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Enhancing Code Aware Routing By Idling Methods To Improve Energy Efficiency In Wireless Networks

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ABSTRACT

Routing is the process of transferring the data from Source to destination in a network. To enhance the routing process the protocols (Rules to transfer data), are used to find the shortest path between the source to destination among the various path. This shortest path is finding out by using COPE (Code opportunity Establishment). The Routing is done by sending the data to neighbour node as a backup. For this process technique called DCAR (Distributed Code Aware Routing) is used. However the link failure reduces the overall efficiency of the framework. Here we address a problem where there is no security for packet transmission. Hence we propose theidling methods which makes the nodes idle and data packet does not transmitted from it.

Indexed Terms: COPE, DCAR, Idling Methods and ECS

I. INTRODUCTION

Wireless network is a developing era in which the long distance communication is possible compared to the wired communication. It has strong adaptability, comprehensive sensing coverage and high fault tolerance. Routing is the process in which the main task is to find the shortest path between the source and the destination. In this paper, the COPE is merged the DCAR to transmit the data packet.

The network coding is an engineering technique to improve throughput and the energy efficiency in the network. The network coding technique is particularly developed for wired network to improve the efficiency. Now days, the engineering research in wireless network coding is helpful for improving the bandwidth and the energy efficiency. COPE is used to increase the network coding at the higher layer. The link failure handing can be overcome by aware the neighbor nodes before

transmitting the data packets as a backup. If the failure is happen in the link, by using neighbor node the retransmission can occur.

If there is no link failure, there is a probability of transfer of data from the neighbor nodes. To overcome this defect, the method proposed is maximum residual multicast protocol to protect the data packet from transferring to another nodes O-idle and E-idling methods are used. O-idling method is used to avoid spending energy on overhearing by forcing the overhearing nodes radio interface to transition to a low energy idling mode and E-idling method is used for reducing energy consumption due to erroneous carrier sensing (ECS).The idea behind E-idling is when a node starts receiving ECS signal, its wireless interface is forced to switch to the low-energy idling state till the transmission causing ECS is over.

II. LITERATURE SURVEY

[1] In COPE (Coding Opportunity Establishment), the author proposed a practical network coding system for multi-hop wireless system. Consider the fig.1, which shows the basic scenarios for the COPE. In the figure there are five wireless nodes. When node 1 need to send packet P_1 to node 2 and the packet P_1 need to relayed by node C. when node 3 need to send another packet to node 4, this packet also relayed by nodeC. The dashed arrows 1-->4 and 3-->2 indicate that 4, 2 are within the transmission ranges of 1, 3, respectively. Under this scenario, nodes 4 and 2 can perform "opportunistic overhearing": when 1 (3) transmits P_1 (P_2) to node C, node 4 (2) can overhear the transmission. When node C forwards the packets, it only needs to broadcast one packet ($P_1 \oplus P_2$) to both 4 and 2. Since 4 and 2 have already overheard the necessary packets, they can carry out the decoding by performing $P_2 \oplus (P_1 \oplus P_2)$ or $P_1 \oplus (P_1 \oplus P_2)$, respectively, thereby obtaining the intended packet. In this case, it is easy to see that there is a reduction in bandwidth consumption because node C can use network coding to reduce one transmission.

