Performance Analysis of Network Coding with Exponential back off Algorithm Using Multi Path Transfer Protocol in Wireless Network

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DOI: http://doi.org/10.5281/zenodo.3334957

Abstract
Network coding is an effective technique to boost the capacity of wireless networks. In that network, transmitted data is encoded and decoded to increase network throughput and to reduce end to end delay and make the network more robust. In this paper, the throughput and end to end delay of network coding is investigated under IEEE802.11 DCF. It is proposed that this can be achieved with CSMA/CA as in IEEE802.11 distributed coordination function with Multi Path Transfer Protocol (DCF-MPTP). CSMA/CA is based on the combination of physical carrier sensing and exponential back off algorithm. Proposed model prevents the delay and packed loss.

Keywords: Exponential back off algorithm, IEEE802.11 DCF, multi hop- multi path transfer protocol, network coding,

INTRODUCTION
In multi hop network is type of communication in radio network and one or more intermediate node in path to receive and forward the packets in a wireless link. It have several benefits compared to single hop network, it less transmission power and enable to higher data rate and then also improve the connectivity and extent coverage area of the network. In multi hop wireless network are classified in to four network such as mobile ad-hoc network (MANET), wireless sensor network (WSN), vehicular ad-hoc network and wireless mesh network (WMN). In an area, wireless mesh network provide the redundant communication and more robust in wireless network. The main advantage of wireless mesh network is that its routes are dynamically and then each nodes are connected to the several nodes. In this, it consists of mesh router and mesh client. The mesh client acts as a router; it considered the stationary or mobile user for example laptop and smart phones etc. In wireless mesh router, it is called as one of the intermediate; it provide the best and the most efficient path for effective communication and coverage area is to be very large.

In wireless mesh network, it has collection of nodes and then each node is called as router. The wireless mesh network is one kind of network topology in which node is transmitting the data as relay for other nodes. In IEEE802.11 is a set of MAC and PHY layer specifications implementing in wireless local area network. In IEEE802.11 DCF is a protocol which mainly used in the carrier sensing and maximize the throughput and then preventing the packet collision.

RELEATED WORK
To analyse [5] the throughput and end to end delay of network coding in two hop

network. It also extent the single relay multi user wireless network and it achieve the optimal throughput. It extent the coverage and reduce the energy consumption in wireless network. Network coding is used to mix the two or more packets in a single coded packet at relay nodes to improve the performance in wireless network [6].

In multi hop wireless network it consider about the collision free scheduled access to formulate the saturated and unsaturated queues. Where collision can be occur without assuming the saturated queues and the performance using IEEE802.11 MAC layer it provide the optimum throughput. To formulate the cross layer optimization frame work to derive the maximize throughput region for multicast traffic [7]. In analytical study of stable throughput for multiple broad cast in multiple wireless tandem networks. Network coding is used to increase efficiency among different flows to perform inter-session of wireless medium access [1].

The challenging issue is finite delay. In this paper, the model used is based on the multicast queuing network and the theoretical frame work computing the maximum stable throughput of network coding for ALOHA based random access system [3].

PROPOSED SYSTEM
The proposed model applies random medium access CSMA/CA as in IEEE 802.11 Distributed Coordination Function with Multi-hop multi Path Transfer Protocol (DCF-MPTP) with exponential back off algorithm. In IEEE802.11 DCF is a protocol which is mainly used in carrier sensing and maximize the throughput and preventing the packet collision. In DCF-MPTP is highly effective in alleviating the loss of packets. It is very flexible and easy to deployable. The main challenging issue are network throughput and end to end

delay of the network and then to prevent the packet collision by using exponential back off algorithm.

IMPLEMENTATION TECHNIQUE
- IEEE 802.11 DCF
- Network coding
- Multi path transfer protocol
- Exponential back off algorithm

IEEE802.11 DCF
In IEEE802.11 DCF is a protocol which mainly used in the carrier sensing and then maximize the throughput and preventing the packet collision. IEEE802.11 is a set of MAC and PHY layer specifications and then implementing in wireless local area network. The distributed coordination function does not solve the hidden terminal problem and exposed terminal problem completely it solve the problem by the usage of RTS and CTS control signals in DCF mainly to produce the positive acknowledgement it source to send the frame in to destination. In RTS and CTS to solve the hidden terminal problem and to reduce the frame collision.

