A Mini Project Report on

College Network Scenario

Submitted in partial fulfillment of the requirements of
the Semester VII Subject of

Network Design Lab

in

Information Technology

by

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CERTIFICATE

This is to certify that Network Design Lab (NDL) Mini Project entitled ***"College Network Scenario"*** Submitted by ***"Jay Kate (Roll No 20), Akash Jagtap (Roll No 14) , Rohit Khavanekar (Roll No 22)"*** for the partial fulfillment of the requirement for Semester VII Subject of ***Network Design Lab*** in ***BE Information Technology*** to the University of Mumbai, is a Bonafede work carried out during Semester VII in Academic Year 2019-2020

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Date:

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature
Jay Kate

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Akash Jagtap

Signature
Rohit Khavanekar

Date:

Abbreviations

MSE	**M**obility **S**ervice **E**ngine
UCS	**U**nified **C**omputing **S**ystem
RFP	**R**equest **F**or **P**roposal
IP	**I**nternet **P**rotocol
RIP	**R**outing **I**nformation **P**rotocol
RPP	**R**outing **P**rotocol **P**lan
OS	**O**perating **S**ystem
OSI	**O**pen **S**ystems **I**nterconnection
FTP	**F**ile **T**ransfer **P**rotocol
DNS	**D**omain **N**ame **S**ystem
LAN	**L**ocal **A**rea **N**etwork
VLAN	**V**irtual **L**ocal **A**rea **N**etwork

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Introduction

This College Network Scenario is about designing a topology of a network that is a LAN (Local Area Network) for a College in which various computers of different departments are set up so that they can interact and communicate with each other by interchanging data. To design a networking scenario for a college which connect various departments to each other's, it puts forward communication among different departments. CNS is used to design a systematic and well-planned topology, satisfying all the necessities of the college (i.e. client). CNS come up with a network with good performance.

Objectives

The main objective of the proposed network is to update the existing network and also enhance its capabilities and increase the flexibility of the network which will eventually provide good security.

Network Requirements

1: The new system should be able to reduce internet downtime. Download and upload links should be maintained above 5 Mbps speed requirement.

2: Network will be scalable.

3: The system should support remote access.

4: Should comprise of data centers with necessary security features and support.

Major Design Areas and Functional Areas

The new system planned comprises of IP based switches that remain as the access point to lan-based (ethernet) as well as Wi-Fi-based connectivity.
These switches provide SNMP support as well so that traffic monitoring becomes easy.
Ip based switches are used mainly because:

- The inter VLAN routing feature is supported on both IP base or SMI and IP services or EMI image Layer 3 switches. For Layer 2-only switches, you require a Layer 3 routing device with any of the previous images.

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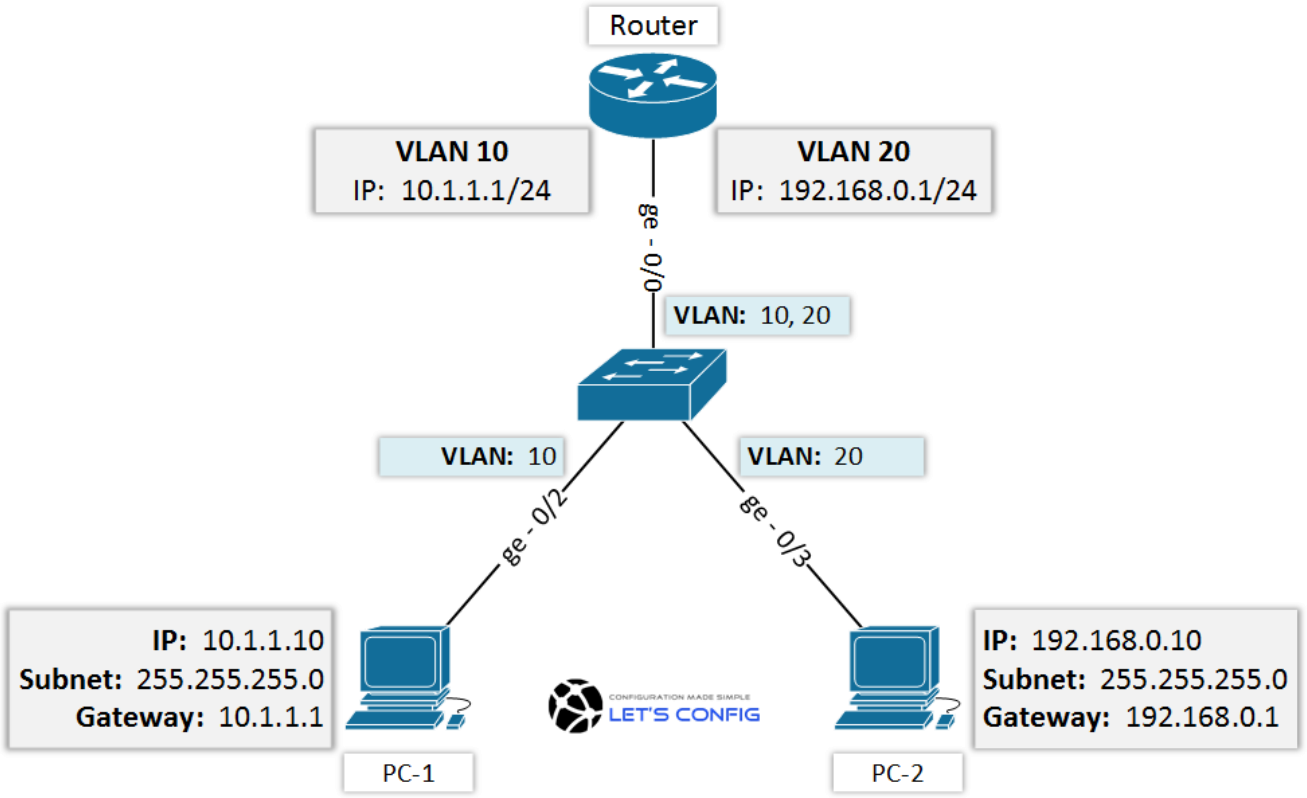


