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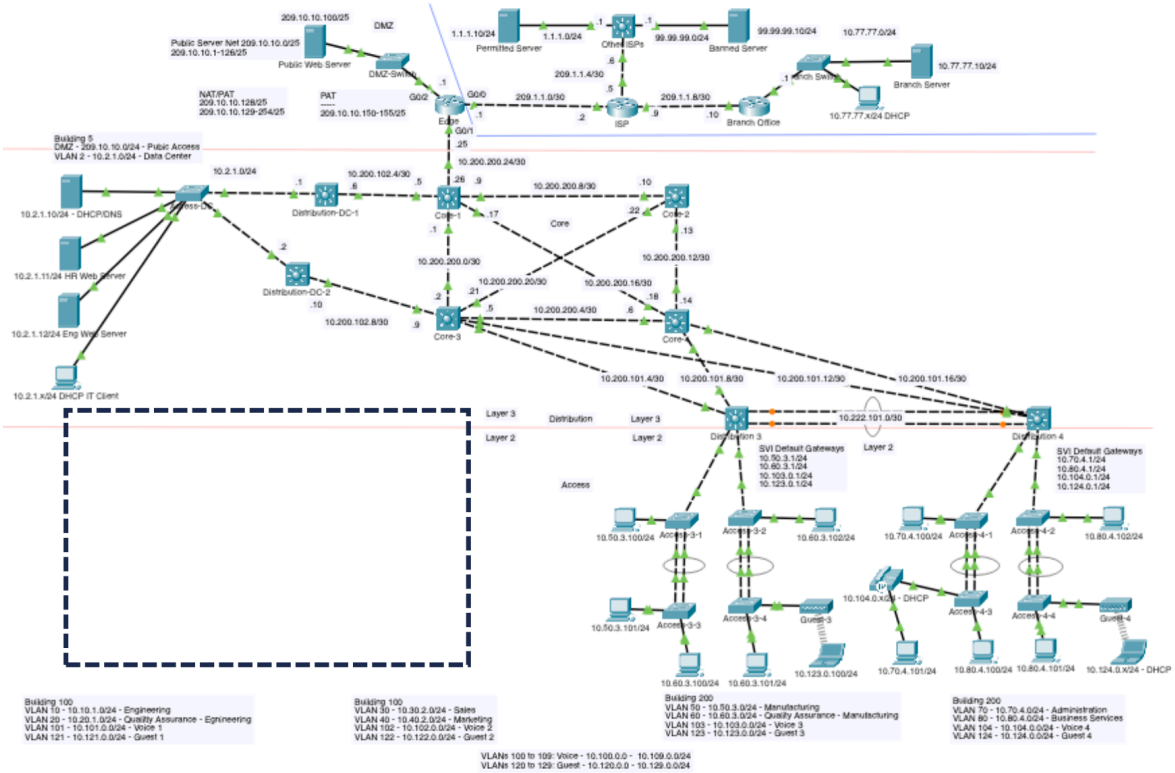
Enterprise Network - Lab 1: Basic Ethernet and IP Networking

