

ABSTRACT

With the rapid development of computer network, the construction of campus network is the inevitable choice of the development of information network. The campus network system is a very large and complicated system. It is not only for modern teaching, integrated information management and office automation series of applications to provide basic operating platform, but also to provide a variety of application services, so that information can be timely and accurate delivery.

The campus network construction in the application of network technology is the important branch of LAN technology to build and management. This paper introduces the goal of campus network design and the selection of network technology, network equipment selection and so on, and gives the concrete network topology diagram through the example of the campus network design and construction process. The study also explains how to plan the formation of campus network safely and efficiently.

TABLE OF CONTENT

| Sl.no | Particular | Page No. |
|-------|------------------------------------|----------|
| 1 | Introduction | 3-4 |
| 2 | Design and Implementation | 5-13 |
| 3 | Testing and Analysis | 14-18 |
| 4 | Conclusion and Future Enhancements | 19 |
| 5 | References | 20 |

INTRODUCTION

The Internet is expanding with a tremendous speed so as its Security. Security is a very important field that consist of the provisions made in computer networks infrastructures, policies adopted by the network administrator to protect networks, the network-accessible resources from unauthorized access and effectiveness of measures combined together. Personal, government and business applications continue to multiply on the Internet and work-based application and services can pose security risks to individuals and to information resources of companies and government. Information is an asset that must be protected. Network security is more challenging than ever, as today's college networks becomes increasingly complex.

As the campus network started late, and the school funds are not very adequate, cannot be in one step. On the other hand, the level of application of the school is more uneven, some systems even if the installation is not used, therefore, in the construction of the campus network process, the system should always implement the application-oriented, pragmatic approach, the principle of economy. The school network needs to complete, including the book information, school administrative office and other integrated business information management system for the majority of faculty and students to provide a network environment for teaching and research work of the advanced platform. The campus network covers the entire campus, and the network design follows the following five basic principles:

Reliability and high-performance networks must be reliable, including network-level reliability such as routing, switching aggregation, link redundancy, and load balancing. The network must be of sufficient performance to meet the needs of the business.

Scalability and scalability of the system to be scalable and scalable, with the business growth and application level, the network of data and information flow will grow exponentially, the need for good network scalability, and can continue to upgrade with the development of technology. Equipment should be used in line with international standards of systems and products to ensure that the system has a long vitality and scalability to meet future requirements of the system upgrade.

Easy to manage, easy maintenance as the campus backbone network system is large, rich and complex application, the need for network management system has good manageability, network management system with monitoring, fault diagnosis, fault isolation, filtering settings and other functions to facilitate the management of the system and maintain.

At the same time as far as possible to choose a high degree of integration, the module can be a common product for easy management and maintenance. Here we use the equipment is Cisco switches, firewalls.

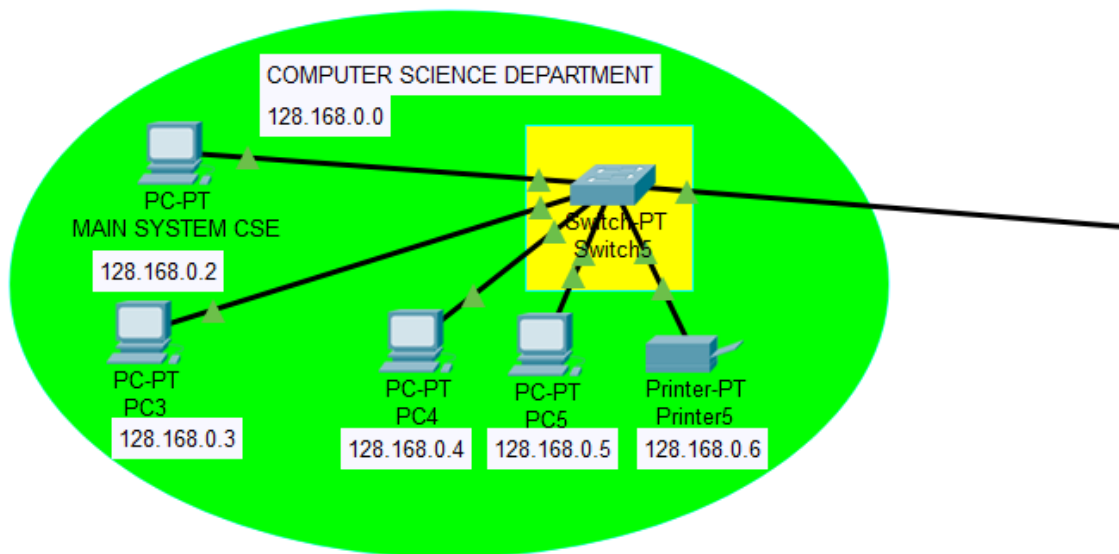
Security, confidentiality of the network system should have good security. As the campus backbone network for multiple user intranet to provide interconnection and support a variety of business, requiring flexible and effective security control, but also should support the virtual private network to provide multi-level security options. In the system design, not only consider the full sharing of information resources, but also pay attention to the protection and isolation of information, so the system should be different for different applications and different network communication environment, take different measures, including system security mechanisms, data access the authority of the control.

