Research Article

Attack Prediction By Using Greedy Algorithm For Diminishing The Drop And Delay In Wireless Sensor Networks

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Article History: Received: 11 January 2021; Accepted: 27 February 2021; Published online: 5 April 2021

.**Abstract:** The essential constraint of the internet is that forwarding the data packets of data among the restricted and trustworthy data nodes. If the receiver node is attacker node then it'll drop the data rather than forwarding the data to ensuing neighbor node. Therefore, efficient and secure data transmission is extremely necessary within the network data transmission. Each router node within the network can accept the data packets up to its buffer size only. Once the queue value reached the buffer threshold value then congestion can occur at the node. Once congestion happens then it would lose the data packets. By sending the data packets to the next neighbour node this problem will be resolved. This congestion will be handled by the Fully Distributed Congestion Control FDCC and Cooperative and Memory Efficient Token Bucket (CMTB) algorithms. Because the data is transmitted to the next neighbour node predicting the node behavior is extremely necessary because it is an attacker or the conventional transmitter node because it has to transmit the efficient data securely to the destination node. In this paper, the node behavior will be predicted by analyzing the trace file. The simulation results show that this proposed method would provide a lot of security in data transmission. The WSN comprises a group of sensor nodes that are disseminated on the network. These sensor nodes initially exchange their data packets to the near nodes to send the data packets to the target node. During the transmission of these data packets some data packets drop may also happen inside the network. This packet drop should be kept up as low as feasible for correct data transmission to the target node or destination node. This algorithm highlights the routes with high link quality, low packet delay and with low packet drop. Simulation results show that this proposed algorithm can provide the most effective path for transmitting the data to the destination meanwhile it reduces the packet drop and packet delay.

Keywords: Cooperative and memory-efficient token bucket (CMTB), fully-distributed congestion control (FDCC), Wireless Sensor Network, Edge Greedy Algorithm, Malicious Node, and Congestion Control.

I. INTRODUCTION

One of the most important ICN (Information-centric Network) Architectures is CCN (Content-Centric Networking). This CCN treats the content as primitive. Here the user required content is requested and retrieved with the help of the name instead of using the specific IP address [2].in CCN, this would have two packets one is interest packet and data packet. For requesting the required content it uses the interest packet. Over all the available connectivity a consumer asks for the required content by broadcasting its interest. If any node received this interest and having the interest data then it will send the data packet. This CCN architecture has three main data structures such as FIB

(Forwarding Information Base), 2.Content Store (Buffer memory) and 3. PIT (Pending Interest Table). Here the consumer will send the interest packet to get the required content. Whenever the interest packet is reached to the receiver it will check the availability of the requested content in its CS. if the CS contains the requested content then the router will throw the data packet in the reverse path of the interest packet. If CS Does not contain the requested content then it will check in the PIT. This PIT contains the interest records. Here the FIB is used to determine where it is needed to forward the interest packet and this FIB contains the outgoing faces [3].

In CCN When the lifetime for the specific interest packet is expired then the interest is removed from the PIT even though it doesn't get the requested data object. So the consumer should resend the interest packet again [4]. This interest packet lifetime may expire due to congestion or its duration is shorter than the network delay. This results in packet loss and retransmission. Congestion prevention is very important in CCN to provide the better quality of service in delay sensitive applications.

In CCN congestion can occur due to the overflow of the packets in the transmission buffer associated with the outgoing interface [5]. In other words, it can also say that if the packets are arriving faster than the routers processing capacity this will cause the packet loss, buffer fullness and interest retransmission. The reason behind the CCN buffer overflow or the congestion control is the incoming chunks from the content provider instead of interest packets. Which are the outgoing interest packets generated by the consumer [6] Due to this congestion occurrence in the CCN, it will lose the data packets and the efficient requested information may be lost.

