NAME – AADITYA BHATT	DATE - 05/03/2024
REGISTRATION NUMBER - 21BEC1531	EXPERIMENT NO. 7

Aim - To evaluate the performance of TCP and UDP protocols using NetSim.

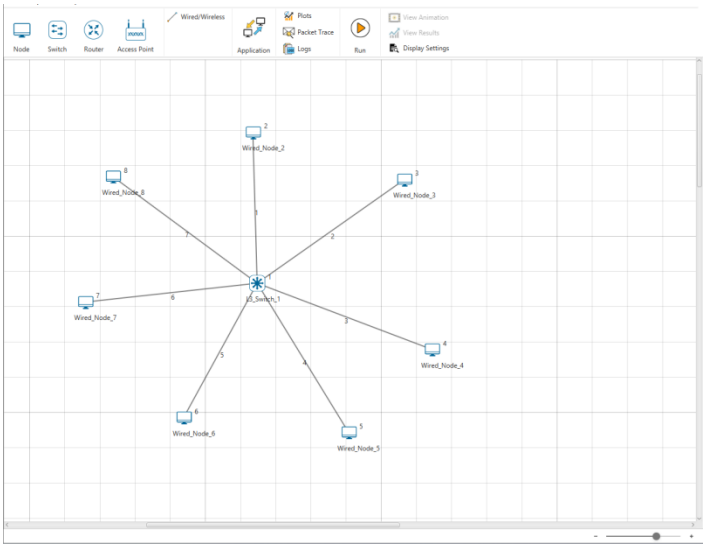
Software Used - Netsim

Procedure -

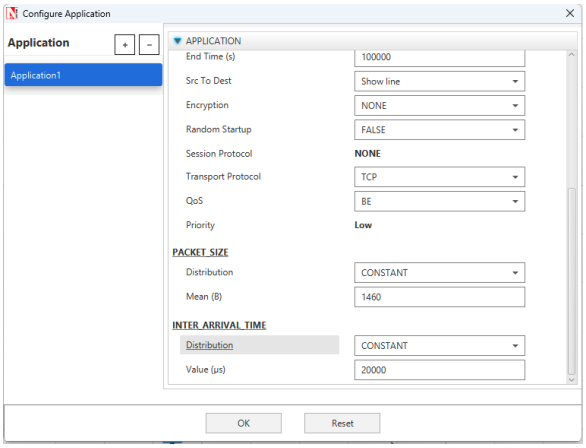
1. Open Netsim

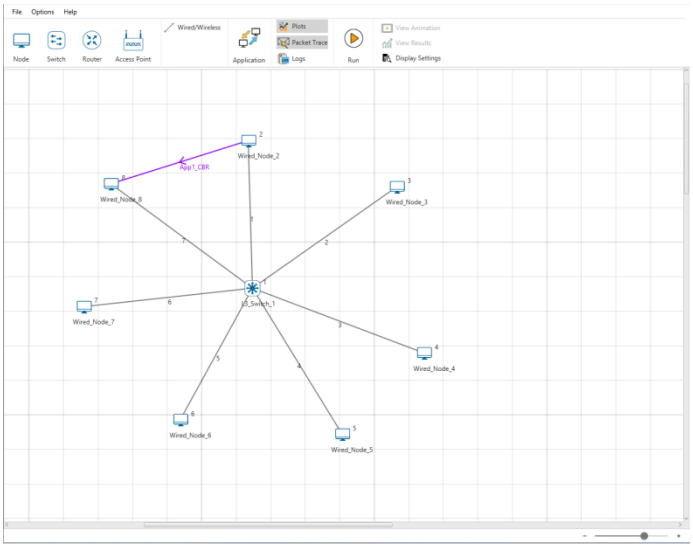
2. Select the Internetworks workspace.

3. With the help of Nodes, wires and switch, sketch the following layout.

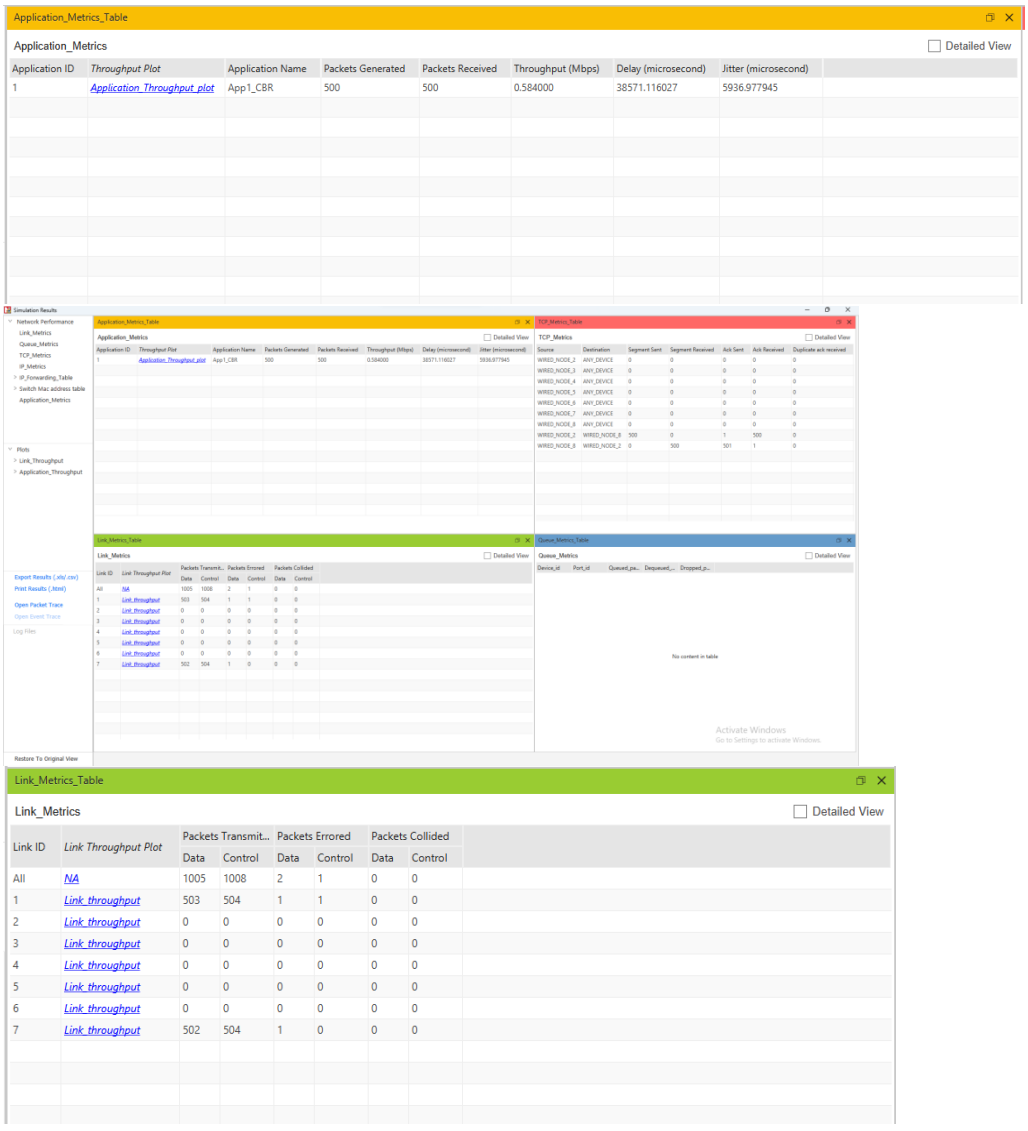


4. Click on Applications, configure it. Select the transport protocol 'TCP' and fill all the other parameters.





5. Click ‘RUN’



Application_Metrics_Table

Application_Metrics

Detailed View

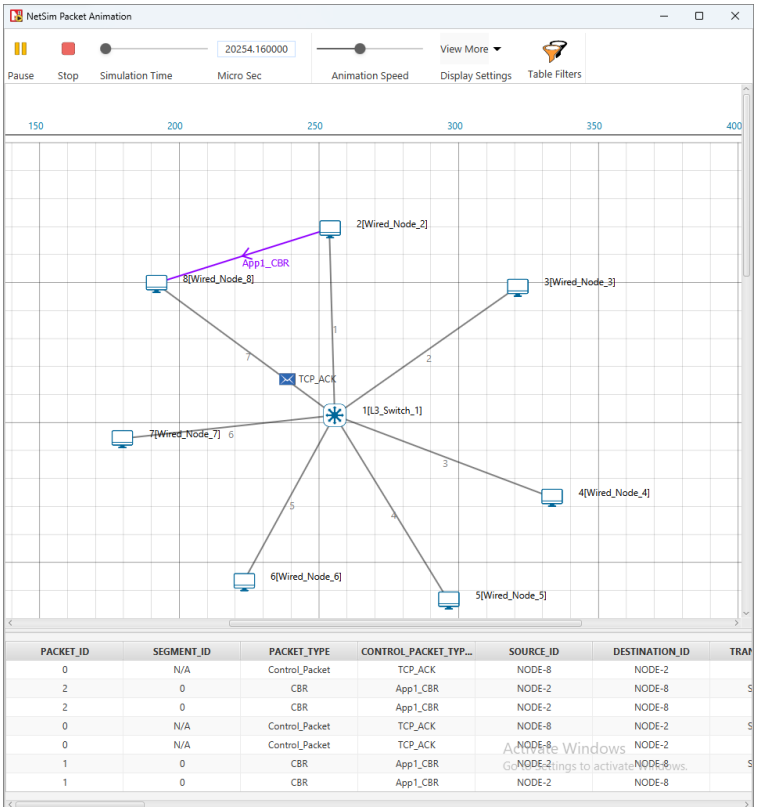
Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)	Jitter (microsecond)
1	Application_Throughput_plot	App1_CBR	500	500	0.584000	38571.116027	5936.977945

Link_Metrics_Table

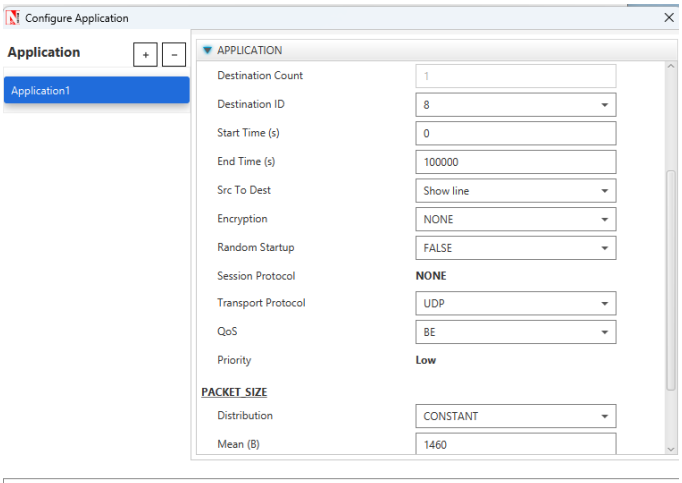
Link_Metrics

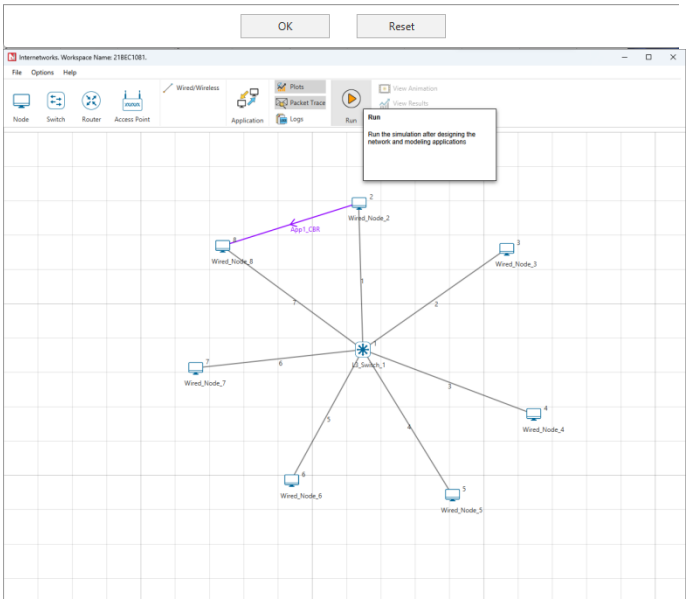
Detailed View

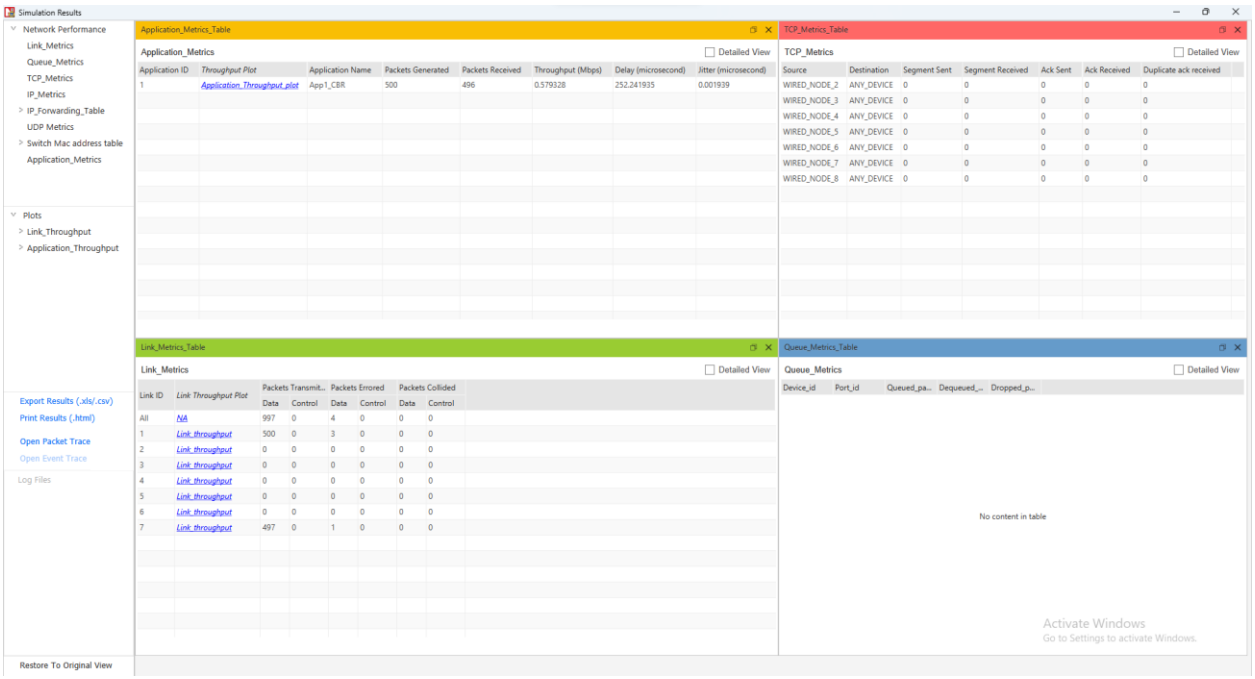
Link ID	Link Throughput Plot	Packets Transmit...		Packets Errored		Packets Collided	
		Data	Control	Data	Control	Data	Control
All	NA	1005	1008	2	1	0	0
1	Link_throughput	503	504	1	1	0	0
2	Link_throughput	0	0	0	0	0	0
3	Link_throughput	0	0	0	0	0	0
4	Link_throughput	0	0	0	0	0	0
5	Link_throughput	0	0	0	0	0	0
6	Link_throughput	0	0	0	0	0	0
7	Link_throughput	502	504	1	0	0	0



6. Similarly, for UDP protocol, go to application1, select the UDP from the Transport protocol option.







Application_Metrics_Table

Application_Metrics

Detailed View

Application ID	*Throughput Plot*	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)	Jitter (microsecond)
1	*Application_Throughput_plot*	App1_CBR	500	496	0.579328	252.241935	0.001939

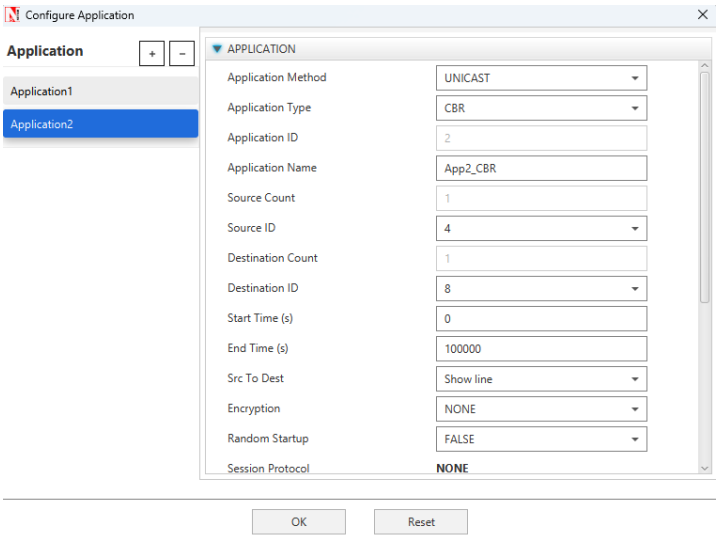
Link_Metrics_Table

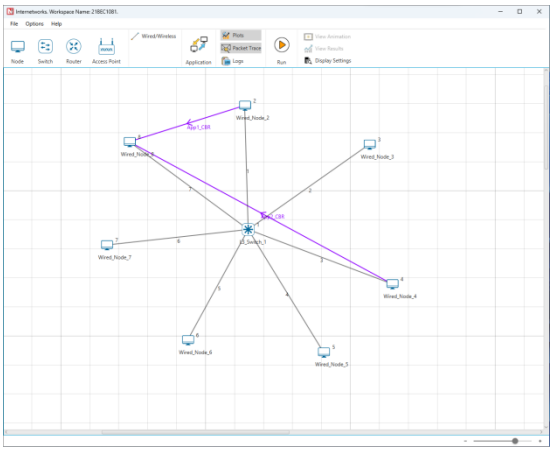
Link_Metrics

Detailed View

Link ID	*Link Throughput Plot*	Packets Transmit...		Packets Errored		Packets Collided	
		Data	Control	Data	Control	Data	Control
All	*NA*	997	0	4	0	0	0
1	*Link_throughput*	500	0	3	0	0	0
2	*Link_throughput*	0	0	0	0	0	0
3	*Link_throughput*	0	0	0	0	0	0
4	*Link_throughput*	0	0	0	0	0	0
5	*Link_throughput*	0	0	0	0	0	0
6	*Link_throughput*	0	0	0	0	0	0
7	*Link_throughput*	497	0	1	0	0	0

7. For different scenarios, such as 2 sources and 1 destination, or 2 sources and 1 receiver, we have to add more application layers, and select the respective transport protocol as well as the source ID and destination ID.





