



**SCHOOL OF COMPUTING  
DEPARTMENT OF NETWORKING AND COMMUNICATION  
COLLEGE OF ENGINEERING AND TECHNOLOGY  
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY  
KATTANKULATHUR- 603 203**

**June 2022**

Network design proposal for Small Office

**18CSS202J- Computer Communication Project Report**

*Submitted by*

Rakshita Raj(RA2011030010030)

Harshitha Devi Gokaraju(RA2011030010020)

Likitha Sai Donta(RA2011030010055)

*Submitted to*

*Rajaram V*

Assistant Professor, Department of Networking and Communication

*in partial fulfilment for the award of the degree*

*of*

**BACHELOR OF TECHNOLOGY**

In

**COMPUTER SCIENCE  
ENGINEERING WITH  
SPECIALIZATION IN CYBER SECURITY**



SRMI INSTITUTE OF SCIENCE AND TECHNOLOGY  
S.R.M. NAGAR, KATTANKULATHUR -603 203

BONAFIDE CERTIFICATE

Certified that this lab report titled “Network design proposal for Small Office “ is the Bonafede record of work done by Harshitha Devi(RA2011030010020), Rakshita Raj(RA2011030010030) and Likitha Sai(RA2011030010055) of CSE w/s in Cyber Security 2nd Year B. Tech Degree course in who carried out the mini project report under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other work.

Signature  
Rajaram V  
Networking and Communications- Course Faculty

Assistant Professor  
Department of Networking and Communications

### **TABLE OF CONTENTS**

<b>S.No</b>	<b>PARTICULARS</b>	<b>Pg. No.</b>
1.	Abstract	4
2.	Objective of the project	5
3.	Network requirements	6
4.	Software Analysis	7
4.	Hardware Analysis	8
5.	Network Topology	11
6.	Configuration Table	15
7.	Conclusion	17
8.	References	18

**Project Title:** Network design proposal for Small Office

**Abstract:**

The network design is a major part of the infrastructure of a small office. A small office network design will of course be a function of the number of users, and the programs that make it up. For most small office a peer-to-peer network with a file server, a router, and a few workstations will be adequate.

These days, many budding entrepreneurs and small business owners prefer to work from home or to maintain only a small office. Budding entrepreneurs and small business owners need small network and access to the Internet for their daily work. SOHO network is a solution for this type of network requirement. SOHO network is meant for use in small businesses. Most cases, SOHO networks are configured for privately owned business or individuals who are self-employed.

SOHO networks are small LANs (Local Area Networks). Typically, SOHO networks consist of less than 10 computers. Network service servers like DNS server, email server, web server etc., are typically configured outside SOHO network.

A SOHO network can be a small, wired Ethernet LAN or made of both wired and wireless computers.

**Objectives:**

The primary objective of this project is to provide state of the art networking facilities for the working staff of the office. Given below the points to throw light on the subject matter:

- Providing internet access through ADSL internet connection.
- Uninterrupted printing by the user over the network.
- Provide secure wireless access to the network, with the flexibility to connect via LAN. - Uninterrupted communication between different departments on the network
- Providing remote view and control to the administrators over the file server

## **Network Requirements:**

- 1.All users should be able to access the internet through the ADSL internet connection.
- 2.All users should be able to print via the network.
- 3.All users should have secure wireless access to the network, with the flexibility to connect via LAN.
- 4.A file server for sharing files on the network.
- 5.Hosted Email servers for email access.
- 6.Administrator should be able to remotely view and control the file server from any location on the internet.

## **Network Requirements analysis:**

The software used is cisco packet tracer and for implementing this small office prototype we have used 2811 router which have serial ports, So that it will be easy for us to connect to 4 departments and we have also used 2960-24TT switches all over the network to connect to various departments among the office 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 department without confusion.

## **Cisco Packet Tracer:**

- Cisco Packet Tracer is a visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks.
- We can also configure each and every router and network with the IP address and tested whether the data transfer is successful or not.
- Using packet tracer we have implemented network topology, assigned routers and switches.

