Reprocess of Self-Absorbed Node in WI-FI Network Using Incentive Mechanism

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***Abstract*- Detecting the self-seeking node in Wi-Fi network with the help of Interference method and reusing that self-seeking node into active node by Incentive mechanism .By the usage of Incentive mechanism, we are reusing the node which acts as a self- seeking and increase the efficiency of transmission. The Incentive scheme needs to be carefully altered to the characteristics of the co-operation protocol, they should support. Competence of node co-operation is to share power and consumes less energy. Re-transmit diversity which is used to motivate the need for a simple form of node co-operation. We deliver such a simple form of node co-operation which can bring relevant benefits to Omni-directional antenna networks. Several folds can bring great gains to Wi-Fi network .To adapt this Incentive mechanism, the design of a simple and efficient MAC protocol is calculated through NS2 simulations for the smart antenna environments.**

Keywords – Wi-Fi protocol, incentive mechanism, co-operative node, MAC-layer disobedience

I. INTRODUCTION

Wi-Fi Networks has significant attention over the last few years. While Wi-Fi networks with all nodes are having the same antenna capabilities which will have certain applications, contend that Wi-Fi network with nodes having antenna capabilities are more likely to be the norm due to a variety of interesting factors. This project is designed for developing routing protocol for wireless networks that should improve the routing performance of the greedy forwarding in sensor networks in terms of latency through minimum hop count, energy and quality link. While transmitting the packets, if energy is reduced then the coverage area also reduced using Wi-Fi network, which is similar to Ad-hoc network. To detecting the self-seeking node in Wi-Fi network, we implementing Interference measurements of nodes.Wireless transmission diversity are dissipation of energy and, therefore, communication protocols for Wireless Sensor Networks (WSNs) message re-transmission schemes. Protocols may use feedback (for example, in form of acknowledgments sent form the receiver to the sender) in order to decide if a retransmission is necessary. In the simplest form, a message is retransmitted at a later stage in the hop that channel conditions have improved. However, it is known that re-transmission diversity.

Many other applications are there to find out the self-seeking node behaviour.eg: consider three nodes in which node (A) simultaneously transmitting the data to node (B) then every node will have some energy level, so due to simultaneous transmission of packets from node (A) to node (B) after that node (B) goes to drained state. It won't transmit the packets to destination .it acts as selfish. Generally, Wi-Fi has strong signal strength, if self-seeking node increases, nodes will decrease.

A. Interference

Wi-Fi connections can be distorted or the internet speed lowered by having other devices in the same area. In Wi-Fi pollution, or an excessive number of access points in the area, especially on the neighbouring channel, can prevent access and interfere with other devices for using of other access points which is caused by overlapping channels. This can become a problem in high-solidity areas, such as large apartment complexes or office buildings with many Wi-Fi access points.

II. RELATED WORK

Charles Reis and Ratul Mahajan (University of Washington) "Measurement-based Characterization of 802.11 in a HotspotSetting"-SIGCOMM 2004 conference[1].Wireless nodes adapt their transmission rates with an extremely high frequency. Working with wireless traces preferable than the wireless medium. Amith .P and Jordash"Visualisation for the Analysis of congestion in IEEE 802.11b Network"[4].To improve the data collections in the congested wireless network finding sniffer location is helpful. Better analyzing the un captured frames. The performance of link layer in congested networks can be improved by 1) sending smaller packets 2)Using higher data rates with a fewer number of packets sent. M.Raya,J-p.Hubaux, and I.Aad,"Domino: A System to detect Greedy Behaviour in IEEE 802.11 Hotspots," proc. ACM Second Int'l conf. mobile systems, Applications, and Services/2004[11]. By usage of domino system, it is only implemented through Access points. System is to detect greedy behaviour in 802.11and also identify scrambled frames (packet loss).