In the secondary campus network erection, it may through subnet and the switch of VLAN to achieve network security. Through the use of structured, modular design forms with flexibility and comprehensive, to meet the system and difference needs from users to adapt to changing requirements. To meet the system goals and functions as the goal, to ensure that the overall program design is reasonable to meet the needs of users, while maintaining the use of the system maintenance, as well as the future system of secondary development and transplantation

2. DESIGN AND IMPLAMENTATION

We have divided our entire college network in 6 components interconnected with switches and routers.

2.1 Computer Science and Engineering Department



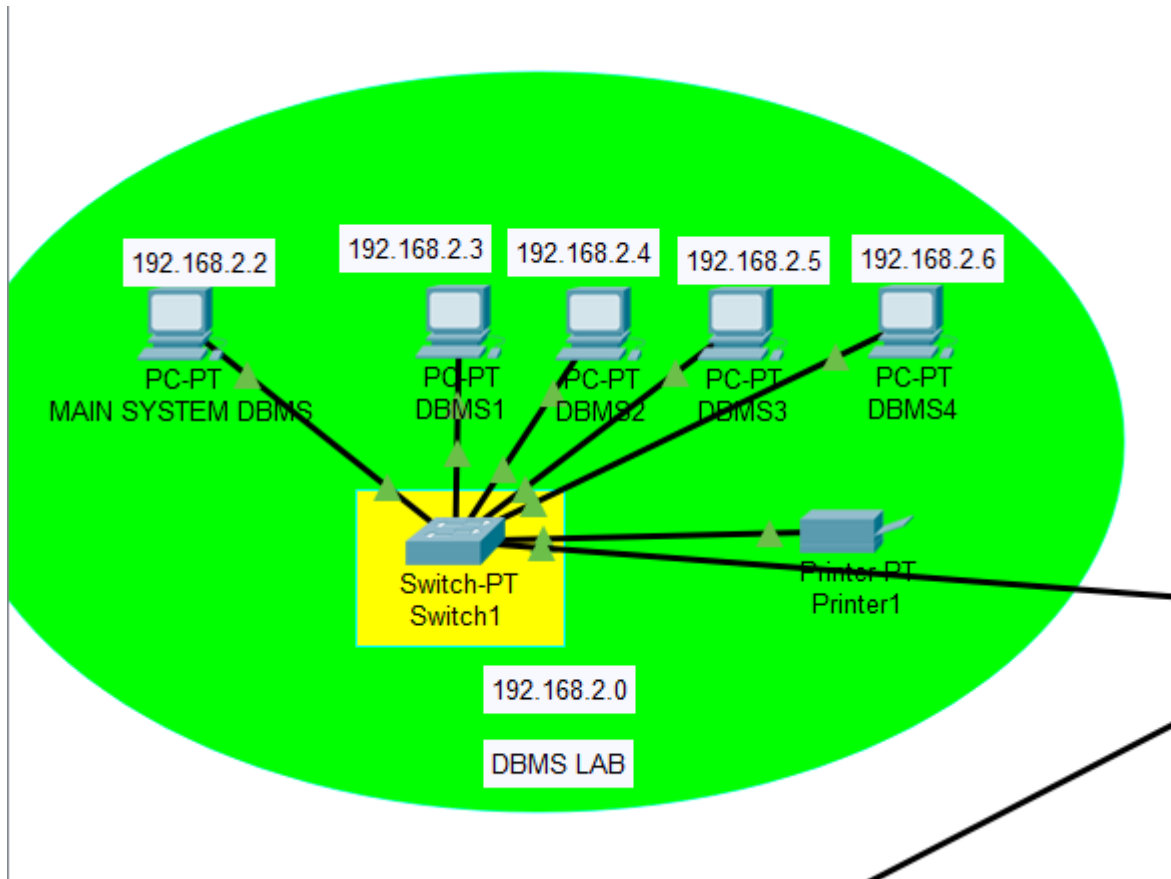
2.1.1 Devices Used

