



University of Moratuwa
Department of Electronic and Telecommunication Engineering
EN2150 - Communication Network Engineering - Semester 4

Network Routing Simulation - OSPF Team Halo

July 30, 2023

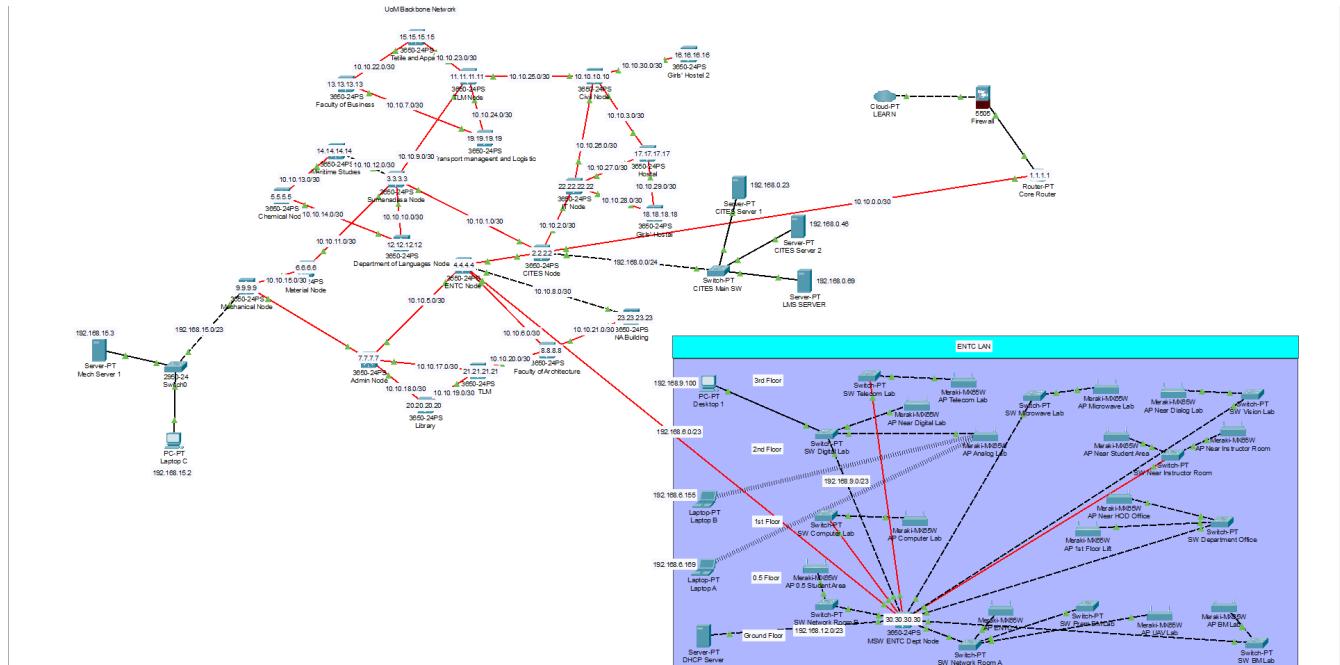
Perera N.W.P.R.A	200462U
Pramuditha A.A.H	200476P
Thilakarathne D.L.J	200650U
Wijetunga W.L.N.K	200733D

This report is submitted as a partial fulfillment of the module EN2150 - Communication Network Engineering

Contents

1	Connecting an ENTC Network to the University Backbone Network through a L3 Switch (Router)	3
2	IP Addressing Plan	3
2.1	IP Block Advertisement in a University Backbone Network for Connected Departments/Divisions	4
3	Developing OSPF Routing Configuration for Redundant Backbone Network	4
4	Simulation	5
4.1	Task 1 : Simulating Routing Path for a Student at ENTC Accessing LMS Servers in the University Data Center	5
4.2	Task 2 : Simulating Routing Path when the Backbone Network Link between ENTC and Data Center is Broken	9
4.3	Task 3 : Simulating Routing Path for an ENTC Student Accessing a Server in the Mechanical Department for Collaborative Research	15
4.4	Task 4 : Simulating Routing Path after Disconnecting a Backbone Link Used in the ENTC-Mechanical Department Server Access Session	20
4.5	Task 1 & Task 2 Comparison	27
4.6	Task 3 & Task 4 Comparison	29

1 Connecting an ENTC Network to the University Backbone Network through a L3 Switch (Router)



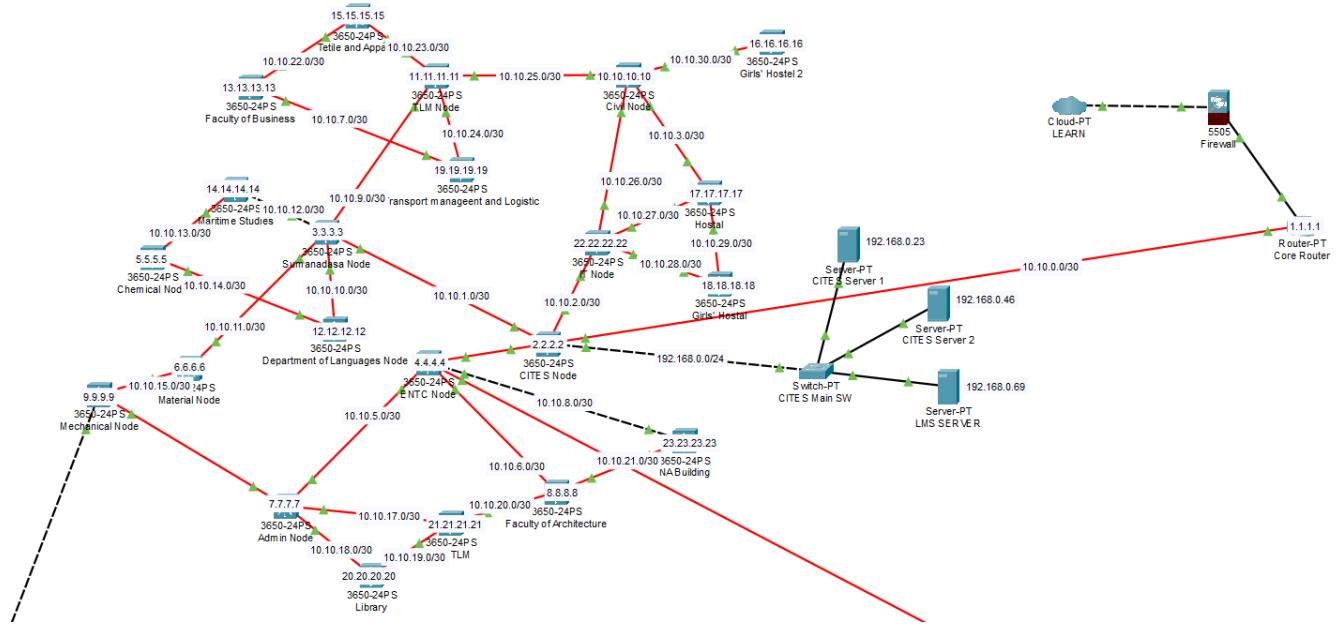
2 IP Addressing Plan

The IP addressing plan remains unchanged, as it was originally designed with careful consideration of the number of users involved in our earlier proposal.

Building	Estimated No. of Users	IP addressing
CITES	200	192.168.0.0/24
Sumanadasa	800	192.168.1.0/22
Admin	200	192.168.5.0/24
ENTC	300	192.168.6.0/23
IT	900	192.168.8.0/22
Civil	300	192.168.12.0/23
Material	250	192.168.14.0/24
Mechanical	300	192.168.15.0/23
Library	800	192.168.17.0/22
TLM	250	192.168.21.0/24
Architecture	500	192.168.22.0/23
Business	200	192.168.24.0/24
Textile	150	192.168.25.0/25
Fashion Design	150	192.168.25.128/25
NA Building	100	192.168.26.0/25
Maritime Studies	50	192.168.26.128/26
Chemical	250	192.168.26.192/26
Language	100	192.168.27.0/25
Hostel	200	192.168.27.128/25
Girl's Hostel	200	192.168.28.0/25

For facilitating OSPF configurations between the internal nodes, a subnet with a /30 IP addressing scheme was utilized, considering the limited number of connecting devices, which amounts to only two.

2.1 IP Block Advertisement in a University Backbone Network for Connected Departments/-Divisions

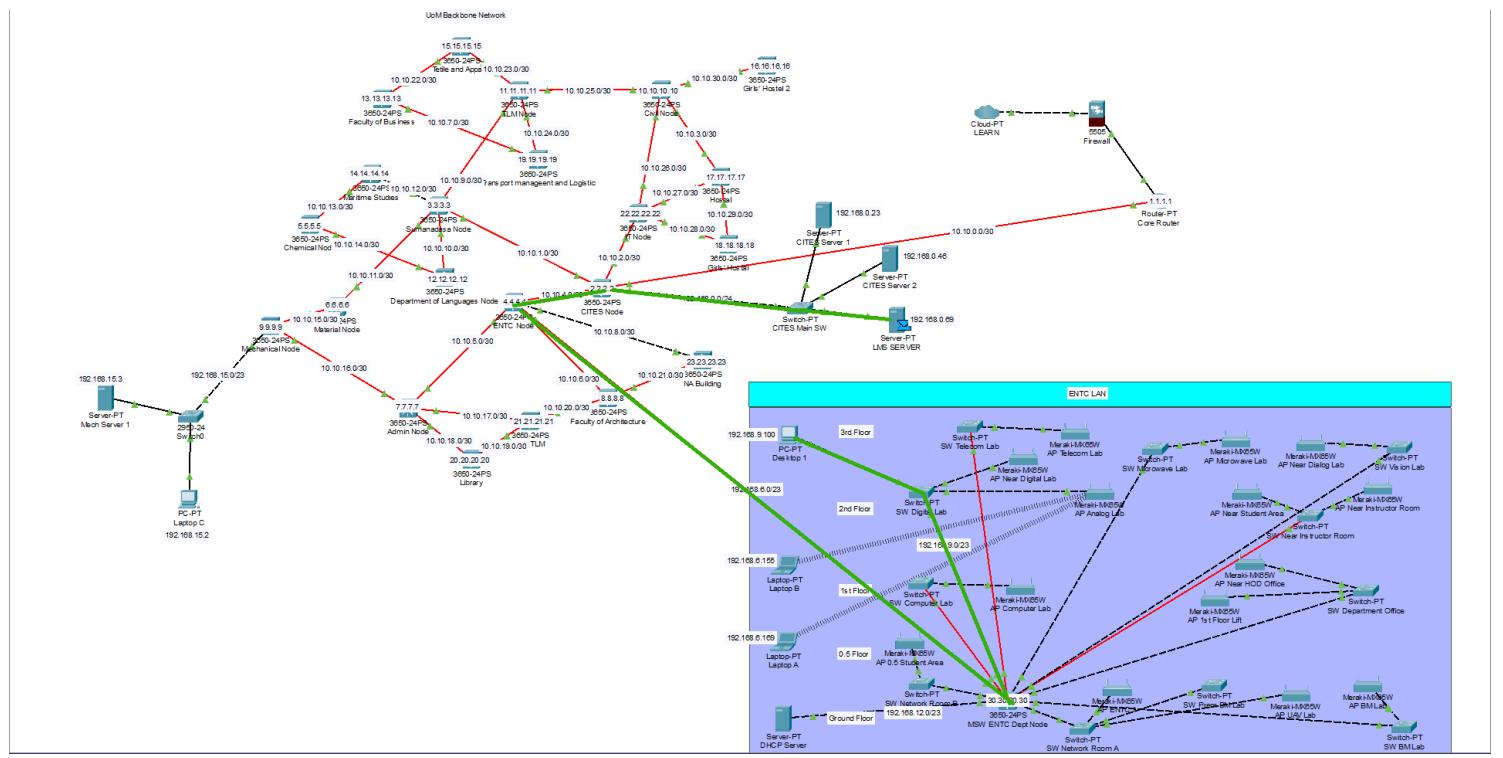


3 Developing OSPF Routing Configuration for Redundant Backbone Network

The numerical value "15" was deliberately selected to serve as the designated OSPF process identifier. This identification number is essential within the OSPF routing protocol framework, as it uniquely distinguishes and associates the particular OSPF process running on a networking device.

4 Simulation

4.1 Task 1 : Simulating Routing Path for a Student at ENTC Accessing LMS Servers in the University Data Center



Path Taken

Simulation Panel

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
0.000	—	Desktop 1	Desktop 1	ICMP
0.001	0.001	Desktop 1	SW Digital Lab	ICMP
0.002	0.002	SW Digital Lab	MSW ENTC Dept Node	ICMP
0.003	0.003	MSW ENTC Dept Node	ENTC Node	ICMP
0.004	0.004	ENTC Node	CITES Node	ICMP
0.005	0.005	CITES Node	CITES Main SW	ICMP
0.006	0.006	CITES Main SW	LMS SERVER	ICMP
0.007	0.007	LMS SERVER	CITES Main SW	ICMP
0.008	0.008	CITES Main SW	CITES Node	ICMP
0.009	0.009	CITES Node	ENTC Node	ICMP
0.010	0.010	ENTC Node	MSW ENTC Dept Node	ICMP
0.011	0.011	MSW ENTC Dept Node	SW Digital Lab	ICMP
0.012	0.012	SW Digital Lab	Desktop 1	ICMP

Reset Simulation Constant Delay Captured to: 0.012 s

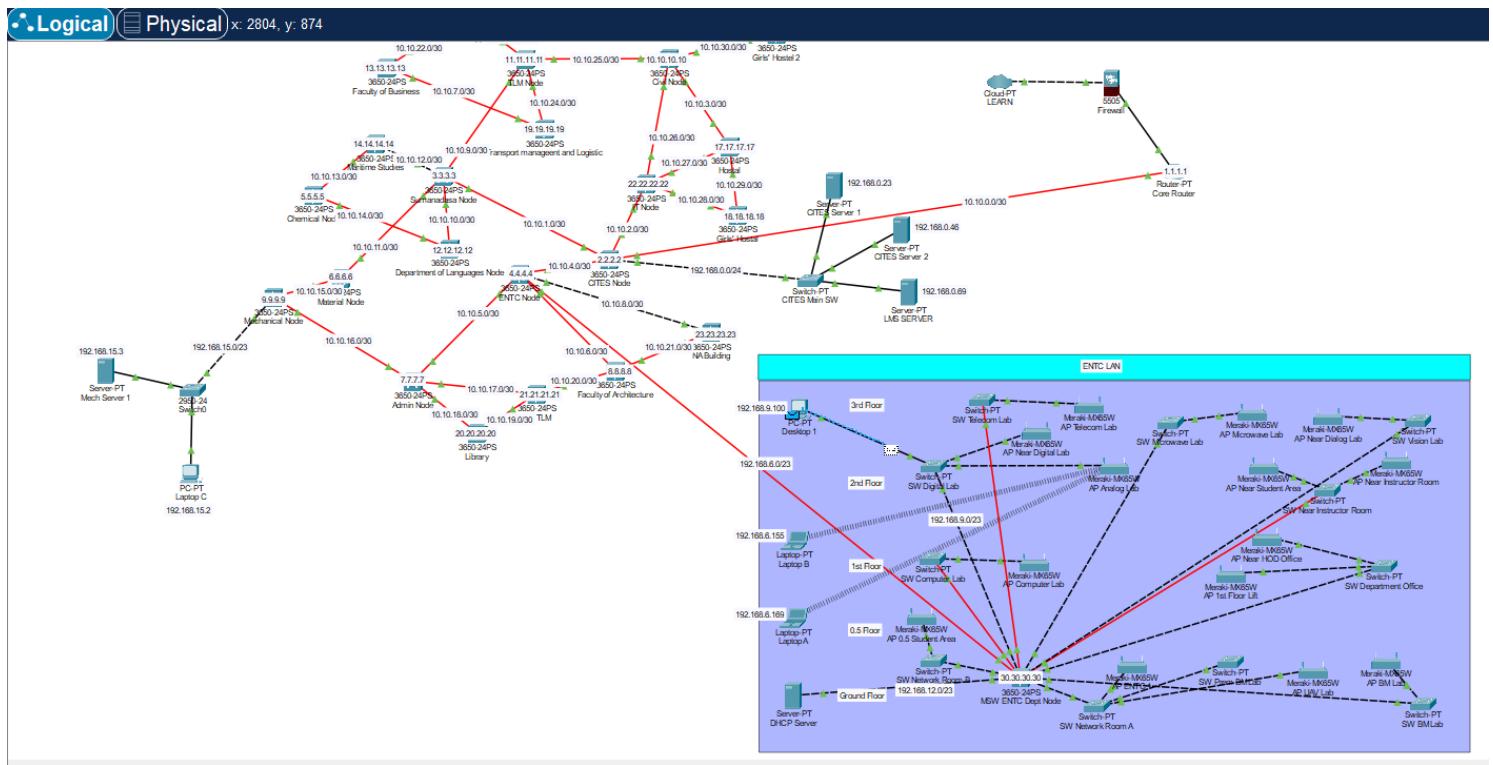
Play Controls:

Event List Filters - Visible Events: ICMP

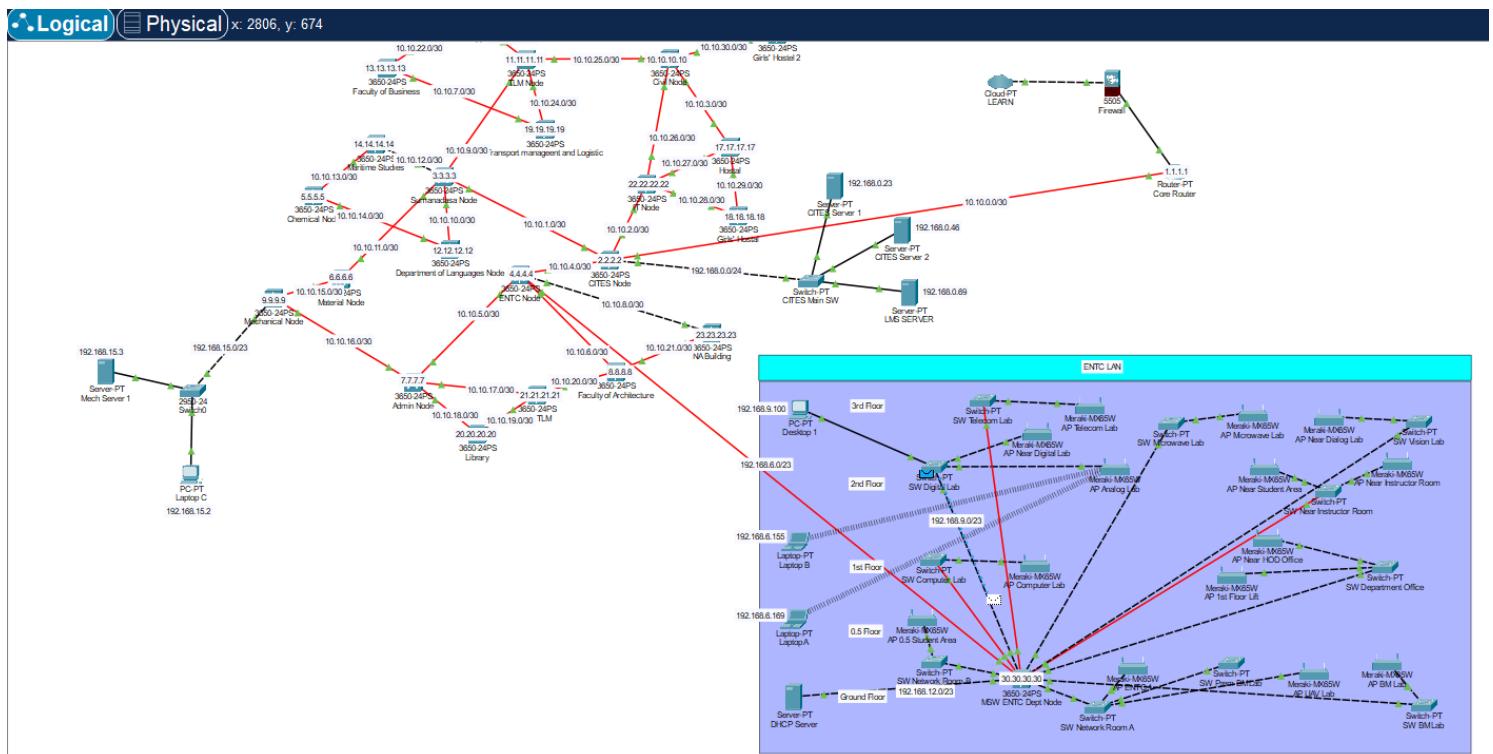
Event List:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Desktop 1	LMS SERVER	ICMP	Blue	0.000	N	0	(edit)	(delete)

