Investigation of Different Ethernet Wiring and Different Frame Size to Enhance the Performance of LAN

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***Abstract*—A computer network that covers only a small area networks abbreviated Local Area Network LAN, is used in campus computer networks, buildings, offices, in homes, schools or smaller.Currently, most LANs based on the IEEE 802.3 Ethernet technology using devices such as hubs and switches, which have a data transfer speed of 10, 100, or 1000 Mega bit /s (Mbps). In this paper, we are investigating the different Ethernet wiring standard and different frame size.**

***Keyword*—frame size,10BaseT,100BaseT,LAN performance,Switch, Hub.**

I. INTRODUCTION

A LAN is a computer network limited to a small area such as an office building, university, or even a residential home. Most mid to large-sized businesses today use LANs, which makes it easy for employees to share information. Currently, the most common type of LANs are Ethernet-based.

The Ethernet standard comprise several wiring and signaling variants of the OSI physical layer in use with Ethernet. The original 10BASE5 Ethernet used coaxial cable as a shared medium. Later the coaxial cables were replaced with twisted pair and fiber optics links in conjunction with hubs or switches.

System communicating over Ethernet divide a stream of data into shorter piece called frames. Each frame contains source and destination addresses and error-checking data so that damaged data can be detected and re-transmitted. As per the OSI model. Ethernet provides services up to and including the data link layer.

Collisions happen when two stations attempt to transmit at the same time. They corrupt transmitted fata and require stations to transmit. The lost data and retransmissions reduce throughput. In the worst case where multiple active hosts connected with maximum allowed cable length attempt to transmit many short frames, excessive collisions can reduce throughput dramatically.

LAN is found in many business environments thatlinks a workgroup of task-related personal computers (PCs), for example, engineering workstations or accounting PCs. One of the computers is given a large capacity disk drive and become a server toall other PCs. Software can be stored on this server and used by the wholeclients of the group.

In the implementation of LAN, we use different types of devices such as repeater, switches, hubs, connectors and different cables. Currently, most LANs based on the IEEE 802.3 Ethernet technology using devices such as hubs and switches, which have a data transfer speed of 10, 100, or 1000 Mega bit/s (Mbps).

In the work done in [1], they are measuring the LAN performance. Their work depends on variation of the time of simulation and the number of hubs and making the frame size fixed value of (46, 2000 bytes)with segmentation (1500 bytes).

In the work done in [2], they are evaluating the performance of the LAN by varying the frame size between (1500, 1024 and 512) only and the variation of the Ethernet wiring standard.

In this paper, we evaluate and test the performance of LANs under different conditions of Ethernet wiring (10BaseT and 100BaseT) and different frame size (1500, 1024, 512, 128 and 64 bytes). The collision count, utilization, data traffic received and data traffic sent is calculated in each case of conditions for hub. For switch the parameters that will be measured is data traffic sent, data traffic received and filtered traffic. Simulations are performed by using Riverbed Modeler Academic edition. In our work we are seeking to simulate 1000BaseT as another type of Ethernet cables with data transmission speed 1000Mbps but the problem that the simulation tool that we used contains 10BaseT, 100BaseT and 10Gig but not contains 1000BaseT as an Ethernet cable.

A network station wishing to transmit will first check the cable plant to ensure that no other station is currently transmitting (CARRIER SENSE) since the communications medium us one cable, therefore, it does allow multiple stations access to it with all being able to transmit and receive on the same cable (MULTIPLE ACCESS). Error detection is implemented throughout the use of station “listening” while it is transmitting its data. Two or more stations transmitting cause a collision (COLLISION DETECTION), jam signal is transmitted to network by a jam signal is transmitted to

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network by the transmitting stations that detected the collision, to ensure that all stations know of the collision. All stations will “back off” for a random time. Detection and retransmission is accomplished in microseconds.

56 bits	8 bits	48 bits	48 bits	16 bits	46 to 1500 bytes	32 bits
Preamble	S F D	Destination Address	Source Address	Lenght or Type	Data/LLC	Frame Check Sequence

Fig. 1. The Ethernet frame format

Figure 1 demonstrate the minimum and maximum value of Ethernet frame size in bytes. We can see that the maximum value of the frame size at the case of Ethernet is 15018 bytes while the minimum value of the frame size is 64 bytes.

If the data packet size is larger than the maximum size so we will use the segmentation where one of them will be the maximum size and the other segment will be the remaining bits.

If the data packet size is smaller than the minimum value of the frame size, there are padding bits will be added to the frame size to make its value reach to the minimum value of frame size. [3]

II. LAN Components

A. Network media

Network media, sometimes called Network medium, is the physical channel that used for transmission in network. There are two types of mediums used in the implementation of computer networks. One is guided medium and another is unguided medium.

Guided Media (wired)

In guided medium electrical/optical signals are passed through a solid medium such as Copper UnshieldedTwisted Pair (UTP), Copper shielded Twisted Pair (STP), Copper co-axial cables and fiber optics cables.in guided mediums, the signals are confined within the wire and do not propagate outside of the cables.

Unguided Media (wireless)

In unguided medium the data is transmitted by sending electromagnetic signals through free space and hence the signals are not guided in any specific direction. All unguided transmission mediums are classified as wireless transmission.

10BaseT cables

It is a twisted pair Ethernet wiring standard for LAN implementation that support 10Mbps data rate. The maximum transmission length is 100 meters.

100BaseT cables

It is another twisted pair Ethernet wiring standard for LAN implementation that supports 100Mbps data rate. The 100BaseT Ethernet wiring standard is the most commonly used in LAN creation due to its highspeed, robustness and low cost. It is alsocalled fastEthernet because it is ten times faster than 10BaseT [4]- [5].

TABLE I
COMPARISON BETWEEN GUIDED CABLES

Media	Frequency range	Typical attenuation	Repeaters
Twisted pair	0 - 3.5 kHz	0.2 dB/Km At 1KHz	2 km
Coaxial cable	0 -500MHz	7 dB/km At 10MHz	1 - 9 km
Optical fiber	186 -370THz	0.2 to 0.5 dB/km	40km

Table I shows the comparison between the guided cables (Twisted pair, Co-axial cables and optical fiber).

B. Hub

Hub is the simplest component in any local area network (LAN). Any data packet coming from one port is sent to all other ports it is then up to the receiving computer to decide if the packet is for it or not.Since every packet is sent out to every computer on the network there is a lot of wasted transmission, so the network can be easily become bogged down.Hubs are typically used on small networks where the amount of data going across the network is not very high.