8. Hence, the table we inferred from the above experiment :-

Scenario	Packets Generated	Packets Received	Packet Errored	Throughput(Mbps)	Delay(microseconds)	Jitter(microseconds)
1 source & TCP	500	500	1	0.584000	38571.116027	5936.977945
1 source & UDP	500	496	3	0.579328	252.241935	0.001939
2 source & TCP	500	500	2	0.584000	26460.623274	4010.320548
	500	500	1	0.584000	26574.255605	4011.302476
2 source & UDP	500	498	1	0.581664	252.241928	0.001932
	500	496	2	0.579328	374.075806	0.495192
3 source & TCP	500	500	0	0.584000	13357.670510	2005.227645
	500	500	0	0.584000	371.147200	0.592545
	500	500	2	0.584000	26701.535521	4010.889558
3 source & UDP	500	496	2	0.579328	252.241935	0.001939
	500	499	0	0.562832	373.83.2625	0.982490
	500	499	1	0.562832	495.912625	0.982490

Inference - This experiment aims to set up TCP and UDP transport protocol between different devices.From the table, we observed that TCP has achieved higher throughput compared to UDP across different scenarios. UDP has minimal delay and jitter, suggesting lower overhead. TCP is more efficient in handling varying network conditions, maintaining relatively consistent performance.

NAME – Aaditya Bhatt	DATE - 12/03/2024
REGISTRATION NUMBER - 21BEC1531	EXPERIMENT NO. 8

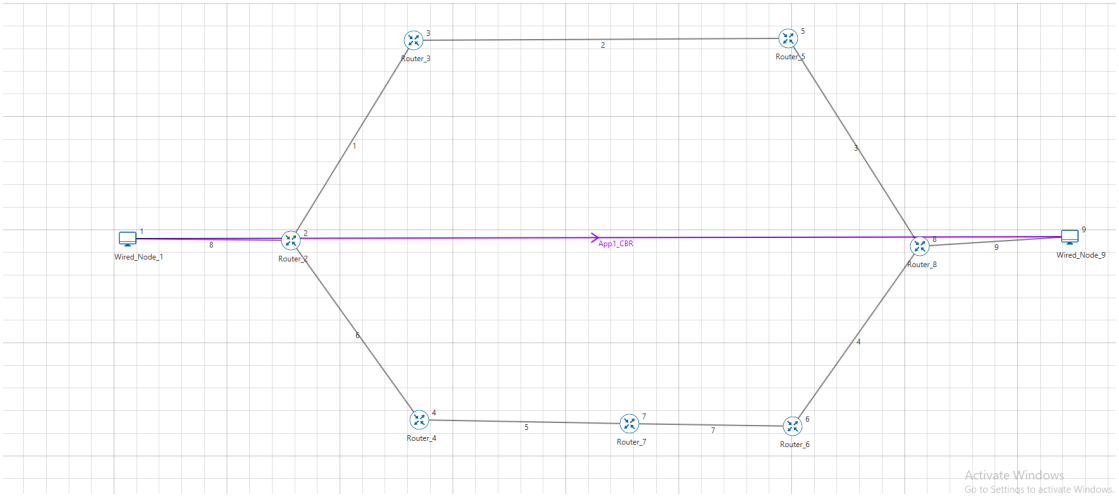
Aim - To evaluate the impact of link failure on the network's performance using NetSim.

Software Used - Netsim

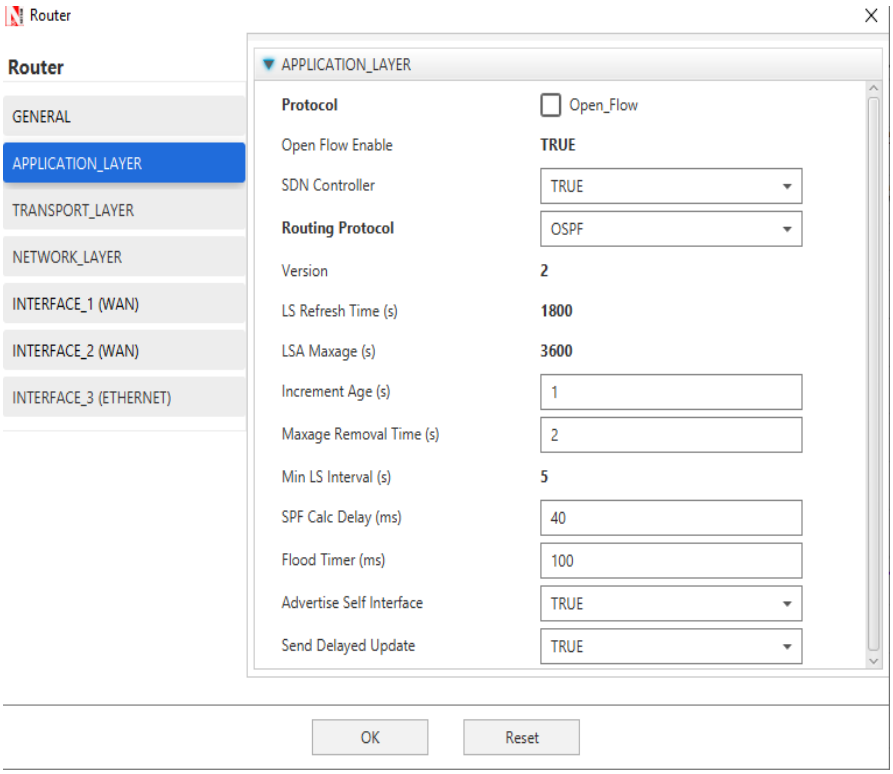
Procedure -

1. Open Netsim, choose Internetworks workspace.

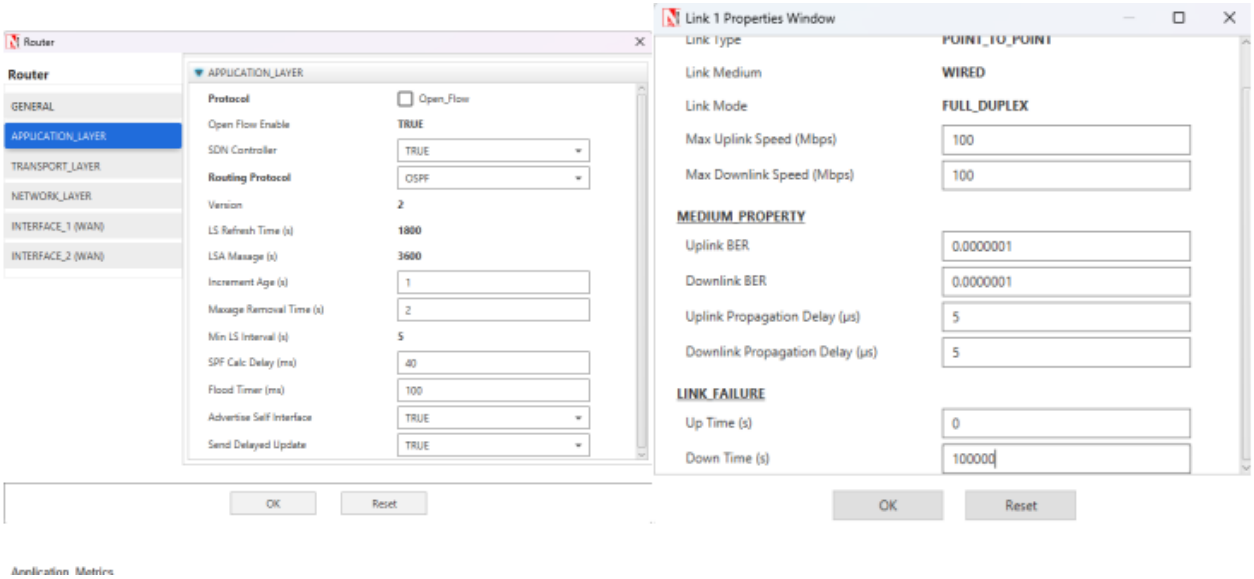
2. Connect more than five routers and two wired nodes.



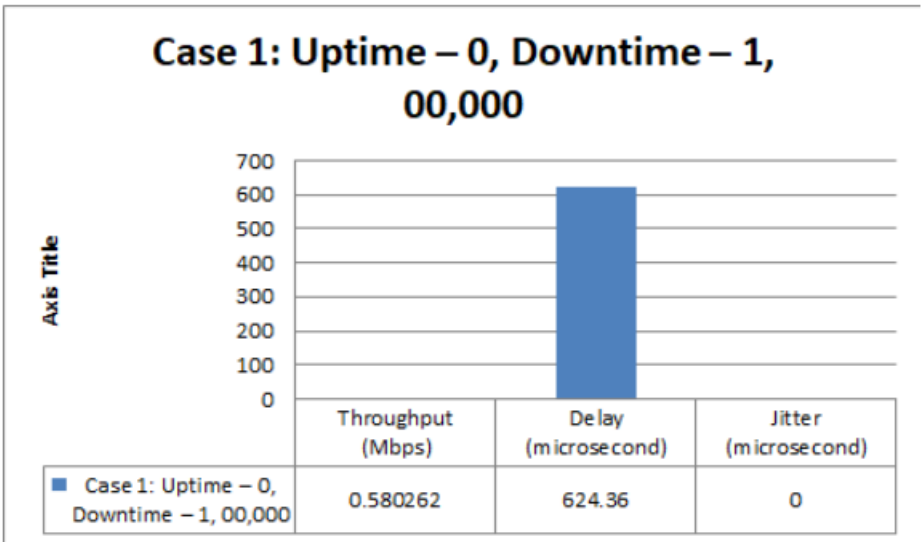
3. Go to application layer, change the routing protocol to RIP/OSPF, when you change one, all the other router's application layer will change subsequently.



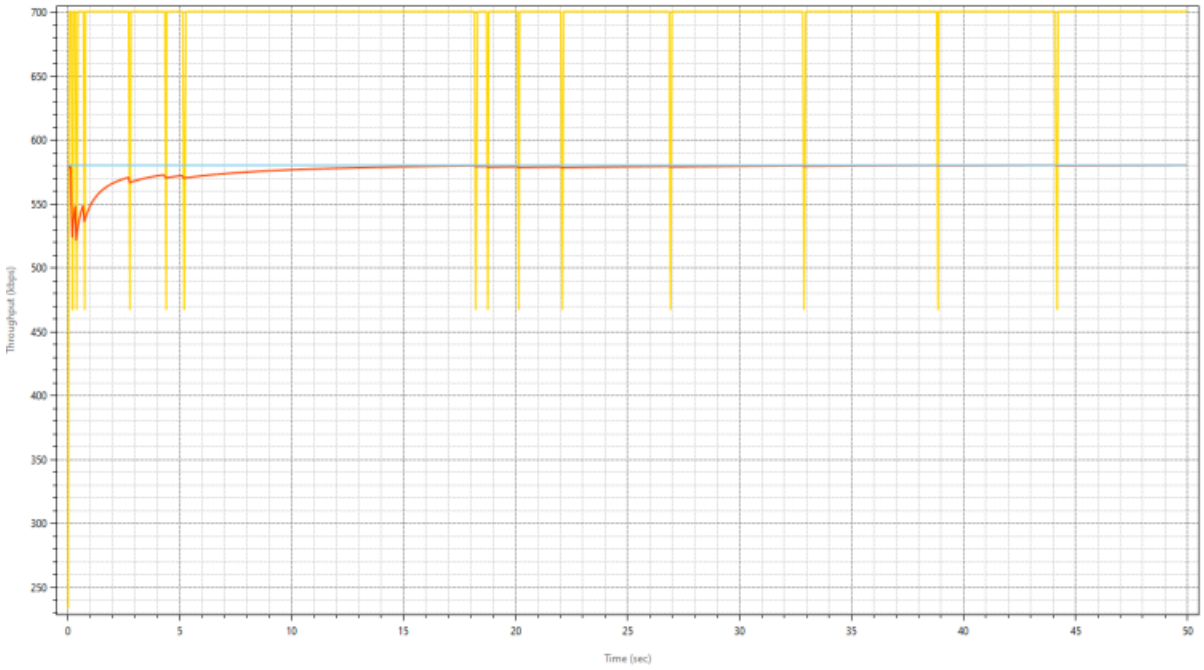
4. Now, go to Link 1 properties to introduce the link failure. The link failure section, fill the Up time and down time.



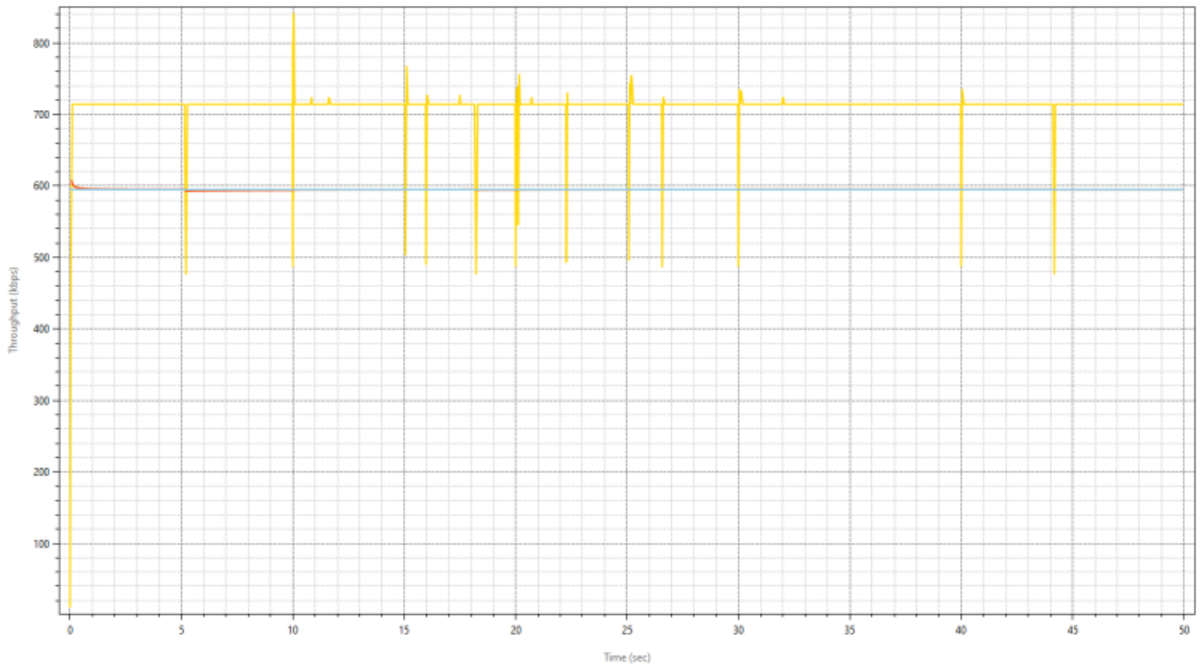
5. Enable plots, and packet trace and then click Run.Check the number of packets transmitted and received.