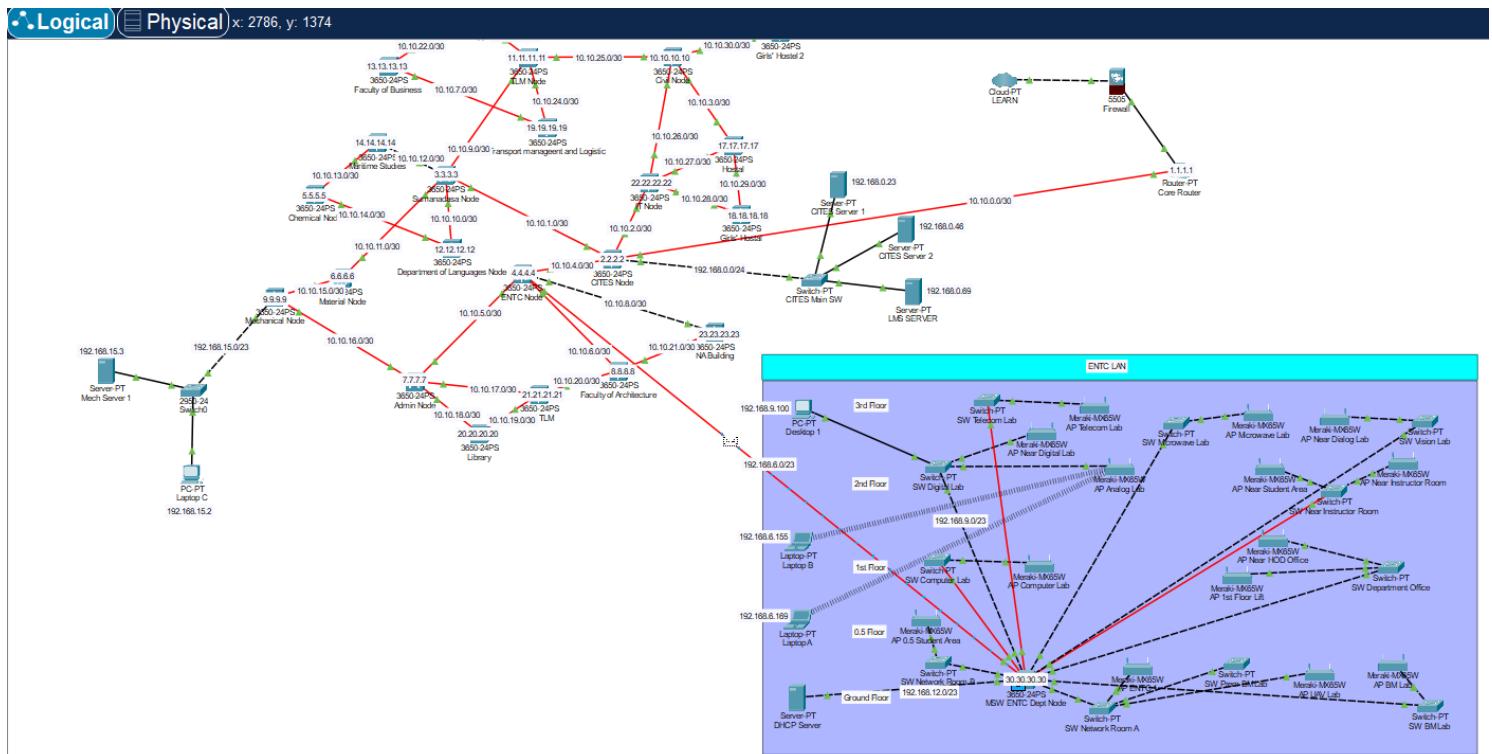
Event List



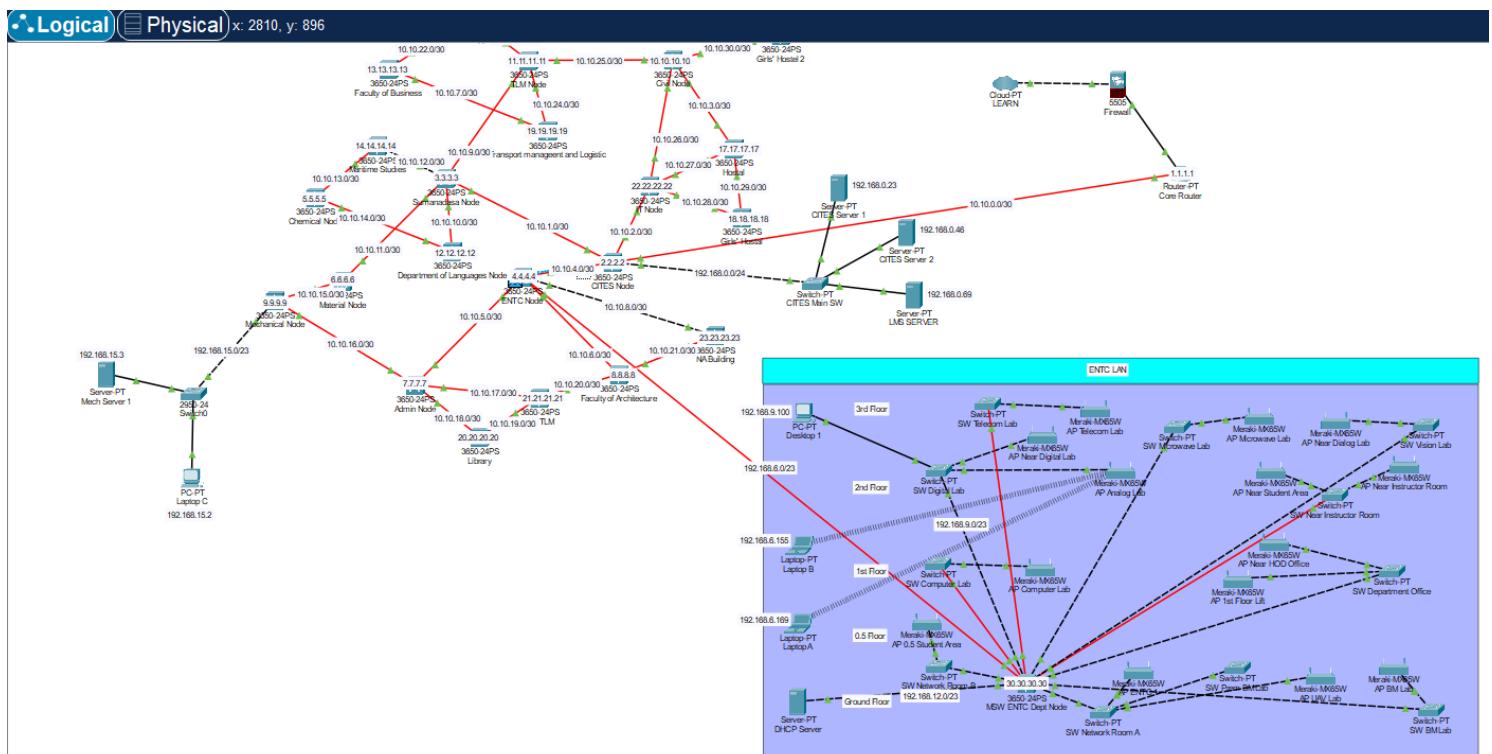
Step 1



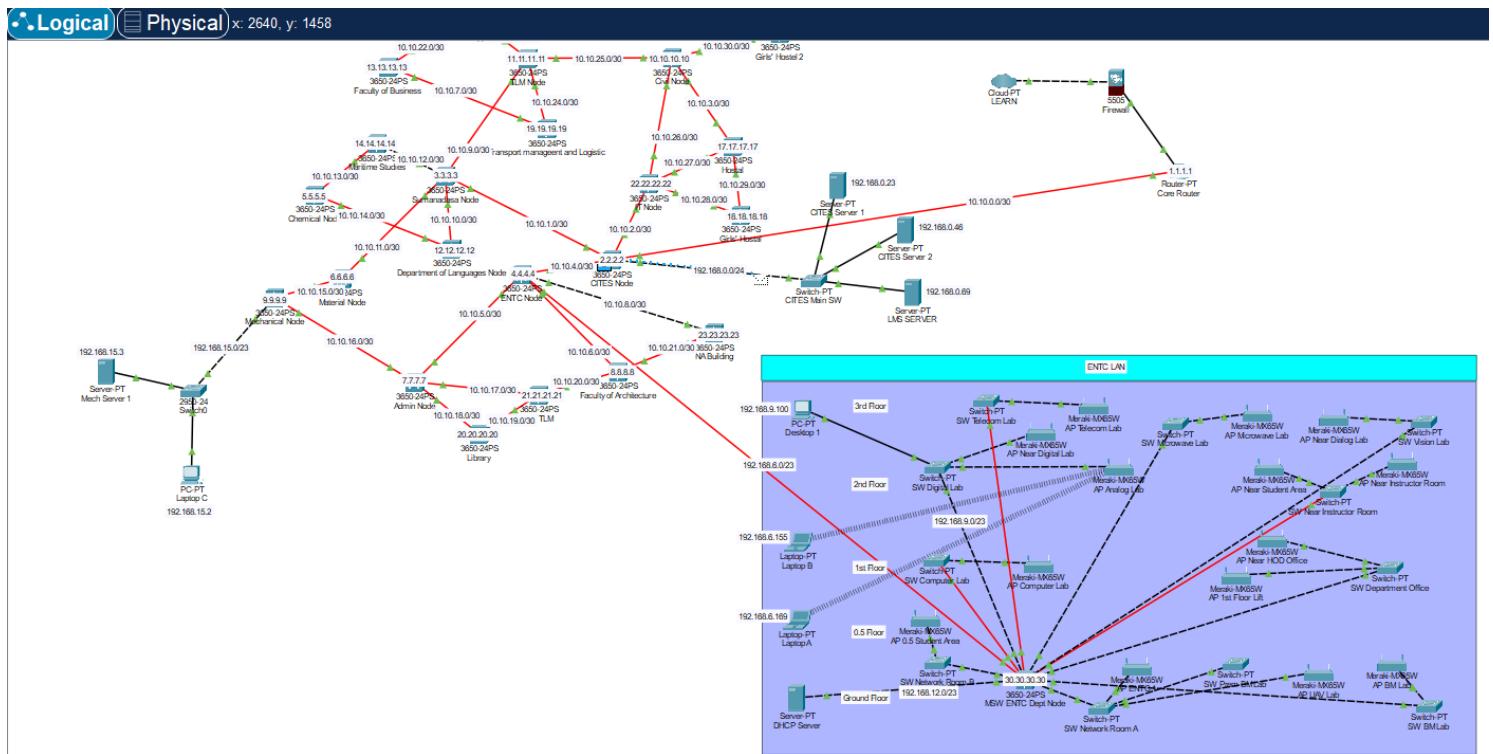
Step 2



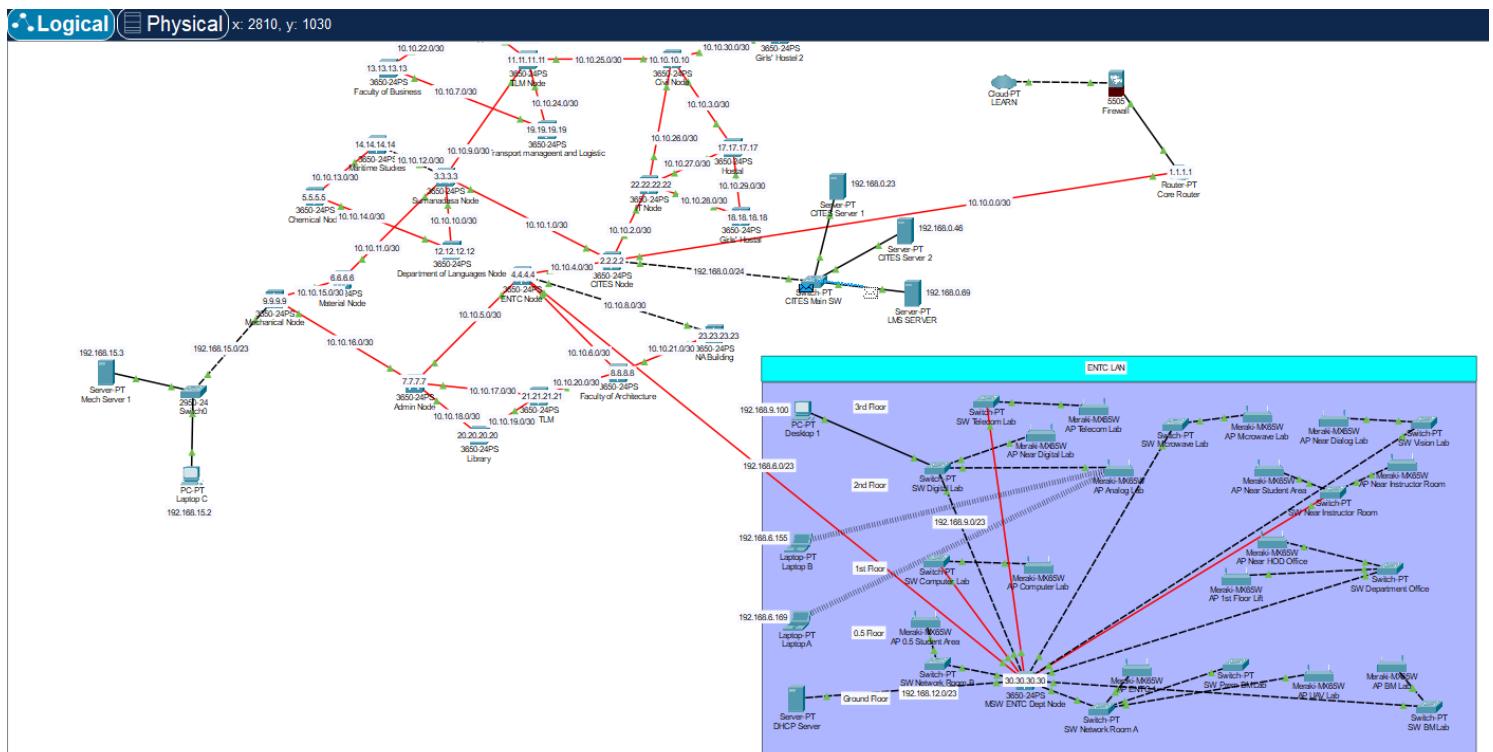
Step 3



Step 4

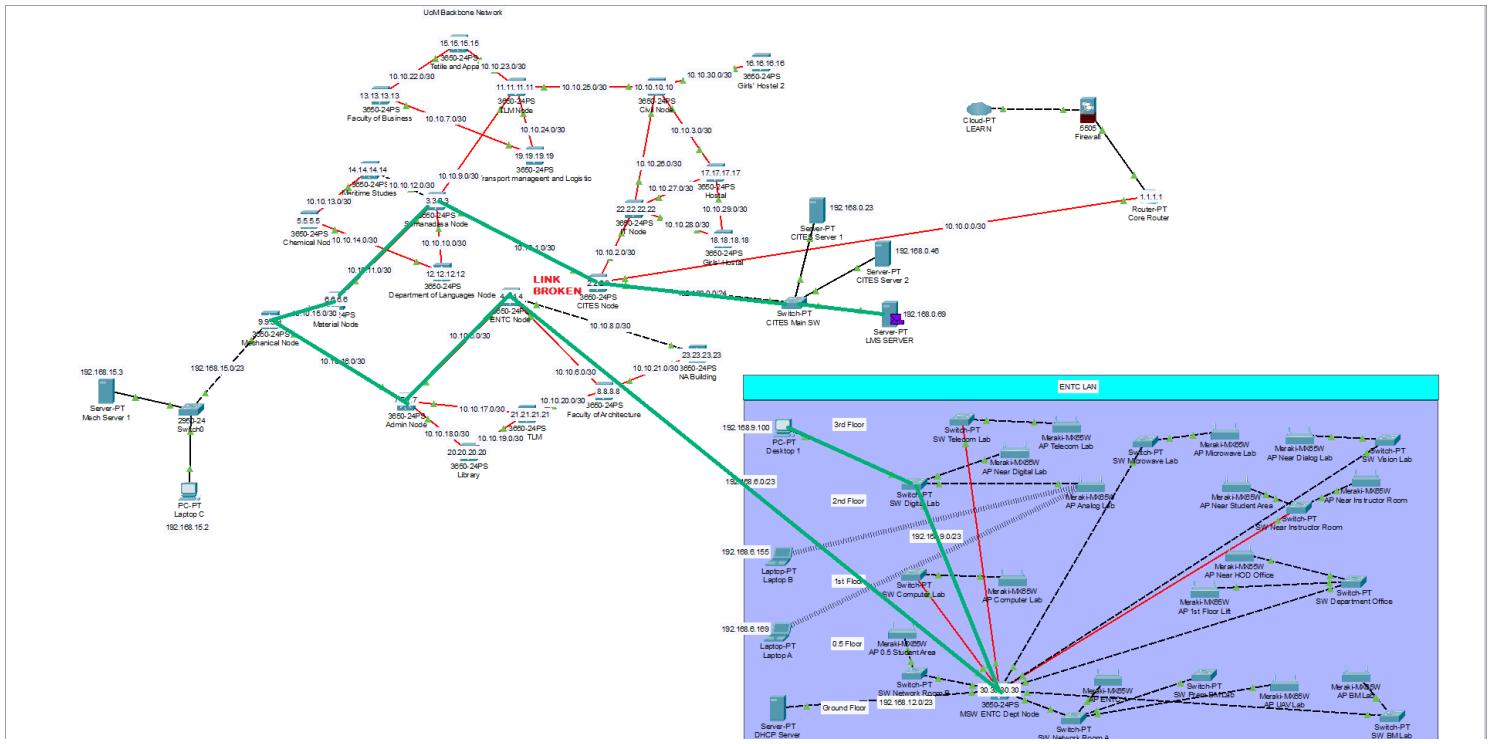


Step 5



Step 6

4.2 Task 2 : Simulating Routing Path when the Backbone Network Link between ENTC and Data Center is Broken



Path Taken

Simulation Panel

Event List				
Vis.	Time(sec)	Last Device	At Device	Type
0.000	--		Desktop 1	ICMP
0.001		Desktop 1	SW Digital Lab	ICMP
0.002		SW Digital Lab	MSW ENTC Dept Node	ICMP
0.003		MSW ENTC Dept Node	ENTC Node	ICMP
0.004		ENTC Node	Admin Node	ICMP
0.005		Admin Node	Mechanical Node	ICMP
0.006		Mechanical Node	Material Node	ICMP
0.007		Material Node	Sumanadasa Node	ICMP
0.008		Sumanadasa Node	CITES Node	ICMP
0.009		CITES Node	CITES Main SW	ICMP
0.010		CITES Main SW	LMS SERVER	ICMP
0.011		LMS SERVER	CITES Main SW	ICMP
0.012		CITES Main SW	CITES Node	ICMP
0.013		CITES Node	Sumanadasa Node	ICMP
0.014		Sumanadasa Node	Material Node	ICMP
0.015		Material Node	Mechanical Node	ICMP
0.016		Mechanical Node	Admin Node	ICMP
0.017		Admin Node	ENTC Node	ICMP
0.018		ENTC Node	MSW ENTC Dept Node	ICMP
0.019		MSW ENTC Dept Node	SW Digital Lab	ICMP
0.020		SW Digital Lab	Desktop 1	ICMP

Reset Simulation Constant Delay Captured to: 0.020 s

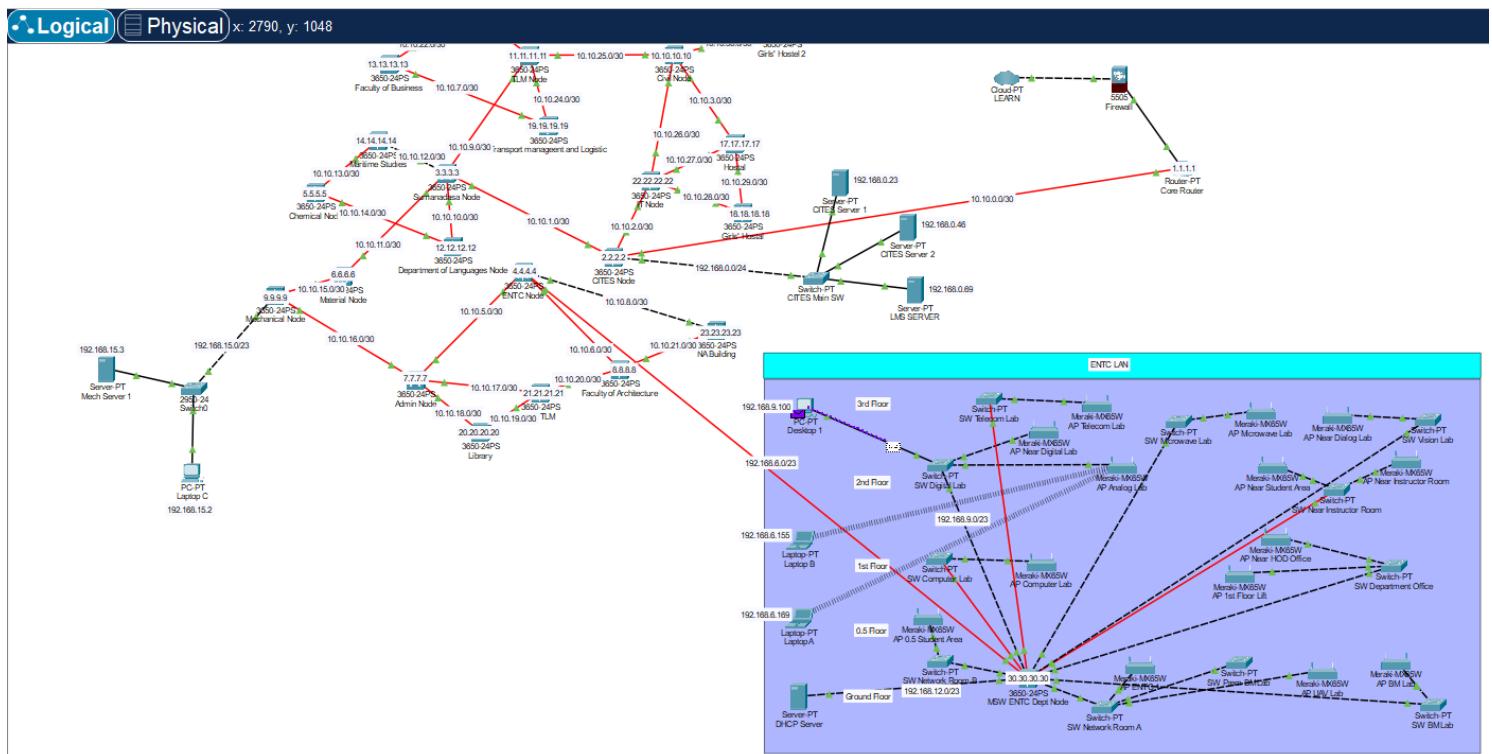
Play Controls:

Event List Filters - Visible Events: ICMP

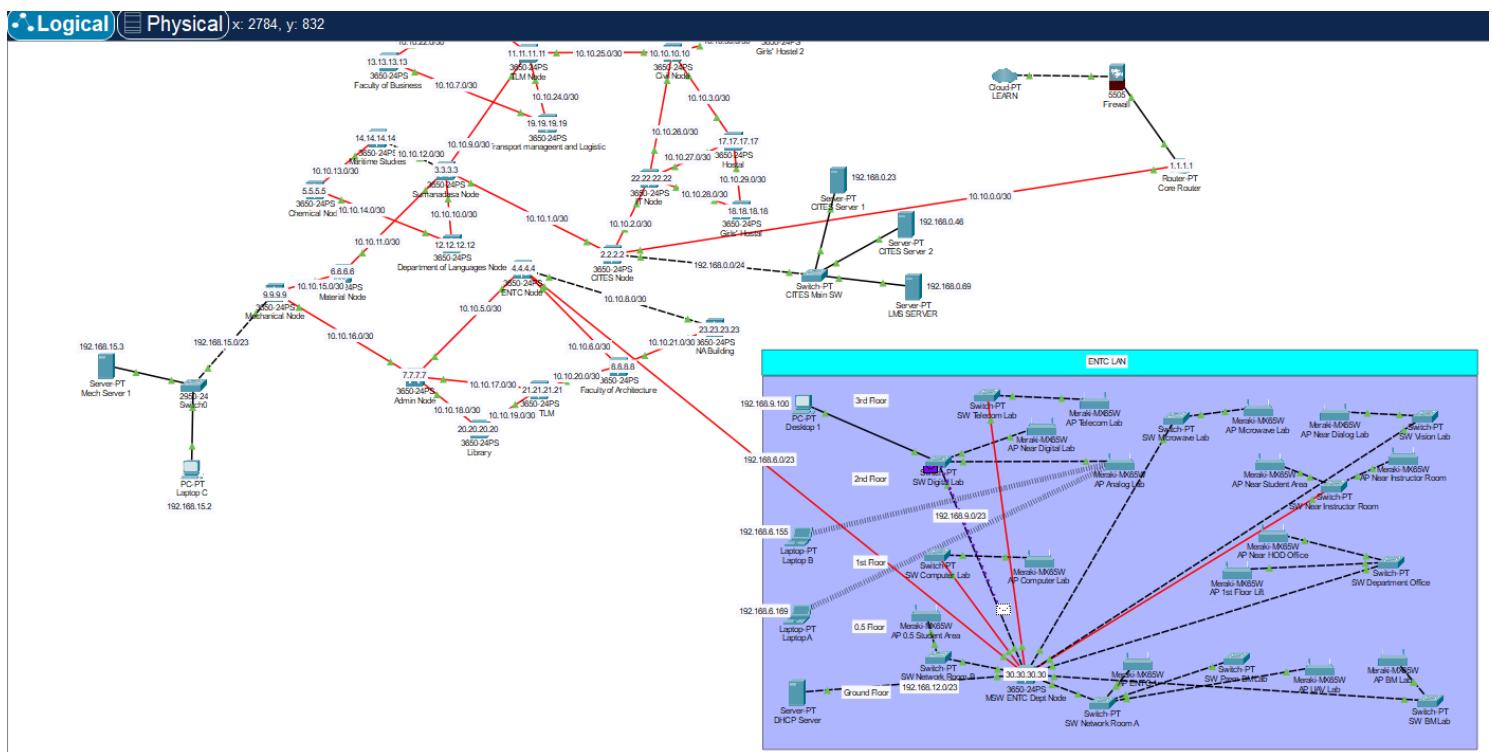
Event List:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Desktop 1	LMS SERVER	ICMP	dark blue	0.000	N	0	(edit)	(delete)

