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Quality of service improved in WSNs using Improved Efficient Quality of Service Oriented Distributed Routing Protocol

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Abstract— As Wireless Sensor Networks(WSNs) gains popularity significant research have been devoted to supporting real time transmission with stringent quality of service requirements for wireless applications. Existing work exploits Quality of Service Oriented Distributed Routing Protocol (QOD) for QoS provisioning with delay and energy constraints in WSNs but they are not sufficient to provide quality of service in WSNs. In this paper improve the quality of QOD routing protocol and enhance the Improved Efficient Quality of Service Oriented Distributed Routing Protocol (IEQOD).The improved efficient quality of service oriented distributed routing protocol which combines selfish node isolation method and awake and sleep scheduling to enhance the performance of QOD. Selfish isolation method is the method in which the energy less nodes are isolated from the network and find and alternative route for packet transmission. Awake and sleep scheduling proactively wake-up the nodes in the transmission route and awakened node reduction. Hence we could improve the quality of service in terms of packet delivery ratio, delay and energy consumption. The IEQOD protocol simulated using ns-2 software. Evaluation result demonstrate that IEQOD significantly improve the QOS in WSNs.

Index Terms— Awake and sleep scheduling, Improved Efficient Quality of Service Oriented Distributed Routing Protocol, Selfish node isolation method, Wireless Sensor Networks.

1 INTRODUCTION

IN Wireless sensor networks (WSNs) have been designed and developed for a wide variety of application such as environment or habit monitoring, smart battle field , traffic application etc[1].The sensor usually consist of limited computational power and limited memory and a power source usually in the form of a battery. The sensor nodes often run on batteries that are generally difficult to be recharged once implement o the area, energy efficiency is a critical feature of WSNs, for the purpose of extending the network lifetime. Providing Quality of service in WSNs is a challenging problem.

For enhance the energy we define the problem as selfish node and idle listening. In WSNs the transmission range of sensor nodes is limited due to power. Hence communication between source node and destination node beyond the transmission range the intermediate nodes are help to forward the packets .These intermediate nodes are sometimes do not work properly, in order to conserve their limited resources such as energy, bandwidth etc. Such nodes are non-cooperative nodes or misbehaving nodes. They are following types:

Malicious Nodes: Malicious nodes are present in a MANET, they may reduce the network connectivity by non-cooperative actions, but in effect drop any data during transmission. Several types of attacks are performed by malicious node like DOS attack, black hole attack, worm hole attack.

Selfish Nodes: The node does respond to route request messages, but when becoming part of a route it silently discards the data when becoming part of a route it is supposed to forward. The attacks of selfish node in the form of unnecessary route request control message, frequent generation of beacon packets or forwarding of stale information to nodes. These actions may result in degrade the performance of the network.

Usually for target tracking applications, idle listening is a major factor for energy waste. Duty cycling is one of the most commonly used approaches to avoid energy waste in WSNs. The idea of duty cycling is to periodically awake date and put nodes in the sleep state for most of the time. As a compensation for tracking performance loss caused by duty cycling.

In this paper we enhance quality of service oriented distributed routing by combining selfish node isolation method and awake and sleep scheduling This method IEQOD makes the following contributions:1) We designed a selfish node isolation method based by detecting selfish node using promiscuous overhearing of neighboring node. 2) Sleep scheduling scheme enhanced the energy efficiency of proactive wake-up with both awakened node reduction and active time control efforts.3) As the result ,we demonstrate that IEQOD protocol significantly increase the QoS in WSNs.

2 PROPOSED SYSTEM AND SIMULATION

Here we improve the QoS by reducing energy degradation problem in Wireless sensor network by combination of two methods. Selfish isolation method and awake and sleep scheduling protocol.

