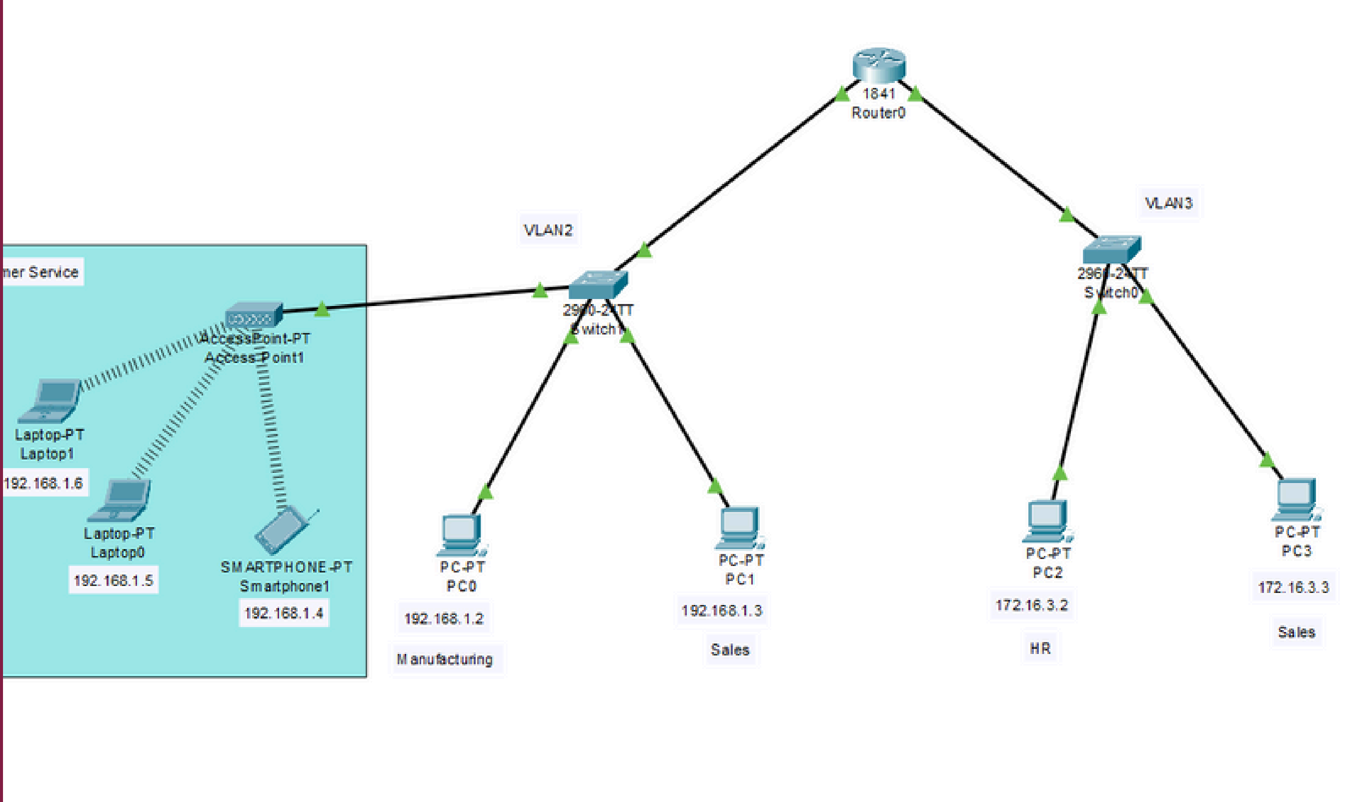
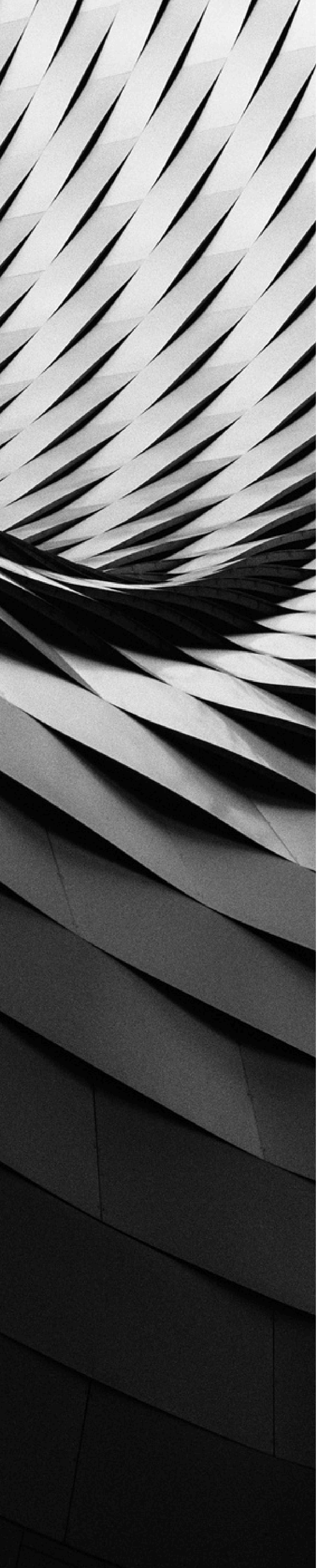
WIRELESS NETWORKS

IT442



Wireless Networks Project Report



What is a VLAN?

