International Journal of Recent Trends and Technology in Electronics and Communication Engineering, Vol. (1), Issue (2), 2019

A SURVEY ON SELFISH NODE DETECTION IN WIRELESS SENSOR NETWORK

Abhishek Bhatt[1], Priya Mishra[2]
Email:Abhishekbhatt.iitr@gmail.com
[1]Professor, Dept. of Electronics and Communication,Technocrats Institute of technology -Science, Bhopal, India
[2]M. Tech Scholar, Dept. of Electronics and Communication,Technocrats Institute of technology - Science, Bhopal, India

ABSTRACT:

While using WSN, selfish nodes are the major problem which come in between the processing, which can be defined as the transfer of data into packets from one end to another end which requires the usage of bandwidth, battery power consumption and the memory or a space requires to allocate it a specific place. Whenever any end becomes free in this situation the transfer of data packets are done. But this process ends-up whenever the presence of selfish nodes is found also they do not transfer data, but starts utilizing the network resources for its own sake, and deny from sharing personal resources for other ends. Due to the selfish nodes the transmission of data does not work properly it causes an error. So, it is an important field to take care of it and its effect on wireless sensor networks (WSN). In our paper we have proposed an algorithm for selfish node detection in a given network.

KEYWORDS : *WSN, Selfish node, Retransmission Numbers.*

1. INTRODUCTION

Wireless Sensor Networks (WSNs) [1] and Mobile ad hoc networks (MANETs) are collection of mobile nodes which are held responsible for transmitting packets over a wireless transmission medium [2] [3]. The WSN is the construction of nodes, from a few to several hundreds or even thousands, where each node is associated with single or several sensors. Each such sensor network node has characteristically several parts: a radio transceiver with an internal antenna or linking to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, regularly a battery or an embedded form of energy reaping. WSNs are gatherings of mobile nodes swapping packets over a wireless transmission medium. Since packet transferring charges extra energy and bandwidth, balanced nodes may attempt to gather energy and bandwidth by greedily refusing to dispatch packets. Prevention, recognition and justification of selfishness among MANET and WSN nodes have recently received extensive attention. A wireless sensor network (WSN) [6] is made of spread sovereign sensors to check physical or environmental circumstances, like temperature, pressure, sound, etc. and simultaneously the data is passed in the course of the network to a major location. WSN has the benefits of minor volume, little power consumption, small cost, and dispersed,

self-organizing features. Since a universal sensing technology, the WSN is measured to be one of the 10 evolving technologies of the future living which has great likely for many applications such as military investigation, Industrial manufacture procedure nursing, environment nursing, disaster prediction, medical attention and harsh environment nursing and other fields. Mobile ad hoc networks are widely used and they are infrastructure less. It can be installed without base station and dedicated routers and don't rely on extraneous fixed infrastructure .It can be established when it is required. Each node in MANET, works as a router and maintain communication with other nodes. It is a multi-hop network. There are many MANET application in the world, for example, it can be used in natural disasters, battle fields etc. Due to presence of the selfish node MANET is affected during communication of data packets in case of accessibility of data. In these network, the nodes have limited battery power and bandwidth and each node needs the assistance of others for packet forward.

A selfish node [4] uses all the network resources but it never gives away its own resources to other node. The network is disordered when most of the node behave like selfish node happens. The selfish node utilizes the network property like battery power, bandwidth etc. for its own profit. If such a selfish behavior happens in the network, the network seems to be inactive. Retransmission numbers of nodes happens due to unsuccessful packets received at the destination nodes. It is basically similar with Automatic Repeated Request and it is responsible for resending of grouping of packets of nodes due to unreachable grouping of packets at the destination nodes. Every data items of each node is responsible for forwarding data packets to neighboring nodes. Retransmission numbers of nodes occur due to lack of grouping packets received at the destination node. So that the source node retransmits the data packets to destination node until the original grouping is reached at the destination node. In order to proper detection of selfish nodes, this paper proposes a new approach for cooperation of node's selfish behavior mechanism.

2. RELATED WORK

When a node becomes selfish in a network, the network doesn't properly work in order of relocating data in wireless sensor network. The nodes are not supportive in nature in case of relocating data because of selfish behavior. A selfish node utilizes the total network resources for its individual profit. When these behavior happens among most of the nodes in the network, it may finally escort to disruption of network. The influence of selfish nodes creates attention on the lead of service in MANETs and WSNs [1]. Features of selfish nodes [4]:

• A selfish node discard routing messages or it may change the Route request and Reply packets by altering TTL value to minimum probable value.

• A selfish node doesn't reply to hello messages, so that other nodes may not be capable to detect its existence when they want it.