C. Switch

Switch has multiple ports. When the packet comes through a switch it is read to determine which computer to send the data to. This leads to increase the efficiency and the performance of the device because the packets are not going to computers that do not require them [6].

The switch can determine the address of the sender and the receiver according to its MAC address table, where it’s a table in each switch which store the MAC address transmission easy when any device need to send data several times.

III. Simulation Software and Parameters

The simulation will be done by using Riverbed Modeler Academic Edition 17.5 [7].Riverbed Modeler Academic edition is a high-level event based network level simulation tool, it contains a huge library of accurate models of commercial available fixed network hardware and protocols. Riverbed Modeler Academic Edition can be used as a research tool or as a network design/analysis tool. It consists of high level user interface, which is constructed from C and C++ source code with a huge library of Riverbed Modeler specific functions. Modelling in Riverbed is divided into three main domains. The first one is Network domain that is responsible for networks, sub networks, network topologies, geographical coordinates and mobility. The second one is Node domain that includes single networknodes such as routers, workstations, mobile devices. The last model called Process domain that represent single module and source code inside network nodes such as data traffic source model and IP protocol. For this work we will create an office LAN which consists of hubs, switch, twenty Ethernet stations,10 devices per each hub, under 10baseT (for scenario 1) and 100baseT (for scenario 2) Ethernet wiring standard.

A. Riverbed Modeler Academic Edition 17.5

Riverbed Modeler is software that is specialized for network research and development.This release replaced

OPNET IT guru academic edition “Optimized Network Engineering Tool”. I used that software to implement the office LAN because it offers relatively much powerful visual or graphical support for the users.

B. *Parameters of nodes*

Traffic Generation Parameters

Start time in seconds will be constant (5.0), ON State Time in second is constant (1000), OFF state Time is (0).

Packet Generation Arguments

Packet size in bytes will be varied according to the frame size in each case which will be (1500,1024,512,128,64), segmentation size in bytes will be No segmentation.

C. *Performance parameters*

For Hub

Utilization, Collision count, Traffic forwarded (bits/sec) and Traffic received (bits/sec).

For Switch

Traffic forwarded (bits/sec), Traffic received (bits/sec), Traffic filtered (bits/sec).

D. *Running time parameters*

The simulation are performed for 4 min and we make the time of simulation is constant for all the scenarios that we made.

IV. Simulation Scenarios

In our simulation we used two different scenarios for implementation of LANs with two different wiring Ethernet standard. At each scenario we changed the frame size to calculate some parameters of the network, then we evaluate the performance of the network.

A. *Scenario 1*

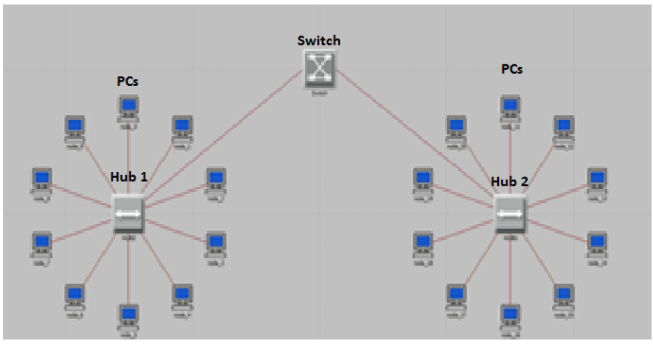

Fig. 2. Office LAN under 10BaseT wiring standard

Figure 2 illustrates scenario 1 which contains connection of 20 Ethernet stations to hubs, each hub connected to 10 Ethernet stations, and the hubs connected to Ethernet switch. 10BaseT Ethernet wiring standard will be used in that scenario.

B. *Scenario 2*

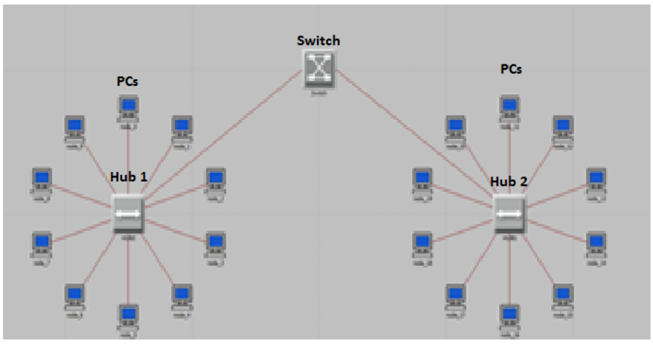

Fig. 3. Office LAN under 100BaseT wiring standard

Figure 3 illustrates scenario 2 which contains connection of 20 Ethernet stations to hubs, each hub connected to 10 Ethernet stations, and the hubs connected to Ethernet switch. 100BaseT Ethernet wiring standard will be used in that scenario.

V. Simulation Results

After we made the simulation we took the results that measure and evaluate the performance of LAN under different Ethernet wiring standard with different frame size as following:

A. *Number of collision counts at Hub 1*

TABLE II
NUMBER OF COLLISION COUNTS AT HUB1 (AVG.)

Time duration	4 minutes	
Devices	Collision count Hub 1	
standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	3,456.19	24.24
1024 bytes	1,558.101	14.051
512 bytes	333.03	7.753
128 bytes	26.292	5.589
64 bytes	13.54	4.7

Table II shows the comparison between the collision count number at hub 1 under 10BaseT (scenario 1) and 100BaseT (scenario 2) for 1500, 1024, 512, 128 and 64 bytes of frame size.This table shows that the value of the collision count at the case of using 10BaseT Ethernet cables is larger than value of the collision count at the case of using 100BaseT regardless the value of frame size is.

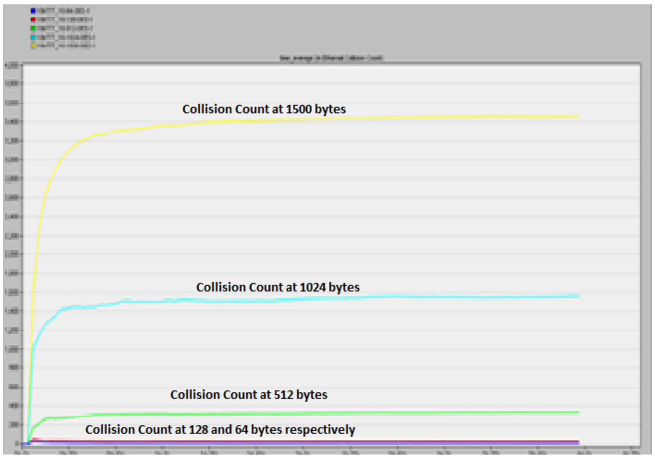

Fig. 4. Comparison between numbers of collision count at Hub1 under different frame size at 10BaseT Ethernet wiring standard.