A. *Finding the Disobedience performance of MAC*

Medium Access Control (MAC) Protocols belong to a sub layer of the data link layer called MAC (Medium Access Control).This layer has as a primary responsibility to provide error-free transmission of data information between two remote hosts (computers) attached to the same physical cable.MAC layer takes care of physical address and allows upper layer access to physical media, handles frame address ,and error check .

The MAC layer is responsible for moving data packets to and from one Network Interface Card (NIC) to another across a shared channel. The MAC sub layer uses MAC protocols, to guard that signals sent from different stations across the same channel by without any collision.

The Data Link control layer is the Logical Link Control layer. The Data-Link layer is the protocol layer in a program that handles the moving of data in and out across a physical link in a network. The Data-Link layer guards an initial connection has been set up, that will separate the output data into data frames, and controls the acknowledgements from a receiver that the data arrived successfully. It also protect the incoming data has been received successfully by analyzing bit patterns at special places in the frames.

Analyzing from several Multiple Access Protocols, the Main aim of the task is to minimize the collisions in order to utilize the bandwidth by 1) Determining a particular station which is capable of use the link effectively. 2) The Station should have an awareness of its performance when the links /medium are busy. 3) The station should have estimation or a detailed idea when it is involved in collision.

The problem is that when two or more nodes transmit at the same time, their frames will clash and the link bandwidth will be wasted during collision. So, a protocol to correlate the transmission of the active node.In MAC many approaches are there to find self-seeking node and one of the techniques to find the misbehaviour detection in MAC layer is DOMINO system.

B. *Domino System*

DOMINO System for detection of selfish behaviour in the MAC layer of IEEE 802.11 Networks, a software to be installed in the access point. DOMINO can detect and identify egocentric stations, without requiring any modification of the standard protocol at the AP and without revealing its own presence.

The key features of DOMINO are its (1) seamless integration in the AP1 without interfering with its normal functions (this is achieved by means of statistical approach based on track monitoring) (2) compatibility with existing networks, and (3) Necessity for future versions of IEEE802.11 with minor changes.

To restrict the sender from being self-seeking, DOMINO can detect other misbehaviour in addition to back off manipulation, e.g., sending "scrambled frames," using smaller DIFS (distributed inter frame space is to transmit frame in a shorter period) and using oversized NAV. It is also used to identify the mismatching frames (packet loss) in MANET.

DOMINO can be seamlessly integrated with Wi-Fi security tools to provide ultimate protection. An important feature is that, a cheater has no way of knowing whether an AP is enabled in DOMINO. DOMINO is implemented only at the access points.

III. FINDING SELF-SEEKING NODE BY INTERFERENCE MECHANISM

By using **Interference Method ,** let us consider three nodes say(A) , (B)and (c) in which(A) acts as a source and(B) acts as a forwarder and (c)acts as a destination point. For every node the coverage area is directly proportional to energy and density also depends on the coverage area.Consider coverage area asC1,C2 and density as D1,D2 and energy as E1,E2 using intersection method we can write asC1 D1 E1 ***intersect*** C2 D2 E2.Since coverage area remains same so C1 and C2 cancel each other. And density also remains same so D1 and D2 cancel each other. So we will get E1 intersect E2 (Energy alone fluctuates).

If the result of intersection will be high then it resembles no other disturbance in transmission. If the result of intersection will be low then it resembles then one of the two nodes behave selfishly .Here (A) is the source from which data is transmitting and c is the receiver which will gain the message and (B) act as a forwarder which keeps on forwarding the data it gets.

From the conclusion Since (A) is a source, if energy is low at (A) then it can't transmit. So (A) is not at all selfish. If suppose the energy will be low at A itself then it is not having the capacity to send the data, then (A) goes to ideal mode. And (C) which is a receiver surely it can't be the selfish node. Since no drop will be there at the receiver side. So that (B) (forwarded node) which acts as a "selfish node".

