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Impactofcritical Nodeand Selfish Nodeandhandlingtheminwsn

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Abstract : *Every Node Relaydata Packets Tofurther Nodes And Spend Its Property In Wireless Sensor Network(Wsn) Communication. In Bestcircumstances All The Nodes Forward Packets To Other Nodes In A Network According To Their Demands .Presence Of Critical Node And Selfish Nodes Is A Very Big Matter In Wsns. The Data Communication Fails Because Aselfish Node Doesn't Forward Packets To Other Nodes And The Critical Node Simply Divides The Network Into Two Or Several Sub Networks. If This Type Ofsituations Happens Within Most Of The Nodes In The Network, The Network Is Disrupted Or Divided Due To Presence Of Critical Node And Selfish Node. In Our Paper We Have Describedthe Impact Of Critical Node And Selfish Node And Handling Of A Selfish Node And The Necessary Action To Be Taken If The Node Is A Critical Node.*

Keywords:*Wsn,Manet, Selfish Node,Critical Node, Residual Capacity,Throughput,Replica Allocation.*

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I. Introduction

Wireless Sensor Networks (WSNs) andMobile ad hoc networks (MANETs) aregathering of mobile nodes which are held responsible fortransaction ofpackets over a wireless transmission medium.The WSN is the construction of nodes , from a few to several hundreds or even thousands, where each node is associatedwithsingleor several sensors[1],[4]. 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 energyreaping.WSNs are gatherings of mobile nodes swappingpackets over a wireless transmission medium. Since packet transferringcharges extra energy andbandwidth, balanced nodes may attempt to gatherenergy and bandwidthby greedily refusing to dispatchpackets. Prevention, recognition andjustification of selfishness among MANET andWSN nodes have recently received extensive attention.A wireless sensor network (WSN) is made of spread sovereign sensors to check physical or environmental circumstances, like temperature, pressure, sound, etc. and to simultaneously the data is passedin 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 ismeasured to be one of the 10evolving 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[7],[5]. Each node in MANET, works as a router and maintain communication with other nodes. It is a multihop 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 networks , the nodes have limited battery power and bandwidth and each node needs the assistance of others for packet forward.

When a node becomes selfish as well as critical node , the network is divided according to the position of the critical node .The presence of the critical node , decomposes the network into two or several sub networks[7].Critical node problem is a N P-Complete .The critical node is an element or position, whose disruption is immediately degrades the performance of the network. The nodes of one network can't forward data packets to the nodes of another network. so the network is divided and the communication is disrupted. Critical nodes consume all the network recourses like battery power , bandwidth etc.A major reason of a node becomes a critical node is heavy battery power consumption. If a selfish node becomes a critical node , the

network is divided and to overcome the problem of data accessibility among nodes need the replica allocation of data in memory space of other nodes.

The timely recognition of critical node is important in order to perform some data or service replication. Several existing centralized or globalized algorithms declare an edge or a node as critical if their removal will separate the network into several components. A node is critical if the sub-graph of k-hop neighbors of node (without the node itself) is disconnected.

A selfish node enjoys all the resources of the network for its own profit but it never gives away its own resources to other node.When most of the node behave like this disorder of network[5] happens. The selfish node utilizes the network resources like battery power , bandwidth etc. for its own profit. If such a selfish behavior happens in the network , the network seems to be inactive.

To improve the accessibility of data between nodes , the data present in owner node is replicated to other nodes as well[6] known as replica distribution. In the replica distribution technique , the data present in memory space of one node copy to memory space of another node. So that the node transfers data to otherneighboring nodes successfully.The CONFIDANT algorithm to arrangement with selfishnodes[10], the algorithm achieved thereputation value and in use to remove network method to punish non-cooperative nodes, the method exists a problemof malicious nodes failure behavior .

In order to determine the impact of critical node and selfish nodes, this paper proposes anew approach and gives an idea of cooperation of node's selfishbehavior mechanism .

RELATED WORK

When a critical node present in the network then alternate path will be selected for the efficient work[11]. The major challenges are:

1. Mobility: The mobility of the nodes results in frequent path breaks, packet, collisions, transient loops, stare routing information and difficulty in resource reservation.
2. Capability for power control: The transmission power control reduces the energyconsumption at the nodes.
3. Ability to measure the resource availability: The MAC protocol should be able to provide an estimation of resource availability at every node.

If there is a critical node present in the network then we have to give attention towards some properties.

The properties are

a) Reliability
b) Residual Battery Power
c) Minimize Energy Consumed/Packet
d) Availability
e) Residual Capacity

Every node in the network consume their required energy and they want consume extra energy.

For one packet, energy consume $\mathrm{E} = \sum_{i=1}^{k-1} \mathrm{T}\ (n_i, n_{i+1})$

Some of the nodes consume heavy amount of energy or packets , so that the network is partitioned as the nodes become critical.