NETWORK CODING
Network coding is one of the information theory and coding theory and is a method of maximum information flow in a network. In network coding it composite two or more messages and it is necessary to consider encoding and decoding data on nodes in a network in order to achieve optimal throughput.

MULTI PATH TRANSFER PROTOCOL
Multipath transfer protocol (MPTP) may also be used within different paths to enhance data transfer reliability. Network coding may be used to improve data flow and reliability in a multi path scenario. MPTP can send packets via any available network like wireless, wired or USB. In DCF-MPTP is highly effective in alleviating the receiver buffer blocking.

EXPONENTIAL BACK OFF ALGORITHM

The back off algorithm is one of the collision resolution algorithms which is used in random access MAC protocol.

This algorithm is generally used in Ethernet to schedule retransmission after collision. To prevent such scenario is called back off algorithm.
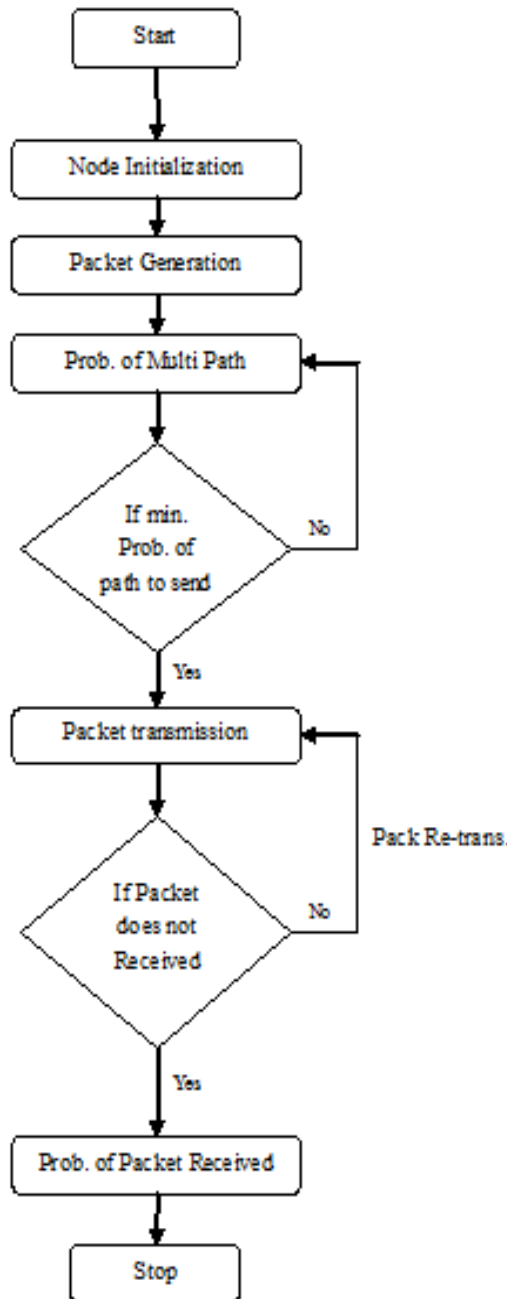
FLOW CHART

Figure 1: MPTP.