1 Administration PC, 3 Normal PC, 1 Switch and a Printer for CSE Department Internal Network.

2.1.2 Network ID

All devices are connected in the network ID : 128.168.0.0

2.2 Database and Management LAB



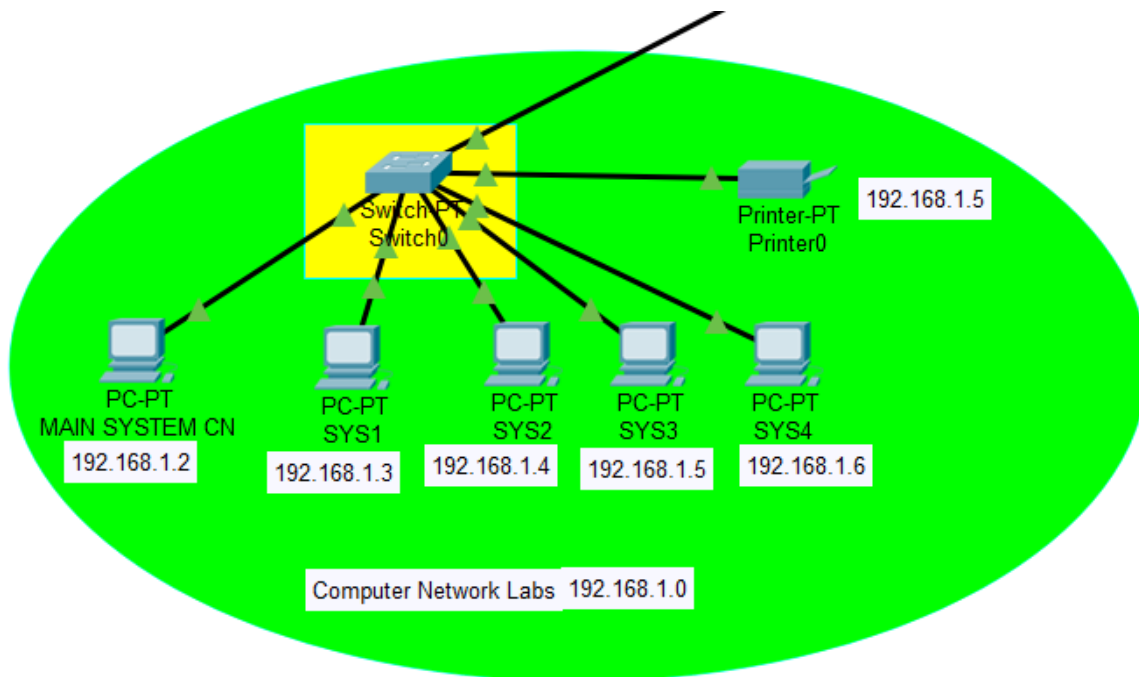
2.2.1 Devices Used

1 Administration PC, 4 Normal PC, 1 Switch and a Printer for CSE Department Internal Network.

2.2.2 Network ID

All devices are connected in the network ID : 192.168.2.0

2.3 Computer Networks Lab



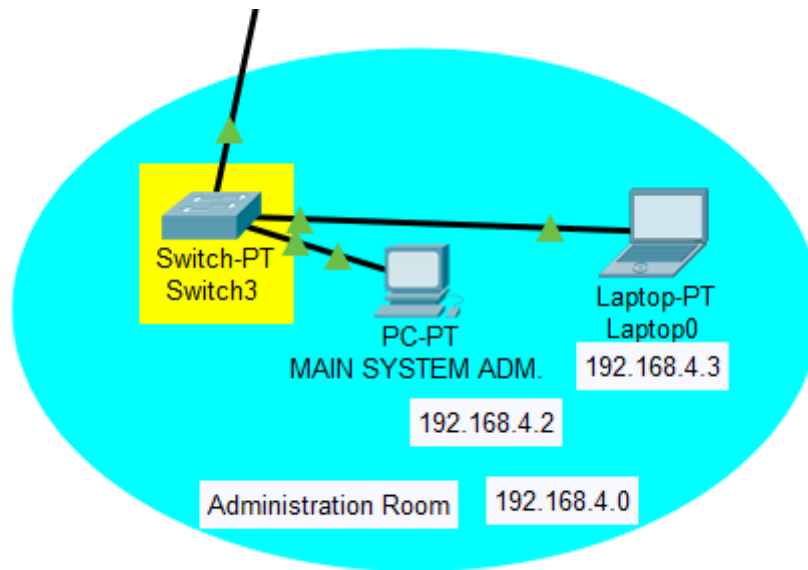
2.3.1 Devices Used

1 Administration PC, 4 Normal PC, 1 Switch and a Printer for CSE Department Internal Network.

2.3.2 Network ID

All devices are connected in the network ID : 192.168.1.0

2.4 Administration Room



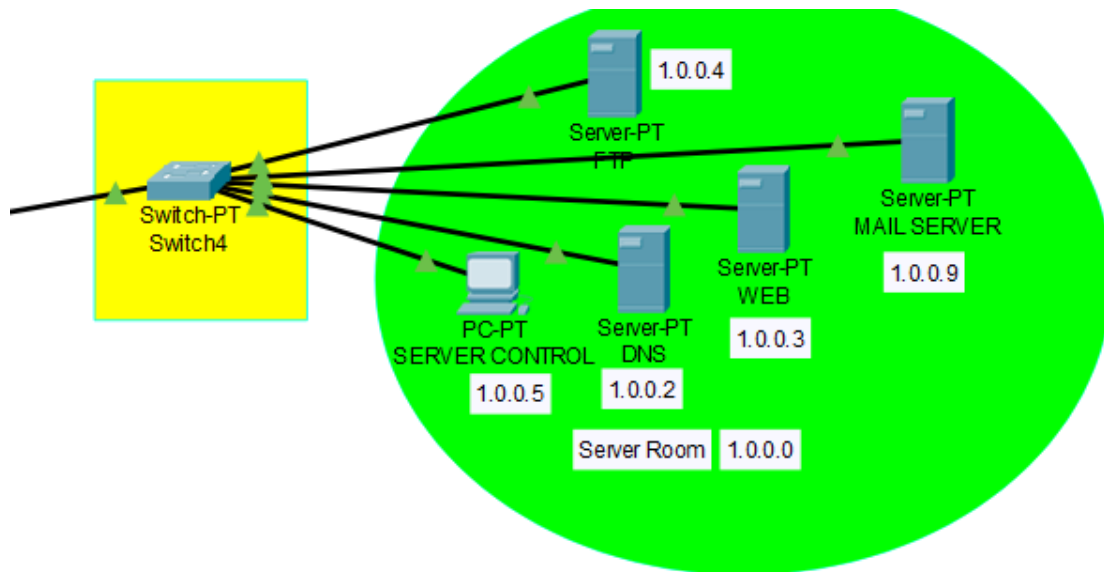
2.4.1 Devices Used