VLAN Config

- The IP Base feature set includes advanced quality of service (QoS), rate limiting, access control lists (ACLs), and basic static and Routing Information Protocol (RIP) functions. Dynamic IP routing protocols (Open Shortest Path First (OSPF), BGPv4, Enhanced Interior Gateway Routing Protocol (EIGRP)) are available only on the IP services image.

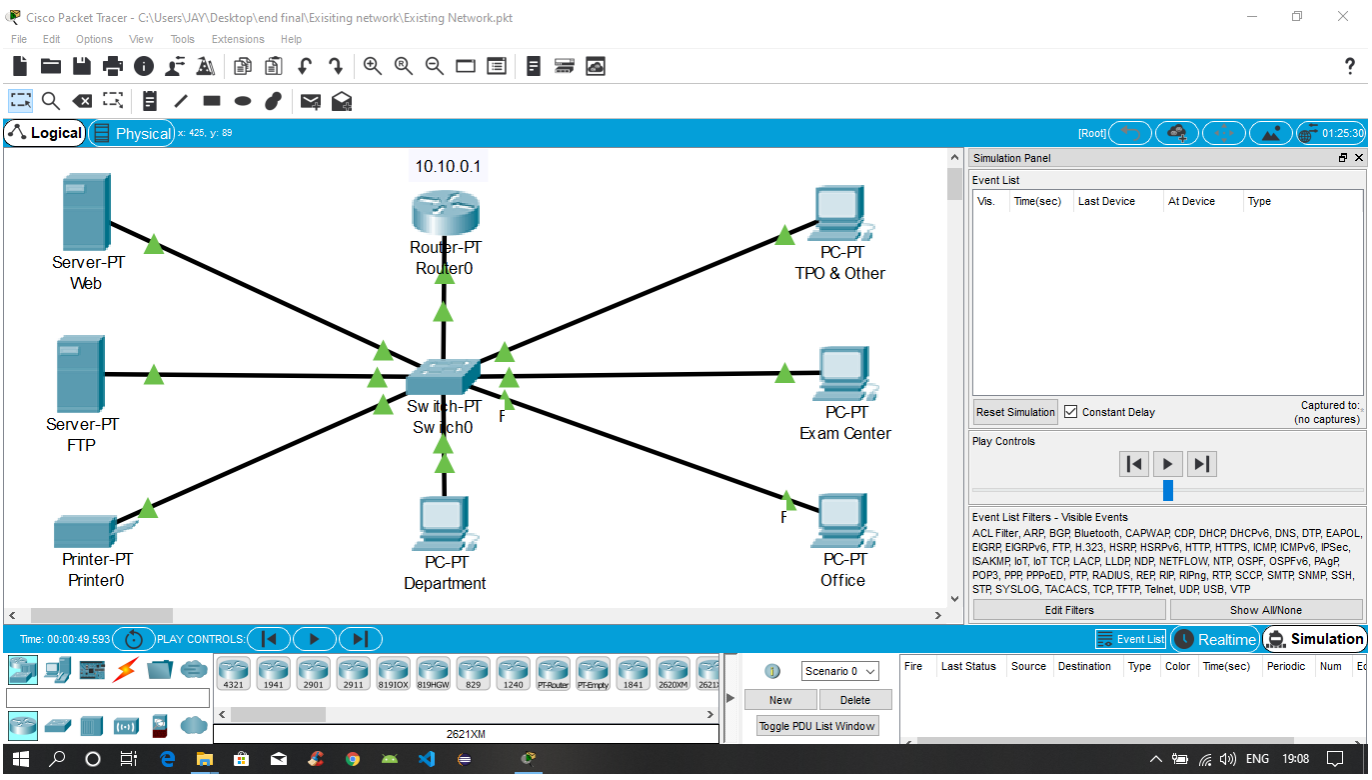
- The IP Services image provides a richer set of enterprise-class features, which includes advanced hardware-based IP unicast and IP Multicast routing. Support for IPv6 Layer 3 switching in hardware is also available with the addition of the Advanced IP Services license to either the IP Base or the IP Services images. Both the IP base Image and the IP services image allow for Layer 3 and Layer 4 lookups for QoS and security.

