Lab 2

Q1)a)The Control packets sent in the simulation are:-

- 1. TCP_ACK
- 2. TCP FIN
- 3. TCP_SYN
- 4. TCP_SYNACK

Control packets provides data for delivering the payload (source and destination addresses, protocol details etc). They are typically sent before data is exchanged across the particular network/link and at the end of the session.

b) HD-Video Application typically requires a higher exchange rate for data due to its high frame rate. Thus a higher amount of packets are exchanged on this account.

The only thing constantly varying is the source and destination for the same packet in each instance. The packets are first being sent by the host to the switch. The switch in turn is forwarding it to the Receiver. This happens on a recurring basis as seen in the picture below.

L2 Switch K	Wired Node B	HD_VIDEO-1	SUCCESS	34043.77
L2 Switch K	Wired Node B	HD_VIDEO-1	SUCCESS	33946.81
Wired Node A	L2 Switch K	HD_VIDEO-1	SUCCESS	33917.65
L2 Switch K	Wired Node B	HD_VIDEO-1	SUCCESS	33824.73
Wired Node A	L2 Switch K	HD_VIDEO-1	SUCCESS	33820.69
L2 Switch K	Wired Node B	HD_VIDEO-1	SUCCESS	33702.65
Wired Node A	L2 Switch K	HD_VIDEO-1	SUCCESS	33698.61
L2 Switch K	Wired Node B	HD_VIDEO-1	SUCCESS	33580.57
Wired Node A	L2 Switch K	HD_VIDEO-1	SUCCESS	33576.53
Wired Node A	L2 Switch K	HD_VIDEO-1	SUCCESS	33454.45

- c) Gmail and HTTP packets are not sent frequently because of the following reasons:
 - 1. The applications are designed in such a way that they send out a mail or an HTTP request every 2s. In contrast Video Applications have a design aspect of 30 frames/s. Hence the disparity.
 - 2. Also with respect to a real life model mails and HTTP requests are less frequent with respect to the data packets exchanged while streaming a video.

Dotaloso -Wired Limit wired Nodo Node TCP-SYN TCP-SYN TCD-SYNACK TCP-SYNACK TCP-ACK TCP-ACK APP_DATABASE LAPP-DATA BASE - selection / Wined Switch Wired Node D Node BE Youther I Youtube - I Nessage seguence are drawn w.r.t animation

2)a) Average Throughput

NAME OF APPLICATION	AVERAGE THROUGHPUT(Mbps)
HD	1.520862
YOUTUBE	0.099151
GMAIL	0.108000
BROWSING	1.37798
DATABASE	0.008237

b)Average Delay

Name of software	Average Delay (Microseconds)
HD	526.538692
YOUTUBE	118.792727
GMAIL	880.930101
BROWSING	996.115555
DATABASE	85.8400000

c) Packet Delivery Ratio= (packets received/packets transmitted)

Name Of software	Ratio
HD	0.993844
Youtube	1
Gmail	1
Browsing	1
Database	0.99278

3) overhead ratio= (Number of control packets/ Number of data packet)

Link_id	Overhead Ratio
1 (HD)	0
2 (HD)	0
3 (YouTube)	0
4 (YouTube)	0
5 (Gmail)	1.03
6 (Gmail)	1.03
7 (Browsing)	1.25
8 (Browsing)	1.25
9 (Database)	1.988
10 (Database)	1.988

4)

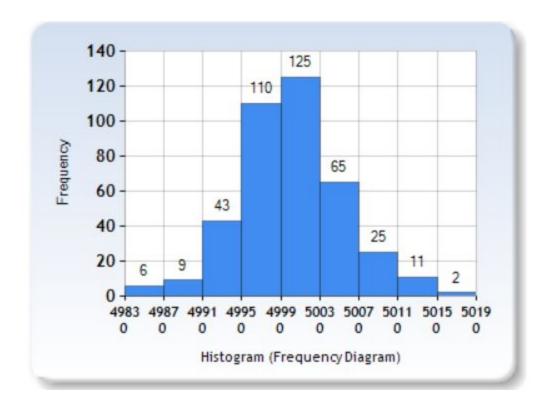
Count of CONTROL_PACKET_TYPE/A	APP_NAME Column Labe	els 🔻							
Row Labels	▼ NODE-10	NODE	-2 NODE-4	NODE-5	NODE-6	NODE-7	NODE-8	NODE-9	Grand Total
NODE-1		28	88						2888
NODE-10								1974	1974
NODE-3			398	3					398
NODE-5					342				342
NODE-6				342					342
NODE-7							472		472
NODE-8						464			464
NODE-9		2178							2178
Grand Total		2178 28	88 398	342	342	464	472	1974	9058

5)

