



# PROJECT REPORT ON ENTERPRISE NETWORK DESIGN

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# TITLE

## ENTERPRISE NETWORK DESIGN

### INTRODUCTION

A computer network is a group of computers that use a set of common communication protocols over digital interconnections for the purpose of sharing resources located on or provided by the network nodes. The interconnections between nodes are formed from a broad spectrum of telecommunication network technologies, based on physically wired, optical, and wireless radio-frequency methods that may be arranged in a variety of network topologies.

The nodes of a computer network may include personal computers, servers, networking hardware, or other specialised or general-purpose hosts. They are identified by hostnames and network addresses. Hostnames serve as memorable labels for the nodes, rarely changed after initial assignment. Network addresses serve for locating and identifying the nodes by communication protocols such as the Internet Protocol.

Computer networks may be classified by many criteria, including the transmission medium used to carry signals, bandwidth, communications protocols to organize network traffic, the network size, the topology, traffic control mechanism, and organizational intent.

Computer networks support many applications and services, such as access to the World Wide Web, digital video, digital audio, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications.<sup>[1]</sup>

### NETWORK COMPONENTS

#### ❖ Hub

A Hub is a hardware device that divides the network connection among multiple devices. When computer requests for some information from a network, it first sends the request to the Hub through cable. Hub will broadcast this request to the entire network. All the devices will check whether the request belongs to them or not. If not, the request will be dropped.

The process used by the Hub consumes more bandwidth and limits the amount of communication. Nowadays, the use of hub is obsolete, and it is replaced by more advanced computer network components such as Switches, Routers.<sup>[2]</sup>

#### ❖ Switch

A switch is a hardware device that connects multiple devices on a computer network. A Switch contains more advanced features than Hub. The Switch contains the updated table that decides where the data is transmitted or not. Switch delivers the message to the correct destination based on the physical address present in the incoming message. A Switch does not broadcast the message to the entire network like the Hub. It determines the device to whom the message is to be transmitted. Therefore, we can say that switch provides a direct connection between the source and destination. It increases the speed of the network.<sup>[2]</sup>

#### ❖ Router

- A router is a hardware device which is used to connect a LAN with an internet connection. It is used to receive, analyse and forward the incoming packets to another network.

- A router works in a Layer 3 (Network layer) of the OSI Reference model.
- A router forwards the packet based on the information available in the routing table.
- It determines the best path from the available paths for the transmission of the packet. <sup>[2]</sup>

### ❖ Modem

- A modem is a hardware device that allows the computer to connect to the internet over the existing telephone line.
- A modem is not integrated with the motherboard rather than it is installed on the PCI slot found on the motherboard.
- It stands for Modulator/Demodulator. It converts the digital data into an analog signal over the telephone lines. <sup>[2]</sup>

Based on the differences in speed and transmission rate, a modem can be classified in the following categories:

- Standard PC modem or Dial-up modem
- Cellular Modem
- Cable modem

### ❖ Cables and Connectors

Cable is a transmission media used for transmitting a signal. <sup>[2]</sup>

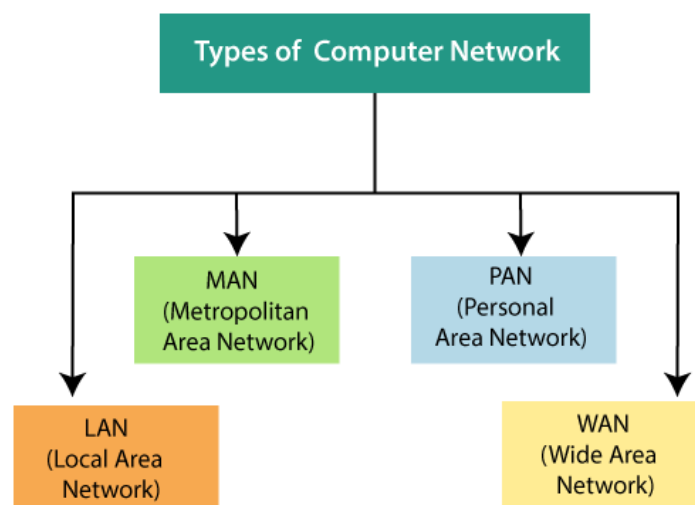
There are three types of cables used in transmission:

- Twisted pair cable
- Coaxial cable
- Fibre-optic cable

## COMPUTER NETWORK TYPES

A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications. <sup>[3]</sup>

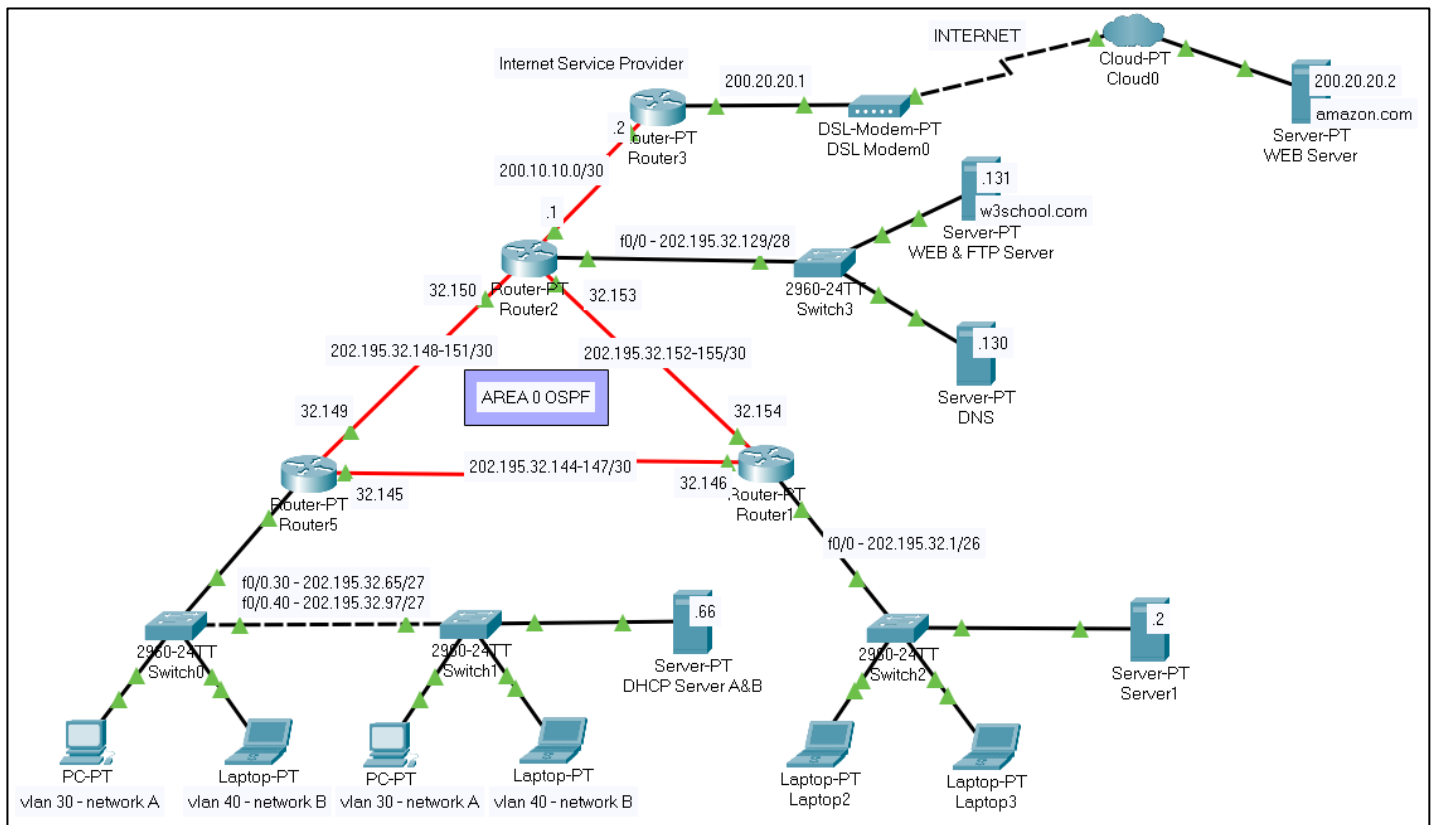
A computer network can be categorized by their size. A computer network is mainly of four types:



## PROBLEM STATEMENT

1. An ISP granted a block of IP address starting with 202.195.32.0/24 to an enterprise. Enterprise having 2 virtual subnet, 2 physical subnet and 4 links. Number of hosts required in different subnets are: Network A 30 host, Network B 30 host, Network C 60 host and Network D 12 host. Distribute the IP address to different subnets and links by subnetting IP block granted by ISP. Use a different IP for link between Enterprise Router and ISP Router (e.g., 200.10.10.0/30)
2. Create 2 Virtual Network A and B. Implement Inter VLAN Routing between VLANs.
3. Connect a DHCP server in Network A and configure DHCP relay in router total low automatic IP configuration in Network B. Connect another DHCP server in Network C. Use static IP in Network D.
4. Implement Dynamic routing protocol for routing within enterprise network and default routing to connect with ISP.
5. Implement webserver, FTP server and DNS Server in network D.
6. Restrict host of Network A from exiting the network. Host of Network C should not able to access web server but can connect with internet. Hosts of Network B should not able to access internet.

## SOLUTION



### ❖ ISP\_Router configuration

Current configuration : 783 bytes

version 12.2

no service timestamps log datetime msec

no service timestamps debug datetime msec no service password-encryption

```
hostname ISP_Router
```

ip cef

```
no ipv6 cef
```

!

```
interface FastEthernet0/0
```

```
ip address 200.20.20.1 255.255.255.0
```

duplex auto

speed auto

```
interface FastEthernet1/0
```

no ip address

duplex auto

speed auto

shutdown

```
interface Serial2/0
```

```
ip address 200.10.10.2 255.255.255.252
```

!

```

interface SerialI3/0
no ip address
clock rate 2000000
shutdown
!
interface FastEthernet4/0
no ip address
shutdown
!
interface FastEthernet5/0
no ip address
shutdown
!
ip classless
ip route 202.195.32.0 255.255.255.0 200.10.10.1
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
!
!
end

```

## CONCLUSION

By configuring all the devices, we achieve our requirements,

1. Network A is not able to reach another network including internet.
2. Network B can use DHCP server of Network A, it can browse YouTube server and it is unable to reach internet.
3. Network C can't use the YouTube server but can access google server which is over internet.

We achieved our requirements by using ACL (Standard and Extended), Inter-vlan routing, Dynamic Routing Protocol (RIP), DHCP relay agent, Static Routing etc.

## REFERENCES

- [1] [https://en.wikipedia.org/wiki/Computer\\_network](https://en.wikipedia.org/wiki/Computer_network)
- [2] <https://www.javatpoint.com/computer-network-components>
- [3] <https://www.javatpoint.com/types-of-computer-network>