Almost always within the developing network management scenario the most important components are how to make it more efficient and secure. This article offers to Virtual Local Area Networks (VLANs) which is a useful network tools that will allow network administrators to portion the physical network into multiple logical subnetworks. VLANs create these virtual partitions which are a very capable available alternative to network performance improvement, network security, and network management simplicity solutions.

Traditionally, Local Area Networks' (LANs) are a unified single broadcast domain. This implies that all the computers which are part of LAN receive each broadcast message without checking who is being addressed by it. In large or complex networks, this incessant function of the order of unimportant traffic can result in excessive congestion and bad performance as a whole. Moreover, a flat LAN setup brings several security concerns since all the data travel across the whole network without segmentation at all.

VLANs overcome the above-mentioned limitations of the physical LANs by rendering them as a single logical broadcast domain. These virtual networks, defined by their specific VLAN ID, can be considered as lan cabinet of physical isolation. Devices within VLAN communicate with other devices in the same group alone. The isolation that is built into broadcast traffic ensures that the traffic in the assigned VLAN is the only one that is extracted from the network, thus, reducing network congestion and improving overall performance.

The Purpose of a VLAN

Enhance Security

VLANs physically divide the network broadcast zones, thereby, deny unauthorized access to vital data to other parts of the network. Such things like a VLAN which only financial department can use, and another VLAN for guest access that simply cannot be used by finance department, help decrease the possibility of security breaches.

Increase Manageability

VLANs offers a way to simplify network management because the administrators can now idea for a particular group of devices to use specific policies and configurations. For instance, network ACLs can serve the purpose of applying specific security settings on a per-VLAN level, hence helping to simplify the security management process.

Improve Performance

Being restrictive in their traffic, VLANs not only result in a significant reduction of network congestion, but also faster response time and in exceptional cases might bring overall better network performance for any device. It turns out that data transmission on fast networks is also a good option for band-width-intensive application including video conferencing or VoIP.

VLAN Memberships

VLAN membership can be assigned to a device by one of two methods

1. Static
2. Dynamic

These methods decide how a switch will associate its ports with VLANs.

1. Static VLANs

- Typical method of creating VLANs
- Most secure

  A switch port assigned to a VLAN always maintains that assignment until changed

2. Dynamic VLANs

- Node assignment to a VLAN is automatic
  - MAC addresses, protocols, network addresses, etc
- VLAN Management Policy Server (VMPS)
  - MAC address database for dynamic assignments
  - MAC-address to VLAN mapping

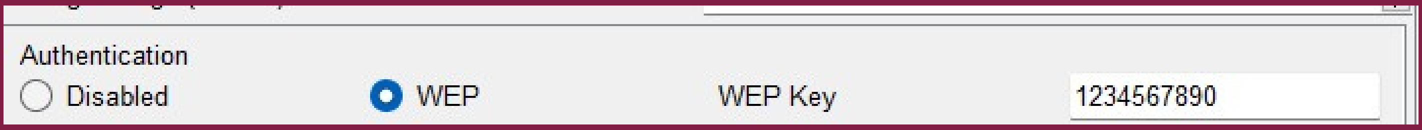
The main difference between static VLANs and dynamic VLANs is that the static VLANs are configured manually by assigning ports to a VLAN while dynamic VLANs use a database that stores a VLAN-to-MAC mapping to determine the VLAN that a particular host is connected to. This provides more flexibility in dynamic VLANs allowing the hosts to move within the network as opposed to static networks[2].

Properties of VLAN

- Allows us to split switches into separate (virtual) switches.
- Inter-VLAN traffic must be routed (i.e. go through a router) because they are separate subnets
- VLANs provide segmentation based on broadcast domains.
- VLANs logically segment switched networks based on the functions, project teams, or applications of the organization regardless of the physical location or connections to the network.
- All workstations and servers used by a particular workgroup share the same VLAN, regardless of the physical connection or location.
- VLANS address scalability, security, and network management.
- Routers in VLAN topologies provide broadcast filtering, security, and traffic flow management.
- The switch behaves as several virtual switches, sending traffic only within VLAN members.

VLAN CONNECTIONS

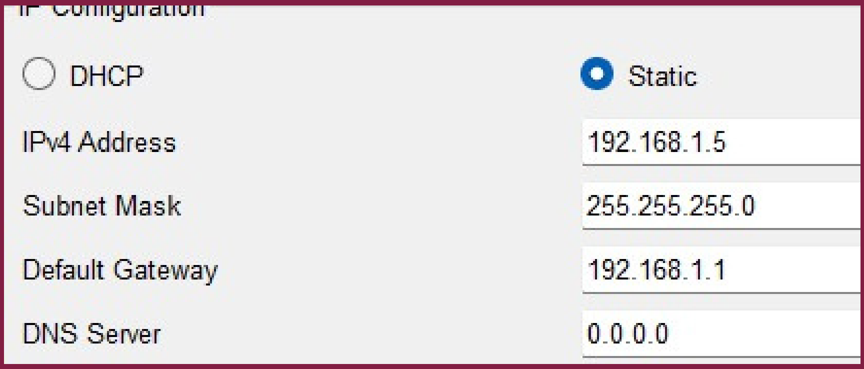
Access point:



Authentication

○ Disabled ● WEP WEP Key 1234567890

Wireless devices:



IP Configuration

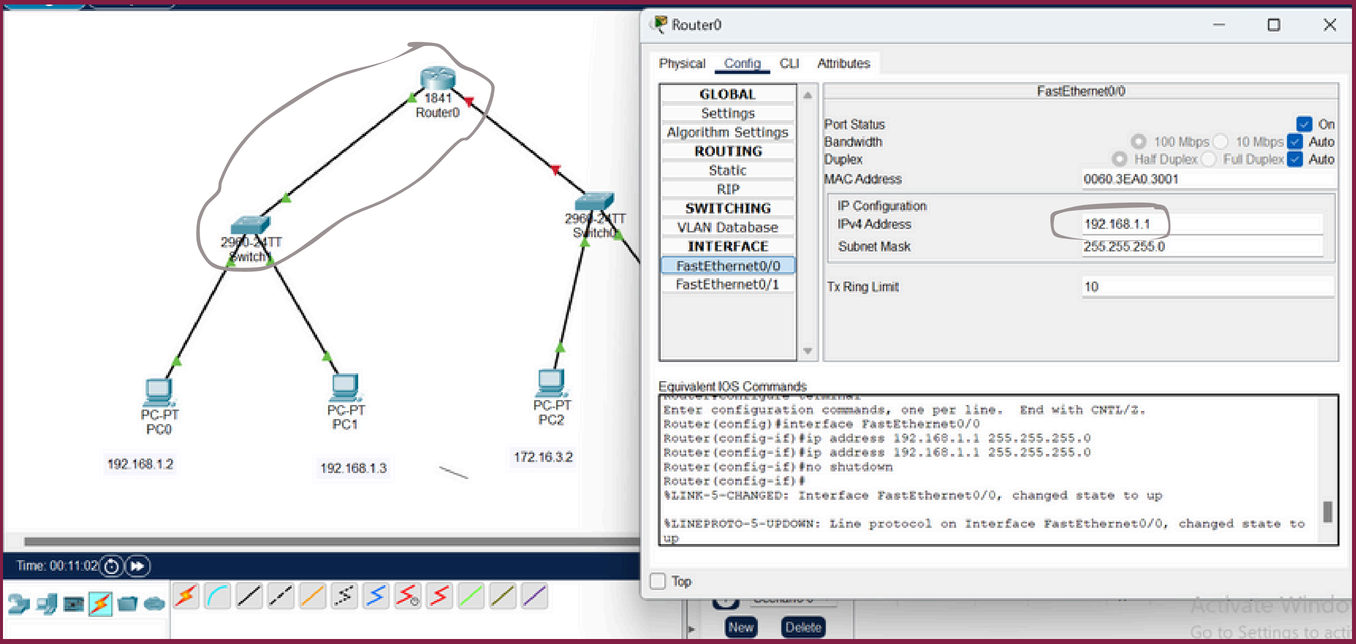
○ DHCP ● Static

IPv4 Address	192.168.1.5
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

Each device typically has its own IP address assigned to it. These IP addresses allow devices to communicate with each other within the network. Additionally, a default gateway is configured on each device to enable communication with devices outside the local network

CONFIGURATIONS

1. Configuring the Router:



FastEthernet0/0

Port Status ☑ On
Bandwidth ○ 100 Mbps ○ 10 Mbps ☑ Auto
Duplex ○ Half Duplex ○ Full Duplex ☑ Auto
MAC Address 0060.3EA0.3001

IP Configuration
IPv4 Address 192.168.1.1
Subnet Mask 255.255.255.0

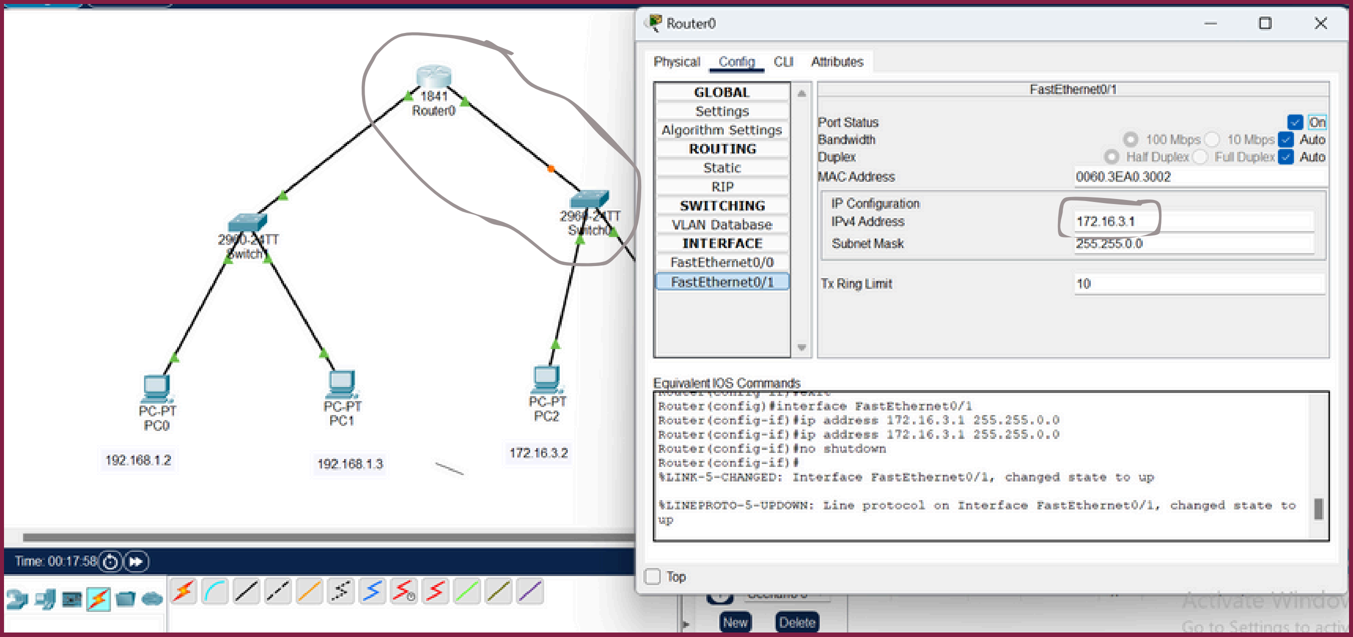
Tx Ring Limit 10

Equivalent IOS Commands

```
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to
up
```