## **ADSL**

ADSL (Asymmetric Digital Subscriber Line) is a technology that facilitates fast data transmission at a high bandwidth on existing copper wire telephone lines to homes and businesses.

Unlike regular dial-up copper telephone line service, ADSL provides continuously available, always-on broadband connections. ADSL is asymmetric in that it uses most channels to transmit downstream to the user and only a small part for uploading information from the user.

By 2000, ADSL connections and other forms of high-speed DSL were available in urban areas. ADSL simultaneously accommodates analog (voice) information and data on the same phone line. It is generally offered at downstream internet connection data rates from 512 kilobits per second (Kbps) to about 6 megabits per second (Mbps).

With ADSL -- and other forms of DSL -- telephone service providers compete with internet service providers and varied internet connection methods, such as modems, Wi-Fi routers and fiber optic cable providers.

### **How does ADSL work?**

ADSL works on existing copper phone lines by using a DSL filter, or splitter, to isolate the bands with higher frequencies so that the landline and the ADSL modem can be used at the same time.

At the central office, or telephone exchange, the line ends at the DSL access multiplexer (DSLAM), where an additional splitter segregates the voice signal to the phone network.

ADSL was designed to exploit the one-way nature of most multimedia communication in which large amounts of information flow toward the user and only a small amount of interactive control information is returned.

It is a cost-effective method for internet access at faster speeds compared to a traditional dial-up connection.

## Physical Requirement-

- Servers : A computer programme or apparatus that offers a service to another computer programme and its user, also known as the client, is referred to as a server. The actual computer that a server programme runs on in a data centre is also frequently referred to as a server.



Switches : A computer programme or apparatus that offers a service to another computer programme and its user, also known as the client, is referred to as a server. The actual computer that a server programme runs on in a data centre is also frequently referred to as a server.



Routers : One or more packet-switched networks or subnetworks can be connected using a router. By sending data packets to their intended IP addresses, it manages traffic between different networks and permits several devices to share an Internet connection.





- PC and laptops



### Cloud:

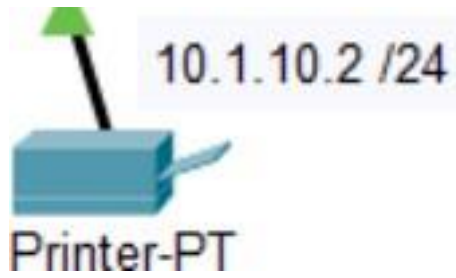
The role of the Cloud-PT component here is to simulate a black box that is irrelevant from our network topology. It could hide for example a complex network infrastructure that is not relevant for the problem we are simulating.



