Assignment 2

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Course: ***Computer Networks***
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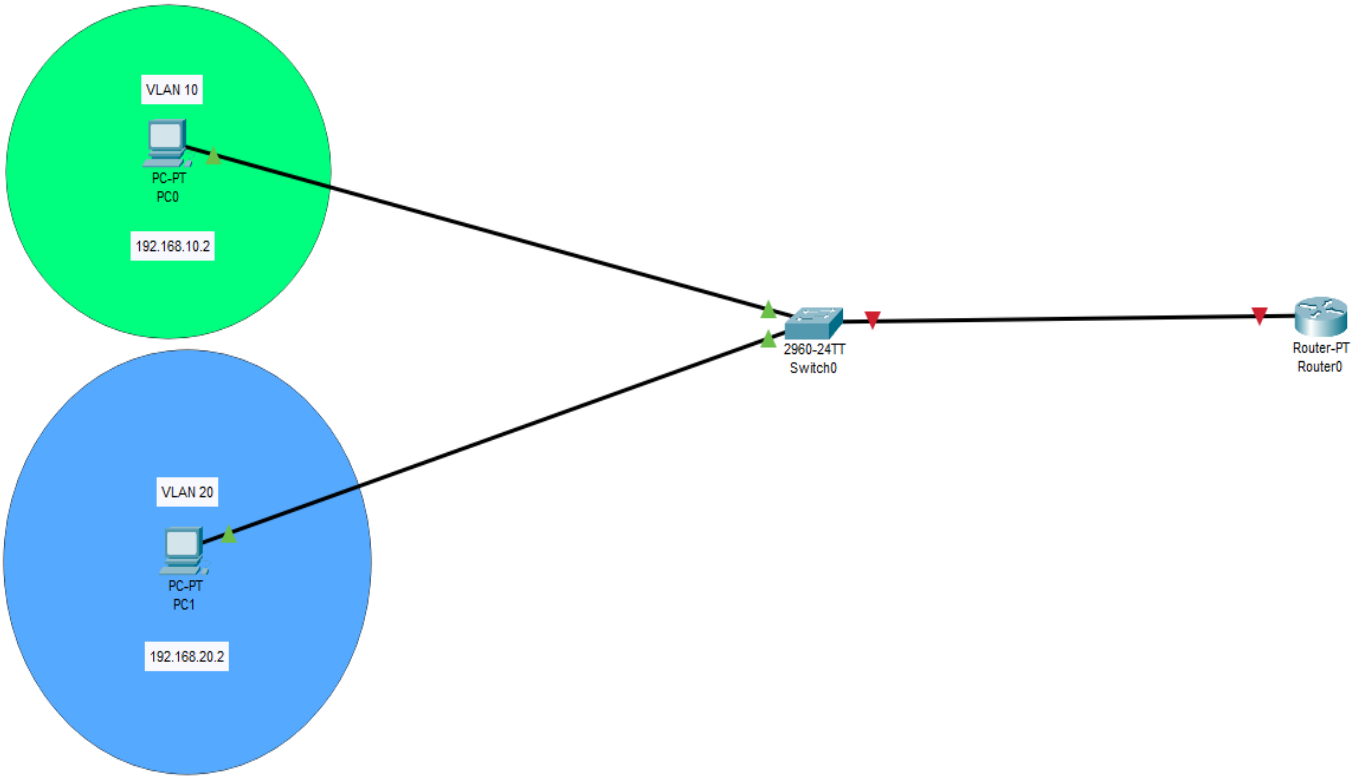
Network Overview