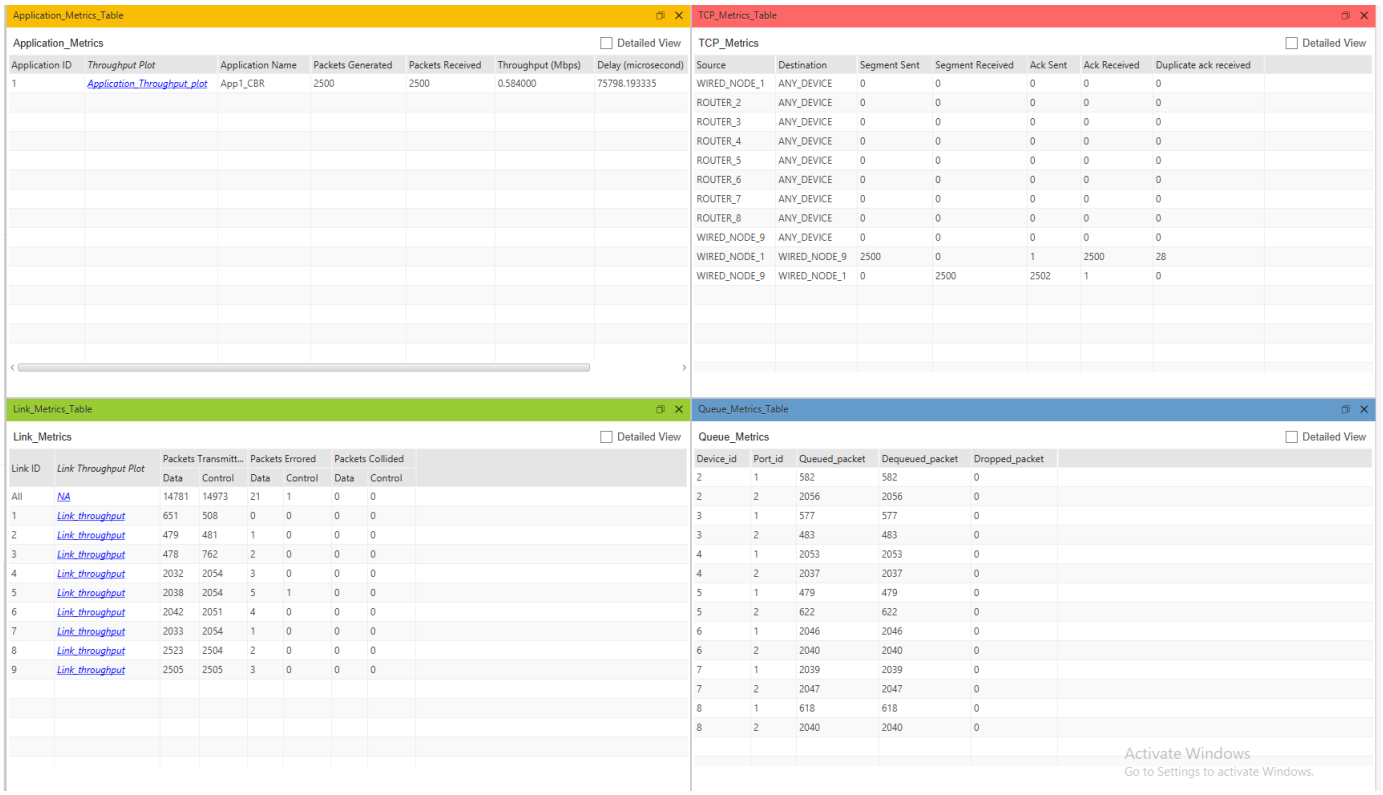


App1_CUSTOM_Throughput



Link_1_Throughput (Bi-directional Aggregated)





Application_Metrics_Table

Application_Metrics — Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	2500	0.584000	75798.193335

TCP_Metrics_Table

TCP_Metrics — Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	2500	0	1	2500	28
WIRED_NODE_9	WIRED_NODE_1	0	2500	2502	1	0

Link_Metrics_Table

Link_Metrics — Detailed View

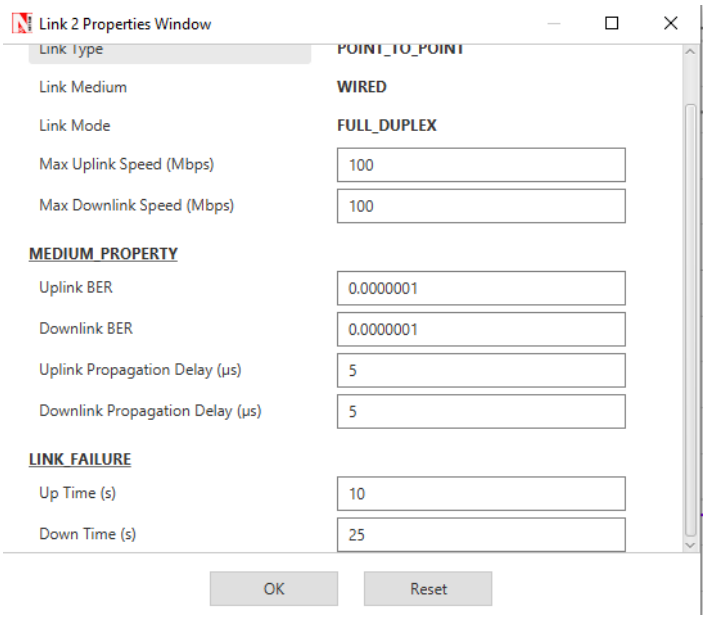
Link ID	Link Throughput Plot	Packets Transmitt...		Packets Errored		Packets Collided	
		Data	Control	Data	Control	Data	Control
All	NA	14781	14973	21	1	0	0
1	Link_throughput	651	508	0	0	0	0
2	Link_throughput	479	481	1	0	0	0
3	Link_throughput	478	762	2	0	0	0
4	Link_throughput	2032	2054	3	0	0	0
5	Link_throughput	2038	2054	5	1	0	0
6	Link_throughput	2042	2051	4	0	0	0
7	Link_throughput	2033	2054	1	0	0	0
8	Link_throughput	2523	2504	2	0	0	0
9	Link_throughput	2505	2505	3	0	0	0

Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	582	582	0
2	2	2056	2056	0
3	1	577	577	0
3	2	483	483	0
4	1	2053	2053	0
4	2	2037	2037	0
5	1	479	479	0
5	2	622	622	0
6	1	2046	2046	0
6	2	2040	2040	0
7	1	2039	2039	0
7	2	2047	2047	0
8	1	618	618	0
8	2	2040	2040	0

6. Change the Up time and down time in the link failure section and then run again.



Link 2 Properties Window

Link Type	POINT_TO_POINT
Link Medium	WIRED
Link Mode	FULL_DUPLEX
Max Uplink Speed (Mbps)	100
Max Downlink Speed (Mbps)	100
MEDIUM_PROPERTY	
Uplink BER	0.0000001
Downlink BER	0.0000001
Uplink Propagation Delay (µs)	5
Downlink Propagation Delay (µs)	5
LINK_FAILURE	
Up Time (s)	10
Down Time (s)	25

OK Reset

Application_Metrics_Table

Application_Metrics

Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	2486	0.580730	45372.597880

TCP_Metrics_Table

TCP_Metrics

Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	2487	0	1	2486	21
WIRED_NODE_9	WIRED_NODE_1	0	2486	2487	1	0

Link_Metrics_Table

Link_Metrics

Detailed View

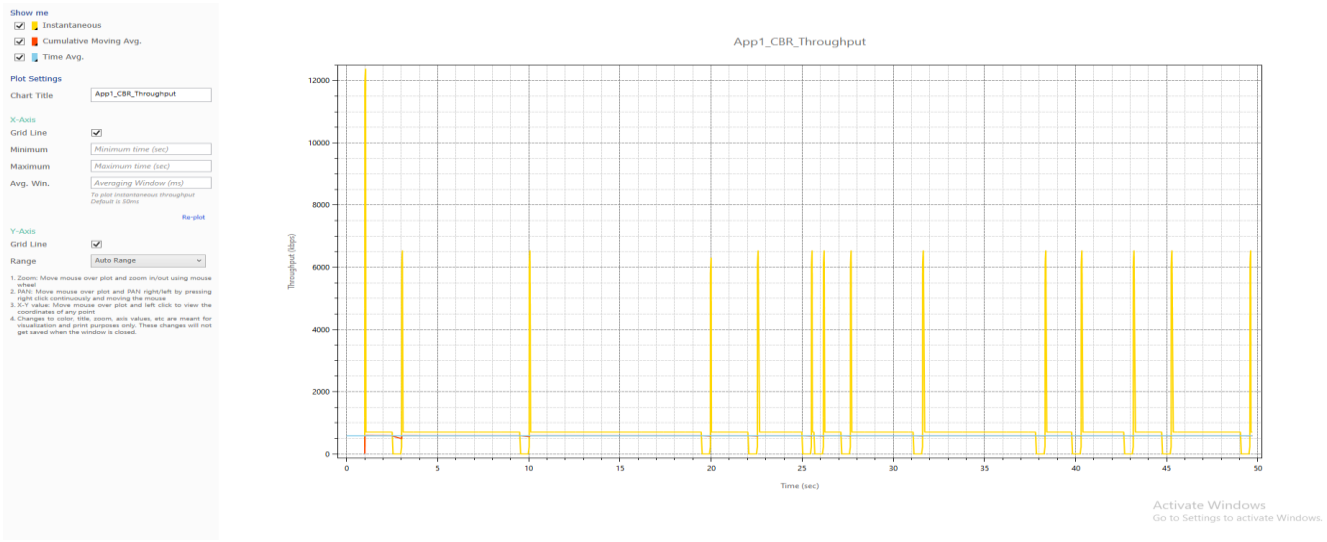
Link ID	Link Throughput Plot	Packets Transmitt...		Packets Errored		Packets Collided	
		Data	Control	Data	Control	Data	Control
All	NA	13730	13924	16	1	0	0
1	Link_throughput	1256	1288	0	0	0	0
2	Link_throughput	1255	1279	1	1	0	0
3	Link_throughput	1254	1290	2	0	0	0
4	Link_throughput	1239	1273	2	0	0	0
5	Link_throughput	1245	1272	4	0	0	0
6	Link_throughput	1247	1269	2	0	0	0
7	Link_throughput	1241	1273	2	0	0	0
8	Link_throughput	2504	2490	1	0	0	0
9	Link_throughput	2489	2490	2	0	0	0

Queue_Metrics_Table

Queue_Metrics

Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	1277	1277	0
2	2	1264	1264	0
3	1	1267	1267	0
3	2	1271	1271	0
4	1	1263	1263	0
4	2	1252	1252	0
5	1	1264	1264	0
5	2	1274	1274	0
6	1	1257	1257	0
6	2	1255	1255	0
7	1	1254	1254	0
7	2	1259	1259	0
8	1	1270	1270	0
8	2	1255	1255	0



Inference - In OSPF, when a link failure occurs, packets are rerouted along an alternative path. This rerouting process is unique to OSPF. Additionally, a shorter physical distance between the uplink and downlink results in reduced delay for the packets. This suggests that proximity between these points directly influences the time it takes for packets to traverse the network.

NAME – Aaditya Bhatt	DATE - 19/03/2024
REGISTRATION NUMBER - 21BEC1531	EXPERIMENT NO. 9

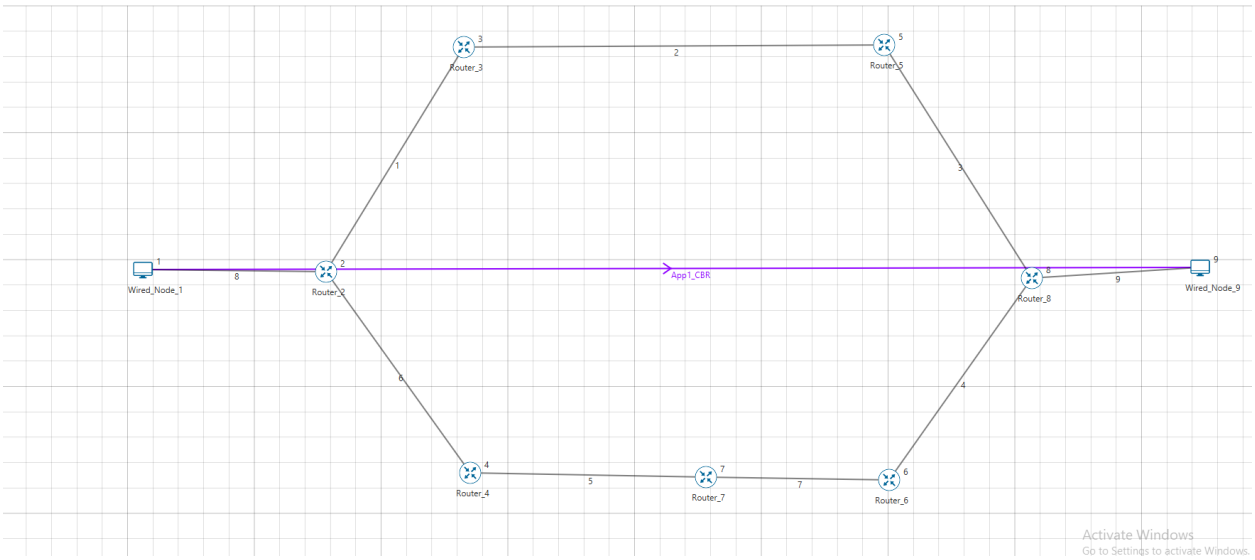
Aim - To evaluate the working of RIP and OSPF routing protocols in NetSim.

Software Used - Netsim

Procedure -

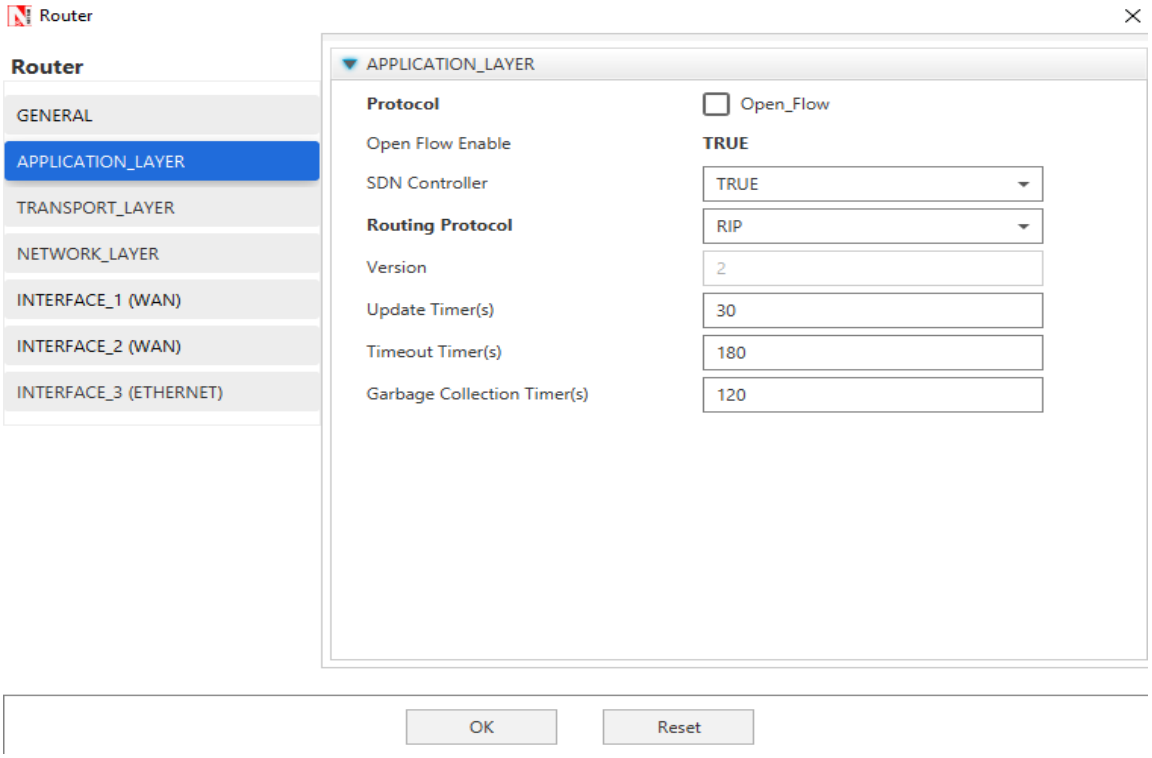
1. Open Netsim, choose Internetworks workspace.

