

Design a Pre-Sales Proposal for Network Setup in a University
A COURSE PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this mini project report " Design a Pre-Sales Proposal for Network Setup in a University" is the bonafide work of Tarun Negi (RA2011026010132), Harshit Kochhar (RA2011026010182), Swapnil Saxena (RA2011026010129) , who carried out the project work under my supervision.

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ABSTRACT

In this project we will primarily focus on design and implementation of network setup in a university using Cisco Packet Tracer (CPT).

This job with respect to the College's Networking Scenario is to provide a systematic, secure, valid, dependable communication among different departments.

This network will provide access to the Internet or LAN to users located in two or more buildings or in the campus. This network can be used for an office, for labs and also in libraries.

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1. ABSTRACT

A pre-sales design proposal for network setup in a university

The university has the following 7 departments.

1. IT

2. Finance

3. HR

4. Management

5. Faculty

6. Students

7. R&D

The university has an ADSL internet connection which would be used by the departments

except for the R&D department which should not have access to the same.

All the

departments should be able to communicate with each other. Each department contains

25-50 users.

2. 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.

3. LITERATURE SURVEY

Sr. No.	Title Of Paper	Authors Name	Publication Years And Detail	Technique Use	Advantage
1	Distributed Firewalls	Steven M. Bellovin	1999	distributed firewall design	Policy rules at the endpoints rather than a single entry point to network.
2	Wireless LAN Security Threats & Vulnerabilities	Md. Waliullah	2014	WLAN Technology	Greater availability of wireless LAN
3	Implementing a Distributed Firewall	Ioannidis, S. and Keromytis, A.D., and Bellovin, S.M. and J.M. Smith	2000	Pull and push of network security	Computer and Communications Security

1. 'Enhancing the College Network', by Jagdish K.P and Pavan Kumar, they had discussed about the advanced network through integrating IOT devices with classical device using CISCO-PACKET Tracer simulation software version 7.0. The technology focused in this paper is Virtual Local Area Network (VLAN) and IOT devices like software sensors, actuator for virtual communication. The count of device number is more, so to avoid large number of devices we are replacing router with layer 3 switches. By which the count of router and switches will reduce and hence the cost of network.

2. 'Wireless LAN security Threats and Vulnerabilities', by Md. Waliullah had discussed about various security issues and common threats in wireless LAN. This paper contains information of attacks like confidentiality, integrity, availability, access control and authentication. So, the main focus was on to prevent the network from the unauthorized person and hackers. But by using WLAN the risk of hacking and attacks of threats increases, hence to avoid these and to make the network more secure we can implement Network Address Translation (NAT) which will hide the private IP address.

3. 'College Campus Network Design and Security', by Shivam Adke and Rutuja Bhawar, focused on network security to protect the digital information, by creating LAN network and preventing the network from unauthorized user by using firewall. Due to use of hardware firewall the design of network becomes a bit complicated so to solve this issue we can use protocol like Access Control List (ACL) which is used to filter network traffic such as routers and firewalls.

4. 'Design And Implementation Of Secure Campus Network', by Mohammad Nadir Bin Ali, Mohamed Emran Hossain, Md. Masud Parvez, focused on the core issues of the security of the network architecture. They also try to do apply simple network design, so that they can maintain the network, increased the security with the result of the network. The technology focused by them was LAN and WAN and for security they used firewall so we can also use other protocols.

