



East West University

Computer Networks

Department of CSE

Course Name: Computer Networks

Course Code: CSE 405

Section No: 03

Mini Project Report

Submitted To.

Dr. Anisur Rahman (MAR)
Associate Professor
Department of CSE, EWU

Submitted By.

Md Ripon AL Mamun
ID:2021-2-60-083
Department of CSE, EWU

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Title

Design a full-fledged network (Apex University) for an organization with multiple subnets.

Background

Similar to East West University, Apex University has a fully interconnected network. All of the academic and administrative departments' offices, labs, classrooms, and staff workstations are connected for internet access. The institution also provides wireless internet access around the campus. In addition, the organization depends on a complex networked system to support essential functions including financial operations, library administration, result management, advising, admissions, and tenders. The goal is to carefully lay out this intricate network. The Apex University's facilities, network characteristics, and organizational structure will all be fully reflected in this model.

Software Used: Cisco Packet Tracer 8.2.2 64Bit

Components: PT- Router, Wireless Routers, Straight Through Cable, Serial DCE cables, PT- Switches, PC as end devices, DNS Server, Web Server, DHCP server, wireless router etc.

Network overview:

University's full network has covered with 6 campuses with 6 routers and one admin router. All the Ip address set by one DHCP server automatically & DNS server is use to locate Web server.

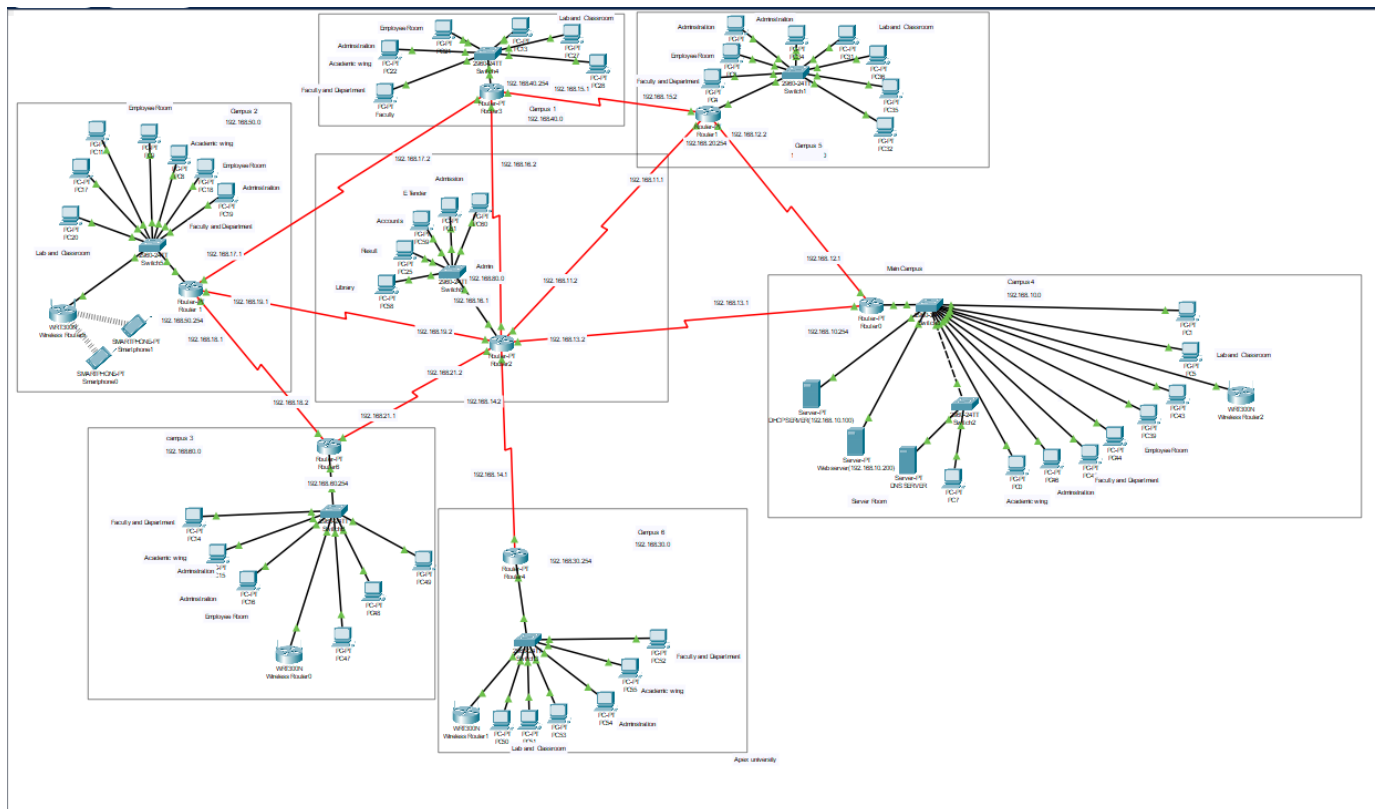


Fig 1: Full network Diagram:

Router configuration:

Admin Router ip

configuration:

```
interface fa0/0 ip address 192.168.80.254
255.255.255.0 no shut do wr exit interface
se2/0 ip address 192.168.11.2
255.255.255.0
```

```
no shut do wr exit interface se3/0 ip
address 192.168.13.2 255.255.255.0 no
shut do wr exit interface se4/0 ip
address 192.168.14.2 255.255.255.0 no
shut do wr exit interface se5/0 ip
address 192.168.16.1 255.255.255.0 no
shut do wr exit interface se6/0 ip
address 192.168.19.2 255.255.255.0 no
shut do wr exit interface se7/0 ip
```

address 192.168.21.2 255.255.255.0 no
shut do wr exit

Campus 2 router ip configuration:

interface fa0/0 ip address 192.168.50.254
255.255.255.0 no shut do wr exit interface
se2/0 ip address 192.168.17.1
255.255.255.0 no shut do wr exit interface
se6/0 ip address 192.168.19.1
255.255.255.0 clock rate 64000 no shut do
wr exit interface se3/0 ip address
192.168.18.1 255.255.255.0 clock rate
64000 no shut

do
wr
exi
t

Campus 1 router ip configuration:

interface fa0/0 ip address 192.168.40.254
255.255.255.0 no shut do wr exit interface
se2/0 ip address 192.168.15.2
255.255.255.0 no shut do wr exit interface
se3/0 ip address 192.168.16.2
255.255.255.0 clock rate 64000 no shut do
wr exit interface se6/0 ip address
192.168.17.2 255.255.255.0 clock rate
64000 no shut do wr exit