Existing Infrastructure

The existing system is a very basic system. College mainly comprises of three main sections as

1. TPO & Other
2. Exam Center
3. Office

All the hosts are assigned with static IPs and are assigned in the order in which it where set up. No support for dynamic IP allocations. Even though the working is divided into three major sectors all the host, multimedia devices are connected in a single network. Thus, network security and maintenance are difficult. One more problem observed was the existing switches were outdated and hence could not prove to be beneficial for the network administrator to observe monitor and handle the network traffic the system has no remote access to the network. Absence of basic small-scale businesses firewall was also observed. Thus, security is also compromised. Three server rooms were used for the purpose of independent networking which further caused wastage of power and money.



The above design is the existing network traced on cisco packet tracer.

Network Devices

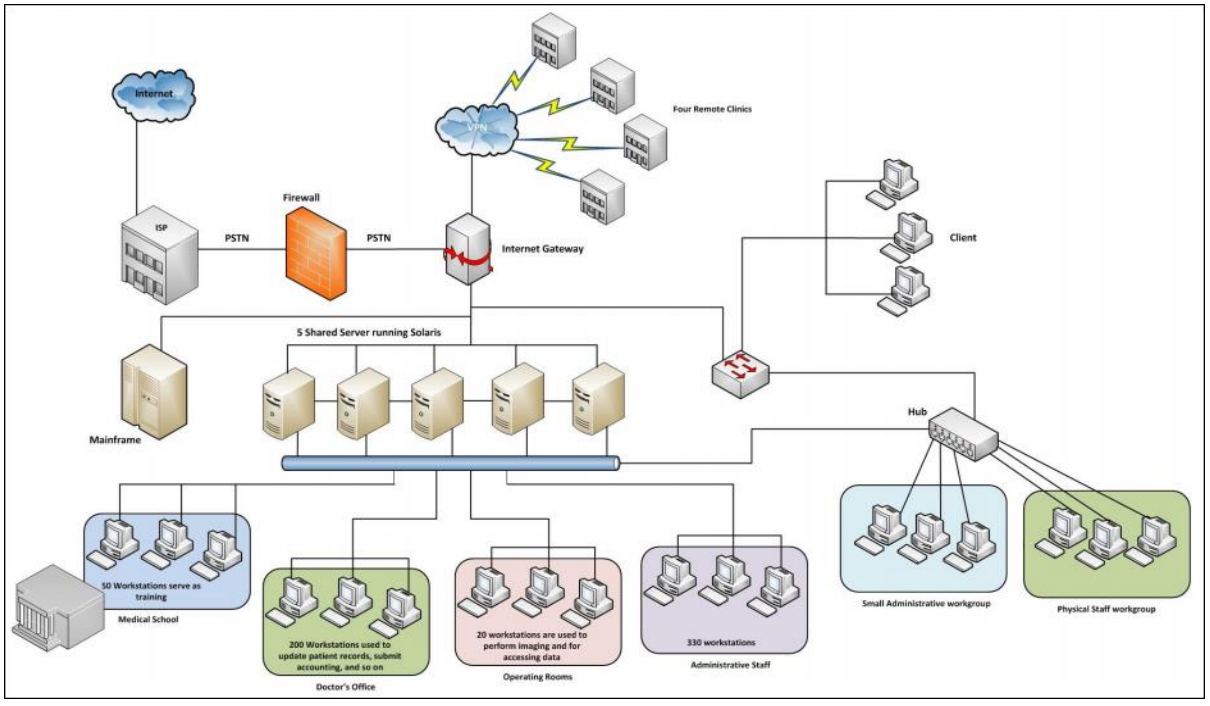
Developing the existing Lan system:

- The basis of the LAN core is Cisco Catalyst 6509 switches equipped with Cisco 720 supervisors and Virtual Switching System (VSS), as well as Cisco 4500 switches, combined in a stack with the data transmission ports at 10 Gb/s bandwidth capacity. Switches create a platform for additional services, such as content processing, firewall (the project uses the Cisco firewall), intrusion prevention system, application of IPsec security tools, the arrangement of protected VPN channels, network analysis and acceleration of Secure Sockets Layer (SSL) connections.