2. Connect more than five routers and two wired nodes



3. Go to application layer,change the RIP/OSPF in the routing protocol option.

CASE-01 (All are RIP)



Instantaneous
Cumulative Moving Avg.
Time Avg.

Plot Settings

Chart Title: App1_CBR_Throughput

X-Axis

Grid Line

Minimum: Minimum time (sec)

Maximum: Maximum time (sec)

Avg. Win.: Averaging Window (ms)

To plot instantaneous throughput Default is 50ms

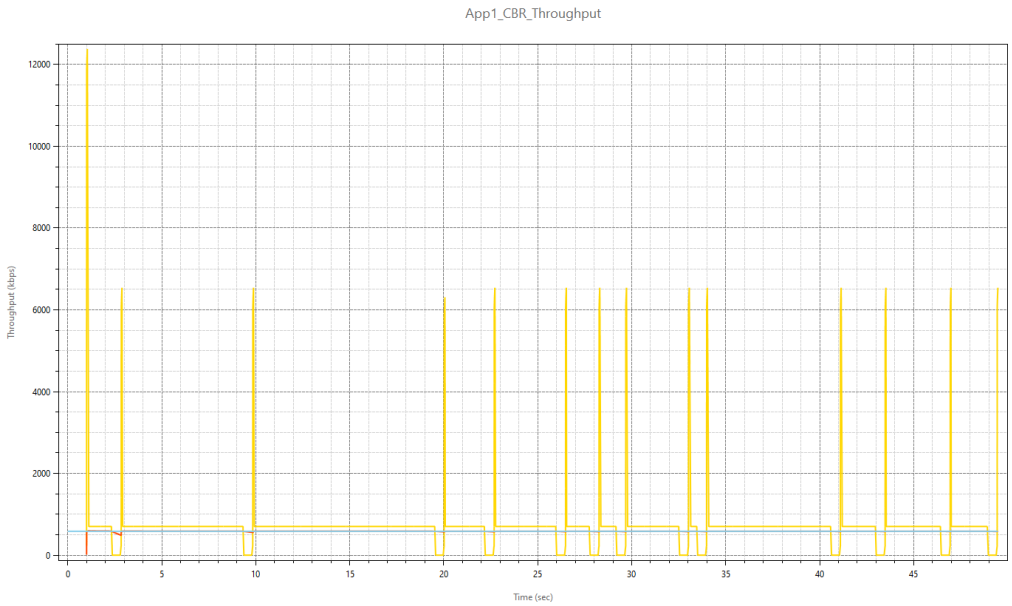
Re-plot

Y-Axis

Grid Line

Range: Auto Range

1. Zoom: Move mouse over plot and zoom in/out using mouse wheel
2. PAN: Move mouse over plot and PAN right/left by pressing right click continuously and moving the mouse
3. X-Y value: Move mouse over plot and left click to view the coordinates of any point
4. Changes to color, title, zoom, axis values, etc are meant for visualization and print purposes only. These changes will not get saved when the window is closed.



Instantaneous
Cumulative Moving Avg.
Time Avg.

Plot Settings

Chart Title: App1_CBR_Throughput

X-Axis

Grid Line

Minimum: Minimum time (sec)

Maximum: Maximum time (sec)

Avg. Win.: Averaging Window (ms)

To plot instantaneous throughput Default is 50ms

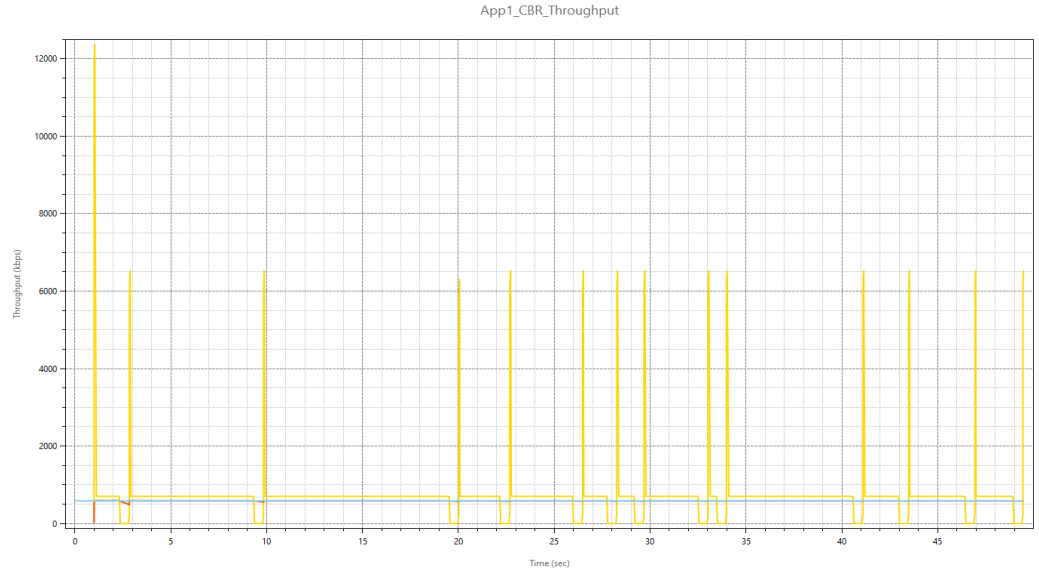
Re-plot

Y-Axis

Grid Line

Range: Auto Range

1. Zoom: Move mouse over plot and zoom in/out using mouse wheel
2. PAN: Move mouse over plot and PAN right/left by pressing right click continuously and moving the mouse
3. X-Y value: Move mouse over plot and left click to view the coordinates of any point
4. Changes to color, title, zoom, axis values, etc are meant for visualization and print purposes only. These changes will not get saved when the window is closed.



Application_Metrics_Table

Application_Metrics — Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	2475	0.578160	45423.817106

TCP_Metrics_Table

TCP_Metrics — Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	2476	0	1	2475	13
WIRED_NODE_9	WIRED_NODE_1	0	2475	2476	1	0

Link_Metrics_Table

Link_Metrics — Detailed View

Link ID	Link Throughput Plot	Packets Transmitt... Data	Packets Transmitt... Control	Packets Errored Data	Packets Errored Control	Packets Collided Data	Packets Collided Control
All	NA	12422	12517	16	2	0	0
1	Link_throughput	2488	2496	4	1	0	0
2	Link_throughput	2484	2497	4	0	0	0
3	Link_throughput	2480	2496	2	0	0	0
4	Link_throughput	0	17	0	0	0	0
5	Link_throughput	0	18	0	1	0	0
6	Link_throughput	0	17	0	0	0	0
7	Link_throughput	0	18	0	0	0	0
8	Link_throughput	2492	2479	4	0	0	0
9	Link_throughput	2478	2479	2	0	0	0

Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	2498	2498	0
2	2	8	8	0
3	1	2486	2486	0
3	2	2495	2495	0
4	1	9	9	0
4	2	9	9	0
5	1	2486	2486	0
5	2	2491	2491	0
6	1	9	9	0
6	2	9	9	0
7	1	9	9	0
7	2	9	9	0
8	1	2485	2485	0
8	2	8	8	0

CASE-02 (ALL OSPF)

Router

Router

- GENERAL
- APPLICATION_LAYER
- TRANSPORT_LAYER
- NETWORK_LAYER
- INTERFACE_1 (WAN)
- INTERFACE_2 (WAN)
- INTERFACE_3 (ETHERNET)

APPLICATION_LAYER

Protocol	☐ Open_Flow
Open Flow Enable	**TRUE**
SDN Controller	TRUE
Routing Protocol	OSPF
Version	**2**
LS Refresh Time (s)	**1800**
LSA Maxage (s)	**3600**
Increment Age (s)	1
Maxage Removal Time (s)	2
Min LS Interval (s)	**5**
SPF Calc Delay (ms)	40
Flood Timer (ms)	100
Advertise Self Interface	TRUE
Send Delayed Update	TRUE

OK Reset

Application_Metrics_Table

Application_Metrics — Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	2500	0.584000	44985.991690

TCP_Metrics_Table

TCP_Metrics — Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	2500	0	1	2500	18
WIRED_NODE_9	WIRED_NODE_1	0	2500	2501	1	0

Link_Metrics_Table

Link_Metrics — Detailed View

Link ID	Link Throughput Plot	Packets Transmitt... Data	Packets Transmitt... Control	Packets Errored Data	Packets Errored Control	Packets Collided Data	Packets Collided Control
All	NA	12547	12742	15	1	0	0
1	Link throughput	2513	2536	3	0	0	0
2	Link throughput	2510	2533	5	1	0	0
3	Link throughput	2505	2537	2	0	0	0
4	Link throughput	0	33	0	0	0	0
5	Link throughput	0	33	0	0	0	0
6	Link throughput	0	29	0	0	0	0
7	Link throughput	0	33	0	0	0	0
8	Link throughput	2516	2504	3	0	0	0
9	Link throughput	2503	2504	2	0	0	0

Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	2532	2532	0
2	2	15	15	0
3	1	2517	2517	0
3	2	2527	2527	0
4	1	17	17	0
4	2	14	14	0
5	1	2516	2516	0
5	2	2524	2524	0
6	1	16	16	0
6	2	17	17	0
7	1	16	16	0
7	2	16	16	0
8	1	2518	2518	0
8	2	17	17	0

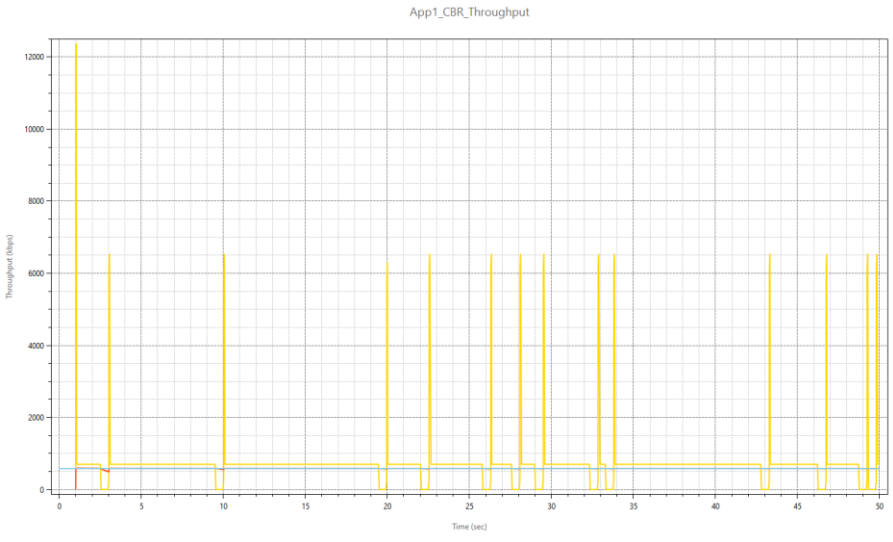
Show me
- Instantaneous
- Cumulative Moving Avg.
- Time Avg.

Plot Settings
Chart Title: App1_CBR_Throughput

X-Axis
Grid Line
Minimum: Minimum time (sec)
Maximum: Maximum time (sec)
Avg. Win.: Averaging Window (ms)
To plot instantaneous throughput Default is 50ms
Re-plot

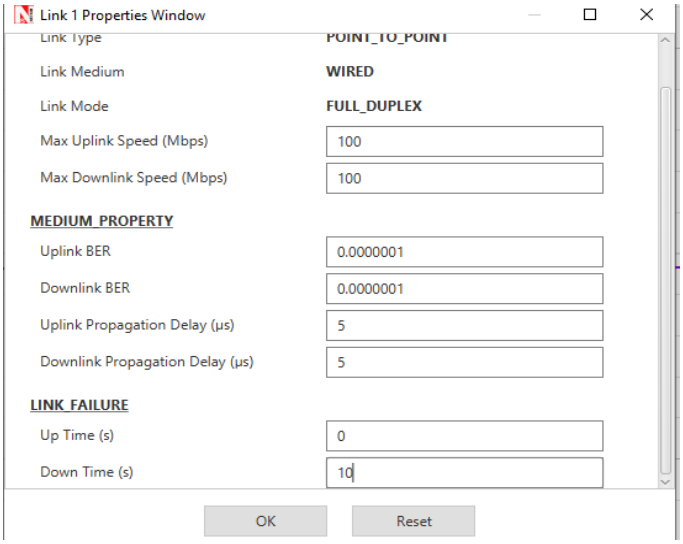
Y-Axis
Grid Line
Range: Auto Range

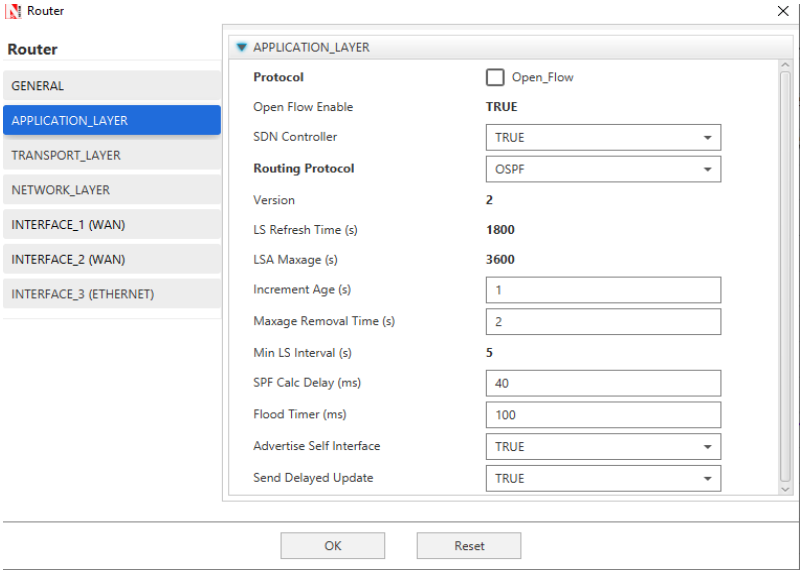
1. Zoom: Move mouse over plot and zoom in/out using mouse wheel
2. PAN: Move mouse over plot and PAN right/left by pressing right click continuously and moving the mouse
3. X-Y value: Move mouse over plot and left click to view the coordinates of any point
4. Changes to color, title, zoom, axis values, etc are meant for visualization and print purposes only. These changes will not get saved when the window is closed.