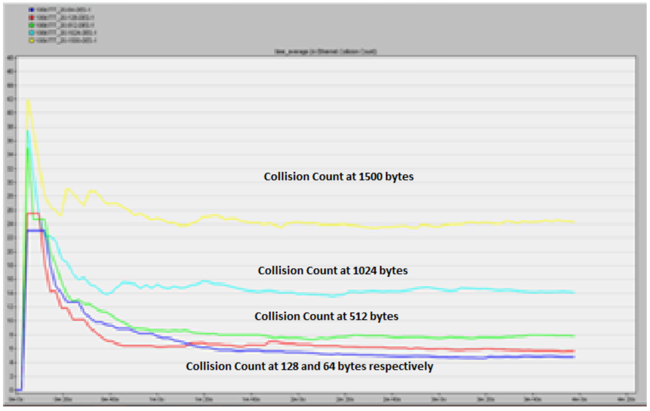

Fig. 5. Comparison between numbers of collision count at Hub1 under different frame size at 100BaseT Ethernet wiring standard

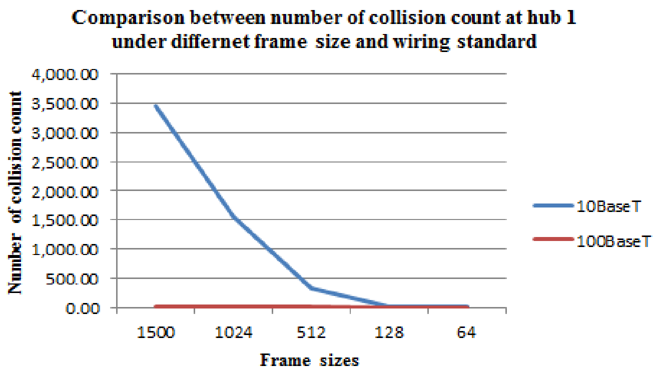

Fig. 6. Graphs for number of collision count at Hub1

Figures 4, 5 and 6 show that the number of collision counts in 10BaseT is more than 100BaseT for all frame sizesregardless the value of the frame size which is used.

B. Utilization of Hub

TABLE III
UTILIZATION OF HUB1 (AVG.)

Time duration	4 minutes	
Devices	Utilization Hub 1	
standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	0.883	0.091
1024 bytes	0.627	0.062
512 bytes	0.321	0.032
128 bytes	0.092	0.009
64 bytes	0.053	0.005

Table III shows the comparison between the utilization of hub 1 under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.This table shows that the value of the utilization at the case of using 10BaseT cables is larger than the value of the utilization when using 100BaseT cables regardless the value of the frame size that is used because the value of utilization proportional directly with the value of the collision count.

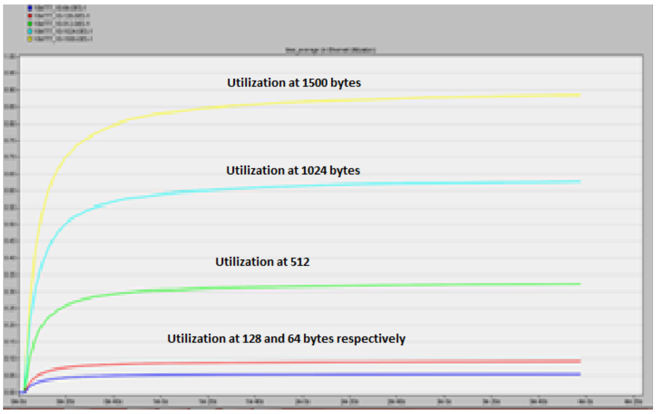

Fig. 7. Comparison between utilization at Hub1 under different frame size at 10BaseT Ethernet wiring standard.

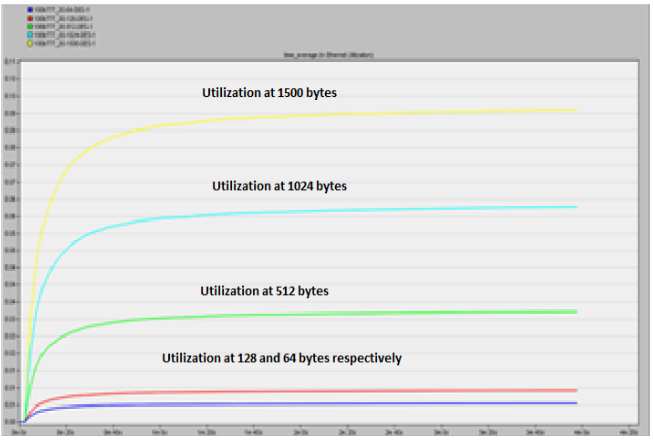

Fig. 8. Comparison between utilization at Hub1 under different frame size at 100BaseT Ethernet wiring standard

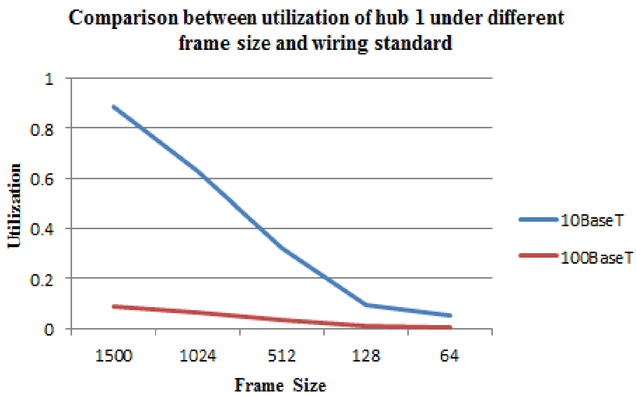

Fig. 9. Graphs for Utilization of Hub1

Figures 7, 8 and 9 demonstrate that the utilization in 10BaseT is more than 100BaseT for all frame sizesregardless the value of the frame size that is used.