1 Administration PC, 1 General Purpose Normal Laptop and a Switch to connect it all.

2.4.2 Network ID

All devices are connected in the network ID : 192.168.4.0

2.5 Server Room



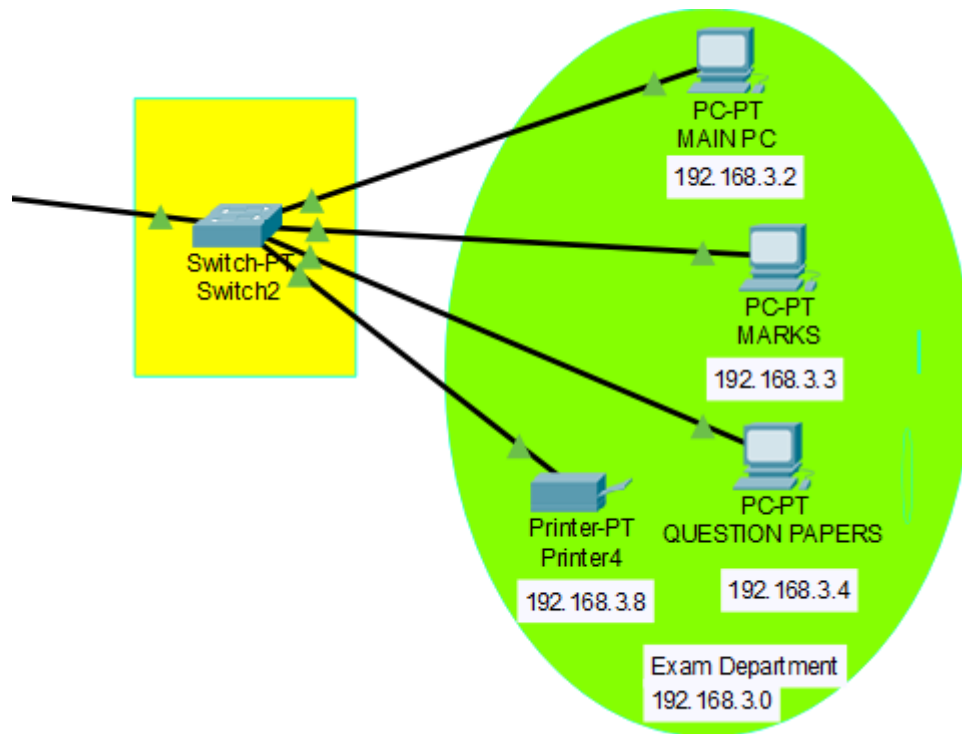
2.5.1 Devices Used

The devices used are a Switch to connect everything, a FTP server, a Mail Server, a Web server, a DNS server and an administration PC to control them all.

2.5.2 Network ID

All devices are connected in the network ID : 1.0.0.0

2.6 Examination Department Room



2.6.1 Devices Used

A switch to connect everything together, a main PC, a marks server, a question paper server and a printer for examination department.

2.6.2 Network ID

All devices are connected in the network ID : 192.168.3.0

2.7 Configurations Used for Interconnection

2.7.1 Static IPs Assigned to all components in the network

MAIN SYSTEM DBMS

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address 192.168.2.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.2.1

DNS Server 1.0.0.2

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address /

Link Local Address FE80::201:97FF:FE48:1E23

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

2.7.2 RIP Used for standard routing protocol

The screenshot shows the configuration window for Router0. The 'Config' tab is selected, and the 'RIP' option is chosen under the 'ROUTING' section in the left sidebar. The main area displays the 'RIP Routing' configuration. It includes a 'Network' input field and an 'Add' button. Below this is a table with the following data:

| Network Address |
|-----------------|
| 10.0.0.0 |
| 192.168.1.0 |
| 192.168.2.0 |

