

Performance Analysis of Network Coding with IEEE802.11 DCF Using Multi Path Transfer Protocol in Wireless Network

¹Nandhini. D, ²Rajeswari. S

¹M.E Student (Communication Systems), ²Associate Professor,
Department of Electronics and Communication Engineering,
Saranathan College of Engineering,
Trichy, Tamil Nadu, India

Email: ¹nandhini21696@gmail.com, ²rajeswaris-ece@saranathan.ac.in

Abstract

In this paper investigated the throughput and end to end delay of network coding under IEEE802.11 Distributed coordination Function (DCF). In this paper proposed the random medium access of CSMA/CA as in IEEE802.11 distributed coordination function with Multi Path Transfer Protocol (DCF-MPTP). In a CSMA/CA is based on the combination of physical carrier sensing and exponential back off algorithm and then formulate the probability of successful transmission, collision probability and the re-transmission mechanism. In our model multi hop network used the MPTP (protocol) it prevent the delay and packed loss of source to destination. Finally use computer simulation to verify an analytical model.

Index Term: performance analysis, network coding, multi hop- multi path transfer protocol, IEEE802.11 DCF.

INTRODUCTION

In multi hop wireless network, if a node send a packet to destination the node should not depend on intermediate node for relaying packets. Hence this paradigm is also known as multi hop wireless network. In this network it have several benefits it compared to the single hop and multi hop network , it improve the connectivity and extend the coverage area of the network and transmitting power of energy is to be efficiency. In a multi hop network moreover, it enable the higher data rate and high throughput in a wireless network.

In a four networks are classified in the multi hop wireless network. Such as mobile Ad-hoc network (MANET), wireless sensor network (WSN), wireless mesh network (WSN), and vehicular Ad-hoc network (VANET). In an area of wireless mesh network it provides the efficient way to interconnect the network,

the wireless mesh network it more robust and redundant communication in an wireless network. It provides the high data rate, scalability and reduced the cost. The wireless mesh network it mainly challenging of interference and channel quality, to over-come the problem to improve the performance of wireless mesh network. In fundamental concept types in MAC layer such as routing protocol, cross layer and network coding for wireless mesh network. In wireless mesh network (WSN) is used the multi path transfer protocol (MPTP) because in a multi path to find which path is efficient channel to choose after will transmit the packet.

In network coding, it transmit the data is encoded and decoded to increase the network throughput, it reduce the delay and make network more robust. In existing method receiver buffer blocking and throughput is main draw bag. In our proposed model IEEE802.11 distributed

coordination function with multi hop in multi path transfer protocol (MPTP). In network coding scheme is based on the Q-learning algorithm to control number of redundant packet depending on the network dynamics to reduce the possibility of receiver buffer blocking. It considers retransmission, collision probability and coding probabilities in calculating the throughput and end-to-end delay of the network.

IMPLEMENTATION TECHNIQUE:

- DCF-MPTP
- Q- Learning algorithm

DCF-MPTP

In IEEE802.11 DCF is a protocol in which mainly used in carrier sensing and maximize the throughput and then preventing the packet collision.

In DCF does not solve the hidden and exposed terminal problem completely to solve the problem by the usage of RTS and CTS control signals. In DCF it mainly to produce the positive acknowledgement if source to send the frame in to destination.

Q- LEARNING ALGORITHM

In Q- learning algorithm to control the number of redundant packet and to reduce the possibility of receiver buffer blocking. If any collision is occurred in re-transmission is easily to be predicted and highly effective in alleviating the loss of packets.

RELATED WORK

Shijun Lin [7], in a network coding scheme under the ALOHA protocol. The three ways of expression network throughput, the physical layer network coding (PNC), Traditional high layer network coding (HNC) and non-network coding (NNC). In a two way relay channel is compared to PNC is better transmission efficiency. So it used the hybrid network scheme it has better throughput

performance compared than PNC, HNC and NNC schemes. In HNC are combination of physical and network layer and it improving the performance. It main disadvantage is two hop wireless network with high delay and unicast transmission low throughput.