Mobility Services Engine (MSE) solution and 300 Cisco Aironet 1140 access points were used.

- The Cisco Aironet 1140 Series is a component of the Cisco Unified Wireless Network, which can scale up to 18,000 access points with full Layer 3 mobility across central or remote locations on the enterprise campus, in branch offices, and at remote sites.

- The Cisco Unified Wireless Network is the industry's most flexible, resilient, and scalable architecture, delivering secure access to mobility services and applications and offering the lowest total cost of ownership and investment protection by integrating seamlessly with the existing wired network.



Above is the pictorial representation of the proposed network

Cisco Unified Computing System (UCS) solution allowed the integration of computer and network resources as well as storage and virtualization systems as part of an energy efficiency system. Cisco Unified Computing System platform notably simplifies traditional architecture and significantly reduces the number of devices to be purchased, to connect by wires, to supply with electricity and cooling, to protect and maintain. This solution is the foundation of complex optimization of the virtualized medium while maintaining the ability to support traditional operating systems and applications stacks in physical medium. This overall infrastructure developed allowed integration of several functionally different physical networks into one, such as guest network, hotel management network, telephone network and IP-Television network. The convergence within single network reduced hotel expenses for constructing and managing several dedicated networks which traditionally remain separate in hotels.

The term unified computing system is often associated with Cisco. Cisco UCS products have the ability to support traditional operating system (OS) and application stacks in physical environments, but are optimized for virtualized environments. Everything is managed through Cisco UCS Manager, a software application that allows administrators to provision the server, storage and network resources all at once from a single pane of glass. Similar offerings to Cisco UCS include HP BladeSystem Matrix, Liquid Computing's LiquidIQ, Sun Modular Datacenter and InteliCloud 360.

Request For Proposal

Serial no	**Network Devices**	**Price per unit** (Approx.)	**Quantity**	**Total cost (INR)**
1	The Cisco System Business switches	17,999	6	108,000
2	Cisco RV042G:	8000	3	24,000
3	Wires	25000	2	50000
			Total	**182,000**

IP Addressing Plan

IT DEPARTMENT (192.168.1.0)	
HOD CABIN	192.168.1.2
IT LAB 1	192.168.1.3
IT LAB 2	192.168.1.4
IT LAB 3	192.168.1.5
IT LAB 4	192.168.1.6
Printer 0	192.168.1.7

COMPUTER DEPARTMENT (192.168.2.0)	
CS HOD CABIN	192.168.2.2
CS LAB 1	192.168.2.3
CS LAB 2	192.168.2.4
CS LAB 3	192.168.2.5
CS LAB 4	192.168.2.6
Printer 7	192.168.2.7

OTHERS (192.168.3.0)	
OFFICE	192.168.3.2
Printer 2	192.168.3.6
EXAM CELL	192.168.3.3
Printer 3	192.168.3.7
ENQUIRY	192.168.3.4
TPO	192.168.3.5
Printer 4	192.168.3.8