When a node becomes selfish, the network doesn'tappropriately work in instance of relocating data in wireless sensor network. The nodes are not supportive in nature in case of relocating databecause of selfish behavior.

A selfish node utilizesthetotal network resources for its individual profit. When these behavior happens among most of the nodes in the network, it mayfinallyescort to disruption of network. This section*[1]* studies the influence of selfish nodes consideration onthe control of service in MANETs and WSNs.

Features of selfish nodes [1]:

a) A selfish nodedoesn't take part in routing procedure
b) A selfish nodedoesn't answer or transmit hello messages
c) It intentionally delays the RREQ packet.
d) Selfish nodes perhaps be part of the routingpost but may not broadcast data packets.

The cost of a packet is decided by numerous parameters such as essentialoverall transmission power and the battery status of the intermediate nodes. Themethod to deal with this selfish behavior should be dependent on their concentration intensity inthe network because of the impact they have on the network commotion will be different at different level oftheir concentration.

The difficultyof selfish nodes can be similar in ad hoc networks and WSN [1]. The major purposefor theselfishness is the deductionof power with time. As the time passesaway the nodes consume their batterypower and in a disaster hit area or battle field area restoring is not technically feasible.

The selfish node isconcerned to diminish data accessibility and createhighdata communication cost in terms of inquirydispensation[6].Various selfish node discoveryapproaches are there to identify the nodes which

don'tcontribute in packet forwarding but they fall short to detect the selfish nodes which does not allot replica for the reason of further nodes. The methods are able to detect selfish nodes as assigning replica to other nodes. The methods are divided likedetecting the selfish nodes and decreasing the effect of that nodes in mobile ad hoc network. Themajor attributes are counted as the selfish nodes and number of replica share techniques. The selfish node detection algorithm that considers partial selfishness and novel replica allocation techniques to properly cope with selfish replica allocation.

Reliability computationof large scale MANETs is an NP computational problem, and this complexity can be concentrated by recognizing critical nodes in a network. The identificationof critical nodes itself is a computationally hard problem [7].

The consequence of selfish nodes concentration [0-100%] on the various Quality ofService (QoS) parameters[1]. The QoS parameters is taken into contemplation are as follows:

1. Throughput: Proportion of packets accepted by the target to the number of packets directed by the source.
2. Hop count: Stated as the number of hops present between cause and goal.
3. Packet dropped: Amount of packets abandoned by the routers for many reasons.
4. Probability of Reachability: Division of probable accessible routes to the all likely routes among all different sources to all different destinations.

Thus with the rise in attentiveness of selfish nodes:

1. The average hop count may possiblyraise
2. The packet drop rate may possiblyraise
3. The average throughput may possibly decline
4. The probability of reach abilitymay possibly decline

The paper gives an overview of replica allocation techniques[6]. Theelasticity 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 revealtheir remembrance space are called self-centered nodes. The selfish node that doesn't allocate information forother node's purpose is called selfish replica allocation.

The selfish nodes assign data stuff that are highly retrievedby it and don'tbelieve other nodes throughout replica allocation. Selfish nodes lessen the data availability of extra nodes in query processing. Theselfish nodes don't mollify neighbor nodes by giving mandatory information to them. The nodes can be divided into three types[8] they are,

1. Non selfish nodes : forward data packets to other nodes successfully.
2. Fully selfish nodes: don't forward packets to other nodes at all.
3. Partially selfish nodes : forward packets but less number of packets reached at the destination node.

Diminishing the property of selfish nodes will be significant to surge the data availability between the nodes.

Replica allocation proceduresare employed to lower communication cost, while achieving good data availability.

In Wireless sensor network, the characteristic data ofnodes selfish behavior including throughput, delay time,retransmission numbers [3].

II. Proposed System

Both critical node and selfish node create major impact on throughput, hop count, packet dropped, probability of reachability.In the network where selfish behavior happens, are usually defective, there is no guarantee that they will not holdup, break, or make the packets , or take them out of order. Protocols those offertrustworthy communication over those networks use a mixture of acknowledgments,retransmission of missing or broken packets, and checksums to provide that reliability.When a node become critical , the main reason in this paper is heavy consumption of battery power. All mobile should drain their power at equal rate as a minimal set of mobile exist such that their removal cause network to partition. Such node is called as critical node.

Here we consider residual capacity of a node to identify the critical node.

Residual Capacity is defined as the difference between the node's channel capacity and the sum of the bandwidth consumed by all contending flows of that node. Channel capacity means total bandwidth.

Residual Capacity,$R_c = \frac{T_{idle}}{T_p} (C_c)$---------- 1

T_{idle} = channel idle time during previous measuring period T_p

C_c = channel capacity

For each node in the network, we calculate the residual capacity and measure the throughput of that node for a critical node.

From the equation(1) , we can calculate the average throughput of the critical node and selfish node.