□ Top



FastEthernet0/1

Port Status ☑ On
Bandwidth ○ 100 Mbps ○ 10 Mbps ☑ Auto
Duplex ○ Half Duplex ○ Full Duplex ☑ Auto
MAC Address 0060.3EA0.3002

IP Configuration
IPv4 Address 172.16.3.1
Subnet Mask 255.255.0.0

Tx Ring Limit 10

Equivalent IOS Commands

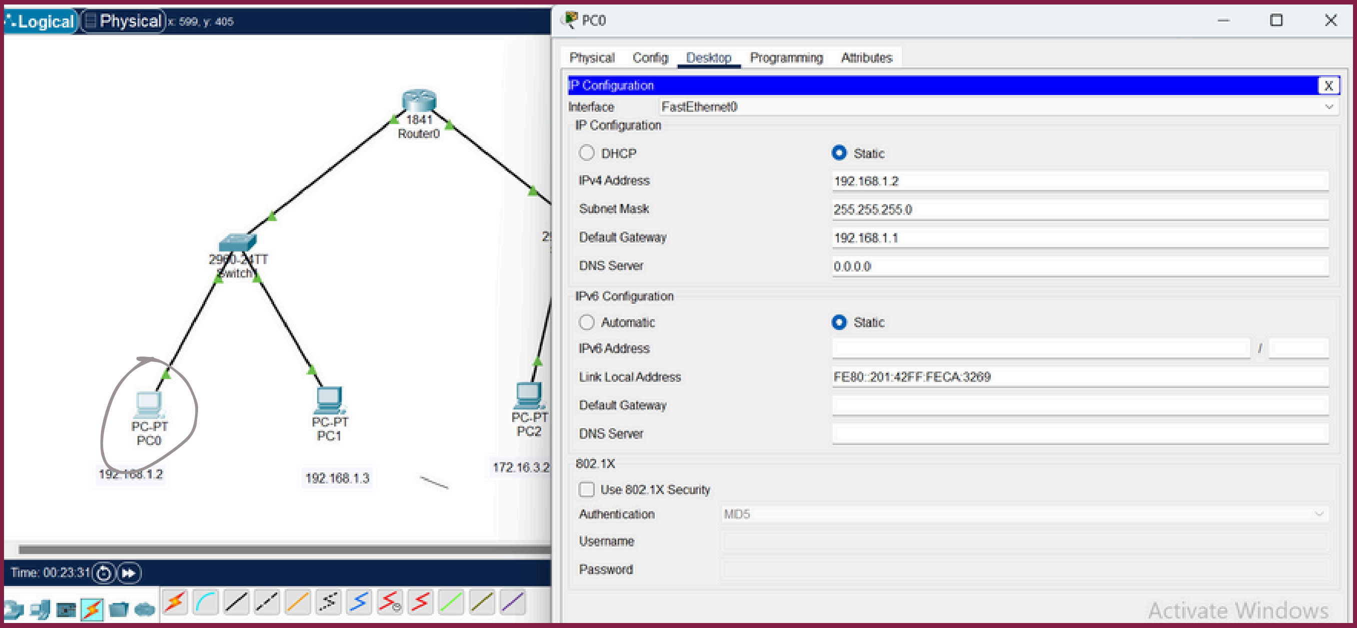
```
Router(config-if)#exit
Router(config)#interface FastEthernet0/1
Router(config-if)#ip address 172.16.3.1 255.255.0.0
Router(config-if)#ip address 172.16.3.1 255.255.0.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up
```

□ Top

CONFIGURATIONS

2. Configuring the Devices:



IP Configuration

Interface: FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address: 192.168.1.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

○ Automatic ● Static

IPv6 Address: /

Link Local Address: FE80::201:42FF:FECA:3269

Default Gateway:

DNS Server:

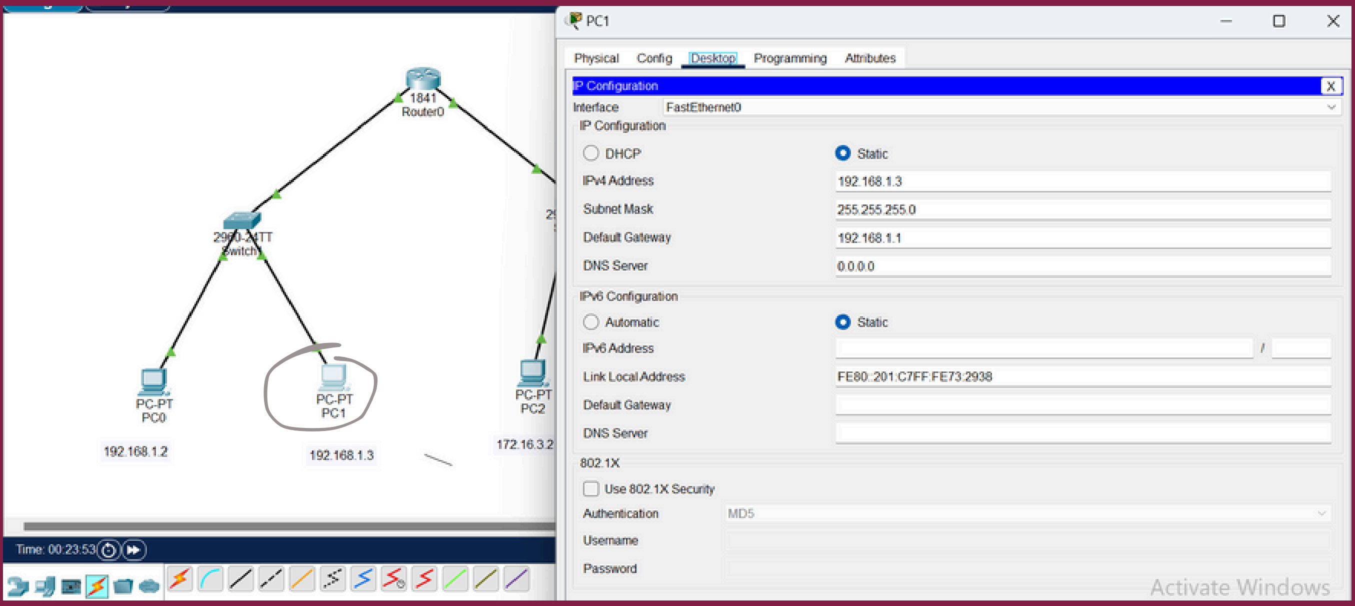
802.1X

□ Use 802.1X Security

Authentication: MD5

Username:

Password:



IP Configuration

Interface: FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address: 192.168.1.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

○ Automatic ● Static

IPv6 Address: /

Link Local Address: FE80::201:C7FF:FE73:2938

Default Gateway:

DNS Server:

802.1X

□ Use 802.1X Security

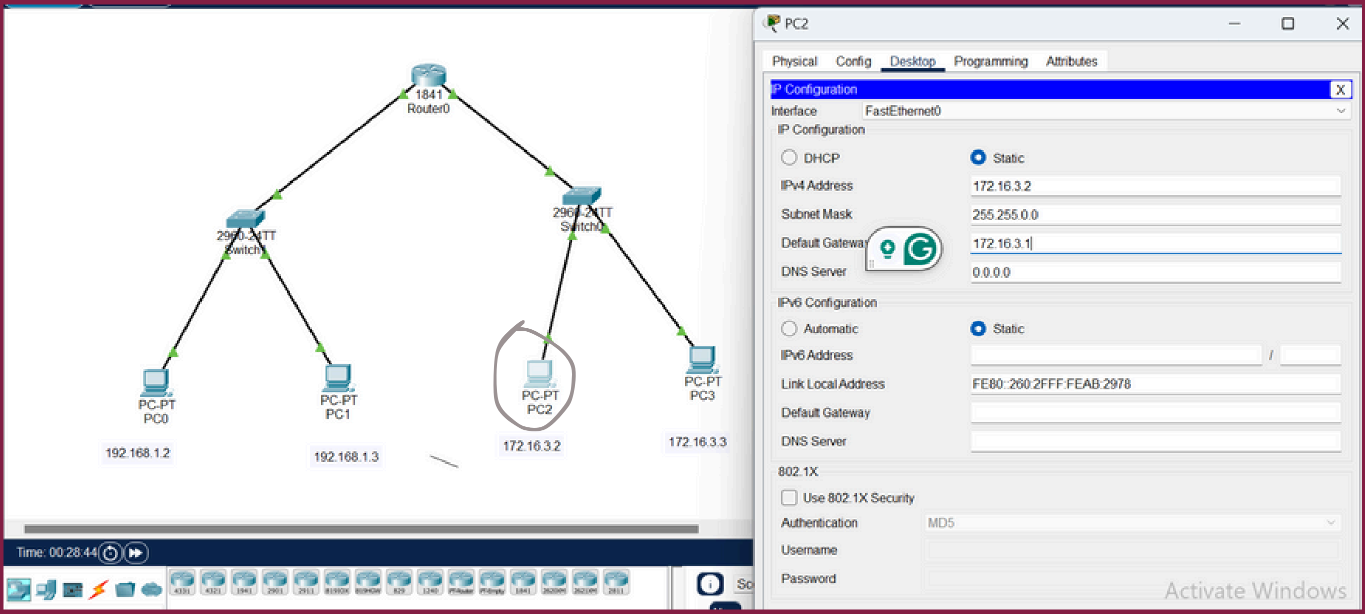
Authentication: MD5

Username:

Password:

CONFIGURATIONS

2. Configuring the devises:



IP Configuration

Interface FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address 172.16.3.2

