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Registration No: *18BIS0043*

Subject Code: *ECE3030*

Slot: *L5 + L6*

Faculty: *Suresh Chavhan*

Lab Assesment – 1

Comparison of Voice Codecs

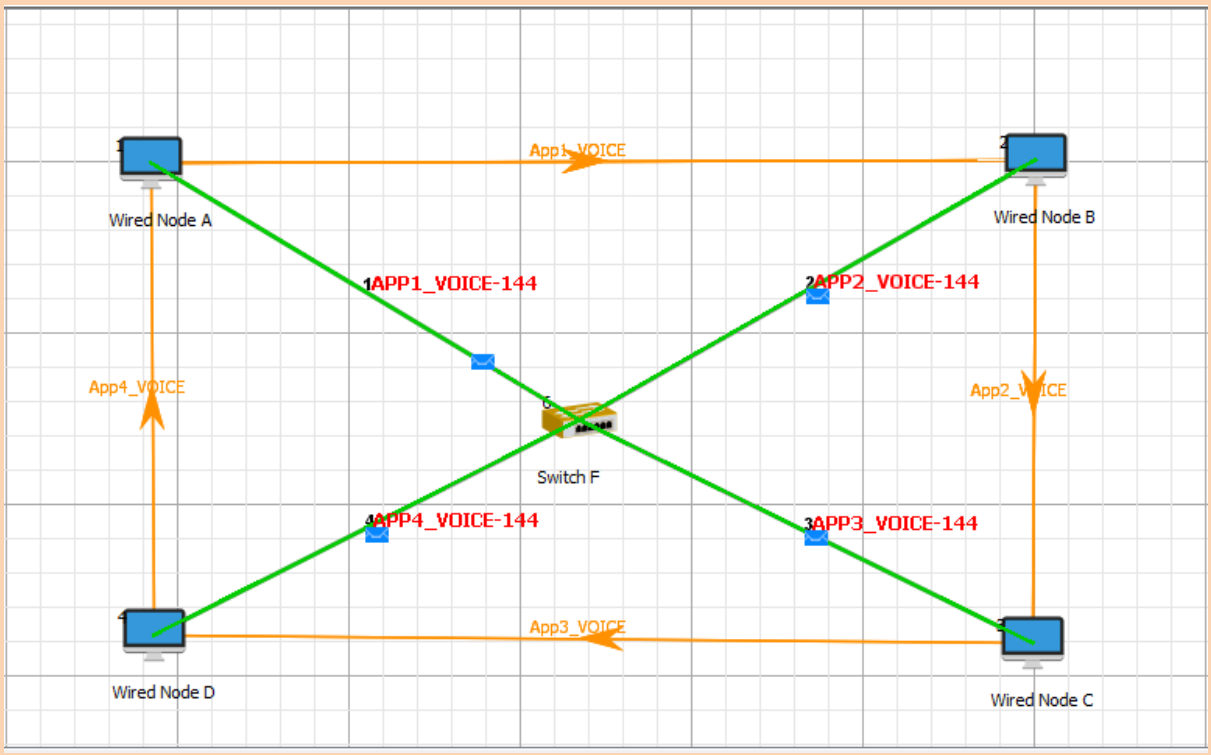
Aim

To simulate Networks using various voice codecs in Netsim and compare their performance.