A. *Overview of the approach*

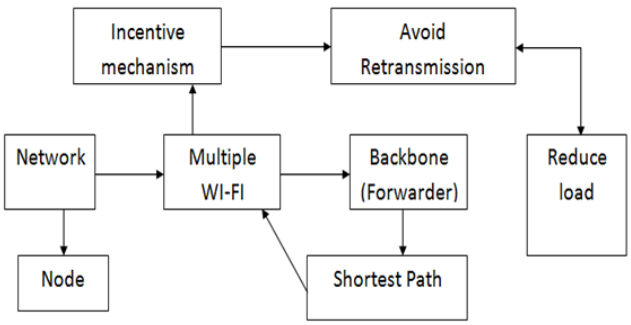

Fig3.1 .The above block diagram shows the overall process of the Incentive technique.

The overview of Incentive technique helps to find the shortest path and applying incentive mechanism to avoid

retransmission .The below points shows the overall process of incentive technique

1) In a network, node is a connection points either a redistributed point or end point for the data. The node is connected to a network.

2) Identifying the forwarder, it is used in selection process which can identify which packets have to forward the data. This acts as a backbone.

3) Finding the Shortest path, this will improve the transmission. Energy and power of transmission will be consumed by this technique

4) Using the interference measurement method the self seeking node has been detected in the multiple WI-FI blocks. If the nodes doesn't behave as a selfish then no need of Incentive.

5) Implementing Incentive mechanism for the self seeking node. If the node behaves as "selfish" by the usage of Incentive mechanism we can reuse that selfish node into an active node.

6) If Incentive technique is used then no need to send the data again from the source it will avoid re-transmission. We can actively use the same node which acts as a self- seeking.

7) Reduce work load (maximum potential to handling the packets).

B. Incentive mechanism

Incentive Mechanisms requires powerful infrastructure and the performance depends on the level of co-operation .The routing function is distributed among the participating nodes. Current Wi-Fi routing protocols assumes that all the nodes are co-operative. However, forwarding of packets consumes resources such as battery power which are scarce. If the nodes in an non- cooperative network belong to different users, they don't have any incentive to co- operate. The routing component of any such protocol will not work if the nodes are selfish as the information provided by nodes may not be correct. Thus to prevent this, protocols should have an Incentive scheme associated with them.Incentive (necessity) Node should receive enough energy for forwarding a message, so it can send its message with the received energy.

The non-cooperative nodes may have severe impacts, the solution for this impact, the Incentive mechanisms should stimulate co-operation between nodes (reward people who supply their work to the system). Incentive mechanisms = stimulate co-operation. The credit system will improve the co-operation between the nodes. Providing high priority to the users, who contribute it.Example, If Node A wants to communicate with Node Z (Z not in its radio range). The intermediate nodes B, C … Y need some kind of incentive to use their resources to forward packets.

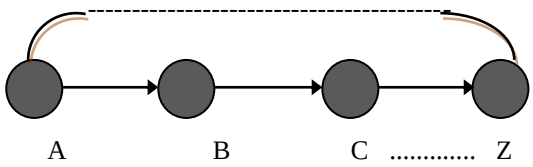

Fig 3.2 Aspects of Incentive Mechanism

In exchange mechanism, the upload and download capacity should be fixed. Each node has an IRQ (incoming request queue) for upload queue.2-way exchanges are simple but frequently do not resolve into convenient pairs. If the rings will be larger more peers can be served and high probability for loss of peer .If the rings will be smaller than lower search cost and higher expected exchange volume. Peers usually care less about global performance than about their own benefit.

Consider three nodes as A, B, C. A acts a as a source and B acts as a destination. x and y acts as a data needs to be shared. A has x and it wants y, B has Y and it wants X, here c got the high priority since it act as a forwarder for A and B but does not contribute to the system ,bidirectional encryption of transfer takes place by using secret key. The trusted node C is mediator and verifies data. Trusted peer is mediator and verifies data.

TABLE I

Peer	Upload	Has	Wants
A	5	x	Y
B	5	y	X
C	10	-	X

Incentive mechanism yield better performance at a lower cost and respects desire not to participate.1) We assume users are not good and bad.2) We respect desire not to store or share any objects.3)A would not be able to participate at all in a pure object exchange.4)Incentive scheme neglect delay and loss.