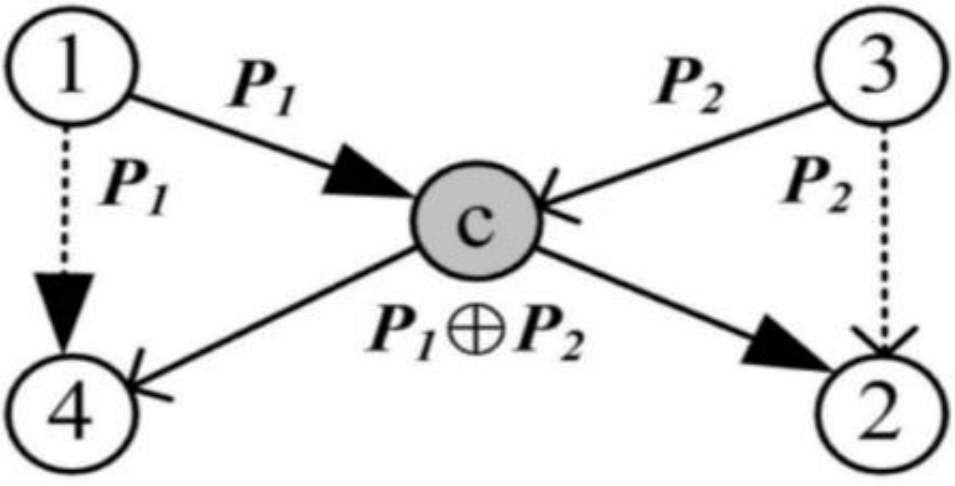

Figure 1: Coding Scenario with coding opportunity listening

[3] In distributed code aware routing mechanism can be used to discover the available paths and concurrently using potential coding opportunities. In this paper, there is a unified frame work which is said to be "Coding-Aware Routing Metric" (CMR) is used to evaluate the performance of a path (i.e.) it will be coding-possible or coding-impossible. This mechanism describe how to discover the available path for a new flow initiated in to the wireless network and also the detection of potential coding opportunities of the paths simultaneously. The detection of the coding opportunities based on the condition as shown below, for two flows F_1 and F_2 at node C

1. There exists d1 ∈ D(c, F1), such that d1 ∈ N (s2), s2 ∈ U(c, F2), OR d1 ∈ U(c, F2).
2. There exists d2 ∈ D(c, F2), such that d2 ∈ N (s1), s1 ∈ U(c, F1), OR d2 ∈ U(c, F1)

To find the suitable routing metric for coding - aware routing the following properties or imposed in it.

i. The metric should take into account the "free-ride" benefit of the coding-possible paths: if a new flow can be encoded with some existing flows, it can "free- ride" on the bandwidth used by the existing flows.
ii. The metric should be general in quantifying the merits for both coding-possible paths and coding- impossible paths. In other words, the interpretation of "free-ride" benefit for coding-possible paths should be transferable to the performance measure for coding-impossible paths.

[7] A distributed methodology and its implementation are proposed to resolve the maximum-residual multicast problem; it is proposing a distributed algorithm to derive a multicast tree with the best energy efficiency, where each node makes its own decision autonomously. A routing protocol is then developed in as a realization based on the proposed algorithm. The maximum residual multicast protocol (MRMP) is used to avoid extra energy consumption due to overhearing problem in the wireless network. The overhearing problem in the node is avoided by setting in sleep mode which may be result in latency. O-idling method used to avoid spending energy on overhearing by forcing the overhearing node's radio interface to transition to a low energy idling mode. E-idling is when a node starts receiving ECS signal, its wireless interface is forced to switch to the low-energy idling state till the transmission causing ECS is over. From thisproposed distributed methodology is also applicable to various related optimization problems (such as the minimization of the total energy consumption of any path from a source to a destination)

III. EXSISTING WORK

Network coding is a technique where, instead of simply relaying the packets of information they receive, the nodes of a network will take several packets and combine them together for transmission. This can be used to attain the maximum possible flow in network. Consider the following simple example which depicts how

the network coding is carried out. In Fig.1, there are three nodes, 1, C, 2.The nodes 1 and 2 act as both source and destination nodes. There are two information flows in the network. The first flow is from the source node 1 to the destination node 2 through the intermediate node C. The second flow is from the source node 2 to the destination node 1 through the intermediate node c. These two flows have the common intermediate node, C. The node, C, can now XOR the two packets that are transmitted from the two source nodes1 and 2.After that node C can do the single broadcast (XOR packets-P1 and P2), so that it reaches the two destination nodes 1 and 2.After receiving the coded packets, the two destination nodes will decode the packet to get the corresponding packets. Now the node 1 will get the packet P2 and node 2 will get the packet P1.