C. *Traffic forwarded (bits/sec) at Hub 1*

TABLE IV
TRAFFIC FORWARDED (BITS/SEC) TO HUB 1 (AVG.)

Time duration	4 minutes	
	Traffic Forwarded (bps)	
Devices	Hub 1	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	8,815,602	9,100,506
1024 bytes	6,259,192	6,263,042
512 bytes	3,209,531	3,214,534
128 bytes	919,988	918,550
64 bytes	538,601	538,967

Table IV shows the comparison between the traffic forwarded to Hub 1 under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

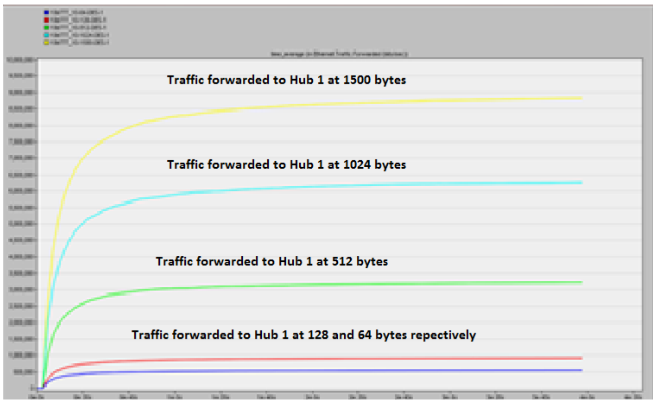

Fig. 10. Comparison between traffic forwarded (bps) at Hub1 under different frame size at 10BaseT Ethernet wiring standard

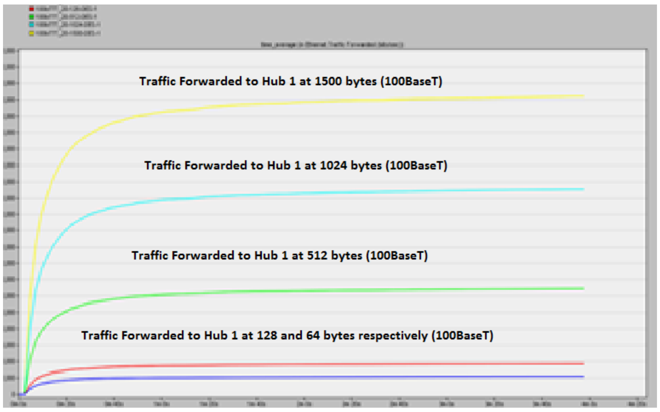

Fig. 11. Comparison between traffic forwarded (bps) at Hub1 under different frame size at 100BaseT Ethernet wiring standard

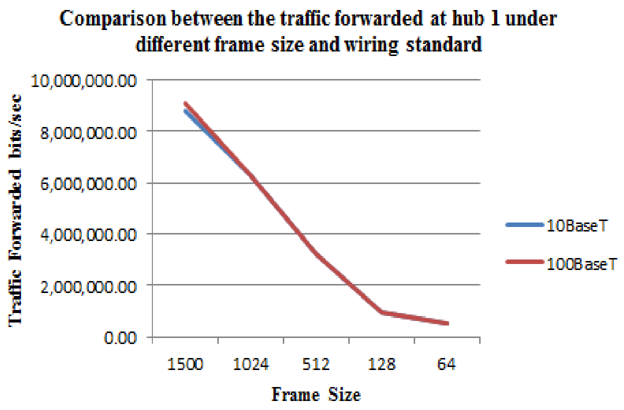

Fig. 12. Graphs of traffic forwarded at Hub1 (bit/sec)

Figures 10, 11 and 12 show that at some points both curves overlap to each other; it means that traffic forwarded to hub1 is approximately same at these points.

D. *Traffic received (bits/sec) at Hub 1*

TABLE V
TRAFFIC RECEIVED (BITS/SEC) TO HUB 1 (AVG.)

Time duration	4 minutes	
	Traffic Received (bps)	
Devices	Hub 1	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	8,815,602	9,100,506
1024 bytes	6,259,192	6,263,042
512 bytes	3,209,531	3,214,534
128 bytes	919,988	918,550
64 bytes	538,601	538,967

Table V shows the comparison between the traffic received to Hub 1 under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

Tables V and IV shows that the value of the traffic sent in bits per second and the value of the traffic received in bits per second at the case of hub is equivalent because hub doesn't understand addressing the data which the hub receive is broadcasted to all device in the network so the amount of received data is the same as the amount of sent data.

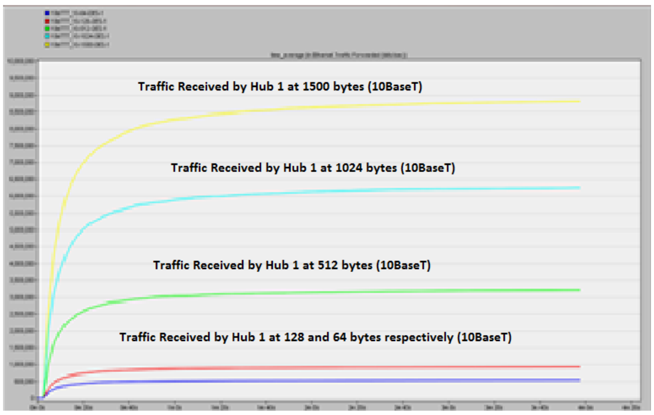

Fig. 13. Comparison between traffic received (bps) at Hub1 under different frame size at 10BaseT Ethernet wiring standard

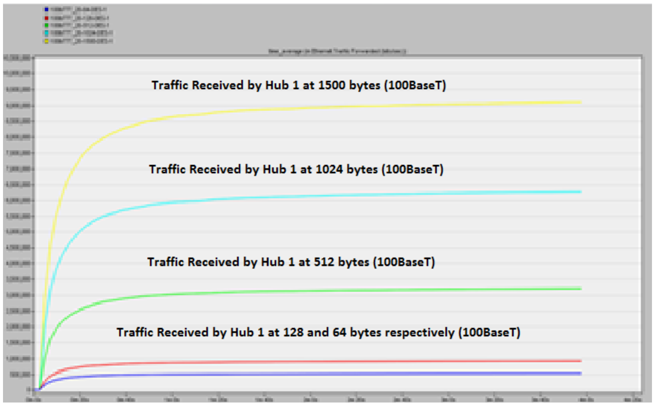

Fig. 14. Comparison between traffic received (bps) at Hub1 under different frame size at 100BaseT Ethernet wiring standard.

