

A Mini Project Report on

College Campus Network

By

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SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this project report "**COLLEGE CAMPUS NETWORK**" is the bonafide work of **AKASH KUMAR SINGH** who carried out the project work under my supervision.

SIGNATURE

Contents

1: Aim	1
2: Objectives	1
3: Introduction	1
4: Requirement Analysis	2
5: Major Design Areas and Functional Areas	3
6; Infrastructure	4
7: IP addressing Plan	6
8: Routing Protocol Plan & Implementation	7
9: Network Design	9
10: Experiment Result and Analysis	10
11: Summary	12

AIM

To construct and implement a College Campus Network using Cisco Packet Tracer.

Objectives

The main objective of the proposed network is to implement the college campus network in which every user will be given a access to the web server and the mail server to interact with every other users and provide good security to every routers and switches of the network by using highly secured encrypted passwords.

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.

REQUIREMENT ANALYSIS

Hardware Requirements

1. Processor: 2.4 GHz Clock Speed
2. RAM: 1 GB
3. Hard Disk: 500 MB (Minimum free space)

Software Requirements

- i. Operating System: Windows
- ii. CISCO PACKET TRACER (VERSION-8.0.0 & HIGHER)

Network Requirements

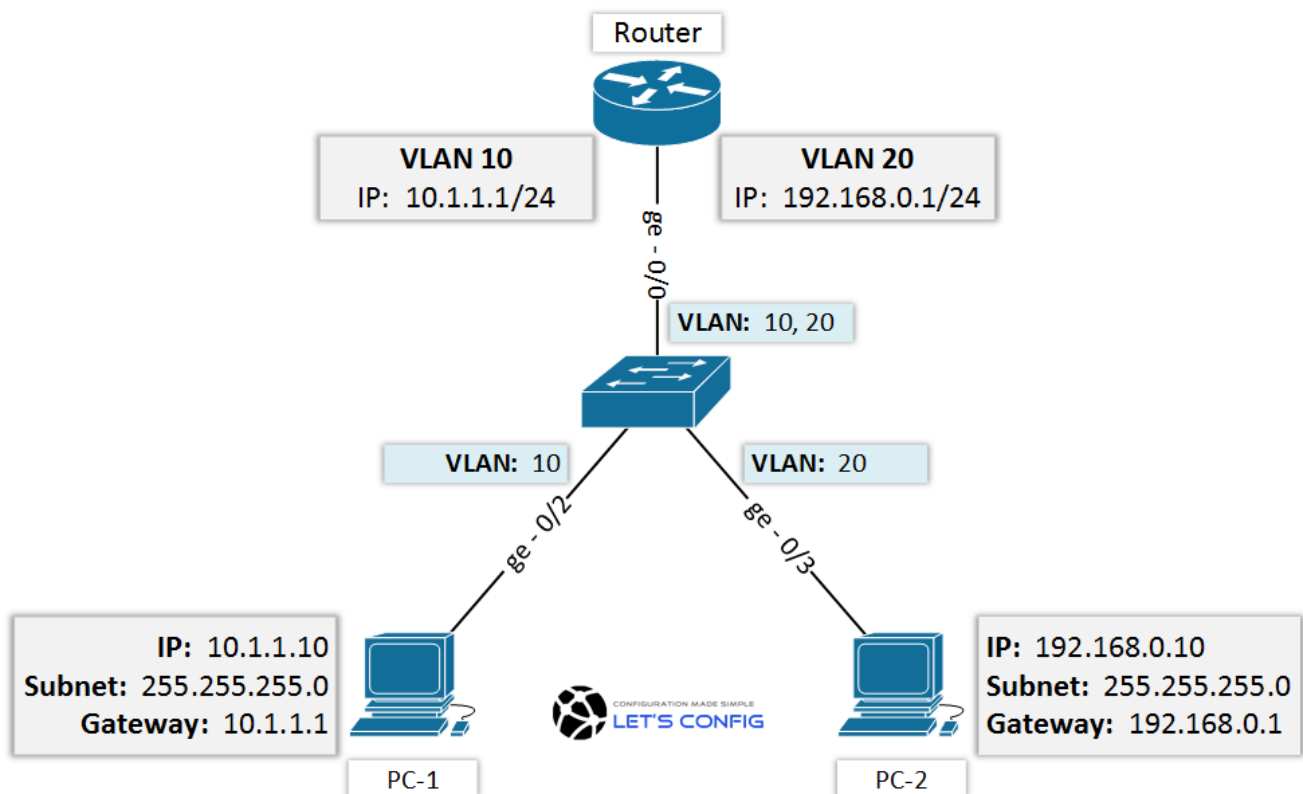
- i. The new system should be able to reduce internet downtime. Download and upload links should be maintained above 5 Mbps speed requirement.
- ii. Network will be scalable.
- iii. The system should support remote access.
- iv. Should comprise of data centers with necessary security features and support.

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.