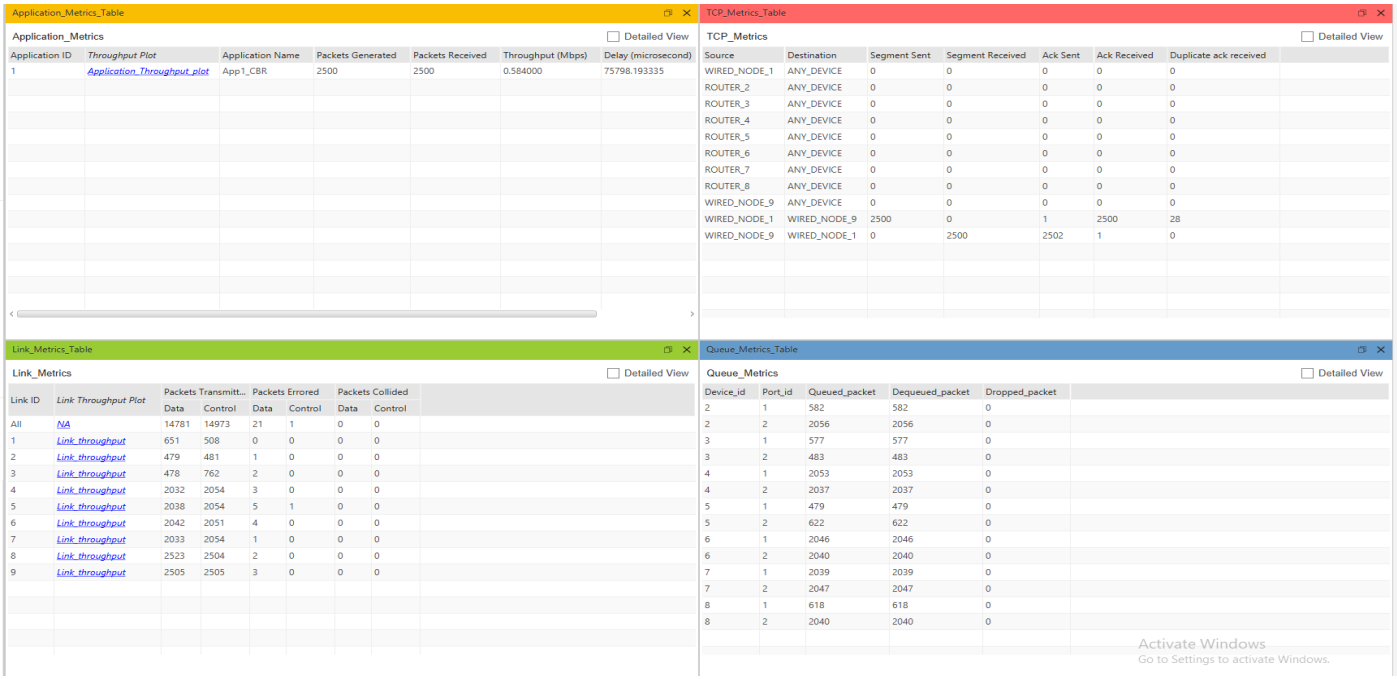


CASE-03(LINK FAILURE FOR OSPF)

4. Introduce the link failure







Application_Metrics_Table

Application_Metrics — Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	2500	0.584000	75798.193335

TCP_Metrics_Table

TCP_Metrics — Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	2500	0	1	2500	28
WIRED_NODE_9	WIRED_NODE_1	0	2500	2502	1	0

Link_Metrics_Table

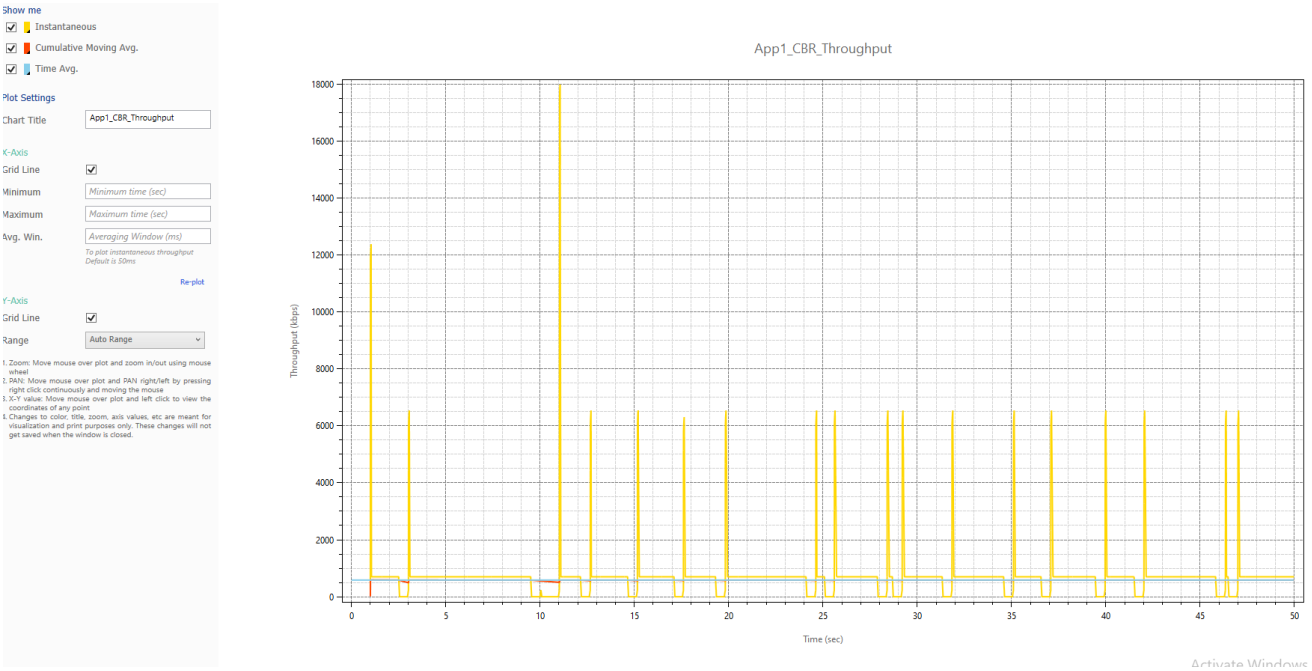
Link_Metrics — Detailed View

Link ID	Link Throughput Plot	Packets Transmitt... Data	Packets Transmitt... Control	Packets Errored Data	Packets Errored Control	Packets Collided Data	Packets Collided Control
All	NA	14781	14973	21	1	0	0
1	Link_throughput	651	508	0	0	0	0
2	Link_throughput	479	481	1	0	0	0
3	Link_throughput	478	762	2	0	0	0
4	Link_throughput	2032	2054	3	0	0	0
5	Link_throughput	2038	2054	5	1	0	0
6	Link_throughput	2042	2051	4	0	0	0
7	Link_throughput	2033	2054	1	0	0	0
8	Link_throughput	2523	2504	2	0	0	0
9	Link_throughput	2505	2505	3	0	0	0

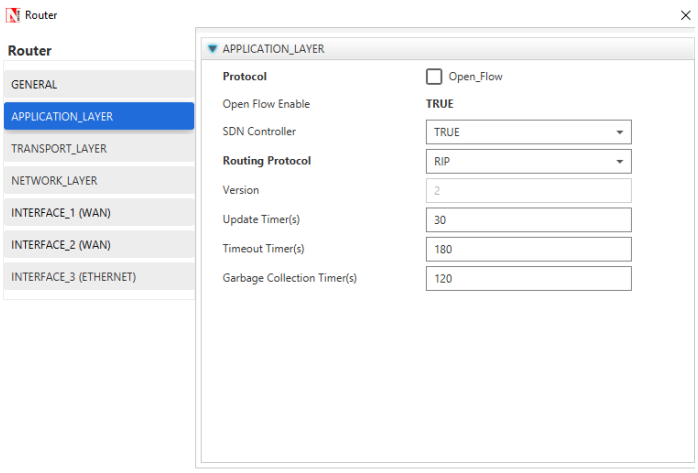
Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	582	582	0
2	2	2056	2056	0
3	1	577	577	0
3	2	483	483	0
4	1	2053	2053	0
4	2	2037	2037	0
5	1	479	479	0
5	2	622	622	0
6	1	2046	2046	0
6	2	2040	2040	0
7	1	2039	2039	0
7	2	2047	2047	0
8	1	618	618	0
8	2	2040	2040	0



CASE 04 (LINK FAILURE USING RIP)



Application_Metrics_Table

Application_Metrics — Detailed View

Application ID	Throughput Plot	Application Name	Packets Generated	Packets Received	Throughput (Mbps)	Delay (microsecond)
1	Application_Throughput_plot	App1_CBR	2500	500	0.116800	78334.149585

TCP_Metrics_Table

TCP_Metrics — Detailed View

Source	Destination	Segment Sent	Segment Received	Ack Sent	Ack Received	Duplicate ack received
WIRED_NODE_1	ANY_DEVICE	0	0	0	0	0
ROUTER_2	ANY_DEVICE	0	0	0	0	0
ROUTER_3	ANY_DEVICE	0	0	0	0	0
ROUTER_4	ANY_DEVICE	0	0	0	0	0
ROUTER_5	ANY_DEVICE	0	0	0	0	0
ROUTER_6	ANY_DEVICE	0	0	0	0	0
ROUTER_7	ANY_DEVICE	0	0	0	0	0
ROUTER_8	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_9	ANY_DEVICE	0	0	0	0	0
WIRED_NODE_1	WIRED_NODE_9	501	0	1	500	0
WIRED_NODE_9	WIRED_NODE_1	0	500	500	1	0

Link_Metrics_Table

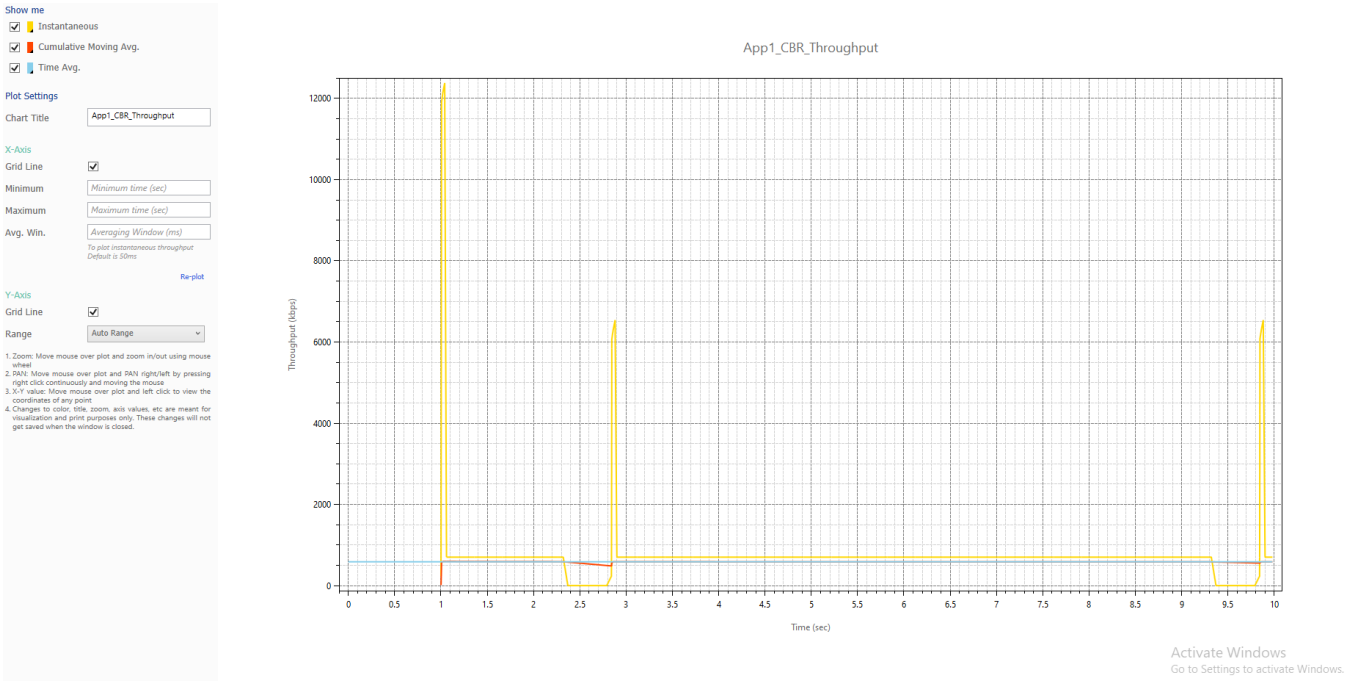
Link_Metrics — Detailed View

Link ID	Link Throughput Plot	Packets Transmit... Data	Packets Transmit... Control	Packets Errored Data	Packets Errored Control	Packets Collided Data	Packets Collided Control
All	NA	2521	2636	2	1	0	0
1	Link_throughput	509	520	0	0	0	0
2	Link_throughput	502	519	1	0	0	0
3	Link_throughput	501	520	1	0	0	0
4	Link_throughput	0	17	0	0	0	0
5	Link_throughput	0	18	0	1	0	0
6	Link_throughput	0	17	0	0	0	0
7	Link_throughput	0	18	0	0	0	0
8	Link_throughput	509	504	0	0	0	0
9	Link_throughput	500	503	0	0	0	0

Queue_Metrics_Table

Queue_Metrics — Detailed View

Device_id	Port_id	Queued_packet	Dequeued_packet	Dropped_packet
2	1	519	519	0
2	2	8	8	0
3	1	510	510	0
3	2	520	520	0
4	1	9	9	0
4	2	9	9	0
5	1	510	510	0
5	2	512	512	0
6	1	9	9	0
6	2	9	9	0
7	1	9	9	0
7	2	9	9	0
8	1	509	509	0
8	2	8	8	0



INFERENCE - In OSPF, when a link failure occurs, packets are automatically redirected along an alternative path, a feature not present in RIP. As a result, OSPF ensures continuous data transfer even in the event of link failures. In contrast, RIP lacks this capability, causing packets to continue along the original path, potentially resulting in interruptions or dropped packets. Consequently, OSPF's ability to dynamically reroute packets enhances network resilience and reliability compared to RIP, especially in scenarios involving network disruptions or failures.

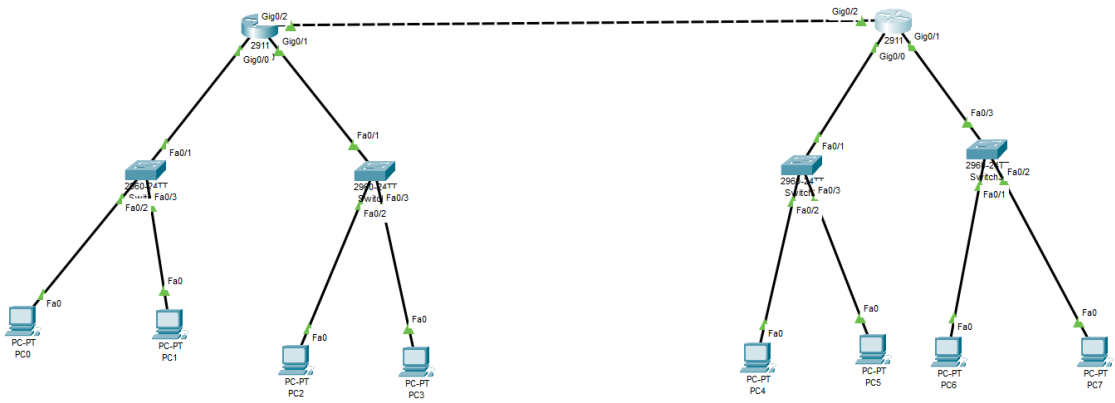
NAME – Aaditya Bhatt	DATE - 26/03/2024
REGISTRATION NUMBER - 21BEC1531	EXPERIMENT NO. 10

Aim - Fragment a network to different subnets using cisco packet tracer.