In this paper we studied regarding network, such as how different universities design a network with high quality security and low cost by using DHCP, network used WLAN technology so that data must be accessed by the authorized individuals. But while studying these we came through some drawbacks like increased congestion on a particular group of IP's not necessary/optional, various cost minimized in order to maximize the quality of the network, we can have greater availability of wireless LAN etc. also the protocols used were less, by using various protocols the network can become more enhanced and hence we can obtain the required network with more security more life span of network and encryption will be more secure. By analyzing we came with the solution which includes better routing protocol (EIGRP), various protocols like HSRP, NAT, ACL, and PORT SECURITY and also tried to minimize the count of the devices so that the cost of network would become less costly

4. REQUIREMENTS

Networking Requirement

From the given scenario, we draw the following requirements:

1. The active network components which are required (Routers, Switches).
2. The number of switches, routers which are required for the design.
3. The IP Design schema for the department.
4. Explanation of the details required to be configured on the Switch and how to create different departments with VLAN.
5. Explanation of how to restrict internet connection for R&D Department and allow access for the other departments with Access control lists on the Router.
6. Identify the feature on the router which is required for sharing the Internet for the users.
7. Identify the TCP/IP adapter parameters (IP address, Subnet mask, Default Gateway, DNS Server IP address) for the users.
8. Network Design Diagram.

Hardware and Software Requirement

1. At the main office, a VPN appliance would be required, which would have integrated firewall and deep packet inspection. The recommended VPN appliance is Sonic wall NSA 220/W, which has the capacity to support site to site VPN tunnels and also has deep packet inspection and firewall capabilities.
2. There are 200 users in the main office. A total of 5 nos of 48 port switches are recommended considering ports for servers, VPN appliance and expansion plan. The Cisco Catalyst 2960S- 48FPD-L is recommended for the same.
3. At the branch offices, the Sonicwall TZ105 series is recommended to establish site to site VPN connectivity with the main office.
4. There are a total of 100 users each at the branch office. A total of 3 nos of 48 port switches is recommended, which are Cisco Catalyst 2960S-48FPD-L, considering future expansion plans.
5. Windows 2008/2012 is recommended for the application server with server hardware

Switch Configuration Guidelines:

Step 1. Open the packet tracer desktop and take a switch (PT-Switch) from the devices.

Step 2: Configure the Host name of the switch0.

- Click on switch0 and go to Command Line Interface.
- Then change the hostname to “sh”

Step 3: Set a message of the day (MOTD) banner for the users.

Step 4: Set up line control password and enable secret password.

To configure the Line Control password and Enable secret follow the below commands:

```
sh#conf t
```

```
sh(config)#
```

```
sh(config)#line con 0
```

```
sh(config-line)#password GFG123
```

```
sh(config-line)#login
```

```
sh(config-line)#exit
```

Step 5: Verify the password

- When you try to log in first, it will ask for the **line control password**.
- Then, to configure the terminal it will ask to **enable a secret password**.

VLAN Configuration Guidelines:

Step 1: In Cisco Packet Tracer, create the network topology

Step 2: Create 2 VLANs on the switch

```
Switch#config terminal
```

```
Switch(config)#vlan 10
```

```
Switch(config-vlan)#name SALES
```

```
Switch(config-vlan)#vlan 20
```

```
Switch(config-vlan)#name IT
```

Step 3: Assign switch ports to the VLANs.

Step 4: Configure inter-VLAN routing on the router.

Step 5: Test inter-VLAN connectivity.

Router Configuration Guidelines:

Step-1(Configuring Router1):

1. Select the router and Open CLI.
2. Press ENTER to start configuring Router1.
3. Type enable to activate the privileged mode.
4. Type config t(configure terminal) to access the configuration menu.
5. Configure interfaces of Router1
- 6.Type no shutdown to finish.

Step-2(Configuring PCs):

1. Assign IP Addresses to every PC in the network.
2. Select the PC, Go to the desktop and select IP Configuration and assign an IP address, Default gateway, Subnet Mask
3. Assign the default gateway of PC0 as 192.168.10.1.
4. Assign the default gateway of PC1 as 192.168.20.1.