C. Reasons will improve Incentive

Exchange-based approach provides better Incentives. This technique is simpler than credit or cash. The higher service priority to peers providing simultaneous and symmetric service in return. It provides N-way exchanges and methods for regulating transfers. This technique helps in protection against malicious users. The simulations show significant performance advantage to co-operating users.

D. Co-operative node

The key idea in node co-operation is that of resource-sharing among multiple nodes in a network. Willingness of

node-cooperation is to share power and computation with neighbouring nodes. It can lead to savings of overall network resources. Co-operation is possible whenever the number of communicating terminals exceeds two. Therefore, a three-terminal network is a fundamental unit in node co-operation. This performs Better Efficiency and Easy transmission.

Co-operation between two nodes is the essential the element in data transmission. Expecting that all the nodes will forward the data on behalf of others. As mentioned above, the data sent by the sender and the data received by the receiver consume node resources, in which predominantly energy may be the limiting factor, so that co-operation may be recognised as expensive and thus undesirable. Also, raise of communication load creates a bottleneck condition on the entire transmission. So that a node's messages might circulate less quickly and in unfaithful manner. This may stimulate the users to make their nodes uncooperative, i.e., selfish behaviour. The result of selfish behaviour is that nodes cannot depend on the help of others. Still, cooperation is compulsory to achieve an acceptable communication performance to meet the users' requirements.

Observe the point to point communication between nodes, in which nodes may act as a source and sink, or forwarder. Forwarders considered messages as of no value .so that, accumulating the messages and forwarding it would not yield any desirable gain. Pointing the three types of node behaviours:

1) Forwarding or co-operative nodes are selflessness i.e., without any restriction, the nodes will forward and accumulate the messages.

2) Non-cooperative nodes or Non-forwarding nodes, begins to send the messages as a source and receives the messages as sink, but they don't accept any other messages that would need forwarding. Such nodes are called selfish (free riders) and use other nodes for their goodness, but do not subscribe to the community, minimizing their own resource utilization. As they don't share their resources into receiving any other messages, for some extent they are honest in that they do not blank any copies of message.

3) partly-cooperative nodes or Partly-forwarding nodes accept messages from other nodes for forwarding, but they only give up them directly to the destination. The purpose behind this type of behaviour is to alter the nodes that want to make a positive contribution when they spend own resources for forwarding .

The presumption is that receiving messages are accumulated, that is acceptable as it is mandatory for being semi co-operative, while using power to send them is expensive. The most important finding is that considering that delivery rate of messages is acceptable in the co-operative case. Entire system can accept large number of free riders, In such scenarios, all routing protocols inquired can easily accept 20–40% of non-cooperating nodes, even though those nodes still utilize other node resources for their goodness.

E. *Algorithm*

Wi-Fi routing protocol(WRP) is a proactive unicast routing protocol for mobile adhoc network .Routing table contains entries for every reachable node . A router does not know entire path for the Receiver station. The router only knows the path, in which packets should be forwarded it is far to the Receiver station. Some distance routing protocols sent request for the router to periodically broadcast the entire routing table to each of its neighbours.

The below steps taken from the wifi routing protocol.

Step-1:Set the Timers

Step-2:Broadcast ID Management Functions

Step-3:Make sure that you don't "down" a route more than once

a) If the route is up, forward the packet.

b)A local repair is in progression. Buffer the packet.

Step-4: Packet Reception Routines

a) TCP adds the IP header.

b)To avoid setting the header twice, IP header will check if this packet is not a TCP or ACK segment.

Step-5: Chec k the TTL. If it is zero, then discard the Incoming packets. Drop if

a)If it is the source and it recently heard this request.

b)The source will either going to forward the REQUEST or REPLY.

Step-6: Se t expiry time to CURRENT_TIME + ACTIVE _ ROUTE_TIMEOUT

a) This is because route is used in the Forward but only source get benefited by this change.