VLAN Config

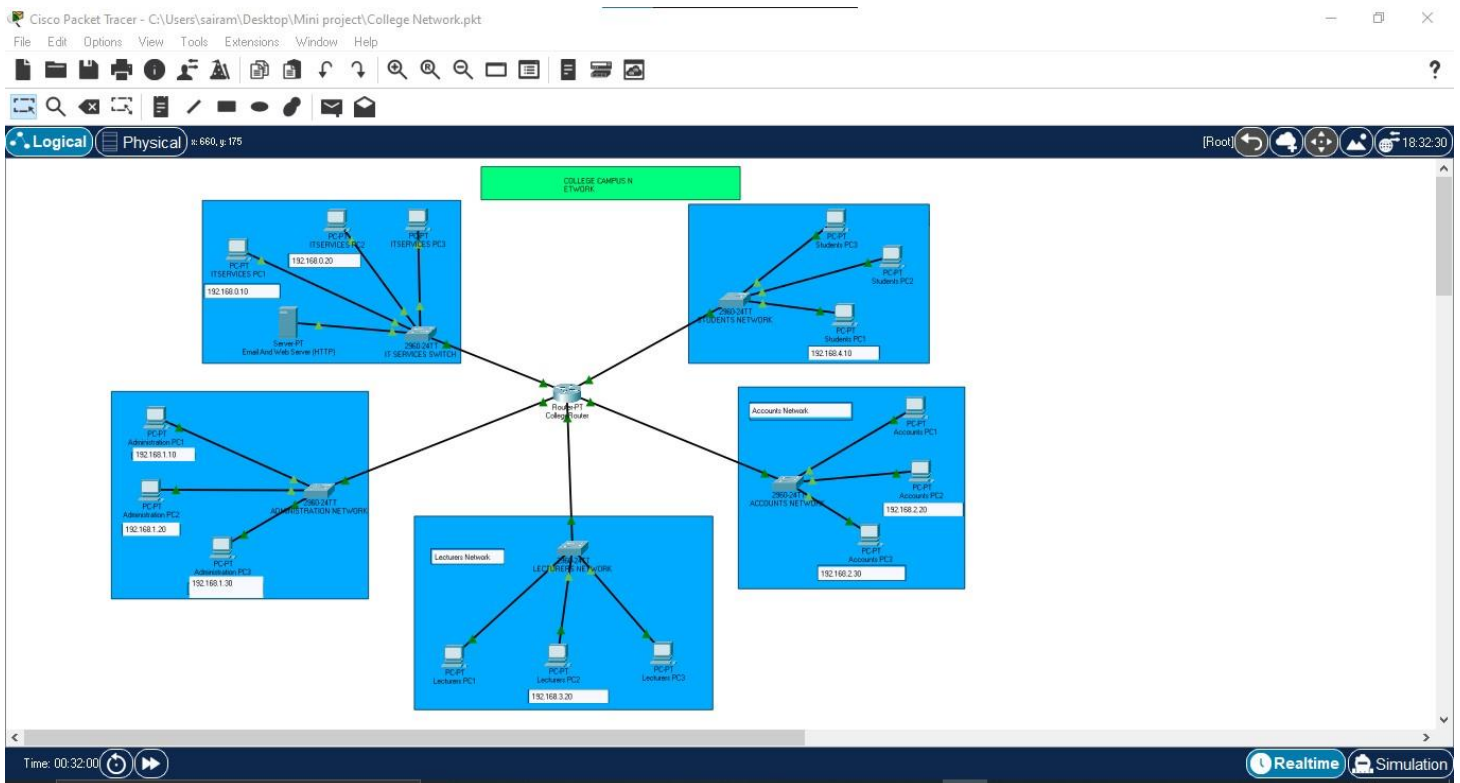
- The IP Base feature set includes advanced quality of service (QoS), rate limiting, access control lists (ACLs), and basic static and Routing Information Protocol (RIP) functions. Dynamic IP routing protocols (Open Shortest Path First (OSPF), BGPv4, Enhanced Interior Gateway Routing Protocol (EIGRP))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

Infrastructure

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

1. IT SERVICES SECTION
2. ADMINISTRATION NETWORK
3. LECTURERS NETWORK
4. ACCOUNTS NETWORK
5. STUDENTS NETWORK

All the hosts are assigned with static IPs and are assigned in the order in which it was set up. No support for dynamic IP allocations. Even though the working is divided into five major sectors all the host, multimedia devices are connected in a single network. All the switches are configured and this will include the securing access to the command line interface (CLI) and console ports using encrypted and plain text passwords and also all the switches have configured messages for users logging into switch. These banners are also used to warn unauthorized users that access is prohibited



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

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.

IP Addressing Plan

IT SERVICES DEPARTMENT (192.168.0.0\24)	
IT SERVICES PC1	192.168.0.1
IT SERVICES PC2	192.168.0.2
IT SERVICES PC3	192.168.0.3

ADMINISTRATION DEPARTMENT (192.168.1.0\24)	
ADMINISTRATION PC1	192.168.1.1
ADMINISTRATION PC2	192.168.1.2
ADMINISTRATION PC3	192.168.1.3