Row Labels	-	NODE-10		NODE-2	NODE-4	NODE-5	NODE-6	NODE-7	NODE-8	NODE-9	Grand Total
NODE-1				2888							2888
NODE-10										1974	1974
NODE-3					398						398
NODE-5							342				342
NODE-6						342					342
NODE-7									472		472
NODE-8								464			464
NODE-9			2178								2178
Grand Total			2178	2888	398	342	342	464	472	1974	9058

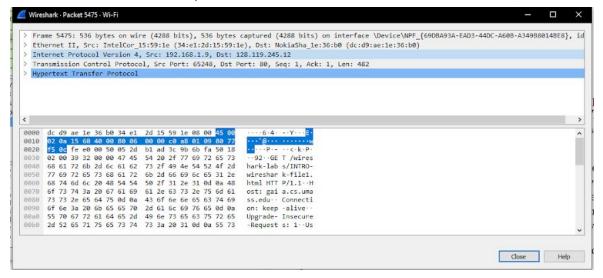
These two tables are almost similar because the error bits are negligible.

6) The Histogram represents a Normal Distribution.



Q2.4)

1. Source: 192.168.1.9, Dest: 128.119.245.12



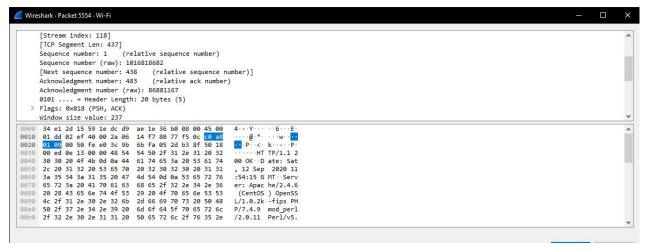
2. 536 bytes

3.

```
✓ Wireshark · Packet 5475 · Wi-Fi

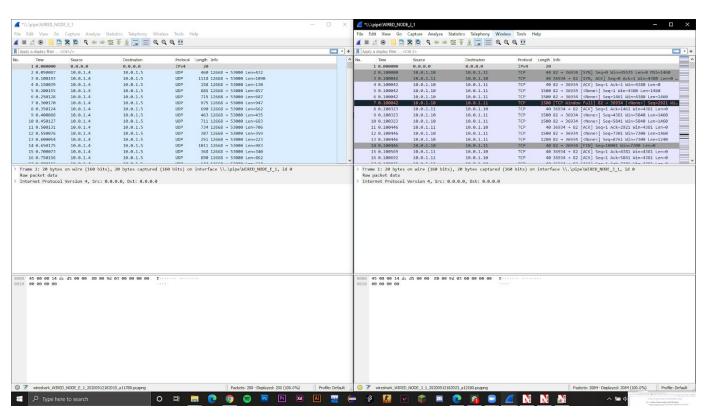
               [Stream index: 118]
              [TCP Segment Len: 482]
              Sequence number: 1
                                                              (relative sequence number)
              Sequence number (raw): 86880685
              [Next sequence number: 483
                                                                                (relative sequence number)]
             Acknowledgment number: 1 (relative ack number)
Acknowledgment number (raw): 1016818682
             0101 ....
                                     = Header Length: 20 bytes (5)
       > Flags: 0x018 (PSH, ACK)
Window Size Value. Sale 1 2d 15 59 1e 08 00 45 00 0010 02 0a 15 60 45 00 80 06 00 00 co a8 01 09 80 77 0020 f5 0c fe e0 00 50 05 2d b1 ad 3c 9b 6b fa 50 18 0030 02 00 39 32 00 00 47 45 54 20 2f 77 69 72 65 73 66 172 6b 2d 6c 61 62 73 2f 69 46 66 66 66 65 31 2e
             Window size value: 512
                                                                                                                                              `@-......
                                                                                                                                                          ....k.P.
                                                                                                                                     · 92 · GE T /wires
hark-lab s/INTRO-
wireshar k-file1.
html HTT P/1.1 · H
              58 61 72 65 73 66 61 72 65 73 67 49 46 54 52 47 26 77 69 72 65 73 66 61 72 65 53 1 2e 68 74 6d 6c 20 48 54 54 54 50 2f 31 2e 31 0d 0a 48 6f 73 74 3a 20 67 61 69 61 2e 63 73 2e 75 6d 61 73 73 2e 65 64 75 0d 0a 43 6f 6e 6e 65 63 74 69 6f 6e 3a 20 6b 56 57 70 2d 61 6c 69 76 65 0d 0a 55 70 67 22 61 64 65 2d 49 6e 73 65 63 75 2e 65 2d 52 65 71 75 65 73 74 73 3a 20 31 0d 0a 55 73
                                                                                                                                     ost: gai a.cs.uma
ss.edu·· Connecti
on: keep -alive··
Upgrade- Insecure
                                                                                                                                     -Request s: 1 · Us
```

- 1. Source: 128.119.245.12, Destination: 192.168.1.9
- 2. 491 Bytes
- 3.



