is not necessary in the case that the transmitting power is small because the additional overhead for coordinating the relaying overtakes the energy saving from diversity gain. Those inefficient cases are avoided by introducing a transmitting power threshold L_p . In DEL-CMAC, upon receiving the RTS frame, the destination computes the required transmitting power for the direct transmission PDs (given in Section 4.2). There are two cases depending on the calculated PD

Case (i): $PDs \leq L_p$. The destination sends a CTS frame with flag field (FLAG_P) equal to 0, which implies that the direct transmission is adequate. Thus, when the transmitting power for the direct transmission is sufficiently low, DEL-CMAC is reduced to the DCF protocol and thus has backward compatibility with the legacy 802.11 standard.

Case (ii): $PDs > L_p$. FLAG_P in the CTS frame is set to 1, which indicates that the cooperative relaying is desired. All the terminals having overheard RTS and CTS, and not interfere with other ongoing transmissions are considered as the relay candidates.

After the relay candidates check if they are able to reduce the energy consumption (given in the capable relay candidates contend for relaying by sending ETH after a utility-based backoff (utility function is provided in Section 4.1). Notice that there may exist the case that two relay candidates hidden with each other (outside the transmission range). However, they can still sense the message sent from each other (within the sensing range which is set at 1.9 times of the transmission range in the simulator by default). The case that multiple ETH frames collide due to hidden would not exist. After SIFS (short interframe space), the winning relay broadcasts the II message to reconfirm the interference range of the allocated transmitting power at relay, which is used in the NAV setting. After the above control frame exchanging, the source and relay cooperative send the same data frames to the destination in two consecutive time intervals using the allocated transmitting power. Finally, the destination sends an ACK back to the source if it decodes the message successfully. The flow charts of the terminals are given in the Appendix B, available in the online supplemental material. The detailed protocol operations are provided from the perspective of different terminals:

IV. EXPERIMENTAL RESULTS

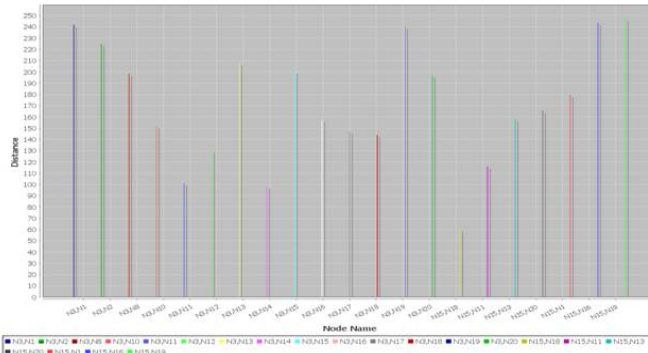
In this experiment, we can create the network by giving node size means number of nodes to be created in the network and we can also select node speed of the network after that network simulation screen will be displayed and select the any requesting source node and destination node and select the any requesting file that will be store in storage node and the mobile ad hoc network simulation screen distributed nodes are placed for sharing the data the requesting selected node is share the data from the other node here the relay nodes will be used to send some data from a sender node to a destination node to increase the energy levels of the sender node further to increase the life time of the node If we send same data from same nodes also the relay node will be changed because if we use the same relay node for every time its energy levels are going to be reduced so these process to increasing the lifetime of the network. In the below chart we can observe that difference between the length of distance and multiple nodes

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Vol. 6, Issue 8, August 2017



We can observe that node distance chart on every node as the average number of nodes is sending the data in a unit distance by using relay node in thnode distance chart.

V. CONCLUSION

In this paper we conclude that, we proposed a new distributed energy-adaptive location based media access control protocol along with effective cross layer optimization with cooperative diversity routing approach (DEL-CMAC). DEL-CMAC cooperative diversity routing plays an important role in increasing the throughput is the amount of data moved successfully from one place to another in a given time period and responsibility of the system. Using cooperative diversity, diversity gain is achieved. Cooperative diversity plays important role in cooperative communication. Through our implementation we can improve the lifetime of the network at lower cost then compare to current protocols.

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