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Mitigation of Channel Impairment in Ethernet Wireless Local Area Network in Nigeria

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ABSTRACT: This paper focuses on mitigation of channel impariment in Ethernet wireless local area network. During the data collection procedure, the flowchart for the queuing behaviour of Ethernet was shown, the throughput data presentation as well as the MATLAB CODE were also presented in this paper. The major objective of this paper is to establish the influence of varying the traffic intensity and the network size of Ethernet quality of service (QOS). The network is developed and converted into MATLAB simulation model.

Key words: Throughput, delay Ethernet frame

INTRODUCTION

Wireless network is the major medium of communication between people in today's tremendous growing world. The demand for this type of communication is increasing every minutes of the day, therefore to handle this great demand, more wireless Ethernet network has been established in order to attain the high speed rate and data rate requirement. Since the local area network also known as LAN concept was defined about 30 years ago, many technologies have been developed to occupy times area of the market. Names such as 100 voice grade (100VG) and local Asynchronous transfer mode (LATM) were once common but however. Ethernet has outlive them all become used in almost all local area network installation [2]. Ethernet therefore refers to a family of protocols and standards that together defined the physical and data link layer of the world most popular type of LAN.

1. ETHERNET FRAME

A frame is the heart of an Ethernet network which the station uses to deliver data between the stations on the network. A frame consists of a set of bits organized into several fields. These fields include includes address fields, a variable size data field that carries from 46 to 15000 byte of data and error checking field that check the integrity of the bits in the frame to make sure that the frame has arrived.

2. DATA COLLECTION

The traffic data used in this paper were been obtained from input generator of the Ethernet network. The input generator module generate input for bandwidth sizes and packet sizes in order to generate request. This input generator were built inside the Ethernet local area network that runs on a mix operation system and formulated special software.

The synchronous (sloshed) operation throughputs can be expressed as shown below.

$$S=\frac{E[H_S]}{E[Ls]} \quad - \qquad (1)$$

Where E $[H_s]$ is the amount of useful work

E (L_s) is the expected donation of random slot

E (U_s) = (GrGe (-ara)) Era

E)L_s) =$G_e{}^{-ara}$ + (1+g) arG^{-ara} + (bta) [1-(1+arg)

E(-ara) Erg),

G = Traffic intensity

γ = Vitual Clock rate

a = Propagation time

b = Transmission time foe colliding message under asynchronous operation, the throughput is expressed as

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$$S = \frac{E[Hc]}{E[L_C]} \qquad -(2)$$

Where E [Hc] = [Ce] $^{-ara)\ Era}$

E[Lc[= (1+2a + e^t (-arg) / rG)

The standard equilibrium radom access delay mode is used to estimate the mean message delay . t so that

$$T = (S\text{-}T_o+1)\ T_R + 1 + G \quad - \qquad (3)$$

Where To is the initial delay.
TR is the retransmission delay.
The arrivals of data frame are described by general passion processes Gi with arrival rate Xi, and the variable lengths of frames are reflected by general transmission described by General transmission processes Gt.

$$T = T_T = T_D\ (x) + Tack \quad - \qquad (4)$$

Where

T_T Es transmission TD (x) Es Radom transmission delay
T_{ACK} is the acknowledgement time –a
The maximum throughput

$$X_{max} = \frac{1}{E\ [T_T]+t_0+E\ [Tack]} \qquad (5)$$

Expected mean average time

$$X_{max} = \frac{1+C^2}{2(1-\rho 0} \quad E[T]- \qquad (6)$$

Where ρ = utilization load factor.

$$C^2 = \frac{E[T^2]}{E[T^2]} 2_{-1} \qquad (7)$$

E (T) = average service time per transmission

$$E[T^2] = E[T_T{}^2] = E\ [T_T]^2 + E[T_D{}^2]\text{-}E[D]^2 + E[T]^2 \ -- \qquad (8)$$

In the simulation model, throughput sis defined as follow

S = (Number of Successful Transmission) x (Message Length) (9)
Total Transmission Time

$$S_{max} = \frac{\rho}{[PxF]} \quad - \qquad (10)$$

Where ρ= time length of a massage

F = time length for an interferes

Time fill

4. DATA PRESENTATION AND ANALYSIS

Table 1: Displays the relationship between throughput and varying packet sizes. The mean throughputs increase as the traffic intensity increased. When 5=3 throughput increase linearly with offered load for a small number contending stations due to multiplexing of back off times that occurs. However, at higher contention level, when 5=6 and 10. The curve of simulated results binging to deniate from theoretical curve.

