EAST WEST UNIVERSITY

Course Name: Data Communications
Course Code: CSE350

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Lab Topic: Topology & Ip Address Classification

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1 Bus Topology

Bus topology is a network structure where all devices connect to a single central cable or bus, that acts as a shared communication line. Data sent by any device travels along the bus until it reaches its destination, with terminators at each end to prevent signal bounce. While it's easy to set up and cost-effective due to minimal cabling, bus topology suffers from limited bandwidth and performance issues as more devices are added.

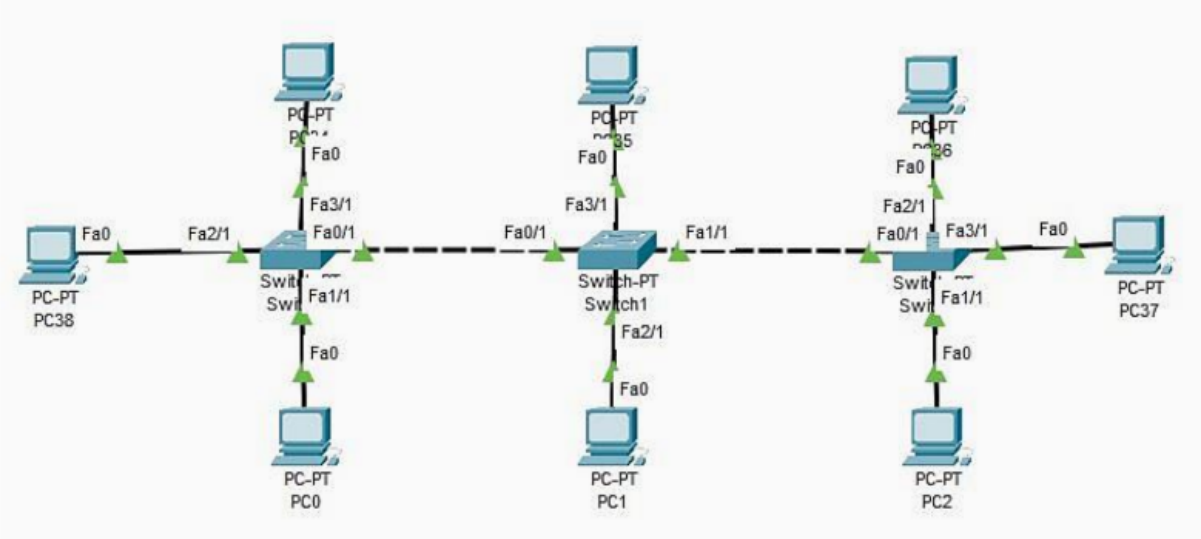

Figure 1: Bus Topology

2 Mesh Topology

Mesh topology is a network structure where each device is interconnected with one another, creating a web of direct connections. This configuration can be either full mesh, where every node is connected to all others, or partial mesh, where only some nodes have multiple connections.

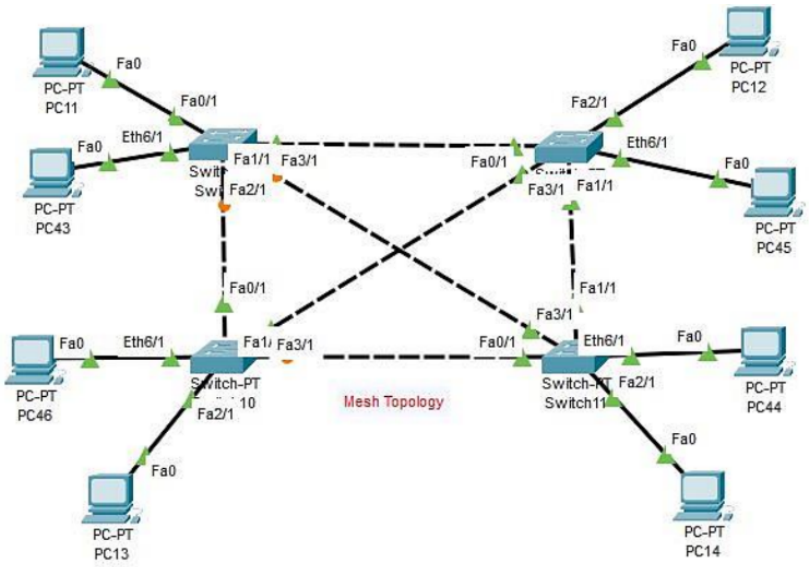

Figure 2: Mesh Topology

3 Star Topology

Star topology is a network configuration where each device is connected to a central hub or switch. This central device acts as a mediator, facilitating data transmission between connected nodes. One of the main advantages of star topology is its simplicity and ease of troubleshooting.