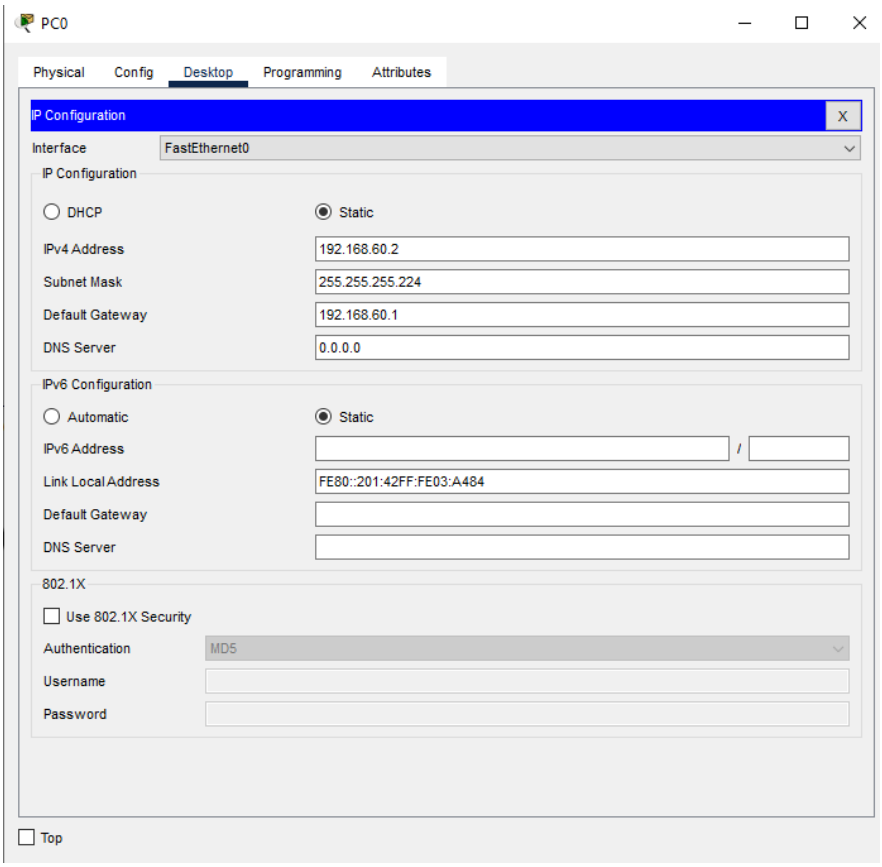
Software Used - Cisco Packet Tracer

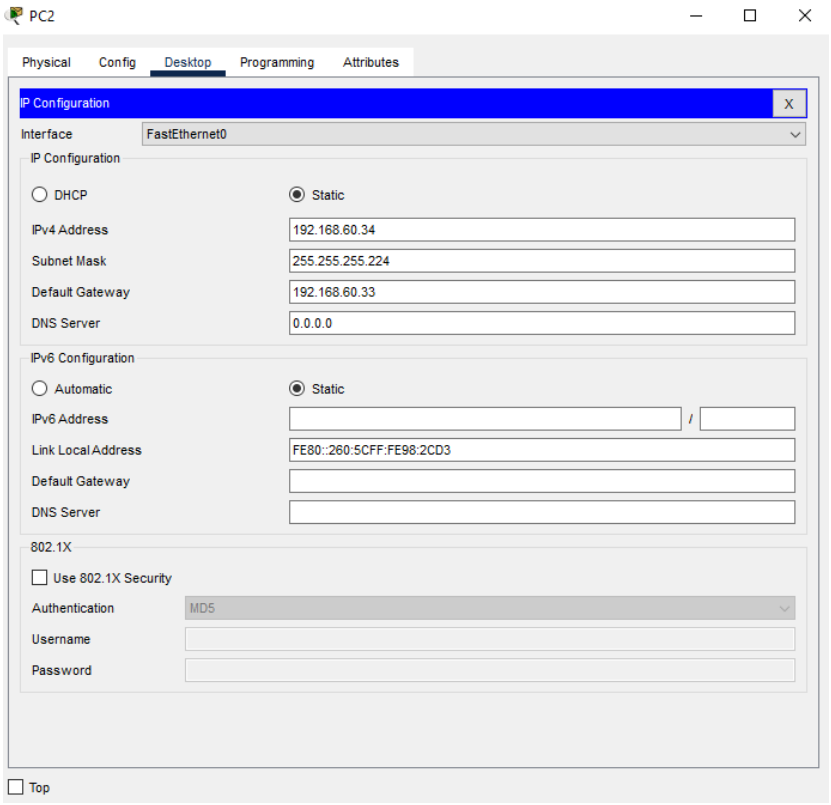
Procedure -

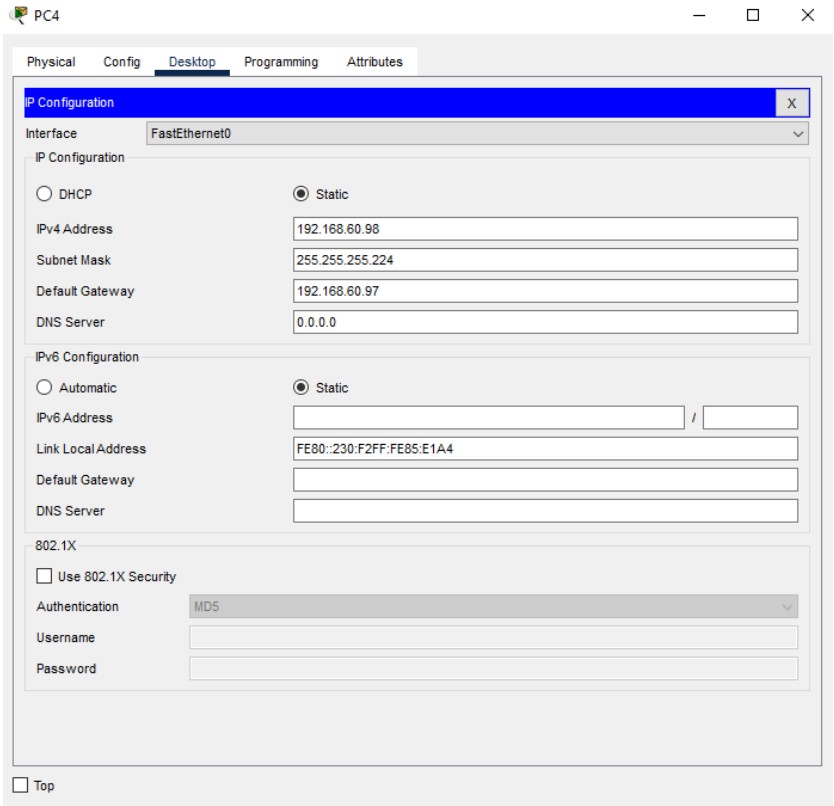
1. Click on the Devices tab and drag six PCs, two switches(2980-24TT), and two routers(2911) onto the workspace.

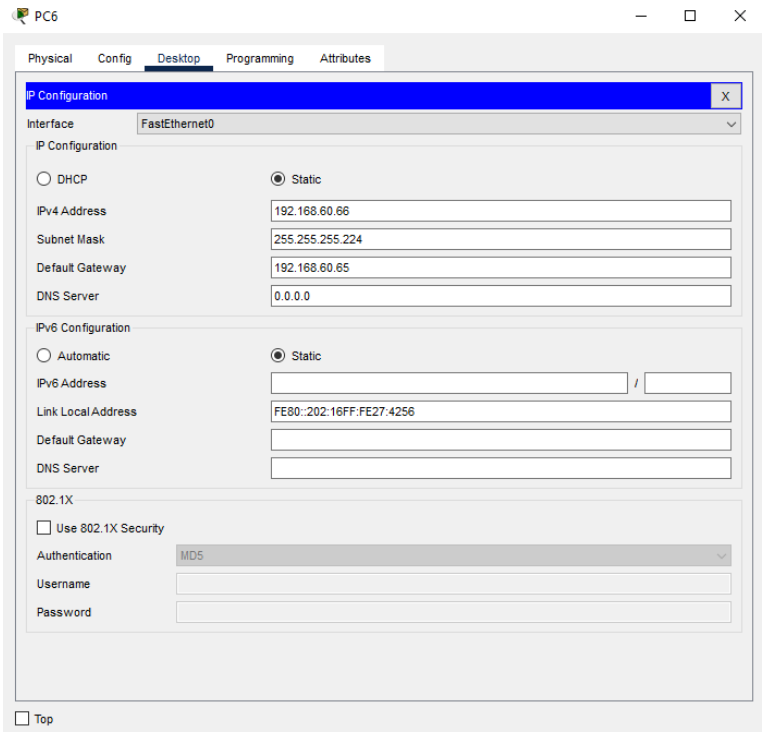


2. Assign IP Addresses to every PC in the network

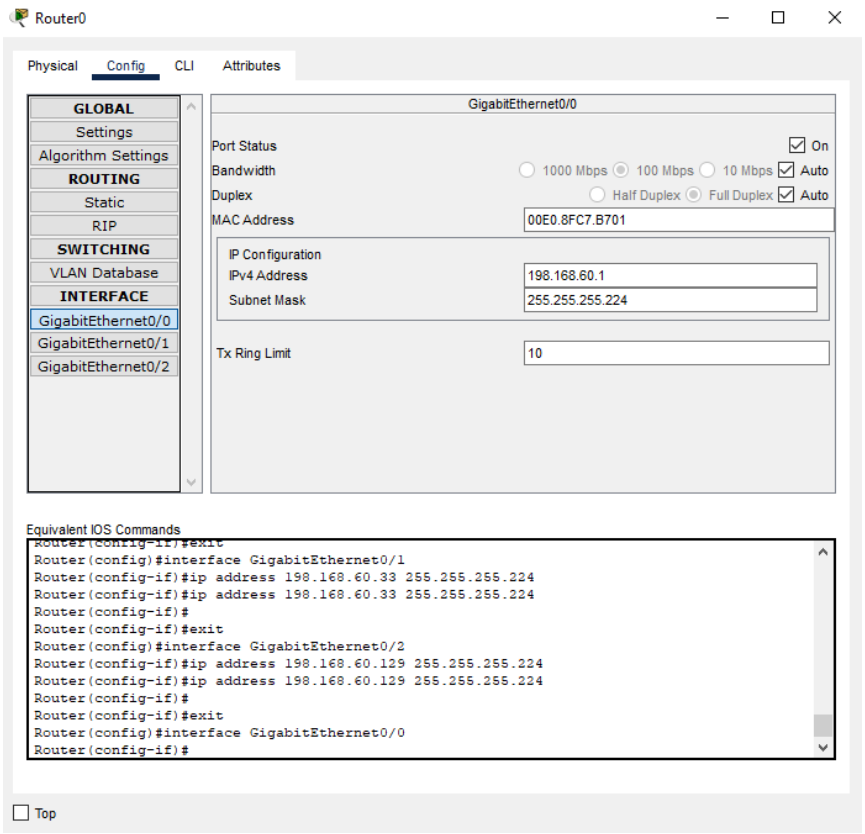


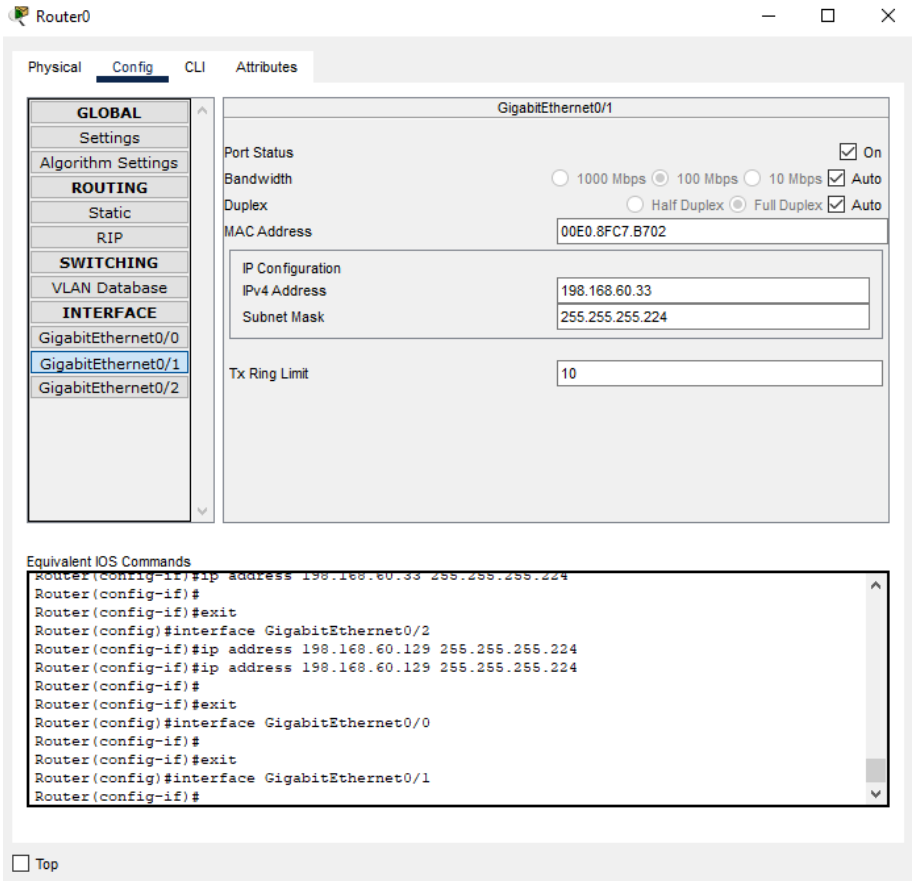

PC2
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.60.34
Subnet Mask
255.255.255.224
Default Gateway
192.168.60.33
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::260:5CFF:FE98:2CD3
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

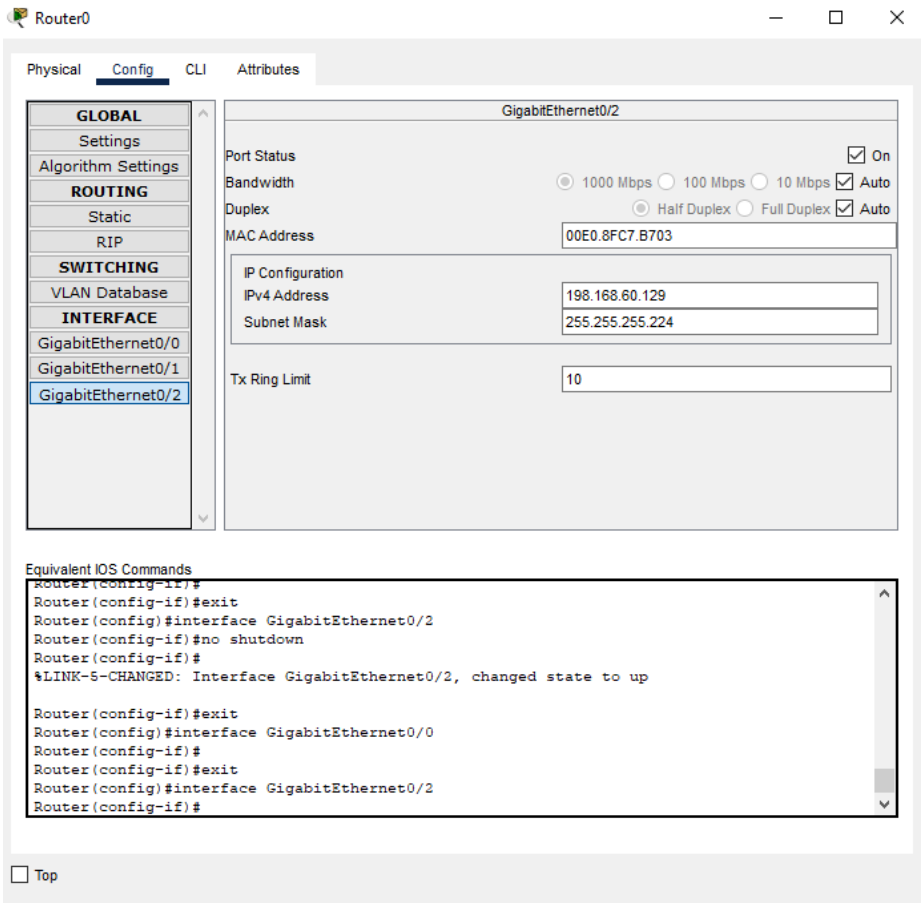

PC4
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.60.98
Subnet Mask
255.255.255.224
Default Gateway
192.168.60.97
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::230:F2FF:FE85:E1A4
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top