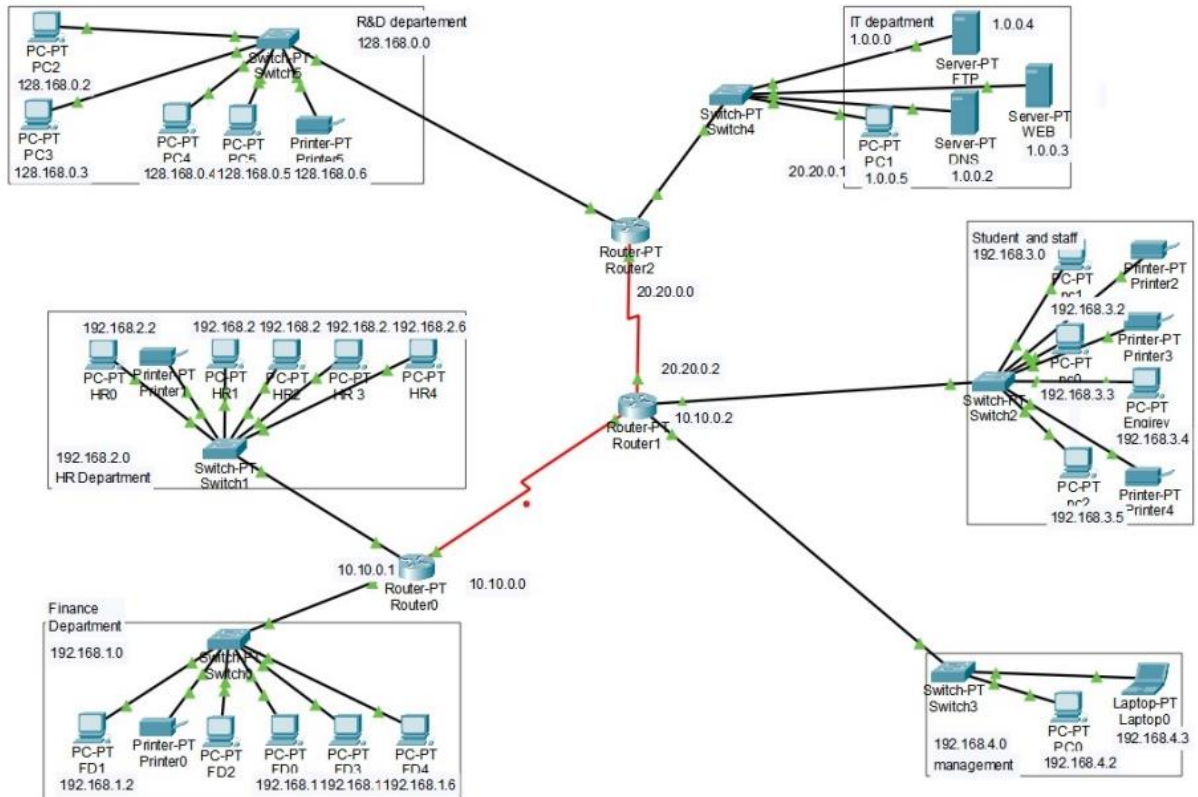
Step-3(Connecting PCs with Router):

1. Connect FastEthernet0 port of PC0 with FastEthernet0/0 port of Router1 using a copper straight-through cable.
2. Connect FastEthernet0 port of PC1 with FastEthernet0/1 port of Router1 using a copper straight-through cable.

5. ARCHITECTURE AND DESIGN

Network Architecture and Design Strategy

The network architecture is as follows:



The architecture consists of three major networks:

- Network of different departments
- Network maintained by the Internet Service Provider
- Host Network

These networks are interconnected with each other with varying degrees.

6. IMPLEMENTATION

For implementing this bank prototype we have used Router-PT which have serial ports, So that it will be easy for us to connect to 6 branches and we have also used 2960-24TT switches all over the network to connect to various campuses among the cities which are then interconnected to the servers and users. All the serial ports are assigned with IP addresses so they can be recognized between the cities without confusion.