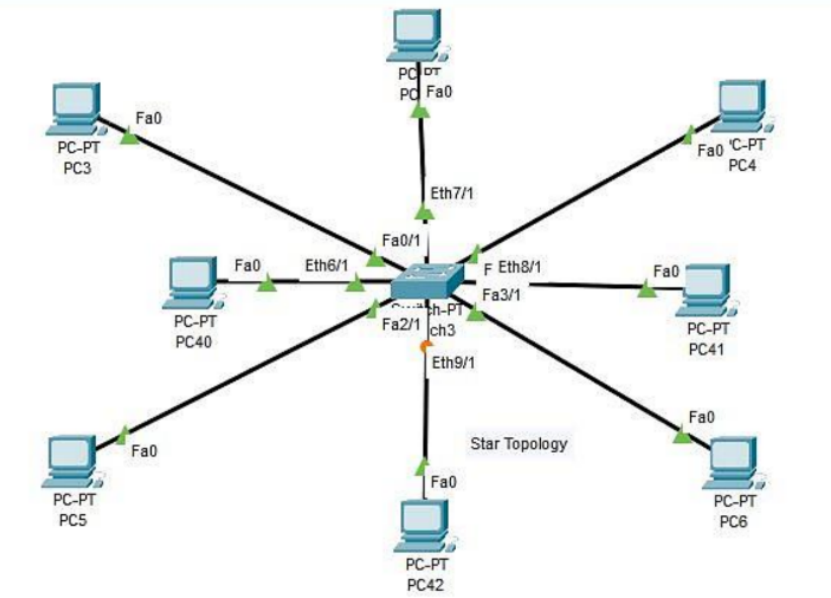

Figure 3: Star Topology

4 Ring Topology

Ring topology is a network configuration where each device is connected to exactly two other devices, forming a closed loop or ring. Data travels in one direction (unidirectional) or both directions (bidirectional), passing through each device until it reaches its destination. One of the main advantages of ring topology is the predictable data transfer with minimal collision, making it efficient for handling high-volume traffic.

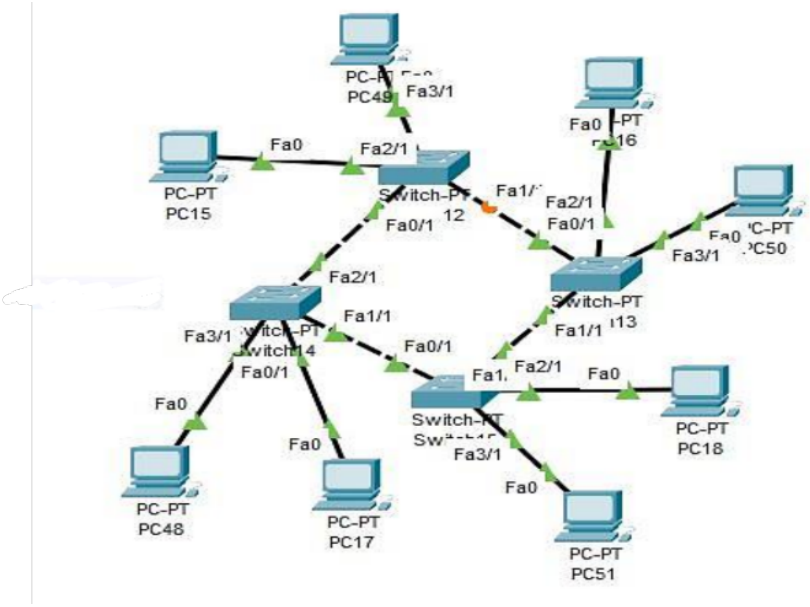

Figure 4: Enter Caption

5 Hybrid Topology

Hybrid topology is a network configuration that combines two or more different types of network topologies, such as star, ring, bus, and mesh, to create a versatile and efficient network structure. This approach leverages the strengths of each integrated topology while compensating for their limitations.