The congestion or packet overflow problem in the network can be solved by monitoring the queue. To monitor this queue this method used two algorithms namely cooperative and memory-efficient token bucket (CMTB) and fully-distributed congestion control (FDCC). Here CMTB algorithm monitors the buffer size and controls the rate at which the packets are injected into the network. In order to make sure the CCN buffer router overflow as well as to avoid underflow. Here the FDCC algorithm is used to monitor the queue. If the queue value is greater than the queue threshold value then the congested node will inform the source node to reduce the data rate and it will inform the downstream node to handle this traffic. By using this it can reduce the packet drop which causes the congestion.In the existing system, with the help of the selected router the data is transmitted from the source node to destination node. For the selected router it will calculate the buffer router threshold value. Here it monitors the rate at which the data packets are reaching the router. To monitor the packet rate here it uses the CMTB algorithm and with the help of the FDCC algorithm it will monitor the buffer size value. Whenever the queue value limit reached the buffer threshold value then the selected router will become congested and then received data packets are assigned to the next router to handle this data traffic. If it transfer the data to the next neighbor node predicting the type of the router is very important to transmit the data securely to the destination. If the neighbor node is the attacker node then it will drop the data instead of sending the data to the next neighbor node. So in the existing system security is less even though the data drop is less and packet delay is less. In this proposed system has used the FDCC and CMTB algorithms are used to monitor the queue value and to monitor the data transfer rate. Whenever the queue limit value is greater than the queue threshold value then the congestion will occur then the data transfer will be shifted to the next neighbour node. Here it used the malicious node detection algorithm to detect the neighbour node is either attacker node (malicious node) or the normal data transmission node. So here it manually introduced one malicious node to prove the data drop occurs at the attacker node and packet delay is also high due to packet drop. Here the packet drop can be identified by the analysis of the simulation trace file.

II RELATED WORK

Increasing Throughput and Reducing Delay in Wireless Sensor Networks Using Interference Alignment [9] in this, it primarily concentrating on increasing the throughput and decreasing the delay in wireless sensor networks. Because of higher communication and sensing abilities of the sensor nodes, the challenge faced by the network is to maximize the data gathering capability of sensor networks. Because of large knowledge transmissions, interference can arise within the data network layer. Once multiple data transmissions occur to extend the network capability the interferences is a vital issue within the network. If these interferences continuously occur then the delay and throughput of the data transmission can become less. To enhance the delay and throughput values it proposed a new methodology that utilizes the interference alignment (IA) technique to reduce the interference effects in wireless sensor networks (WSNS).In this proposed IA technique the multiple transmitters can put together encode their signals to the allotted receiver nodes, therefore, the interference signals are eliminated. Finally, it can conclude that the proposed methodology will increase the performance of the network layer in terms of delay and throughput.

Minimizing Delay and Maximizing Lifetime for Wireless Sensor Networks with any cast [10] in this paper, it is principally concentrating on minimizing the delay and increasing the lifetime of the event-driven wireless sensor networks. In event-driven networks, the events can occur occasionally. In this kind of networks, the energy is wasted while it waits for the arrival to occur. The sleep-wake programming methodology is an efficient method so as to increase the period of the energy-constrained wireless sensor networks. In this method also the packet delay is high. This delay will be reduced by developing the any cast-based packet forwarding schemes. Within which every node send the data packets to subsequent close node then this node can awaken among multiple candidate nodes. During this paper, it implements the any cast forwarding theme for minimizing the delay from the device nodes to the sinks. The numerical results show that our proposed methodology can reduce the delay and improve the period of the network particularly within the practical things wherever there are difficulties, e.g., a lake or a mountain, in the coverage space of wireless sensor networks.

An interference aware routing algorithm for multimedia streaming over wireless sensor networks [11] the wireless sensor networks vary from the standard communication networks in some ways. Due to the availability of the low-priced cameras, microphones and alternative sensor producing the multimedia data it received to develop the wireless multimedia system sensor networks (WMSNs). The foremost necessities of the multimedia system applications include the end to end delay, bandwidth and loss during the data transmission. Directed diffusion is that the data-centric algorithmic rule designed for wireless sensor networks. But this protocol is inefficient within the video sensor networks. Because it'll not satisfy the throughput and delay necessities of the multimedia data. Thus during this paper, it proposed the Expected rate (EDR), for accurately finding high throughput paths within the wireless sensor networks.

The simulation results show that our proposed methodology can choose the routes that may offer the higher throughput, low delay and improves the performance of the wireless sensor networks in the multimedia data transmissions.