Address Table

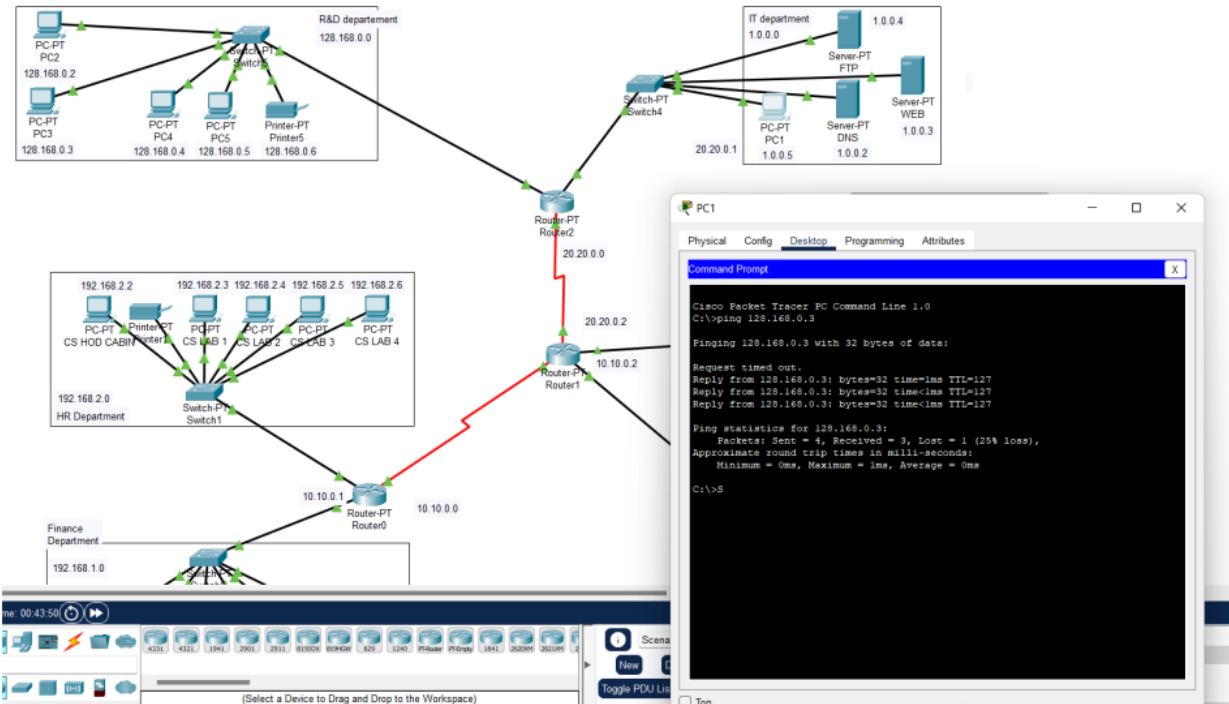
The address table is as follows:

Branch	Ip Address	Subnet
IT	Switch- 1.0.0.0	255.0.0.0
Finance	Switch- 192.168.1.0	255.255.255.0
HR	Switch- 192.168.2.0	255.255.255.0
Management	Switch- 192.168.4.0	255.255.255.0
Faculty and Students	Switch- 192.168.3.0	255.255.255.0
R&D	Switch- 128.168.0.0	255.255.0.0

