Project Report

Project Title: IUS Campus Network System.
Course Name: Network & Server Administration Lab.
Course code: CSE 4278-0612.

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ABSTRACT:

Networking connects computers for secure and efficient information sharing. This project focuses on designing a secure campus network while optimizing resource sharing, including files, applications, and software. Networking enhances security, efficiency, and cost-effectiveness. Key devices like switches and routers enable data transfer via wired and wireless technologies. Collision detection mechanisms prevent data conflicts, ensuring smooth transmission. The project aims to develop a cost-effective network using LAN, WAN, VLAN, and routing protocols while minimizing expenses. Cisco Packet Tracer is used for network design, with hardware implementation providing practical experience in network development.

INTRODUCTION:

A wired campus network is essential for education, giving students and teachers access to resources and seamless communication. As demand for real-time information grows, traditional cable networks face limitations. Wired networking ensures stability, mobility, and flexibility, complementing existing infrastructures. The integration of network technology enhances teaching and research, overcoming cable networks' mobility shortcomings while ensuring continuous and secure connectivity.

Project Statement:

This project simulates a university campus network using wireless technology, dividing it into Main and Branch Campus segments. The goal is to ensure efficient, mobile connectivity while providing DNS, Email, and HTTP servers for resource optimization. Security protocols enhance network reliability. The campus network supports internet access, data sharing, and web services, ensuring stable and efficient communication essential for academic activities.

Tools or Equipment to use:

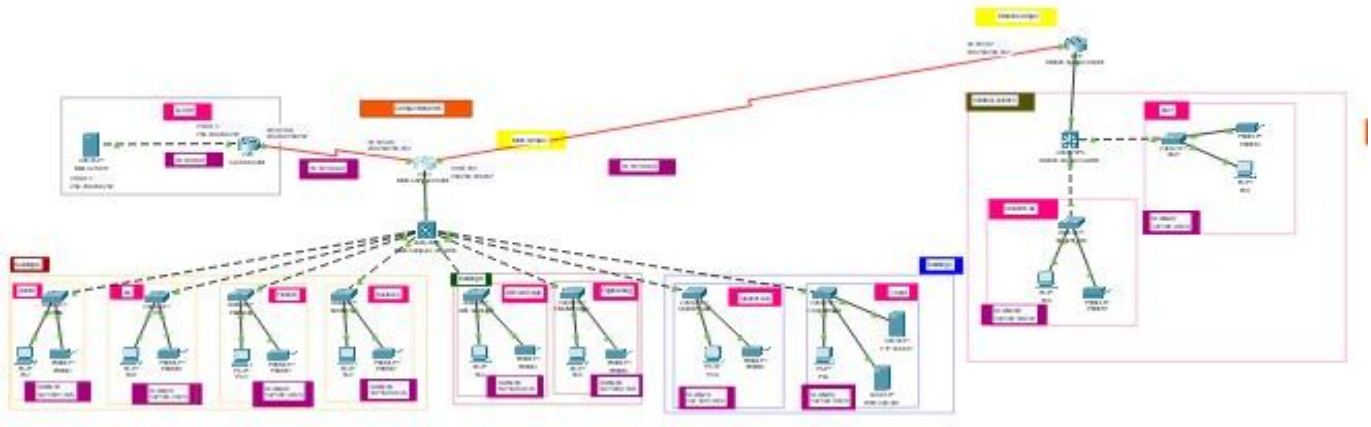
1. Cisco Packet Tracer.

Devices Used in The Network:

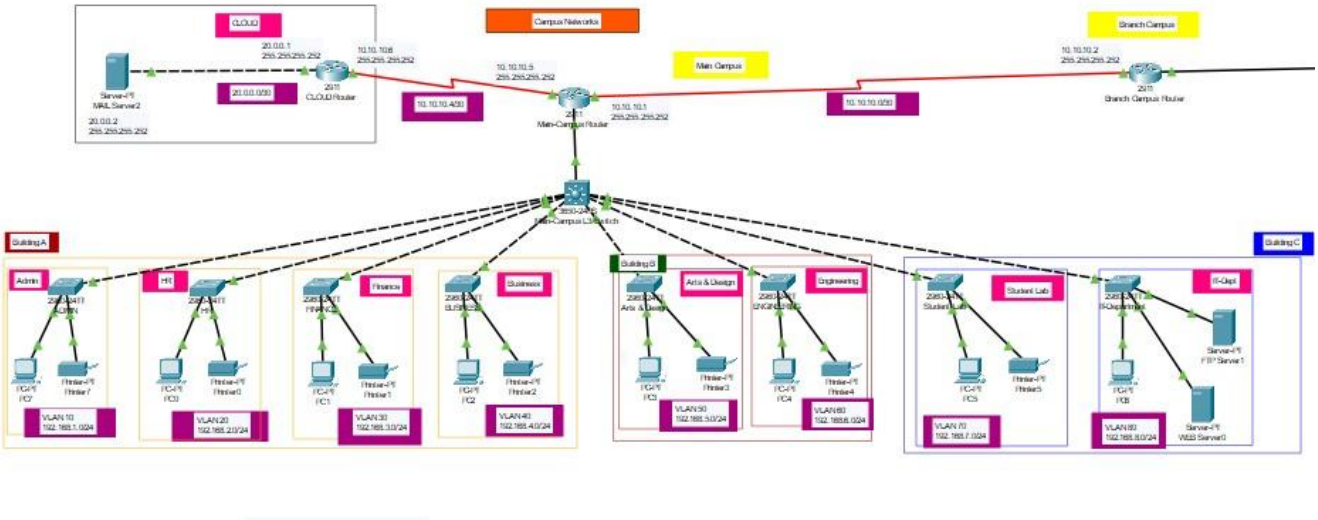
Table 1: Devices names and quantity

Devices	Quantity
Router (2911 PT-Empty)	3
Switch (2960 24PT)	10
Server - PT	3
PC - PT	10
Switch (3560)	2
Printer	9

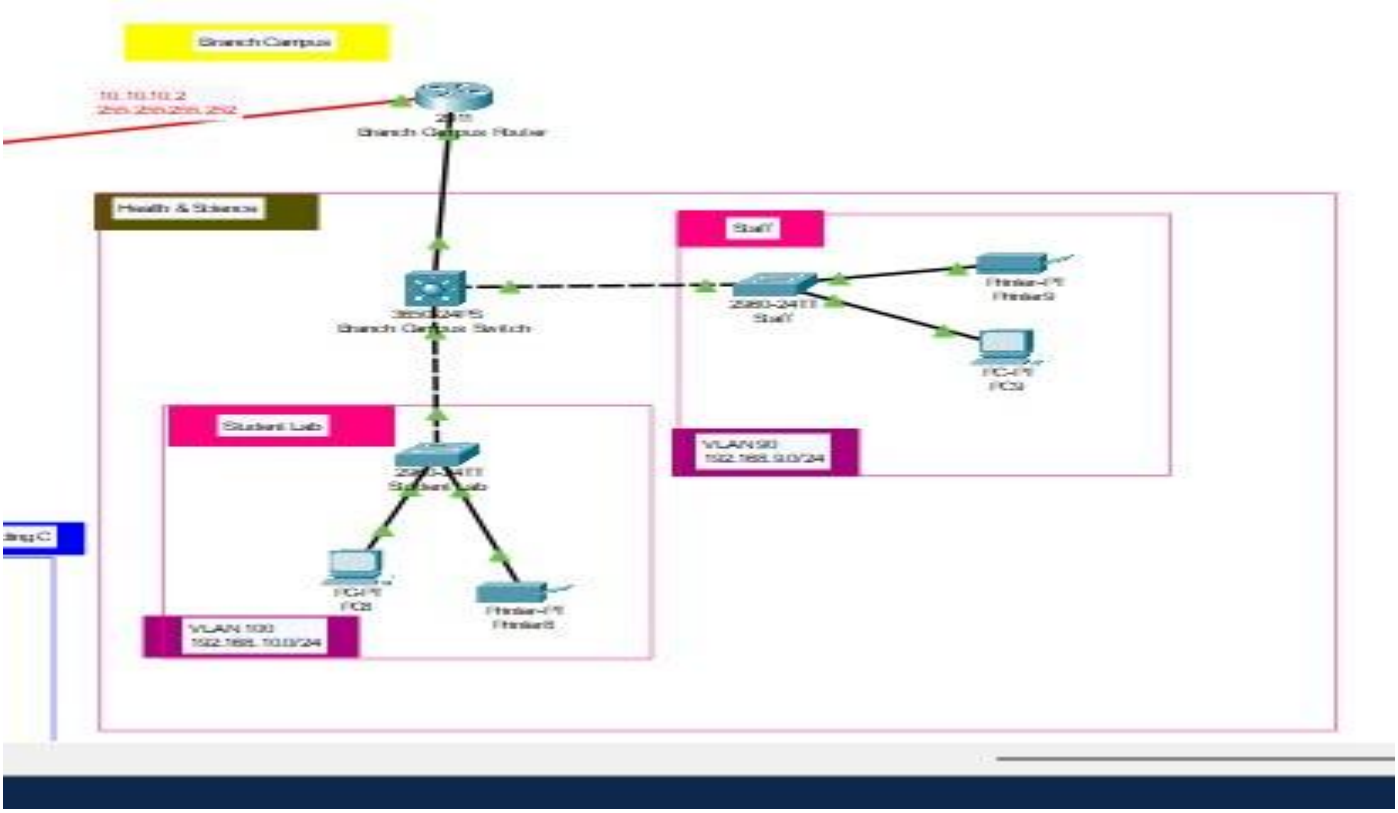
Topology Diagram:



Main-Campus:



Branch campus:



Command-line interface

```
Main-Cam-L3>en
Password:
Main-Cam-L3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Main-Cam-L3(config)#int gig1/0/2
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 10
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/3
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 20
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/4
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 30
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/5
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 40
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/6
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 50
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/7
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 60
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/8
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 70
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#int gig1/0/9
Main-Cam-L3(config-if)#switchport mode access
Main-Cam-L3(config-if)#switchport access vlan 80
Main-Cam-L3(config-if)#ex
Main-Cam-L3(config)#do wr
Building configuration...
Compressed configuration from 7383 bytes to 3601 bytes[OK]
[OK]
Main-Cam-L3(config)#
```

```
Main-Cam-HR>en
Password:
Main-Cam-HR#
Main-Cam-HR#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Main-Cam-HR(config)#int range fa0/1-24
Main-Cam-HR(config-if-range)#switchport mode access
Main-Cam-HR(config-if-range)#switchport access vlan 20
Main-Cam-HR(config-if-range)#do wr
Building configuration...
[OK]
Main-Cam-HR(config-if-range)#ex
Main-Cam-HR(config)#
```

Top

MAIN-CAMPUS ROUTER

Physical Config CLI Attributes

IOS Command Line Interface

```
Main-Cam(config)#service dhcp
Main-Cam(config)#ip dhcp pool admin-pool
Main-Cam(dhcp-config)#network 192.168.1.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.1.1
Main-Cam(dhcp-config)#dns-server  192.168.1.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool hr-pool
Main-Cam(dhcp-config)#network 192.168.2.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.2.1
Main-Cam(dhcp-config)#dns-server  192.168.2.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool finance-pool
Main-Cam(dhcp-config)#network 192.168.3.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.3.1
Main-Cam(dhcp-config)#dns-server  192.168.3.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#ip dhcp pool bus-pool
Main-Cam(dhcp-config)#network 192.168.4.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.4.1
Main-Cam(dhcp-config)#dns-server  192.168.4.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool EC-pool
Main-Cam(dhcp-config)#network 192.168.5.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.5.1
Main-Cam(dhcp-config)#dns-server  192.168.5.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool AD-pool
Main-Cam(dhcp-config)#network 192.168.6.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.6.1
Main-Cam(dhcp-config)#dns-server  192.168.6.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool stu-pool
Main-Cam(dhcp-config)#network 192.168.7.0 255.255.255.0
Main-Cam(dhcp-config)#default-router 192.168.7.1
Main-Cam(dhcp-config)#dns-server  192.168.7.1
Main-Cam(dhcp-config)#ex
Main-Cam(config)#
Main-Cam(config)#ip dhcp pool IT-pool
```

Top

```
Main-Cam>en
Password:
Main-Cam#
Main-Cam#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Main-Cam(config)#router rip
Main-Cam(config-router)#version 2
Main-Cam(config-router)#network 10.10.10.0
Main-Cam(config-router)#network 10.10.10.4
Main-Cam(config-router)#network 192.168.1.0
Main-Cam(config-router)#network 192.168.2.0
Main-Cam(config-router)#network 192.168.3.0
Main-Cam(config-router)#network 192.168.4.0
Main-Cam(config-router)#network 192.168.5.0
Main-Cam(config-router)#network 192.168.6.0
Main-Cam(config-router)#network 192.168.7.0
Main-Cam(config-router)#network 192.168.8.0
Main-Cam(config-router)#ex
Main-Cam(config)#do wr
Building configuration...
[OK]
Main-Cam(config)#
```

Ping All Device

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127
Reply from 192.168.4.2: bytes=32 time=1ms TTL=127
Reply from 192.168.4.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.8.2

Pinging 192.168.8.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.8.2: bytes=32 time<1ms TTL=127
Reply from 192.168.8.2: bytes=32 time<1ms TTL=127
Reply from 192.168.8.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.8.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.9.3

Pinging 192.168.9.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.9.3: bytes=32 time=8ms TTL=126
Reply from 192.168.9.3: bytes=32 time=1ms TTL=126
Reply from 192.168.9.3: bytes=32 time=4ms TTL=126

Ping statistics for 192.168.9.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 8ms, Average = 4ms