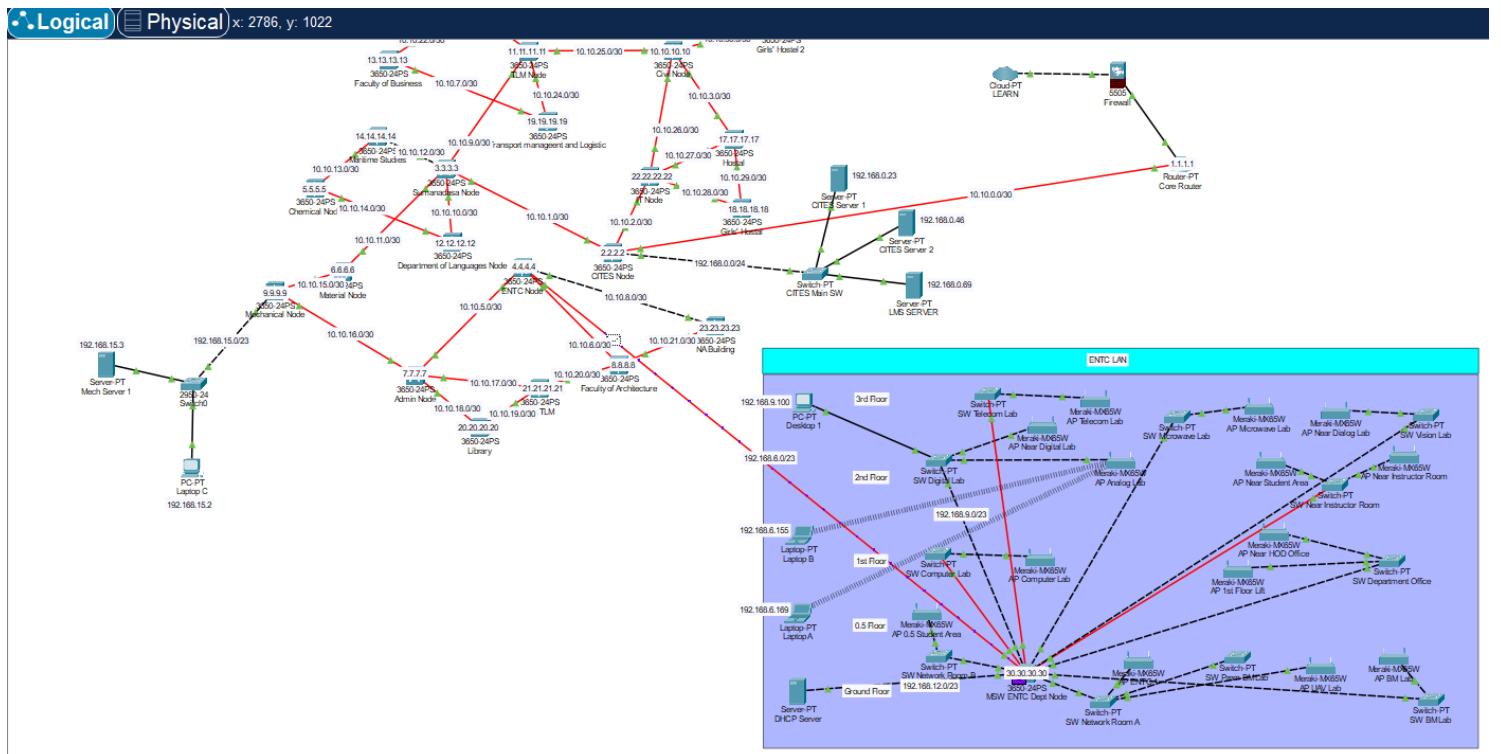
Event List



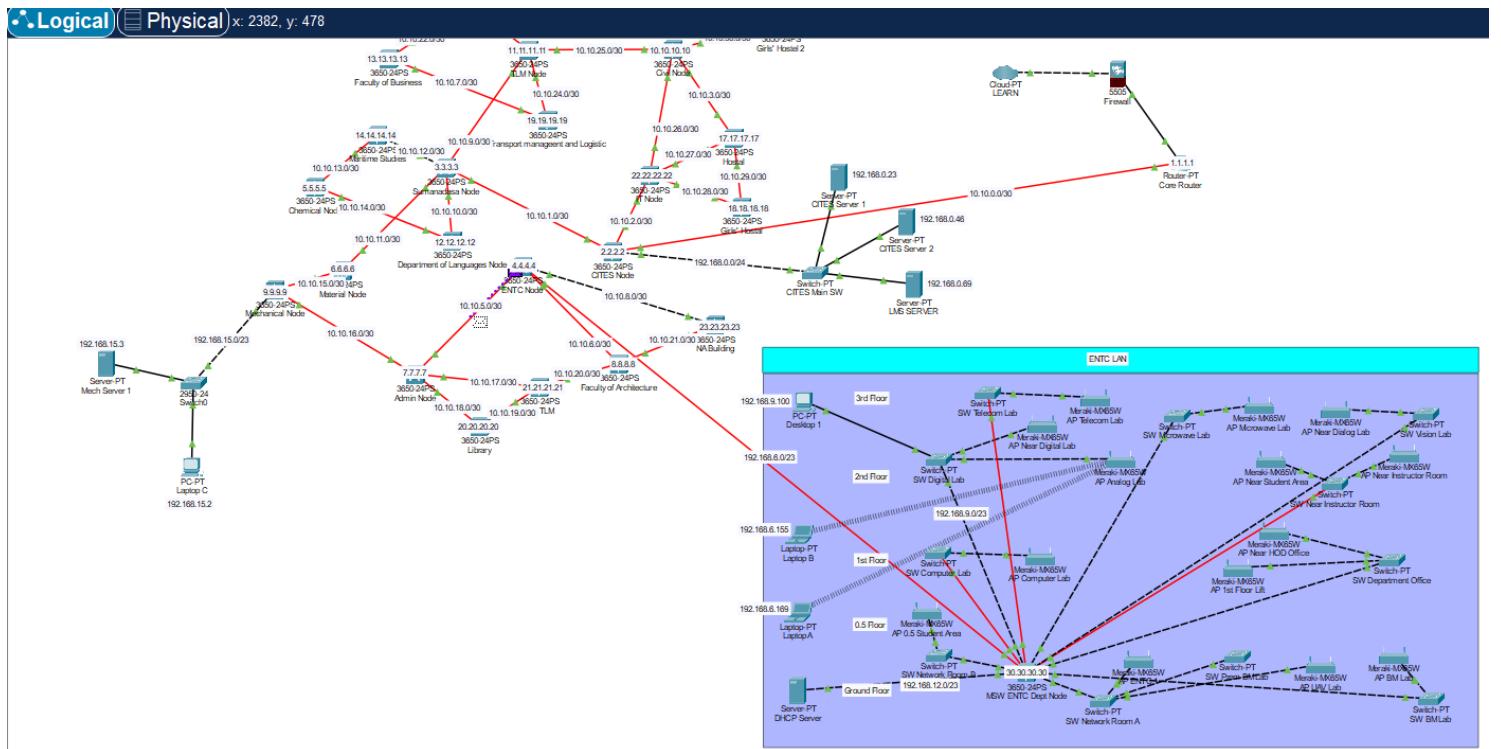
Step 1



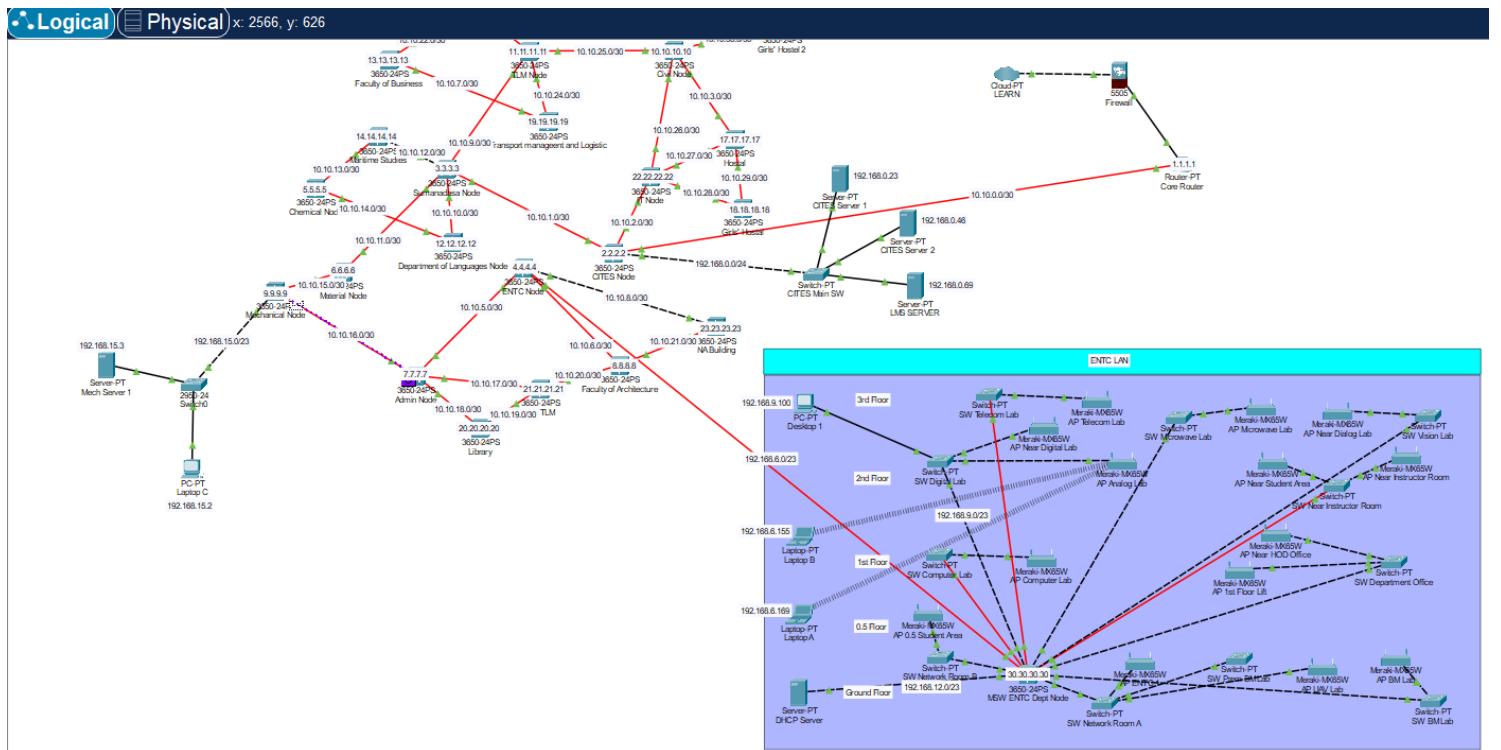
Step 2



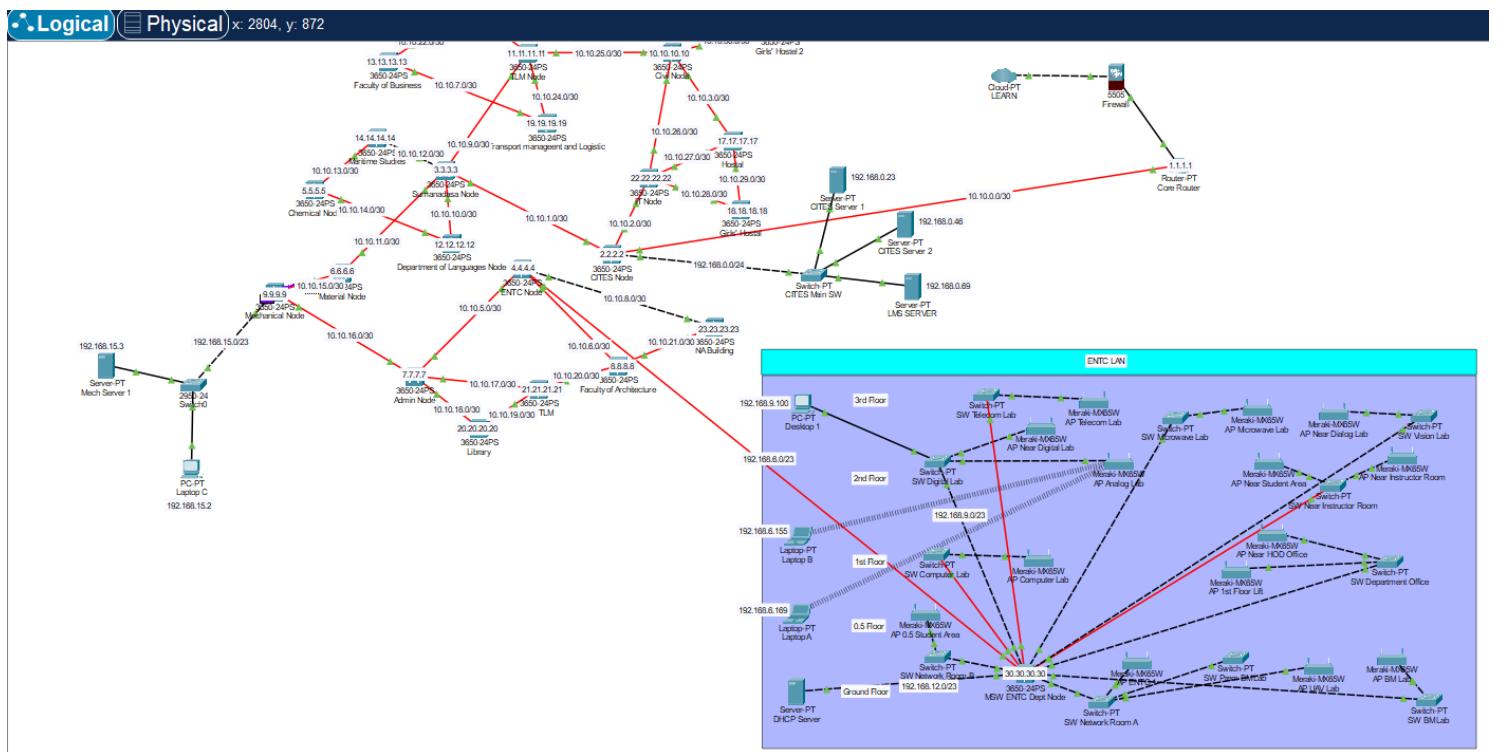
Step 3



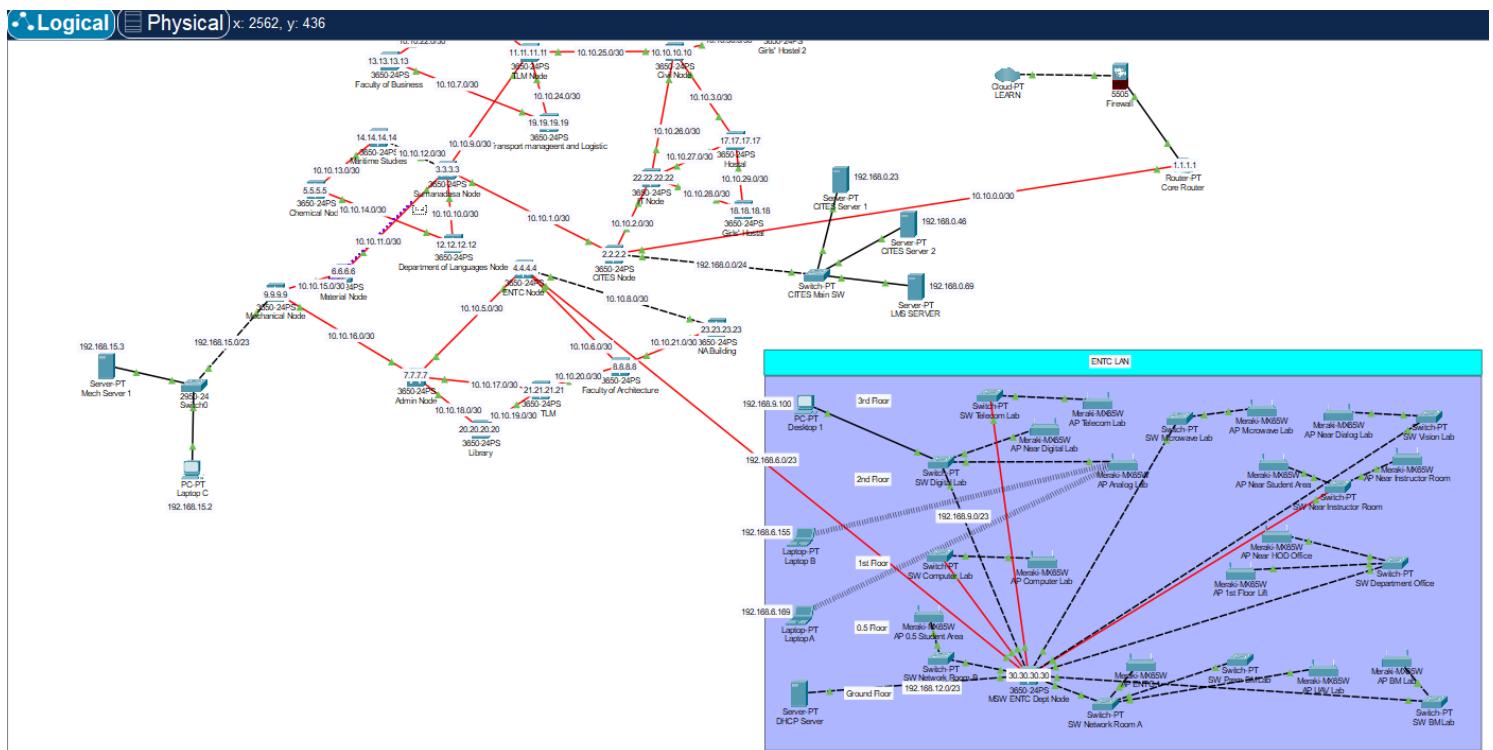
Step 4



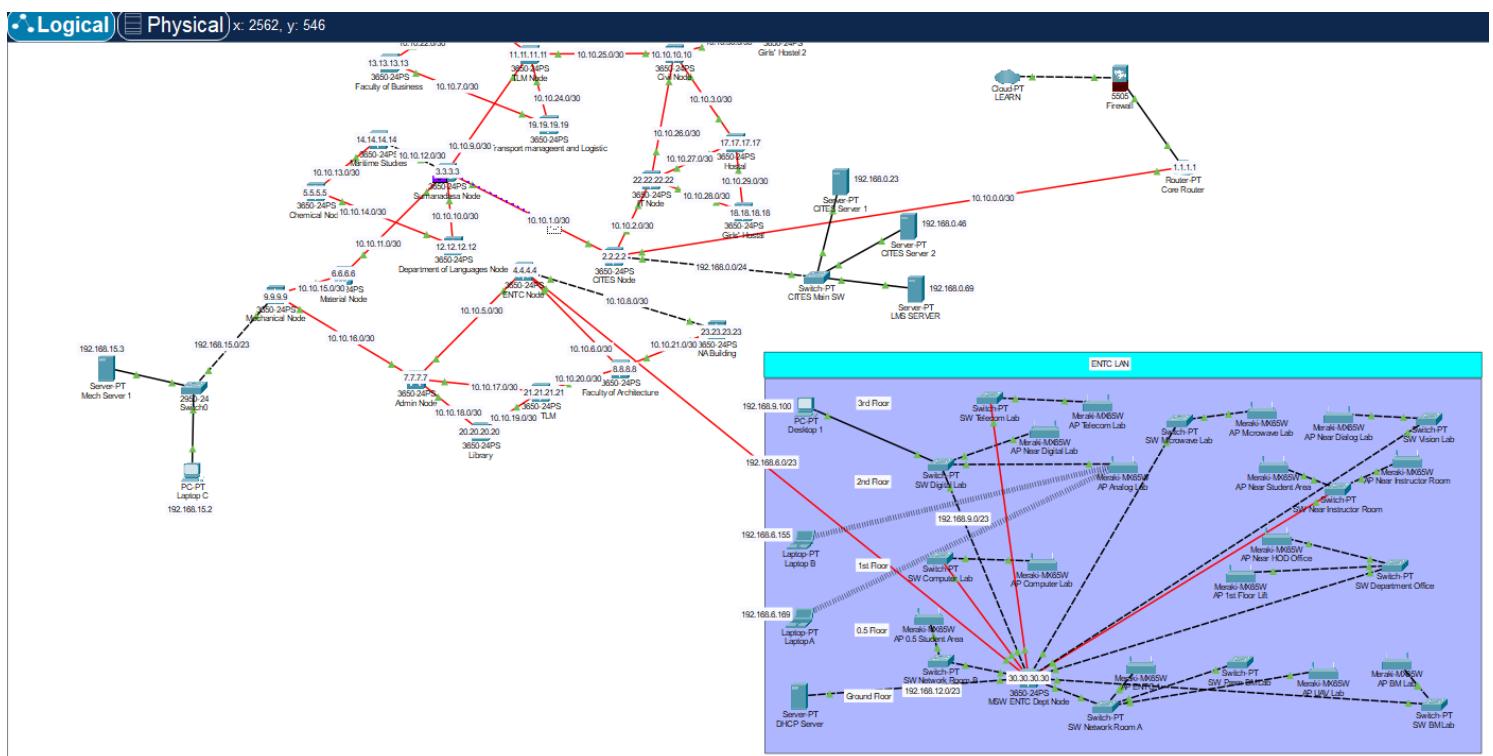
Step 5



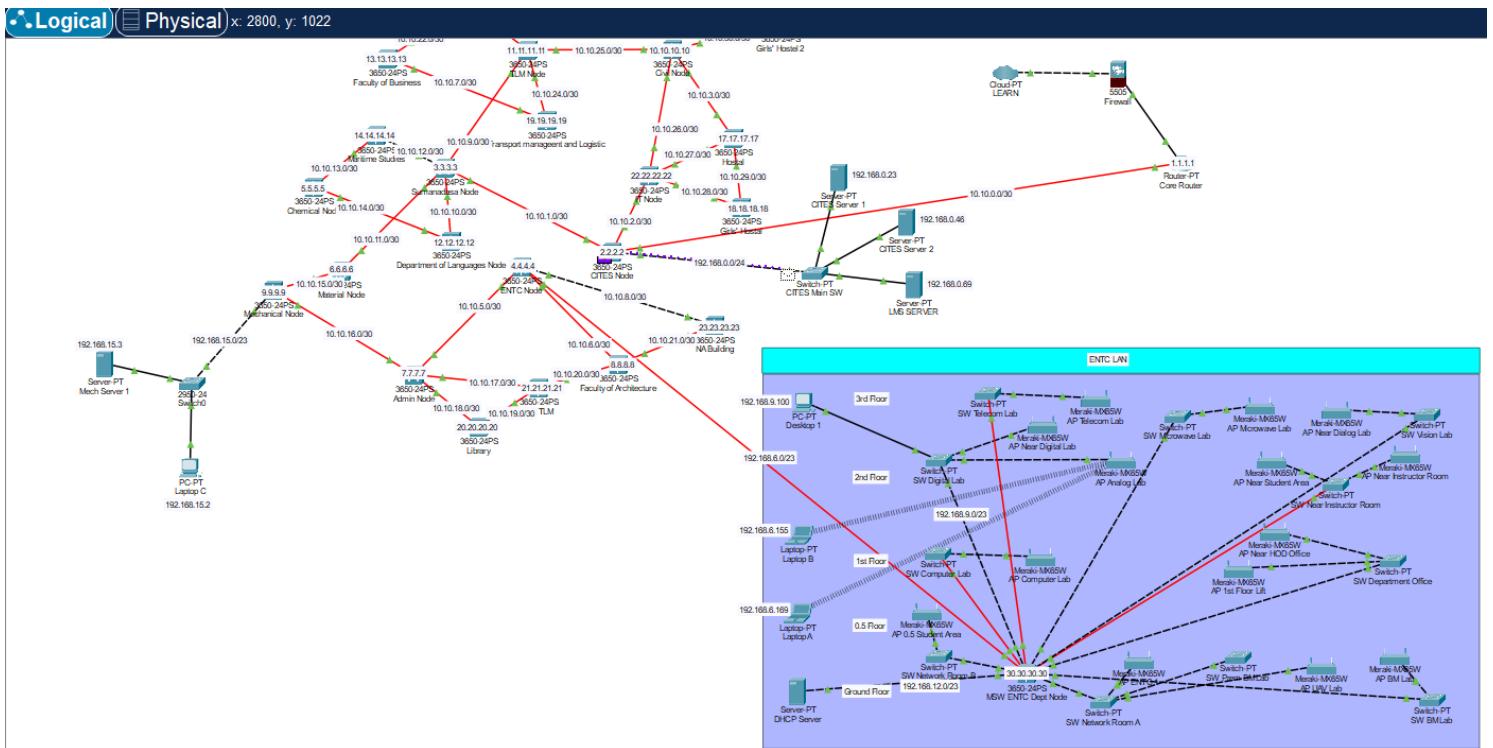
Step 6



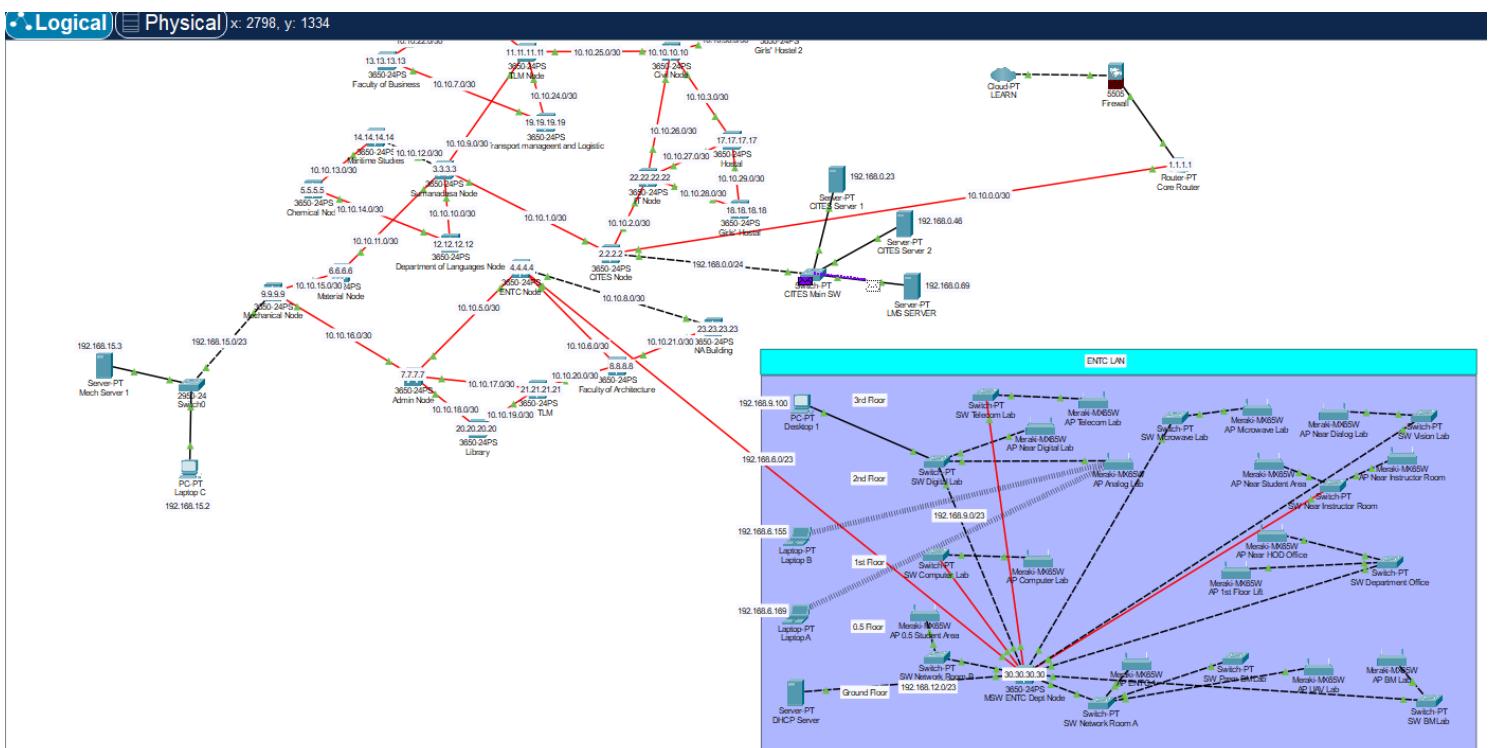
Step 7



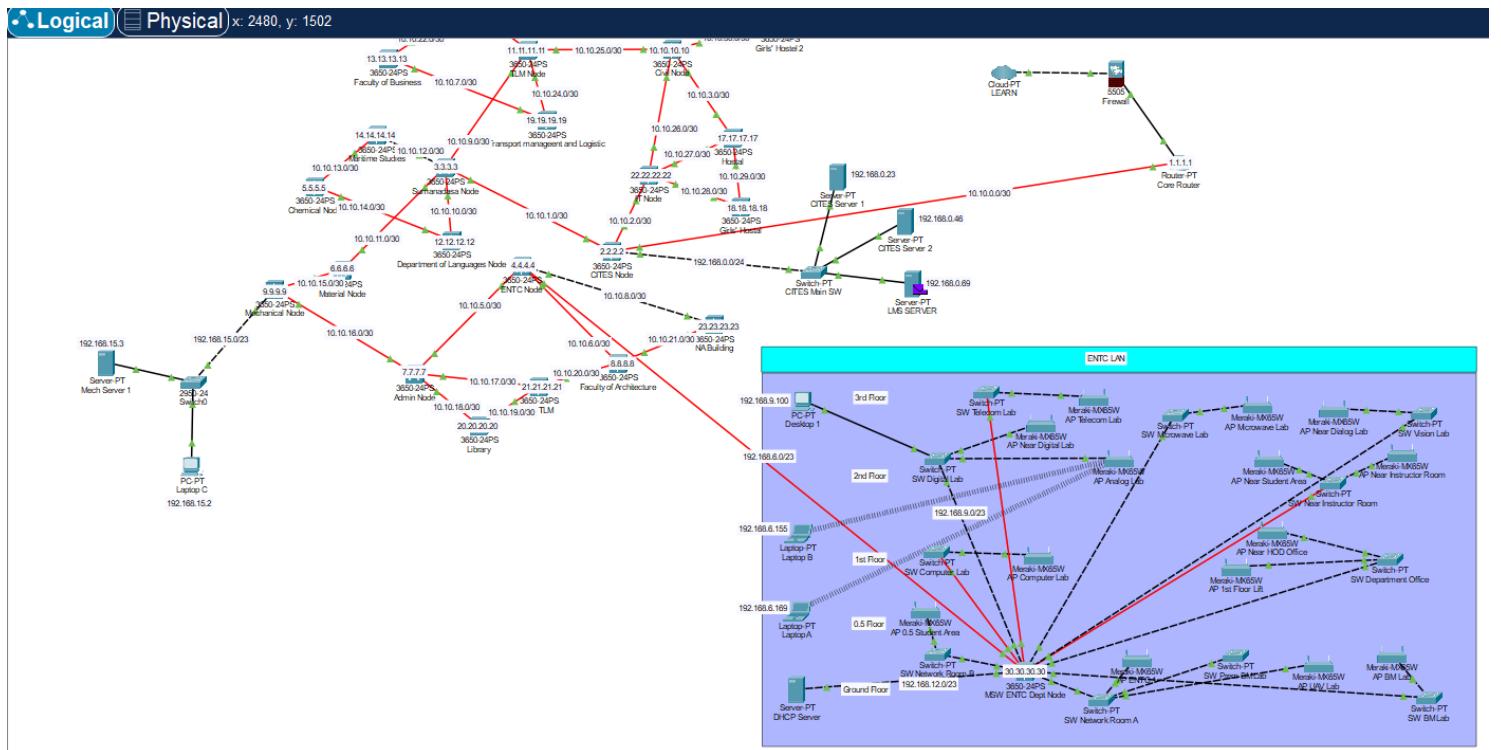
Step 8



Step 9

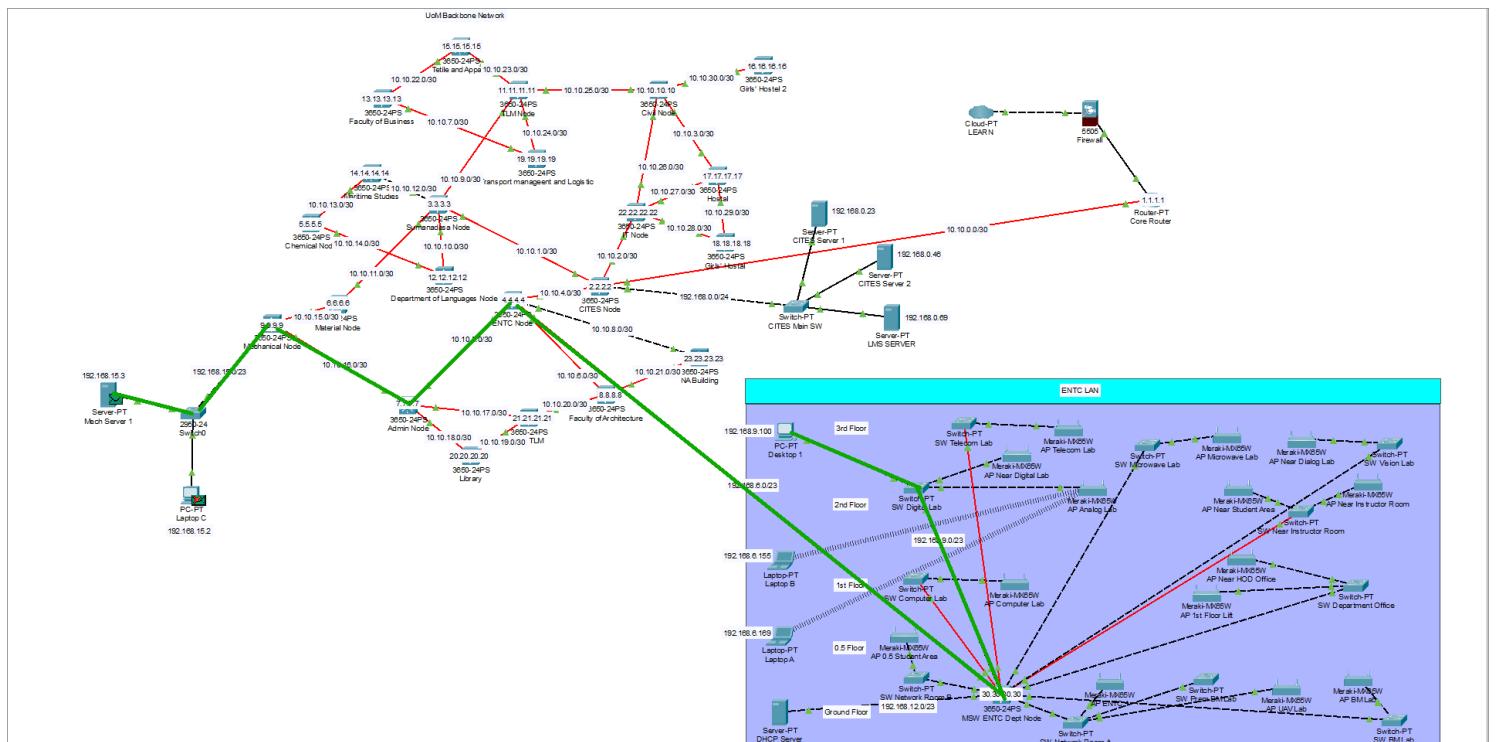


Step 10



Step 11

4.3 Task 3 : Simulating Routing Path for an ENTC Student Accessing a Server in the Mechanical Department for Collaborative Research



Path Taken

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
0.000	--		Desktop 1	ICMP
