

Assignment 2

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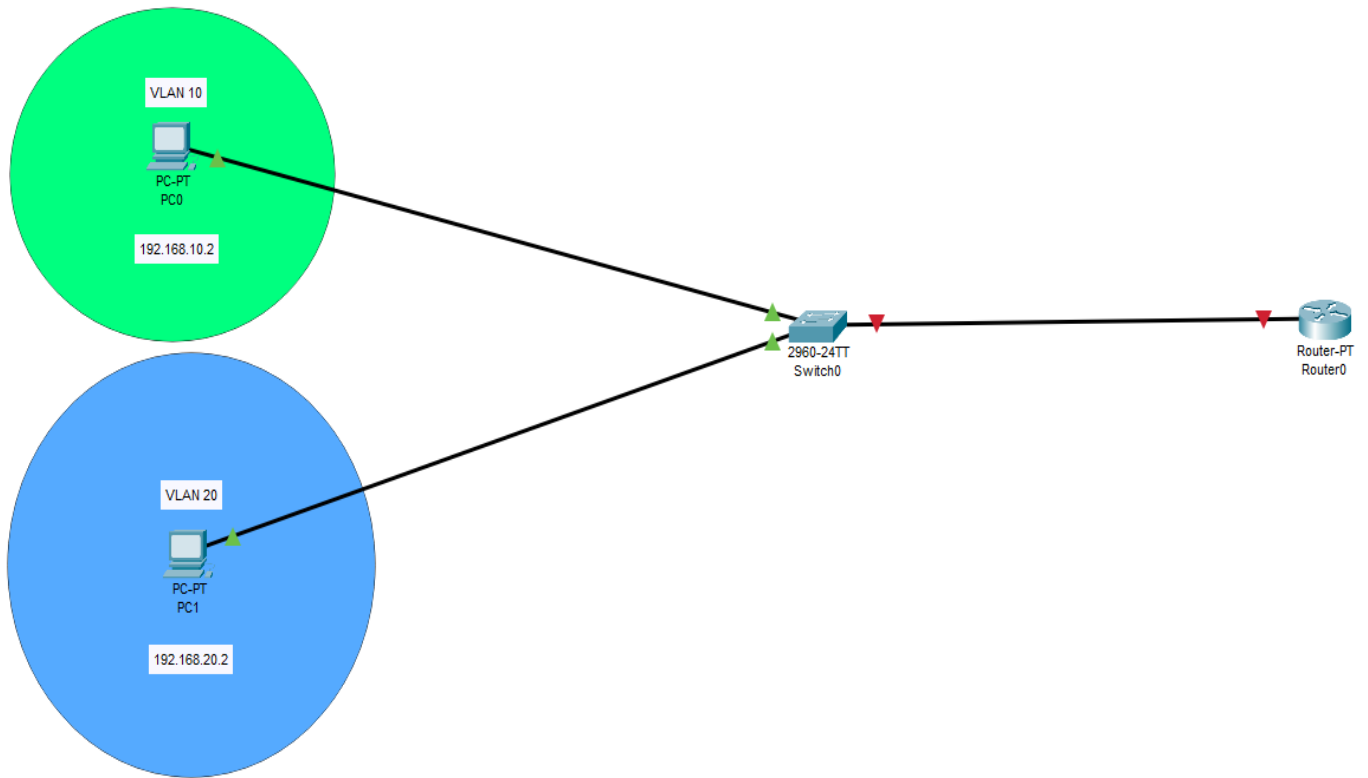
Course: Computer Networks
By Sir Wilayat

Network Overview

Purpose of the Setup

The "Router on a Stick" configuration is used to enable communication between multiple VLANs. In this topology:

- **VLAN 10** (192.168.10.0/24): Assigned to devices on Fa0/3 of the switch.
- **VLAN 20** (192.168.20.0/24): Assigned to devices on Fa0/2 of the switch.
- The router (R1) is used for **inter-VLAN routing**, which allows devices in VLAN 10 and VLAN 20 to communicate.



Switch Configuration

Switch0

Physical Config CLI Attributes

IOS Command Line Interface

```
Switch(config-vlan)#vlan 20
Switch(config-vlan)#name VLAN_20
Switch(config-vlan)#exit
Switch(config)#inte
Switch(config)#interface fas
Switch(config)#interface fastEthernet 3/0
%Invalid interface type and number
Switch(config)#interface fastEthernet 3/0
%Invalid interface type and number
Switch(config)#interface fastEthernet0/3
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport mode ac
Switch(config-if)#switchport mode access vlan 10
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport ac
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#inte
Switch(config)#interface fas
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport mode a
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport ac
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
```

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Physical Config CLI Attributes