Subnet Mask 255.255.0.0

Default Gateway 172.16.3.1

DNS Server 0.0.0.0

IPv6 Configuration

○ Automatic ● Static

IPv6 Address /

Link Local Address FE80::260:2FFF:FEAB:2978

Default Gateway

DNS Server

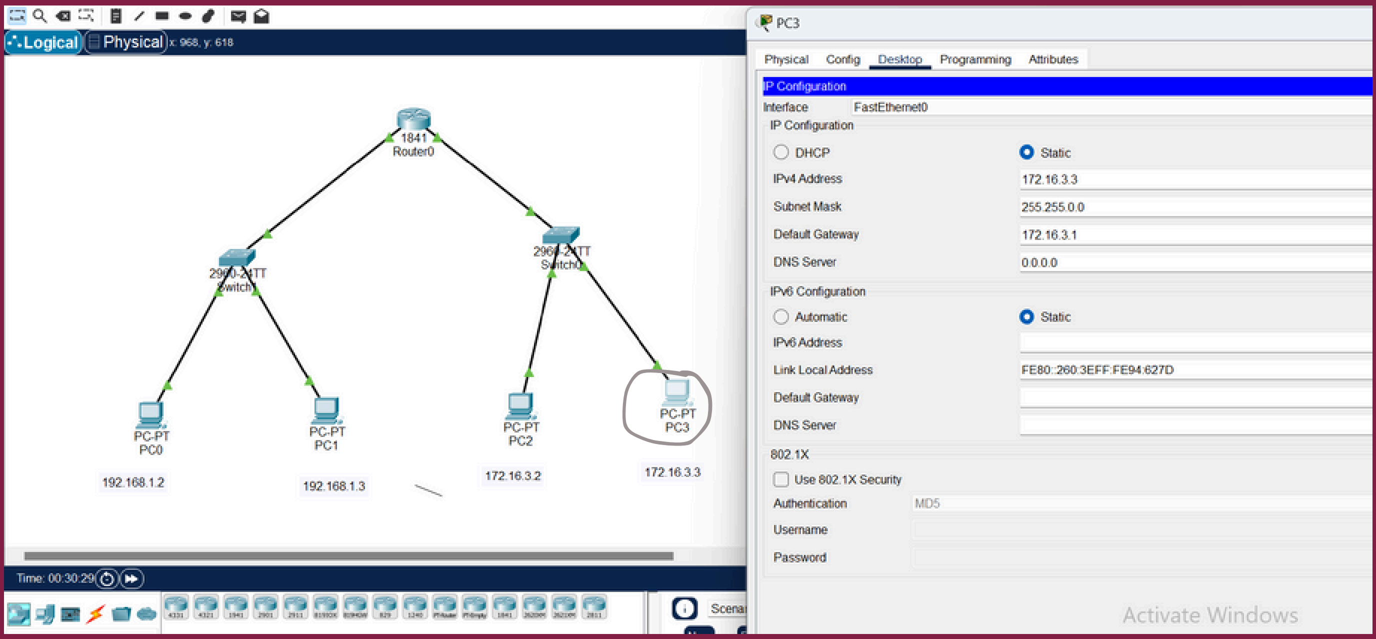
802.1X

□ Use 802.1X Security

Authentication MD5

Username

Password



IP Configuration

Interface FastEthernet0

IP Configuration

○ DHCP ● Static

IPv4 Address 172.16.3.3

Subnet Mask 255.255.0.0

Default Gateway 172.16.3.1

DNS Server 0.0.0.0

IPv6 Configuration

○ Automatic ● Static

IPv6 Address

Link Local Address FE80::260:3EFF:FE94:627D

Default Gateway

DNS Server

802.1X

□ Use 802.1X Security

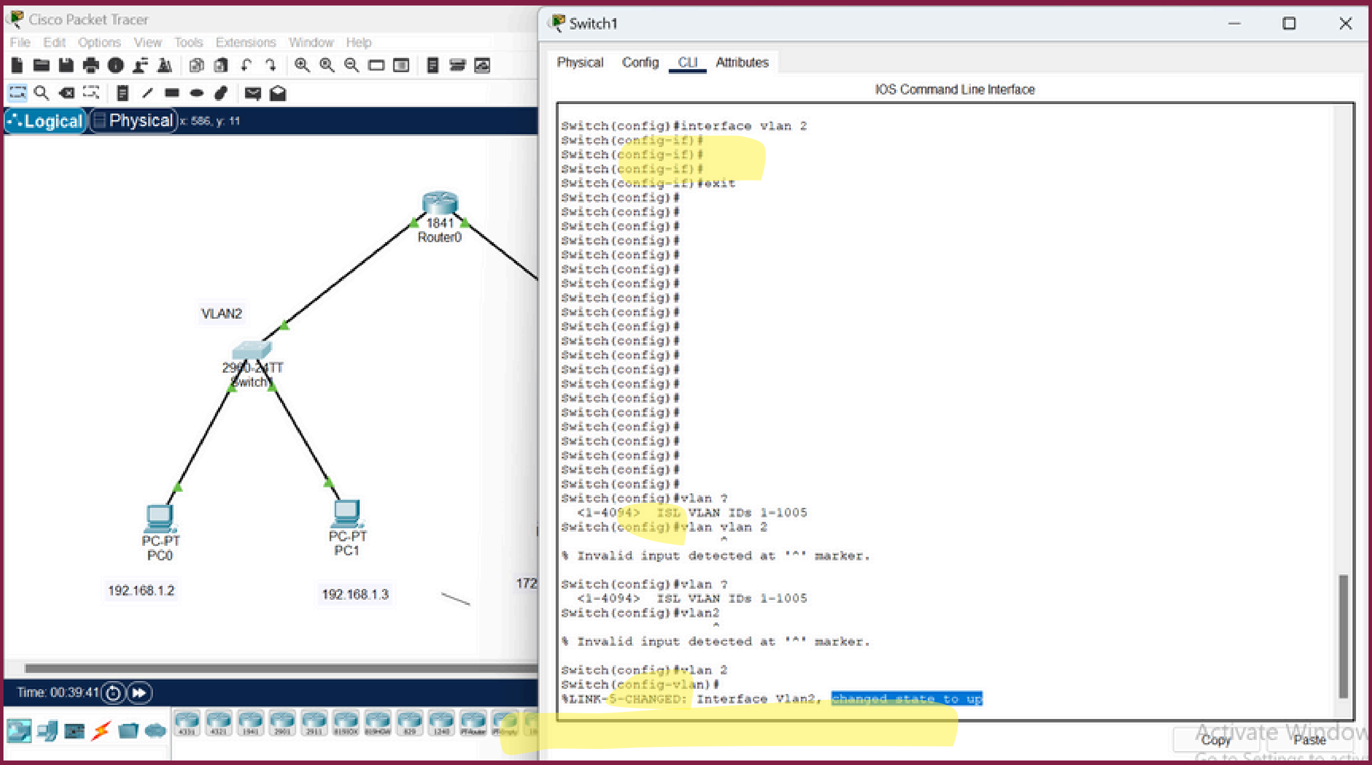
Authentication MD5

Username

Password

CONFIGURATIONS

3. Configuring the Switch:

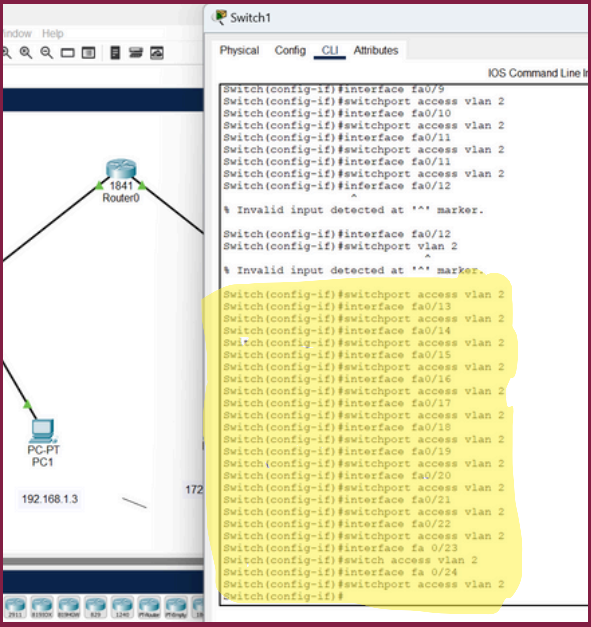


```
Switch(config)#interface vlan 2
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#
Switch(config)#vlan ?
  <1-4094>  ISL VLAN IDs 1-1005
Switch(config)#vlan vlan 2
                    ^
% Invalid input detected at '^' marker.

Switch(config)#vlan ?
  <1-4094>  ISL VLAN IDs 1-1005
Switch(config)#vlan2
                   ^
% Invalid input detected at '^' marker.

Switch(config)#vlan 2
Switch(config-vlan)#
%LINK-5-CHANGED: Interface Vlan2, changed state to up
```