In essence, COPE takes advantage of the "broadcast nature" of the wireless channel to perform "opportunistic overhearing" and "encoded broadcast" so that the number of necessary transmissions can be reduced.COPE has two fundamental limitations which is illustrated as follows:

1. The coding opportunity is crucially dependent on the established routes
2. The coding structure in COPE is limited within a two-hop region only

To overcome the limitations in the (COPE) we have another architecture called as Code aware Routing technique is used.We now present the implementation details of DCAR in ns-2. We modified the DSR routing agent in ns-2 to include the "coding + routing" discovery and path selection functions. We also modified the Interface Queue to include encoding and decoding functions. The overall architecture of DCAR is shown in Fig. 2. The DCAR routing agent maintains a list of one-hop neighboring nodes and the corresponding link qualities (i.e., packet loss probabilities) by periodically broadcasting HELLO messages (the HELLO interval is set to 0.5 second in our ns-2 implementation). When sending the HELLO, each node piggybacks its "Modified Queue (MQ)" length as well as its one-hop neighbors and their MQ lengths. In this way,each node can obtain the queue length information of its two-hop neighbors. Because the carrier sensing range is approximately two times of the transmission range in 802.11, we define the "interfering nodes" (I(c)) to be the two-hop neighbors of a node c. In the HELLO message, each node also piggybacks the number of HELLO messages it receives from its neighbor in the last 5 seconds to let its neighbors examine the reverse links