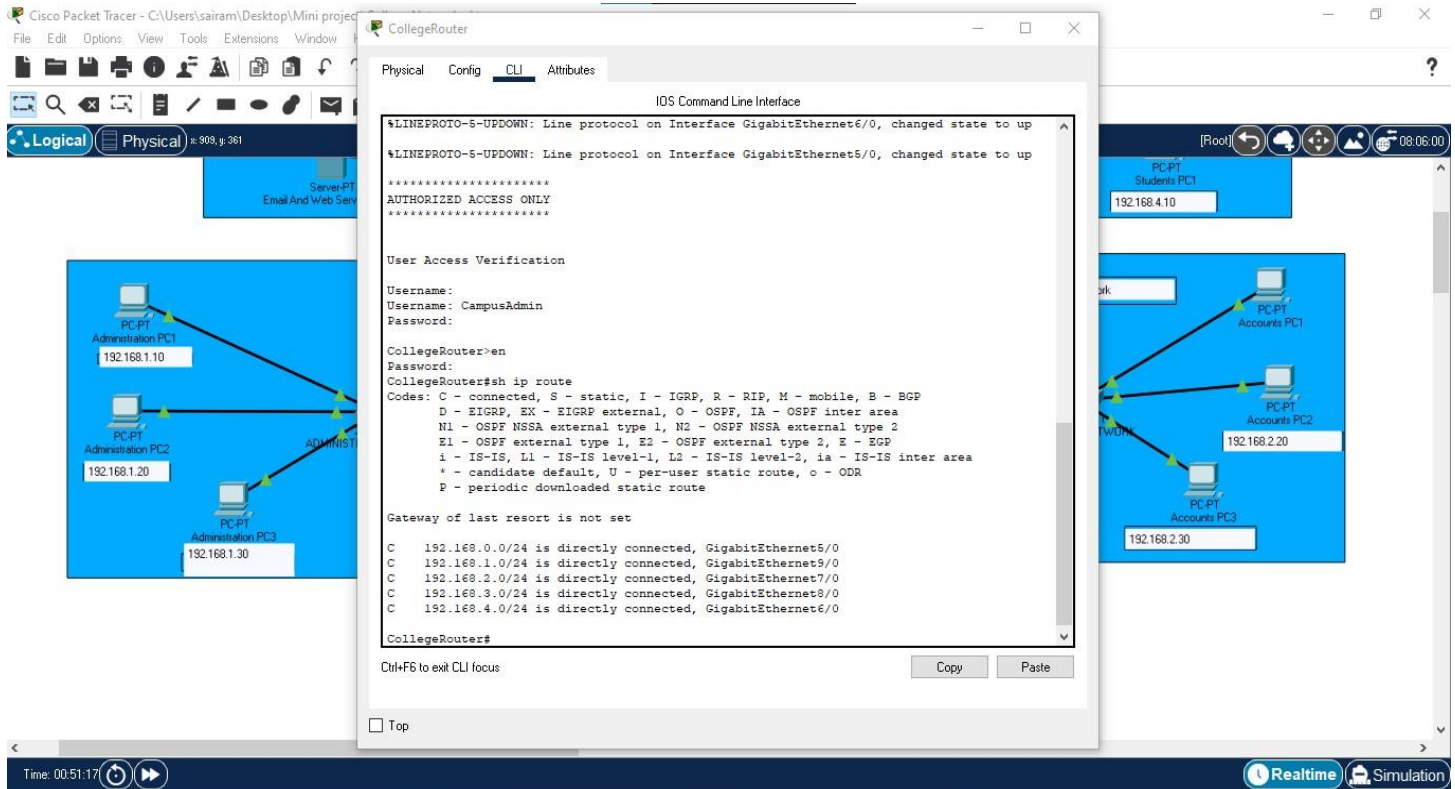
STUDENTS DEPARTMENT (192.168.4.0\24)	
STUDENTS PC1	192.168.4.1
STUDENTS PC2	192.168.4.2
STUDENTS PC3	192.168.4.3

LECTURERS DEPARTMENT (192.168.3.0\24)	
LECTURERS PC1	192.168.3.1
LECTURERS PC2	192.168.3.2
LECTURERS PC3	192.168.3.3

ACCOUNTS DEPARTMENT (192.168.2.0\24)	
ACCOUNTS PC1	192.168.2.1
ACCOUNTS PC2	192.168.2.2
ACCOUNTS PC3	192.168.2.3

Routing Protocol Plan and Implementation

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 Campus Main Router

College Router Configuration

CollegeRouter

Physical Config **CLI** Attributes

IOS Command Line Interface

Press RETURN to get started!

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret password
Router(config)#hostname CollegeRouter
CollegeRouter(config)#enable secret password
CollegeRouter(config)#username CampusAdmin password srml550
CollegeRouter(config)#line con 0
CollegeRouter(config-line)#password srml550
CollegeRouter(config-line)#login local
CollegeRouter(config-line)#line vty 0 15
CollegeRouter(config-line)#password srml550
CollegeRouter(config-line)#login local
CollegeRouter(config-line)#exit
CollegeRouter(config)#
CollegeRouter(config)#service password-encryption
CollegeRouter(config)#
CollegeRouter(config)#banner motd #
Enter TEXT message. End with the character '#'.

AUTHORIZED ACCESS ONLY

CollegeRouter(config)#do copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
CollegeRouter(config)#
CollegeRouter(config)#

Ctrl+F6 to exit CLI focus

Copy Paste

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CollegeRouter

Physical Config **CLI** Attributes

IOS Command Line Interface

CollegeRouter(config)#
CollegeRouter(config)#int g5/0
CollegeRouter(config-if)#ip add 192.168.0.1 255.255.255.0
CollegeRouter(config-if)#no shut

CollegeRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet5/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet5/0, changed state to up

CollegeRouter(config-if)#int g6/0
CollegeRouter(config-if)#ip add 192.168.4.1 255.255.255.0
CollegeRouter(config-if)#no shut

CollegeRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet6/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet6/0, changed state to up