CSE 153 Network Architecture

Guideline/Notes

The Starting Topology



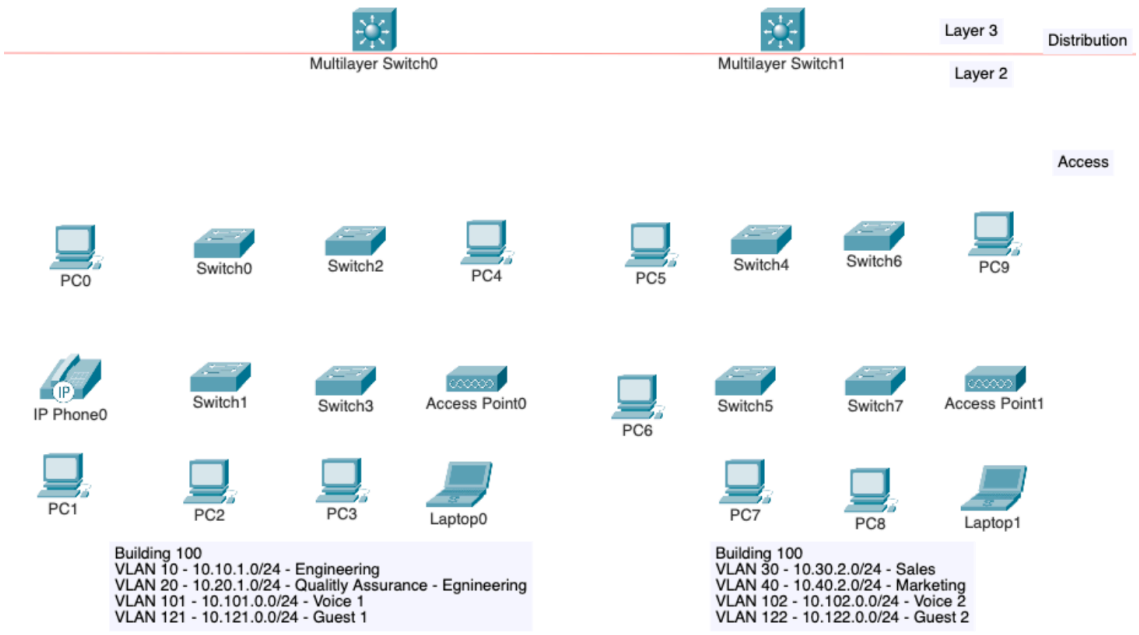
In the real world, network engineers and administrators rarely build networks from scratch. Instead they usually work within brownfield environments–existing networks that are already in operation.

Brownfield environments: existing networks that are already in operation. These networks often include legacy configurations, live traffic, and operational constraints that must be carefully considered when making changes.

Greenfield network: A brand-new deployment where you can design everything from the ground up without needing to account for existing infrastructure.

New Switch Block: A switch block is a group of switches that provides connectivity for a new set of end devices

In this lab, we'll be dealing within a brownfield environment by adding a new switch block into an existing enterprise network.



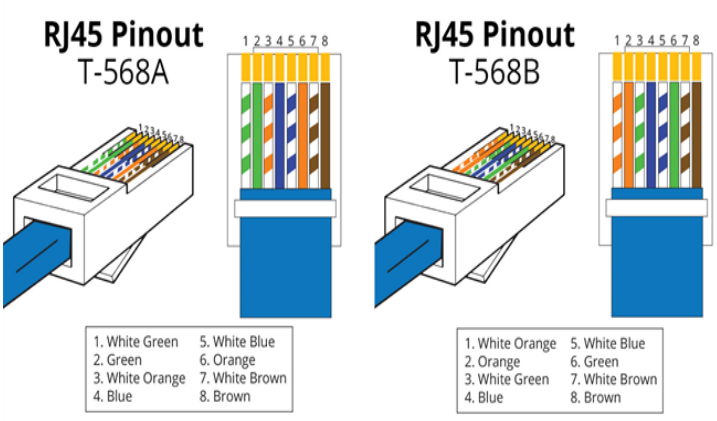
Cabling

When connecting devices, we have to ensure we use the right specific cable types and ensure they're connected in the correct ports assigned

Two options we have for this lab are:

1. ***Copper Straight-Through Cable:***
    a. Used to connect devices that operate at different layers of the network model (such as a computer and a switch or a switch and a router)
    b. The reason for this is the wires are arranged in the same order at both ends of the cable
    c. The wiring scheme is T568A

2. ***Copper Cross-Over Cable:***
    a. For devices that operate at the same layer of the network model such as two computers, switches, or routers.



b. The wires are placed in a different order at each end of the cable.
c. The standard wiring scheme for crossover cables is a combination of T568A and T568B

Wireless LAN (WLAN) Access Points and Laptops:

Access Points SSIDs
Configuring SSIDs (Service Set Identifiers) on access points is essential to define and identify specific wireless networks for devices to connect. Each SSID represents a unique network, allowing users to distinguish between different wireless environments, such in this topology, we have “Guest-1” and “Guest-2”

Laptops
Most real-world laptops have both a wired and wireless Nics. Packet tracer only supports one LAN NIC at a time so we have to install a WLAN NICs.