Enhance Throughput in Wireless Sensor Network Using Topology Control Approach [12] this paper is especially aimed at a way to improve the throughput in wireless sensor networks with the implementation of the topology control approach. Usually, the wireless sensor network is characterized by restricted energy supply and made of a large range of nodes. It will consider that topology control is that the best method for maximizing the network lifetime of the wireless device network. Every attempt within the sensor network is formed to reduce the energy consumption and to maximize the throughput of the wireless sensor node. This topology control technique is especially aimed at extending the lifetime and minimizing the packet delay. This minimizing the delay and up the period of the nodes are referred to as network-wide goals.

The topology control formula is mainly divided into transmission-power-based algorithms and duty-cycle-based algorithms. These algorithms are divided per their energy-saving approaches. The proposed methods are used to enhance the power and throughput among the nodes in a very wireless network in any kind of network topology is implemented.Approaches for Combating Delay and Achieving Optimal Path Efficiency in Wireless Sensor Networks [13] this paper propose very different methodologies for enhancing path efficiency and lessening the delay in wireless sensor networks. Due to the extensive variety of utilizations of the wireless sensor networks, the scientists are showing extra enthusiasm towards these wirelesses sensor networks (WSNS). Sensor network primarily comprise of four execution measurements as it explicitly network lifespan, the end to end delay, packet delivery ratio and throughput.

During this paper first, it enhanced the life span and lessened the time delay of the sensor networks with the help of the any cast operation inside the sensor network. Furthermore, a delay aware knowledge collection network structure is proposed for raising the end to end delay inside the network. It comprises of top-down and bottom-up methodologies.Here it tend to conjointly projected the SRP-MS (squared path with mobile sink) has been proposed for rising the life expectancy of the wireless sensor networks. Here it additionally proposed the Delay-aware and Lifetime- balancing data assortment Protocol for Wireless sensor Network for raising the throughput of the wireless sensor systems.

III PROPOSED METHODOLOGY

In the existing system by using the selected router it can send the data from the consumer node to the selected server node via a selected router. Every router has some specific buffer capacity value. It can monitor the queue value when the data packets are passing through the router. Queue value is nothing but the rate at which the data packets are entering into the router. Here FDCC algorithm is implemented for monitoring queue value and the rate at which the packets are reaching the router can be monitored by using the CMTB algorithm. When the packet rate exceeds the queue threshold value then the router will get congested.

To handle these data packets it is using the next face router to handle the traffic and it added a malicious node to perform the packet drop and it predicted the malicious node presence in the network by analyzing the trace file. Due to this malicious node, it gets the high packet drop and packet delay. It is necessary to improve the packet drop and delay in the network even though if the malicious node is present.

In this paper, it is proposed the CMTB and FDCC algorithms for monitoring the packet rate and the queue value. Whenever the congestion occurs in the network then this congestion can be handled by the next face router. While transferring the data if the neighboring node is an attacker node then this node will drop the data instead of sending data to the next node.

For selecting the nearest path in data transmission here it uses the EDGE a greedy algorithm. EDGE is a distributed algorithm which can dynamically select the efficient sub path. Then the final path is selected at the sink node.

The number of candidate routes at the sink node is O (M), where M is the maximum number of neighbors. In this way, it can minimize the time delay at the sink node. The simulation results show that our proposed algorithm will provide the shortest path for transferring the data and also reduces the packet delay and packet drop in the network.

ALGORITHM USED

In this paper, it has mainly proposing three algorithms for controlling the congestion occurrence and for decreasing the packet drop and packet delay.

The happening of the congestion in the sensor network can be observed and controlled by using the FDCC and CMTB algorithms. Cooperative and memory efficient token bucket (CMTB) algorithm are used for supervising the packet rate and fully-distributed congestion control (FDCC) is used for monitoring the queue value. If the queue limit is greater than the queue threshold then the arriving data packets are handled by the next face router.

Now the next requirement is to diminish the packet drop and packet delay in the network. To reach this goal it proposed the EDGE a greedy algorithm which chooses the nearest neighbour node reaching the router and reduces the delay and drop by avoiding the far node or random node selection.

Algorithm:

Step1:-Enter the total no of nodes it wants to create.