Step-7: Find out whether any buffered packet can benefit from the reverse route.

a) Rt_req_cnt is the no. of times we did network-wide broadcast

b) RREQ_RETRIES is the maximum number, we will allow for before going to long timeout.

c) Per Hop Time is the roundtrip time per hop for route requests.

Step-8: Neighbour Management Function

a) Called when we receive *explicit* notification that a neighbour is not so longer..

IV. SIMULATION

The behavior of network is simulated by NS2 scheme.NS2 is a package of tools that contains set of libraries. Steps involved in created NS2, Create Network Topologies,

Log events that happen under any load, examine events to understand the network behavior.NS (version 2) is an object-oriented, discrete occurrence driven network simulator implemented at UC Berkeley written in C++ and OTcl. NS is predominantly useful for simulating local and wide area networks. NS also realize the multicasting and some of the MAC layer protocols for LAN simulations. Even though there is a lot of estimations done by developers which contains details of the simulator, it is created with the depth of a trained NS user.

A. Simulation Methodologies

To better investigate the performance of proposed system in Wi-Fi network by using Incentive mechanism. All nodes have the same transmission power and the same kind of antenna ie.Omni-directional Antenna.

Scenario 1: This scenario shows, secure Wi-Fi network with an access points. This device connects to a router (via wired network).It provides wireless connection using radio frequency link for other device to utilize wired connection.

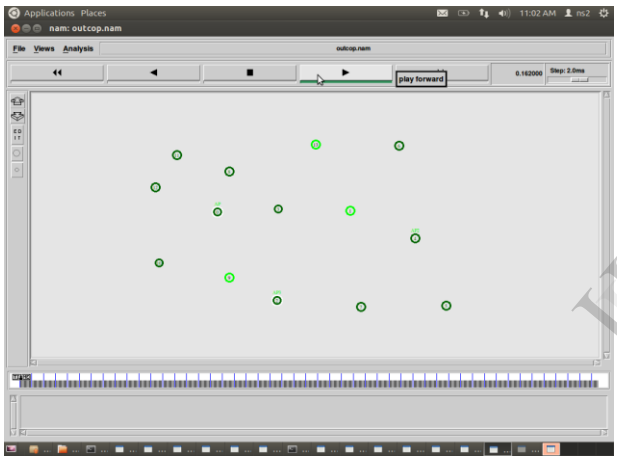

Fig 4.1 Setting Nodes in Nam Animator

The above fig 4.1 shows that, Consider 13 nodes in which nodes 1,9,13 (marked in light green) acts as self-seeking nodes and nodes 0, 4, 2 acts as Access points. Based on Wi-Fi routing protocol, the nodes transmitting the packets

Scenario 2: In this scenario, it shows the self-seeking node behaviour, i.e. Transmission takes place in node which receives the information for a long time. It goes to drained state. Thus it acts as a 'self-seeking node'.

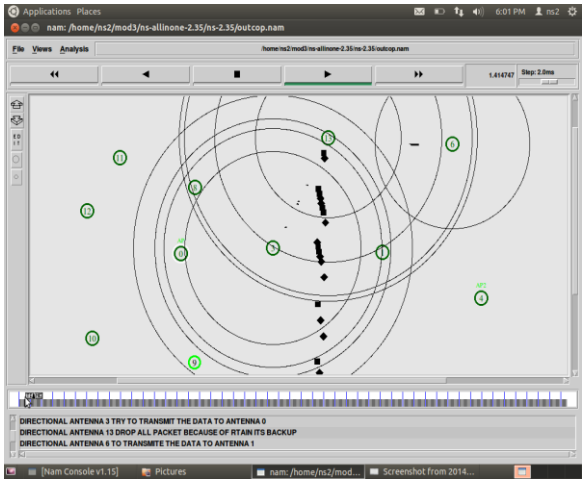

Fig 4.2 Broadcasting and signal drop

The above fig 4.2 shows that, node 6 acts as a source and node 0 acts a destination. During transmission node 6 sent the packet to node 13(neighbour node).Here, node 13 acts as 'self-seeking node', so it drop all the packets, because the node has to drain its backup(energy).now, the node does not sent the data to destination.