### SmartPhone:

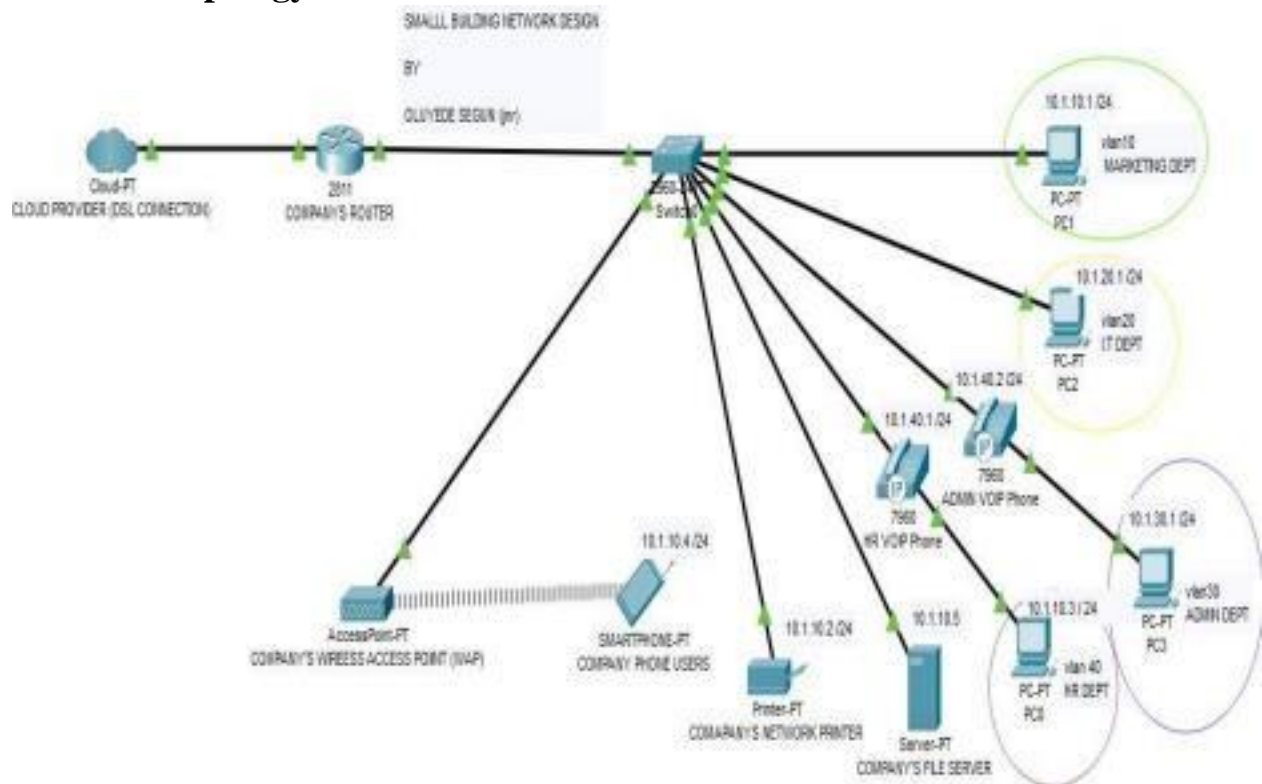


**Printer:**

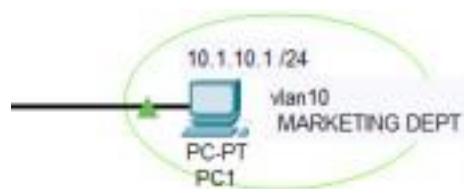


- **Different types of wires used for connecting:**
  1. **Copper crossover**
  2. **Straight through**
  3. **Serial DTE**

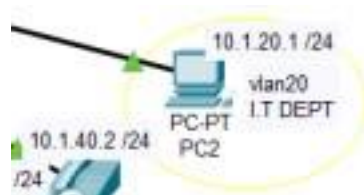
## Network Topology:



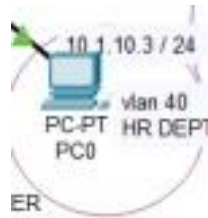
## Marketing Department



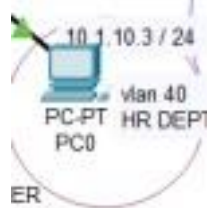
## I.T Department



## Admin Department



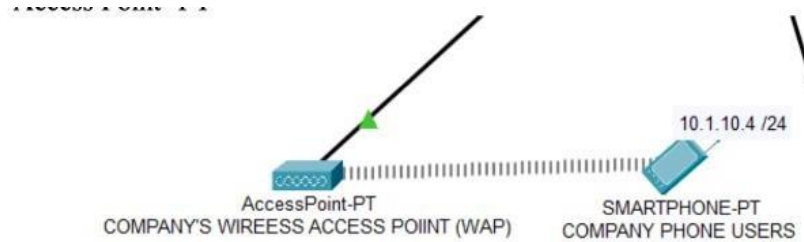
## HR Department



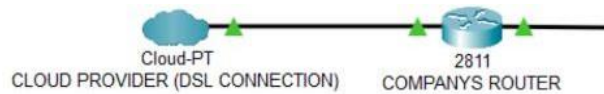
## Printer



## Access Point -PT



## Router



## Access Layer:

In this layer, all the end devices are connected to each other to the network and we will be having the layer 1 switch for the further connections.

## Separation Layer:

Separation layer, mostly the layer 3 switches are used to connect the end devices and make the network correspond and this connects to the access and core layers of the network design.