CollegeRouter(config-if)#int g7/0
CollegeRouter(config-if)#ip add 192.168.2.1 255.255.255.0
CollegeRouter(config-if)#no shut

CollegeRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet7/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet7/0, changed state to up

CollegeRouter(config-if)#int g8/0
CollegeRouter(config-if)#ip add 192.168.3.1 255.255.255.0
CollegeRouter(config-if)#no shut

CollegeRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet8/0, changed state to up

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Administration Switch Configuration

Administration Network

Physical Config **CLI** Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname Administration
Administration(config)#enable secret password
Administration(config)#username CampusAdmin password srml550
Administration(config)#line con 0
Administration(config-line)#password 1550
Administration(config-line)#login local
Administration(config-line)#line vty 0 15
Administration(config-line)#password srml550
Administration(config-line)#login local
Administration(config-line)#exit
Administration(config)#
Administration(config)#service password-encryption
Administration(config)#banner motd #
Enter TEXT message. End with the character '#'.
*****
AUTHORIZED ACCESS ONLY
*****
#

Administration(config)#^Z
Administration#
%SYS-5-CONFIG_I: Configured from console by console

Administration#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Administration#
```

Ctrl+F6 to exit CLI focus

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IOS Command Line Interface

```
*****  
AUTHORIZED ACCESS ONLY  
*****
```

User Access Verification

Username: CampusAdmin
Password:

Administration>en

Password:

Administration#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Administration(config)#int vlan1

Administration(config-if)#ip add 192.168.1.2 255.255.255.0

Administration(config-if)#no shut

Administration(config-if)#

%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Administration(config-if)#exit

Administration(config)#ip default-gateway 192.168.1.1

Administration(config)#^Z

Administration#

%SYS-5-CONFIG_I: Configured from console by console

Administration#copy run start

Destination filename [startup-config]?

Building configuration...

[OK]

Administration#

Administration#


Ctrl+F6 to exit CLI focus

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Accounts Switch Configuration

 Accounts Network

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
*****
AUTHORIZED ACCESS ONLY
*****

User Access Verification

Username: CampusAdmin
Password:

Accounts>en
Password:
Accounts#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Accounts(config)#int vlan1
Accounts(config-if)#ip add 192.168.2.2 255.255.255.0
Accounts(config-if)#no shut

Accounts(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Accounts(config-if)#exit
Accounts(config)#ip default-gateway 192.168.2.1
Accounts(config)#^Z
Accounts#
%SYS-5-CONFIG_I: Configured from console by console

Accounts#
Accounts#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Accounts#
```

Ctrl+F6 to exit CLI focus

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Lecturers Switch Configuration

Lecturers Network

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
*****

User Access Verification

Username:
Username: CampusAdmin
Password:

Lecturers>en
Password:
Lecturers#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Lecturers(config)#int vlan1
Lecturers(config-if)#ip add 192.168.3.2 255.255.255.0
Lecturers(config-if)#no shut

Lecturers(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Lecturers(config-if)#exit
Lecturers(config)#
Lecturers(config)#ip default-gateway 192.168.3.1
Lecturers(config)#^Z
Lecturers#
%SYS-5-CONFIG_I: Configured from console by console