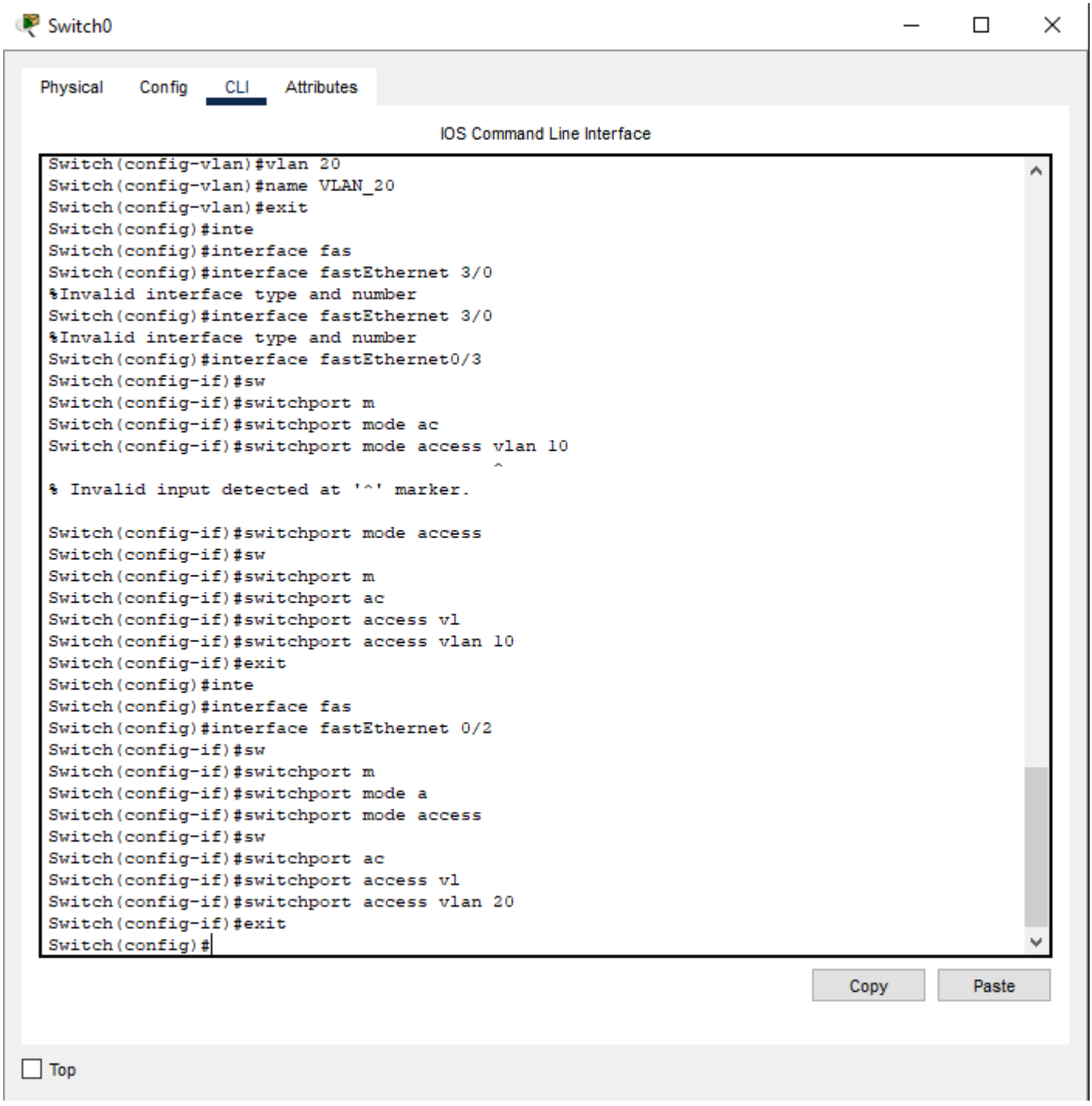
Purpose of the Setup

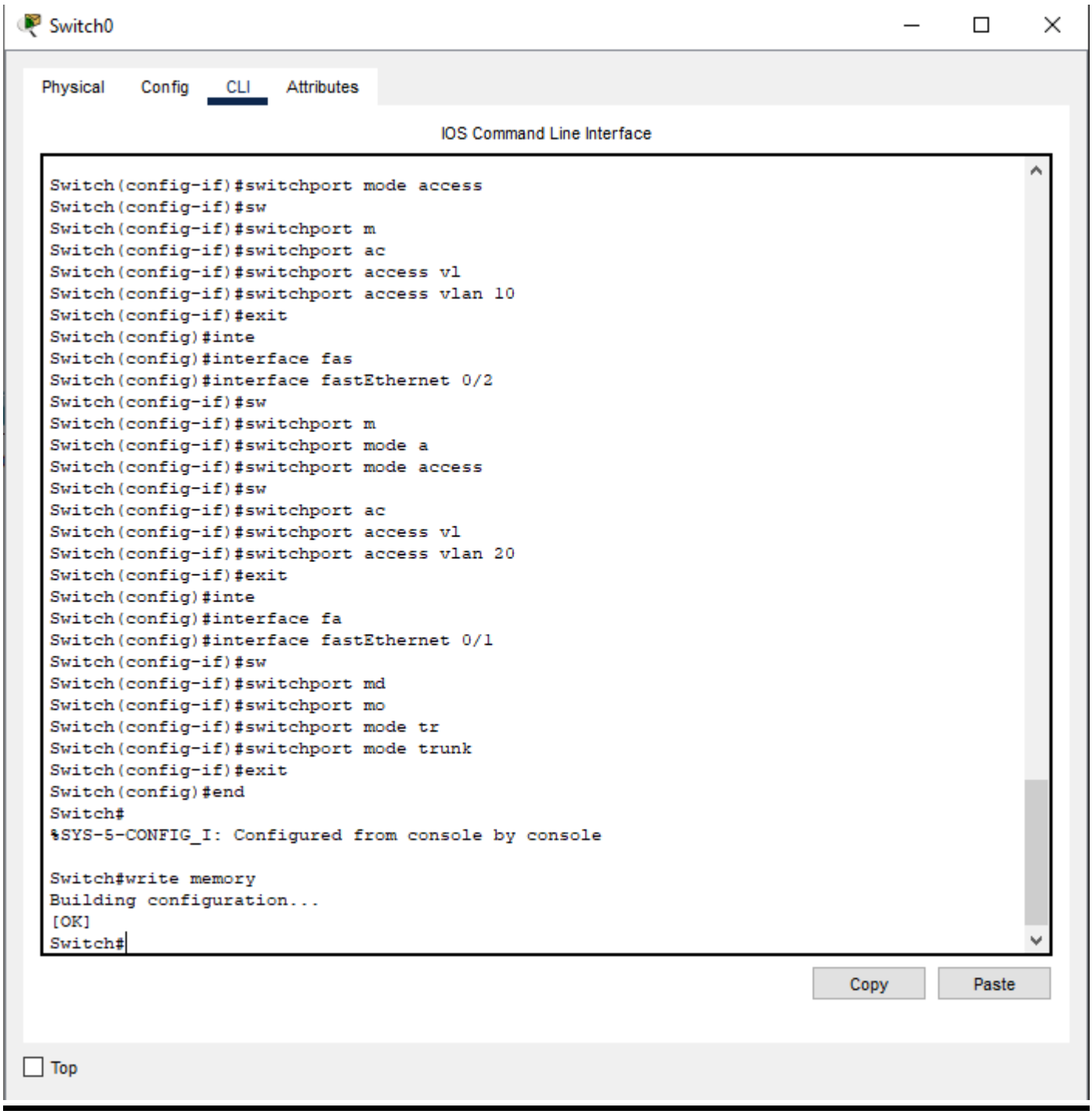
The "Router on a Stick" configuration is used to enable communication between multiple VLANs. In this topology:

- **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.


