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# MINIMIZATION OF HANDOVER USING EFFICIENT ROUTING IN MOBILE WIRELESS SENSOR NETWORK

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## ABSTRACT

*MWSN is routing data from its source to the destination. When data has to transfer from source to destination it has to go through by various nodes which are considered as hops. When data pass from one hop to another its link deteriorate which cause the problem of handover. Nodes have to search for other relay nodes without interrupting the communication channel. In previous work three method used and this work was conducted with the IEEE 802.15.4 standard but this also have some drawbacks like low bandwidth, operating frequency and network range. Our goal is reduce the unnecessary handover. For this work, we will use 802.11x IEEE standard, to predict the future position of nodes so that if they are going outside from the range of node than they become active mode and also to use duty cycle to improve the network performance.*

***Keywords: WSN; MWSN; MAC; Handover; Handoff; RSSI; Mobility; Prediction***

## I. INTRODUCTION

A Wireless Sensor Network (WSN) is a network of two or more self-organizing devices. These devices must be the sensor nodes those can send, receive and process the data in the form of signal to other sensor nodes within the range. These sensor nodes works together to transmit the data to one or more collection points called sinks in order to make the network energy efficient and performance efficient that can help to enhance the lifetime of the network.In many applications of WSN, the major need is in mobility. Mobility is the procedure that a node can have to move in any direction within the range of the current coordinator or away from the range. [1]

The handover mechanism is the process of transferring data from one sensor node of one wireless network to the other sensor node of another network in a continuous flow without breaking the original link. The handover event must be taken place at the time when an existing link deteriorates in the middle of the process of data transmission. The handoff, or handover, method is a capital concern in the employment of the wireless networks impression. It describes the happening where a mobile node achieves the collection and transmission of data from one serving AP to the best existing access point. The collection conditions may be contingent on the incurable or the application necessities as well as the network position and the situation features. A handoff apparatus is essentially the data packet endpoint statement altering from one access point to an improved other one. There are three main stages in the handoff procedure: Observing the radio channel, creation a conclusion for handoff and choice a new AP.In this paper, we used RSSI, which stands for Received Signal Strength

Indication, is the most used metric in handoffalgorithms. The RSSI between one MN and one AP decreases when the distance between the two of them increases. The received signal strength indication can be considered in two ways; absolute RSSI or relative RSSI. In absolute measurements, the algorithm bases its metrics only on the value of the RSSI obtained from one AP. In relative RSSI, the measurements are based on a comparison, or more precisely the ratio between couples of neighboring APs.

RSSI = transmission power/distance

## II. BACKGROUND STUDY AND RELATED RESEARCH WORKS

With the increase in the WSN applications, ranging from industrial processes to medical applications, automated warehouses to embedded systems, handover activity and future prediction are becoming more and more important and drawing much attention from researchers worldwide. Here we briefly explain the disassociation and association procedure of a sensor node operating based WSN& MWSN and discuss about some of the related research done on this topic.

The most widely used criteria for evaluating handoff or handover in wireless networks are bit-error rate (BER) and received signal strength Indicator (RSSI) as indicators for deciding whether to handoff to a new region [7],a fast and seamless handover becomes an important criterion to support mobility in6LoWPAN. When a MN moves out of its home Personal Area Networks (PAN) and joins a new PAN, the handover delay can be separated into movement detection delay. When a MN moves out of its PAN or current coordinator and it is attached to a new PAN or coordinator, the MN should perform handover procedure. This movement of the MN called inter-mobility. [8]

Accordingly, the total energy consumption will be reduced and prolong the network lifetime [9], the popular approach is RSSI (ReceivedSignal Strength Indicator) and is useful in estimating the distance because it is simple and no extra hardware is required. RSSI approach is presented to locate the position of mobile node. The distance between mobile node and the Neighbor Node is estimated by measuring the RSSI (received signal strength indicator). Neighbor Nodes are positioned at the vertices of square and mobile node is moving randomly inside the square. The commonly known techniques to calculate the range information include measuring the Time of Arrival (TOA), Time Difference of Arrival (TDOA), Received Signal Strength Indicator (RSSI) [1] etc.

The schemes proposed in our work use RSSI to calculate the distance between mobile node and neighbor mobile node. Another commonly used parameter for localization in WSNs is the received signal strength indicator (RSSI) from coordinators and sensor nodes [4]. RSSI may form the basis for determining the requirement of a handover activity and reduce the unnecessary handover. However, as considering only RSSI-based or LQIbased measurements during a handover may result in inappropriate decision and selection of the handover target, other essential parameters to consider, in this context, are movement direction, speed and distance of the device [11].