Scenario 3: This scenario shows the technique of Incentive mechanism. Interference measurement technique is used to find out the self-seeking node .Incentive depends on the co-operative node, which is used to reuse that self seeking node into active node.

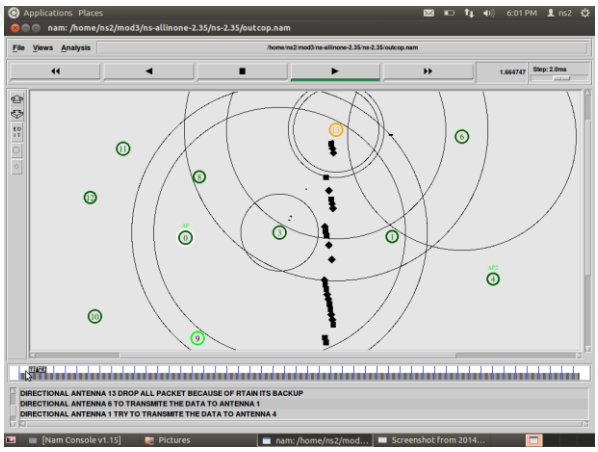

Fig 4.3 Applying Incentive technique

The above fig 4.3 shows, applying incentive mechanism to node13 (self-seeking node), then it will alter the self-seeking node into active node. By the usage of incentive ,there is no disturbance from the selfish node. It will transmit data to destination.

Scenario 4: Scenario shows that with the help of Interference method, finding the selfish node, and applying incentive mechanism and by reusing the same node into active node with the support of co-operative node. More energy has been consumed.

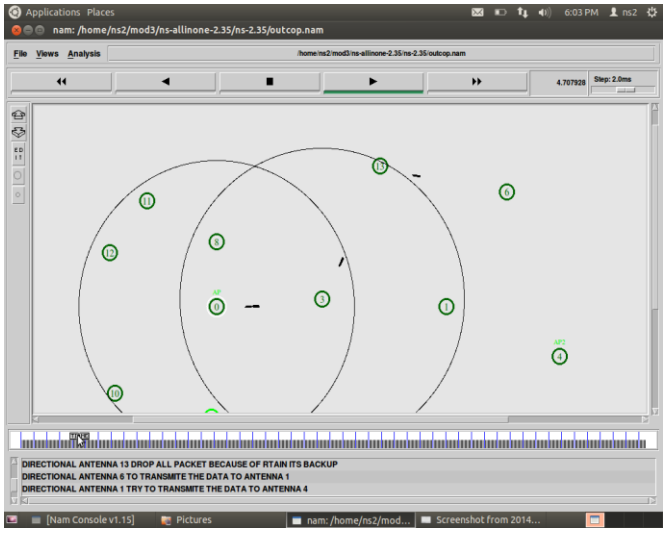

Fig 4.4 Converting selfish nodes into activating node

The above fig 4.4 shows that reusing the node 13(self-seeking node) into active node by incentive mechanism, then from node 13 the packet has been transmitted to node 3(co-operative node) then node 3 transmit the packet to node 0(destination).So, finally concluding incentive performs better. Highly efficient to transmit the data in the same path where self- seeking node has been found.

B. Simulated Graphs

The simulation results show the performance of the system can be analyzed through the parameters used in the network. Some of the parameters implemented in proposed work can be given as follows.

To estimate the performance of protocol using NS-2, first have to define the estimation criteria. By exploring Packet delivery ratio, packet lost and delay, throughput , less delay ratio, probability of interference, selfish ratio, Selfish detection rate .Lets discuss about them in detail below.