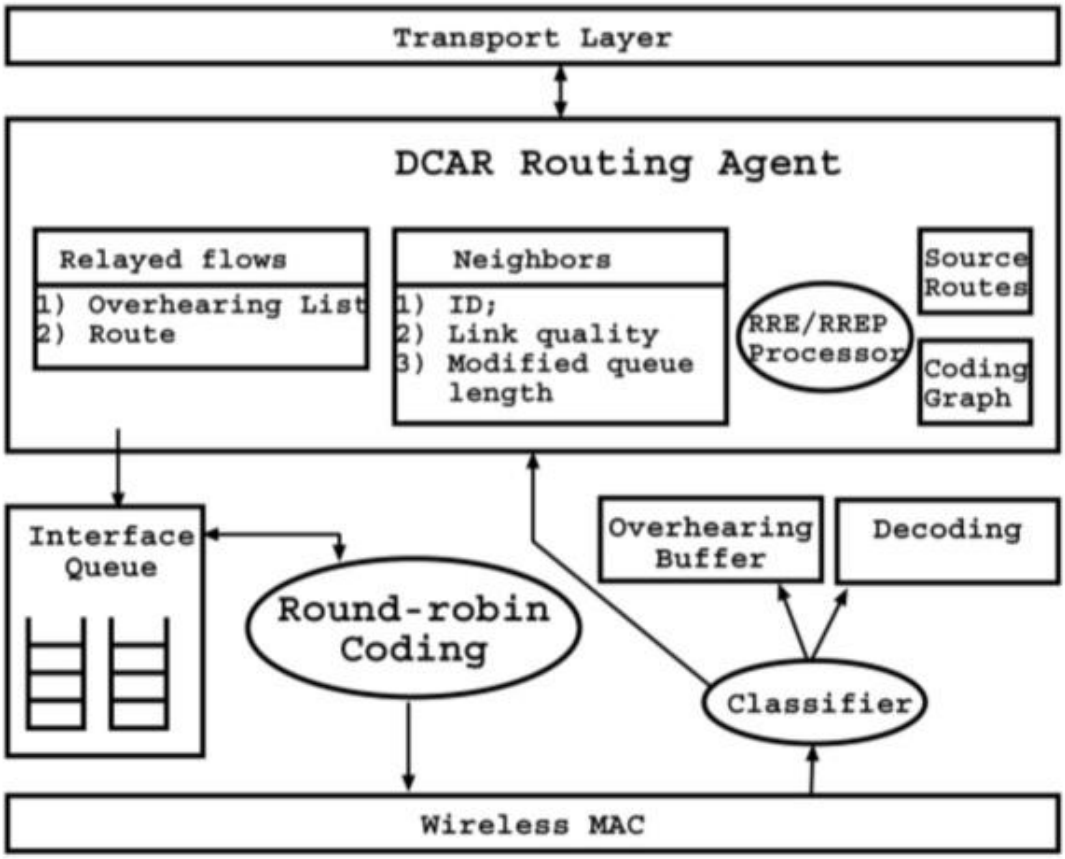

Figure 2: DCAR Architecture

LIMITATIONS:

1. The existing system does not provide any resiliency and guarantee network coding opportunity in the face of link/node failure.
2. The coding +routing discovery is not supported in the case of link failure. This results in the drop in the network performance

IV. PROPOSED WORK

In wireless network, the link failure is the major challenge. This module describes the case of handling link failure. While performing DCAR mechanism, there may be chances of having link failure or node failure. This paper focuses on securing the data packets in case of absence of link failure. For handling the situation the idling method is used. There are two types of idling are present and name das O- idling and E-idling. The idling methods are also used to reduce the high energy consumption.

To Interface idling mechanism for improving energy efficiency of IEEE 802.11 based MAC hardware. A novel protocol state analysis techniques is developed for detecting time windows during which a wireless interface consumes energy due to

802.11 overhearing and which node consumes energy due to erroneous carrier sensing. During this window, energy savings at the MAC layer is accomplished by forcing the wireless interface to a relatively lower-energy idling state.

In order to protect the packet from transferring to other nodes which are not in the routing path and overcome the loss of energy O-idling and E-idling methods are used. Overhearing problem occurs during when an interface receives data and control packets that were transmitted to some other node. In the overhearing phenomena, a node expends same energy as it would have done during reception.

Since the flat grid topology in wireless network is used in this paper, nodes typically run from limited energy portable batteries, a critical design is reducing the power consumption. The method proposed is maximum residual multicast protocol for reduces the loss of energy by using O-idling and E-idling methods where O-idling and E-idling methods reducing loss of energy by forcing the nodes radio interface to transition to a low energy idling mode.