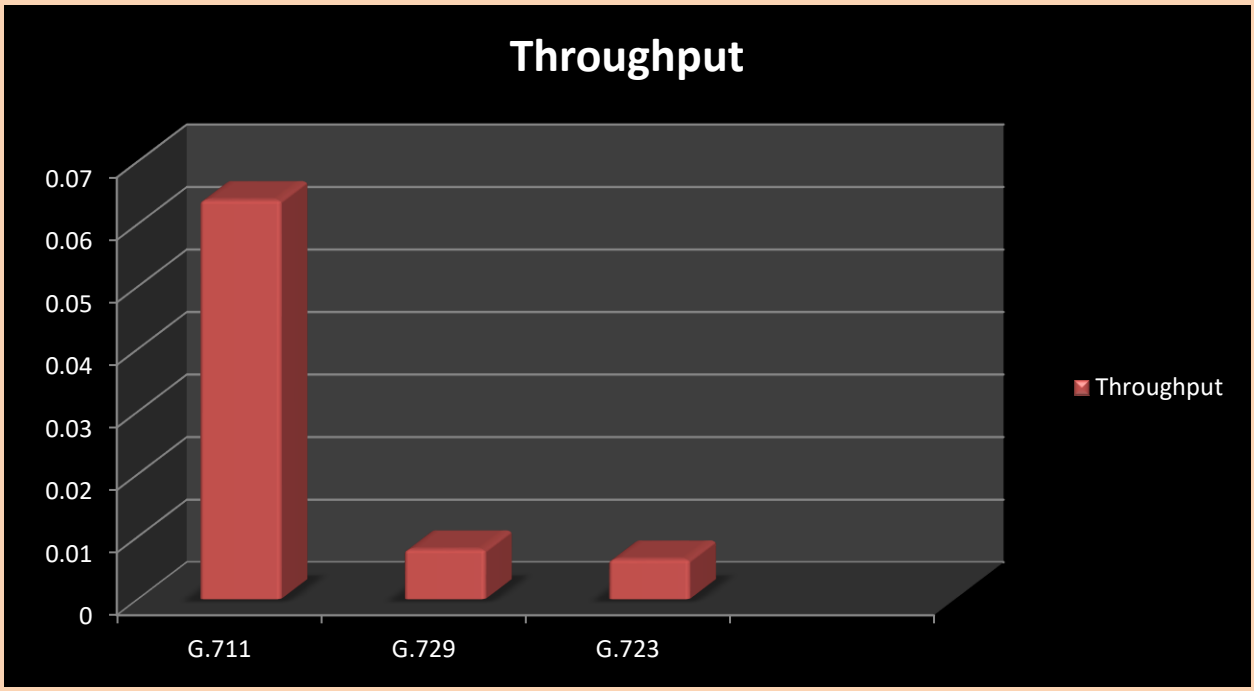
Tools Required

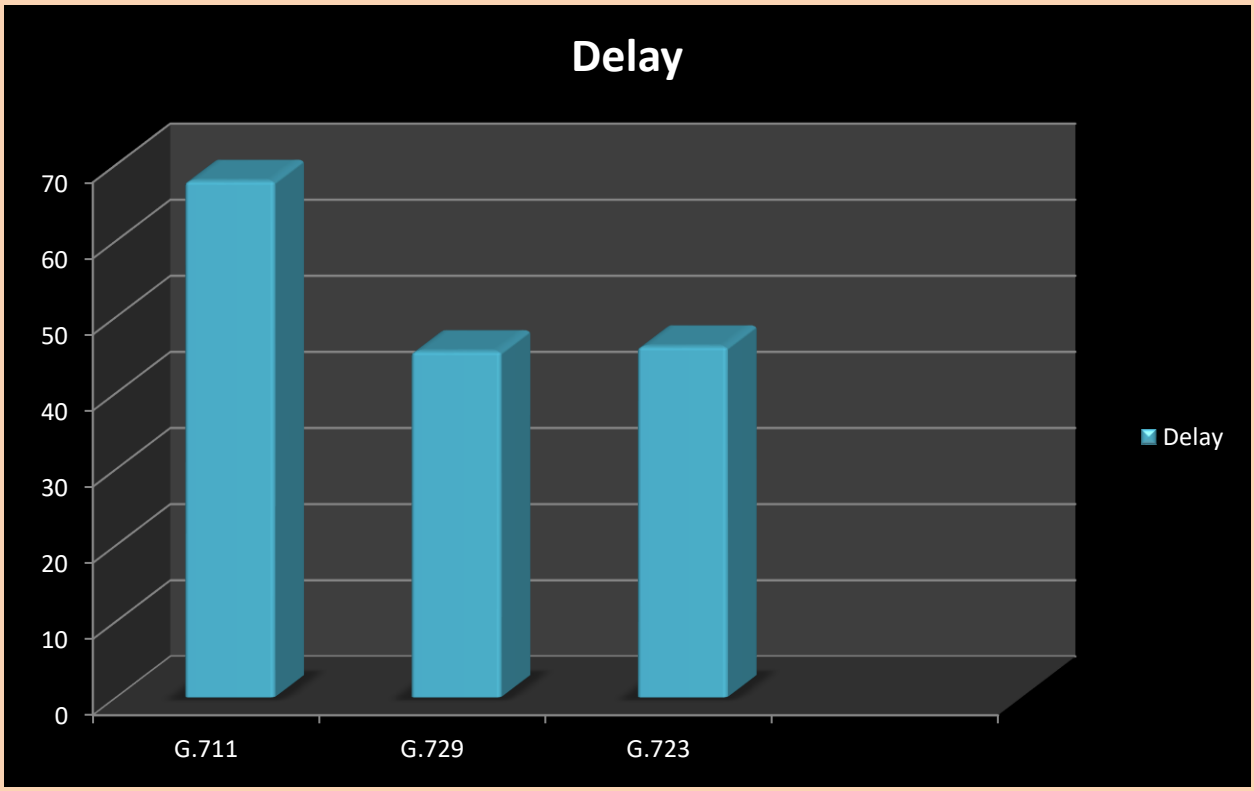
Netsim Software

Circuit Diagram

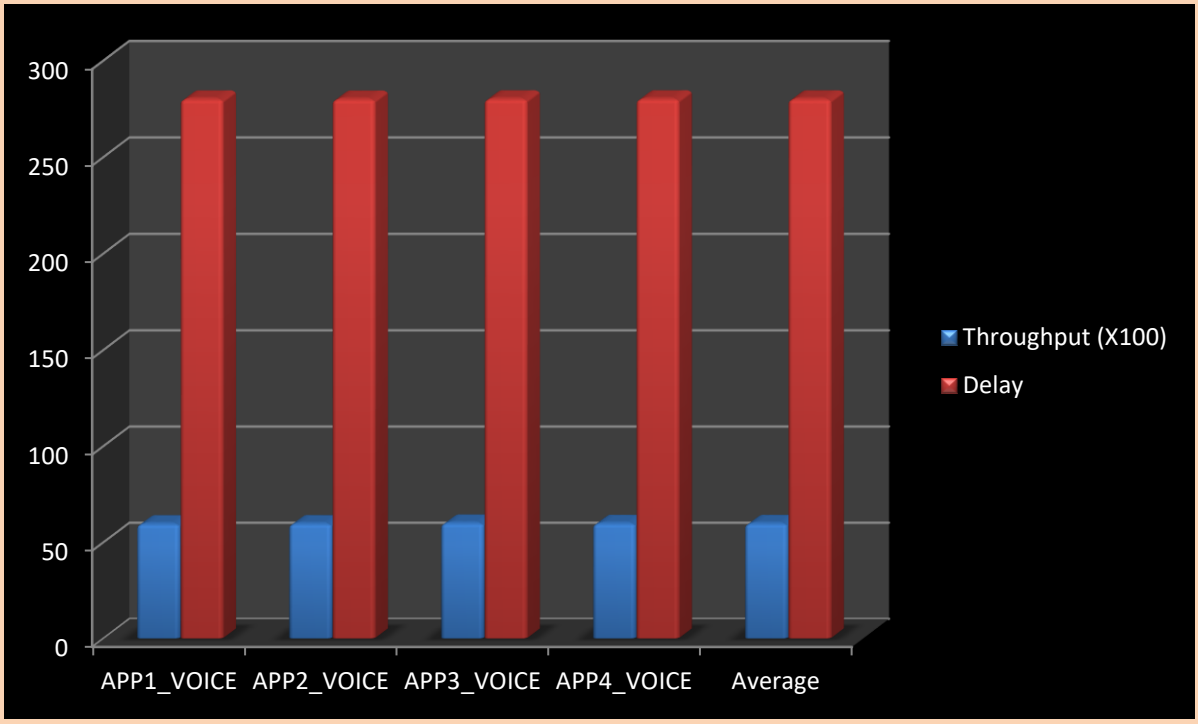


Graphs





"Custom" given as a separate graph and table



Tables

G.711		Throughput	Delay
	APP1_VOICE	0.063872	67.86
	APP2_VOICE	0.063744	67.86
	APP3_VOICE	0.063872	67.86
	APP4_VOICE	0.063872	67.86
	Average	0.06384	67.86

G.729		Throughput	Delay
	APP1_VOICE	0.007989	45.46
	APP2_VOICE	0.007979	45.46
	APP3_VOICE	0.007989	45.46
	APP4_VOICE	0.007989	45.46
	Average	0.0079865	45.46

G.723		Throughput	Delay
	APP1_VOICE	0.006387	46.1
	APP2_VOICE	0.006374	46.1
	APP3_VOICE	0.006387	46.1
	APP4_VOICE	0.006387	46.1
	Average	0.00638375	46.1

Custom		Throughput (X100)	Delay
	APP1_VOICE	59.5307	280.038111
	APP2_VOICE	59.6064	279.956343
	APP3_VOICE	59.92	280.1
	APP4_VOICE	59.7643	280.105668
	Average	59.70535	280.0500305