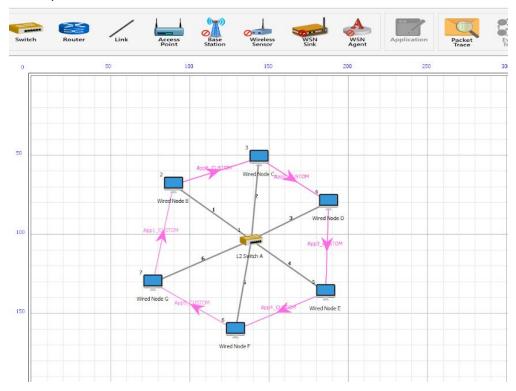
Q2.5)

- (a) TCP for Database
- (b) UDP for Youtube

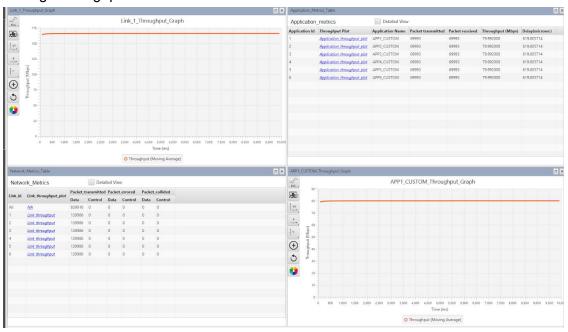


(c) database uses (ACK), (SYN), (FIN) and (SYN, ACK) UDP does not show any such control packets

Q3.1.1)

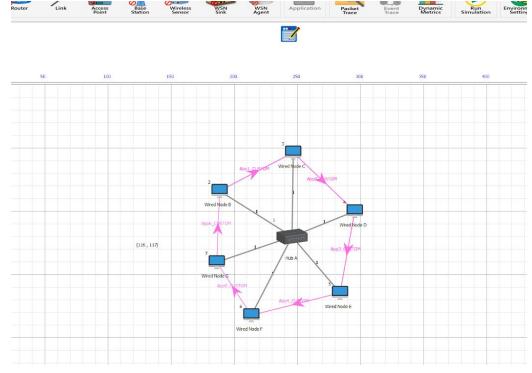


Average throughput

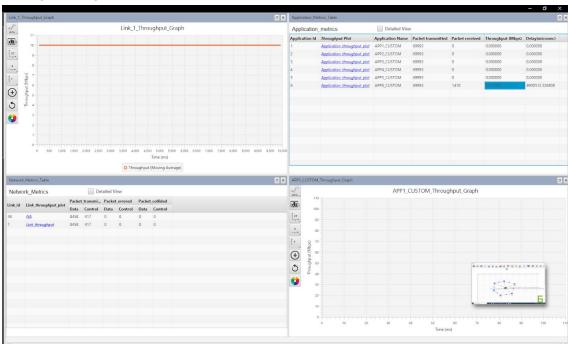


Average = 79.9920 mbps



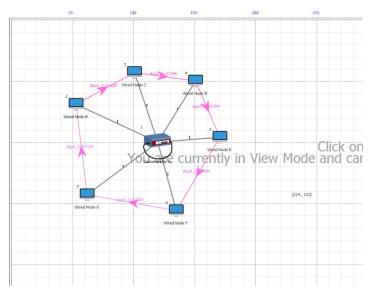


Average throughput

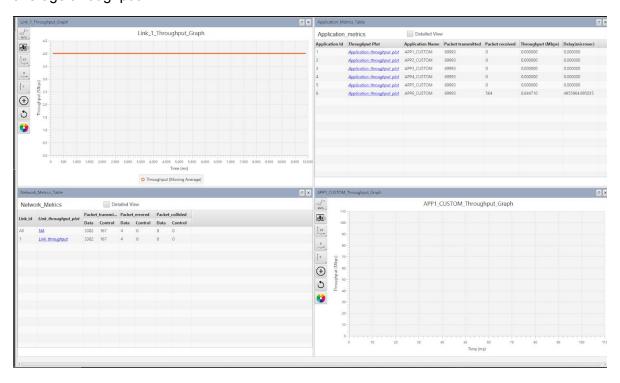


Average = 1.61152 mbps

Q3.1.3)



average throughput



Average = 0.64471 mbps

Conclusion: Max throughput is for Star Topology then for Ring and the least for Bus Topology. This is because the star uses a switch which handles ports individually and the message is forwarded to all links. Ring uses a concentrator which has a token passing algorithm implemented but the bus does not have it implemented in the hardware so it has to send more packets. Both of these pass messages only when they have a token which explains the decreasing order of speed.