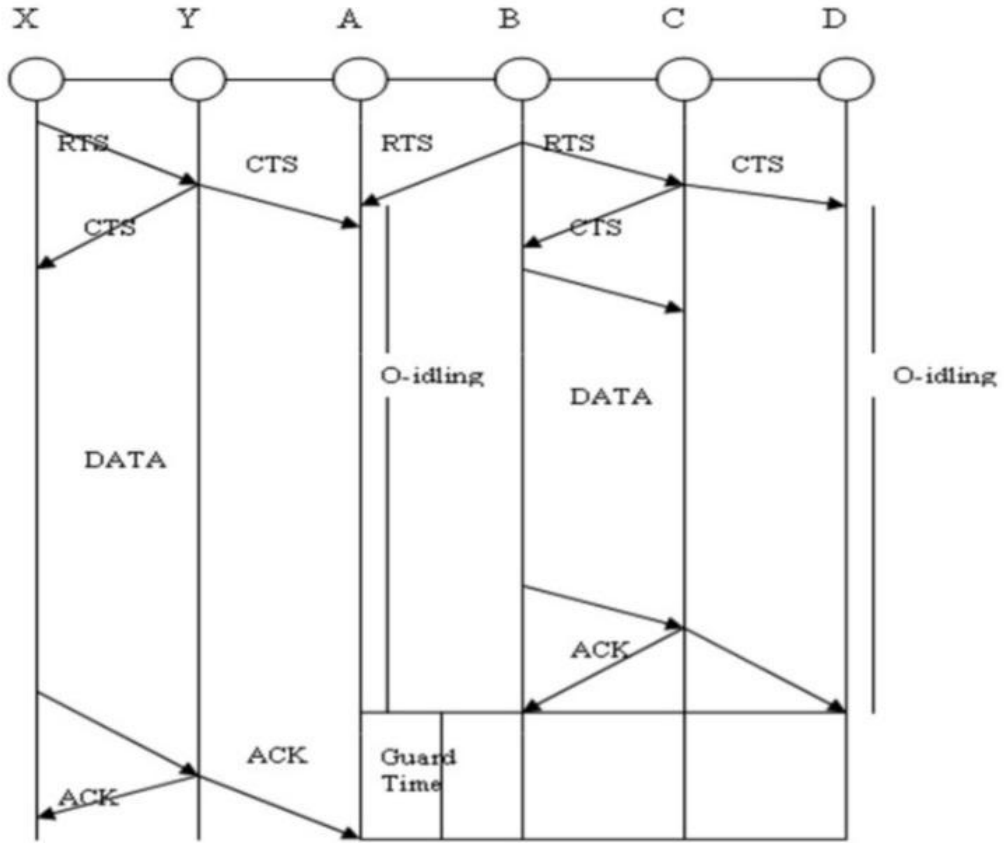

Figure 3: O – IDLING

The goal is to avoid spending energy on overhearing by using O-idling method. O-idling method is done by forcing A's node radio interface to transition to a low-energy idling mode during B's node transmission to c node.