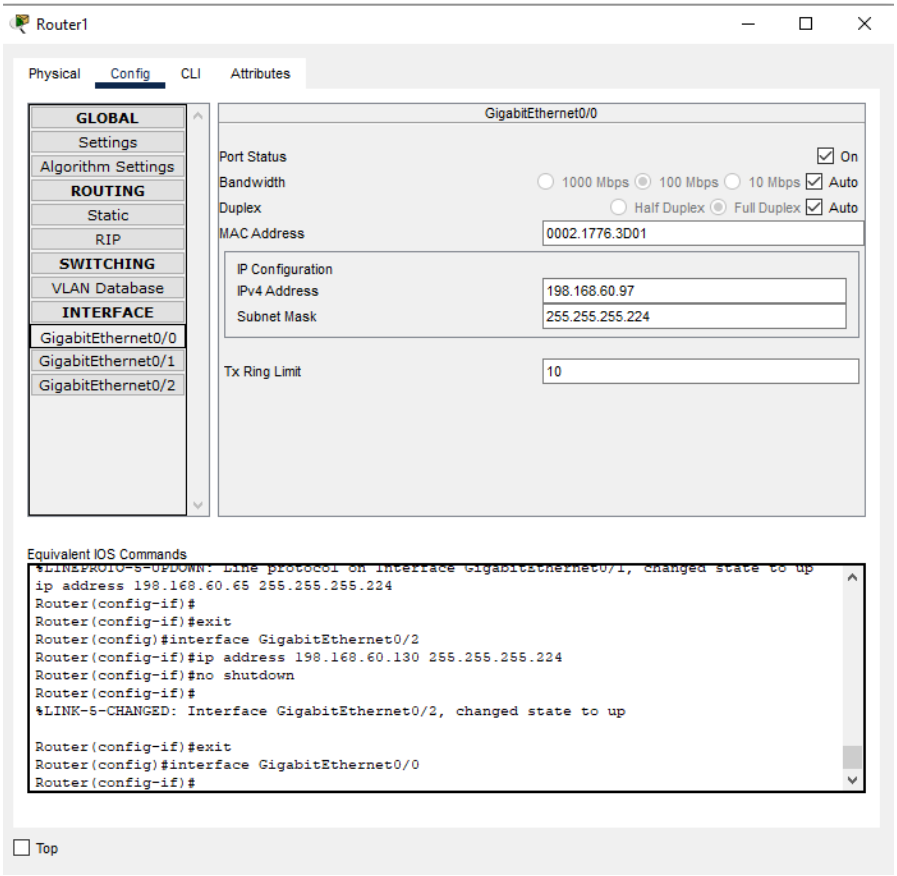


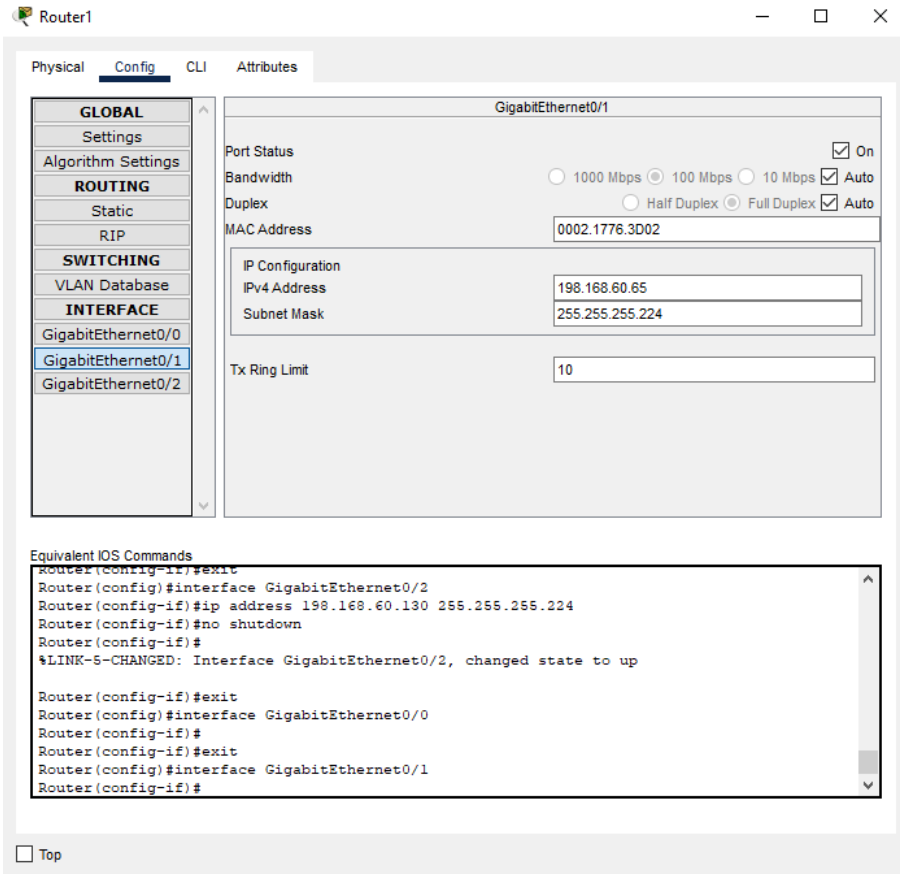
3. Do the router configurations.

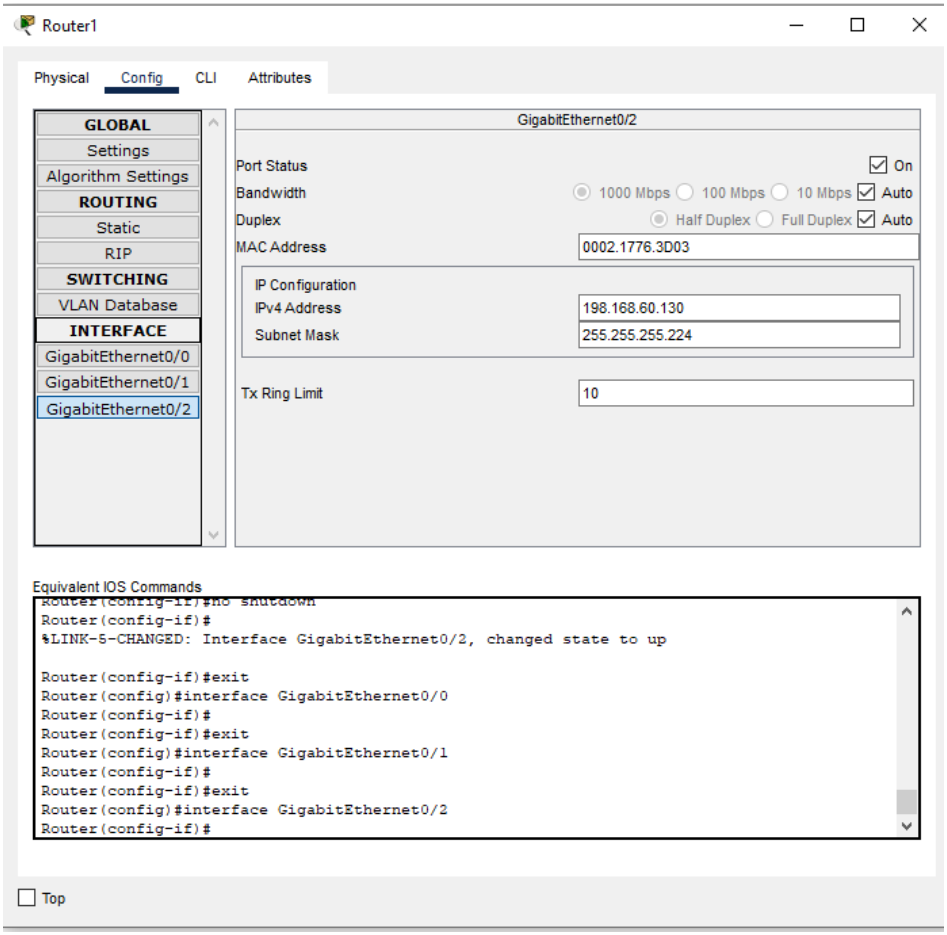



Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.8FC7.B702
IP Configuration
IPv4 Address
198.168.60.33
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#ip address 198.168.60.33 255.255.255.224
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 198.168.60.129 255.255.255.224
Router(config-if)#ip address 198.168.60.129 255.255.255.224
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Top

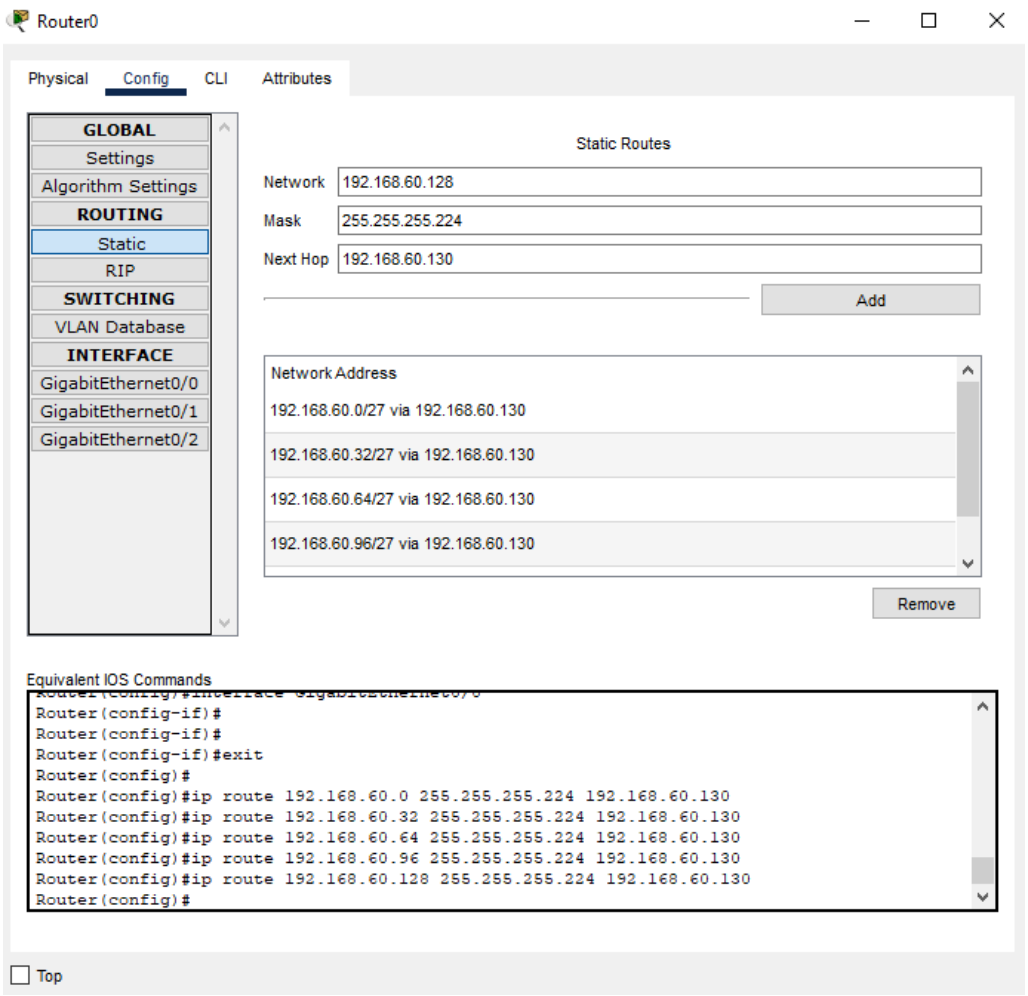

Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/2
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.8FC7.B703
IP Configuration
IPv4 Address
198.168.60.129
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#
Top

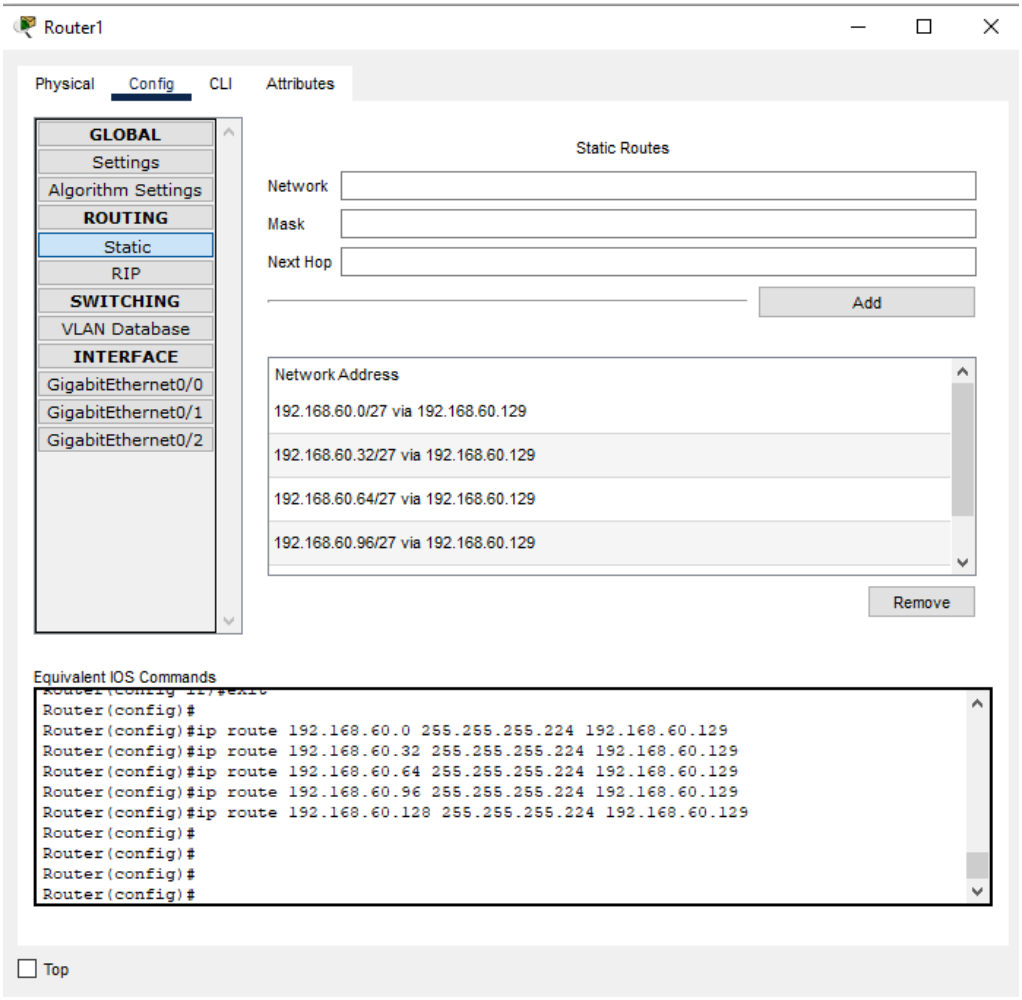

Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0002.1776.3D01
IP Configuration
IPv4 Address
198.168.60.97
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
ip address 198.168.60.65 255.255.255.224
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 198.168.60.130 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Top


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0
GigabitEthernet0/1
GigabitEthernet0/2
GigabitEthernet0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0002.1776.3D02
IP Configuration
IPv4 Address
198.168.60.65
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/2
Router(config-if)#ip address 198.168.60.130 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#
Top