SYSTEM MODELING PARAMETERS AND RESULTS

Throughput

Throughput is the rate of successful message deliver over a communication channel. The throughput is usually measured in bits per second.
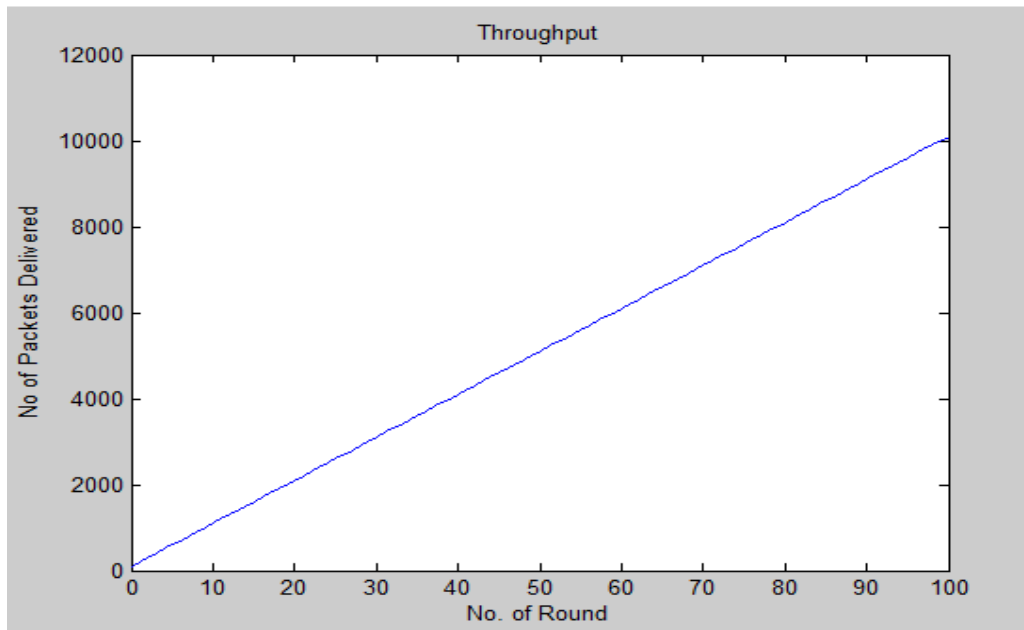
Figure 2: Throughput.

End to End delay

The end to end delay or way delay it refers to time taken for a packet to be transmitted across a network from source to destination.
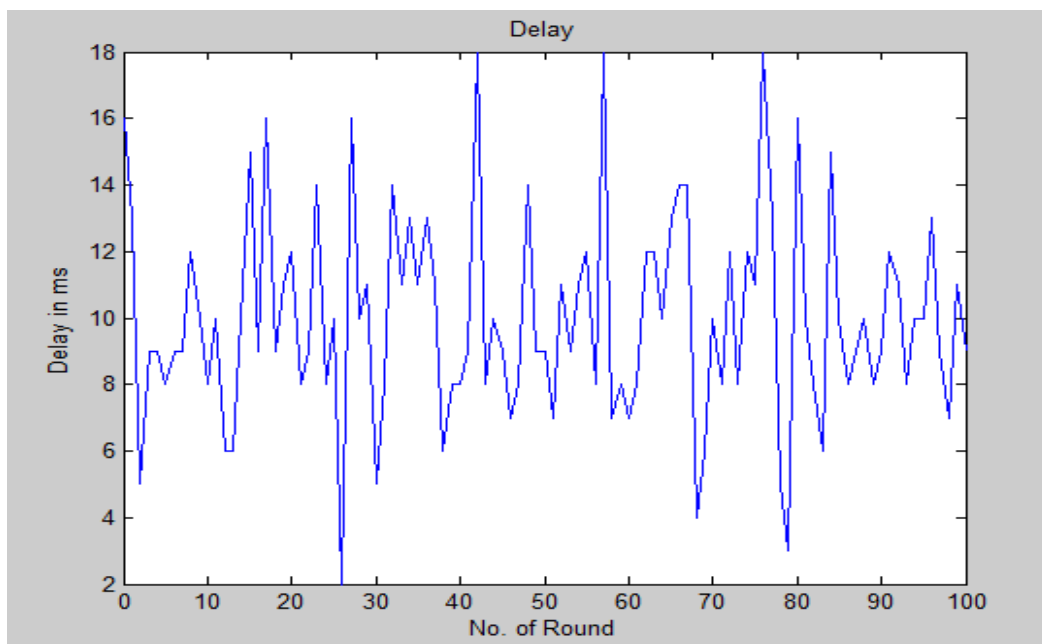

Figure 3: Delay.