0.001		Desktop 1	SW Digital Lab	ICMP
0.002		SW Digital Lab	MSW ENTC Dept Node	ICMP
0.003		MSW ENTC Dept Node	ENTC Node	ICMP
0.004		ENTC Node	Admin Node	ICMP
0.005		Admin Node	Mechanical Node	ICMP
0.006		Mechanical Node	Switch0	ICMP
0.007		Switch0	Mech Server 1	ICMP
0.008		Mech Server 1	Switch0	ICMP
0.009		Switch0	Mechanical Node	ICMP
0.010		Mechanical Node	Admin Node	ICMP
0.011		Admin Node	ENTC Node	ICMP
0.012		ENTC Node	MSW ENTC Dept Node	ICMP
0.013		MSW ENTC Dept Node	SW Digital Lab	ICMP
0.014		SW Digital Lab	Desktop 1	ICMP

Reset Simulation Constant Delay Captured to: 0.014 s

Play Controls

[]

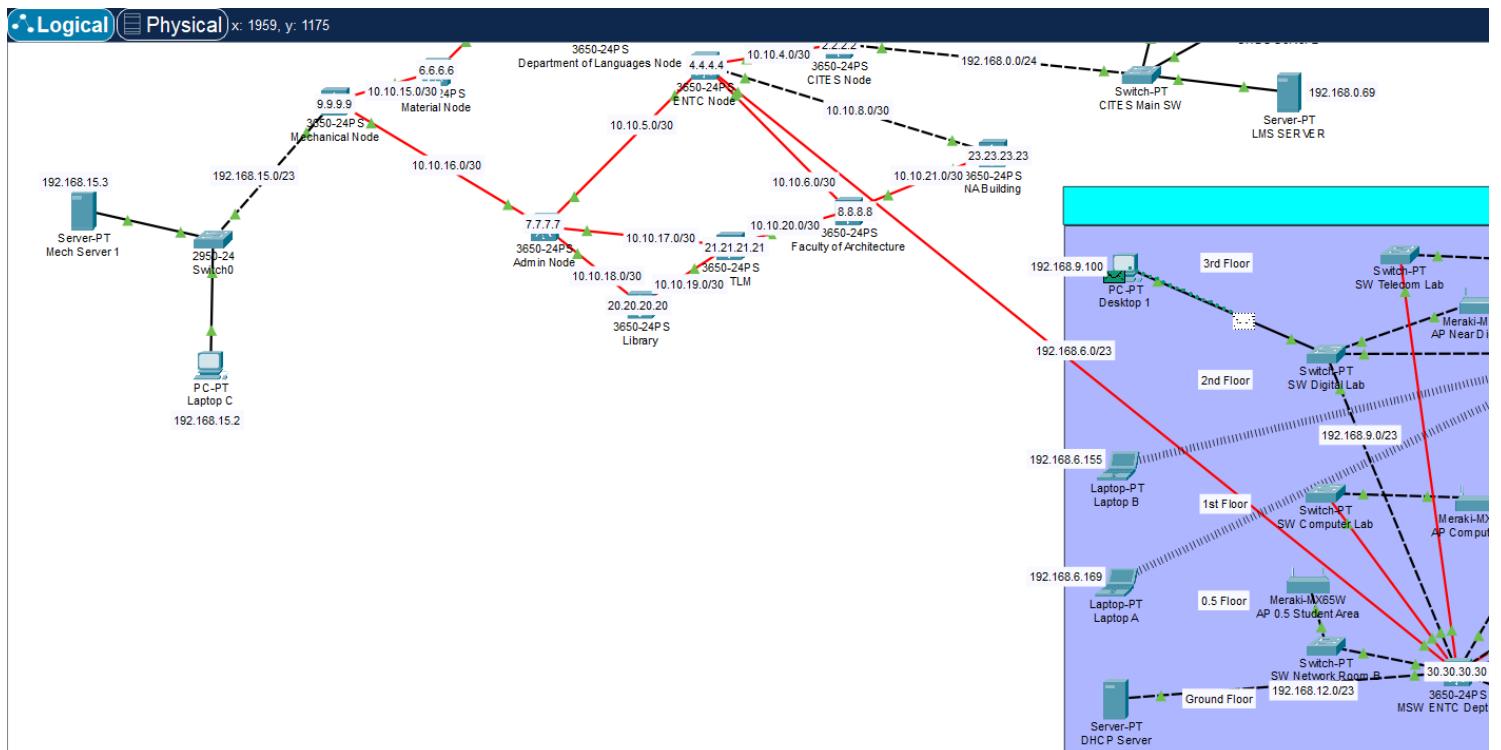
Event List Filters - Visible Events

ICMP

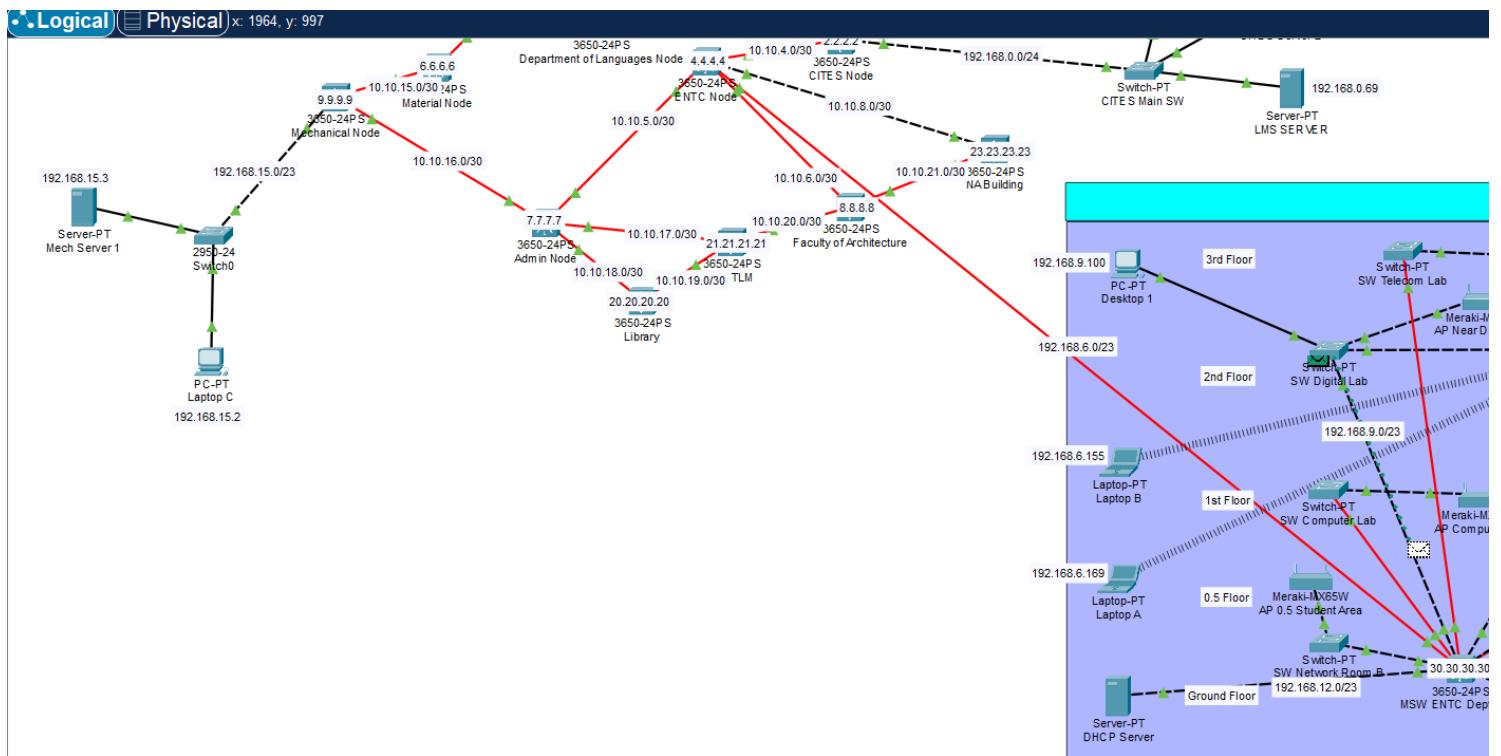
[Edit Filters](#) [Show All/None](#)