Calculations – G.711

Base Band frequency f_m = 4KHz

Bitrate = n x f_s

f_s = 2 x f_m = 8 KHz

Bitrate=8 x 8KHz = 64kbps

Transmission Time = X = L/R

= (160 x 8)/ 64 kbps

=20 ms

Packet Size = (Data Rate x Transmission Time)/8

= (64 x 20)/8

= 160 bytes

Payload = (Packet Transmitted x Packet Size)

= 499 x 160

= 79840

Throughput = (Payload x 8)/ (10 x 106)

= 64 kbps

Calculations – G.723

Base Band frequency f_m = 400 Hz

Bitrate = n x f_s

f_s = 2 x f_m = 800 Hz

Bitrate =10 x 800Hz = 8 kbps

Transmission Time = X = L/R

= (24 x 8)/ 8 kbps

= 24 ms

Packet Size = (Data Rate x Transmission Time)/8

= (8 x 24)/8

= 24 bytes

Payload = (Packet Transmitted x Packet Size)

= 333 x 24

= 7992

Throughput = (Payload x 8) / (10 x 10^6)

= 6.394 kbps

Calculations – G.729

Base Band frequency f_m= 500 Hz

Bitrate = n x f_s

$f_s = 2 \times f_m = 1000$ Hz

Bitrate =8 x 1000Hz = 8 kbps

Transmission Time = X = L/R

= (20 x 8)/ 8 kbps

= 20 ms

Packet Size = (Data Rate x Transmission Time)/8

= (8 x 20)/8

= 20 bytes

Payload = (Packet Transmitted x Packet Size)

= 499 x 20

= 9980

Throughput = (Payload x 8) / (10×10^6)

= 7.984 kbps

Inference

Higher the throughput and the lower delay shows which is the better codec. The 'custom' codec has a significant difference of throughput when compared to the other codecs, but the delay increase it has also is very high. Hence, the best alternative that we have is the G.711 codec.

Voice codec G.711 has a very high throughput value and the delay, despite being high, is very comparable with the other codecs.

***Custom**:*

***Case 1:** Data Rate = 200kbps*

Assume,

Transmission Time = 20ms

X = L/R

L = 20 ms x 200 kbps = 4000 bits

Packet size = 4000/8 = 500 bytes

***Case 2:** Data Rate = 60kbps*

Assume,

Transmission Time = 20ms

X = L/R

L = 20 ms x 60 kbps = 1200 bits

Packet size = 1200/8 = 150 bytes

Demonstration of switches and hubs

Aim

To simulate Networks using switches and hubs in Netsim and compare their performance.

Tools Required

Netsim Software

Important Formulae

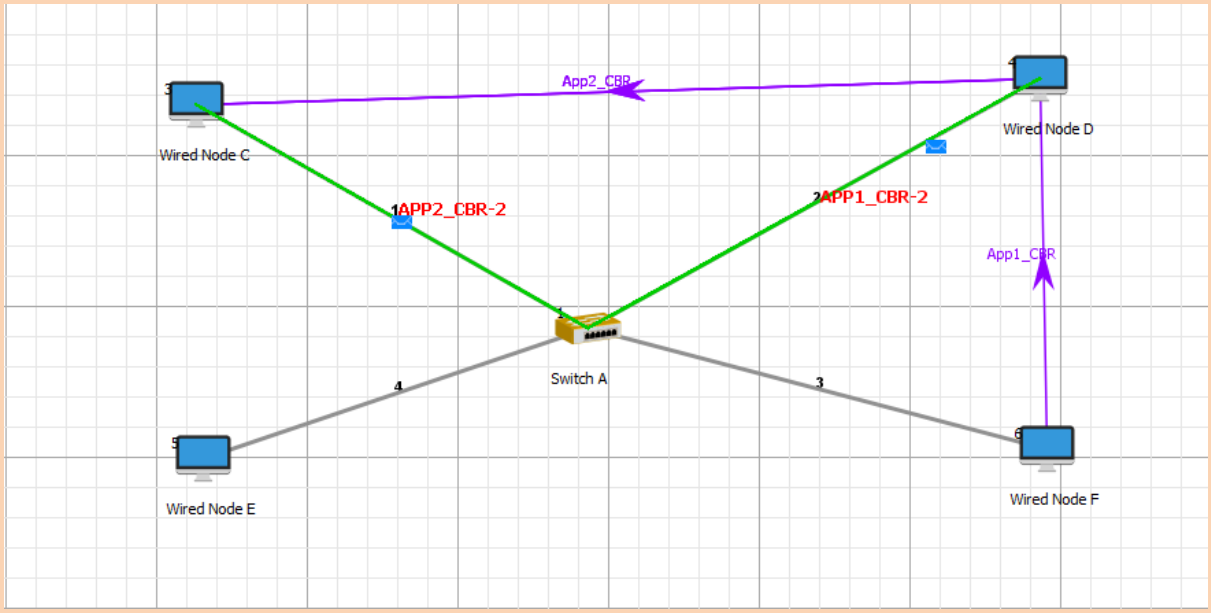
i. *Payload Received = Packet Received x Packet Size*
ii. *Throughput (Mbps) = (Payload Received x 8) / (Simulation Time x 10^6)*