## III. PROPOSED WORK

In this paper, we evaluate the handover performance of the sensor node operating in the 802.11x standard-based network and proposed the predictive scheme on the basis of RSSI (Received Signal Strength Indicator), the

sensor node decides and selects the target coordinator for a seamless handover activity based on RSSI only in the remaining two schemes direction of movement of the sensor node is also considered along with RSSI.

MN in order to become mobile before going out of range of its current coordinator starts scanning process to find other coordinator on the basis of RSSI (Received Signal Strength Indicator) and predict the future position of MN in order to maintain long duration of connectivity with the current coordinator. When MN finally selects new coordinator, it sends beacon to current coordinator so that current coordinator stop sending anymore data to MN. When it stops to send data, MN moves away from the range of current parent coordinator and then going towards the range of selected coordinator. Thus MN completes the handover process without any interrupting the data.

Then MN starts the communication process with the new coordinator. After successful this, it becomes the new coordinator of the MN. Now, at this time new coordinator send alert message to old coordinator. Now old coordinator send all stored queued data packets to new coordinator of the mobile node in order to send packets in secure manner and to avoid the delay without any loss of the data. It will enhance the throughput of the network. After successful completion of data sending, new coordinator send ACK message to old coordinator. Thus, new coordinator and mobile node starts normal data communication process after successful procedure of handover without any interrupting.

*Algorithm: Successfully prediction of node when mobile node in boundary of current Coordinator*

**Inputs:***Initial_Energy of MNs*

*Thresh_value of* $C_n$

*Transmission Power*

**Outputs**: successfully mobile node choose new coordinator without handover

1. Begin
2. **for** ($node_{max}$= n)
3. select coordinator based on RSSI and distance
4. **if** ( node = $max_{rssi}$&& distance = min)
5. select node = coordinator
6. for each ( node=1, node≥40, node++)
7. send message to coordinator
8. if (node goes out of coordinator && RSS of node become low)
9. then coordinator send message to node to select new coordinator
10. **else**
11. repeat steps 4 to 7
12. **end if**
13. now
14. node send request to new coordinator
15. **if** ( repeat = accepted )
16. then transmission take place
17. **else**
18. discover new coordinator

19. **end if**
20. **end for**
21. **END**

## IV. SIMULATION

In this section, discusses the simulation that we have developed in NS2 simulator for validating the proposed work with taking different parameters like throughput, delay, PDR (Packet Delivery Ratio).

**Table:1 Simulation Parameters**

| | |
|---|---|
| Simulation time | 45 seconds |
| Simulation area | 2000x2000 |
| No of nodes | 40 |
| No. of parent coordinators | 4 |
| No. of mobile nodes | 36 |
| Initial Energy | 100 joules |
| Routing Protocol | AODV |
| IEEE standard | 802.11 |
| Packet size | 512 Bytes |

The first stage of experiment consists of mobile node, with coordinators and one PAN coordinator to start the PAN network. The mobile node is moving randomly, with different speeds. Figures 1-10 show throughput, number of association's attempts and re-associations, disassociation and connectivity period for mobile node and required association attempt time for a mobile node with coordinators. Fig. 1 shows the throughput when different speeds are setup for mobile node and also it shows the network throughput with respect to time. In this, network throughput increases slowly from downwards to upwards. It shows that the proposed network having the effective throughput.

Fig. 2 it shows the packet delivery ratio of the network. It is very effective as it moves from downwards to upwards.