In this case, we’ll be installing PT-LAPTOP-NM-1-W-AC where

- NM = Network Module (I think)
- W = Wireless
- AC = Wifi 5

Post Completion of Lab:

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How many broadcast domains did we create? 2 since all devices within their down can communicate at layer 2 with all other devices

When any device sends an ARP Request, An Ethernet Broadcast, which other devices will receive the broadcast?
All devices within the same broadcast domain will receive it. However, only the device with the matching ip address will respond, Devices in different broadcast domains will not the ARP router

Devices on different IP networks, such as PC0 (10.10.1.100/24) and PC3 (10.20.1.101/24) will not successfully ping other. This is because the devices in different subnets require a router or a multilayer switch with routing enabled to facilitate communication

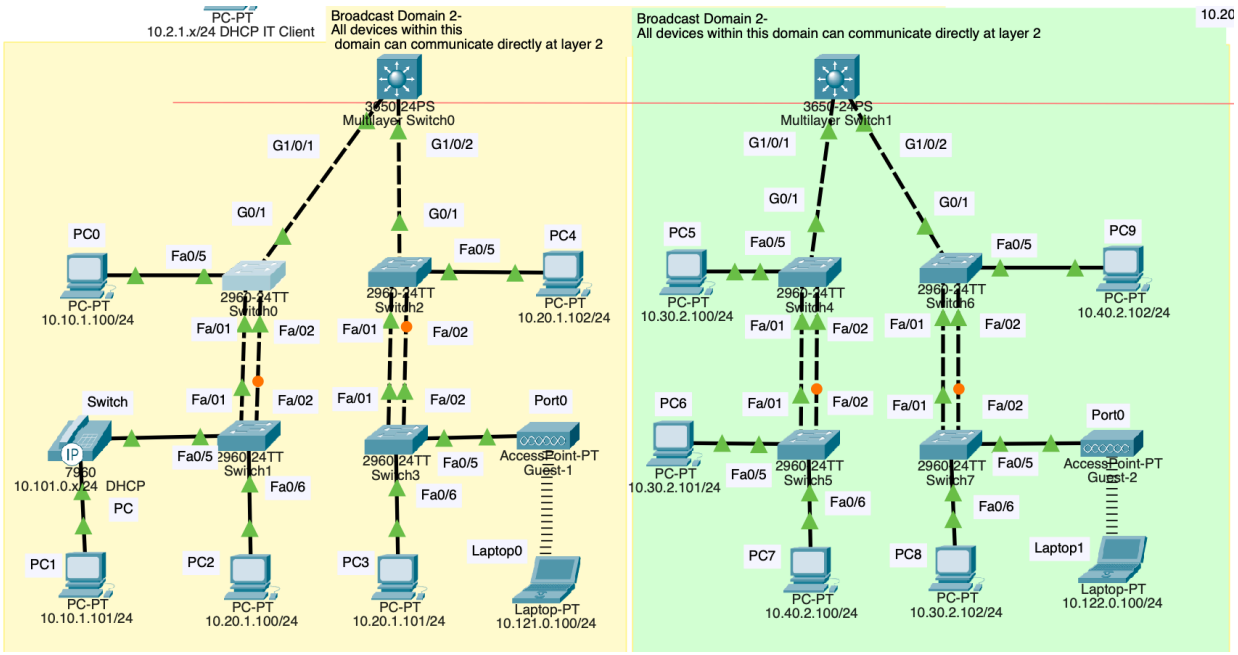
Can any device ping the either of the laptops?
No, the laptops (10.121.0.100/24 and 10.122.0.100/24) are on separate subnets that are not connected to a
router or a routing-enabled switch. Without a Layer 3 device, devices in different subnets cannot
communicate.

Why are some of the link lights amber?
The amber link lights indicate that Spanning Tree Protocol (STP) has placed certain ports into a blocking state
to prevent network loops. This is a normal behavior in redundant network topologies. In later labs, you will
explore technologies like EtherChannel to bundle links and avoid loops while maintaining redundancy.