Campus 5 router ip configuration:

interface fa0/0 ip address 192.168.20.254
255.255.255.0 no shut do wr exit interface
se2/0 ip address 192.168.12.2
255.255.255.0 no shut do wr exit interface
se3/0 ip address 192.168.11.1
255.255.255.0 clock rate 64000 no shut do
wr exit interface se6/0 ip address
192.168.15.1 255.255.255.0 clock rate
64000 no shut do wr exit

Campus 4 router ip configuration;

```
interface fa0/0  
  
ip address 192.168.10.254 255.255.255.0  
no shut do wr exit interface se2/0 ip  
address 192.168.12.1 255.255.255.0 clock  
rate 64000 no shut do wr exit interface  
se3/0 ip address 192.168.13.1  
255.255.255.0 clock rate 64000 no shut do  
wr exit
```

Campus 6 router ip configuration;

```
interface fa0/0 ip address 192.168.30.254  
255.255.255.0 no shut do wr exit interface  
se2/0 ip address 192.168.14.1  
255.255.255.0 clock rate 64000  
no  
sh  
ut  
do  
wr  
exi  
t
```

Campus 3 router ip configuration;

```
interface fa0/0 ip address 192.168.60.254  
255.255.255.0 no shut do wr exit interface  
se2/0 ip address 192.168.18.2  
255.255.255.0 no shut do wr exit interface  
se3/0 ip address 192.168.21.1  
255.255.255.0 clock rate 64000 no shut do  
wr exit
```

Ip routing of campus routers:

Admin router IP routing:

```
router ospf 7 network 192.168.11.0
255.255.255.0 area 1 network 192.168.13.0
255.255.255.0 area 1 network 192.168.14.0
255.255.255.0 area 1 network 192.168.16.0
255.255.255.0 area 1 network 192.168.19.0
255.255.255.0 area 1 network 192.168.21.0
255.255.255.0 area 1 network 192.168.80.0
255.255.255.0 area 1
```

exit

Campus 2 IP routing:

```
router ospf 2 network 192.168.17.0
255.255.255.0 area 1 network 192.168.18.0
255.255.255.0 area 1 network 192.168.19.0
255.255.255.0 area 1 network 192.168.50.0
255.255.255.0 area 1
```

Campus 1 IP routing:

```
router ospf 1 network 192.168.15.0
255.255.255.0 area 1 network 192.168.16.0
255.255.255.0 area 1 network 192.168.17.0
255.255.255.0 area 1 network 192.168.40.0
255.255.255.0 area 1
```

Campus 5 IP routing:

```
router ospf 5 network 192.168.11.0
255.255.255.0 area 1 network 192.168.12.0
255.255.255.0 area 1 network 192.168.15.0
255.255.255.0 area 1 network 192.168.20.0
255.255.255.0 area 1
```

Campus IP 4 routing:

```
router ospf 4 network 192.168.10.0
255.255.255.0 area 1 network 192.168.12.0
255.255.255.0 area 1 network 192.168.13.0
255.255.255.0 area 1
```

Campus 6 IP routing:

router ospf 6 network 192.168.14.0
255.255.255.0 area 1 network 192.168.30.0
255.255.255.0 area 1

Campus 3 IP routing:

router ospf 3

network 192.168.18.0 255.255.255.0 area 1 network
192.168.21.0 255.255.255.0 area 1 network 192.168.60.0
255.255.255.0 area 1 **Server**

DHCP: DHCP is capable of automatically serving IP over a network. We have seven routers and one DHCP server. A device can request a unique IP address from a DHCP server that is compatible with its campus network. This explains why the DHCP server setup has a total of 7 pool names.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	VLLC Address
serverPool7	192.168.80.254	192.168.10.150	192.168.80.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool6	192.168.60.254	192.168.10.150	192.168.60.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool5	192.168.50.254	192.168.10.150	192.168.50.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool4	192.168.40.254	192.168.10.150	192.168.40.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool3	192.168.30.254	192.168.10.150	192.168.30.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool2	192.168.20.254	192.168.10.150	192.168.20.1	255.255.255.0	255	0.0.0.0	0.0.0.0
serverPool	192.168.10.254	192.168.10.150	192.168.10.1	255.255.255.0	255	0.0.0.0	0.0.0.0