Step2:-for (i=first router; i<last router; i++)

{

Calculate the minimum distance from source node to the all routers.

}

Step3:-assign router as minimum distance i^{th} router.

Step4:-assign next face router as $(i+1)^{th}$ router.

Step5:-select destination server.

Step6:-add the malicious node.

Step7:-Calculate the buffer router threshold value.

Step8:-transmit the data packets.

Step9:-monitor the queue value.

Step10:-if (queue limit>router threshold)

{

Congestion is occurred and informs the next face router to handle the traffic data.

}

Else

{

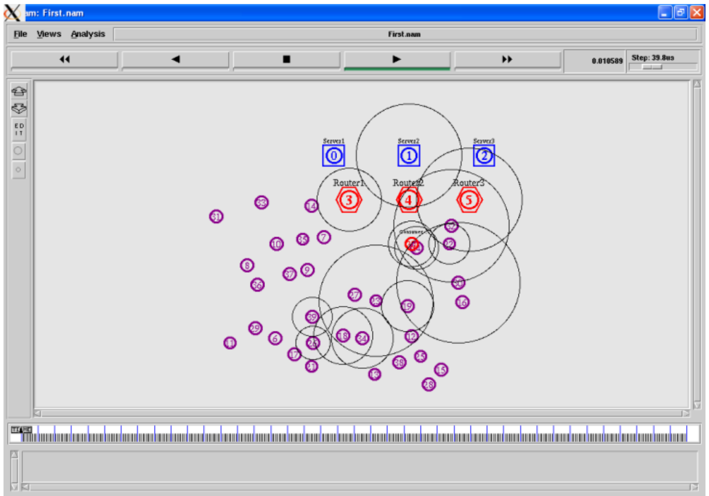
Transmit the Data from the selected router.

}

Step11:-calculate the packet drop and packet delay.

Step12:-Analyze the trace file to predict the node behavior.

Recently the wireless sensor communication has reached the exponential growth due to the need for their connectivity. This growth is same and continuous Because of the exchange of the data in the services such as internet; email and data file transfer in the wireless sensor networks. due to various characteristics of these wireless sensor networks the wireless sensor networks (WSNS) are receiving much attention In the network research community and these characteristics of these WSNS are low-cost, low-power and multifunctional capabilities[1].some of the fields where these sensor networks used are industrial, agricultural, vehicular, residential, medical sensors and actuators and in some other fields also. These wireless sensor networks usually made up of a huge number of sensor nodes. These sensor nodes are capable of sensing, processing and wireless communicating with the adjacent sensor nodes [2]. If it randomly takes two nodes, many possible routes are available between the two selected nodes and with the help of these nodes it can transfer the data. The data collected by these sensor nodes will send the data to the command centre also known as destination node directly or through multiple wireless hops [3].If the network layer consists of the destination node then it can easily transfer the data to the destination node without any interference [4].



Directed diffusion in data-centric networking has been commonly used in wireless sensor networks Due to its energy efficiency and scalability [5].it transmits the data from the data source to the destination node with low delay. This advantage will make the increasing the need for these wireless sensor networks. For example, video sensor network layers will require the data should be broadcasted with low latency and high throughput value and with low packet drop value. So it is necessary to suggest an algorithm which will broadcast the data from the source node to the destination node with less packet delay and packet drop.