A 'Remove' button is located at the bottom right of the table. Below the table, the 'Equivalent IOS Commands' section shows the following commands:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router rip
Router(config-router)#
```

At the bottom left, there is a 'Top' button.

2.7.3 Serial Communication used for inter-router communication

Router0

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet0/0

FastEthernet1/0

Serial2/0

Serial3/0

FastEthernet4/0

FastEthernet5/0

Serial2/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 2000000

IP Configuration

IP Address 10.10.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Equivalent IOS Commands

Router(config-router)#end
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console

☐ Top

3. TESTING AND ANALYSIS

3.1.1 HTTP Protocol Configuration

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

HTTP

☒ On ☐ Off

HTTPS

☒ On ☐ Off

File Manager

| | File Name | Edit | Delete |
|---|-----------------------|--------|----------|
| 1 | copyrights.html | (edit) | (delete) |
| 2 | cscoptlogo177x111.jpg | | (delete) |
| 3 | helloworld.html | (edit) | (delete) |
| 4 | image.html | (edit) | (delete) |
| 5 | index.html | (edit) | (delete) |

3.1.1 HTTP Protocol Result

SERVER CONTROL

Physical Config **Desktop** Programming Attributes

Web Browser

< > URL Go Stop

Dayananda Sagar College Of Engineering

Welcome

Quick Links:

- [A small page](#)
- [Copyrights](#)
- [Image page](#)
- [Image](#)

3.2.1 DNS Protocol Configuration

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS**
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name Type **A Record**

Address

| No. | Name | Type | Detail |
|-----|-----------------|----------|---------|
| 0 | www.dsce.com | A Record | 1.0.0.3 |
| 1 | www.dsceftp.com | A Record | 1.0.0.4 |

3.2.2 DNS Protocol Resolution Result

SERVER CONTROL

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Packet Tracer PC Command Line 1.0
C:\>ping www.dsce.com

Pinging 1.0.0.3 with 32 bytes of data:

Reply from 1.0.0.3: bytes=32 time<1ms TTL=128
Reply from 1.0.0.3: bytes=32 time<1ms TTL=128
Reply from 1.0.0.3: bytes=32 time<1ms TTL=128
Reply from 1.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 1.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>!
```