IOS Command Line Interface

```
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport ac
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#inte
Switch(config)#interface fas
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport mode a
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport ac
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#inte
Switch(config)#interface fa
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#sw
Switch(config-if)#switchport md
Switch(config-if)#switchport mo
Switch(config-if)#switchport mode tr
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#write memory
Building configuration...
[OK]
Switch#
```

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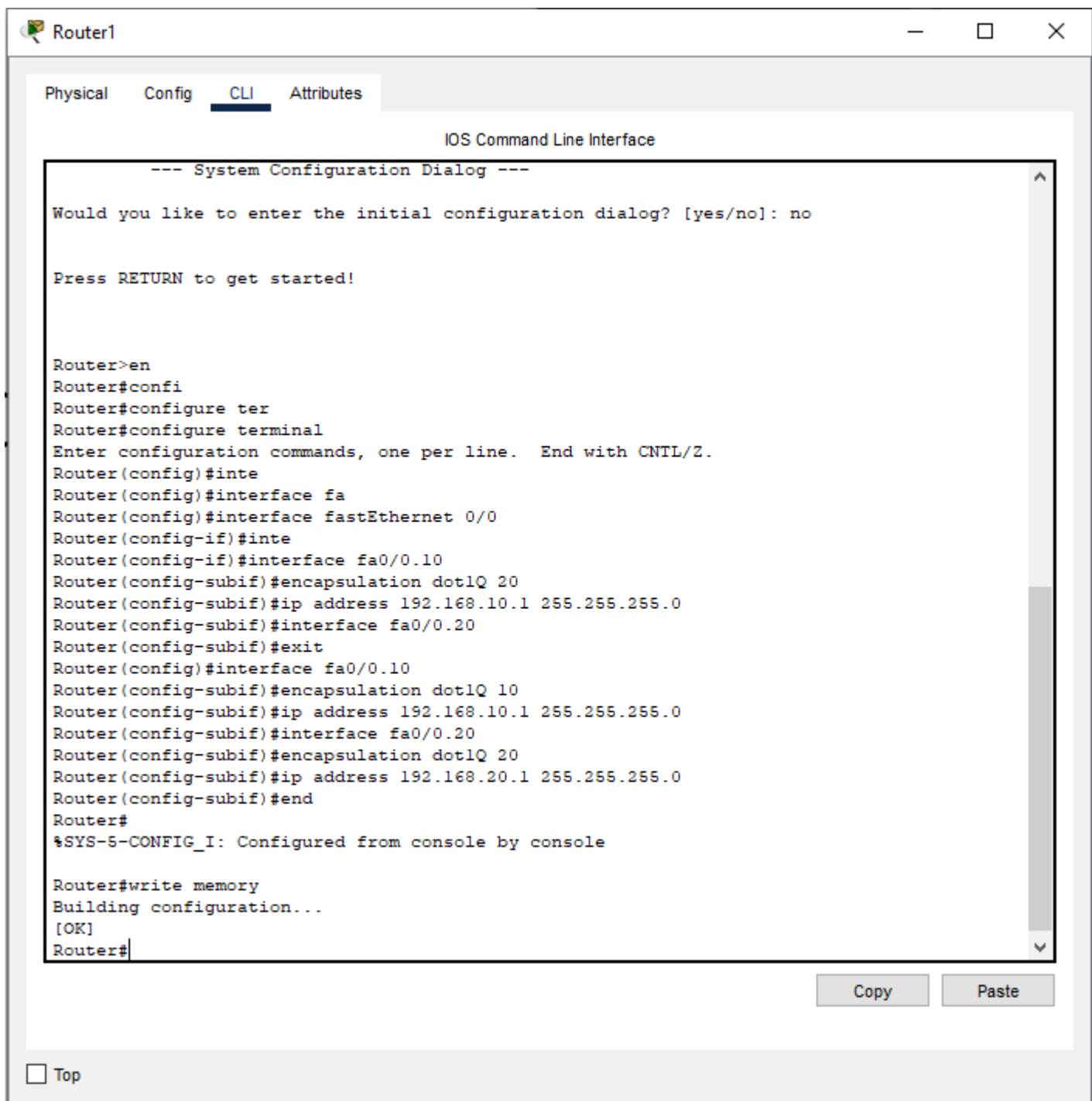
☐ Top

VLAN Creation: VLAN 10 and VLAN 20 are created and named for identification.

Port Assignment: Specific switch ports are assigned to their respective VLANs. Devices connected to these ports become part of their respective VLAN.

Trunk Configuration: Fa0/1 is configured as a trunk to carry traffic for both VLANs to the router.