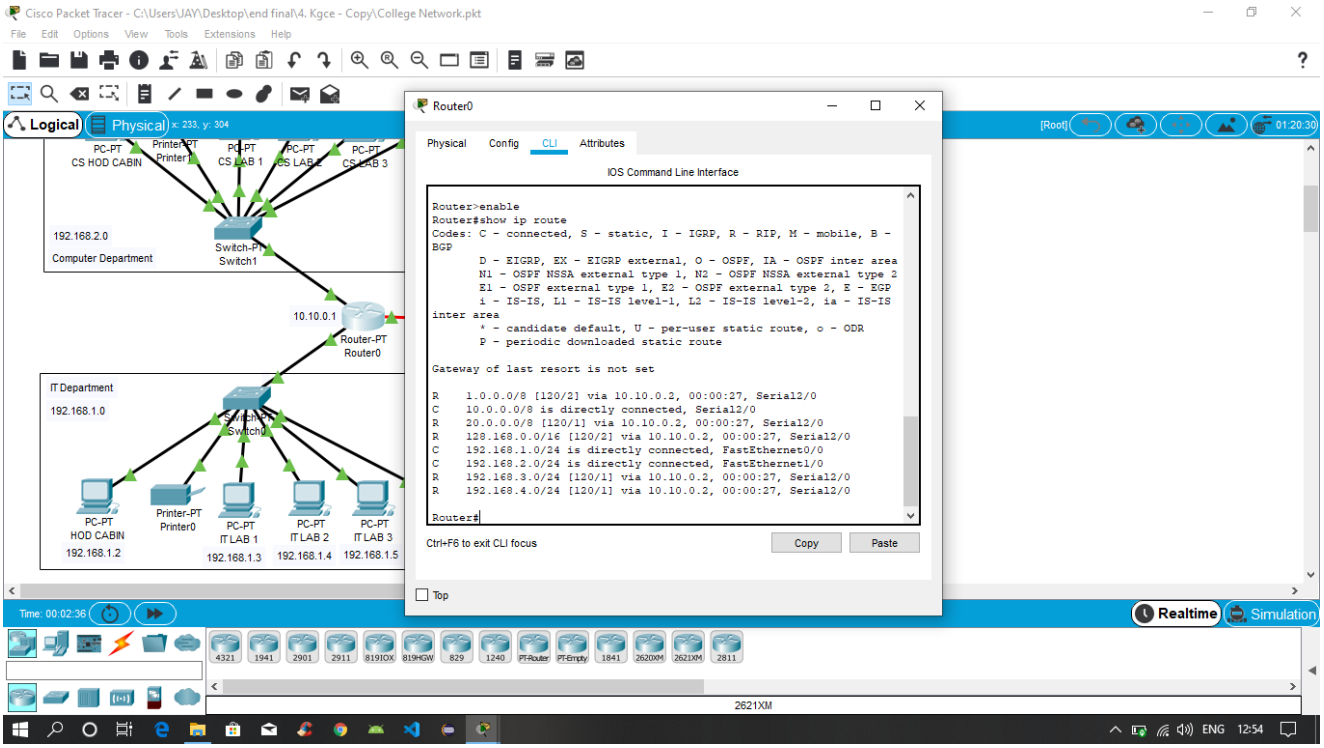
SERVER ROOM (1.0.0.0)	
FTP SERVER	1.0.0.4
PC1	1.0.0.5
DNS SERVER	1.0.0.2
WEB SERVER	1.0.0.3

INTERNET LAB (128.168.0.0)	
PC2	128.168.0.2
PC3	128.168.0.3
PC4	128.168.0.4
PC5	128.168.0.5
Printer 5	128.168.0.6

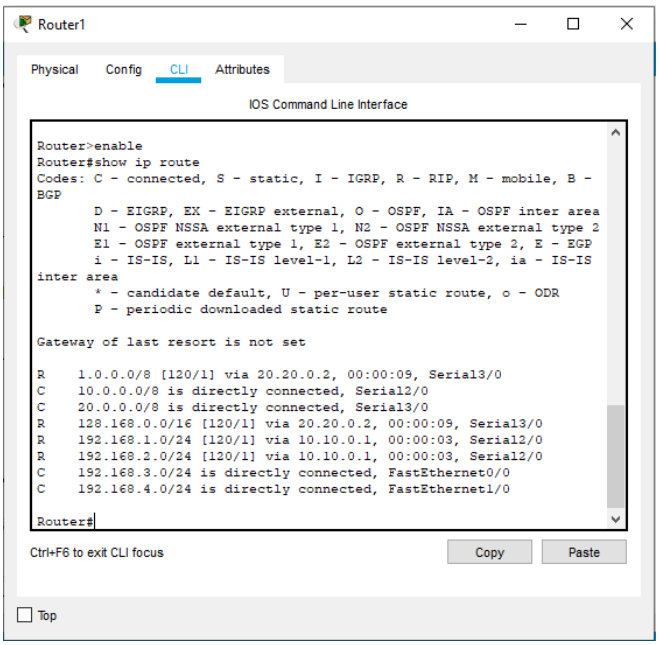
PRINCIPLE ROOM (192.168.4.0)	
PC 0	192.168.4.2
LAPTOP 0	192.168.4.3

Routing Protocol Plan

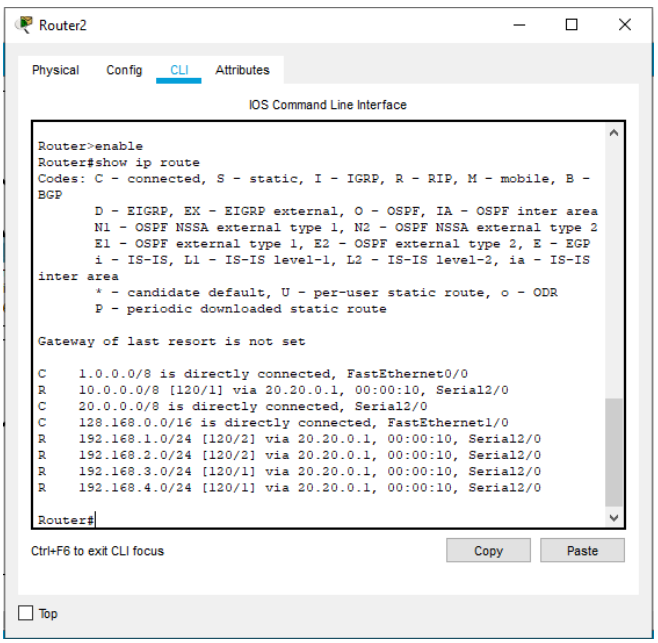
Routing Information Protocol (RIP) is a dynamic routing protocol which uses hop count as a routing metric to find the best path between the source and the destination network. It is a distance vector routing protocol which has AD value 120 and works on the application layer of OSI model.