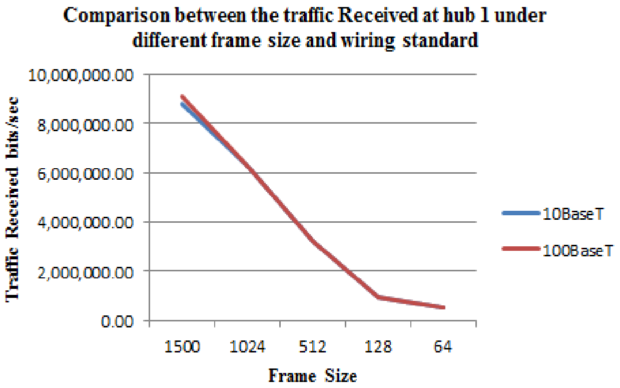

Fig. 15. Graphs of traffic received at hub1 (bit/sec)

Figures 13, 14 and 15 demonstrate that at some points both curves overlap to each other; it means that traffic received to hub1 is approximately same at these points.

E. Number of collision counts at Hub 2

TABLE VI
NUMBER OF COLLISION COUNTS AT HUB 2 (AVG.)

Time duration	4 minutes	
	Collision count	
Devices	Hub 2	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	3,435.919	27.70
1024 bytes	1,572.666	14.877
512 bytes	340.3	7.626
128 bytes	29.4	5.29
64 bytes	12.4	5.13

Table VI illustrates the comparison between the collision count number at hub 2 under 10BaseT (scenario 1) and 100BaseT (scenario 2) for 1500, 1024, 512, 128 and 64 bytes of frame size.The table VI illustrates that the value of the collision count at the case of using 10BaseT Ethernet cable is larger than the amount of collision count when using 100BaseT cables regardless the value of the frame size that is used.

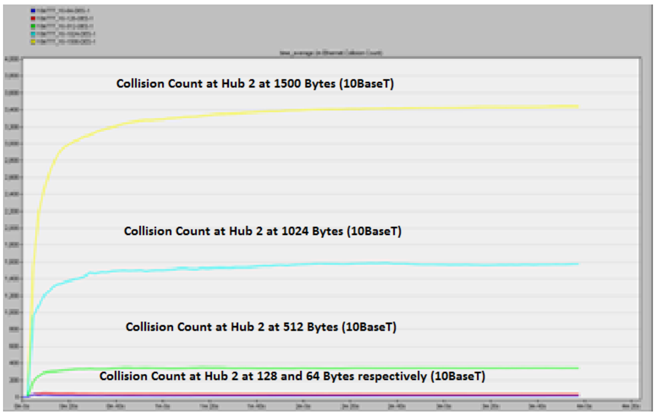

Fig. 16. Comparison between numbers of collision count at Hub2 under different frame size at 10BaseT Ethernet wiring standard

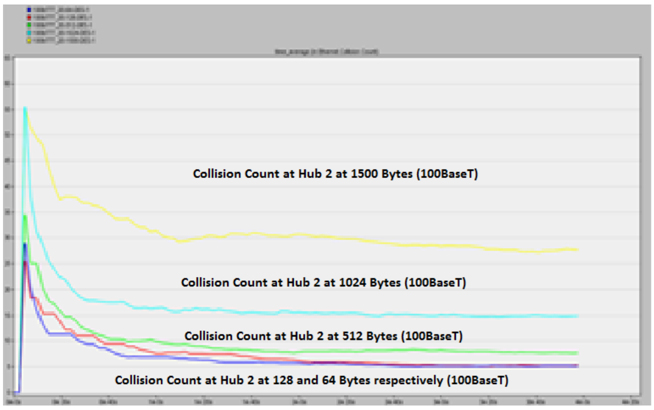

Fig. 17. Comparison between numbers of collision count at Hub2 under different frame size at 100BaseT Ethernet wiring standard

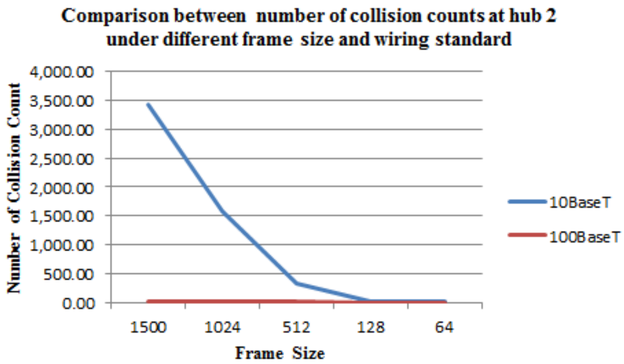

Fig. 18. Graphs for number of collision count at Hub2

Figures 16, 17 and 18show that the number of collision count in 10BaseT is more than 100BaseT for all frame sizesregardless the value of the frame size that is used.

F. Utilization of Hub 2

TABLE VII
UTILIZATION OF HUB 2 (AVG.)

Time duration	4 minutes	
	Utilization	
Devices	Hub 2	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	0.8836	0.0910
1024 bytes	0.6288	0.0626
512 bytes	0.3217	0.0321

128 bytes	0.092	0.009
64 bytes	0.053	0.005

Table 7 shows the comparison between the utilization at hub 2 under 10BaseT (scenario 1) and 100BaseT (scenario 2) for 1500, 1024, 512, 128 and 64 bytes of frame size. The table demonstrates that the value of collision count at the case of using 10BaseT Ethernet cable is larger than its value when using 100BaseT cables regardless the frame size which used because the value of collision count proportional directly with the value of collision count.