C:\>ping 20.0.0.2
```

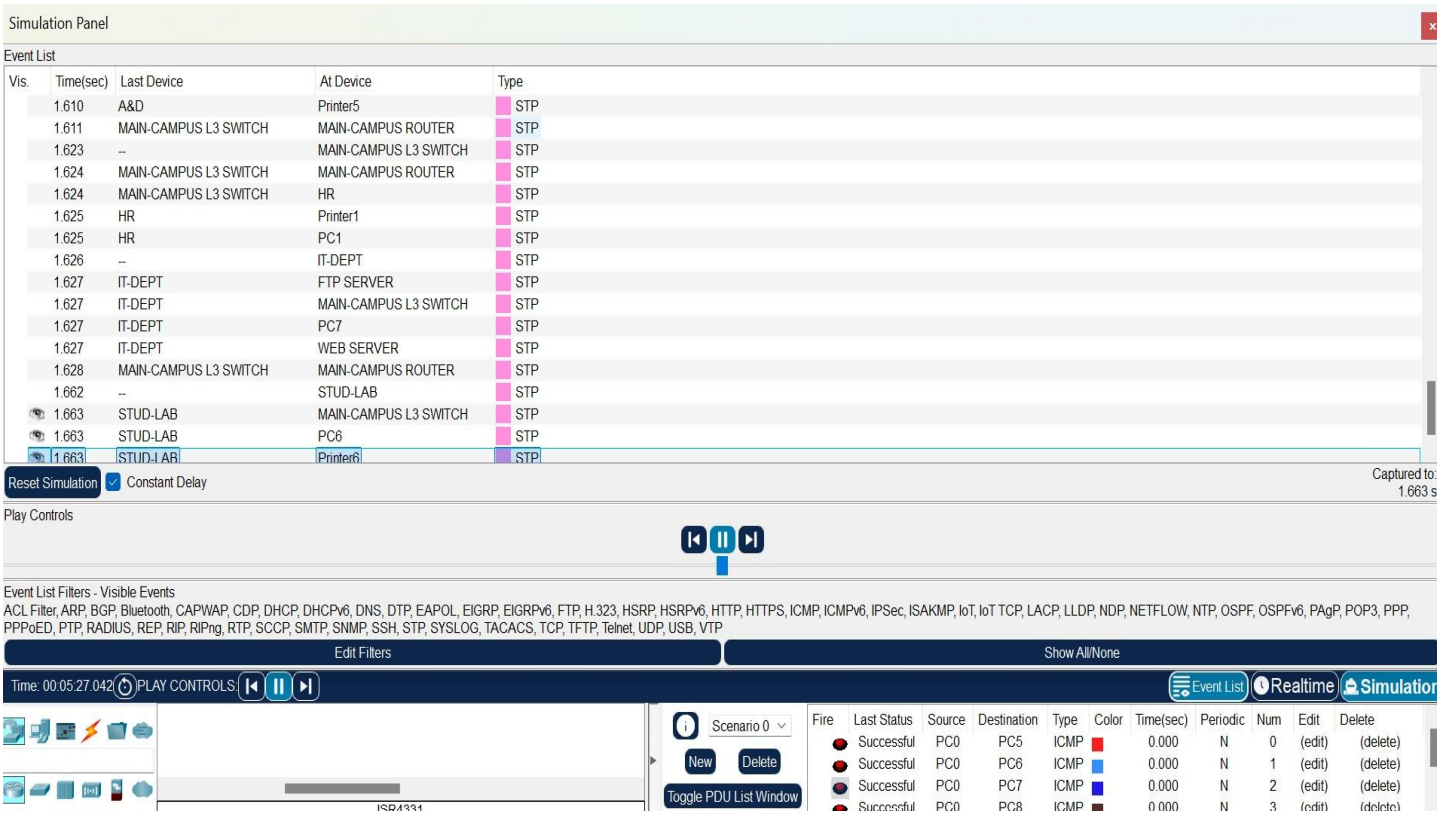
EMAIL SERVER

Physical Config Services Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 20.0.0.1: bytes=32 time<1ms TTL=255
Reply from 20.0.0.1: bytes=32 time<1ms TTL=255
Reply from 20.0.0.1: bytes=32 time<1ms TTL=255
Reply from 20.0.0.1: bytes=32 time<1ms TTL=255

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Simulation



Conclusion

The project successfully addressed key questions regarding the performance of the campus network system. It demonstrates a scalable, secure, and efficient network topology for IUS University, meeting the functional and security needs of a modern educational institution. By implementing VLANs, dynamic IP addressing, RIPv2 routing, and SSH-based secure access, the network ensures seamless communication among faculty, students, and staff across multiple campuses.