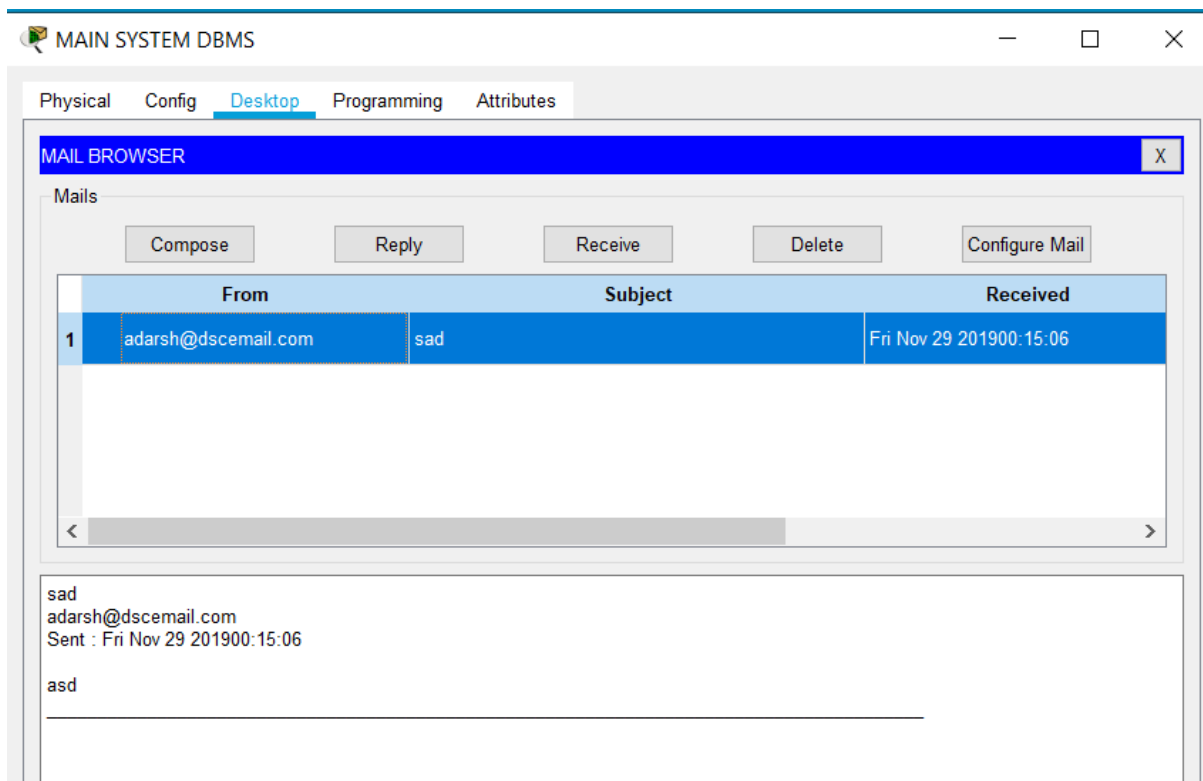
3.3.1 SMTP Protocol Configuration

The screenshot shows the 'MAIL SERVER' configuration window with the 'Services' tab selected. On the left, a 'SERVICES' list includes HTTP, DHCP, DHCPv6, TFTP, DNS, SYSLOG, AAA, NTP, EMAIL (highlighted), FTP, IoT, VM Management, and Radius EAP. The main area is titled 'EMAIL' and contains two service status boxes: 'SMTP Service' and 'POP3 Service', both with 'ON' selected. Below these is a 'Domain Name' field set to 'dscemail.com' with a 'Set' button. A 'User Setup' section includes 'User' and 'Password' input fields, a list of users (adarsh, vijay, sourabh), and '+' and '-' buttons for adding or removing users.

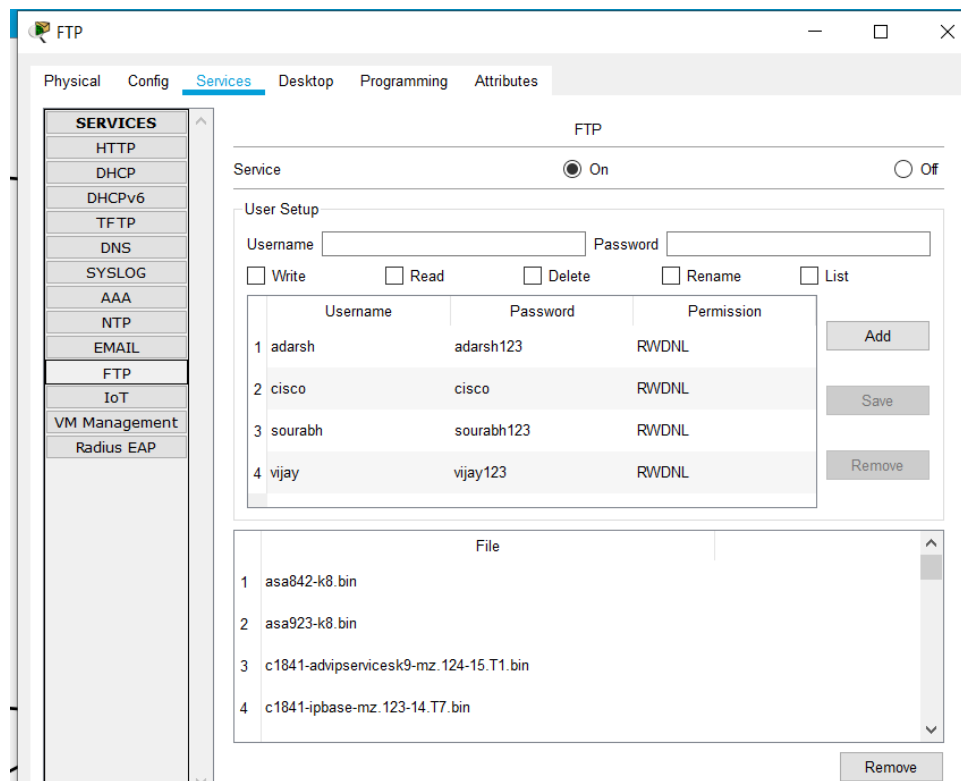
3.3.2 SMTP Protocol Client Configuration