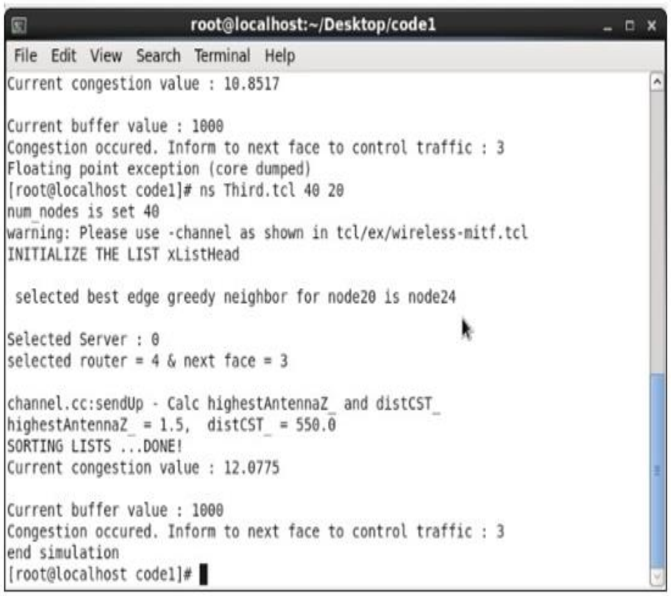
In the existing system, on using the intermediate nodes the data packets are sent out from the source node to the destination node. Initially, the data is transmitted from the source node to the selected router. Typically this router has some threshold value and this router will accept the data packets upon this buffer threshold value only. Whenever the data packet rate go beyond this buffer threshold value then this buffer router will drop the received data packets. Then congestion will occur in the network. So it is essential to control the congestion occurrence inthenetwork. On sending these data packets to the next specified router it can handle the congestion occurrence in the network. This router will handle the excessive received data packets.

This congestion occurrence in the network can be identified and controlled by using the CMTB and FDCC Algorithms [8]. As the data packets sent out to the neighbor node predicting it is necessary to predict the type of the node. If the node is attacker node then this node will drop the data instead of sending the data to the neighboring node. If the attacker node is present then the packet drop is high. In the existing, it used the malicious node detection algorithm to predict the attacker node presence in the network. Due to this attacker node presence, it loses this data packets so packet drop is high and packet delay is also high [7].

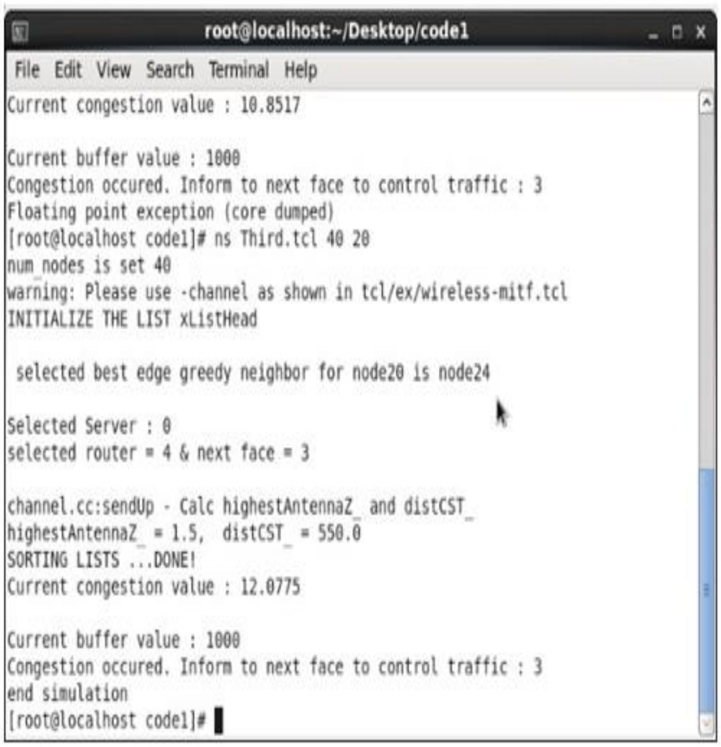
To reduce this packet drop and packet delay in the data transmission network it is proposed the edge greedy algorithm. The packet drop and packet delay can be reduced by taking the efficient route for data transmission. Here it proposed a greedy algorithm which considers both delay and packet drop and calculates the efficient route for data transmission. The design of the wireless sensor networks should essentially follow two rules since as it is self-detection of the link quality and in-network processing. This is essential because of the inconsistency in link quality, low bandwidth of the wireless sensor network and due to the less memory capacity of the wireless sensor nodes. To calculate the transmission quality in wireless sensor networks ETX (Expected transmission count), a link layer metric can be used by the network layer. The ETX of the route can be calculated by the addition of the ETX of all the links in the route [6].initially our algorithm will take all the neighboring nodes and calculate the distance to each node from the sensor node. The node which has the least distance will be chosen as the best path for data transmission. Finally our algorithm will reduce the packet drop and packet delay by selecting the neighbor node instead of selecting the random or farnode.