Fig 2: DHCP server configuration

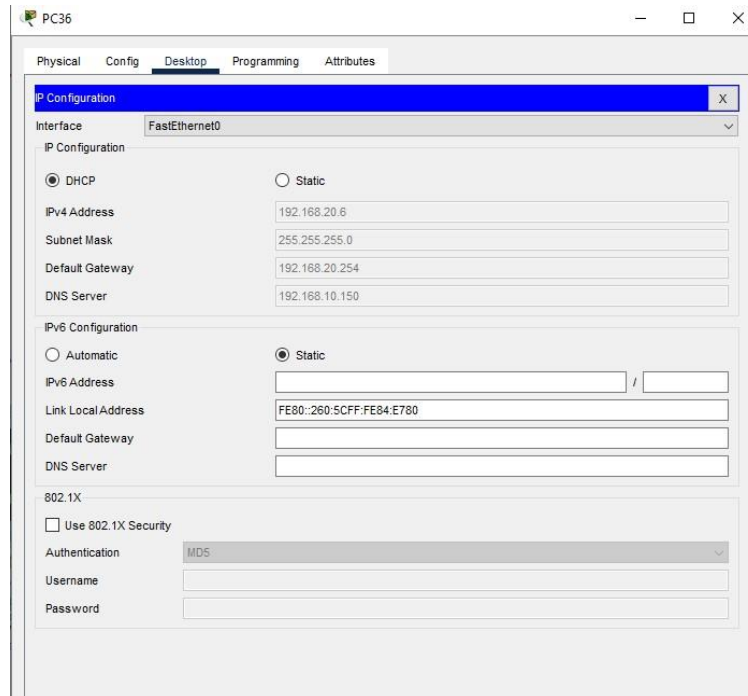


Fig 3: Assigning IP dynamically by DHCP

DNS: DNS server is capable of giving the Ip address from the URL.

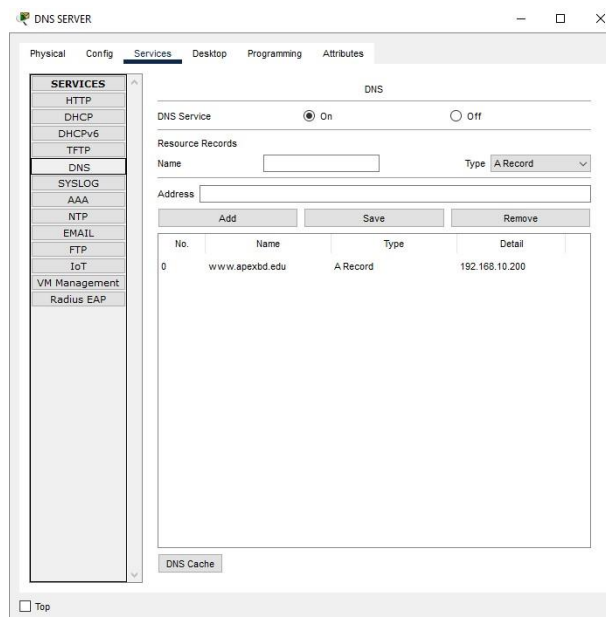


Fig 4: Configuration of DNS

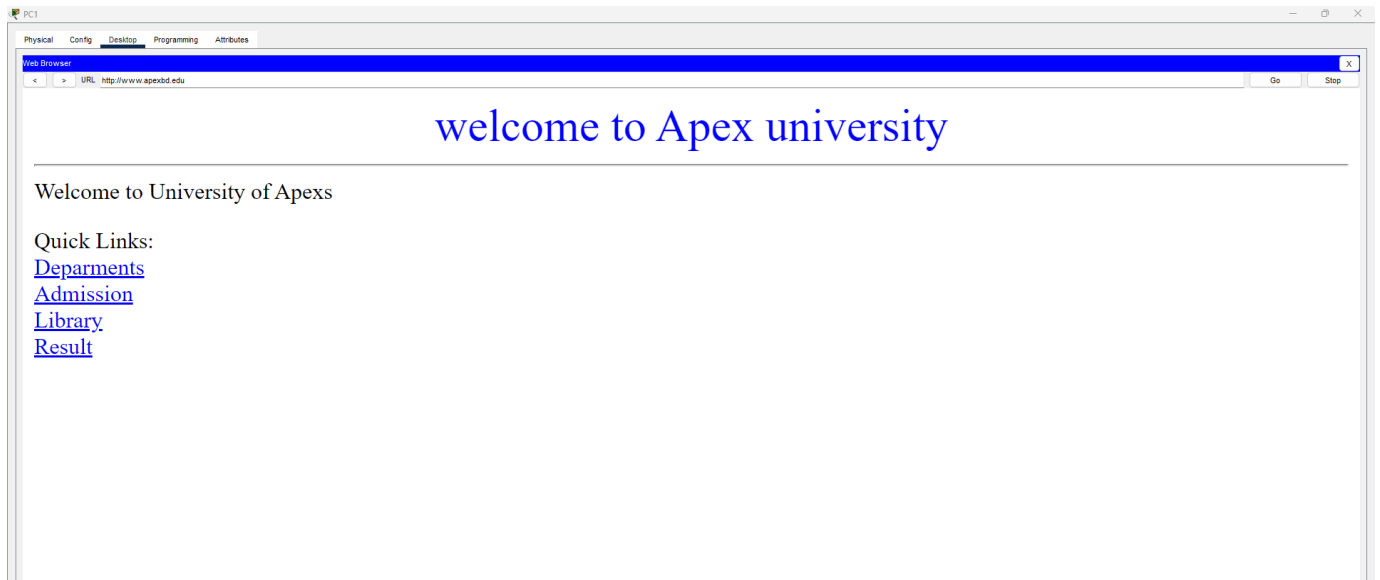


Fig 5: Url access through DNS

Web Server:

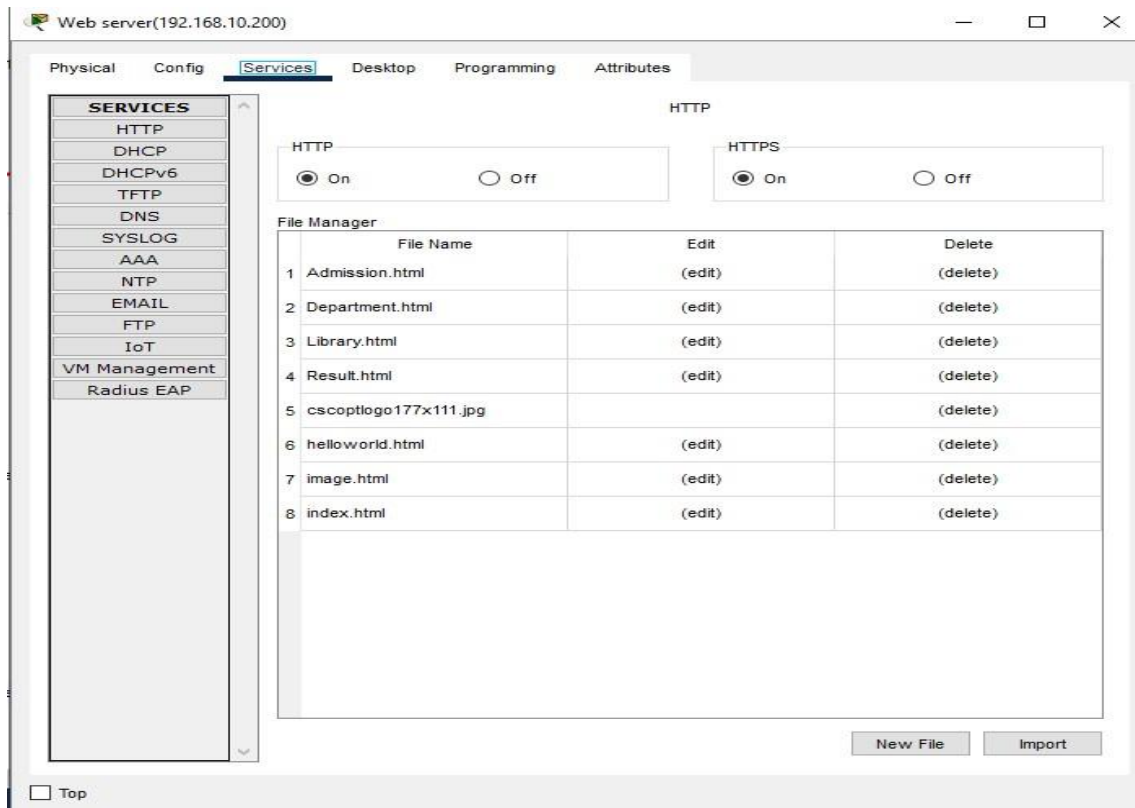
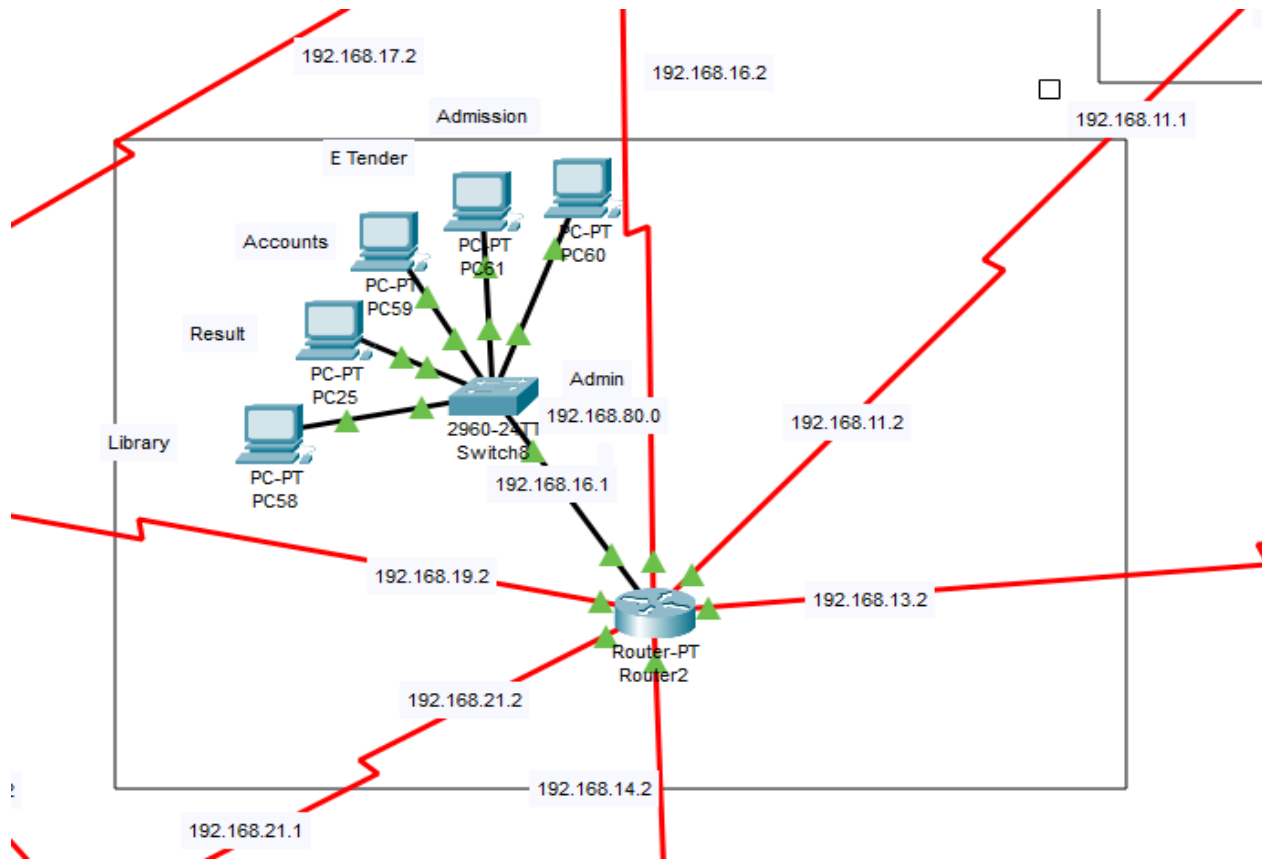
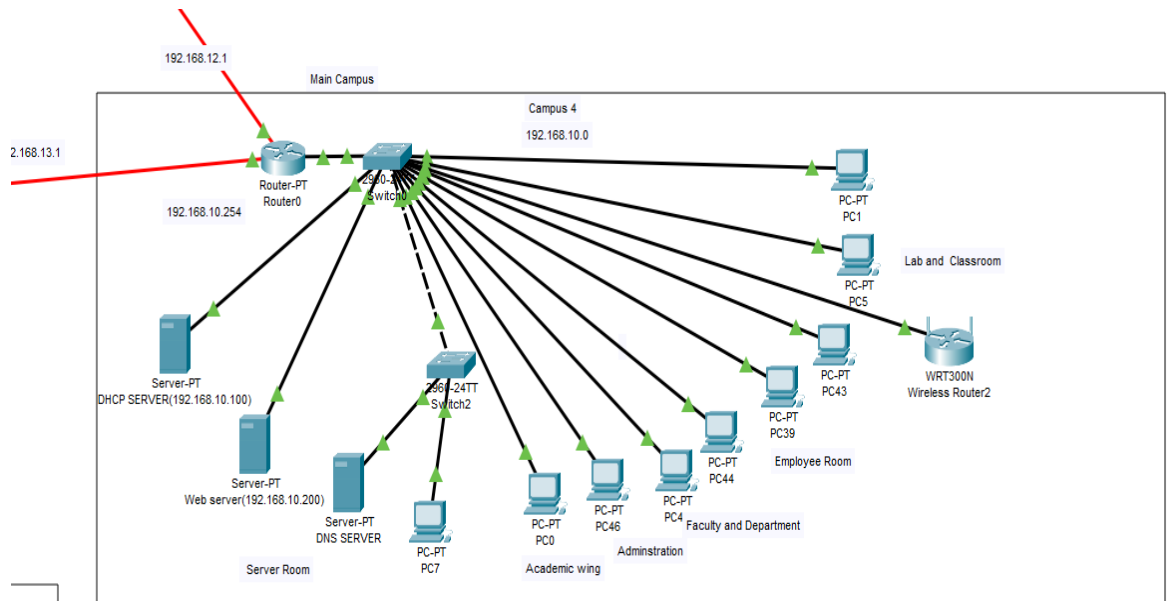