Nadien Moghadam [6], in single hop wireless network if source to transmit the data packet in to destination (receiver) it over the channels, in single hop, the packets are independently it receive the error packet rate. In this paper it considered queue is stable less than the service rate. It proposed the two level structure of queue at the transmitter, the main queue store the arrived packets and the virtual queue stores it transmit the packets are successfully received. It proposed the virtual queue multicast network coding and scheduling scheme (VQ-MNCS). In VQ it consists of packets it received only by the partial users. In queuing model to develop the network coding is based on the packed scheduling algorithm. The main disadvantage is single hop wireless network with high delay and unicast transmission.

Yalin Evren Sagduyu [1], in a fundamental model of tandem network in cross layer optimization to derive the maximum throughput of multicast traffic. In network model if source is burst the packet queues empty slot it occur the maximum throughput and then finite packet delay is to be occurred .The dynamic queue is used to expand the stability region and maximum throughput is occurred. In this paper to formulate the cross layer framework for achievable throughput and through the joint of MAC layer strategies.

Farid Ashtiani [4], in analyzing of maximum stable throughput it achieved by the network coding. In network coding it will adjust the random access parameter for example contention window size,

power control and the throughput is also increased. Wherever the number of nodes is increase, the network coding of throughput will automatically decrease. So we used the asymmetric packet at each node, it possible to recover the problem and then reach the high gain throughput in a network coding scheme. In new metric of (NUR) network unbalance ratio is to be used. The throughput gain of network coding is compared to traditional routing the number of nodes is to be decreased.

Nikola Zlatanov [8], in this paper to proposed the deterministic and probabilistic approach of average delay. In an deterministic approach it have two selection cases one is user-to-relay transmission mode and relay-to-user transmission mode. The user to relay is queue falls the amount of information below the threshold and the relay to user transmission mode it exceeds that the threshold .In an probabilistic selection user-to-relay transmitting mode is smaller than relay-to-user transmission mode. This scheduling is used to maximize the throughput both without constraint on delay and with constraint on delay. It main drawback is two hop wireless network with high delay and unicast transmission and low throughput.

Fragiadis and Paschos.G [5] in this paper used the single hop broad cast channel and interflow network coding is to be implemented it analyzes throughput only and improve the performance by using the XOR operation.

Demo.S and Umehara[3] It analyze the throughput and delay of network coding in an two hop network and single relay multi user wireless network model is used to achieve the throughput, in an optimization problem to control the traffic, to maximize the throughput and reduce the delay of the network.

Ashtian.F and Iraj.M.H [2] In this paper to analyze the throughput and without constraint on delay. It is used in single hop wireless network and then also unicast transmission.

CONCLUSION

I have analyzed the paper it discussed about the throughput using various implementations but it done only minimum amount of data is to be received. To overcome this problem, it using wireless mesh network (WSN) in a multi hop- multi path protocol to increase the throughput and reduce the end to end delay of the network has been analyzed.

REFERENCE

1. Anthony Ephremides and Yalin Evren Sagduyu "Cross layer optimization of MAC and network coding in wireless queueing tandem networks" IEEE transactions, vol.54, No.2, February (2008).
2. Ashtiani. F and Iraj. M. H "An analytical approach for throughput evaluation of wireless network coding", IEEE International conference on communications (ICCC'09), pp.1696-1700, (2009).
3. Denno. S and Umehara "Performance analysis of slotted ALOHA and network coding for single-relay multi user wireless network", ad hoc networks, vol.9, no.2, pp.164-179, (2011).
4. Farid Ashtiani and Mohammad. H "Maximum stable throughput of network coded multiple broadcast sessions for wireless tandem random access networks" IEEE transactions, vol.13, No.6, June 2014
5. Fragiadakis. C and paschos. G "Wireless network coding with partial overhearing information", IEEE. Pp.2337-2345, (2013).
6. Hong Xiang Li and Nadien Moghadam "Queue stability analysis in network

- coded wireless multicast network”
IEEE transaction, (2015).
7. Liqun. Fu and Shijun Lin (2016)
“Hybrid Network coding for
unbalanced slotted ALOHA relay
network”, vol.15, No.1.
 8. Nikola Zlatanov and Schober. R
“Bidirectional buffer- aided relay
networks with fixed rate transmission
part II: Delay constrained case”, IEEE
transactions on wireless
communication, vol.14, no.3, pp.1339-
1355, (2015).