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit (edit)	Delete (delete)
	Successful	Desktop 1	Mech Server 1	ICMP		0.000	N	0	Edit (edit)	Delete (delete)

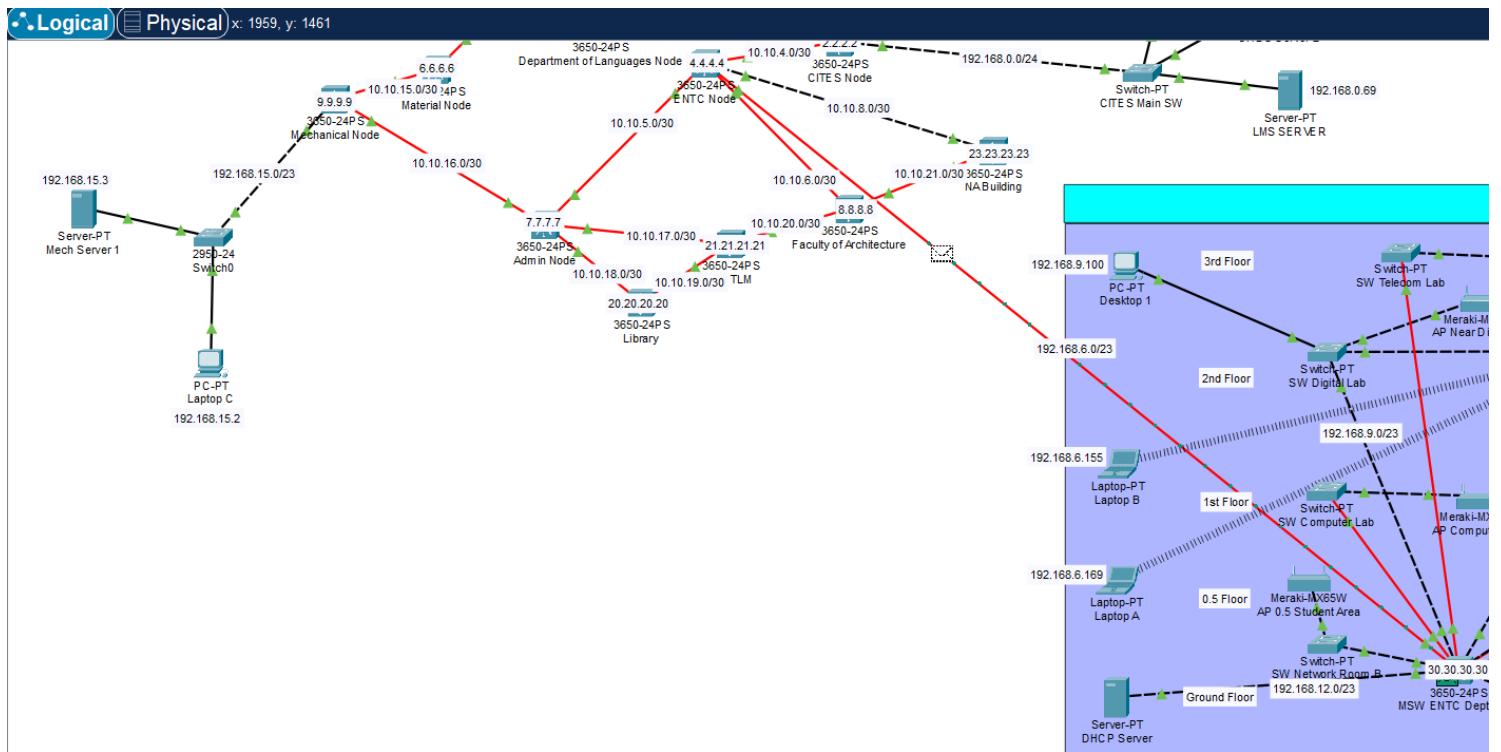
Event List



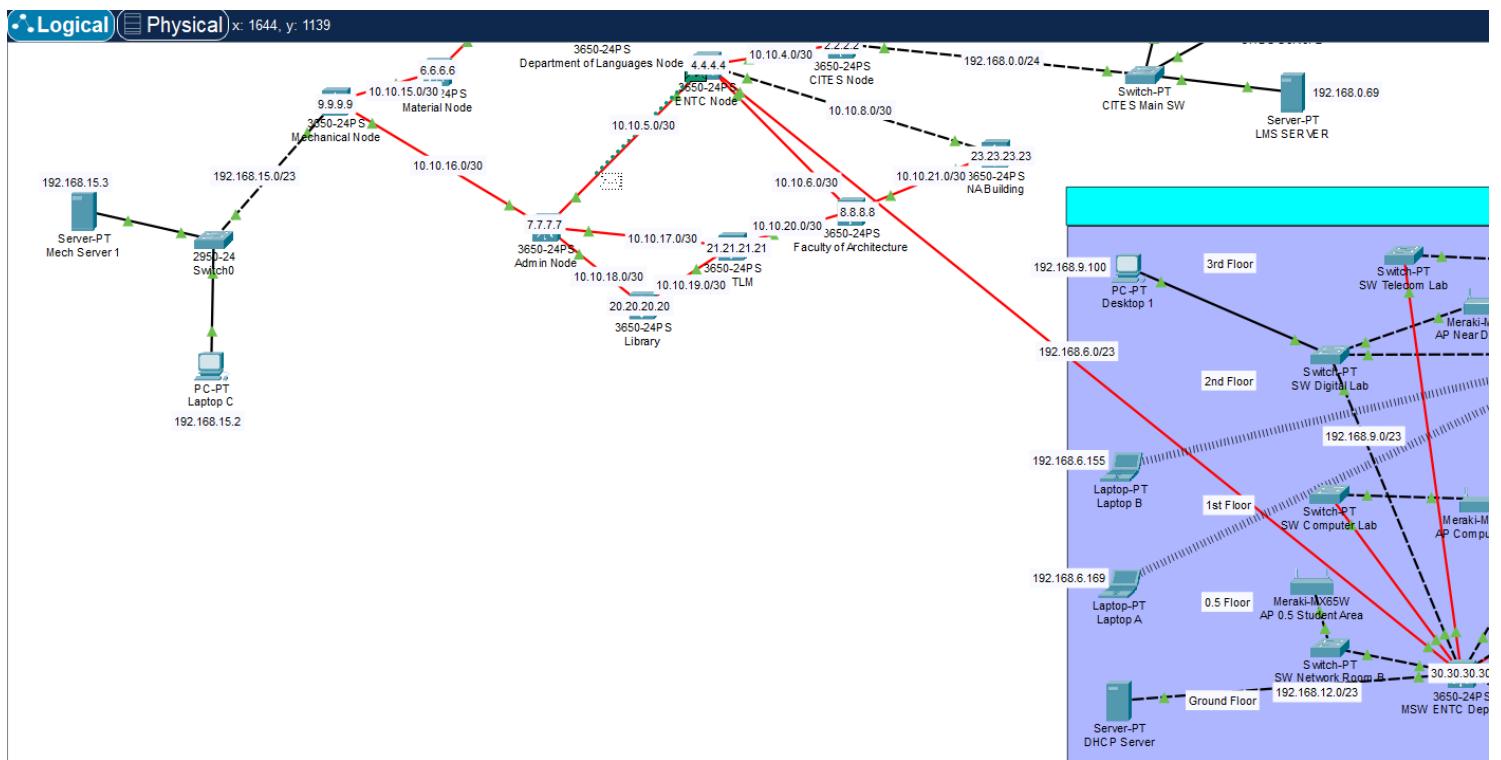
Step 1



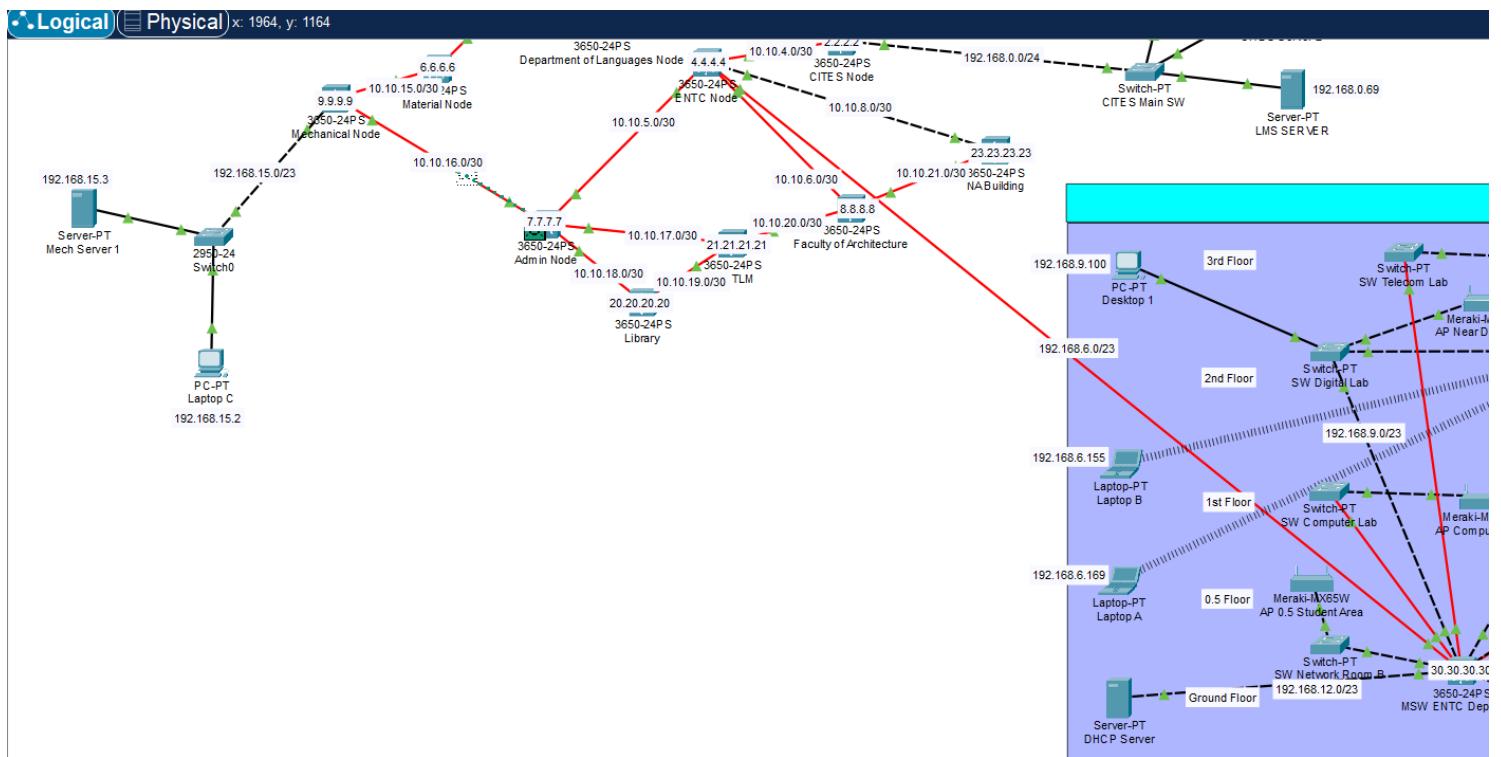
Step 2



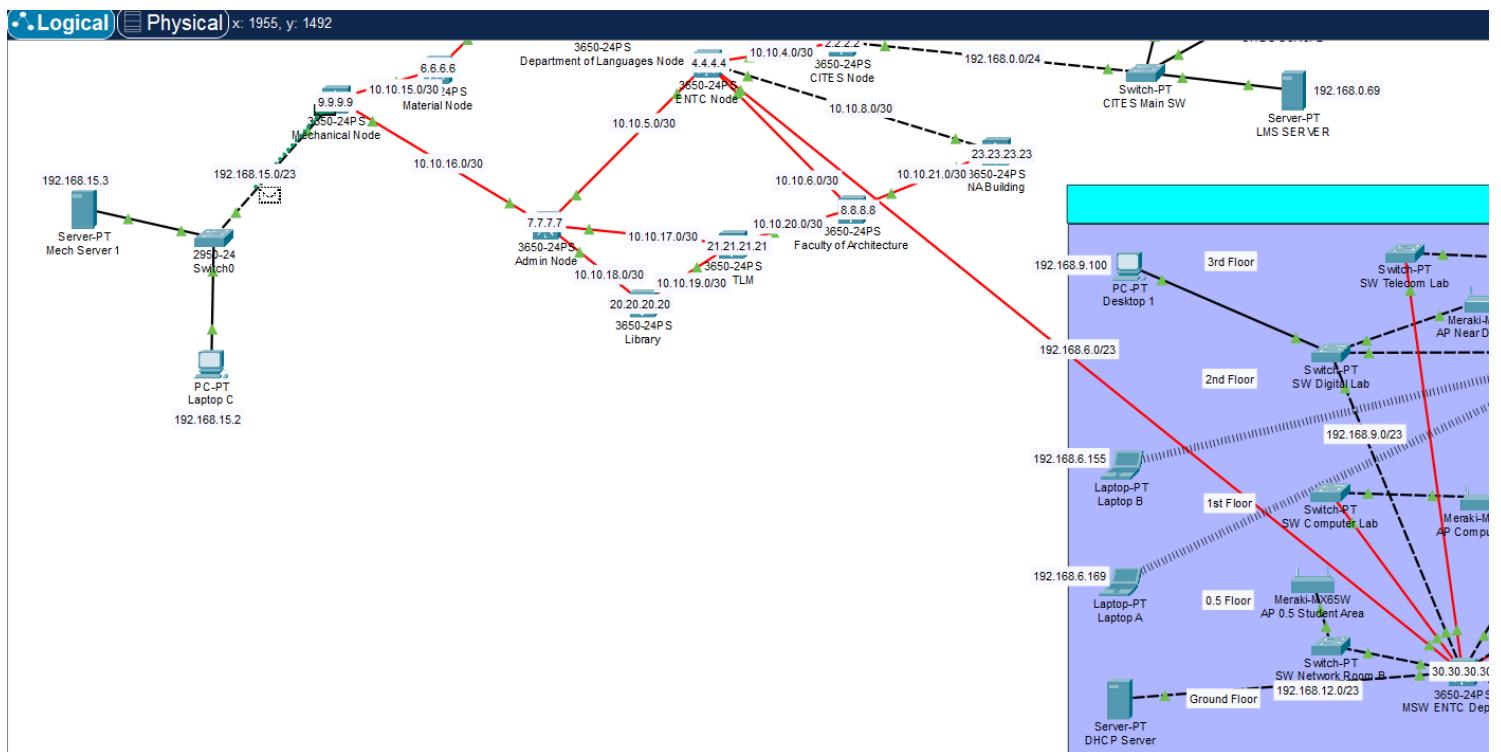
Step 3



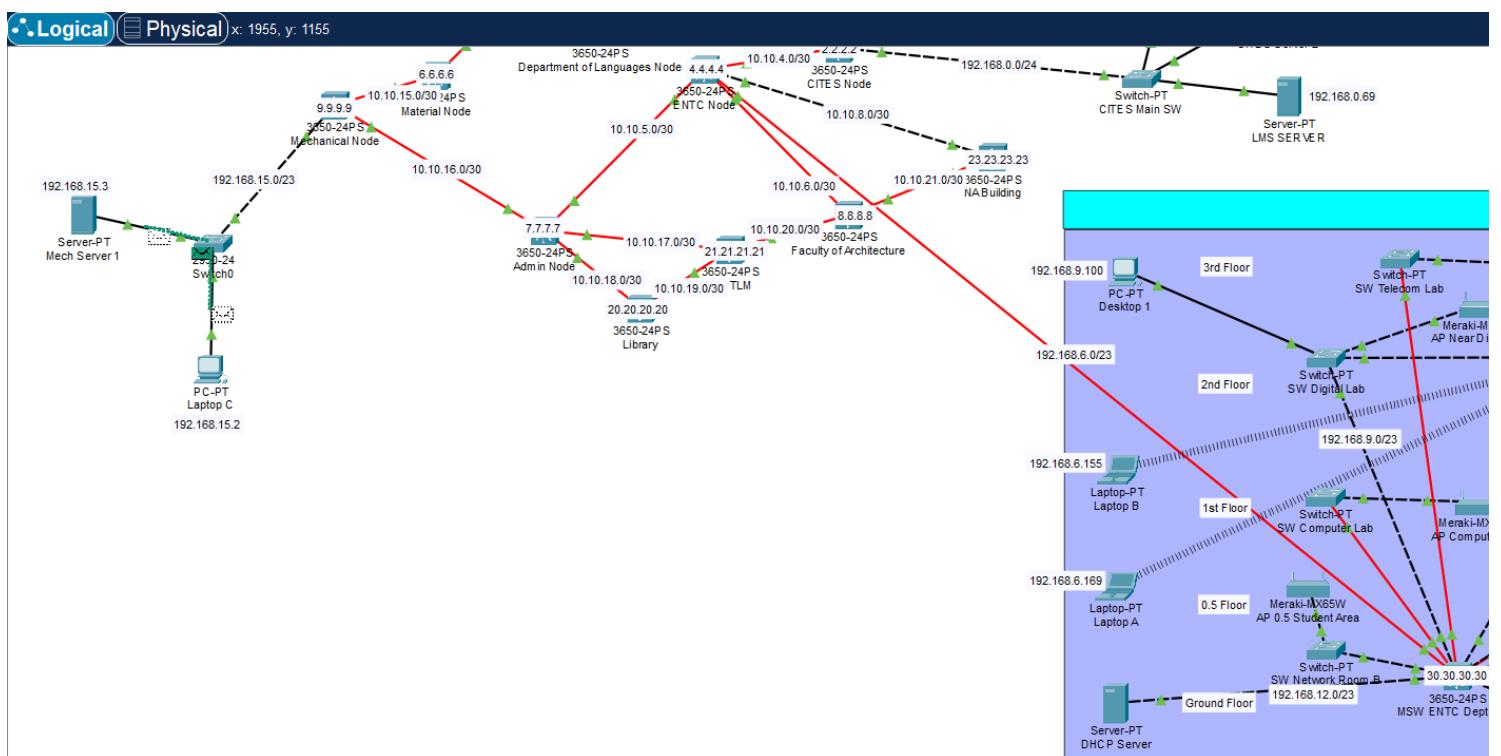
Step 4



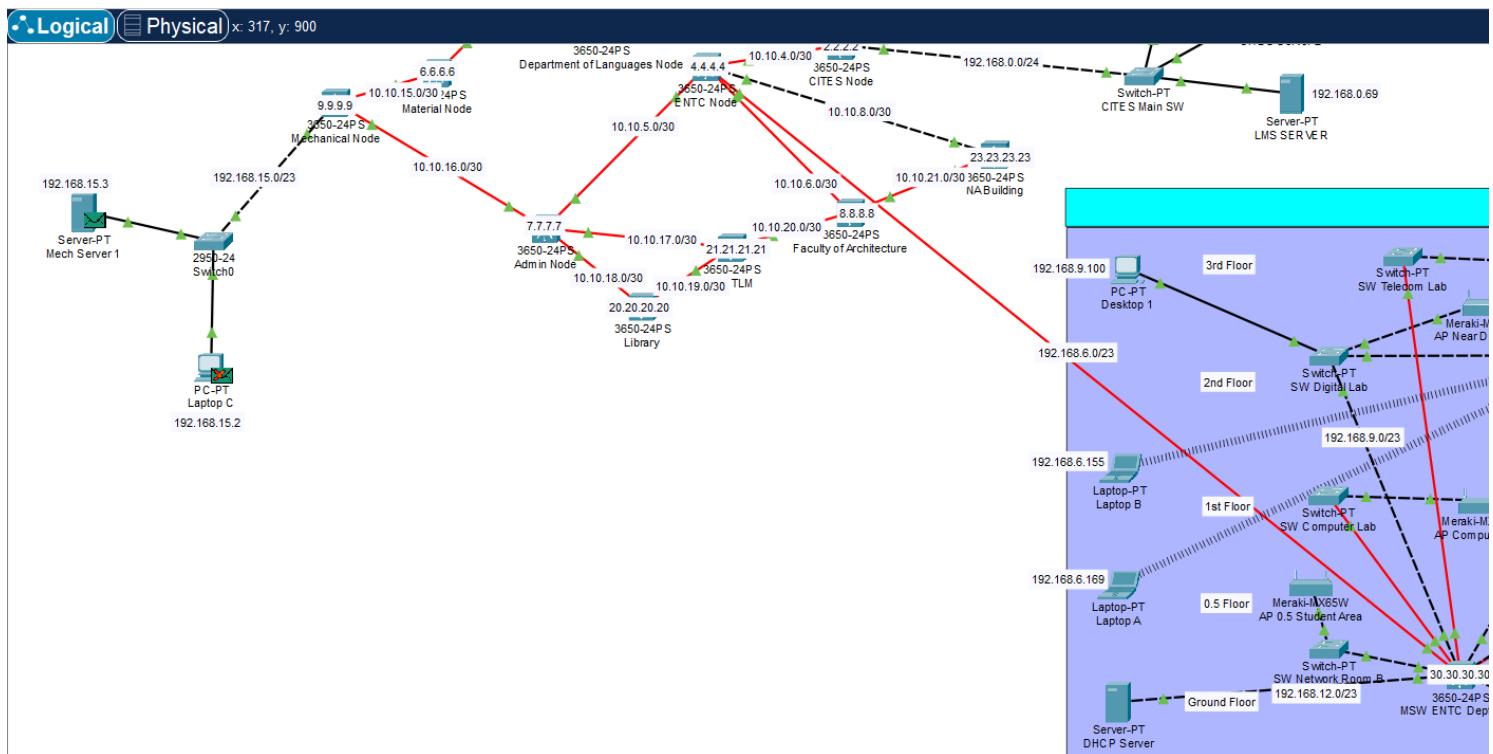
Step 5



Step 6

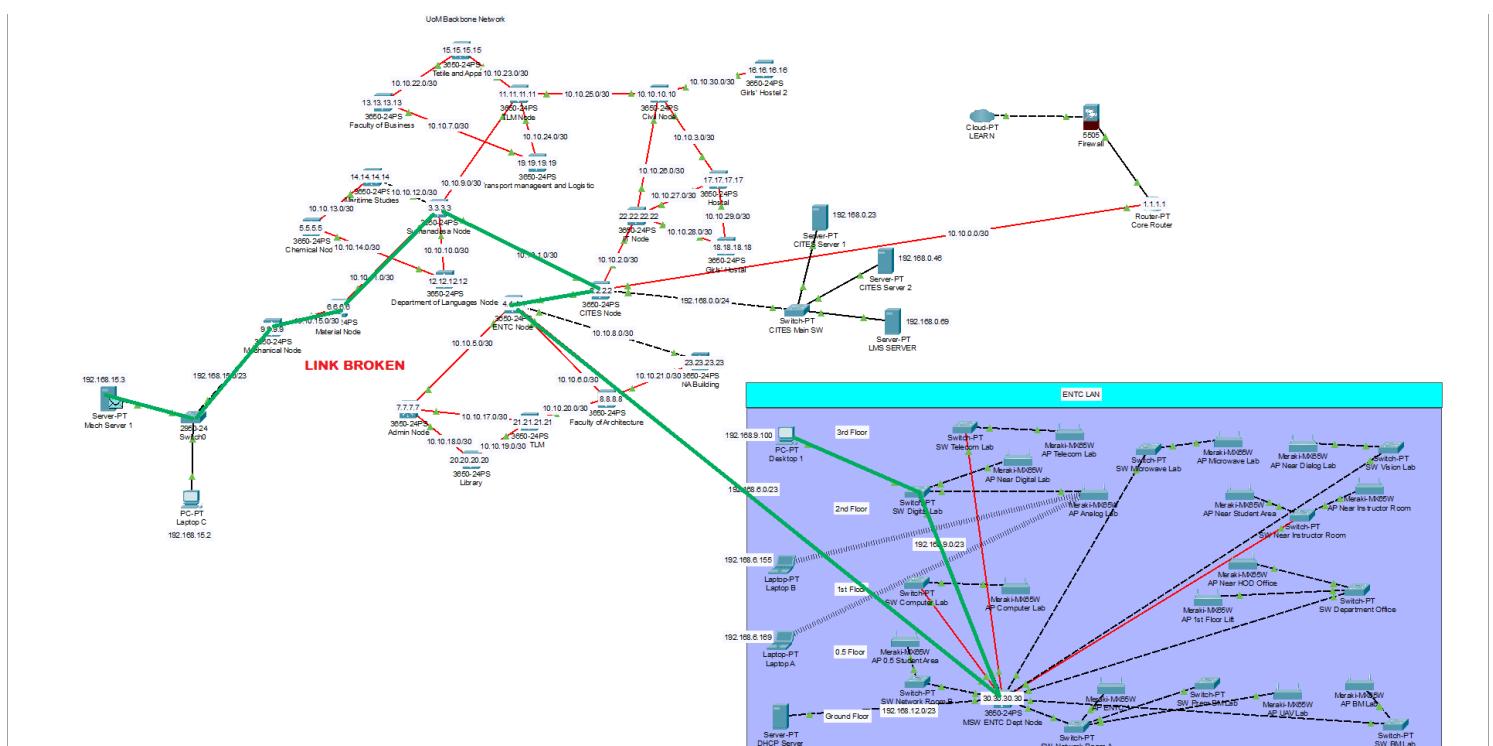


Step 7

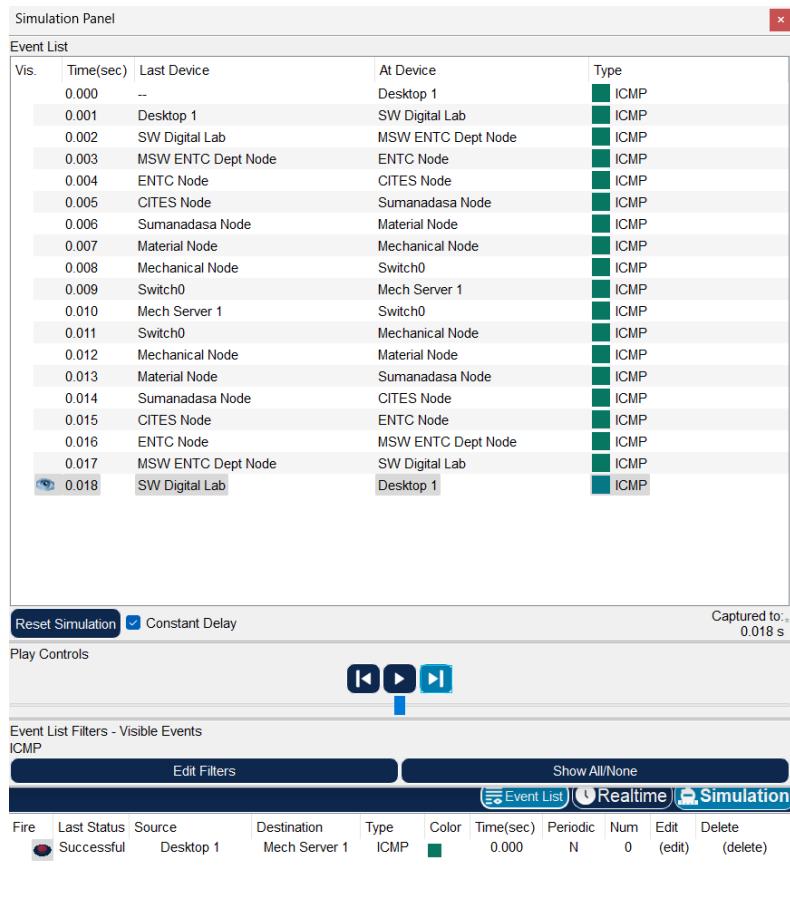


Step 8

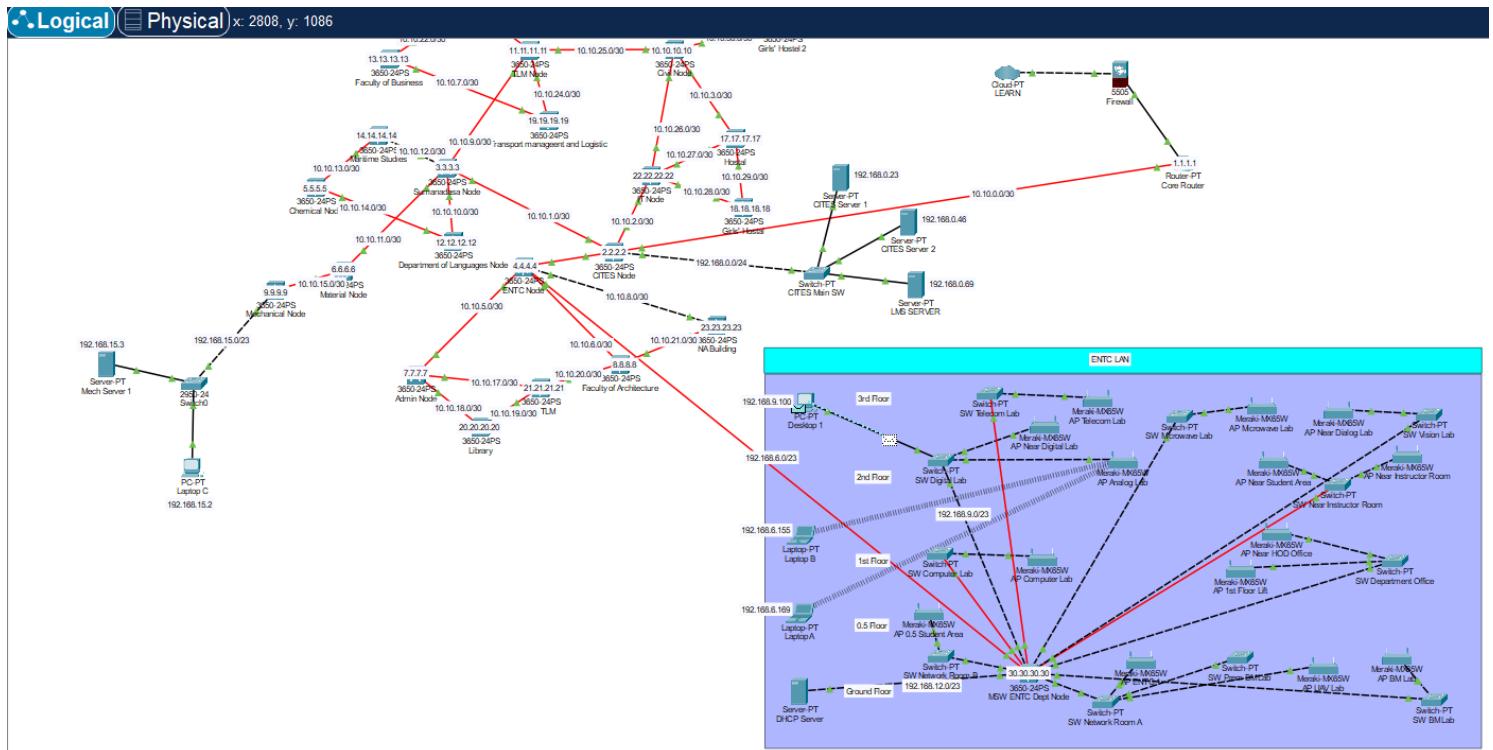
4.4 Task 4 : Simulating Routing Path after Disconnecting a Backbone Link Used in the ENTC-Mechanical Department Server Access Session