The screenshot shows the 'MAIN SYSTEM CSE' configuration window with the 'Desktop' tab selected. A 'Configure Mail' dialog box is open, featuring three sections: 'User Information' with 'Your Name' (Adarsh CSE DEPARTMENT) and 'Email Address' (adarsh@dscemail.com); 'Server Information' with 'Incoming Mail Server' and 'Outgoing Mail Server' both set to 1.0.0.9; and 'Logon Information' with 'User Name' (adarsh) and a masked 'Password'. At the bottom are 'Save', 'Clear', and 'Reset' buttons.

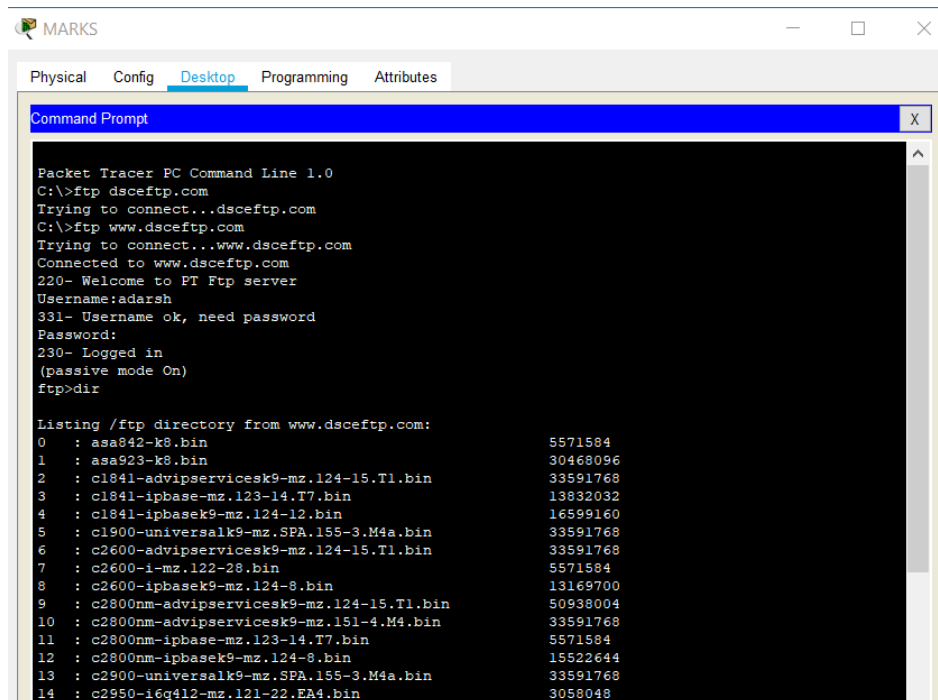
3.3.3 SMTP Protocol Results



3.4.1 FTP Protocol Configuration



3.4.2 FTP Protocol Results



CONCLUSIONS AND FUTURE ENHANCEMENTS

With the advent of the Internet age, the impact of our education is unprecedented, and it also provides a rapid leap for education opportunities, education should be oriented towards modernization, facing the world, facing the future, we must first face the network. Education can only make a combination with network in order to keep up with progress and development of times. The premise of network education is the construction of the network, and as the construction of the campus network is not only the construction of the network hard environment, but also must include the campus network maintenance and security, campus network resources and the effective application of the campus network and other three Link. Only the full and effective application of the campus network in order to make the entire teaching model and the educational concept of a complete change in order to apply the new century to cultivate high-quality creative and complex talents needs for the campus network construction, not applicable to all schools program, even for a school, it is impossible to have the best program, only the better program.

REFERENCES

[1]. Textbook: Computer Networking: A Top-Down Approach

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[3]. <https://www.youtube.com>

[4]. <https://iot.stackexchange.com/questions/2545/how-to-configure-smtp-in-cisco-packet-tracer>