• A selfish node delay the RREQ packet up to the highest upper limit time. It will definitely escape itself from steering ways.

• Selfish nodes may be the part of the routing messages but may not broadcast data packets.

The paper gives an overview of replica allocation techniques. The elasticity causes regular network partition, hence data accessibility in WSN and ad hoc networks is lesser than the fixed networks. The nodes which are not enthusiastic to broadcast packets and reveal their remembrance space are called self-centered nodes. The selfish node that doesn't allocate information for other node's purpose is called selfish replica allocation. The selfish nodes assign data stuff that are highly retrieved by it and don't believe other nodes throughout replica allocation. Selfish nodes lessen the data availability of extra nodes in query processing. The selfish nodes don't mollify neighbor nodes by giving mandatory information to them. The nodes can be divided into three types they are,

I. Non selfish nodes

II. Fully selfish nodes

III. Partially selfish nodes

Non selfish nodes behave like a normal node and allocate their memory space entirely for the use of another nodes. Non selfish node forwards packets to neighboring nodes successfully.

Fully Selfish nodes don't allocate their memory space for the use of other nodes. Fully selfish node doesn't forward packets at all to other nodes.

Partially selfish nodes allocate a smallest amount of their memory space for the use of other nodes and remaining for the benefit of own node. Diminishing the property of selfish nodes will be significant to surge the data availability between the nodes. Replica allocation procedures are employed to lower communication cost, while achieving good data availability.

In Chanak P, Banerjee, proposed mobile sink based diagnosis algorithm for wireless sensor networks, where the hardware and software status of the sensor nodes can be diagnosed by the mobile fault detector which is mobile transceiver does a job of mobile base station. The mobile fault detector moves around the network to detect the hardware and software status of static nodes in the network. It also introduced tour planning algorithm ,by which functionality and accuracy of the network is increased. The faulty nodes are excluded in the next diagnosis tour [5].

K. Chitra, have proposed Cluster Heed Failure recovery Algorithm, if the cluster head is failed, then the secondary cluster head will take over the role of cluster head which is failed. The cluster head and secondary cluster head information will be known to all cluster members, once the cluster head energy drops down below the threshold value, then it sends the message to all its members including secondary cluster head regarding their energy level, then the secondary cluster head becomes the cluster head then all other nodes in the cluster starts communicating with secondary cluster head [7].

Sami UlGani, have presented ,Cluster based fault detection algorithm is proposed, in which initially the cluster is based on Low Energy Adaptive Clustering Hierarchy (LEACH) protocol, and then the reliability of cluster members are verified. The cluster head takes the responsibility of fault

detection with its member Cluster based fault detection algorithm provides better network performance and detection accuracy [8].

T.Gobinath, have proposed a fault tolerance method based on mobile agent federation which is used for diagnostic and repair system based on consumption of less energy. It provides the fault tolerance at the node and network level, which had a hierarchical arrangement of nodes, where the nodes are grouped as cluster ,in each cluster will be having a cluster head which in turns reporting to the sink node. In each node in the cluster , fault tolerance mechanism is implemented. Statistics of the network element can be captured for fault detection , it also proposed communication protocol to initiate the fault repair system [9].

HOU Hui, have suggested, distributed fault detection algorithm in which sensor nodes detects its own fault depends on the information from its neighboring nodes. It also minimize the computational complexity and improve the accuracy, it uses the Neyman-Pearson test method to predict the fault status in every sensor nodes and neighboring sensor nodes. Voting scheme in applied on all sensor nodes to detect the final fault status of each sensor nodes. Author presented a Fault Detection and Recovery technique for Cluster heads (FDRC) in mobile wireless sensor networks .it chooses the monitoring node which in turn detects the faulty node in the network, It also finds the cluster head failure, then it is the responsibility of monitor node to determine the alternate cluster head [10].

DipaliBhosale, have proposed a novel centralized Naïve Bayes Detector (CNBD) fault detection method , where the end to end transmission time is calculated at the sink node using the communication protocols to determine the network status. If the network is faulty, then suspicious faulty sensor nodes can be listed where the Sensor nodes does not perform any of the computation as its own [11].

Table 1: Comparison analysis and working of several algorithms on different aspects.