Fig 6: web server configuration

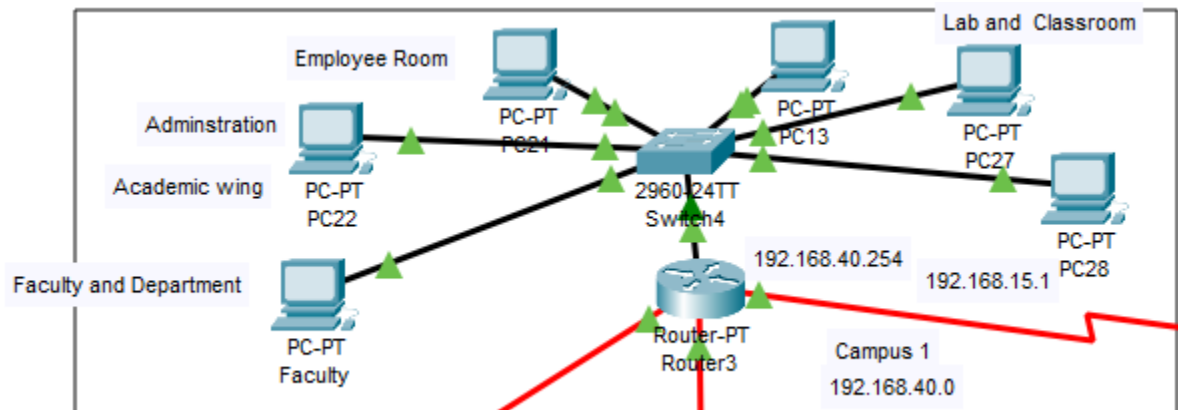
Admin router:



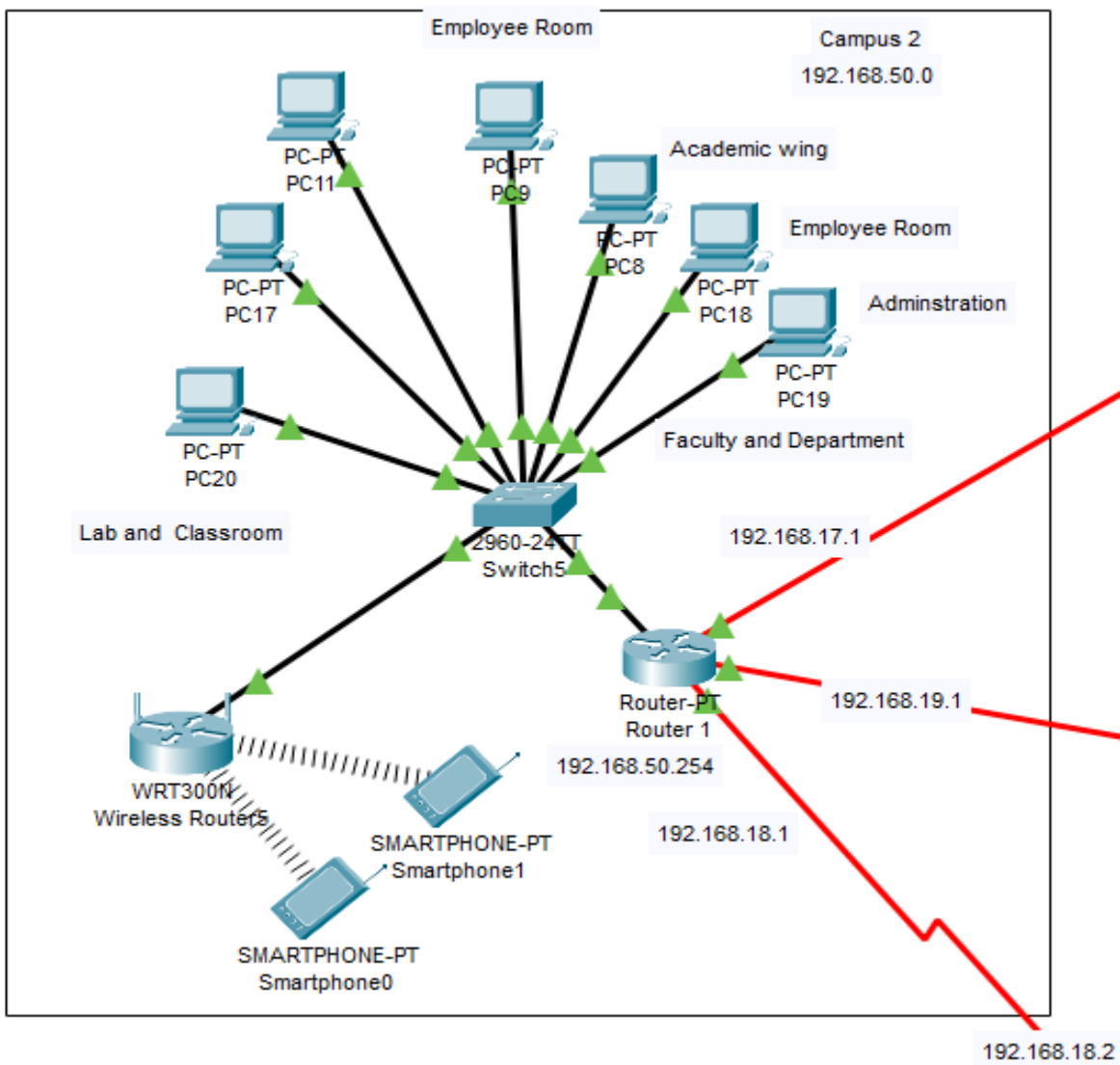
Campus 4 (Main campus)



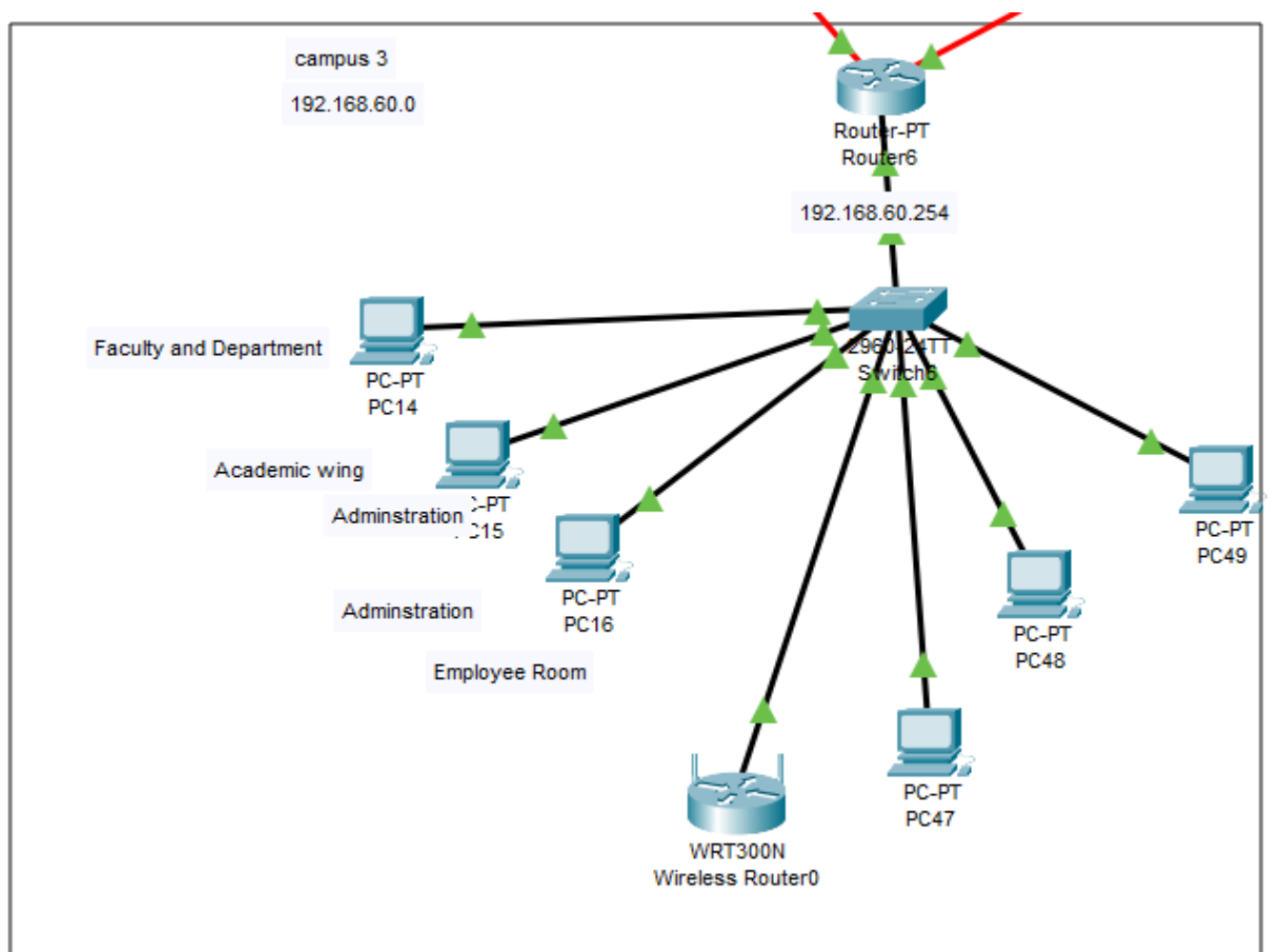
Campus 1:



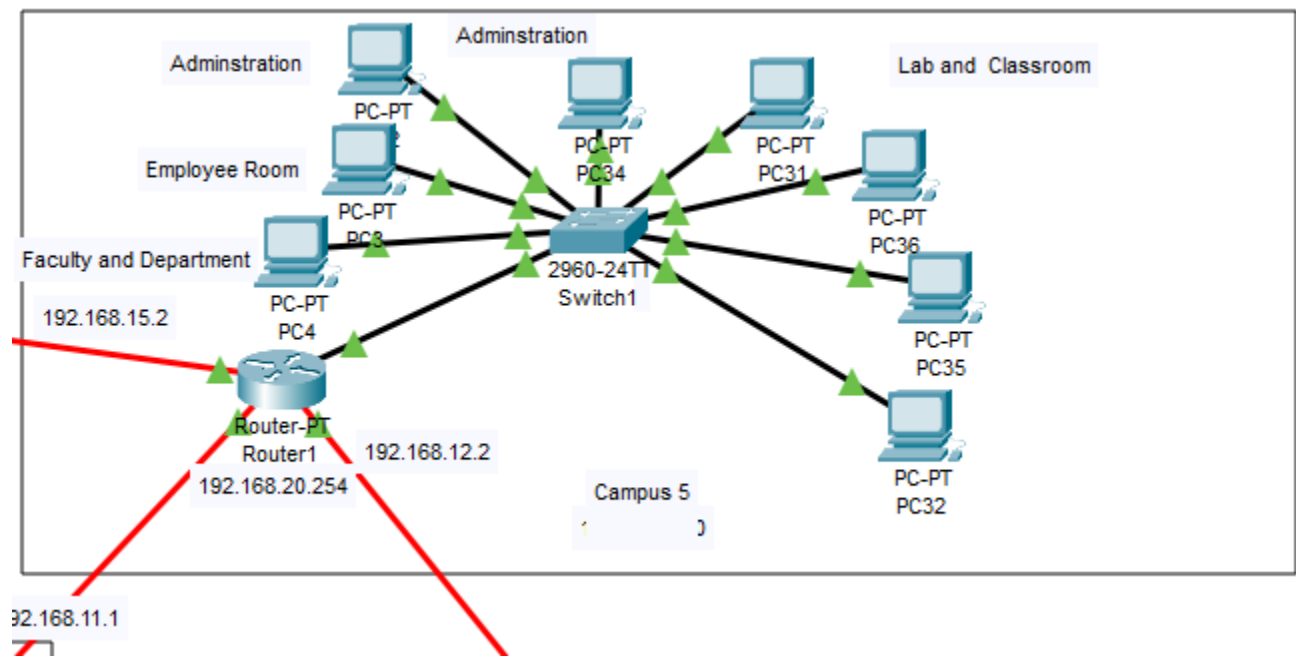
Campus 2:



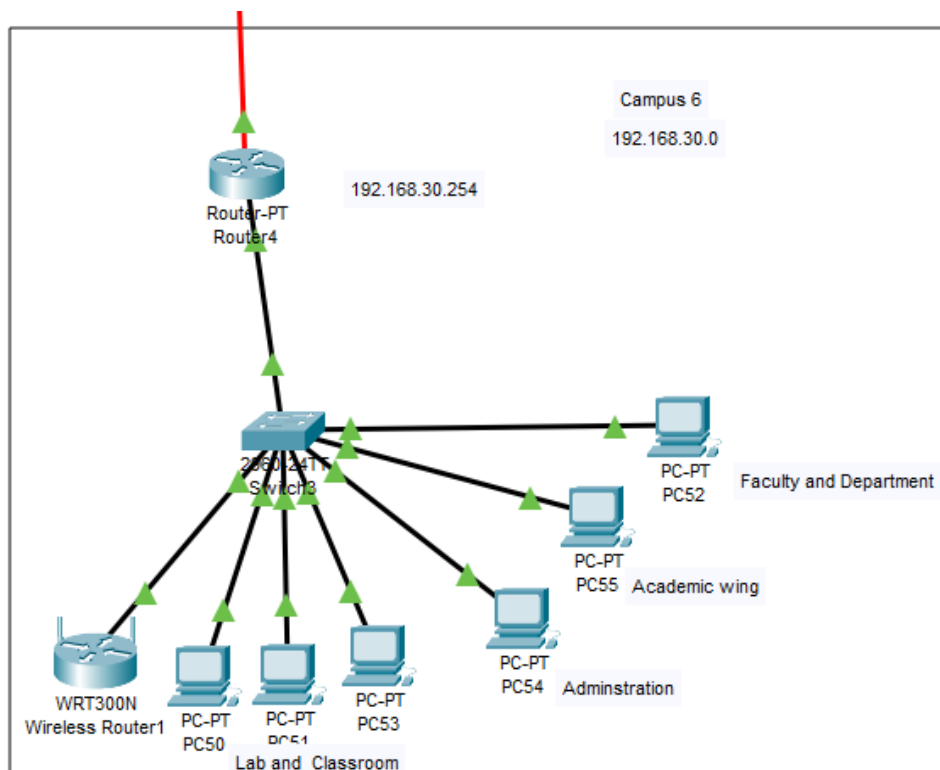
Campus 3:



Campus 5



Campus 6:



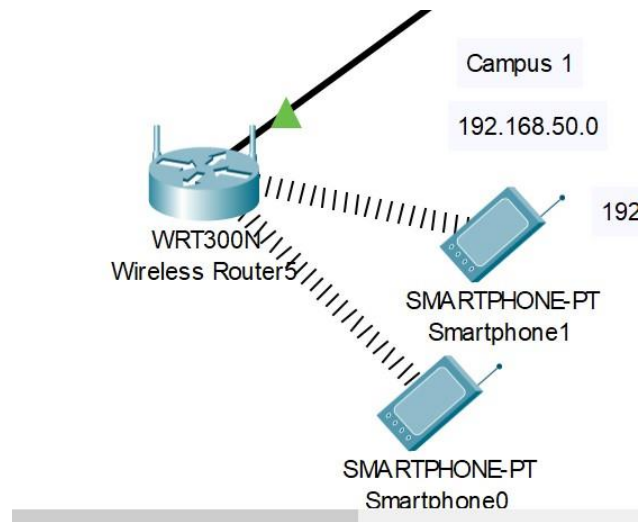


Fig 7: wireless connectivity all over campus

Pinging from different networks:

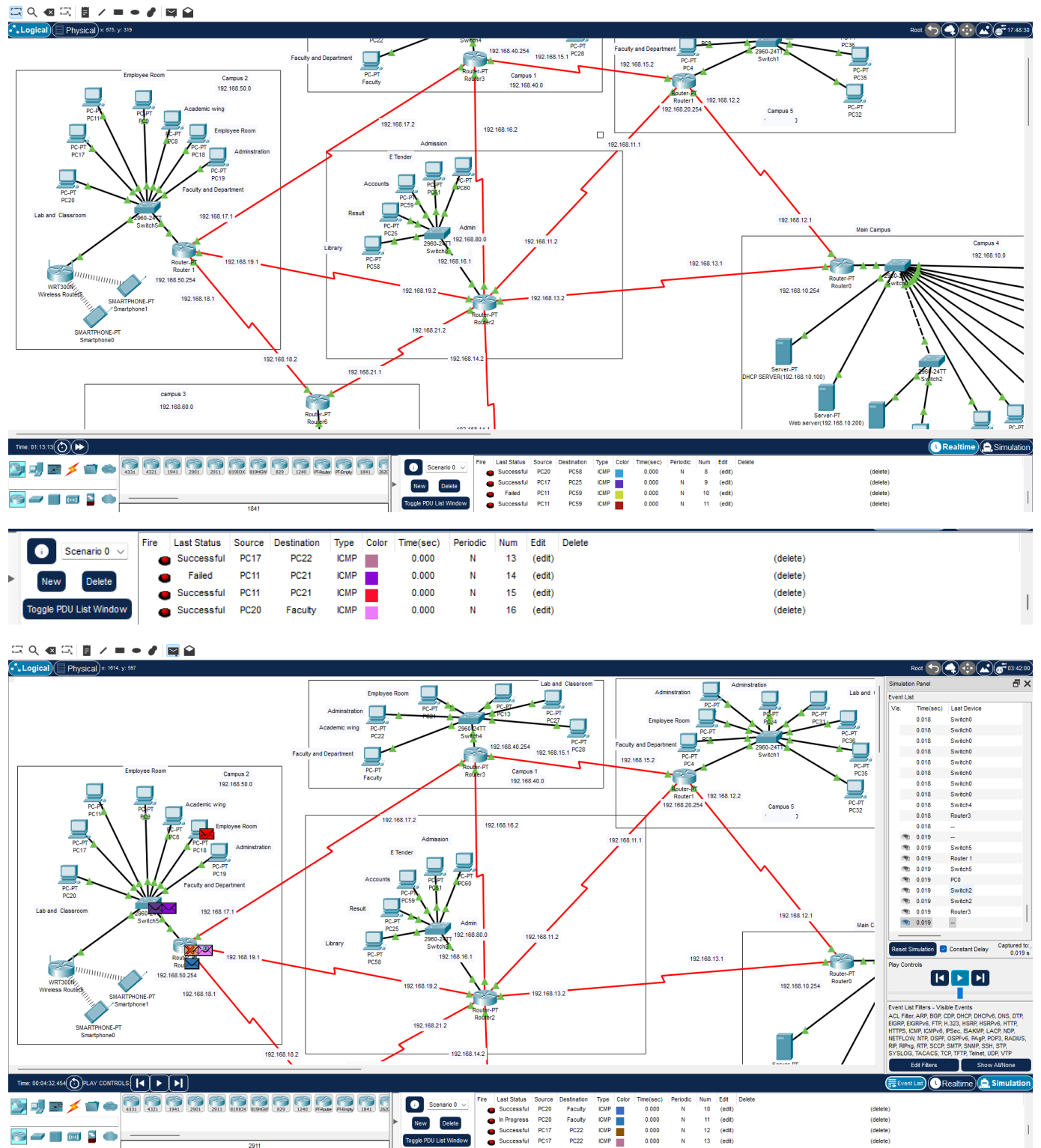


Fig 8: pinging Icmp packets

Limitation:

Following a thorough analysis, our network infrastructure's core design flaws have been found to be absent. Every connection, server, and end device is working without a hitch. But it's important to remember that using Class C IP addresses limits the number of hosts that may be used on a network to 254, thus future scaling solutions will need to be taken into account. Furthermore, we have seen a sporadic glitch with Cisco Packet Tracer in our present setup, where sending an ICMP packet successfully takes two or three tries. Even though there could be a quirk with the platform, after the initial obstacle is cleared, it doesn't interfere with regular activities. The network exhibits a high level of complexity, which may lead to challenges in its maintenance. Incorporating additional campus networks is not a straightforward task, as it necessitates manual configuration. Furthermore, the network's capacity to accommodate hosts is constrained.

Conclusion:

Even though I faced some challenges, I worked hard to follow the project description and complete it perfectly. I created a detailed model of a complex network using different devices like computers, routers, switches, and wireless routers. All these devices were able to talk to each other smoothly. I set up a special computer to show the Apex website, and I even made some changes to the website using a special code. I also made sure that whenever any of the six campus needed an internet address, they could get one quickly. And I set up a system so that when someone typed in the website's name, they would be directed to the right place.