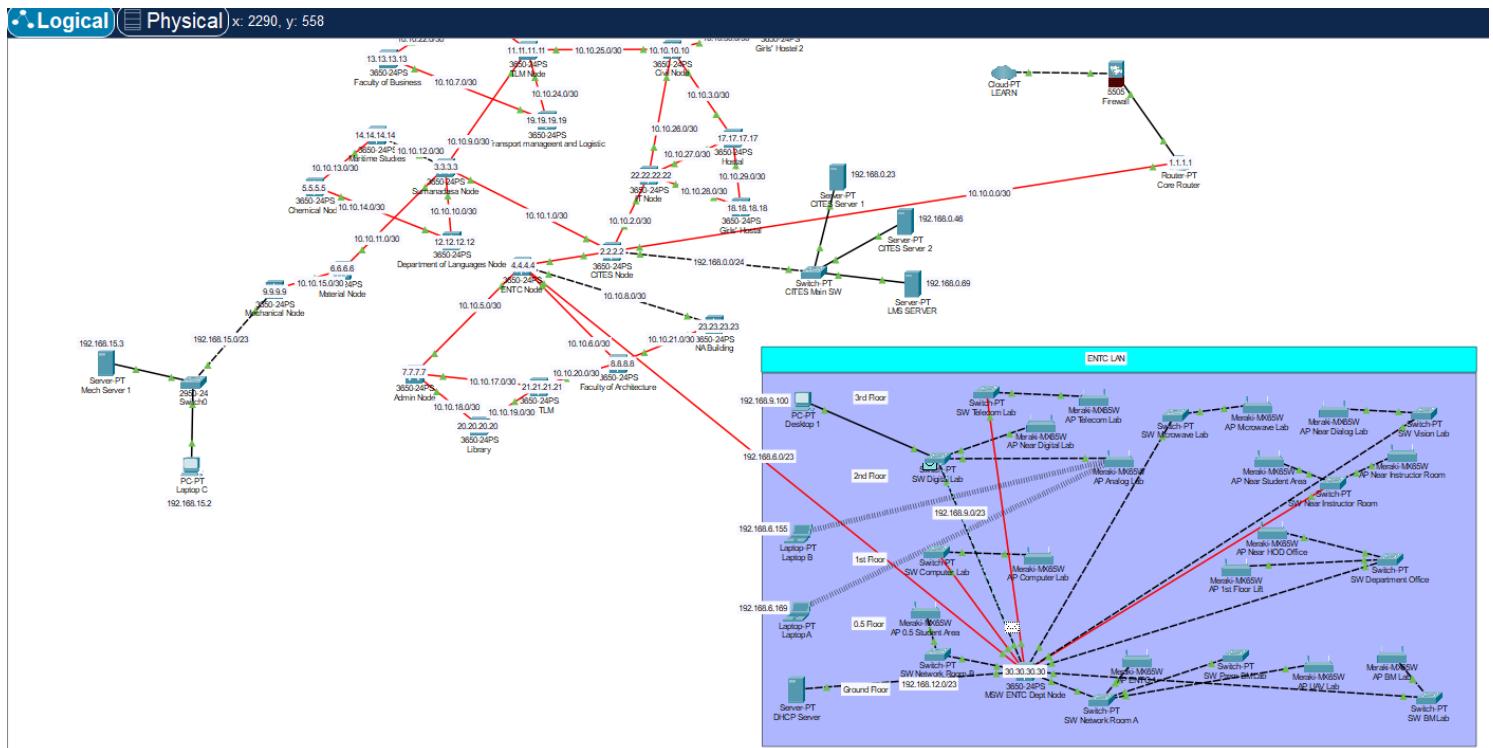
Path Taken



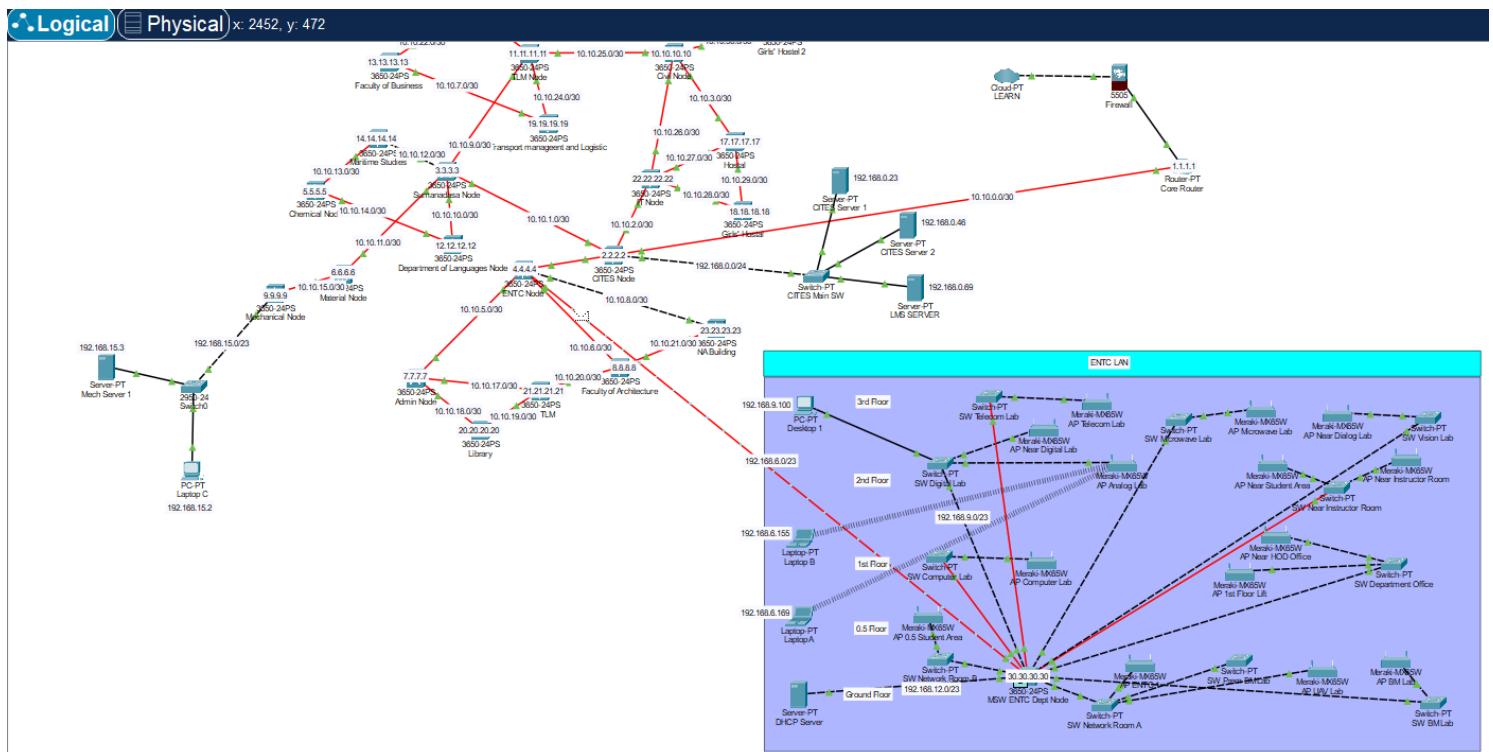
Event List



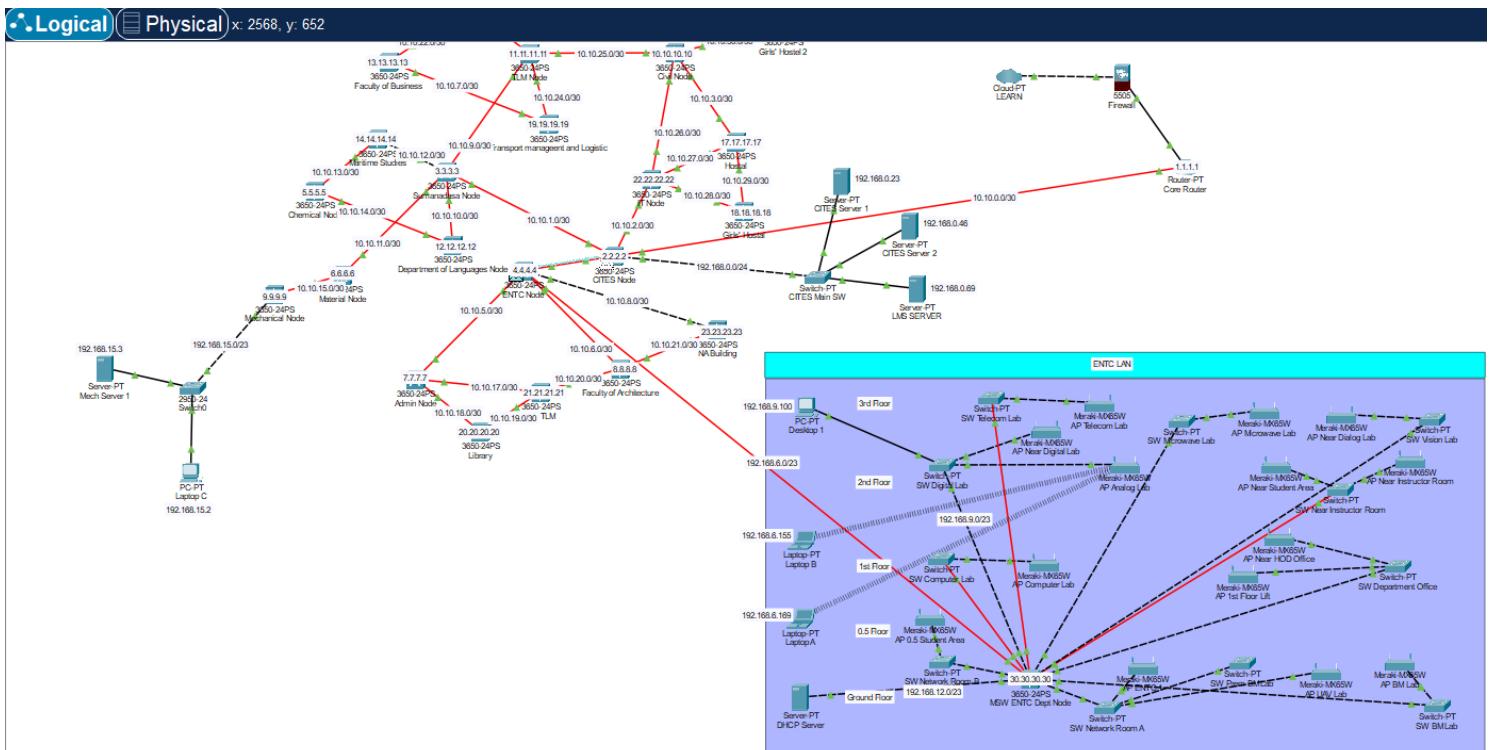
Step 1



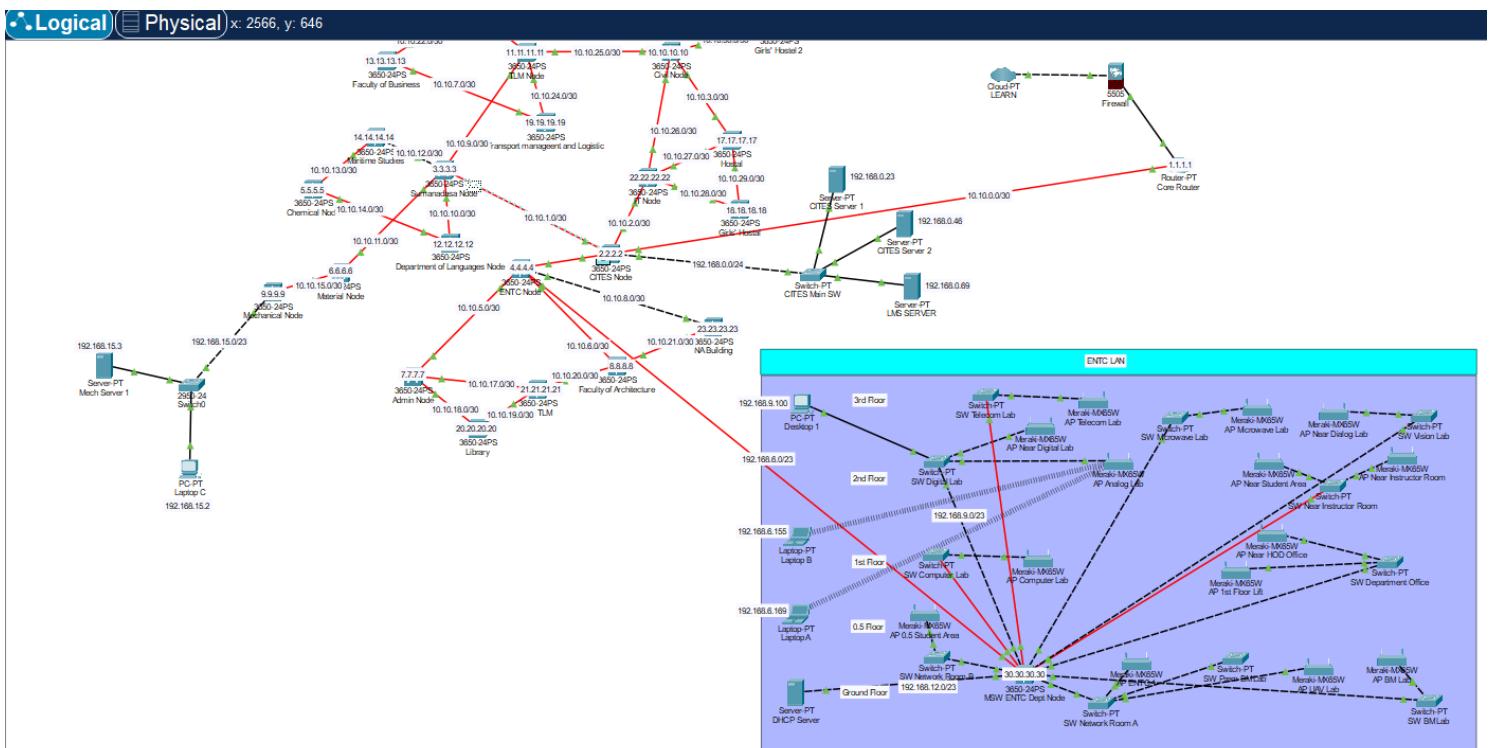
Step 2



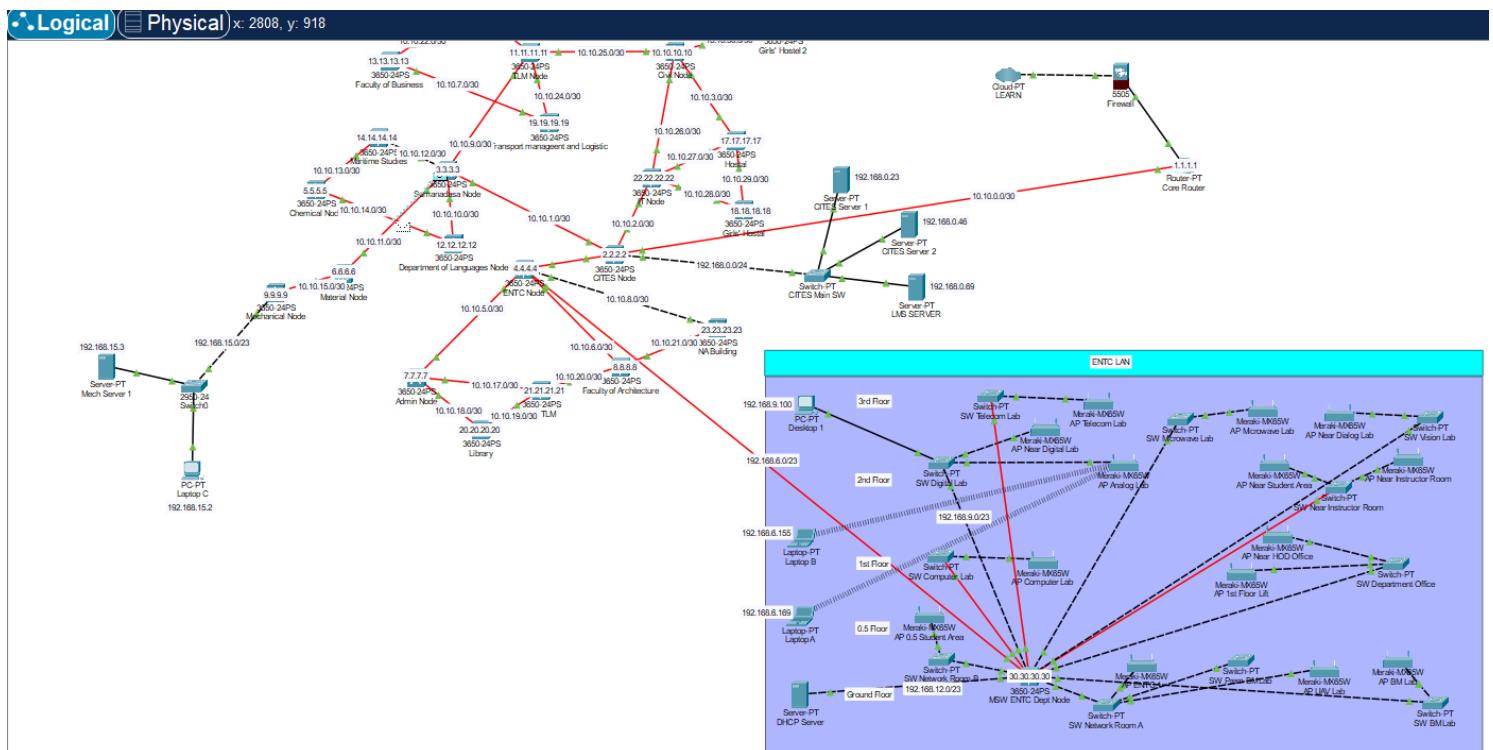
Step 3



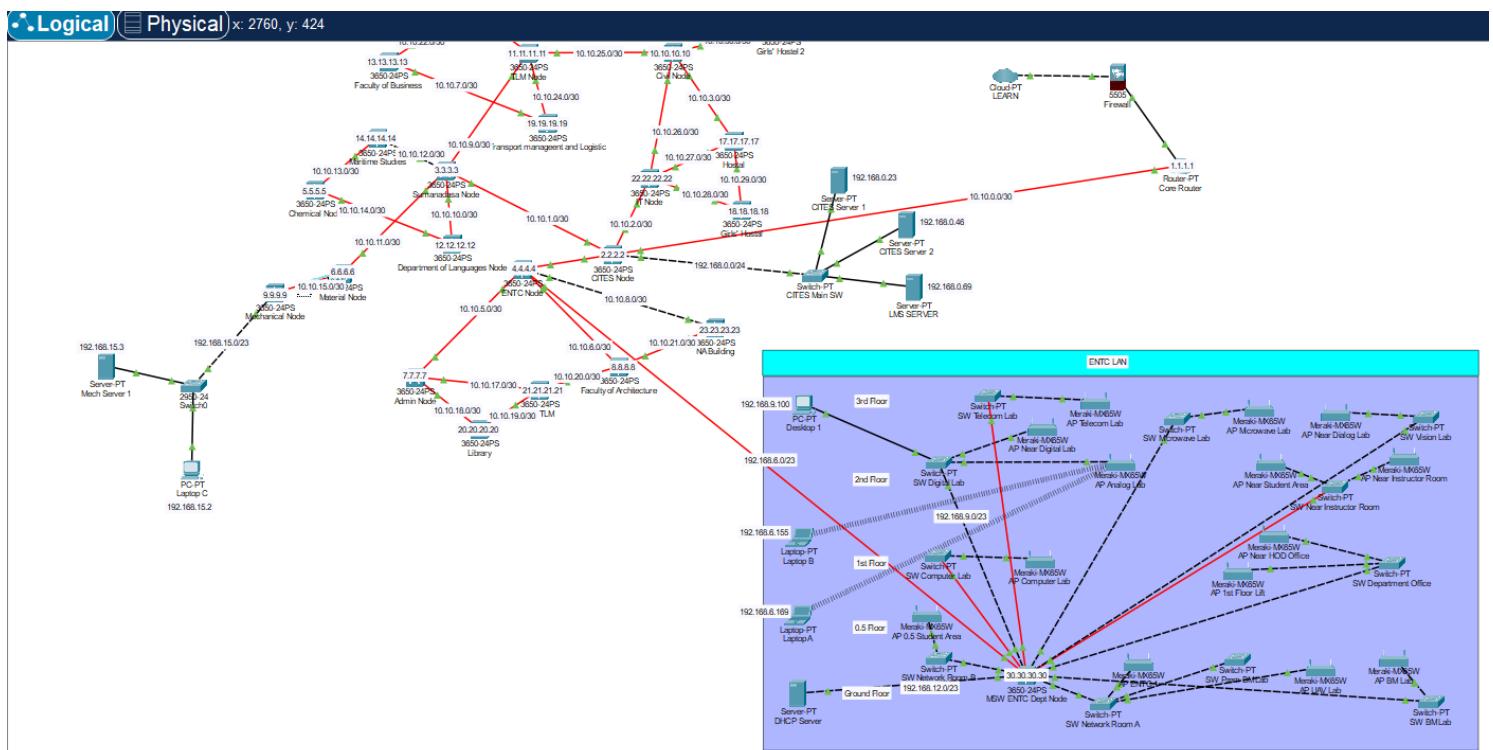
Step 4



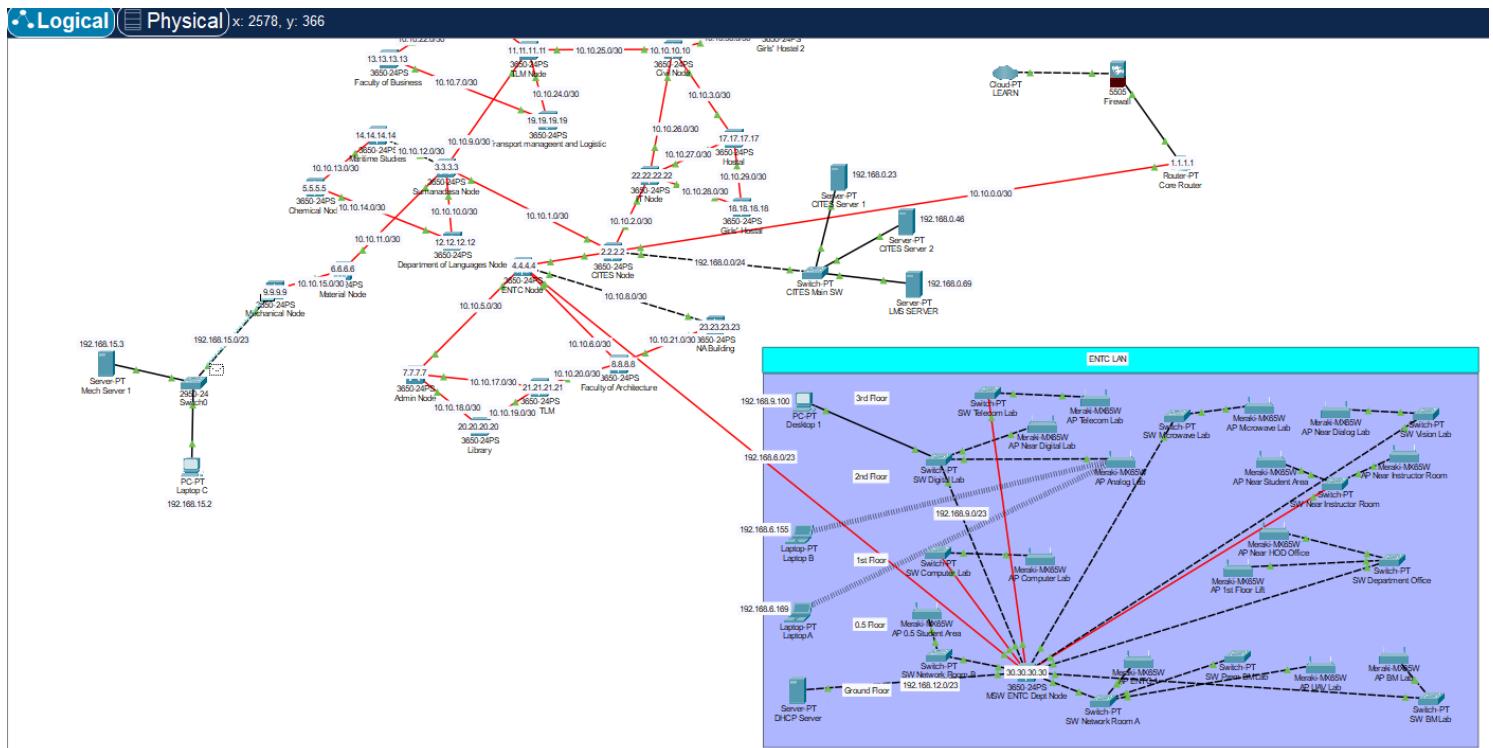
Step 5



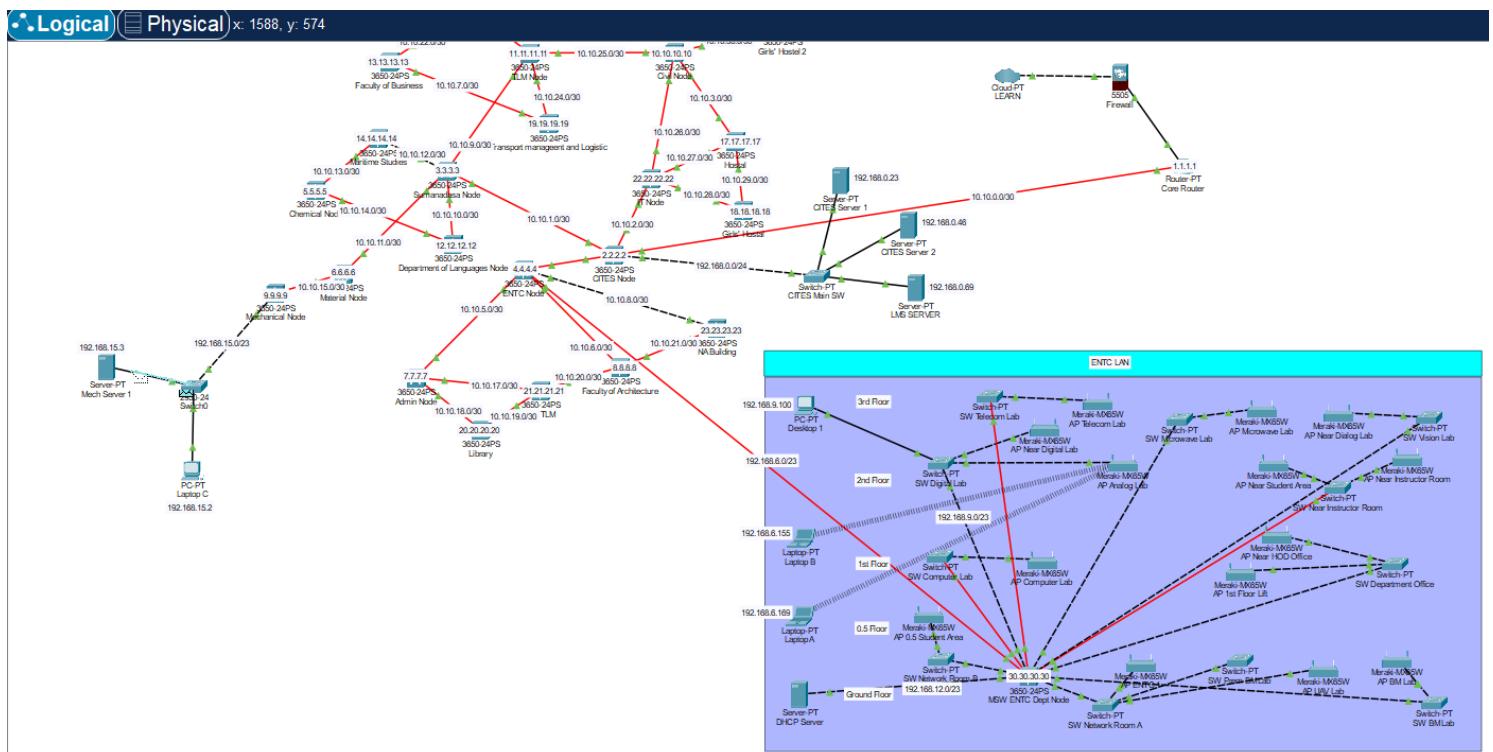
Step 6



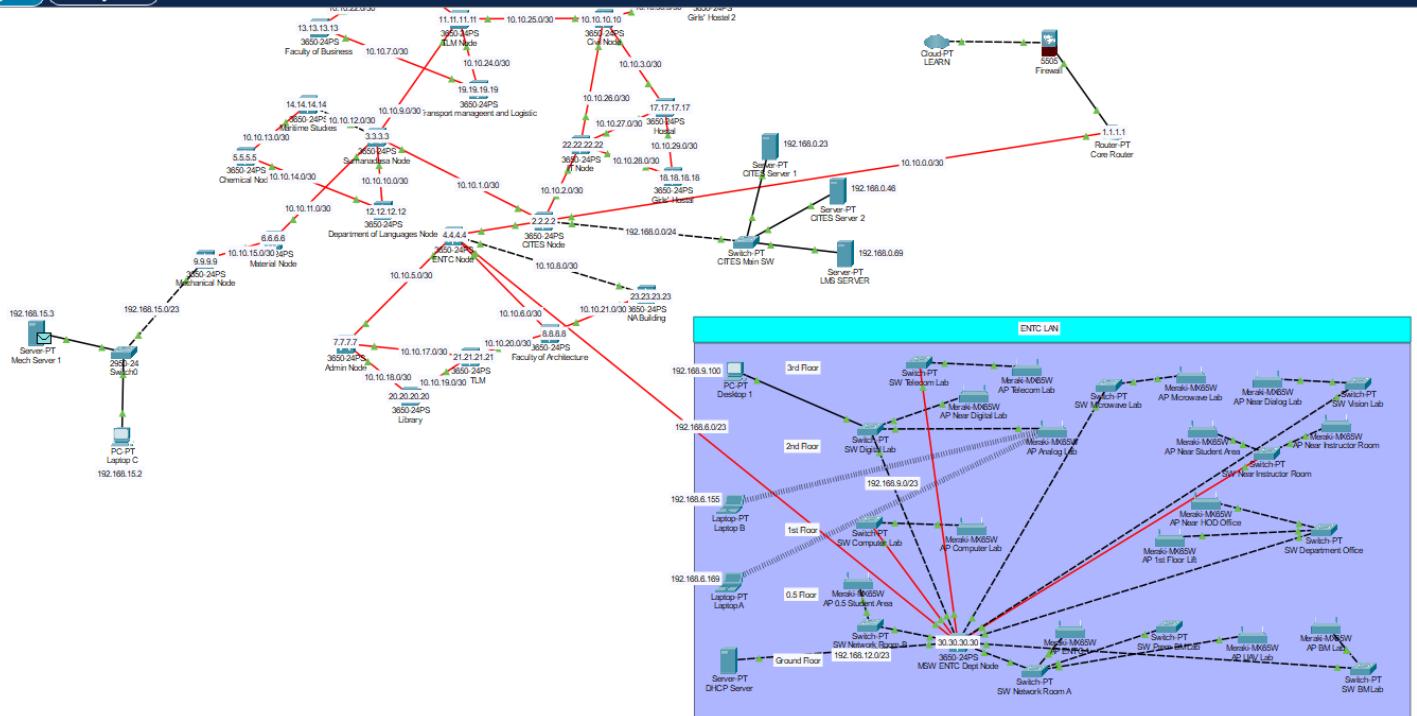
Step 7



Step 8

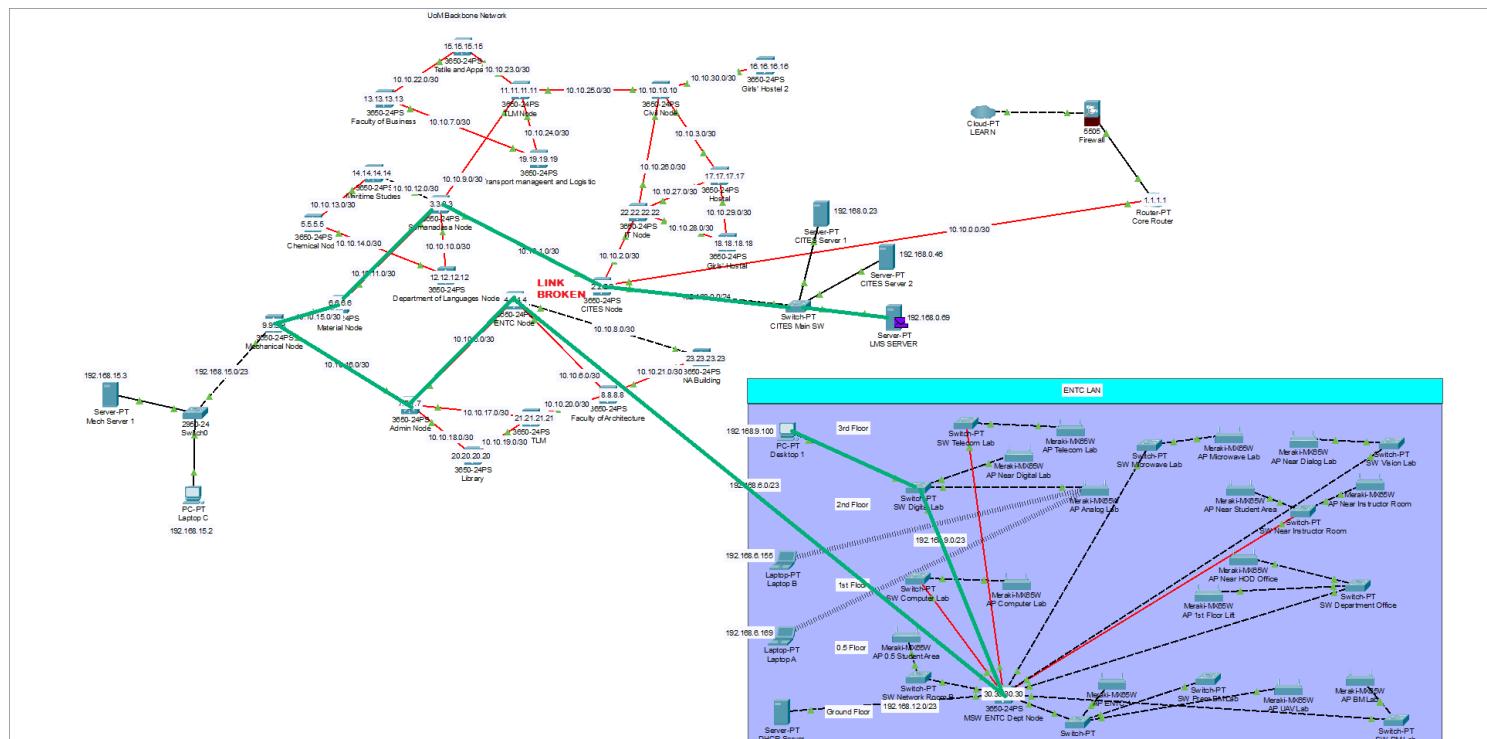
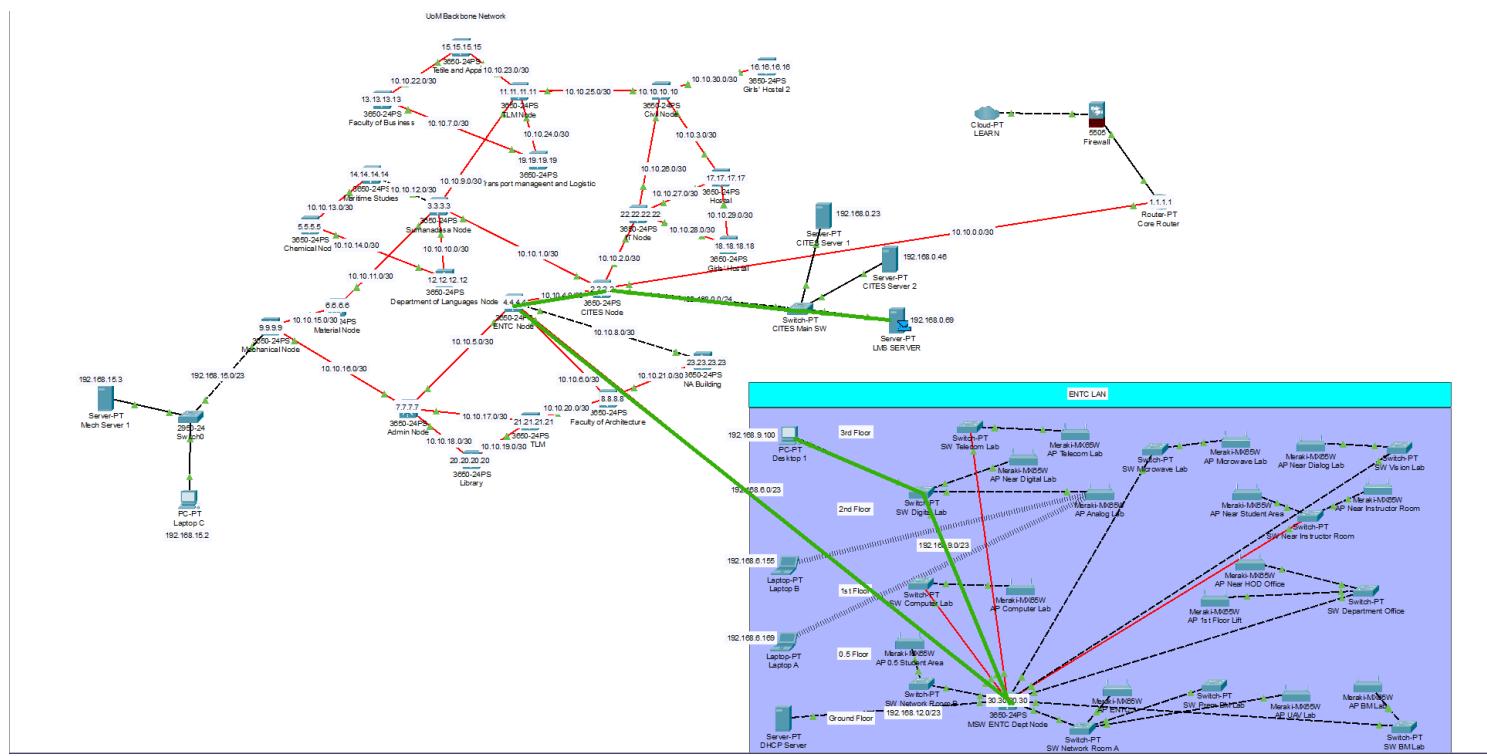