Authors	**Algorithm/Technique**	**Remark/ Further extension**
Chanak P, Banerjee [5]	mobile sink based diagnosis algorithm for wireless sensor networks	The faulty nodes are excluded in the next diagnosis tour.
K. Chitra [7]	Cluster Heed Failure recovery Algorithm.	All other nodes in the cluster starts communicating with secondary cluster head.
Sami UlGani [8]	Cluster based fault detection algorithm is proposed	Provides better network performance and detection accuracy.
T.Gobinath [9]	fault tolerance method based on mobile agent federation	it also proposed communication protocol to initiate the fault repair system.
HOU Hui [10]	fault detection algorithm	Fault detection algorithm in which sensor nodes detects its own fault depends on the information from its neighboring nodes.
DipaliBhosale [11]	novel centralized Naïve Bayes Detector (CNBD)	End to end transmission time is calculated at the sink node using the communication protocols.

In the comparison table 1 above, some existing recent algorithms are discussed.

3. PROPOSED WORK

The proposed technique starts with pre-processing, segmentation, classification which we have used in our paper.

The presence of selfish node creates a defective network, there is no assurance that they will not delay, split, or make the packets, or take them out of order. The protocols those put forward truthful communication over those networks use a combination of acknowledgments, retransmission of missing or broken down packets, and checksums to provide that reliability.

Here each node connected to other nodes and shares their data items for transferring of data packets to neighboring nodes and the cost is assigned to every linked node. Dijkstra's algorithm is used to find the shortest path from source to destination node. But presence of the selfish node creates huge network failure. The original grouping of data packets are forwarded from source node can't reach at the destination node and some of the packets are missing or total packets are missed at the destination node. So retransmission numbers of node occur between these nodes.

Proposed Algorithm

Selfish_Node_Detection (NDmax, NDi)

// NDmax= maximum average retransmission numbers within a certain period //

// 1 , 1, 2..... jj n i ND ND j n n ¦ j=1, 2…n //

1. For (each linked node Nk in G) // decision = NDi / NDmax //

2. If (decision<Thresholdlow)

3. Nk is marked as fully selfish;

4. ElseIf(Thresholdhigh>decision>`Thresholdlow)

5. Nk is marked as partially selfish;

6. Else.

7. Nk is marked as non-selfish;

Here from step (1) to step (11) determines whether the node is a partially selfish node or is a fully selfish node or it is a normal node according to the judgment of retransmission numbers of each nodes by the formula given in equation(1).

4. CONCLUSION

The rate of finding out the network has been improved by an algorithm that we have used. In wireless sensor networks the performance of the networks destructed by the selfish nodes and effects the performance of the whole network because of the non-co-operative nature to other ends or say nodes. The selfish node timely detection is a very crucial issue that is required to resolve as soon as possible. To resolve this issue we will have to create a co-operative nature for the respective data packets to the other nodes.

REFERENCES

[1] Imran Khan., May/June 2015 "Wireless Sensor Network Virtualization: Early Architecture and Research Perspectives." Issue.

[2] Ali Dorri, Seyed Reza Kamel., February 2015. "SECURITY CHALLENGES IN MOBILE AD HOC NETWORKS, International Journal of Computer Science & Engineering Survey (IJCSES) Vol.6, No.1.

[3] Aijaz Ahmad Anchari., July- 2017. "Routing Problems in Mobile Ad hoc Networks (MANET), International Journal of Computer Science and Mobile Computing" Vol.6 Issue.7, pg. 9-15.

[4] Jebakumar Mohan Singh Pappaji Josh Kumar., December 2015. "A unified approach for detecting and eliminating selfish nodes in MANETs using TBUT".

[5] Chanak P, Banerjee., 2016 "Mobile sink based fault diagnosis scheme for wireless sensor networks, Journal of Systems and Softwar." 05.041, 119. pp. 45-57. ISSN 0164-1212.

[6] PriyankaDeokar., January 2017. "Survey on the Selfish Node Detection in the Mobile Ad-Hoc Network" Vol. 5, Issue 1.

[7] K. Chitra, "A Comparative Study of Various Clustering Algorithms in Data Mining, IJCSMC" Vol. 6, Issue. 8, pg.109 – 115.

[8] Sami UlGani, DeepikaRana., July 2017. "MOBILE SINK BASED ENERGY EFFICIENT ADAPTIVE CLUSTERING HIERARCHY PROTOCOL FOR WSN, IJCSMC" Vol. 6, Issue. 7, pg.255 – 264.

[9] T.Gobinath., | Mar -2017. "A Survey of Fault Tolerance Methods in Wireless Sensor Networks",Volume: 04 Issue: 03.

[10] HOU Hui., 2017. "Research on Insulator Fault Diagnosis and Remote Monitoring System Based on Infrared Images" (WTISG).

[11] DipaliBhosale., August 2014. "Feature Selection based Classification using Naive Bayes, J48 and Support Vector Machine" International Journal of Computer Applications (0975 – 8887) Volume 99– No.16.