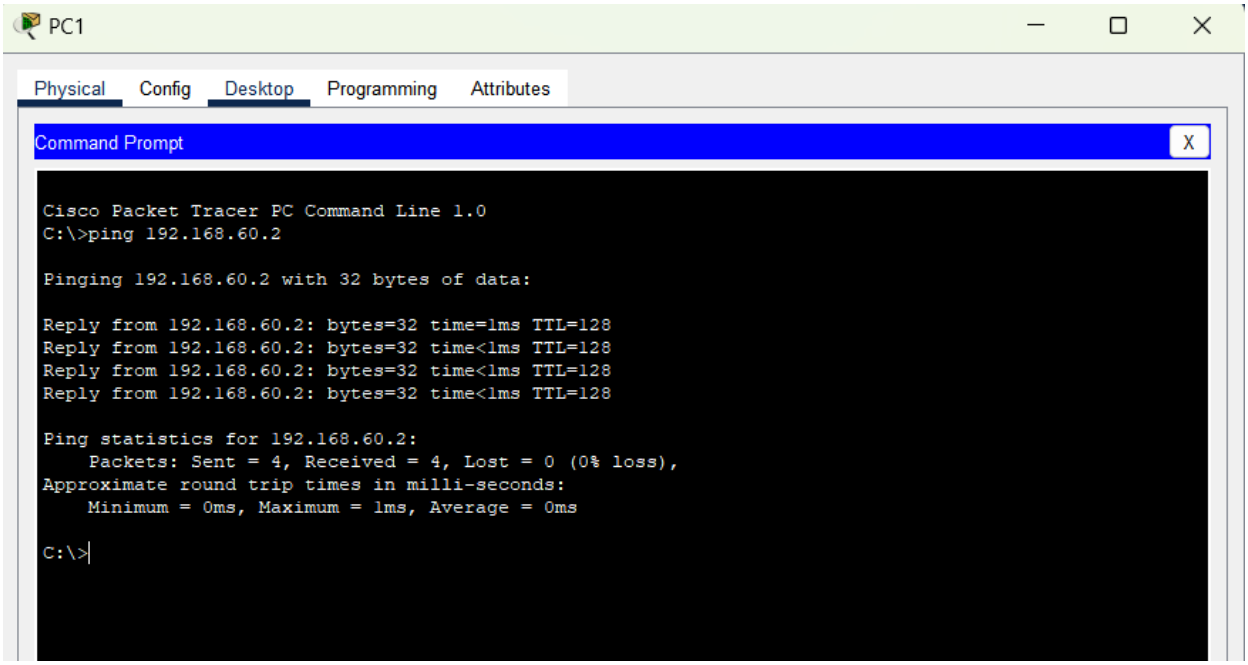


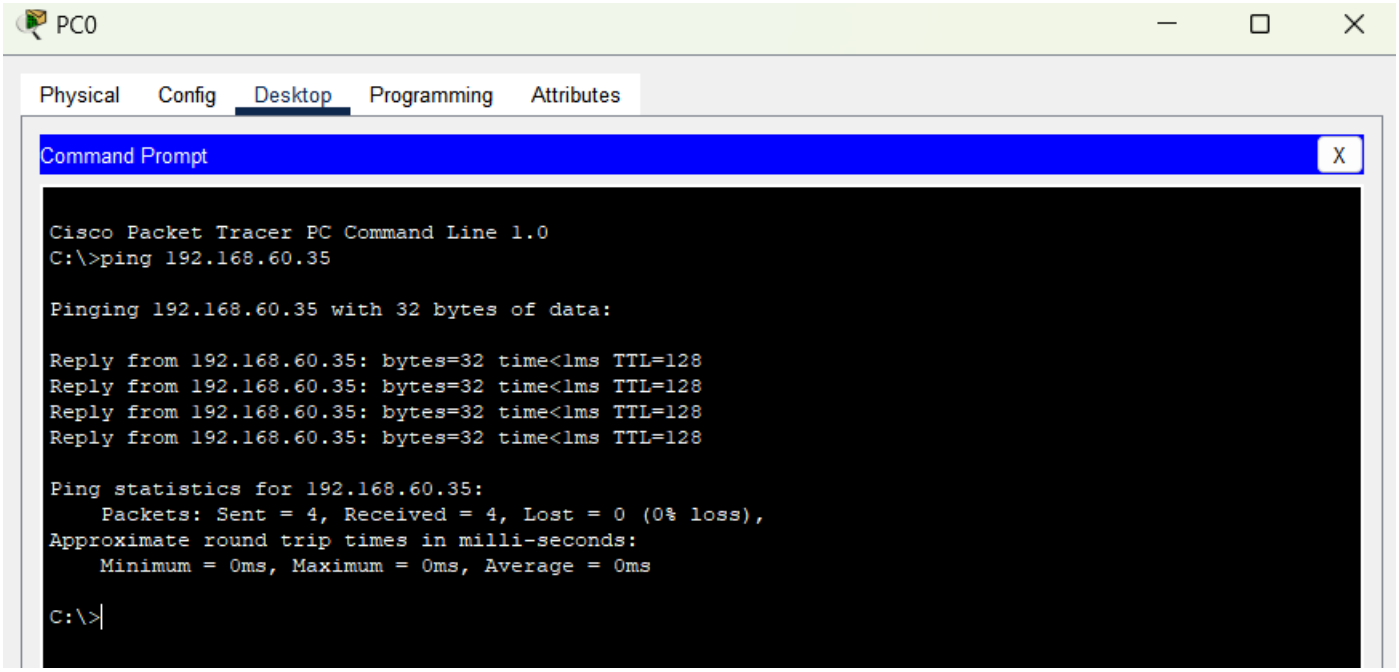
4. Link both the routers.





5. Ping all the PCs to check whether they are communicating or not.





INFERENCE - The Multiple router system has been constructed and messages have been sent and received successfully.

Name: Aaditya Bhatt	Reg.No: 21BEC1531
Experiment: 11	Date: 16/04/2024

Cyclic Redundancy Code

Aim: Implementation of CRC check in Matlab.

Tool Required:- MATLAB

Theory:

Cyclic Redundancy Code (CRC) is a method for error detection in digital communication and storage systems. It involves appending a checksum, calculated using a generator polynomial, to the data stream. By recalculating the checksum at the receiver or during data retrieval, CRC can efficiently detect errors, especially burst errors, providing reliability in data transmission and storage.

MATLAB Code:

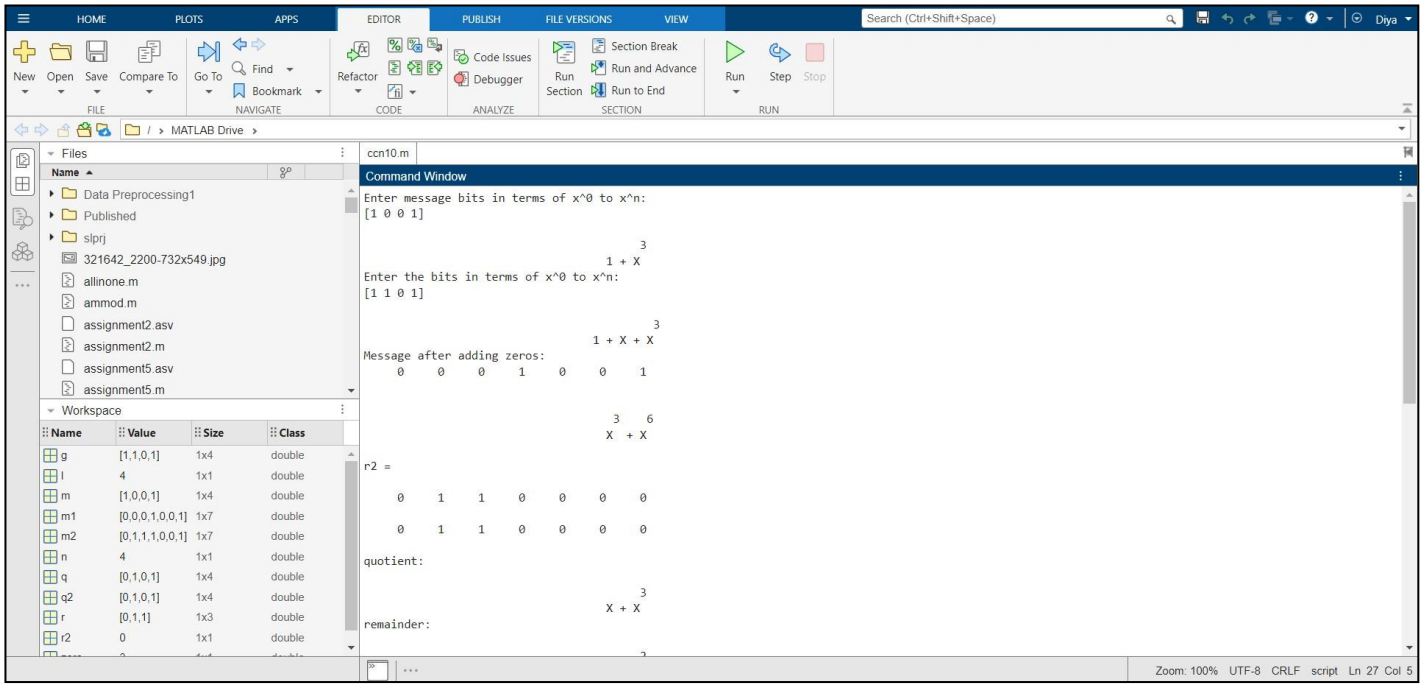
```
clc;
clear all;
close all;
m = input('Enter message bits in terms of x^0 to x^n: ');
gfpretty(m);
g = input('Enter the bits in terms of x^0 to x^n: ');
l = length(g);
gfpretty(g);
zero = l - 1;
m1 = [zeros(1,zero) m];
disp('Message after adding zeros: ');
disp(m1);
gfpretty(m1);
[q,r] = gfdeconv(m1,g);
n = length(m1) - length(r);
r2=resize(r,length(m1))
disp(r2)
disp('quotient: ');
gfpretty(q);
disp('remainder: ')
gfpretty(r);
m2 = m1 + r2;
gfpretty(m2);
[q2,r2]=gfdeconv(m2,g);
if r2 == 0
    disp('Message is error free')
else
    disp('Message contains error')
end
```

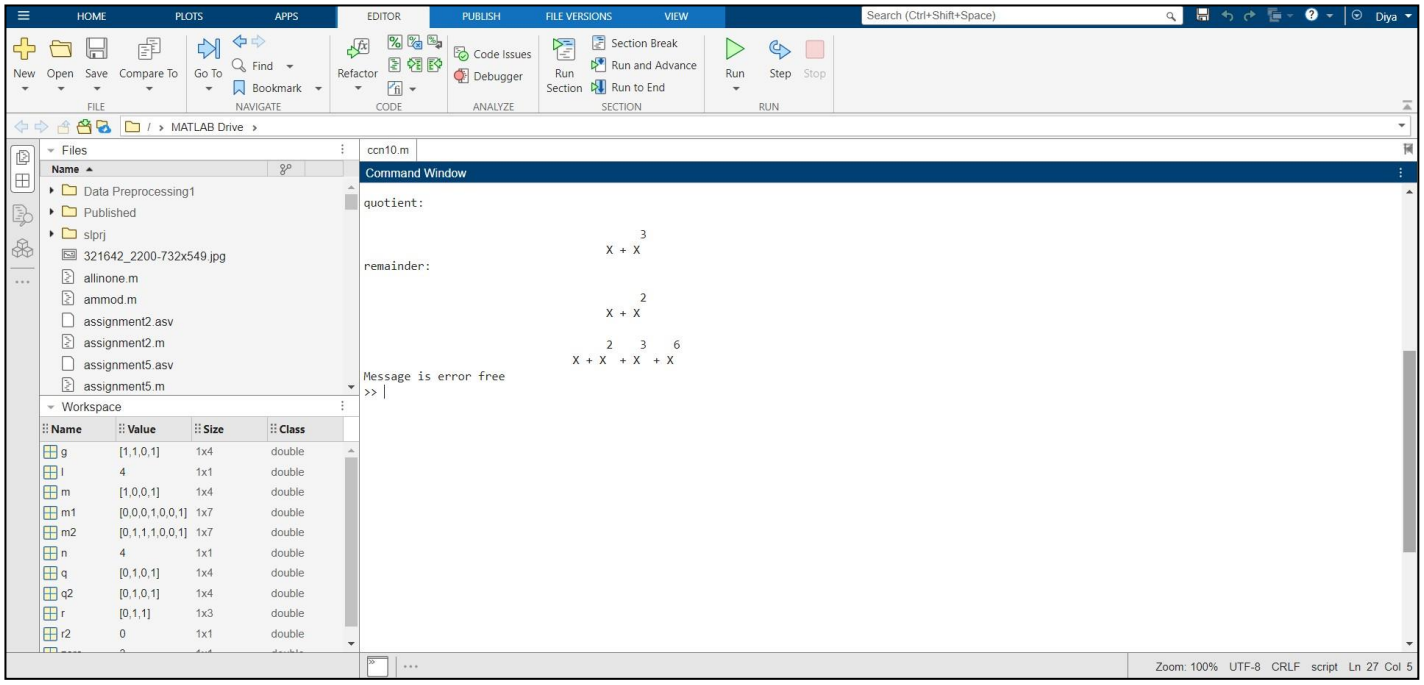
Output:

For input,

m(x) = 1001 (x^3 + 0x^2 + 0x + 1)

g(x) = 1011 (x^3 + 0x^2 + 1x + 1)

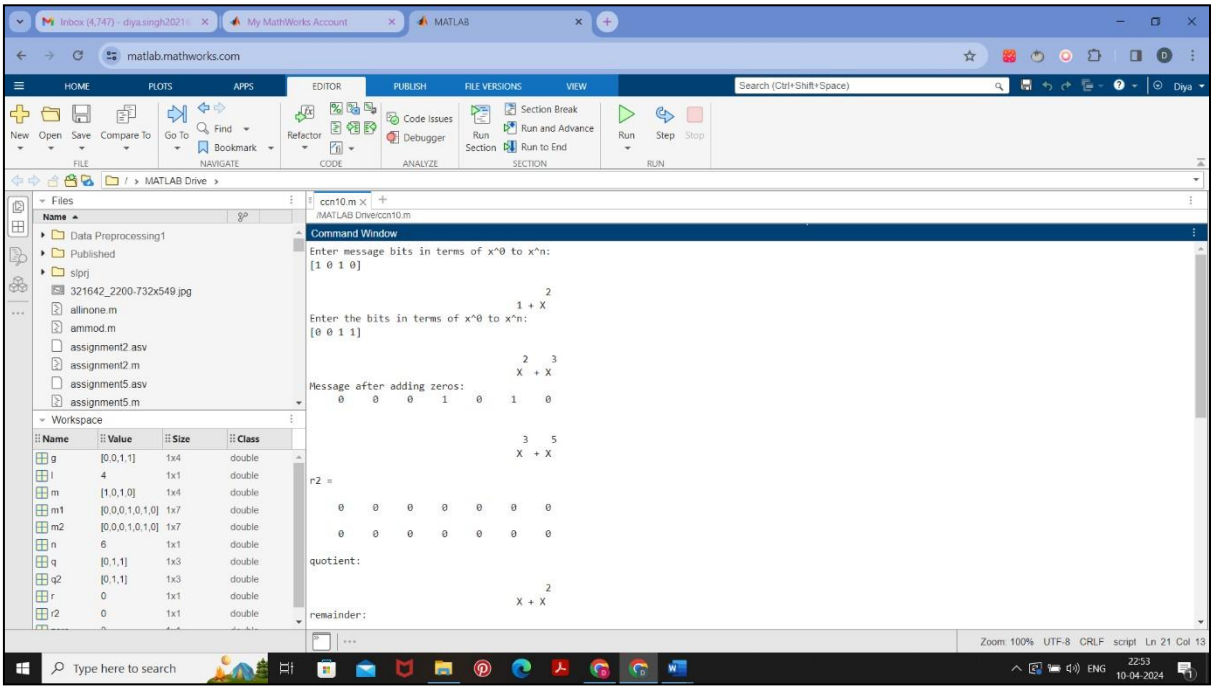


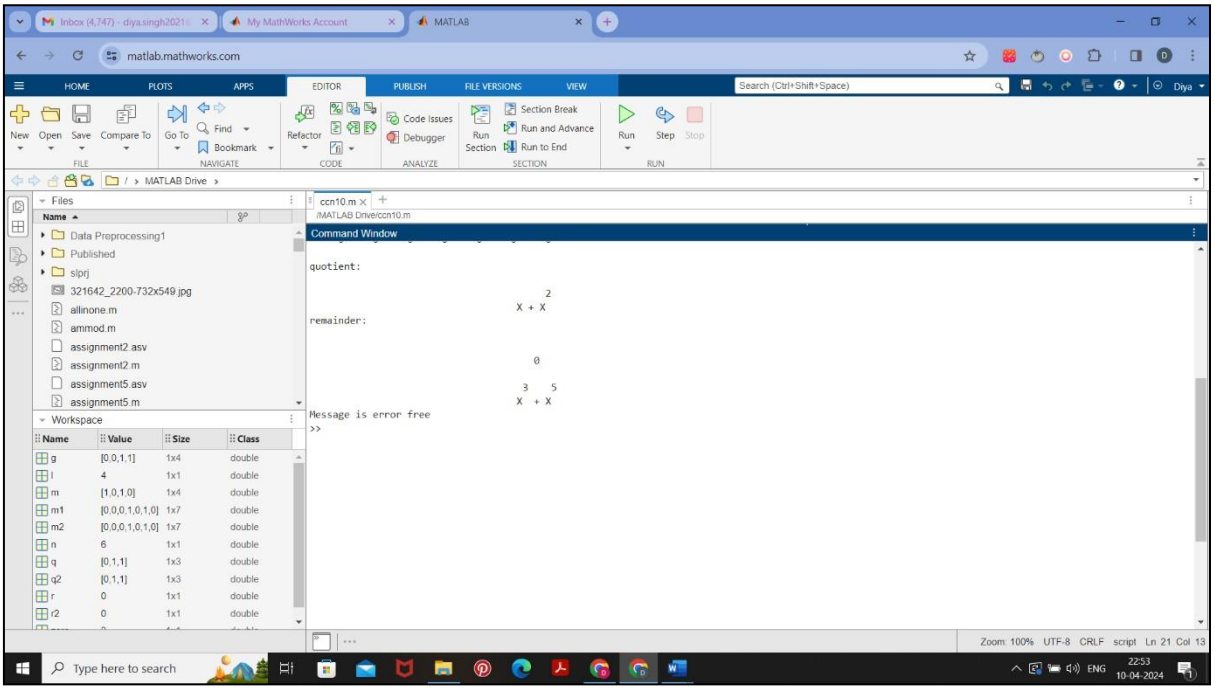


For input,

m(x) = 1010 (x^3 + 0x^2 + 1x + 0)

g(x) = 1100 (x^3 + 1x^2 + 0x + 0)





Inference:

For the given input CRC was performed and the output for the same was noted.

CRC is used for efficient error detection in digital communication due to it's simplicity and effectiveness. It detects error in terms of additional bits added to data stream. If remainder is 0 i.e no error whereas if remainder exists then there is error.