Lecturers#
Lecturers#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Lecturers#
```

Ctrl+F6 to exit CLI focus

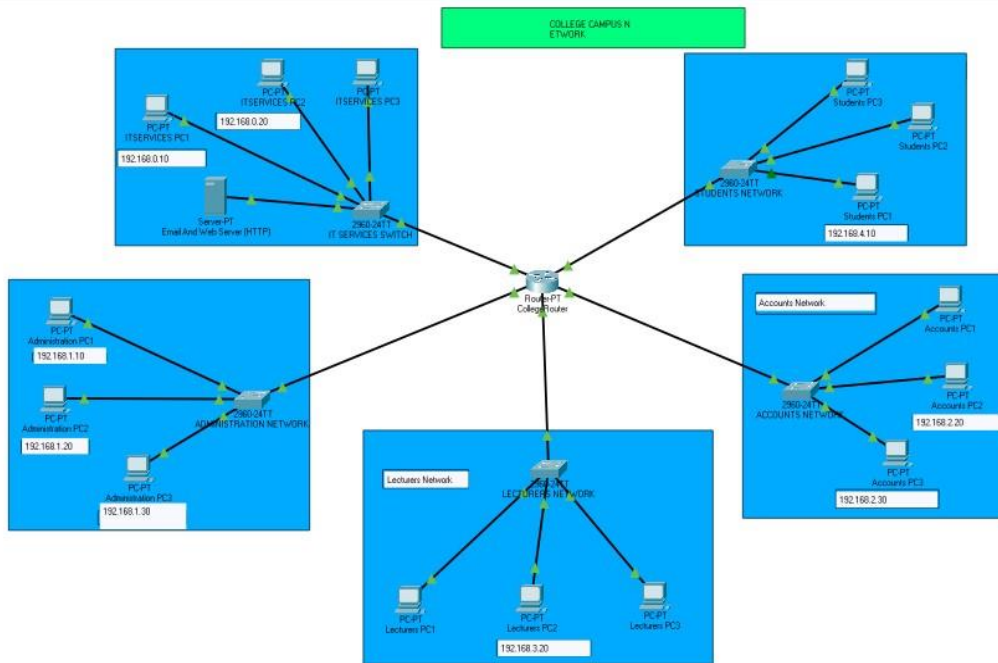
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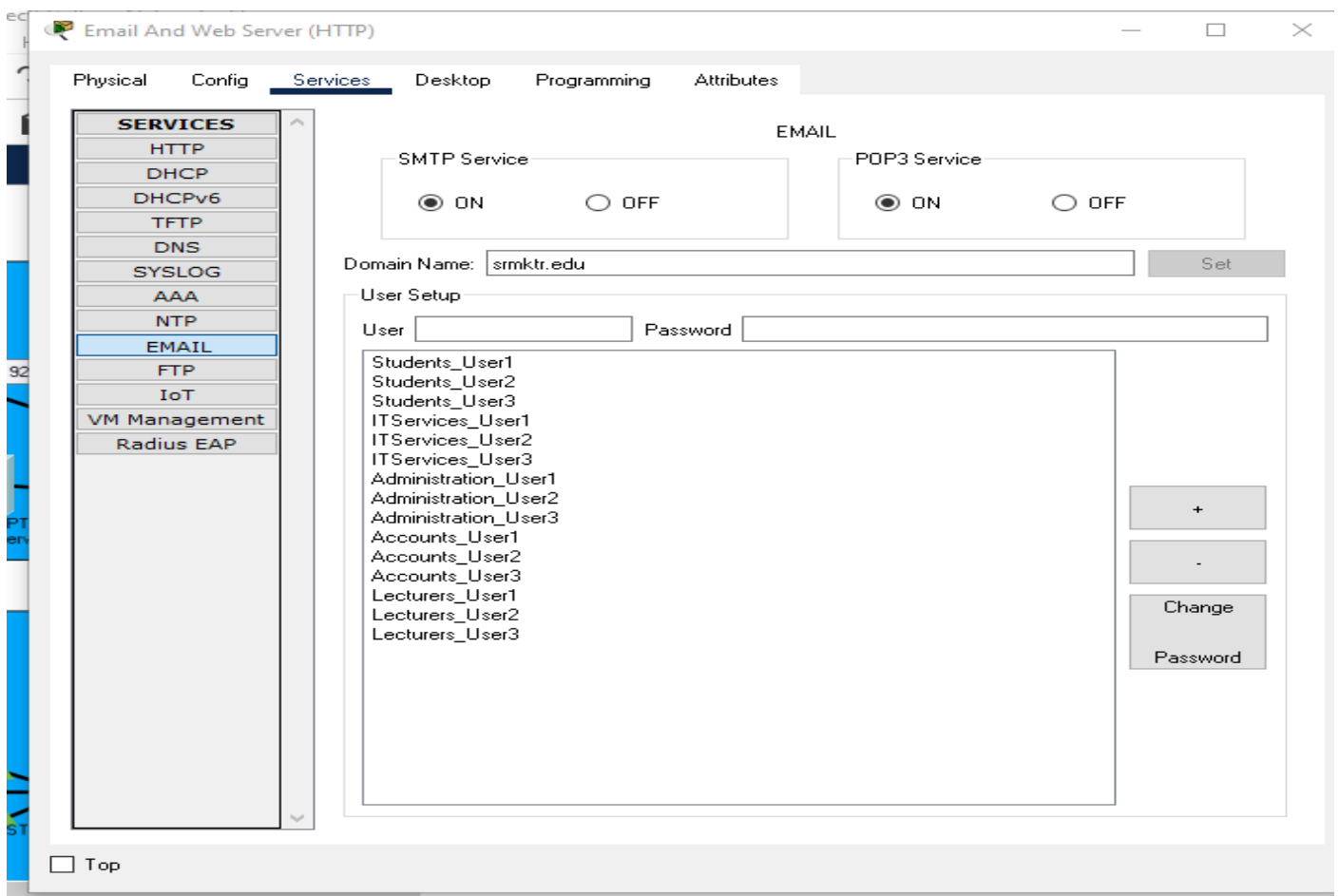
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Network Design

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



Configuration of the Email & Web Server



Email And Web Server (HTTP)

PhysicalConfigServicesDesktopProgrammingAttributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

HTTP

☒ On

☐ Off

☒ On

☐ Off

File Manager

	File Name	Edit	Delete
1	contact.html	(edit)	(delete)
2	copyrights.html	(edit)	(delete)
3	index.html	(edit)	(delete)
4	pic1.jpg		(delete)
5	pic2.jpg		(delete)
6	srmist.jpg		(delete)
7	style.css	(edit)	(delete)

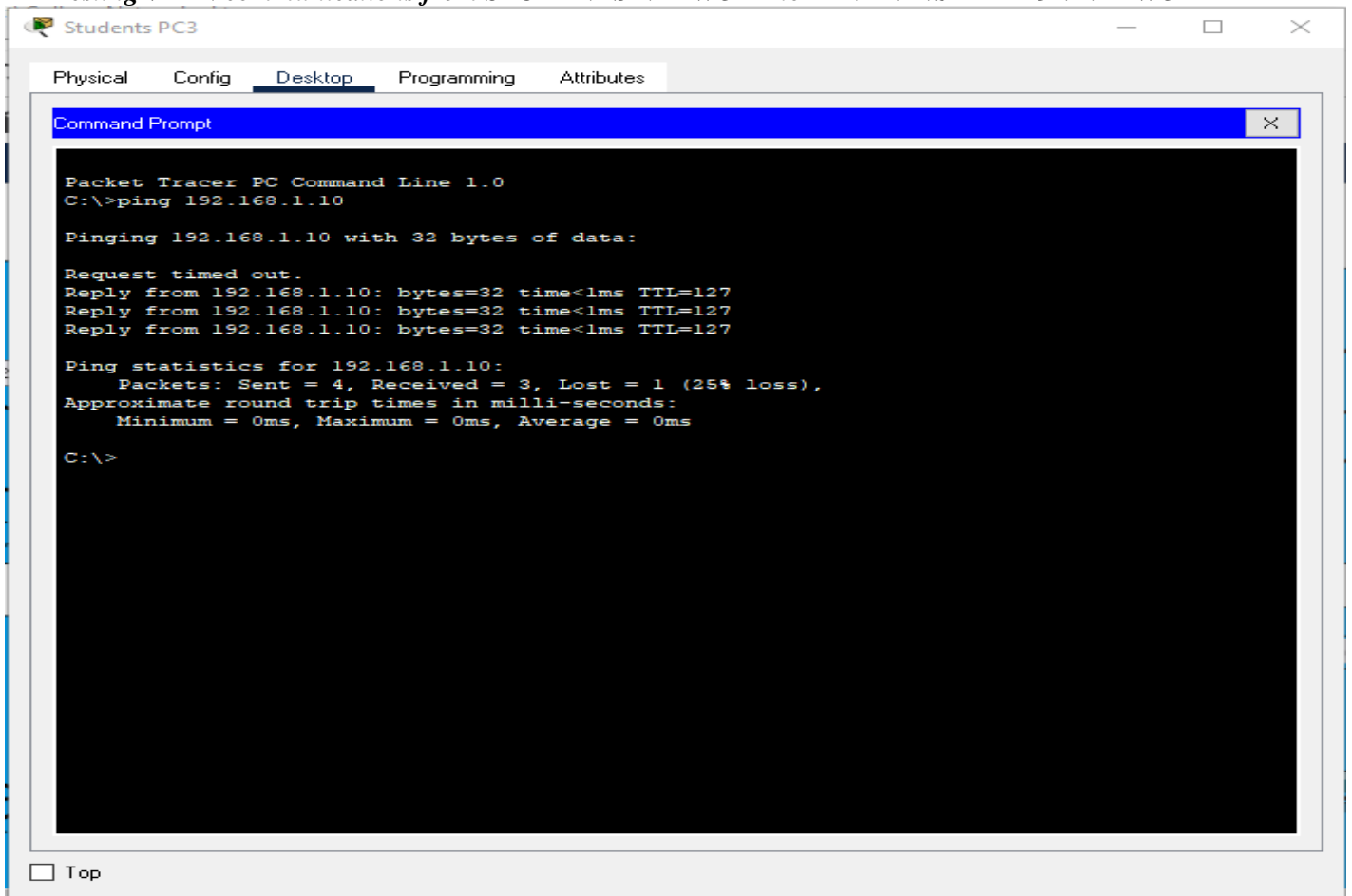
New File

Import