Packet Drop

When packet loss occur, means one or more packets travelling across a network and then reaches to destination. Packet loss is caused by errors in transmission of the data. When it typically across a wireless network or network congestion. When one or more than packets is to be fail to reach in to the destination.
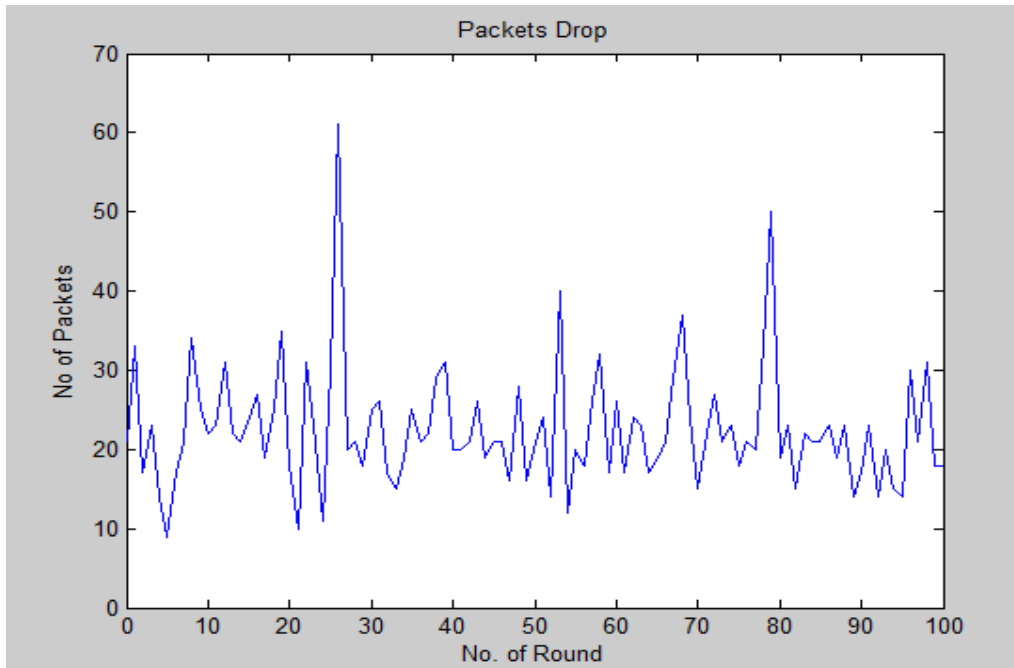
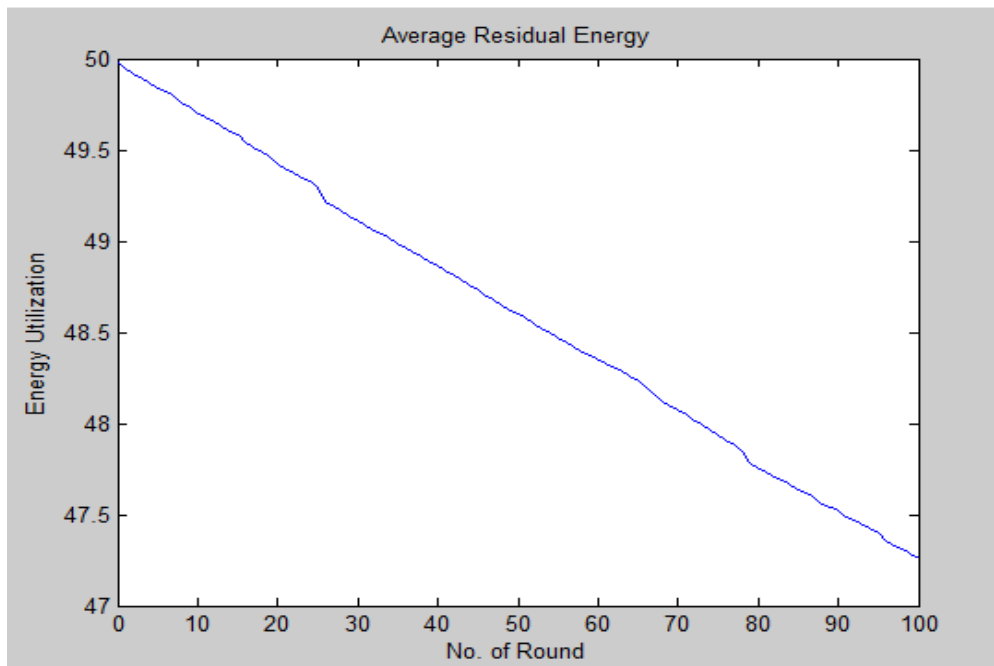***Figure 4:*** *Packet drop.*