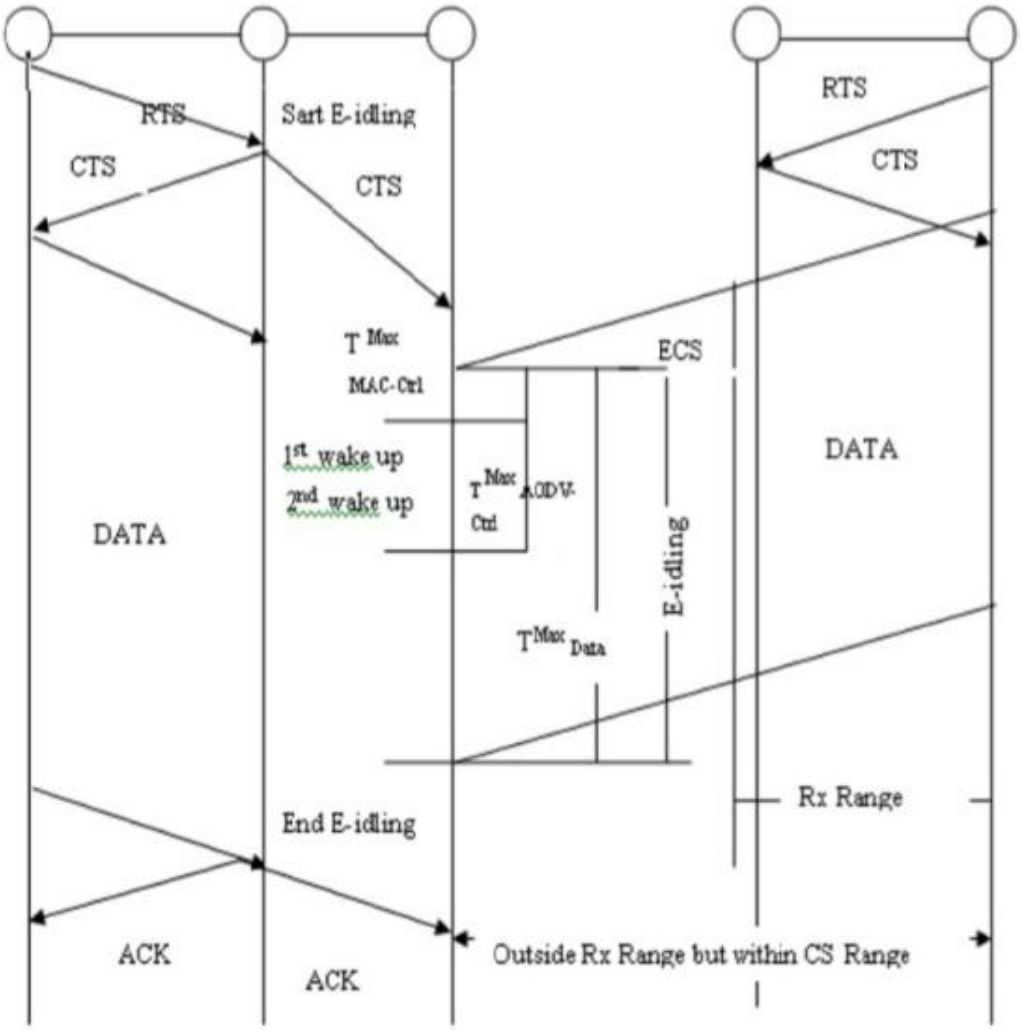

Figure 4: E – IDILING

E -idling as a mechanism for reducing energy consumption due to erroneous carrier sensing (ECS). The idea behind e-idling is when a node starts receiving ECS signal, its wireless interface is forced to switch to the low-energy idling state till the transmission causing ECS is over.

V. SIMULATION RESULTS

In this section, we demonstrate the capability of the proposed DCAR. Idling methods which shows the effect of link failure and packet security. The simulation for the packet flow in coding aware routing is shown in figure 5. In this, the violet colour nodes represented the shortest path between the source and destination. The nodes in red colour represents the neighbor nodes in which the data packets are kept as backup while transmitting to next node in the path. This flow is mentioned as (---)in the screen.