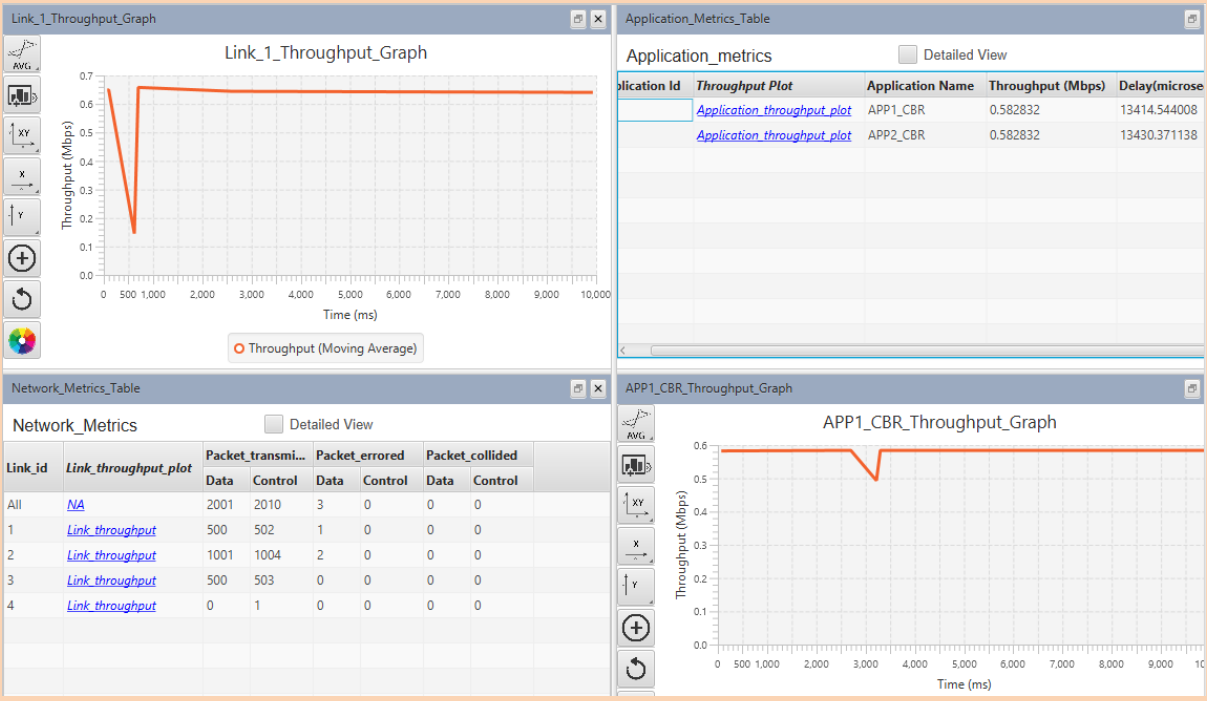
Abstract and Inference

From the previous experiment, it can be inferred that the hub connections have more collision of packets and hence the delay is very high. Also, the structure reduces the throughput, which essentially makes the switch a much efficient system in comparison among the both.