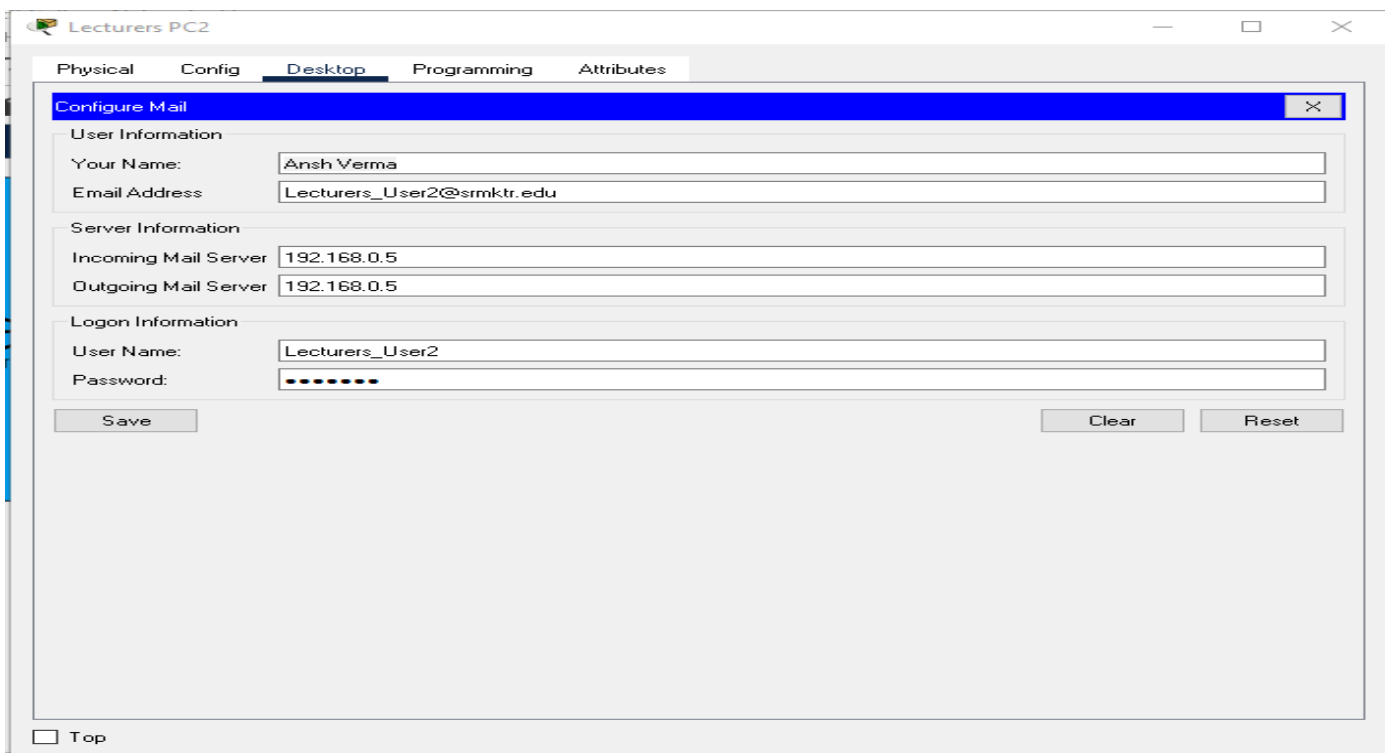
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EXPERIMENT RESULTS & ANALYSIS

Testing VLAN communications from STUDENTS NETWORK to ADMINISTRATION NETWORK



Configure Email for Users

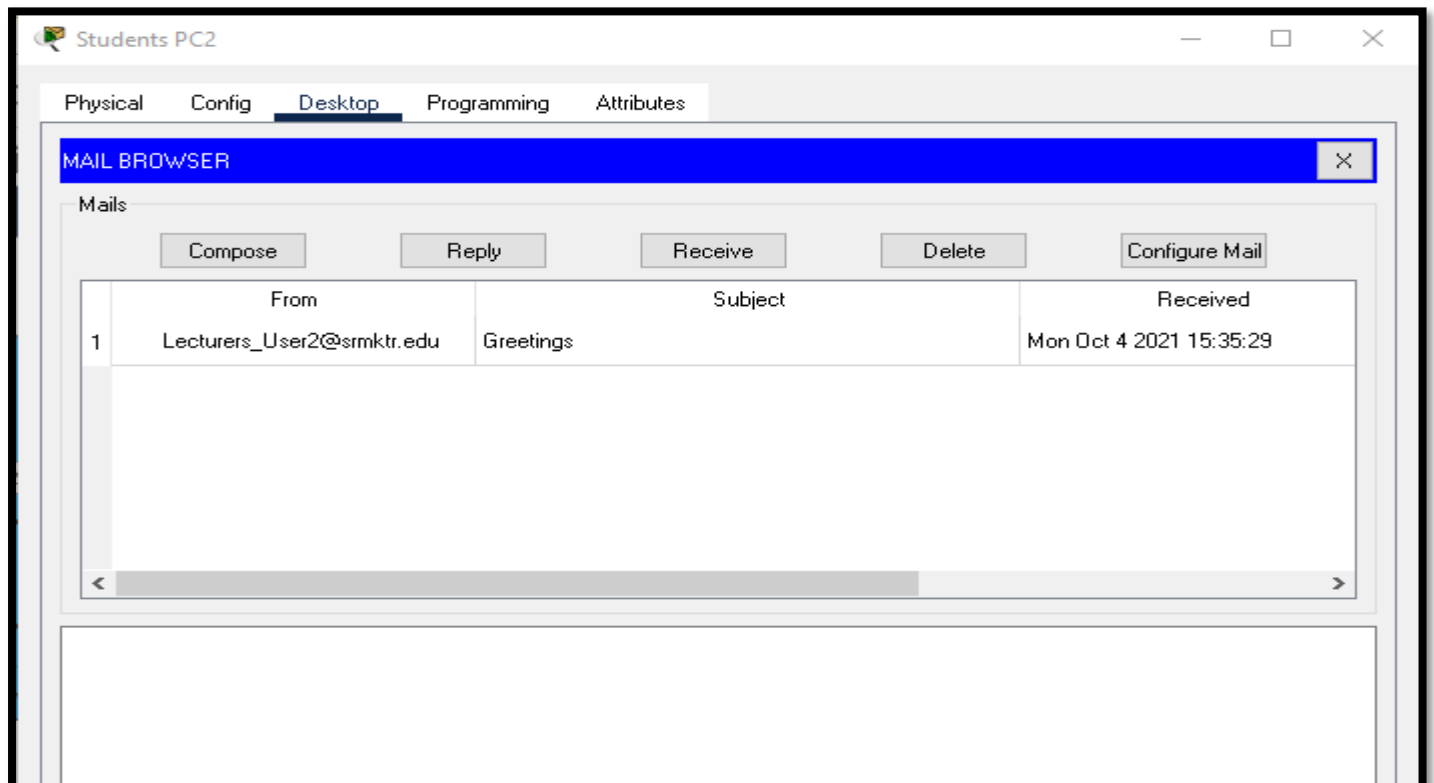
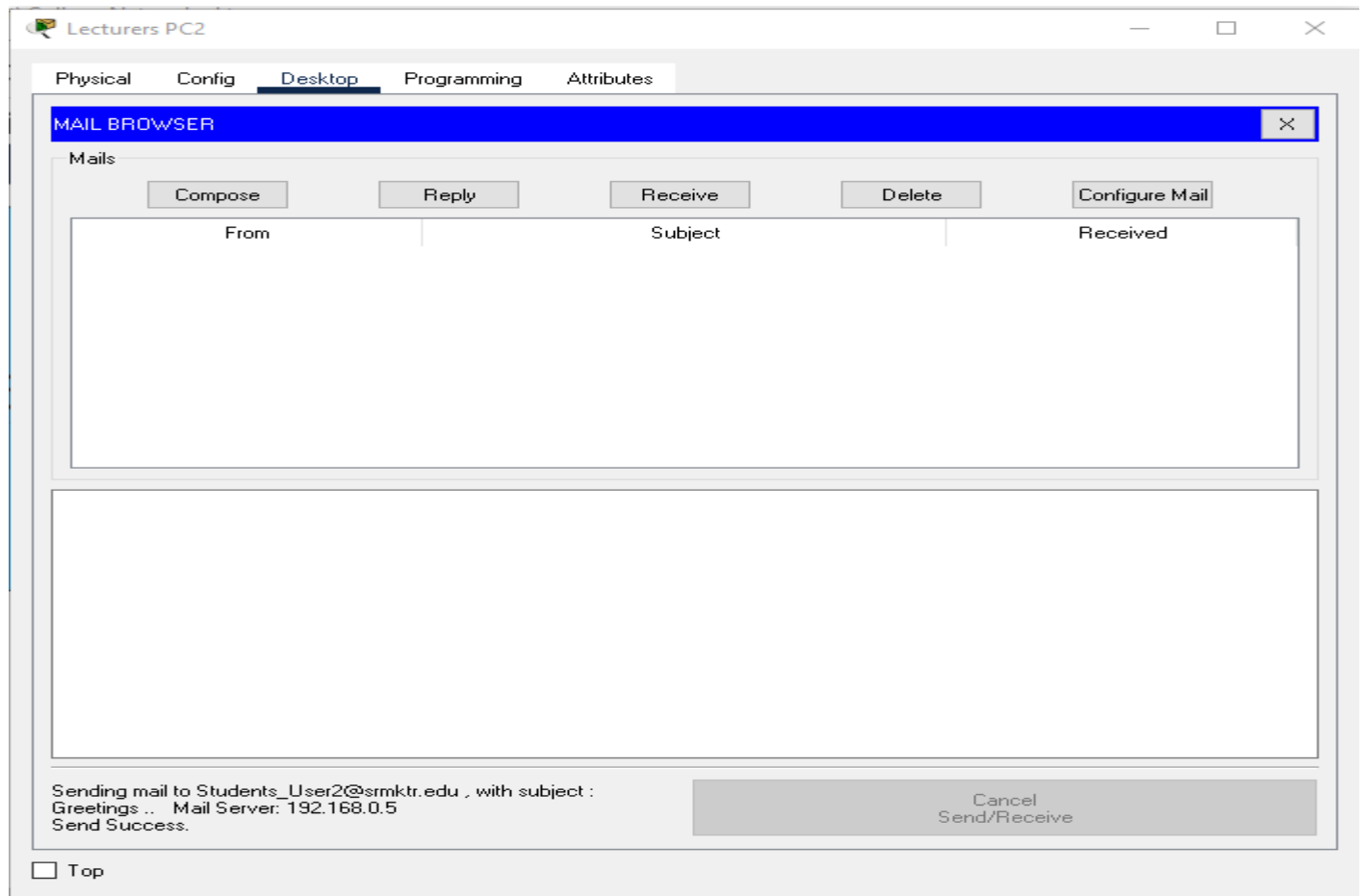


Testing Web Hosting

The screenshot displays a network simulation environment on the left and a web browser window on the right. The network diagram shows a central switch connected to several PCs and a server. The PCs are labeled with IP addresses: 192.168.0.10, 192.168.0.20, 192.168.1.10, 192.168.1.20, and 192.168.1.30. The server is labeled 'SRMIST' and 'Email And Web Server (HTTP)'. The web browser window shows the SRMIST website with the URL 'http://192.168.0.5'. The website has a navigation bar with 'Home', 'Academics', and 'Contact' links. The main content area features the title 