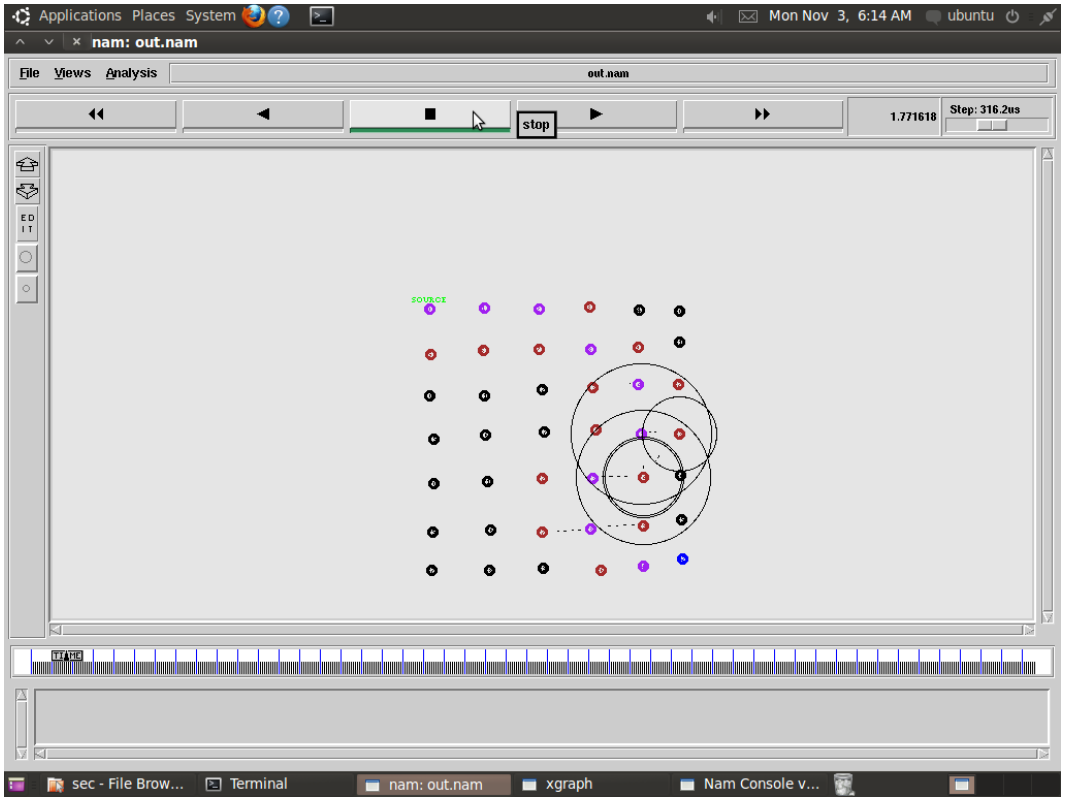

Figure 5: DCAR simulation in NS – 2

We observe the performance improvement over the original approach conservatively. In this performance evaluation, we analyze of throughput and transmission of packets generated. As a result, by the optimization of throughput is 32% increased than the original approach.

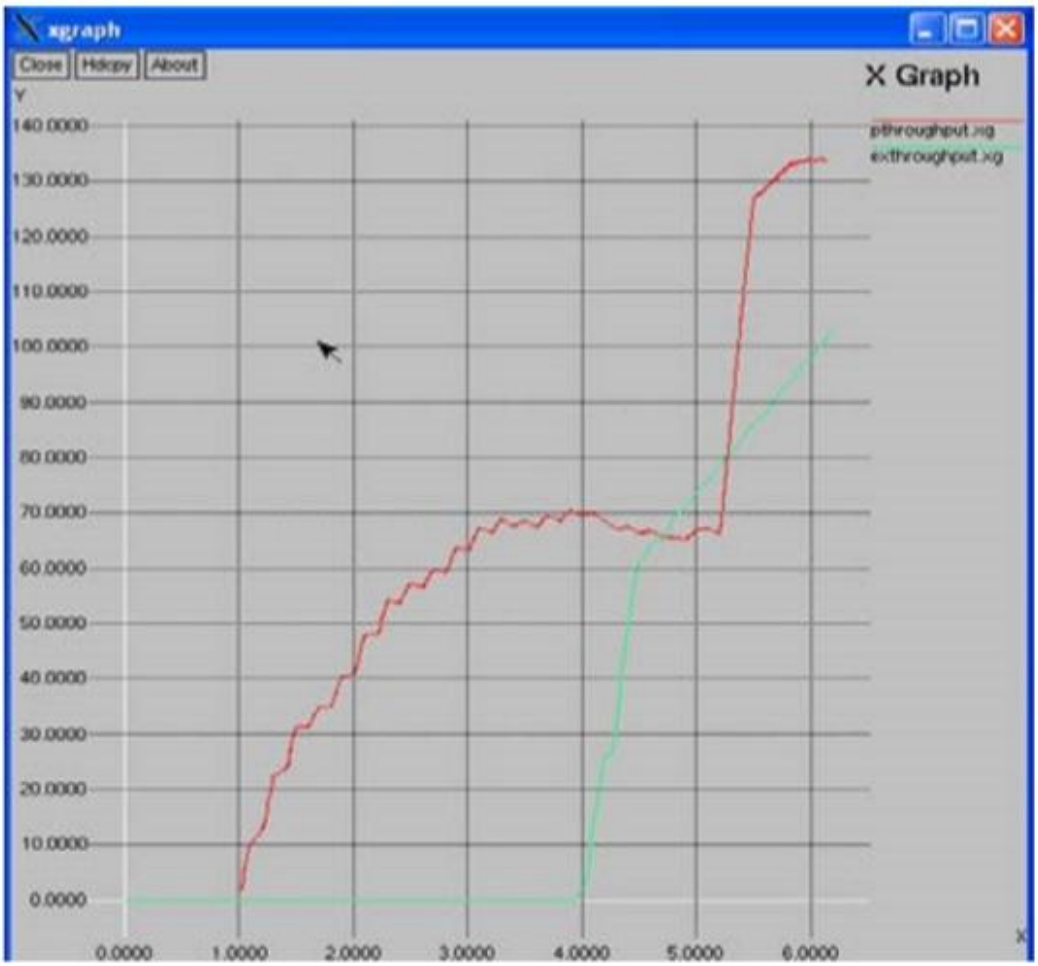

Figure 6: Graph representing throughput versus time

Figure 7 shows Residual energy comparison between (Existing system and O-idling method) Green line show that the Residual energy in proposed system (O-idling) and red line shows that the Residual energy in existing system. Residual energy maximized in the proposed system (O-idling method) and thus has better performance than the existing system.