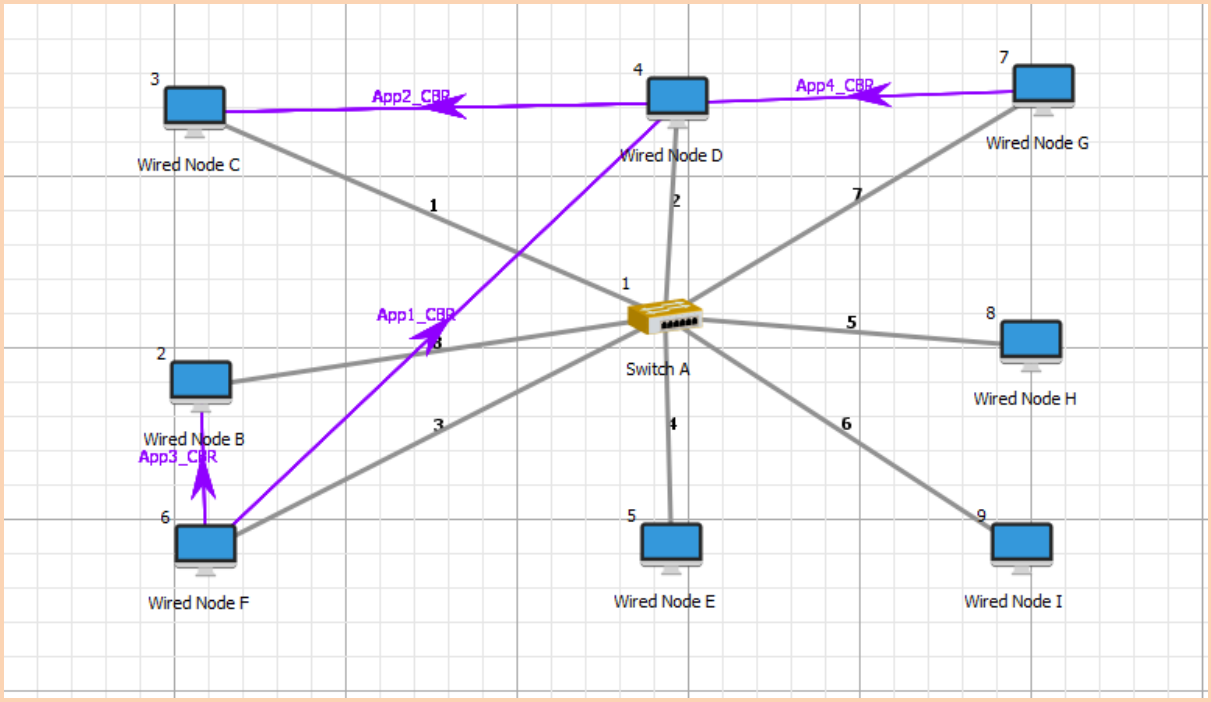
Hub works on a physical layer while the switch works on a data link layer. So, the hub transmits the data to all the destinations and the receivers must decide whether to accept the data or not. Switches on the other hand can control the channel of the message transmission.