2.1 Block Diagram

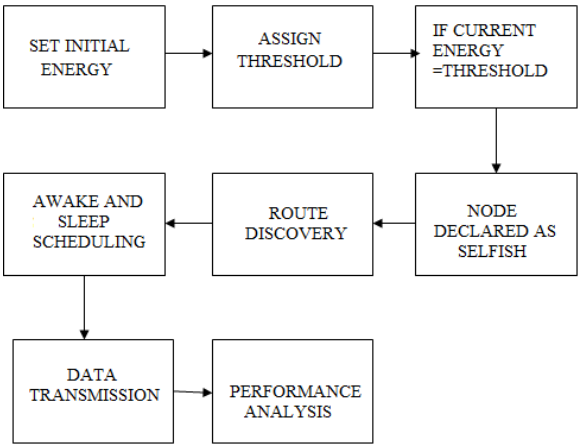

Figure 1: Block Diagram

The proposed system is simulated using NS2 software. Initially the nodes are deployed and set to energy level to the nodes. Source node collect energy of the neighboring nodes. Assign threshold energy to detect the selfish nodes. The nodes current energy is less the threshold energy then the nodes are declared as selfish node and they are isolated from the network. After selfish node isolation the source node discover routing path to reach destination. The node in the route are set to active state during data transmission. The node which is not in the route the became idle state until the data transmission stop.

2.2 Selfish node isolation method

Selfish nodes work in an wireless sensor network to optimize their own gain, with neglect for nodes to conserve its own energy, selfish node is divided into two categories. In category 1, the nodes participate correctly in routing function but not forward data packets they receive to other nodes. In category 2, the nodes do not participate correctly in routing function by not advertising available routes and by allocating packets to other nodes.

In this paper we proposed that the selfish node is isolated by threshold energy value. Here we set threshold value in each node in the network. During data transmission the source node collect the intermediate node energy level. The node below the threshold value are isolated from the network and source node find alternative path for data transmission. This also use DSR which is a source routing protocol and this routing protocol can react to topological changes rapidly. There are two main operation in DSR; route discovery and route maintenance's protocol tries to minimize the energy consumption by discovering route to other nodes only when they are required.

2.3 Awake and sleep scheduling

Awake and sleep scheduling mechanism for achieving an energy-efficiency in WSNs. In existing work exploit sleep scheduling is performed by duty cycling manner. In duty cycling the node which are in transmission path they are put to sleep mode for most of time and wake them periodically. In duty cycling performance of the network may loss. In this paper we combine awake and sleep scheduling with selfish node isolation. After selfish node isolated from the network the source discover the routing path for data transmission. The nodes in the routing path are set to active state and the nodes which are not in the path the put to idle state.

Consider a sleep cycle where Transmission (Trx) is the time that a receiver is listening. Then it is clear that only if the beacon falls within Transmission will the node be successfully awakened. For a given interval T, Tsleep (sleep time) Tsleep = T −Trx. Let the beacon be of length B and the inter-beacon time be Bl (the receiver must respond in this time). Schurgers *et al*, show that the average time a sender will spend sending beacons (Tb) is as follows:

$$Tb = (T + (B + Bl))/2$$

This demonstrates a basic trade-off between the amount of time spent sleeping and the amount of time spent sending beacons.

2.3 Performance analysis

Finally, performance has to be analyzed.

End-to-end Delay: Packet transmission time between Source node and destination node.

Packet Delivery Ratio: The ratio of received packet by transmitted packet.

Energy consumption: Measured as the total amount of energy consumed by the nodes during data transmission

3 RESULTS AND DISCUSSION

The simulation analysis of selfish node isolation method and awake-asleep scheduling is shown in the help of network animator window by using Network simulator. The following graphs shows the performance analysis of IEQOD and it compared with QOD.

