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Pipelined Flow Optimization and Reduce Conjunction by Using Cross-Layer MAC Protocol in Wireless Sensor Networks

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Abstract
In order to reduce end to end transmission delay and more consumption of energy by optimizing the pipelined flow of data packets in wireless sensor networks. I propose a CROP MAC protocol to optimize the pipeline flow of data packets by using the sleep/wake scheduling and routing information of the layer which enables the CROP MAC protocol to schedule between source and destination to transmit many packets in one cycle. By choosing the neighbor nodes which should broadcasting based on the sleep cycle based geographic forwarding protocol. Sleep cycle based geographic forwarding protocol selects the neighbor node which is to awake or already woke nodes. Based on the nodes broadcasting takes place.
I evaluate this CROP MAC protocol by using ns-2.35 simulator and compare this protocol with PMAC, PRMAC and BulkMAC. In terms of end to end delay and energy consumption the CROP MAC protocol gives the best performs out of three protocols. The simulation outcomes show the performance as 608.89%, 14.36 %and 12.5% respectively.

Keywords
Energy efficiency, Medium access control (MAC), Synchronization, Routing information Transmission delay, Wireless sensor networks.

I. Introduction

The crucial requirements in the wireless sensor network (WSN) applications are to minimize the end to end delay and energy conservation while transmitting data. To archive this, manyCross layer MAC protocols are designed [1]-[10] such as RMAC,PRMAC,BulkMAC and CL-MAC. The initial work in the direction of contention based synchronous cross-layer MAC protocols is RMAC [1] .It makes possible multihop transmission of a data packet in a cycle.RMAC is further improved as PRMAC [2] which enables the multihop multi-packet data transmission scheduling in a cycle.PRMAC is further improved by the BulkMAC [3] where the data transmission is continuous by adding one source and multiple receivers.The BulkMAC is extended by CL-MAC [4] which enables the sources to schedule multiple multihop and many packets to flow in a single cycle.
The PMAC accommodate synchronization and grade information in each frame. Although, in PMAC, a data packet can travel continuously from higher grade to lower grade until it reaches the sink. However, due to inefficient scheduling strategy, event occurrence rate (EOR) based loose synchronization scheme and insufficient use of routing layer information.

II. Some of The Disadvantages Of PMAC

- A node can transmit and receive only one data packet in a cycle which leads to increase in end to end delay and reduction in packet delivery ratio when EOR is high.
- It does not address how a node, deployed after initial grade division and schedule assignment process.
- In most of real time WSN applications EOR may vary from once in a second to once in a day or week, it leads to large clock drift, and results in increase in the end to end delay and reduction in PDR due to asynchronization.

In order to overcome the disadvantage of PMAC, a cross layer MAC protocol is proposed that is CROPMAC [5] protocol. The CROPMAC protocol will optimize the pipelined flow with the help of staggered sleep/wake scheduling, efficient synchronization and appropriate use of routing layer information. And this routing layer information enables CROPMAC protocol to schedule source to sink transmission of multiple data packets in a single cycle.

III. The Cropmac Protocols Improves Pmac Protocol With The Following Features

- A double sync window based energy-efficient strategy is proposed to keep the staggered sleep/wake schedule synchronized.
- With the help of the efficient synchronization and routing layer information pipelined flow of data packets is optimized such that a node can schedule end to end flow of multiple data packets in a single cycle.
- To accommodate a node deployed after initial grade and schedule assignment as soon as possible, grade information is accommodated with the schedule information in SYNC packet and a method is given to choose the most appropriate grade and schedule.
- It reduces idle listening with the help of adaptive sleep strategy.

IV. Cropmac Protocol Design

When two nodes send data concurrently to the same node contention occurs. In order to avoid this conjunction CROPMAC protocol is designed in cross layer MAC.Firstly the negotiator as to be selected, toselectednegotiator in the many nodes. The distances between the each node as to be calculated and which node as maximum number of nodes is selected as the negotiatornode. This node will perform to actions. One is synchronization and another is data sending.in synchronization state the time slots will be allocated to be requested nodes and at that time slots allocated nodes will be in active state and other nodes will be sleep state. The active nodes can send data to negotiator. In the second state the data will send the data to the sink by negotiator.

V. Conclusion

In this paper the proposed CROPMAC protocol in the cross layer MAC will avoid the conjunction, reduces the energy consumption and end to end delay in the data transmission.

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