Router Configuration



The screenshot shows a window titled "Router1" with a tabbed interface. The "CLI" tab is selected, displaying the "IOS Command Line Interface". The window contains a text area with the following text:

```
--- System Configuration Dialog ---  
  
Would you like to enter the initial configuration dialog? [yes/no]: no  
  
Press RETURN to get started!  
  
Router>en  
Router#confi  
Router#configure ter  
Router#configure terminal  
Enter configuration commands, one per line.  End with CNTL/Z.  
Router(config)#inte  
Router(config)#interface fa  
Router(config)#interface fastEthernet 0/0  
Router(config-if)#inte  
Router(config-if)#interface fa0/0.10  
Router(config-subif)#encapsulation dot1Q 20  
Router(config-subif)#ip address 192.168.10.1 255.255.255.0  
Router(config-subif)#interface fa0/0.20  
Router(config-subif)#exit  
Router(config)#interface fa0/0.10  
Router(config-subif)#encapsulation dot1Q 10  
Router(config-subif)#ip address 192.168.10.1 255.255.255.0  
Router(config-subif)#interface fa0/0.20  
Router(config-subif)#encapsulation dot1Q 20  
Router(config-subif)#ip address 192.168.20.1 255.255.255.0  
Router(config-subif)#end  
Router#  
%SYS-5-CONFIG_I: Configured from console by console  
  
Router#write memory  
Building configuration...  
[OK]  
Router#
```

At the bottom right of the text area, there are two buttons: "Copy" and "Paste".

At the bottom left of the window, there is a checkbox labeled "Top".

Sub-Interfaces: These virtual interfaces allow the router to handle traffic for multiple VLANs. Each sub-interface corresponds to a VLAN.

Encapsulation dot1Q: Specifies the VLAN ID for each sub-interface and enables 802.1Q encapsulation on the trunk link.

IP Address: Each VLAN is assigned a unique IP address, which acts as the default gateway for devices in that VLAN.

PC0

Physical

Config

Desktop

Programming

Attributes

IP Configuration

X

Interface

FastEthernet0

IP Configuration

DHCP

Static

IPv4 Address

192.168.10.2

Subnet Mask

255.255.255.0

Default Gateway

192.168.10.1

DNS Server

0.0.0.0

IPv6 Configuration

Automatic

Static

IPv6 Address

Link Local Address

FE80::250:FFF:FEA3:B252

Default Gateway

DNS Server

802.1X

Use 802.1X Security

Authentication

MD5

Username

Password

Top

PC1

Physical Config **Desktop** Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.20.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.20.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::2D0:BCFF:FE8D:6664

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

IP Address: Each PC gets a unique IP address from its VLAN subnet.

Subnet Mask: Defines the subnet range.

1. **Default Gateway:** Points to the router's sub-interface for the VLAN, allowing the PC to communicate with other VLANs.

Physical Config Desktop Programming Attributes

Command Prompt

X

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>|
```

The router correctly routed the traffic between VLAN 10 and VLAN 20 using its sub-interfaces, confirming that the "Router on a Stick" configuration is working as expected.

For verifications we can use commands like

Router

show ip interface brief

Switch

show vlan brief

show interfaces trunk

IOS Command Line Interface

Switch>show vl

Switch>show vlan br

Switch>show vlan brief

VLAN	Name	Status	Ports
1	default	active	Fa0/4, Fa0/5, Fa0/6, Fa0/7 Fa0/8, Fa0/9, Fa0/10, Fa0/11 Fa0/12, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
10	VLAN_10	active	Fa0/3
20	VLAN_20	active	Fa0/2
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

Switch>sh

Switch>show tr

Switch>show v

Switch>show int

Switch>show interfaces tr

Switch>show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	on	802.1q	trunking	1

Port	Vlans allowed on trunk
Fa0/1	1-1005

Port	Vlans allowed and active in management domain
Fa0/1	1,10,20

Port	Vlans in spanning tree forwarding state and not pruned
Fa0/1	1,10,20

Switch>

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Physical Config CLI Attributes

IOS Command Line Interface

```
Router>
Router>en
Router#sh
Router#show inty
Router#show inte
Router#show interfaces br
Router#show interfaces br
      ^
% Invalid input detected at '^' marker.

Router#show interfaces brir
Router#show interfaces brief
Router#show interfaces brief
      ^
% Invalid input detected at '^' marker.

Router#show ip interfaces brief
      ^
% Invalid input detected at '^' marker.

Router#sh
Router#show ip
Router#show ip in
Router#show ip interface br
Router#show ip interface brief
Interface                IP-Address    OK? Method Status          Protocol
FastEthernet0/0          unassigned    YES unset    up              up
FastEthernet0/0.10        192.168.10.1  YES manual  up              up
FastEthernet0/0.20        192.168.20.1  YES manual  up              up
FastEthernet1/0           unassigned    YES unset    administratively down down
Serial2/0                 unassigned    YES unset    administratively down down
Serial3/0                 unassigned    YES unset    administratively down down
FastEthernet4/0           unassigned    YES unset    administratively down down
FastEthernet5/0           unassigned    YES unset    administratively down down
Router#
```

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