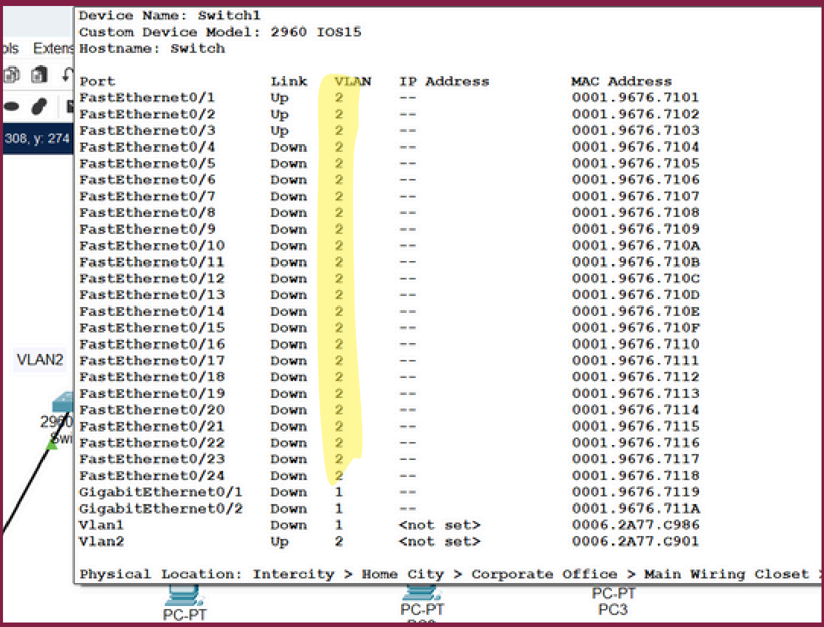
Now all ports is VLAN2



```
Switch(config-if)#interface fa0/9
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/10
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/11
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/11
Switch(config-if)#switchport access vlan 2
Switch(config-if)#inferface fa0/12
                     ^
% Invalid input detected at '^' marker.

Switch(config-if)#interface fa0/12
Switch(config-if)#switchport vlan 2
                                ^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/13
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/14
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/15
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/16
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/17
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/18
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/19
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/20
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/21
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa0/22
Switch(config-if)#switchport access vlan 2
Switch(config-if)#interface fa 0/23
Switch(config-if)#switch access vlan 2
Switch(config-if)#interface fa 0/24
Switch(config-if)#switchport access vlan 2
Switch(config-if)#
```