7. RESULTS AND DISCUSSION

7.1 RESULTS

Network Design and configuration strategy

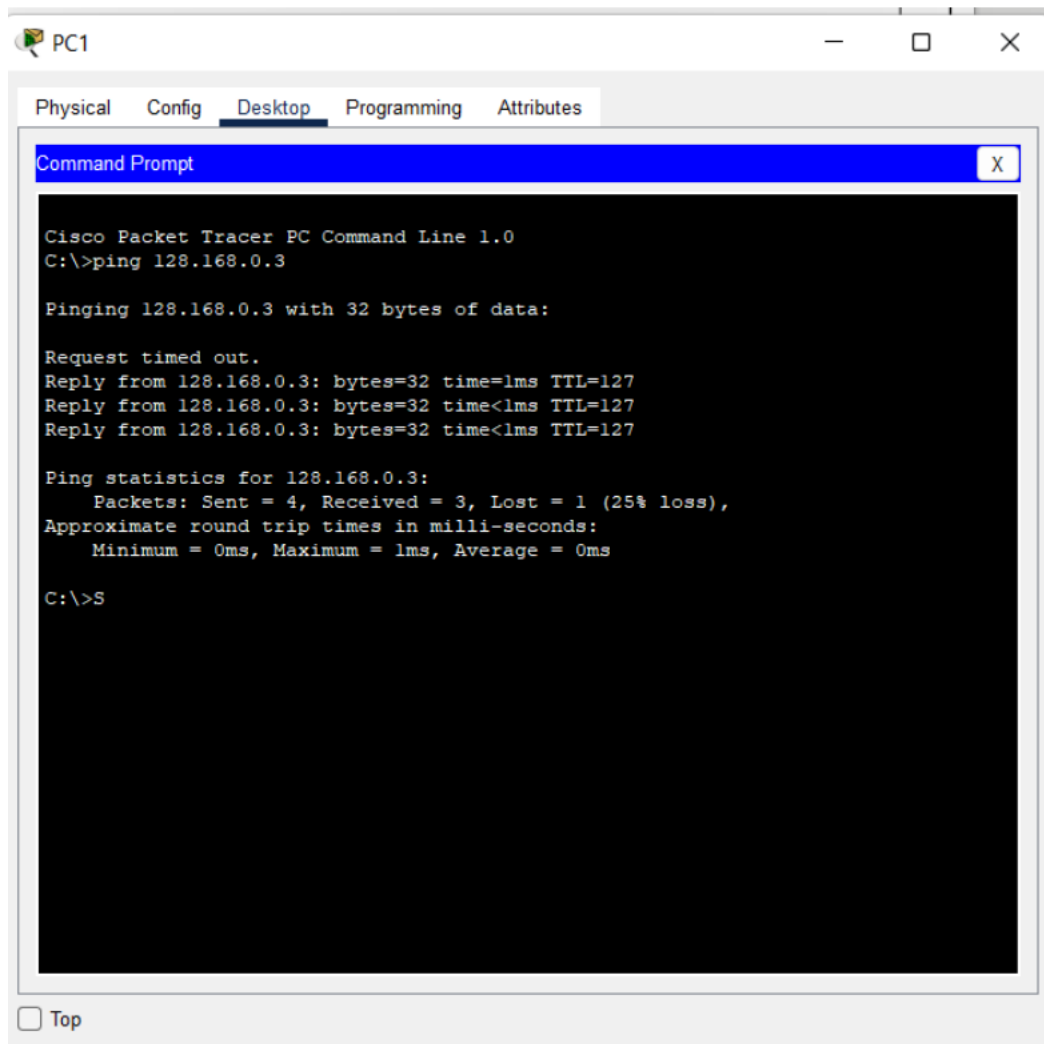


To manually check connection between pcs we can do this individually with testing from 1 pc from one branch device to other branch devices instead of buffer manager interface. After testing this manually buffer testing is implemented and checked.

7.2 RESULT ANALYSIS:

Ping from a PC to Another PC:

Pc1 in IT department is used to ping pc3 in HR department to check logical connection.



```
PC1
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 128.168.0.3

Pinging 128.168.0.3 with 32 bytes of data:

Request timed out.
Reply from 128.168.0.3: bytes=32 time=1ms TTL=127
Reply from 128.168.0.3: bytes=32 time<1ms TTL=127
Reply from 128.168.0.3: bytes=32 time<1ms TTL=127

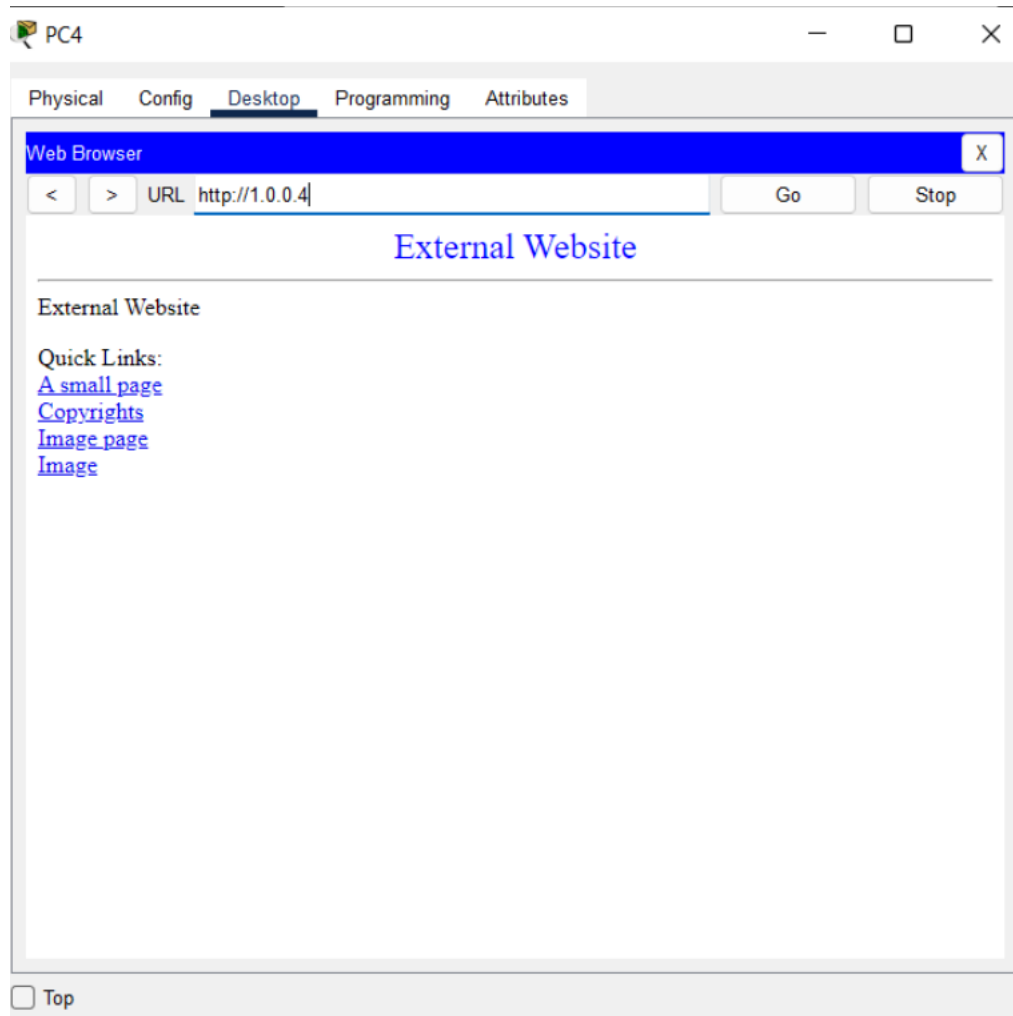
Ping statistics for 128.168.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>S
```

- The above screenshot shows the successful implementation of the connection across two different systems, where it executes perfectly.
- All the data packets are received without any loss of data.

HTTPS Check

The server access was checked with HTTPS by using a browser:



8. CONCLUSION AND FUTURE ENHANCEMENT

Network designing is one of the vital roles in making sure that it needs the objective. Network is a connected collection of devices and end systems, such as computers and servers, which can communicate with each other.

The physical components are the hardware devices that are interconnected to form a computer network. Software and firewalls play a major role in making sure that data is protected. Apart from the physical devices, selecting software products for installing in the network is a challenging task.

To improve college campus network design service, the technology used was creating LAN, WLAN ,rip v2 and using cheap device to reduce cost of the network. But the network can also become more enhanced using better routing protocols and many other protocols can be used to improve the security.

So, we are going to try many such protocols using less number of devices and will try to keep the cost of the network less. To design such network we used software known as Cisco-Packet Tracer

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