Packet size (bytes) throughput for press stations

Table 1:

Packet size (types)	**Throughput for (3) stations**	**Throughput for six stations**	**Throughput for Ten station**
0	400	1500	2800
400	1200	2400	3550
800	1500	2700	3500
1200	1700	3100	3350
1600	1900	3250	3230
2400	2100	3300	3200
2800	2250	3270	3180
3200	2400	3250	3040
3600	2500	3230	2860
4000	2700	3200	2500
4400	2850	3180	2400
4800	2950	3120	2500
5200	2980	3050	2290
5600	3000	2980	2250
6000	2980	2924	2210
6400	2950	2828	2170

Therefore, in order to maximize throughput in the network, the load must be carefully chosen.

The graph below show throughput for collision detected for three station

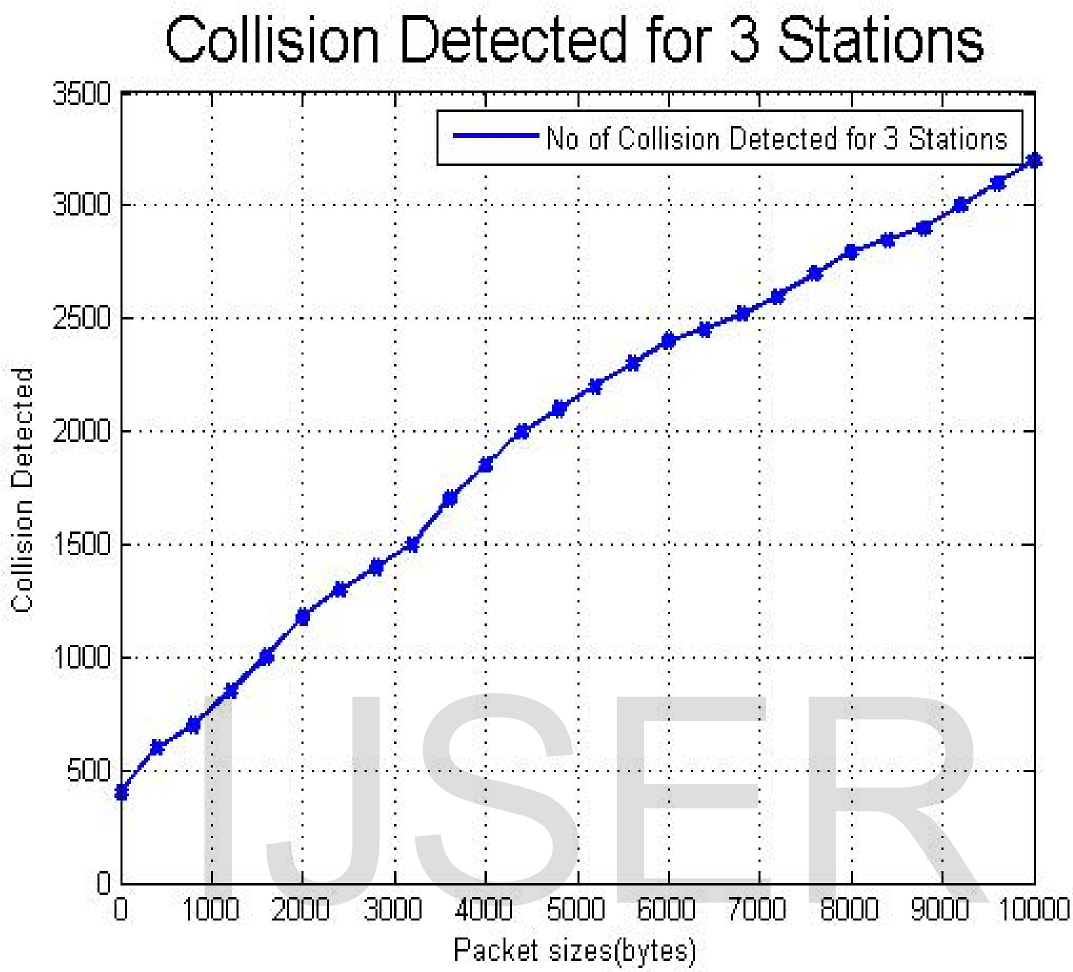

Fig. 1: Collision for three stations versus varying packet sizes

5. CONCLUSION

In this paper, the major findings of this work are summarizes with recommendations given for improvise the traffic performance in Ethernet network scheme. It has also been verified that Ethernet network is influenced by the sizes of the packets transmitted to the network. The result shows that with respect to quality of service parameter like throughput, collision utilization and delay are summarized.

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