'About SRM Institute of Science & Technology' and a paragraph of text about the institute's mission and programs. A circular image of a building is also visible on the right side of the page.

The screenshot displays a network simulation environment on the left and a web browser window on the right. The network diagram is identical to the one in the first screenshot, showing a central switch connected to several PCs and a server. The PCs are labeled with IP addresses: 192.168.0.10, 192.168.0.20, 192.168.1.10, 192.168.1.20, and 192.168.1.30. The server is labeled 'SRMIST' and 'Email And Web Server (HTTP)'. The web browser window shows the SRMIST website with the URL 'http://192.168.0.5/contact.html'. The website has a navigation bar with 'Home', 'Academics', and 'Contact' links. The main content area features the title 'Contact Us' and a form for users to fill out to contact the institute. The form includes fields for 'Name', 'Email', and 'Message', and a 'Submit' button.

TESTING EMAIL SERVER



Summary

The outcome of the proposed network 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 for college campus network. The installed equipment allowed to organize high-speed connections throughout the whole complex of college campus as well as providing transfer of all types of data throughout the single optimized network.

References

- 1) “Design and Simulation of Local Area Network Using Cisco Packet Tracer”. The International Journal of Engineering and Science (IJES) || Volume || 6 || Issue || 10 || Pages || PP 63- 77 || 2017 || ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805.
- 2) Qin, X. U. E. "Simulation Experimental Teaching of Computer Network Based on Packet Tracer [J]." Research and Exploration in Laboratory 2 (2010): 57-59.