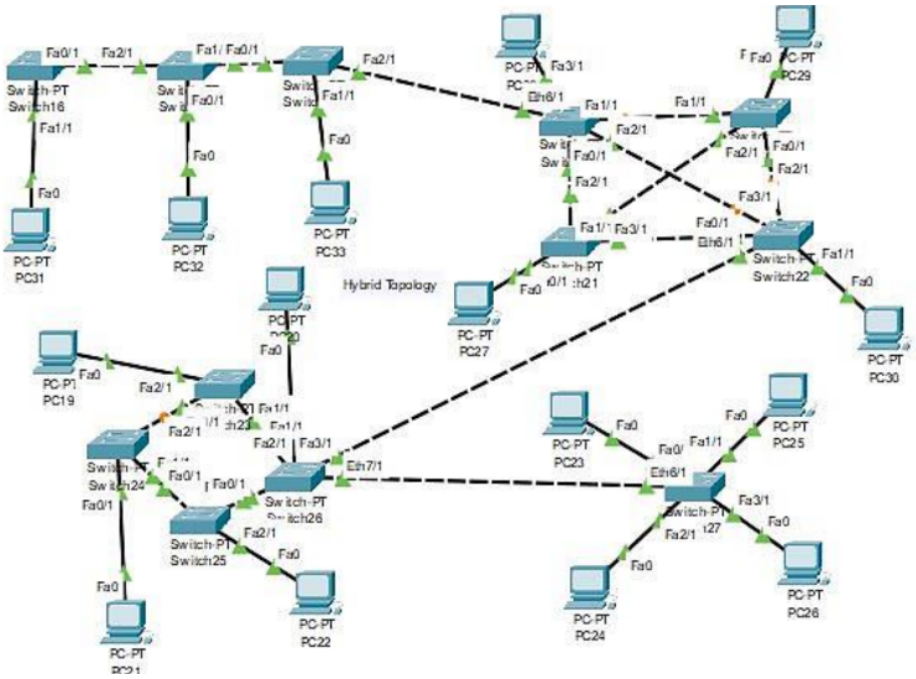

Figure 5: Hybrid Topology

6 IP Address

An IP (Internet Protocol) address is a unique numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. It serves two main functions: identifying the host or network interface and providing the location of the device in the network. IP addresses come in two versions: IPv4 and IPv6.

7 Comparison Between IPv4 and IPv6

Feature	**IPv4**	**IPv6**
Address Length	32 bits	128 bits
Address Format	Dotted decimal (e.g., 192.168.0.1)	Hexadecimal (e.g., 2001:0db8:85a3::8a2e)
Address Space	4.3 billion addresses	3.4×10^{38} addresses
Configuration	Manual or DHCP	Auto-configuration (Stateless Address Autoconfiguration)
Security	Optional (via IPSec)	Built-in (IPSec support)
Fragmentation	Can be done by both sender and routers	Only performed by sender
Broadcasting	Supported	Not supported (uses Multicast and Anycast)
Header Complexity	More complex with optional fields	Simplified fixed-length header
Routing Efficiency	Less efficient due to more complex headers	More efficient with simplified headers

Table 1: Comparison of IPv4 and IPv6

8 IPv4 Class, Subnets, CIDR and Wildcard Masks

Class	**Range**	**Default Subnet Mask**	**CIDR Notation**	**Wildcard Mask**
A	0.0.0.0 to 127.255.255.255	255.0.0.0	/8	0.255.255.255
B	128.0.0.0 to 191.255.255.255	255.255.0.0	/16	0.0.255.255
C	192.0.0.0 to 223.255.255.255	255.255.255.0	/24	0.0.0.255
D	224.0.0.0 to 239.255.255.255	(Multicast)	-	-
E	240.0.0.0 to 255.255.255.255	Reserved for Experimental Use	-	-

Table 2: IPv4 Address Classes, Subnet Masks, CIDR, and Wildcard Masks

9 IPv4 Network Portion & Host Portion

Class	**Network Portion**	**Host Portion**
A	First 8 bits (1st octet)	Last 24 bits (remaining 3 octets)
B	First 16 bits (2 octets)	Last 16 bits (remaining 2 octets)
C	First 24 bits (3 octets)	Last 8 bits (1 octet)

Table 3: Network and Host Portion in IPv4 Classes