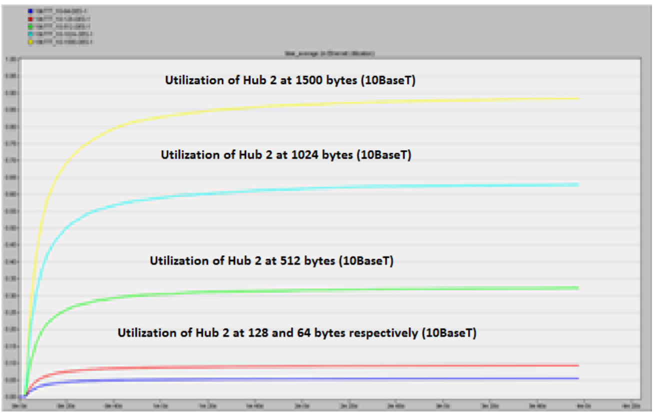

Fig. 19. Comparison between utilization at Hub2 under different frame size at 10BaseT Ethernet wiring standard

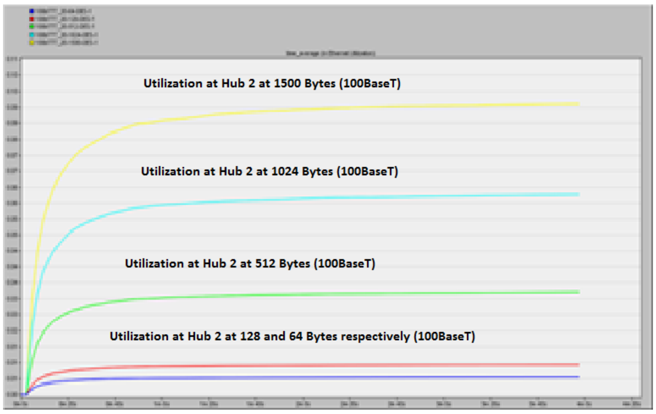

Fig. 20. Comparison between utilization at Hub2 under different frame size at 100BaseT Ethernet wiring standard

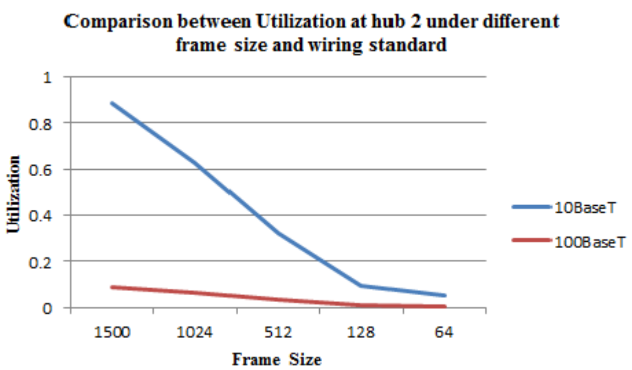

Fig. 21. Graphs for Utilization of Hub2

Figures 19, 20 and 21 illustrate that the utilization in 10BaseT is more than 100BaseT for all frame sizesregardless the value of the frame size which is used.

G. *Traffic forwarded (bits/sec) at Hub2*

TABLE VIII
TRAFFIC FORWARDED (BITS/SEC) TO HUB 2 (AVG.)

Time duration	4 minutes	
	Traffic Forwarded (bps)	
Devices	Hub 2	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	8,813,873	9,105,746.133
1024 bytes	6,276,727	6,266,542.4
512 bytes	3,214,211	3,212,418.33
128 bytes	920,963.466	918,889.6
64 bytes	538,082.4	539,042.4

Table VIII shows the comparison between the traffic forwarded to Hub 2 under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

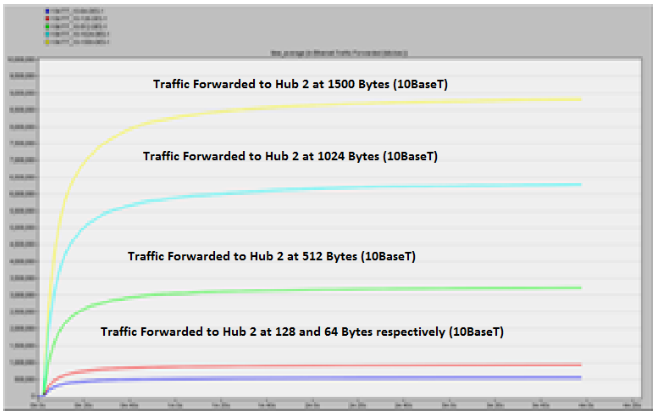

Fig. 22. Comparison between traffic forwarded (bps) at Hub2 under different frame size at 10BaseT Ethernet wiring standard.

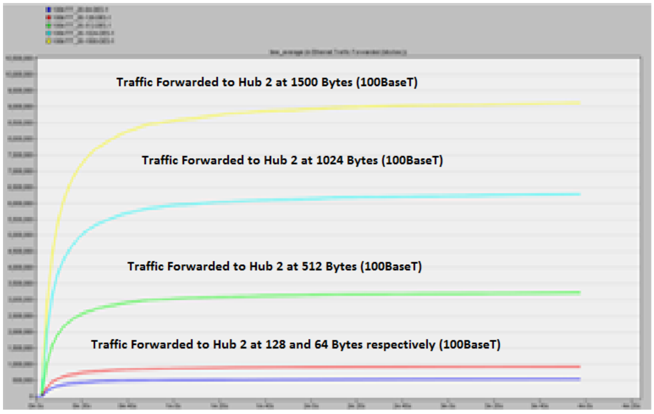

Fig. 23. Comparison between traffic forwarded (bps) at Hub2 under different frame size at 100BaseT Ethernet wiring standard.

Fig. 24. Graphs of traffic forwarded to hub2 (bit/sec)

Figures 22, 23 and 24 demonstrate that at some points both curves overlap to each other, it means that traffic forwarded to hub2 is approximately same at these points.

H. Traffic received (bits/sec) at hub 2

TABLE IX
TRAFFIC RECEIVED (BITS/SEC) TO HUB 2 (AVG.)

Time duration	4 minutes	
	Traffic Received (bps)	
Devices	Hub 2	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	8,813,873	9,105,746.133
1024 bytes	6,276,727	6,266,542.4
512 bytes	3,214,211	3,212,418.33
128 bytes	920,963.466	918,889.6
64 bytes	538,082.4	539,042.4

Table IX shows the comparison between the traffic received to Hub 2 under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

Tables VIII and IX shows that the value of the data traffic sent in bits per second and the data traffic received in bits per second for hub are the same because hub is broadcasting all the incoming data to all the devices in the same network without filtering the traffic.