Energy Utilization

Figure 5: *Energy utilization.*

MPTP

Multipath transfer protocol (MPTP) may also be used within different paths to enhance data transfer reliability. Network coding may be used to improve data flow and reliability in a multi path scenario. MPTP can send packets via any available network like wireless, wired or USB. In DCF-MPTP is highly effective in alleviating the receiver buffer blocking**.**
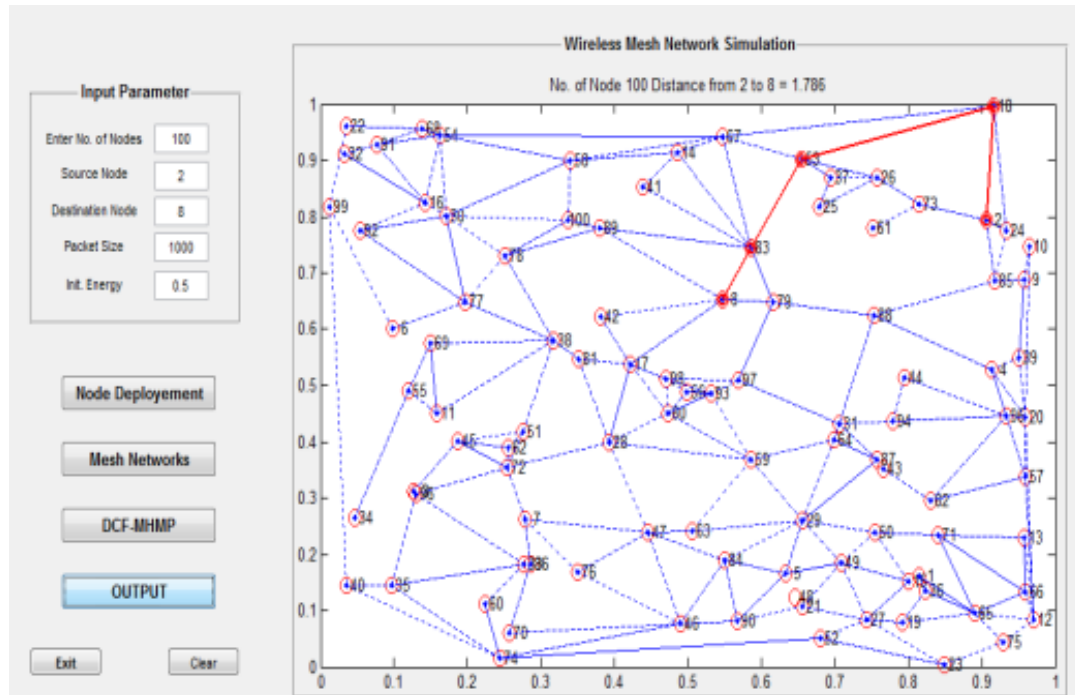
Figure 6: MPTP.

Parameter	Value
Throughput	49355.1469 (bps)
Delay	9.6254 (ms)
Packet drop	21.5245 (bps)
Energy	37.4343 (J)

CONCLUSION AND FUTURE WORK
This project, the multi-path transfer protocol, is highly effective in alleviating the loss of packets. We consider retransmission, collision probability in calculating the throughput and an upper-bound of average end-to-end delay of the network.

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Cite this Article as:
Nandhini.D, & S. Rajeswari. (2019). Performance Analysis of Network Coding with Exponential back off Algorithm Using Multi Path Transfer Protocol in Wireless Network. Journal of Analog and Digital Communications, 4(2), 20–26. http://doi.org/10.5281/zenodo.3334957