A. DELAY

The delay of QOD for 50 nodes is about 5 ms but the IEQOD has the delay 3ms.IEQOD delay increases compared with QOD shown in Figure 2.In this the quality of service in the wireless sensor network improved in terms of delay

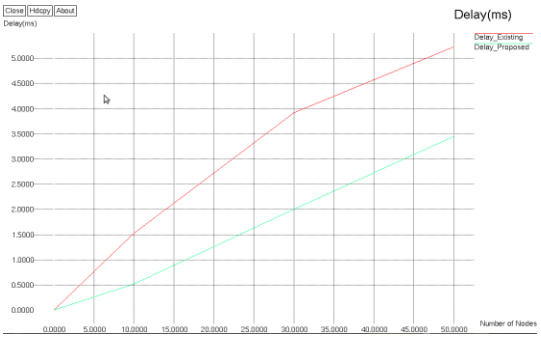

Figure 2: Delay versus Number of nodes

B. PACKET DELIVERY RATIO

The packet delivery ratio of QOD for 50 nodes is 85-90% but the IEQOD has the packet delivery ratio 55-60% .The packet delivery ratio increases rapidly compared with QOD shown in Figure 3 in this the quality of service in the wireless sensor network improved in terms of packet delivery ratio.

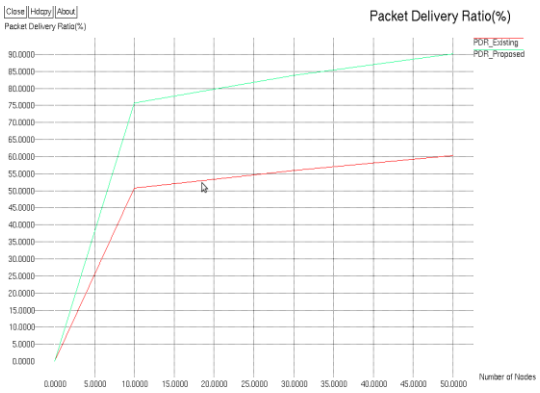

Figure 3: Packet delivery ratio versus number of nodes

C. ENERGY CONSUMPTION

The Energy consumption of QOD for 50 nodes is about 32J but the IEQOD has the energy 24J. Sleep and Awake method and selfish isolation method decrease energy consumption significantly compared with QOD shown in Figure 4. In this the quality of service in the wireless sensor network improved in terms of energy.

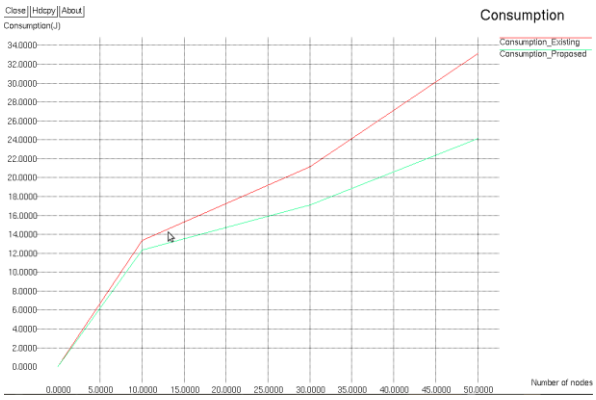

Figure 4: : Energy consumption versus Number of nodes

4 CONCLUSION

In wireless sensor network providing quality of service is an challenging issue. In existing work exploit quality of service oriented distributed routing protocol (QOD) transform the packet routing problem to a resource scheduling problem. Analytical and simulation result based on the random way model show that Quality Of

Service Oriented Distributed Routing Protocol (QOD) can provide QOS but it is not sufficient to provide QOS in WSNs. In this paper we improve the performance by combining selfish isolation method and awake and sleep scheduling of QOD. Simulation result of IEQOD shows that the performance of wireless sensor network is improved in terms of packet delivery ratio, delay and energy consumption.

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AUTHOR'S PROFILE

Jayashri.N obtained her B.E. in Electronics and Communication Engineering,(Kings college of Engineering ,Thanjavur 2013), M.E. in Applied Electronics (Hindusthan College of Engineering and Technology, Coimbatore 2015).She is currently doing her project work on Quality of service improved in WSNs using Improved Efficient Quality of Service Oriented Distributed Routing Protocol.

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