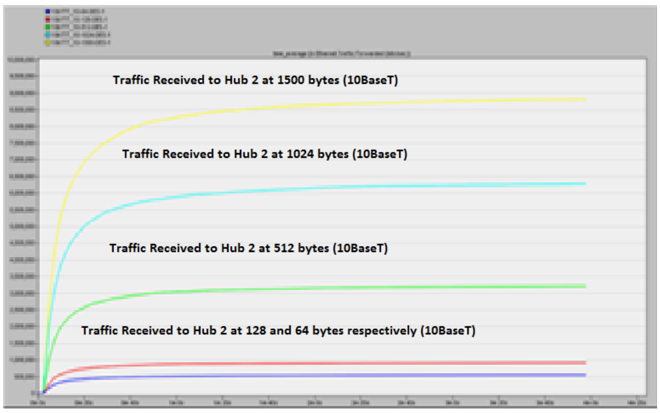

Fig. 25. Comparison between traffic received (bps) at Hub2 under different frame size at 10BaseT Ethernet wiring standard

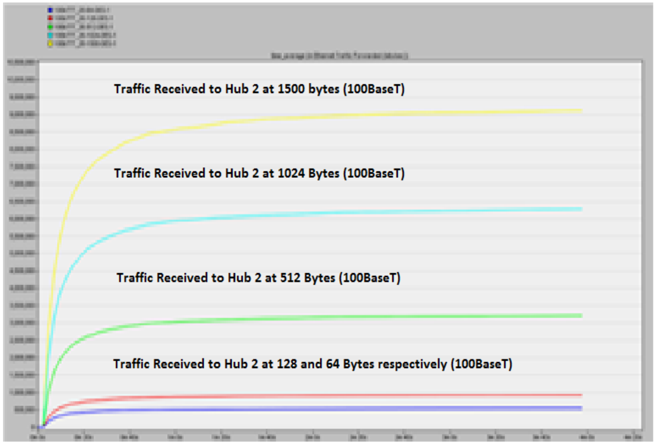

Fig. 26. Comparison between traffic received (bps) at Hub2 under different frame size at 100BaseT Ethernet wiring standard.

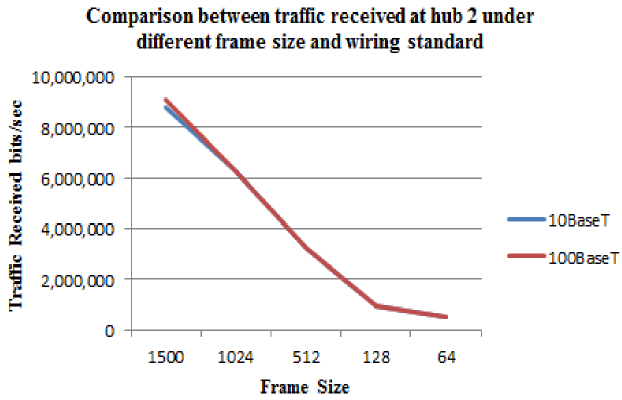

Fig. 27. Graphs of traffic received to hub2 (bit/sec)

Figures 25, 26 and 27 show that at some points both curves overlap to each other; it means that traffic received at hub2 is approximately same at these points.

I. Traffic forwarded (bits/sec) at switch

TABLE X
TRAFFIC FORWARDED (BITS/SEC) TO SWITCH (AVG.)

Time duration	4 minutes	
	Traffic Forwarded (bps)	
Devices	Switch	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	6,091,588.533	6,281,372.066
1024 bytes	4,312,105	4,327,995
512 bytes	2,212,381.533	2,220,971.6
128 bytes	634,480	633,561.133
64 bytes	370,812	372,297

Table X shows the comparison between the traffic forwarded to switch under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

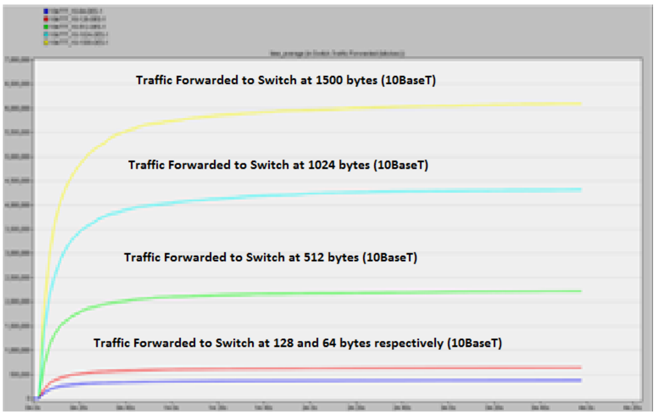

Fig. 28. Comparison between traffic forwarded (bps) at Switch under different frame size at 10BaseT Ethernet wiring standard

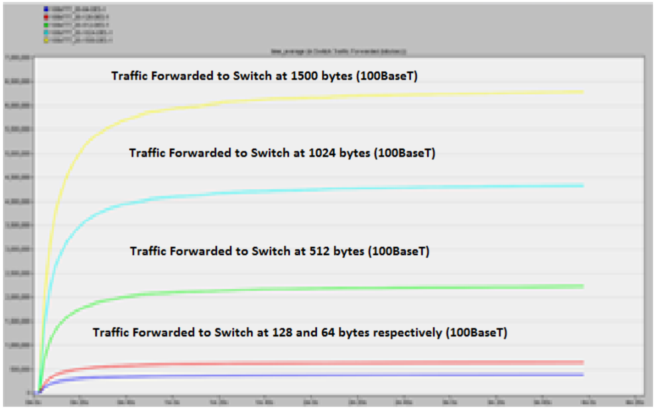

Fig. 29. Comparison between traffic forwarded (bps) at Switch under different frame size at 100BaseT Ethernet wiring standard

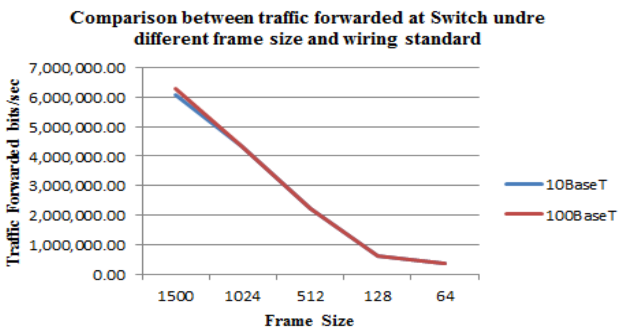

Fig. 30. Graphs of traffic forwarded to switch (bit/sec)

J. *Traffic received (bits/sec) at switch*

TABLE XI
TRAFFIC RECEIVED (BITS/SEC) TO SWITCH (AVG.)