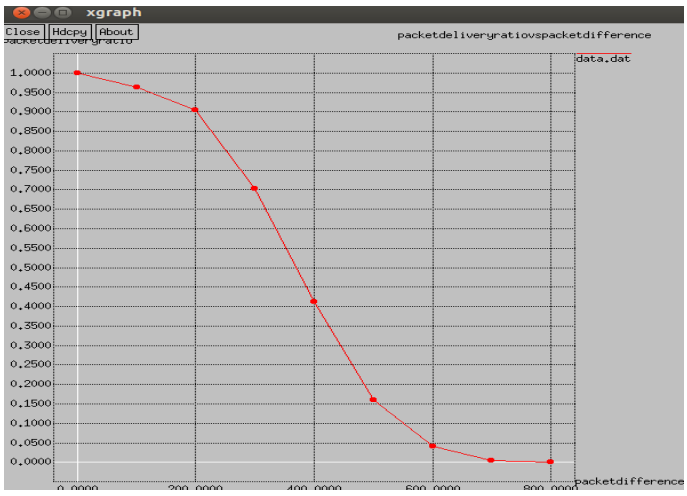

Fig 4.5 Estimated results for packet delivery ratio vs. packet difference

The packet delivery ratio is plotted against packet difference. The ratio of the number of delivered data packets to destination (packet delivery ratio) is plotted against y-axis and the packet difference is plotted towards x-axis. The packet difference shows the difference between sending packet and receiving packet. Figure shows that when packet difference value increases, the packet delivery ratio will decreases.

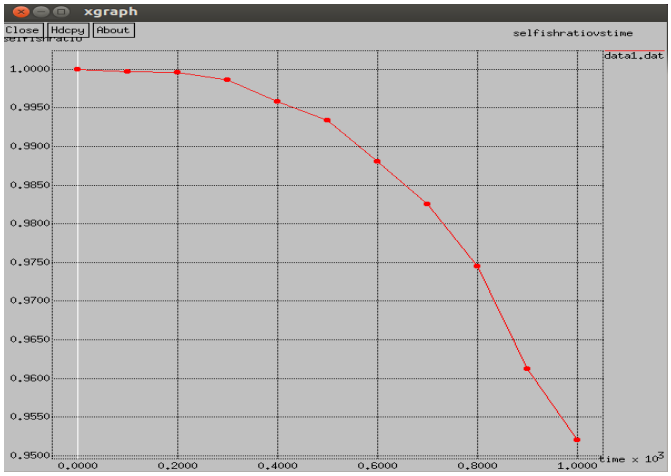

Fig 4.6 Simulation results for Selfish ratio vs. Time.

Selfish nodes are nodes which refuse to carry out networking tasks for others. Even though they use the services provided by others in the region.. They clear all data and control packets that are destined to them; they act as a reserving resource of their own to the peak level. Figure shows that when network time improves, self-seeking node ratio will decreases.

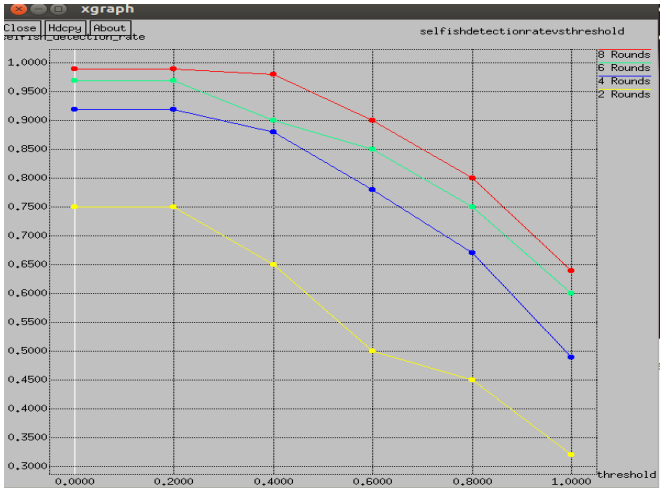

Fig 4.7 NS2 Simulation results showing Selfish detection vs. Threshold value.