## **Description**

- This is a small office network design
- It has 4 departments: HR ,IT , Marketing, Admin
- It has a router , switch, a wireless access point, pcs, void phones, printers and file server
- These devices are assigned an ip address by the router via dhcp, and a re preconfigured to ping google dns server 8.8.8.8
- the service provider cloud provides a DSL connection to the company router, and assign an ip address to the router via dhcp
- the service provider cloud provides a DSL connection to the company router, and assigns an ip adress to the router via dhcp
- Run command 'showrun' on router and switch to see preconfigured commands

NB : IP assigned to devices on vlan 10 changes when router power on,

- based on interface vlan.

## **Network Communication**

1.ALL PCS IN DIFFERENT VLANS CAN PING EACH OTHER AND

ACCESS INTERNET 2. ADMIN AND HR CAN DIAL EACH OTHER WITH

THERE VOIP PHONES 3.EVERY EMPLOYEE CAN ACCESS COMPANY

PRINTER ON NETWORK.

4. EMPLOYEES AND GUEST CAN CONNECT TO COMPANYS WAP WITH THER PHONE, AND ACCESS INTERNET, AFTER PUTTING IN WEP KEY PASSWORD CONFIGURED ON THE WAP

5 ALL EMPLOYESS CAN ACCESS FILE SERVER FROM ANYWHERE IN THE NETWORK AND SEND FILES TO IT , AFTER PUTTING IN USERNAME AND PASSWORD.

## Configuration Table:

SOME QUICK COMMANDS TO CONFIGURE THIS NETWORK		
DHCP AND SUB INTERFACE	NAT	ASSIGNING TELEPHONY NUMBER
ipaddress :fa0/1 : ip adress dhcp		telephony-service
ipaddress: fa0/0.10 :10.1.10.254/24	fa0/0 : ip nat inside	max-ephones 5
dhcp network: 10.1.10.0 / 24	fa0/0.10 : ip nat inside	max-dn 5
gateway: 10.1.10.254 /24		ip source-address 10.1.40.254 port 2000
ipaddress fa0/0.20 :10.1.20.254	fa0/0.20 : ip nat inside	auto assign 4 to 6
dhcp network: 10.1.20.0 /24		auto assign 1 to 6
gateway: 10.1.20.254 /24	fa0/0.30 : ip nat inside	
ipaddress fa0/0.30 :10.1.30.254		ephone-dn 1
dhcp network: 10.1.30.0 /24	0/1 : ip nat inside source list 1 interface fa0/1 or	number 0011
gateway: 10.1.30.254 /24		
ipaddress fa0/0.40 :10.1.40.254		ephone-dn 2
dhcp network: 10.1.40.0		number 0022
option 150 ip 10.1.40.254		
gateway: 10.1.40.254 /24		

We have checked manually the network between each user in the branch is connected to one other. This is done individually with testing from one branch device to other branch devices instead of buffer manager interface. After testing this manually buffer testing is implemented and checked.

**Hardware inventory list –**

<b>Devices</b>	<b>Required Nos</b>
<b>PCs</b>	<b>04</b>
<b>Routers</b>	<b>01</b>
<b>Switches</b>	<b>01</b>
<b>Server</b>	<b>01</b>
<b>Smartphone</b>	<b>01</b>
<b>Printer</b>	<b>01</b>
<b>VOP phone</b>	<b>02</b>
<b>Access Point (Wireless)</b>	<b>01</b>
<b>Cloud</b>	<b>01</b>



**Conclusion:**

With the growth of Information Technology in every sector and the explosion of entrepreneurs and small offices, the design of a network of any a small office has become very essential factor. Offices need to have a reliable, secure and scalable network design in order to keep their clients' information, convenient communication between various departments, etc. The hierarchical model of networking best suits our needs along with providing additional features like easy maintenance, high security, simplified troubleshooting and effective performance.

## Reference

<https://www.netacad.com/courses/packet-tracer>

<https://www.techtarget.com/searchnetworking/definition/ADSL>