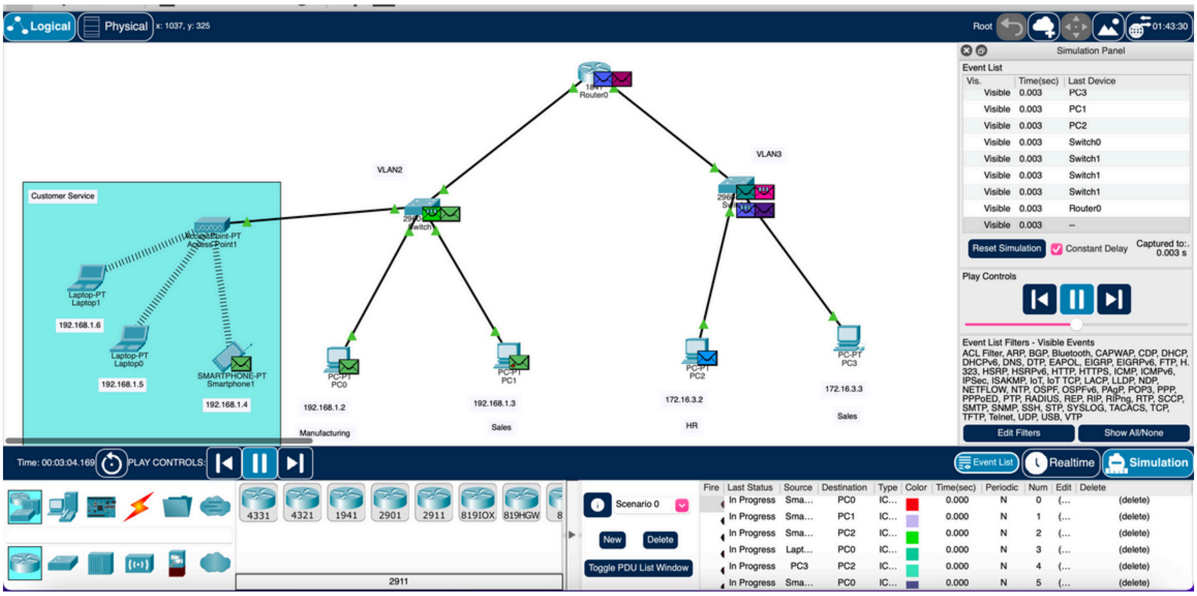
```
Device Name: Switch1
Custom Device Model: 2960 IOS15
Hostname: Switch

Port                Link   VLAN   IP Address        MAC Address
FastEthernet0/1     Up     2      --                0001.9676.7101
FastEthernet0/2     Up     2      --                0001.9676.7102
FastEthernet0/3     Up     2      --                0001.9676.7103
FastEthernet0/4     Down   2      --                0001.9676.7104
FastEthernet0/5     Down   2      --                0001.9676.7105
FastEthernet0/6     Down   2      --                0001.9676.7106
FastEthernet0/7     Down   2      --                0001.9676.7107
FastEthernet0/8     Down   2      --                0001.9676.7108
FastEthernet0/9     Down   2      --                0001.9676.7109
FastEthernet0/10    Down   2      --                0001.9676.710A
FastEthernet0/11    Down   2      --                0001.9676.710B
FastEthernet0/12    Down   2      --                0001.9676.710C
FastEthernet0/13    Down   2      --                0001.9676.710D
FastEthernet0/14    Down   2      --                0001.9676.710E
FastEthernet0/15    Down   2      --                0001.9676.710F
FastEthernet0/16    Down   2      --                0001.9676.7110
FastEthernet0/17    Down   2      --                0001.9676.7111
FastEthernet0/18    Down   2      --                0001.9676.7112
FastEthernet0/19    Down   2      --                0001.9676.7113
FastEthernet0/20    Down   2      --                0001.9676.7114
FastEthernet0/21    Down   2      --                0001.9676.7115
FastEthernet0/22    Down   2      --                0001.9676.7116
FastEthernet0/23    Down   2      --                0001.9676.7117
FastEthernet0/24    Down   2      --                0001.9676.7118
GigabitEthernet0/1  Down   1      --                0001.9676.7119
GigabitEthernet0/2  Down   1      --                0001.9676.711A
Vlan1               Down   1      <not set>         0006.2A77.C986
Vlan2               Up     2      <not set>         0006.2A77.C901

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet
```

Testing

We used the ping to test the connectivity of our network devices



Simulation Panel

Event List

Vis.	Time(sec)	Last Device
Visible	0.003	PC3
Visible	0.003	PC1
Visible	0.003	PC2
Visible	0.003	Switch0
Visible	0.003	Switch1
Visible	0.003	Switch1
Visible	0.003	Switch1
Visible	0.003	Router0
Visible	0.003	--

Reset Simulation ☑ Constant Delay Captured to:. 0.003 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoED, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show All/None

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	In Progress	Sma...	PC0	IC...	🟥	0.000	N	0	(...	(delete)
	In Progress	Sma...	PC1	IC...	🟪	0.000	N	1	(...	(delete)
	In Progress	Sma...	PC2	IC...	🟩	0.000	N	2	(...	(delete)
	In Progress	Lapt...	PC0	IC...	🟩	0.000	N	3	(...	(delete)
	In Progress	PC3	PC2	IC...	🟩	0.000	N	4	(...	(delete)
	In Progress	Sma...	PC0	IC...	🟦	0.000	N	5	(...	(delete)

RESOURRESOURCES

[1]https://www.techtarget.com/searchnetworking/definition/virtual-LAN

[2]Sysnet Notes, “What is the difference between static VLAN and dynamic VLAN?,”. [Online]. Available: https://sysnetnotes.blogspot.com/2013/07/what-is-difference-between-static-vlan.html