Number of Nodes increasing we can identify the self-seeking node certainly, depends on the threshold value. Figure shows that, initially setting the threshold value has been set to 8.If the value is less than threshold value such as 7, then it will intimate route error. So we can round off to 6(for proper result we are setting even values).

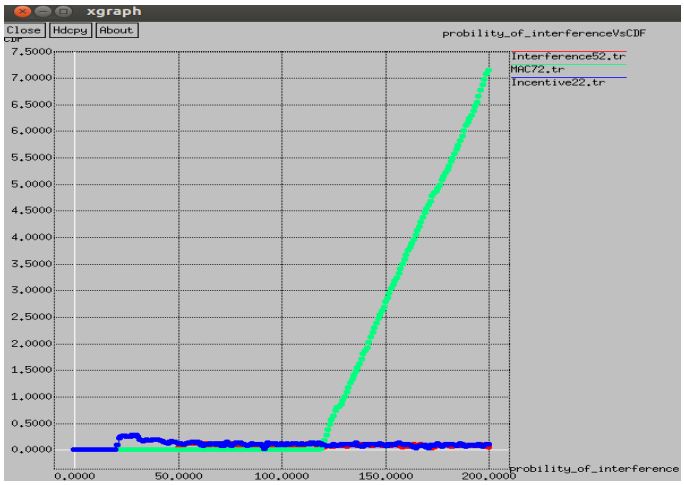

Fig 4.8. Measuring the probabilities of interference with CDF.

Initially the incentive threshold value was assigned for every node. We have to match the incentive value, with the co-operation value which provides the interference value. In fig .5, shows the interference value is very less due to incentive scheme, which will transmit the packet without any noise. For MAC, the interference value is higher because of re-transmission of packets.

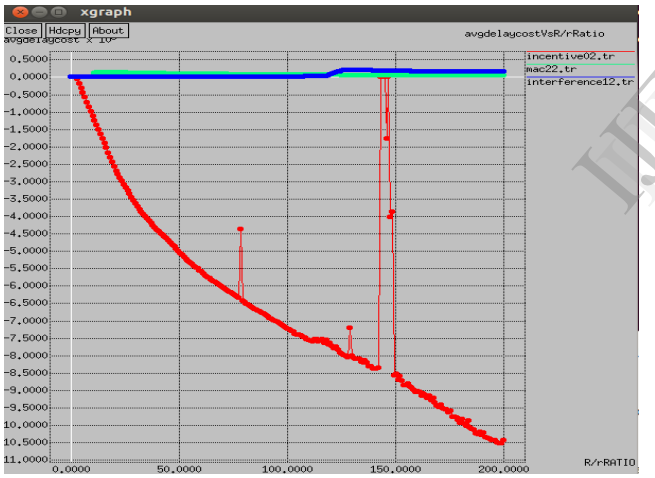

Fig 4.9. Combining performance results for receiver ratio with average delay.

The delay calculation comparing by different techniques. Figure shows that, here the red curve shows the delay is less due to incentive and the slight fluctuations is due to the time gap for applying the incentive, once the selfish node was found. The green curve shows the delay occurs in existing MAC which is higher, because of dropping the packets from selfish nodes.

V. CONCLUSION

These results show that finding the self-seeking node from Wi-Fi network by using interference measurement which will provide a high performance and easy transmission. To implement the incentive mechanism to detect self-seeking node & reusing that node by tailoring the self seeking node into active by the co-operative node technique .so every node have some energy from neighbouring nodes(sharing the power) .so we get better performance &efficiency. No need to go for finding new route to transmit the packets from source to destination.

FUTURE WORK

In Industrial standard, by assuming zone management system set the AP to monitor the self-seeking node, for a particular location .With an effective traffic management system in Wi-Fi network will enable multiple AP so that better utilization of incentive will reduce loss and effective way of finding the self-seeking node. Apply this technique in Wi-Max, with proper effective traffic management functions. It includes more evaluations to determine this feature.

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