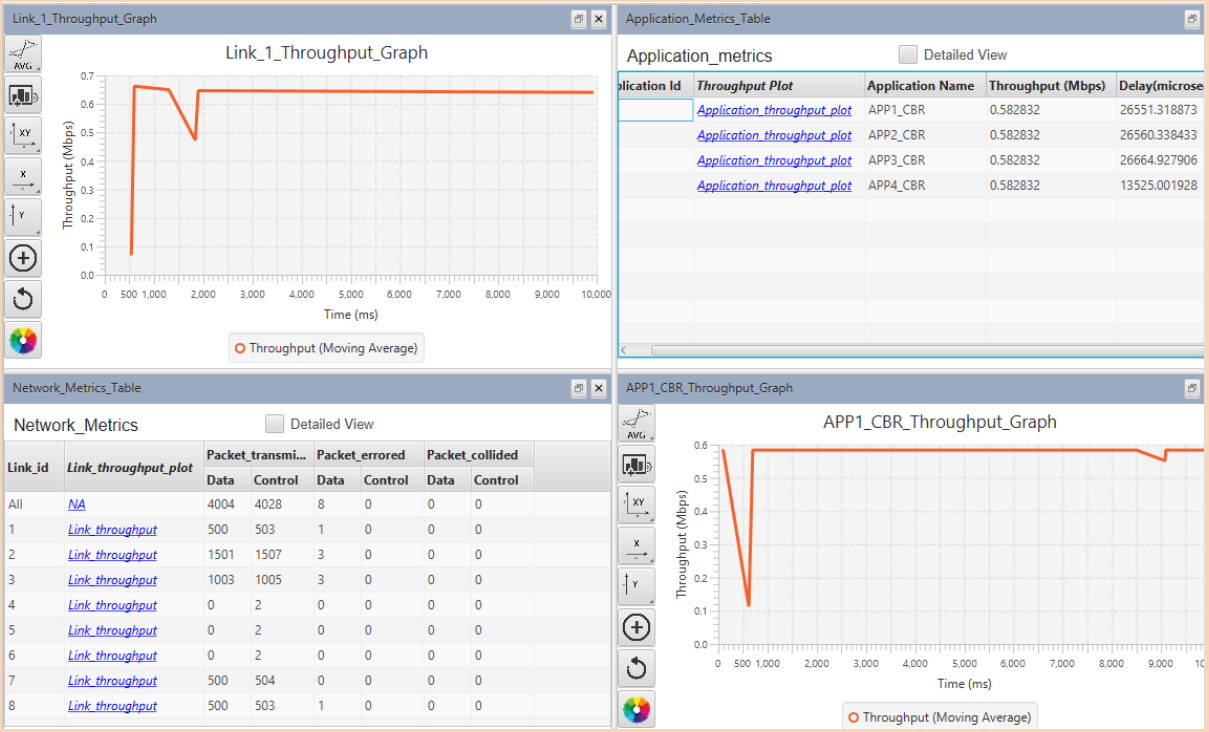
Circuit Diagram with SWITCH – 4 Nodes



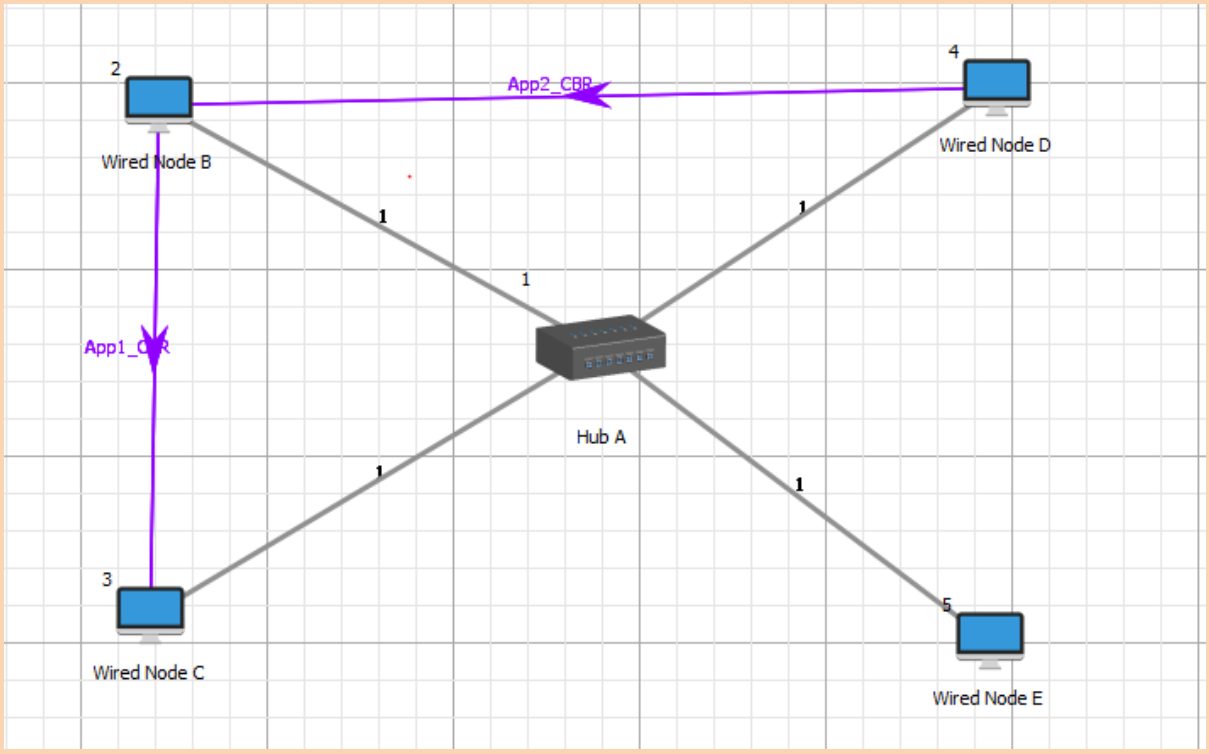


Circuit Diagram with SWITCH – 8 Nodes





Circuit Diagram with HUB – 4 Nodes



Application_metrics Detailed View

Application Id	Application Name	Throughput (Mbps)	Delay(microsec)
1	APP1_CBR	0.582832	3401.385170
2	APP2_CBR	0.578160	3370.214141