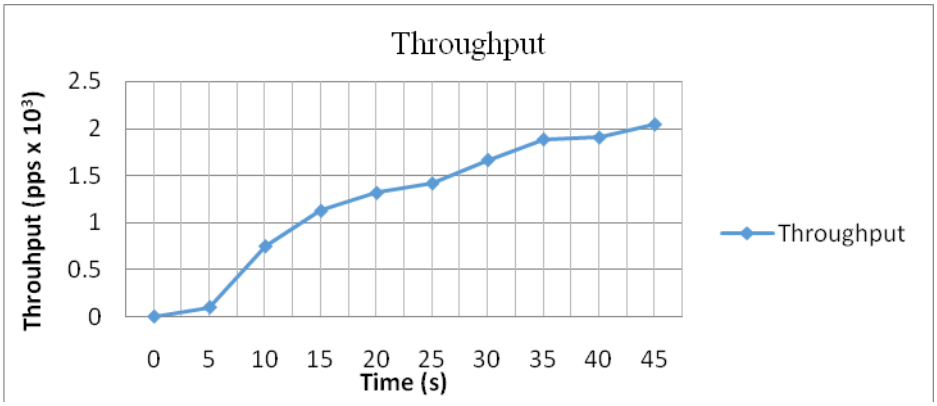


**Fig.1 Throughput**

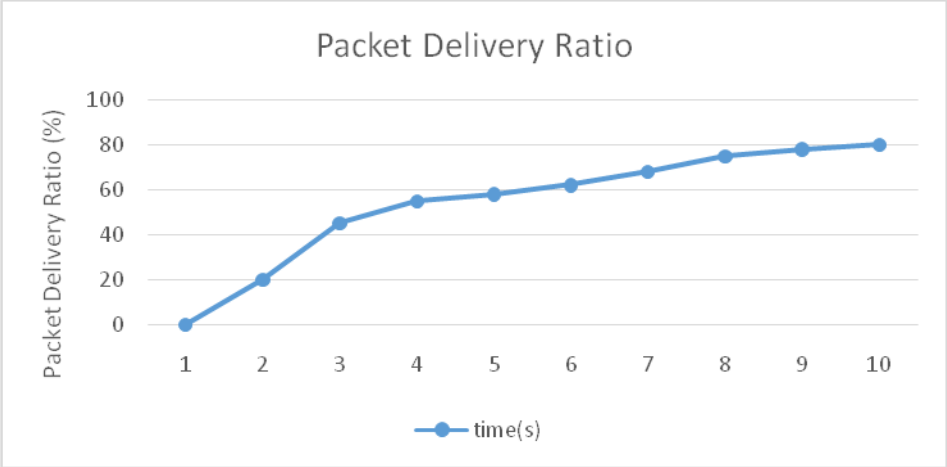


**Fig.2 Packet Delivery Ratio (PDR)**

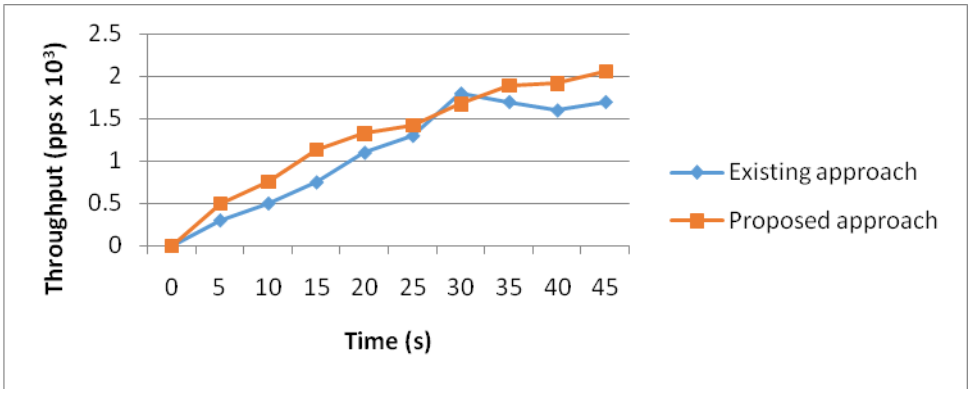


**Fig.4 Graph of comparison for throughput**

In Fig. 2, the results with the increases complexities of the proposed scheme, the amount of delivery ratio also increases. A transmission is successful, if the sensor node receives an acknowledgment from its associated coordinator the transmitted data packets. Fig.3 it shows the delay. In the network, delay increases with the time. Here delay is shown with respect to time.

Fig. 4 it represents the significant differences in the success rate percentage between the IEEE standard 802.15.4 and the proposed scheme. It shows that proposed approach is performing better than the existing approach. According to the results, with the increases in the complexity of predict the future position of mobile nodes. This is due to not only taking less amount of time to predict the future position of node to choose new coordinator but also the association attempt is taking place with the current coordinator.

## V. CONCLUSION

Handover is the basic requirement or real time applications in Mobile Wireless Sensor Network.

There are various handover approaches available. Main focus of our thesis is on that handover approach which make the network more reliable, effective packet delivery ratio and efficient communication without any loss of original link during data transmission. In this research, proposed procedure is reduce the unnecessary handover without loss beacon packets and choose new coordinator without interrupting data transmission between mobile node and coordinator.

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