Routing Protocol Plan for Router0

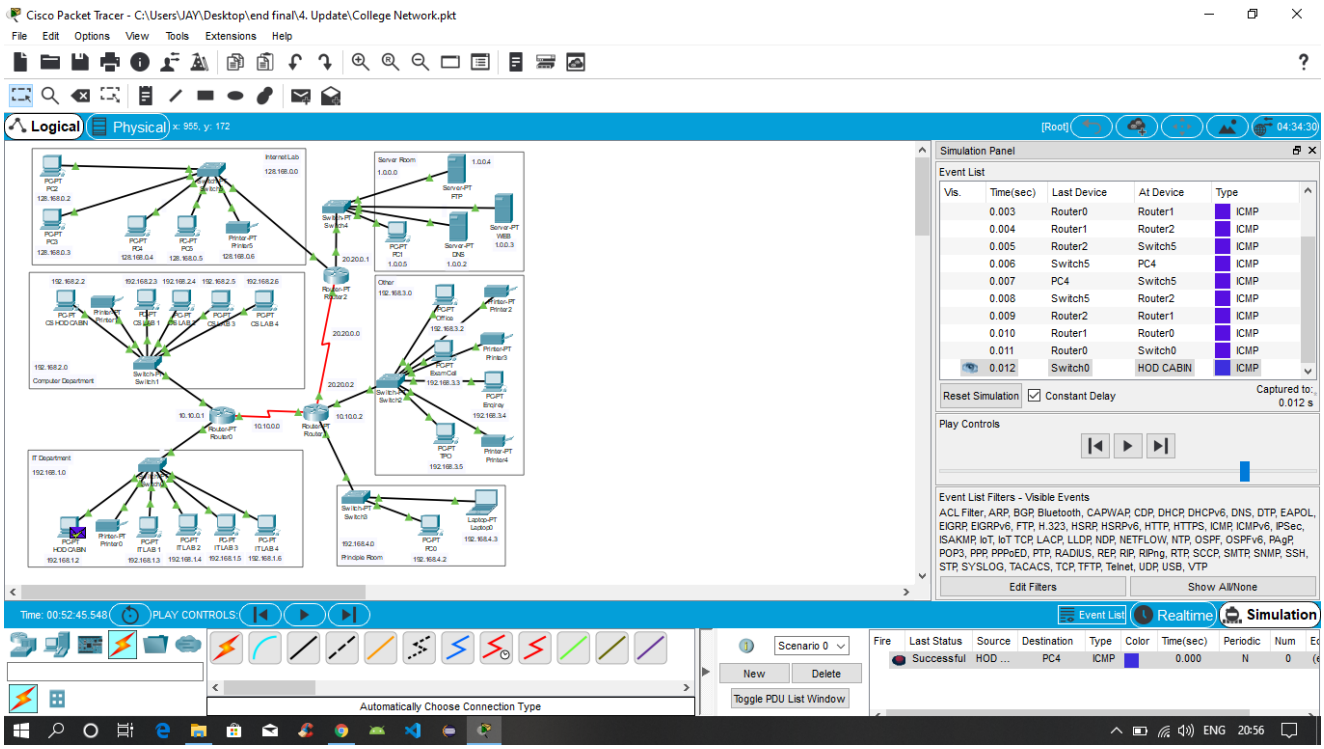


Routing Protocol Plan for Router1

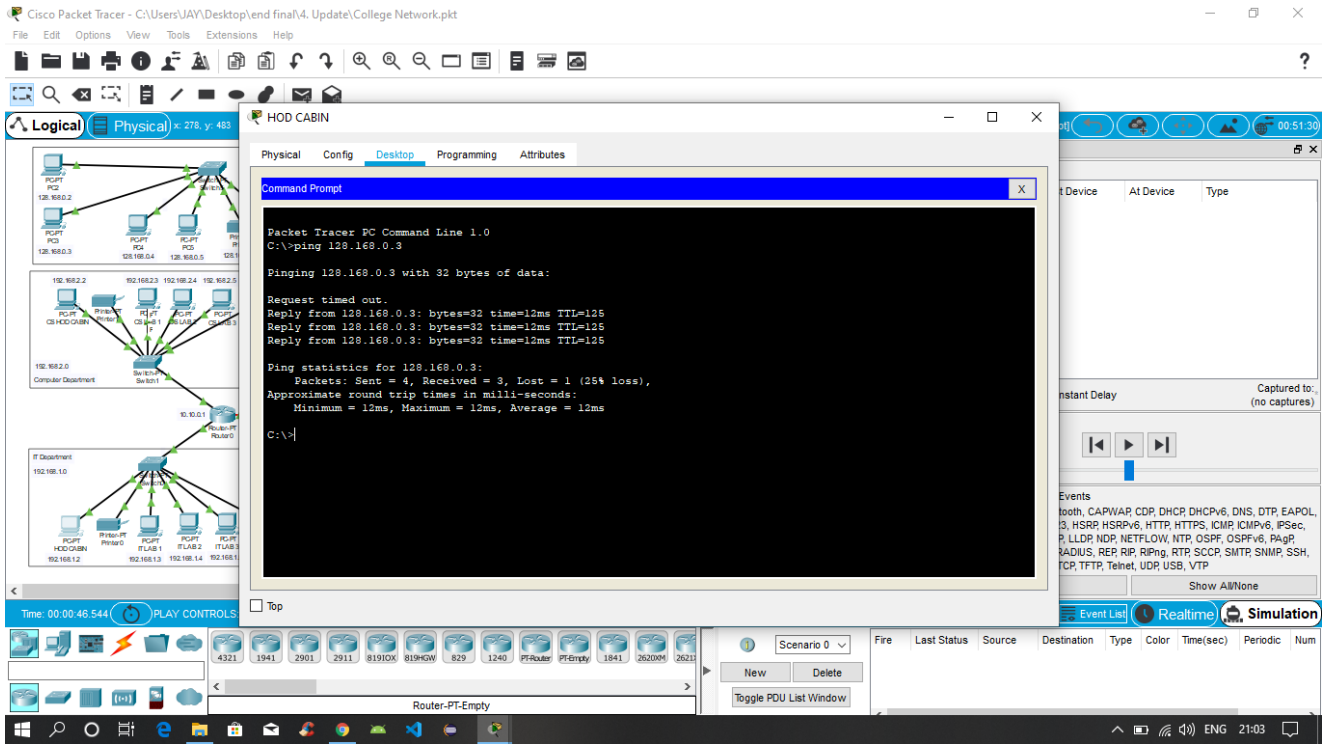


Routing Protocol Plan for Router2

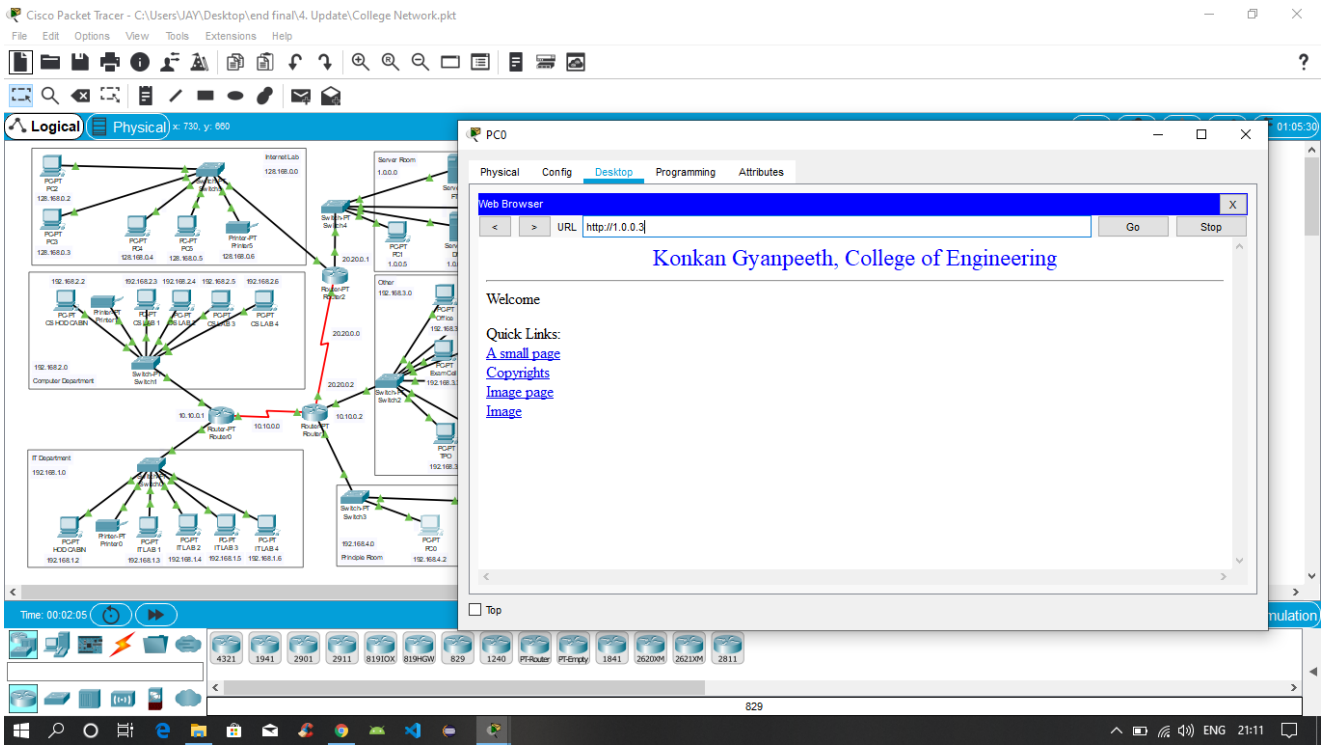
Network Design



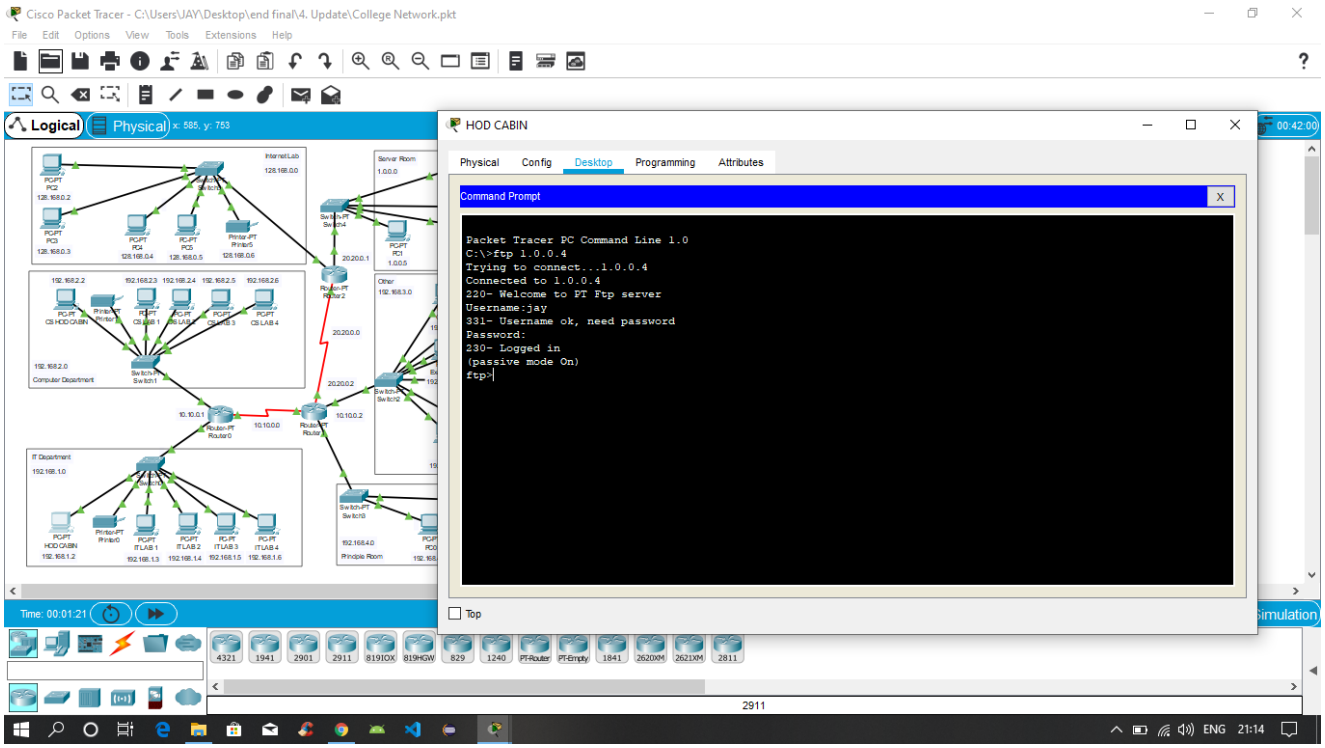
The prototype of the proposed network is implemented on cisco packet tracer



Testing VLAN communications from HOD Cabin to Internet Lab



Testing Web Hosting



Testing FTP Server

Summary

The outcome of the proposed system will be a fail-safe backbone network infrastructure which meets the requirements for readily available access to information and security of the private network, and also ensures optimized productivity when telecommunication services are accessed. The installed equipment allowed to organize high-speed wired and wireless Internet access throughout the whole complex of hospital buildings as well as providing transfer of all types of data throughout the single optimized network.

References

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