3.1 Handing the selfish node and criticalnode and make the selfish node into cooperative nature:

To decrease the hop count, increase the throughput and to increase the percentage of reachabilityof packets for transmission of packets in WSN due to selfish behavior of node and critical node present between the networks , replica allocation technique is very efficient for cooperating the selfish node to other nodes.

The replica allocation technique is used to make the selfish node cooperative in nature to other nodes .When a network is disrupted or the network is divided due to critical node , the nodes are not responsible for forwarding packets. In this technique all nodes are having data items of other nodes.where nodes ND1; ND2;... ND6 contain their memory space MS1; MS2;...MS6, respectively.When the data transmits from one node to another nodes , sharing of memory space of each node is responsible for transmission. If one node is selfish in the network or it is a critical node , the memory space of selfish node and critical node doesn't take the data items of other neighbor. For forwarding packets through the selfish nodes and the performance of the critical node simply copy the data items of neighbor nodes into the memory space of selfish node explicitly and make the selfish node cooperative to other nodes.

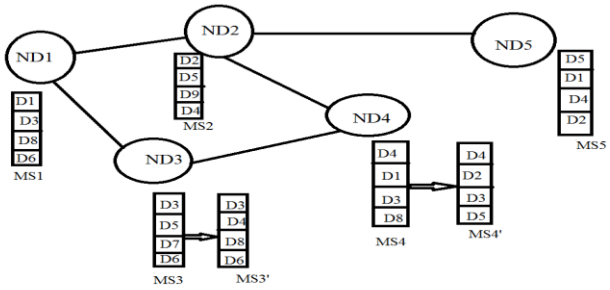

Figure 1: *Replica allocation to nodes in network G*

To overcome the selfish behavior of a node and critical node in a networkG , replica allocation helps to make the selfish node and critical node cooperative with neighbor nodes and other nodes. If the selfish node becomes fully selfish node , the node doesn't forward any packets to other nodes. For cooperation , the selfish node and critical node makes replica of other neighbor nodes and store the data items into its memory space.

3.2 Proposed Algorithm

Replica allocation algorithm

// Handling the network during the presence of critical node and selfish node//

1. Replica_allocation()
2. for(each linked node NDkfrom NDi)
3. copy replica of NDk into NDi ;
4. NDki=the total number of allocated replica;
5. SSki= the total size of allocated replica;
6. if(Dihas not allocated replica to Dk)
7. NDki=0;
8. SSki=0;
9. else
10. NDki=1;
11. SSki= size of the data item;

From step (1) to step (16) gives how the selfish node become cooperative with other nodes by the technique of replica allocation. In this technique , adjacent nodes are considered for replica allocation where D_k havingthe size of shared memory space and it is denoted as $SS^k_i$and shared data items of D_k's is denoted asND^k_i ,observed by D_i.For selfish behavior removal where data items of one node creates a replica of data items of another neighbor nodeand store in its memory space.

III. Evaluation

We have implemented in MATLAB . We have calculated the residual capacity for each node in the network. Average throughput decreases when concentration of selfish node increases. The process of selection of source and destination is random there are some fluctuation in the results as shown in figure(2).

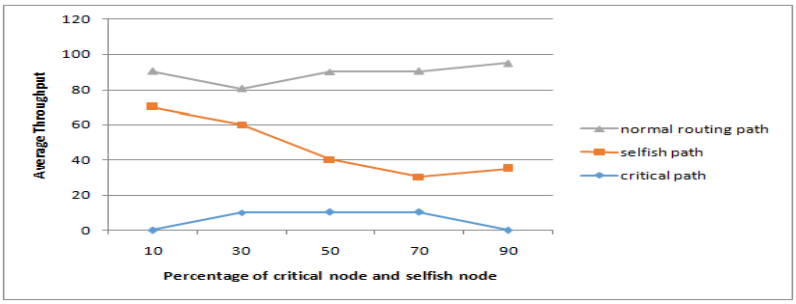

Figure 2: *Impact of critical node and selfish node on Average throughput*

In figure 2 , we have shown the throughput of critical node , selfish node and normal node .
For handling the selfish node, simply change the stratagem of the selfish node by replica allocation. In replica allocation , we use contention window (CW) for sharing of data items. We use 12 nodes where node 0 is the central coordinator node and remaining 11 nodes to build a 11 link simulation scenario.

Figures & Tables
Figure 1: Replica allocation to nodes in network G
Figure 2: Impact of critical node and selfish node on Average throughput

IV. Conclusion

We have designed an algorithmwhich will improve the performance of the network and also described about impact of critical node and selfish node in Wireless Sensor Network.The selfish behavior of nodes and the presence of critical nodesresult in degradationof the performance of the whole network in the wireless sensor networks. The critical node and the selfish node detection andhandling is very important issue and makes the nodes cooperative in nature in case of transferring data.When the selfish node becomes critical node , it will have a major impact on the network and the network is divided. To overcome the problem of network partitioning and forward packets between nodes successfully , replica allocation technique is used. Replica allocation technique gives better result for communication of data packets between nodes.

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