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Improving Energy Efficiency and Performance in Wireless Sensor Networks Using MAC

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ABSTRACT

Remote sensor arrange (WSN) alludes to a gathering of spatially scattered and committed sensors for observing and recording the physical states of the earth and sorting out the gathered information at a focal area. Late advances have shown the capability of system MIMO (netMIMO), which consolidates a handy number of disseminated recieving wires as a virtual netMIMO AP (nAP) to enhance spatial multiplexing of a WLAN. Existing arrangements, nonetheless, either basically group close-by radio wires as static nAPs, or powerfully bunch reception apparatuses on a for every parcel premise in order to boost the total rate of the booked customers. To strike the harmony between the over two extremes. In this paper, we propose a versatile supporting system for MAC conventions, in which the choice to refresh the neighbors of a portable hub is made adaptively as per the versatile speed. Examination and recreation comes about exhibit that the instrument proficiently stays away from the detachment of a versatile hub from its neighbors and accomplishes a superior execution as contrasted and settled occasional neighbor disclosure.
Keywords : Wireless Sensor Network (WSN), WLAN, MAC Protocols

I. INTRODUCTION

A Wireless sensor network can be defined as a network of devices that can communicate the information gathered from a monitored field through wireless links. The data is forwarded through multiple nodes, and with a gateway, the data is connected to other networks like wireless Ethernet. Furthermore, contention-based MAC protocols provide an equal probability for mobile and static nodes to access the channel and they do not incur the overhead produced by hybrid protocols. To handle the schedule updating problem of the mobile node when it crosses between different virtual clusters, in the border nodes add all the schedules' information that they follow to the SYNC packets, so that the mobile node performs schedule adaptation according to the schedules it receives from the border nodes. However, since SYNC packets broadcast at a fixed interval of 10 listen-sleep cycles, it is possible that the mobile node will miss them if they pass through the border nodes at a speed faster than 10 cycles. In, the authors also proposed adjusting the establishing period of the active/sleep schedule according to the estimation of the change in the number of onehop neighbors; however, their method does not consider making the schedule adaptable to the variation in mobile speed. The mobility-aware delay-sensitive sensor MAC (MD-SMAC) protocol inherited the basic idea of the mobility-aware sensor MAC (MS-MAC) protocol: The mobile node increases the frequency of the neighbor discovery and leaves the other nodes to continue their normal operations. When the mobile node has discovered the new schedule, it returns to its normal neighbor discovery frequency (every 5 m) and removes its old schedule.

In, an enhanced MS-MAC protocol named EMS-MAC was introduced to predict the node's movement more accurately by using both received signal strength indication (RSSI) and link quality indication (LQI), since MS-MAC causes energy wastage because of the inappropriate mobility prediction produced by using only RSSI. However, EMS-MAC has the same periodic procedure for connection setup as MS-MAC. In existing variations of contention-based MAC to support mobility, the fixed period of neighbor discovery and schedule updating does not allow the mobile node with its varying speed to connect to new neighbors in a sufficiently short time. In the contention-based MAC protocols mentioned above, a mobile node synchronizes with its neighbors after hearing a SYNC frame. We propose a mobility support mechanism based on the exchange of SYNC to allow the mobile nodes to set up connections with their neighbors adaptively, while a low power level is maintained.

II. ALGORITHM

A. S-MAC

S-MAC is one of the most popular contention-based MAC protocols designed to ensure energy efficiency in WSNs. It adopts a periodic listen-sleep cycle as the schedule for the node to follow. Nodes that have the same schedule form a virtual cluster to wake up for listening at the same time. The listen period is further divided into a SYNC period and a Data period for broadcasting or receiving SYNC and sending or receiving DATA packets, each node broadcasts a SYNC packet every synchronization period, which is generally 10 frames, about 10 s. Furthermore, to avoid loss of SYNC among neighbors, S-MAC is defined to repeatedly execute neighbor discovery every 5 m, when the node has at least one neighbor, and more frequently, for instance every 30 s, when the node has no neighbors. During the neighbor discovery period, the node continues to listen for 10 listen-sleep cycles without sleeping to achieve more chances of hearing a new neighbor node. MS-MAC has the same packet format as S-MAC, while DE-ASS adds multiple schedule information in the SYNC packet at the border node. The packet structures of other MAC protocols designed to support mobility are more complicated than those of S-MAC. The design of our mechanism is based on the S-MAC format.

B. Design of Control Packet Format

There are three types of SYNC packets in our mobilitysupporting mechanism; the original SYNC, MSYNC, and MACK. MSYNC is used by the mobile node and MACK is broadcast by the nodes that receive the MSYNC. The original SYNC is still used by the ordinary static nodes and border nodes. The two fields sleepTime and srcAddr in the SYNC packet. represent the sender's schedule information to determine when the sender will enter the next sleep period after it sends the SYNC packet and the sender address through which the receiver can update its neighbor list, respectively. The mobile nodes broadcast only MSYNC with two fields of speed and angle added in the original SYNC packets. In addition to the usages similar to those of the original SYNC, MSYNC can inform the receivers that the mobile node has entered their communication range.

C. Location Estimation from RSSI

When a mobile node initiates movement in the networks, it sends MSYNC, through which it becomes synchronized with its neighbors. One of the neighbor nodes is chosen to deduce the appropriate announcement time of MSYNC and broadcasts a MACK packet to the mobile node. The mobile node then adaptively broadcasts MSYNC to its one-hop neighbors during its movement. Other neighbor nodes that are not chosen to send the MACK packet compete to broadcast original SYNC packets at the following frames. In the proposed MS-MAC protocol, a change in the radio signal level of received SYNC messages is used as an indication of a mobile's presence. Although this method does not provide a high level of accuracy, it is effective in our mechanism. An incorrect detection of mobility may unnecessarily trigger a neighbor search, but it does not degrade the network performance. Unlike the IR, acoustic, or ultrasound signals used in other methods, the radio signal of SYNC messages is available at no extra cost in terms of energy consumption.

D. The Process of the Mobility-Supporting Mechanism

For the sake of clarity, we divide our mobility-supporting mechanism into intra-cluster and inter-cluster processes. In both, the same neighbor updating process is applied. For example, the static node checks whether it meets the limitation (3) and computes the NextAnnounceInterval field in the MACK packet to inform the mobile node when to send MSYNC again. The mobile node and the static node add the sender to the neighbor list and set the active cycle field based on (11) if they receive the control packets from the sender the first time; else, they decrease the active cycles in the neighbor list by 1 per frame to delete the disconnected neighbors. Our scheme employs an adaptive MSYNC announcement and ensures that the mobile node broadcasts MSYNC when it is approaching the border of a virtual cluster. If two schedules are included in the MACK packet, this means it is broadcast by the border node; the mobile node can follow these two schedules and determine when it can broadcast MSYNC again according to the NextAnnounceInterval field in the MACK packet.

III. CONCLUSION

This paper concentrated on the key criteria of vitality effective MAC to help and advance the exhibitions of portable applications in WSNs. The most imperative component of our system is that the versatile hub adaptively fabricates associations with its new neighbors in a dynamic way in view of the two-route handshake for the speed and timetable data trade in an edge time of the SYNC period and limits the overhead. We can improve energy of the performance and accuracy.

IV. REFERENCES

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