Time duration	4 minutes	
	Traffic Received (bps)	
Devices	Switch	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	11,559,450	11,924,876.13
1024 bytes	8,223,810	8,201,585
512 bytes	4,211,356	4,205,994.33
128 bytes	1,206,466.8	1,203,874.466
64 bytes	705,867	705,708

Table XI shows the comparison between the traffic received by switch under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.

Tables X and XI shows that the amount of the data traffic sent in bits per second and the amount of data traffic received in bits per second at the case of switch is not the same as the case of hub. The amount of data traffic received is larger than the amount of data traffic sent because there are some filtered data. At the case of switch not all the incoming data is broadcasted because it knows the address of the sender and receiver by using the MAC address table.

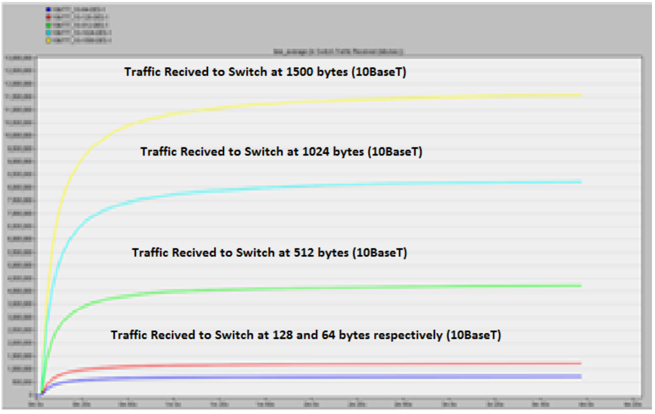

Fig. 31. Comparison between traffic received (bps) at switch under different frame size at 10BaseT Ethernet wiring standard

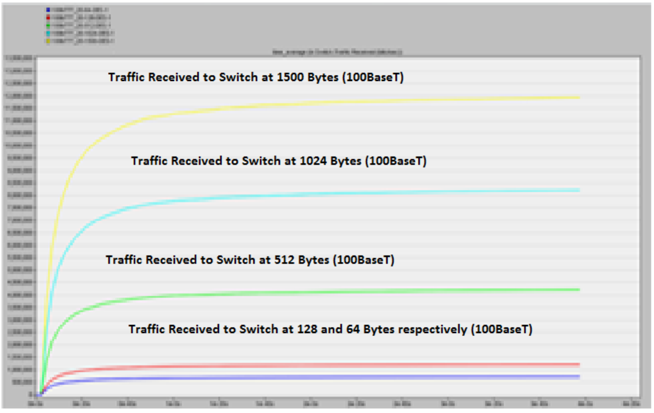

Fig. 32. Comparison between traffic received (bps) at switch under different frame size at 100BaseT Ethernet wiring standard

Fig. 33. Graphs of traffic received at switch (bit/sec)

K. *Traffic filtered (bits/sec) by switch*

TABLE XII
Traffic received (bits/sec) to switch (Avg.)

Time duration	4 minutes

Devices	Traffic Filtered (bps)	
	Switch	
Standards	10BaseT (scenario1)	100BaseT (scenario2)
1500 bytes	5,467,861.67	5,643,504.04
1024 bytes	3,911,705	3,873,590
512 bytes	1,998,974.8	1,985,022.7
128 bytes	571,986.8	570,313.33
64 bytes	335,055	333,411

Table XII shows the comparison between the traffic received by switch under 10BaseT (scenario1) and 100BaseT (scenario2) for 1500, 1024, 512, 128 and 64 bytes of frame size.From the table we can see that the amount of filtered traffic at the case of using frame size 1500 bytes is larger when using 100BaseT than 10BaseT which indicates better performance, but when we decrease the frame size to 512, 128 and 64 the amount of filtered traffic at the case of using 10BaseT is larger than the amount of filtered traffic when using 100BaseT which indicated better performance for switch.

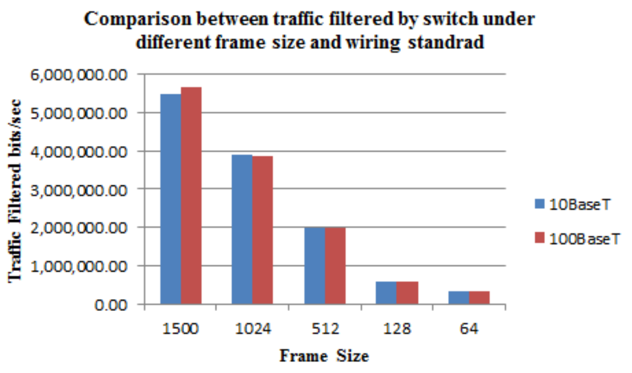

Fig. 34. Comparison between the traffic filtered by switch under different frame size and wiring standard

Figure 34 shows that the initially filtered traffic is better in case of 100BaseT for 1500 bytes frame size than 10BaseT. For 1024, 512, 128 and 64 bytes frame size the switch under 10BaseT filtered more traffic than 100BaseT, it means that the performance of 10BaseT Ethernet wiring standard is become better at the case of low traffic data.

VI. Conclusion

Computer Simulation are outperformed by using Riverbed Modeler Academic edition tool. The performance of LANs is tested and investigated under different conditions of Ethernet wiring and different frame size. The result remarks and observations from our simulations outcomes are:

- The number of collision counts in 10BaseT is always more than 100BaseT for all the frame sizes because of the nature of 10BaseT [8], [9].
- Hubs are more utilized in case of 10BaseT because of the large value of collision count so the more retransmission attempts will be required.
- The performance of a switch is better for 100BaseT wiring standard at the case of 1500 bytes frame size than that the case of 10BaseT because it filters more traffic.When the frame size is 1024 bytes, filtered traffic will be approximately the same for both 10BaseT and 100BaseT.When frame size is further reduced to 512, 128 and 64 the results show that the performance of 10BaseT becomes better than 100BaseT because the switch filtered more traffic than 100BaseT.
- If we have LAN in which high traffic is not required and the frame size will be fixed to 512, 128 or 64 bytes,10BaseT will give us good result and performs better as compared to 100BaseT Ethernet wiring standard.
- At the case of small frame size we will not able to transfer more traffic per seconds (traffic receiving and forwarding is less) so we cannot use them in heavy traffic (refer tables X and XI).

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