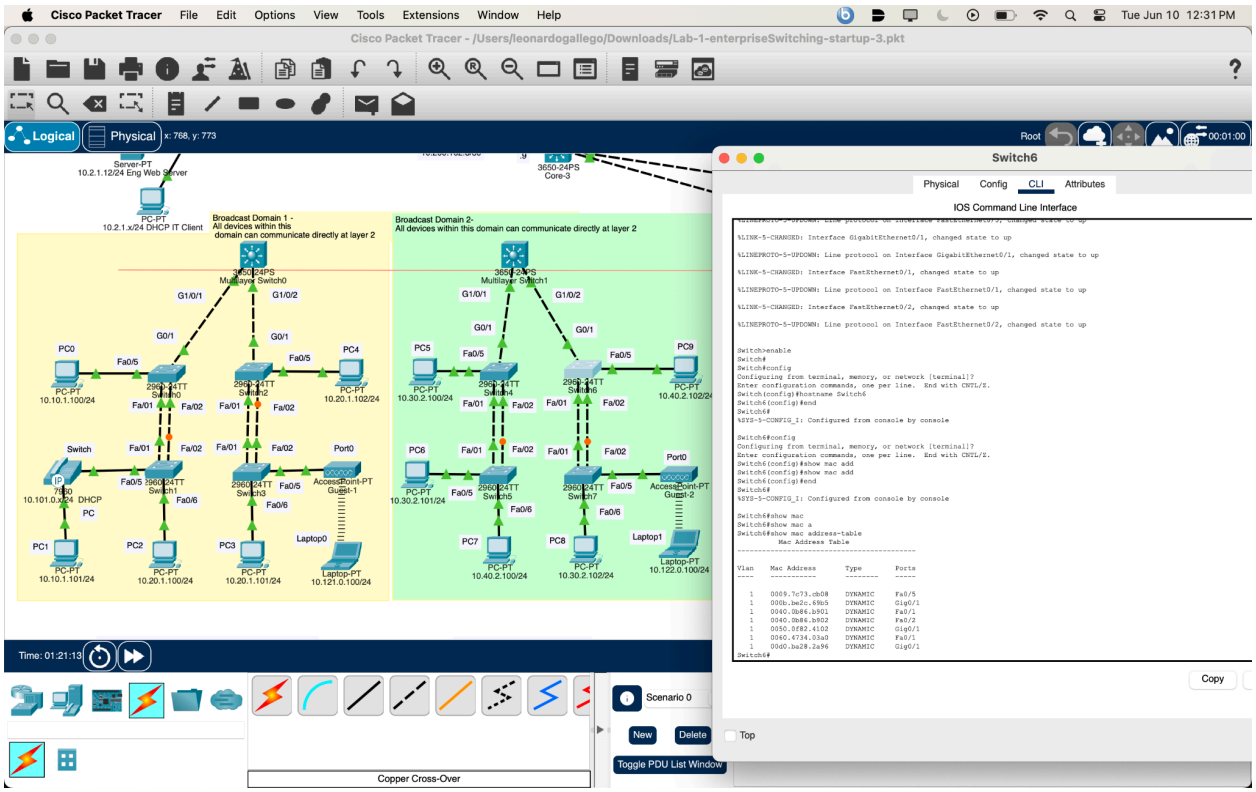
What would we need for device in different networks to communicate?
Devices in different networks require a router or a multilayer switch with routing enabled. The router must
have interfaces configured with IP addresses corresponding to the default gateways of each network to
facilitate inter-subnet communication.

What would we need for the two physically separate LANs to communicate?
To enable communication between the two physically separate LANs, you need a direct physical connection
between Multilayer Switch0 and Multilayer Switch1. This connection will allow routing or Layer 2
switching/bridging to occur, as configured in later labs.

Is there a disadvantage to have devices in different networks in the same broadcast domains?
Yes, having devices in different networks within the same broadcast domain can cause performance
degradation due to excessive broadcast traffic, limit scalability as the network grows, and introduce security
risks since traffic is not segmented. Configuring VLANs will address these issues by isolating broadcast traffic
and improving overall network efficiency.



Mac Address Table of switch 4:



Currently, all switch ports are part of VLAN 1, meaning all devices are in the same broadcast domain. You can verify this by examining the MAC address table, which lists the MAC addresses learned on each port. In future labs, you will configure VLANs to

segment the network into multiple broadcast domains, improving performance, scalability, and security.[17]