VLAN 10
PC-PT
PC0
192.168.10.2
VLAN 20
PC-PT
PC1
192.168.20.2
2960-24TT
Switch0
Router-PT
Router0

Switch Configuration



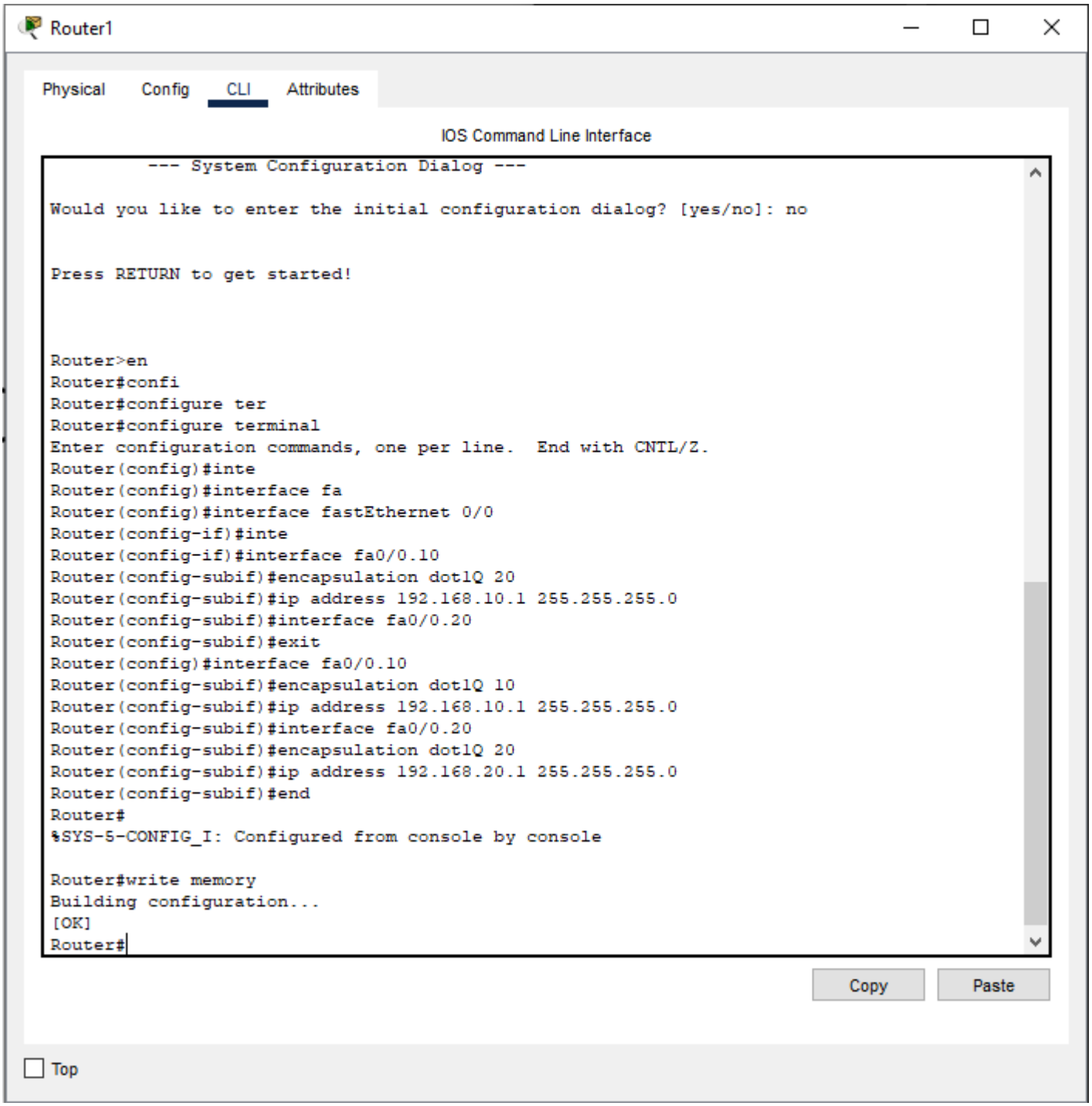

Switch0
Physical
Config
CLI
Attributes
IOS Command Line Interface
Switch(config-if)#switchport mode access
Switch(config-if)#sw
Switch(config-if)#switchport m
Switch(config-if)#switchport ac
Switch(config-if)#switchport access vl
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#inte
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#
Copy
Paste
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.