The result of simulation by NS-2 to demonstrate the significant performance improvement achieved by proposed method.

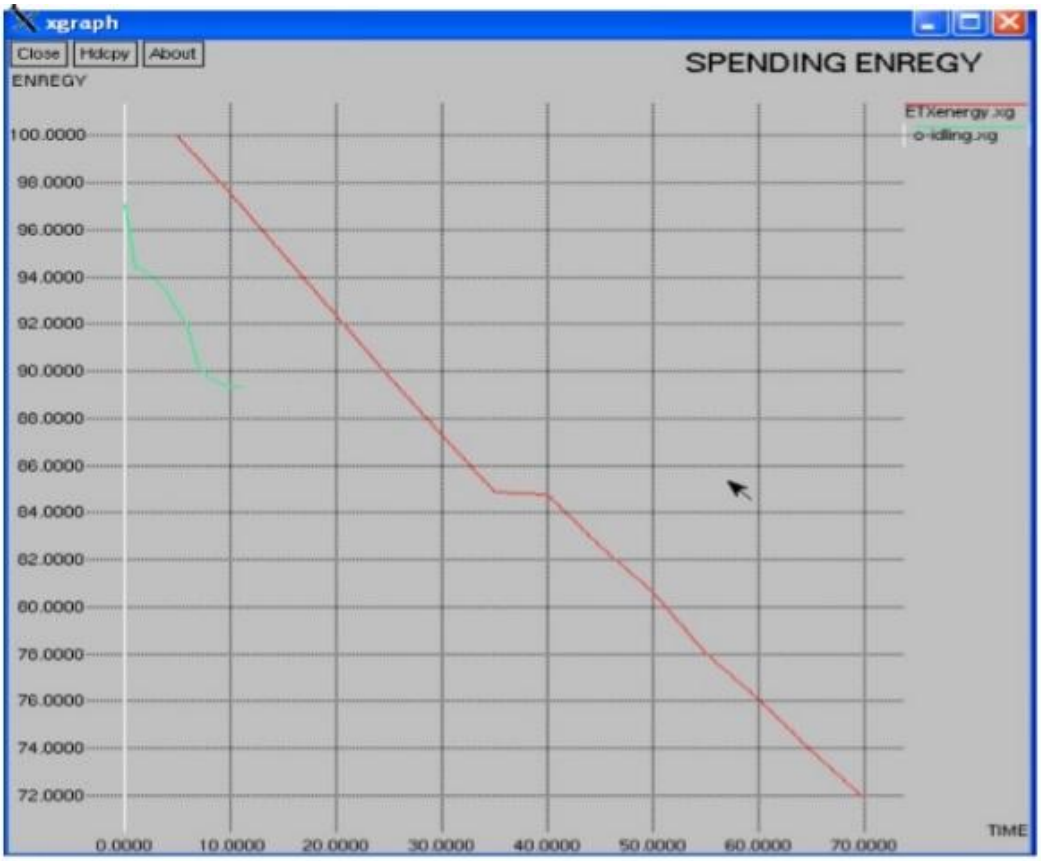

Figure 7: Graph representing Residual energy versus Time

VI. CONCLUSION

In the constructed wireless network, the energy efficient way of routing process is simulated by using network coding techniques such as COPE and DCAR. The link failure handling is one of major problem which is not addressed byCOPE is improved by DCAR has some security problem. Hence for the security of data packet idling method is came into existence which overcome the link failure of node thereby reducing the energy consumptionand gave solution to overhearing in distributed networks.

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