IV RESULTS AND DISCUSSION

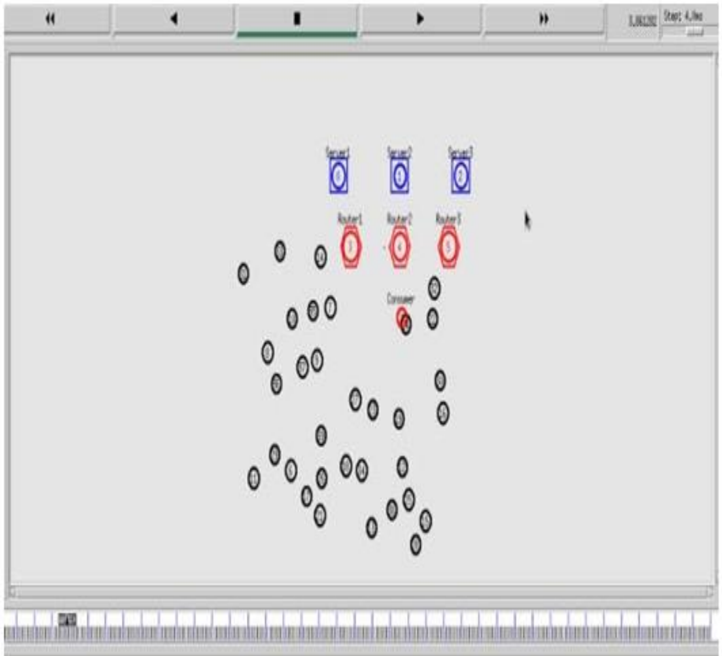
The below presented screen shown the concept of simulation by running the second.tcl file. In which the number 40 represents the total no of nodes in the network and 20 represented the source node. In this screen it can also observe that the selected router is 4 and the next face router is3.



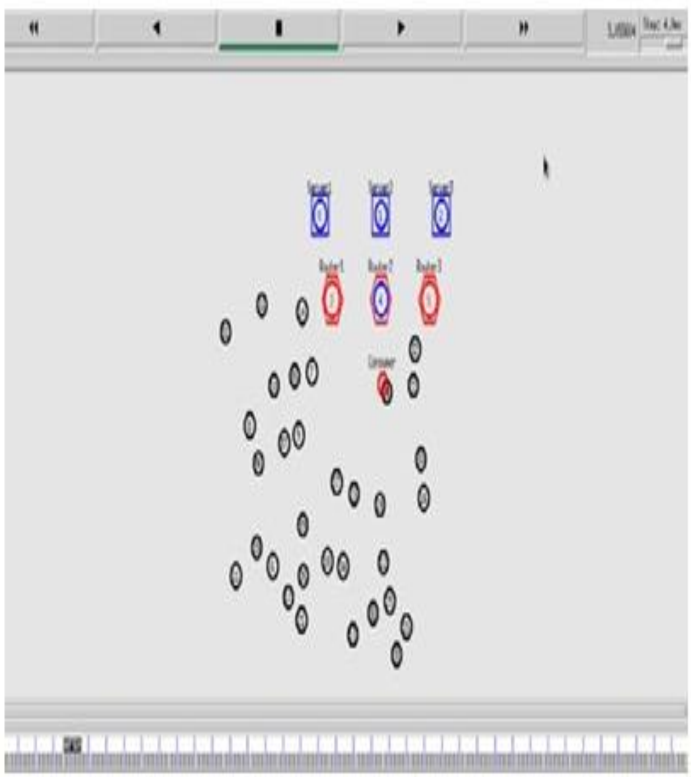
In this below screen it can see that the network topology is formed which consists of nodes, routers and servers.