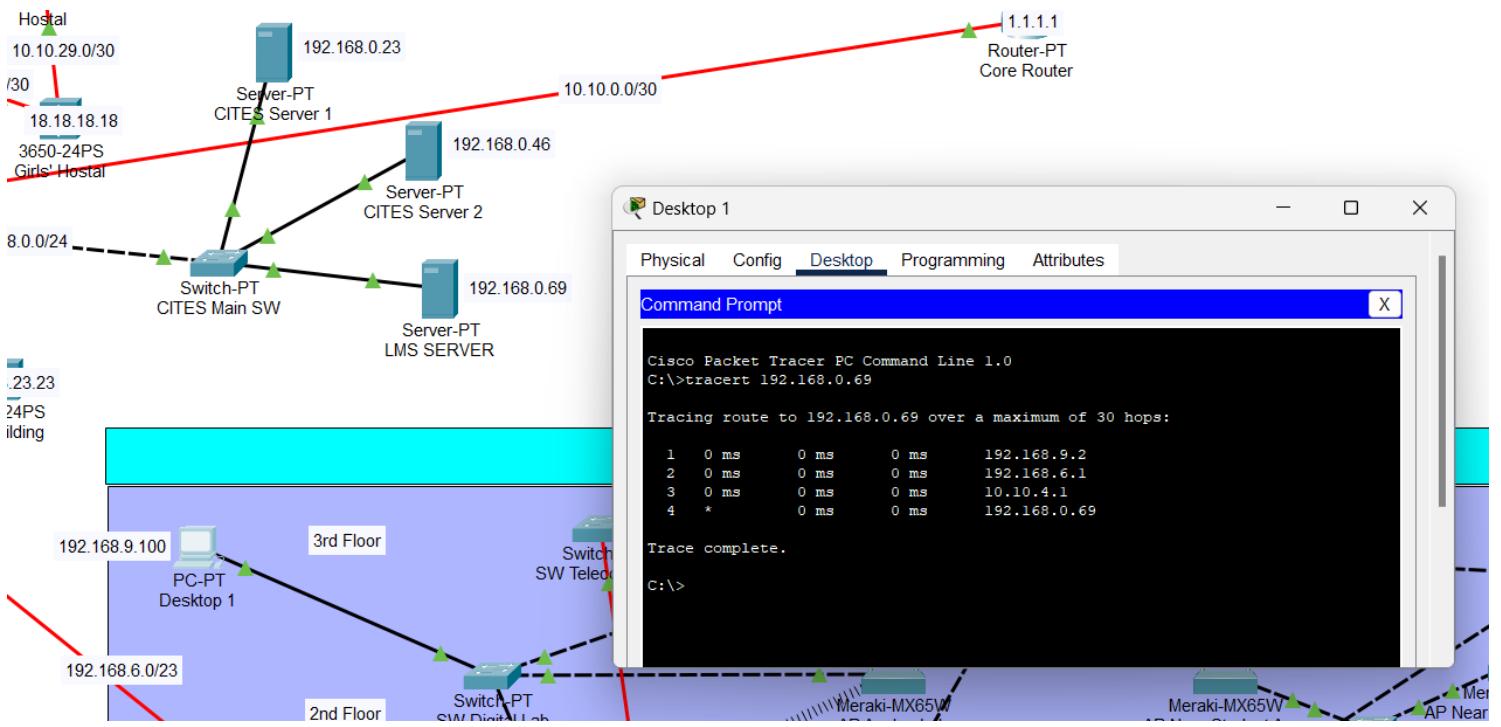
Step 9



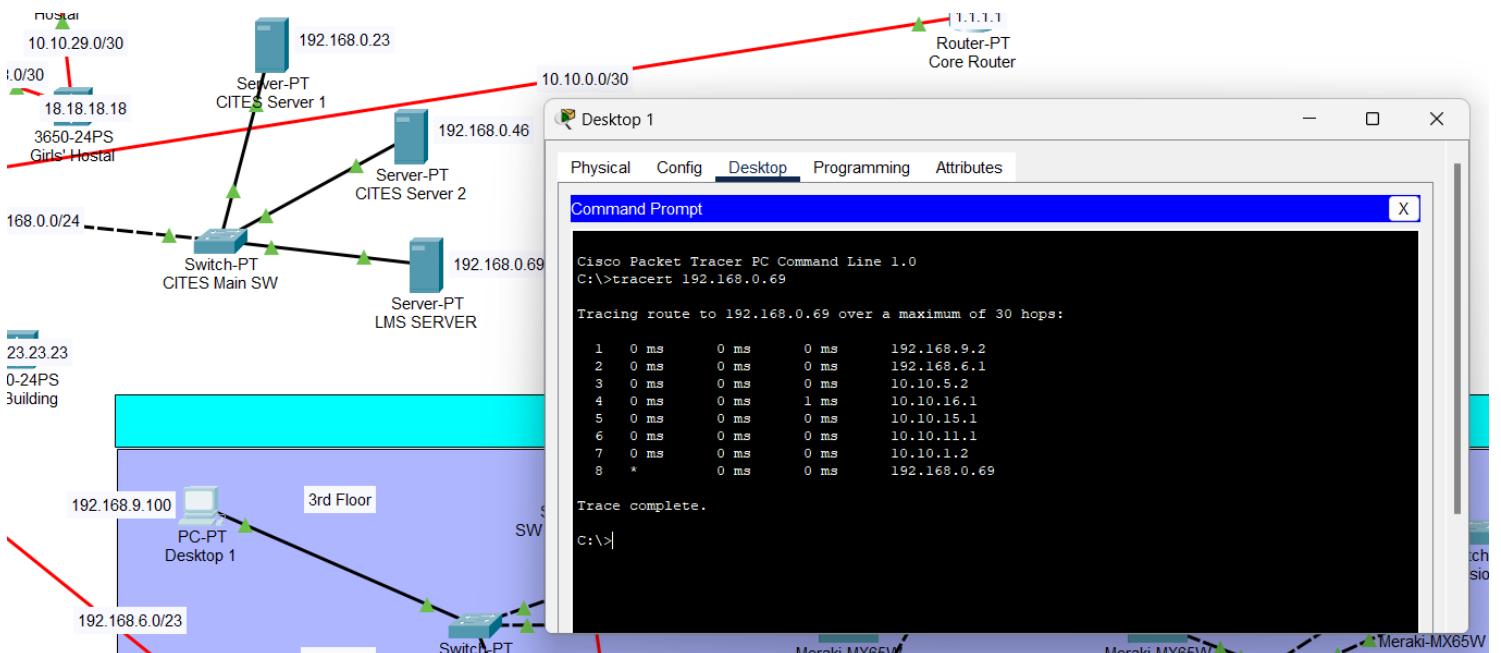
Step 10

4.5 Task 1 & Task 2 Comparison



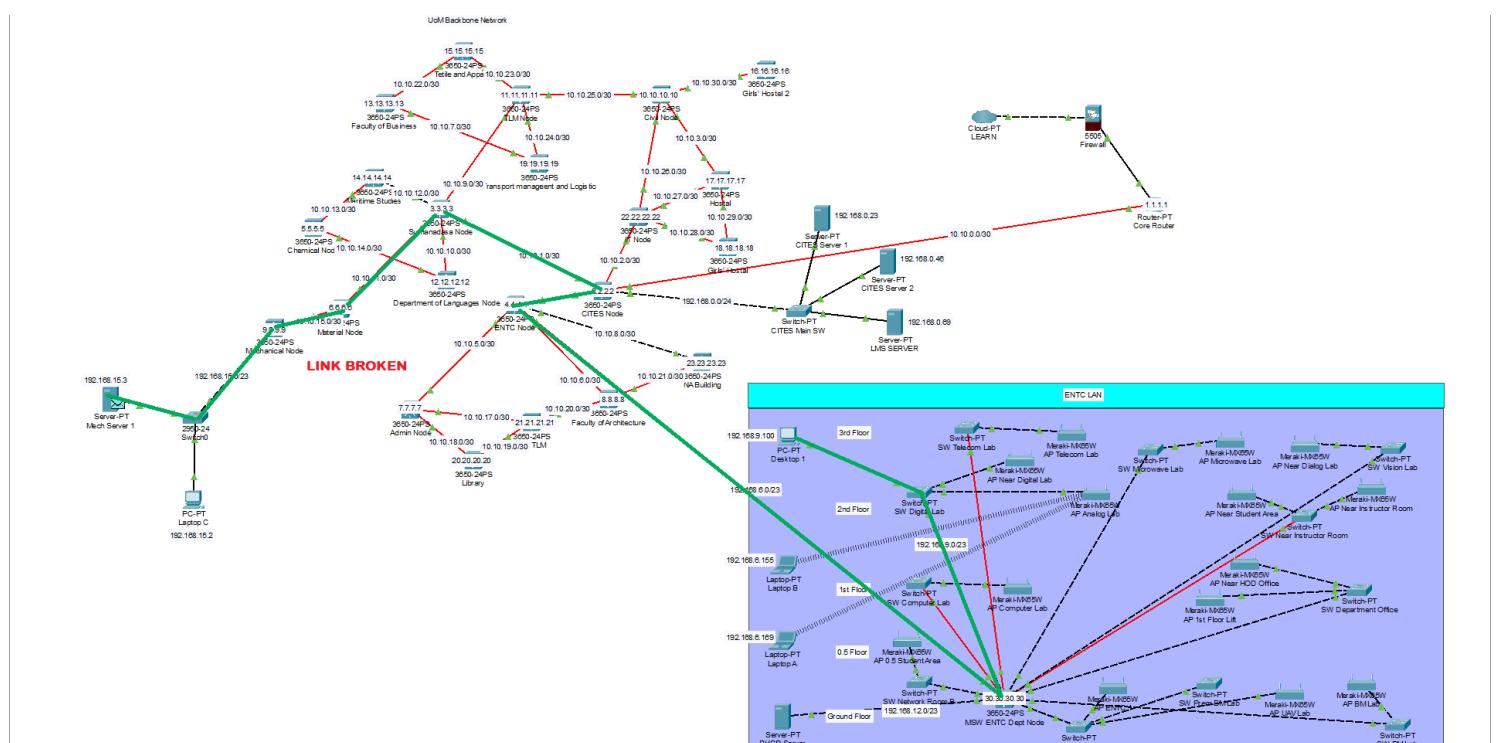
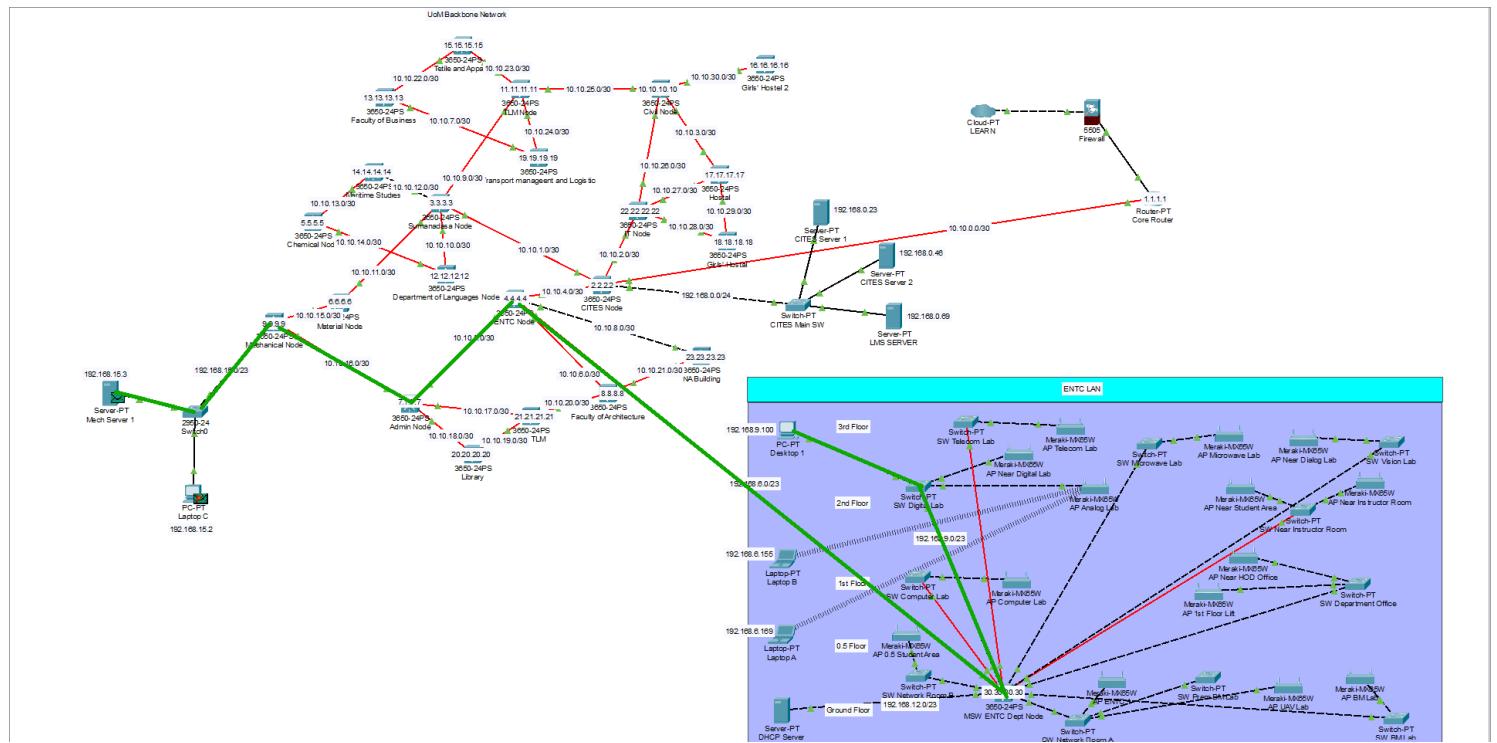


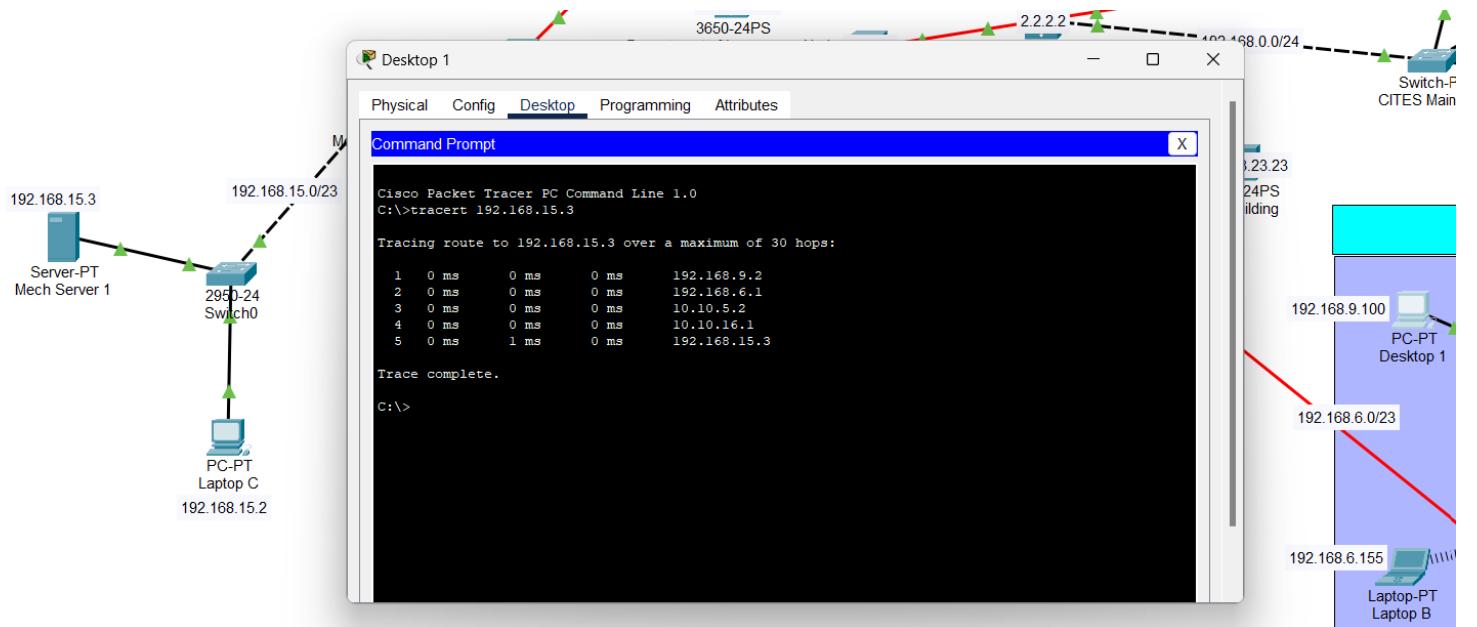
Trace-route 1 (4 hops taken)



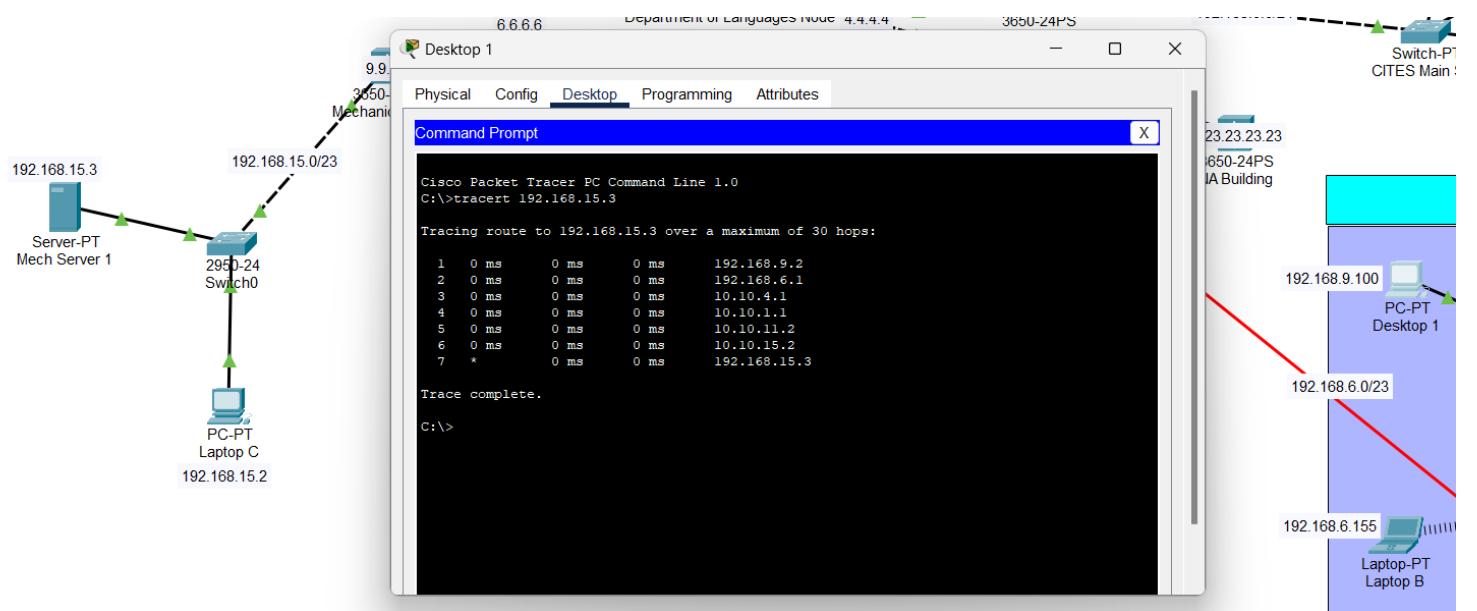
Trace-route 2 (8 hops taken)

4.6 Task 3 & Task 4 Comparison





Trace-route 3 (5 hops taken)



Trace-route 4 (7 hops taken)