



# **NETWORK TOPOLOGY IN AN OFFICE**

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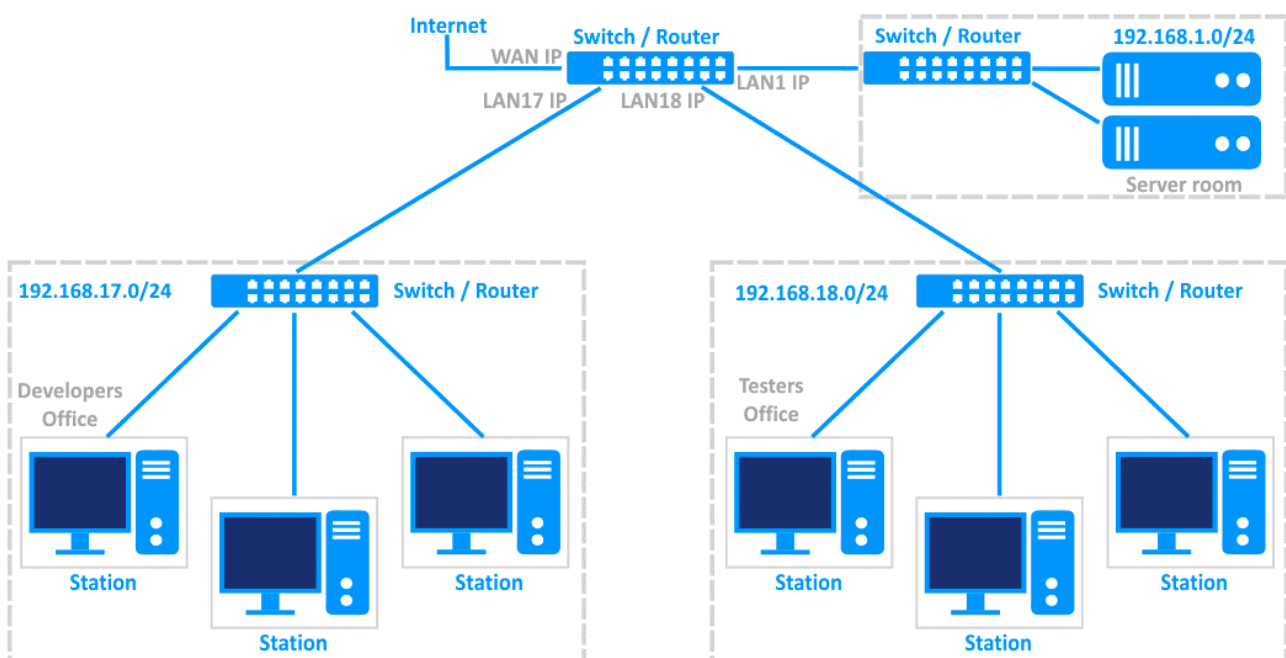
# INTRODUCTION

The office network topology plays a crucial role in the smooth functioning of communication within an organisation. It defines the structure of the network and the way devices and users communicate with each other. A poorly designed network topology can result in slow communication, data loss, and security vulnerabilities. Therefore, it is essential to evaluate and optimize the network topology of an office for efficient communication.

The objective of this project is to evaluate and optimize the network topology of an office for efficient communication. The project will begin with an analysis of the current network topology, identifying areas for improvement. The analysis will include a review of the hardware and software components, network protocols, and network security measures. Based on the analysis, the project will propose a new network topology that is optimized for the office's communication needs.

The proposed topology will be implemented and tested in a controlled environment, and the results will be compared with the current network topology. The project will evaluate the performance of the network topology in terms of speed, reliability, and security. The project will also provide recommendations for maintaining and upgrading the network topology to ensure efficient communication in the future.

Overall, this project aims to help organizations optimize their network topology to facilitate efficient communication and improve their overall productivity. Here Is an example of an basic Office Network Setup:



## Base Subnet Connections Used in the Topology :

Base network: 192.168.1.0

No. of subnets= 3

No. of subnets=  $2^n$

$2^n=3 \Rightarrow n=2$

Class C= 255.255.255.0} 11111111. 11111111. 11111111.00000000

After borrowing 2 bits

New binary= 11111111. 11111111. 11111111.11000000

New subnet mask : 255.255.255.192

Block size= 64

1st Subnet

Network ID: 192.168.1.0

Broadcast ID: 192.168.1.63

Host range: 192.168.1.1 - 192.168.1.62

2nd subnet

Network ID: 192.168.1.64

Broadcast ID: 192.168.1.127

Host range: 192.168.1.65 - 192.168.1.126

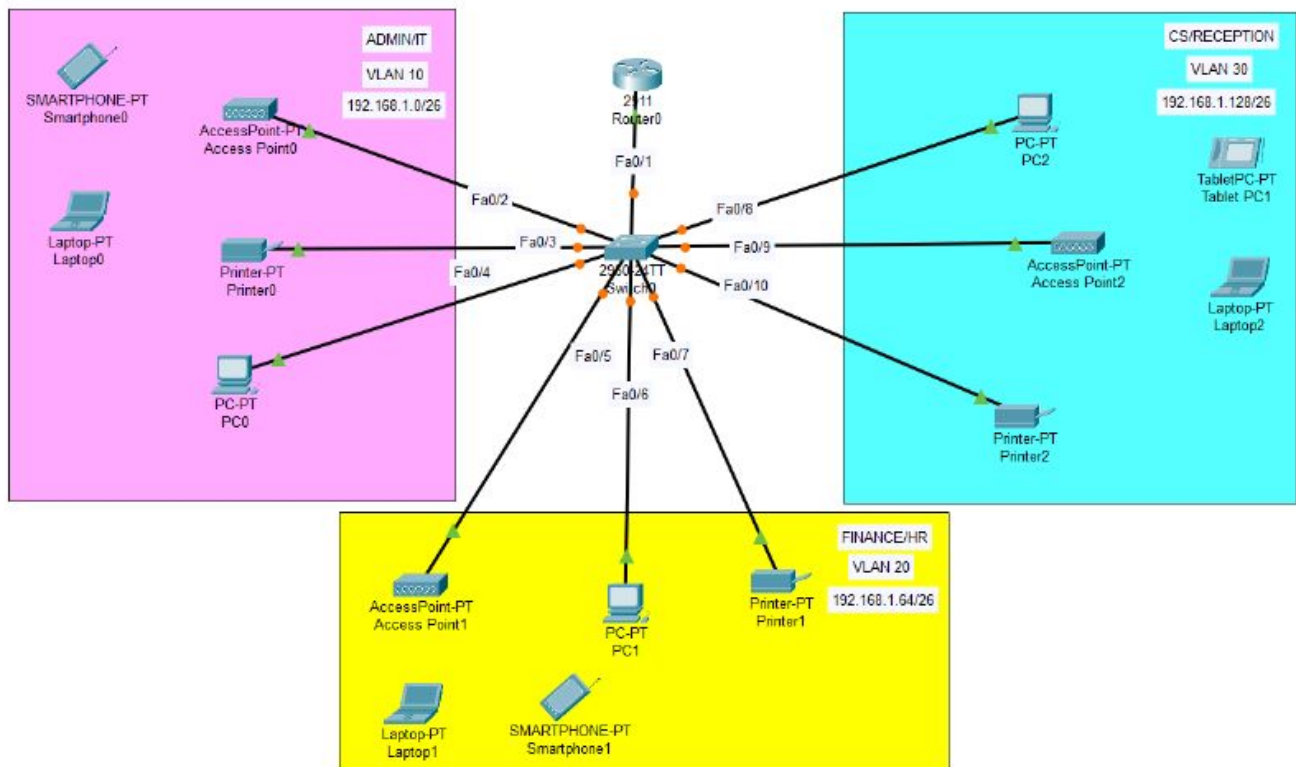
3rd subnet

Network ID: 192.168.1.128

Broadcast ID: 192.168.1.191

Host range: 192.168.1.129 - 192.168.1.190

## Physical Model Using Cisco Packet Tracer :



Choosing the right network topology for a medium-scale office depends on several factors, including the number of devices, the size and layout of the office, the type of network traffic, and the level of security required. Each topology has its own advantages and disadvantages, and it is important to carefully consider these factors before making a decision. For our Purposes we have chosen a **star topology** networking framework.

### Star Topology:

A star topology is a network layout in which all devices are connected to a central hub or switch. This type of topology is more scalable than a bus topology, as new devices can be easily added without affecting the rest of the network. It also provides better performance, as traffic is directed through the hub or switch. However, it requires more cabling than a bus topology and can be more expensive to install.

Star topology is the most efficient topology for a medium-scale office for several reasons:

1. **Scalability:** A star topology is highly scalable, which means it can easily accommodate additional devices without affecting the performance of the network. This is important for a medium-scale office as it is likely to experience growth and expansion over time, and will require additional devices to be added to the network.
2. **Centralized Control:** In a star topology, all devices are connected to a central hub or switch, which provides a centralized point of control for the network. This makes it easier to manage and troubleshoot the network, as all traffic flows through the hub or switch.
3. **Performance:** A star topology provides high performance, as traffic is directed through the hub or switch rather than being broadcasted to all devices. This reduces network congestion and improves the speed and reliability of the network.
4. **Security:** A star topology provides a higher level of security compared to other topologies, as each device is connected to the hub or switch via a separate cable. This means that if one device is compromised, it does not affect the rest of the network.
5. **Ease of Installation:** A star topology is relatively easy to install, as it requires less cabling compared to other topologies such as mesh or ring. This reduces installation time and costs, making it a cost-effective option for a medium-scale office.

Overall, a star topology provides a balance of scalability, performance, security, and ease of installation, making it the most efficient topology for a medium-scale office.

While a star topology is generally considered the most efficient topology for a medium-scale office, it does have some disadvantages to consider:

1. **Single Point of Failure:** Since all devices are connected to a central hub or switch, the failure of the hub or switch can bring down the entire network. This makes the network less fault-tolerant, and requires a backup hub or switch to be in place to avoid downtime in case of failure.
2. **Cost:** A star topology can be more expensive to implement compared to other topologies such as bus or ring. This is because it requires additional cabling and a central hub or switch to be installed.

3. **Limited Distance:** The distance between the central hub or switch and the connected devices is limited, which can be a disadvantage for a larger office. This can lead to the need for additional hubs or switches to be installed to cover the distance, which adds to the cost.
4. **Maintenance:** Maintenance of a star topology can be more complicated compared to other topologies, as it requires regular checking of the hub or switch and the individual connections. This can add to the workload of the network administrator.
5. **Bandwidth Limitations:** The bandwidth of a star topology is limited by the capacity of the central hub or switch. This means that as the number of devices on the network increases, the performance may start to degrade.

While these disadvantages should be considered when choosing a network topology for a medium-scale office, a star topology is still often the most efficient and effective choice.

## **Conclusion :**

Choosing the right network topology for a medium-scale office is crucial for the success of the business. While there are several types of network topologies available, a star topology is often the most efficient and effective choice. It provides scalability, centralized control, high performance, and a higher level of security compared to other topologies. However, a star topology does have some disadvantages to consider, such as cost, limited distance, and maintenance requirements. Overall, it is important to carefully consider the specific needs and requirements of the office before making a decision on which network topology to implement.

## **References :**

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