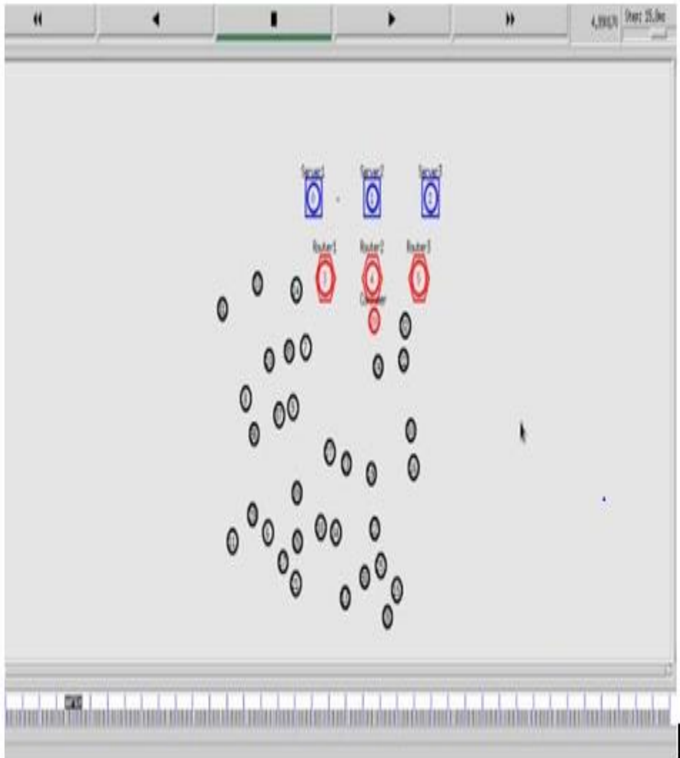
Here it can also view the consumer node as 20.Now the data will be transmitted from the source node to the selected router whenever the queue value is reached the buffer threshold value then congestion will occur. Here the congestion occurrence will be represented by changing the color of the router.



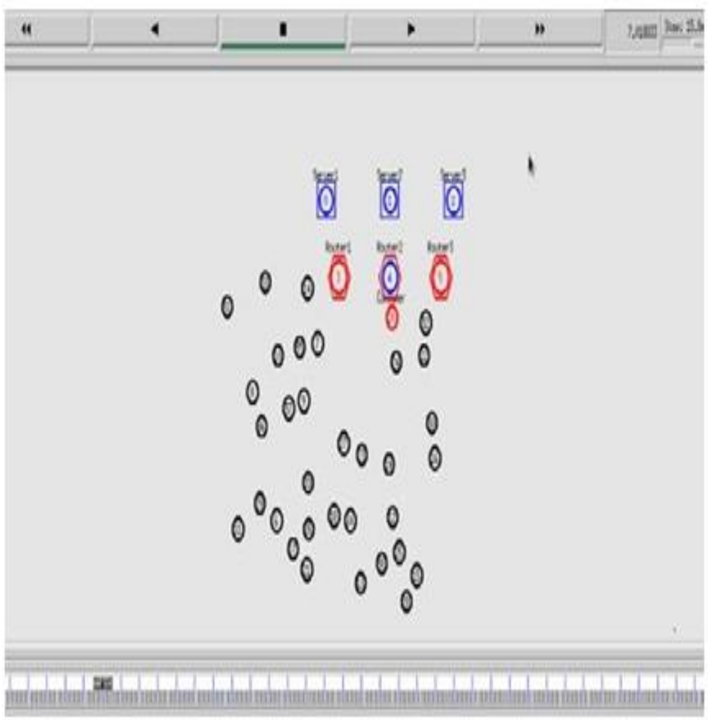
In the below screen it can run the edge greedy algorithm concept by running the third.tcl file. In this screen it represents the total no of nodes as 40and 20 represents the source node. Here the selected router is 4 and the next face router is 3.



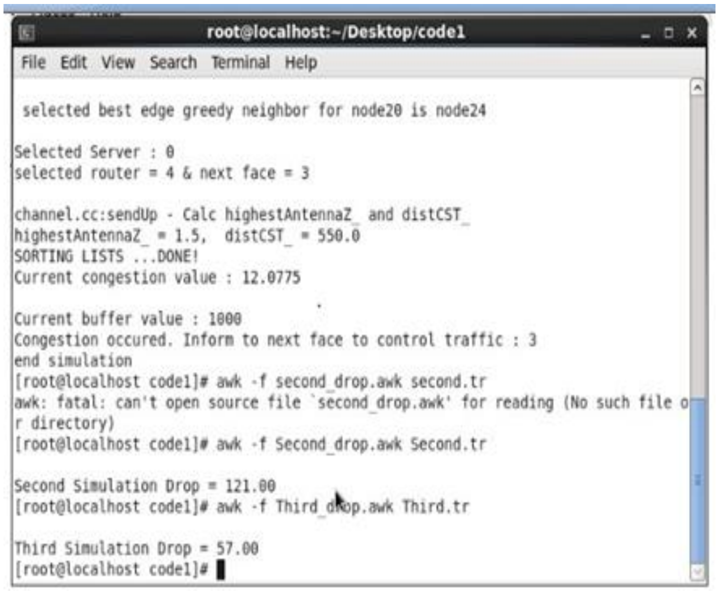
The below screen represent the network formation which consists of nodes, routers and servers. Here the system considers 20 as source node.