Network_Metrics_Table

Network_Metrics Detailed View

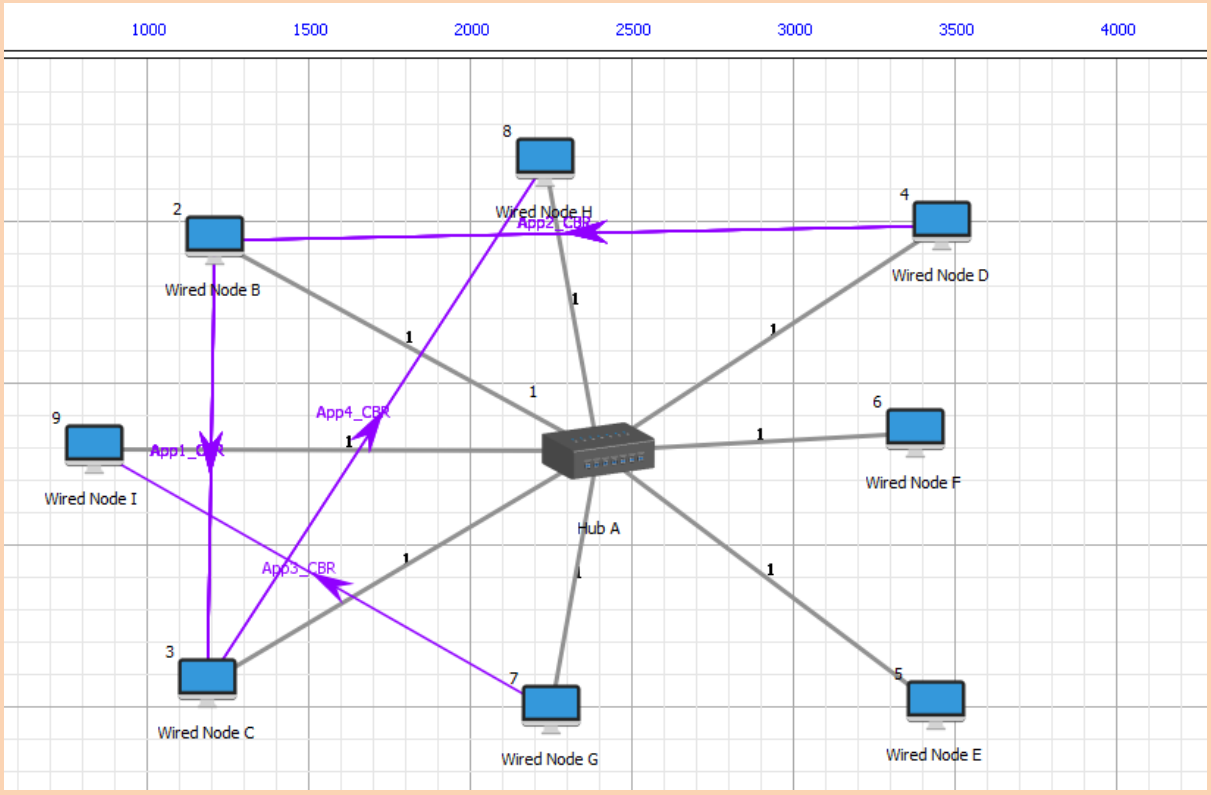
Link_id	Link_throughput_plot	Packet_transmi...		Packet_errored		Packet_collided	
		Data	Control	Data	Control	Data	Control
All	NA	2070	0	4	0	1072	0
1	NA	2070	0	4	0	1072	0

IP_Metrics_Table

IP_Metrics Detailed View

Device Id	Packet sent	Packet forwarded	Packet received
2	499	0	495
3	0	0	499
4	499	0	0
5	0	0	0

Circuit Diagram with HUB – 8 Nodes



Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_pa...	Dequeued_...	Dropped_p...

No content in table

Application_Metrics_Table

Application_metrics — Detailed View

Application Id	Application Name	Throughput (Mbps)	Delay(microsec)
1	APP1_CBR	0.374928	2036866.746418
2	APP2_CBR	0.456688	1147022.215857
3	APP3_CBR	0.414640	1474829.056902
4	APP4_CBR	0.369088	1795649.397469

Network_Metrics_Table

Network_Metrics — Detailed View

Link_id	Link_throughput_plot	Packet_transmit...		Packet_errored		Packet_collided	
		Data	Control	Data	Control	Data	Control
All	NA	16825	0	6	0	15436	0
1	NA	16825	0	6	0	15436	0

IP_Metrics_Table

IP_Metrics — Detailed View

Device Id	Packet sent	Packet forwarded	Packet received
2	499	0	391
3	499	0	321
4	499	0	0
5	0	0	0
6	0	0	0
7	499	0	0
8	0	0	316
9	0	0	355