In the below screen it can observe that the network is formed and then the data is transmitted from source node to destination router when this router gets congested then the arriving data packets are handled by the next selected router3 and the congestion occurrence can be changed by changing the color of the router.



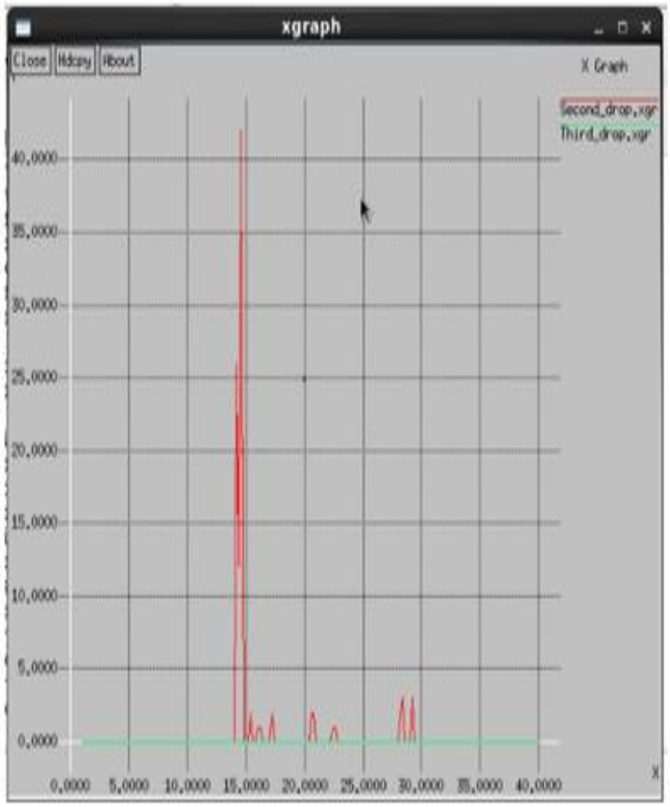
The below presented screen it can get the simulation drop of the malicious node detection process by running the second_drop.awk file and the edge greedy algorithm by running the third_drop.awk file from this can be observed that the malicious node detection simulation drop value as 121 and for the edge greedy algorithm the simulation drop value as57.



From the below presented screen it is identified that the simulation of packet delay of the malicious node detection process by running the second_delay.awk and the edge greedy algorithm by running the third_delay.awk from this it can be observed that the malicious node detection simulation drop value as 0.096 and for the edge greedy algorithm the simulation drop value as 0.079.

The below mentioned screen represents the graphical comparison between the malicious node detection process and for the edge greedy algorithm in terms of packet drop. From the graph it observed that the packet drop is more in the malicious node detection process than compared with the edge greedy algorithm.

The below represented screen tells about the graphical comparison between the malicious node detection algorithm and edge greedy algorithm in terms of packet delay. From this it can observed that packet delay is less in the edge greedy algorithm.



V. CONCLUSION

For efficient data transmissions wireless sensor networks are mostly used in different areas now a days. The sensors in this wireless sensor network will transfer the data packets from the selected source node to the destination server via assigned router. The network which has less packet drop and packet delay is highly recommendable for the efficient data transmission. To give the low packet drop and packet delay values here it proposed the EDGE a greedy algorithm for selecting the shortest routes based for data transmission. This edge greedy algorithm which prefers nearest neighbor node to reach router and this technique can further reduce delay by avoiding far node selection or random node selection. The advantages of this edge are that it minimizes both packet delay and packet drop

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