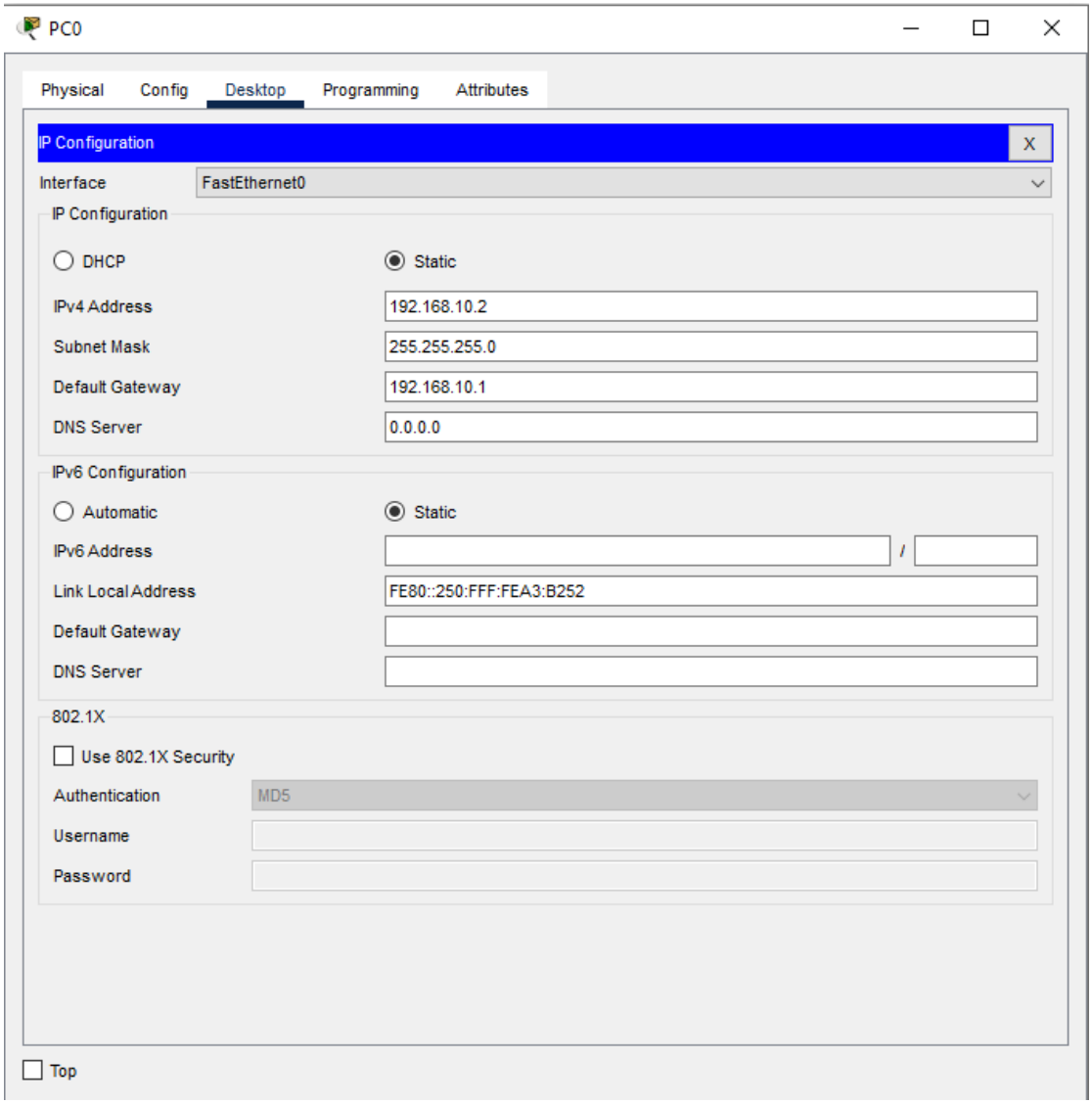
Router Configuration

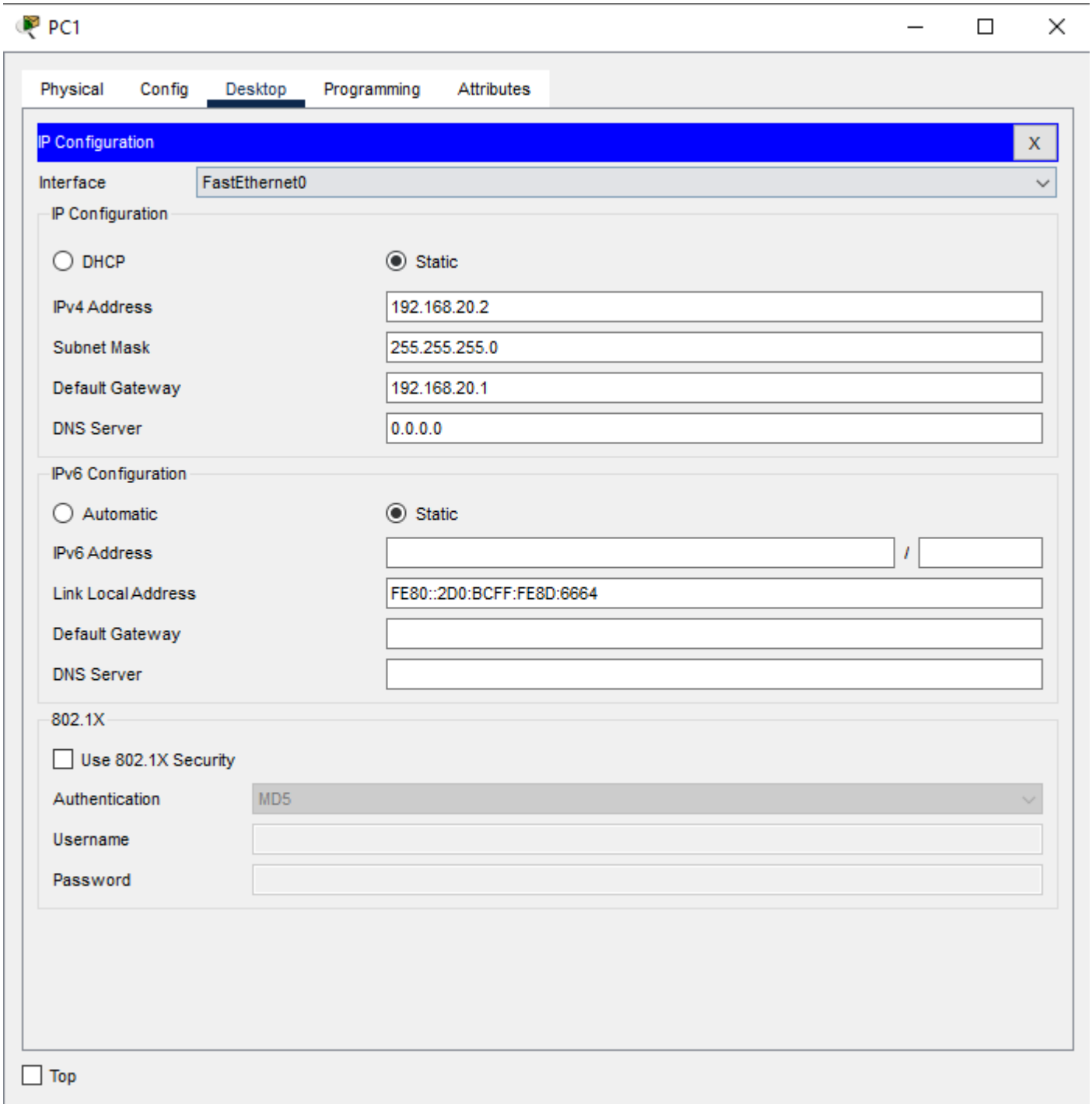


Sub-Interfaces: These virtual interfaces allow the router to handle traffic for multiple VLANs. Each sub-interface corresponds to a VLAN.

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.

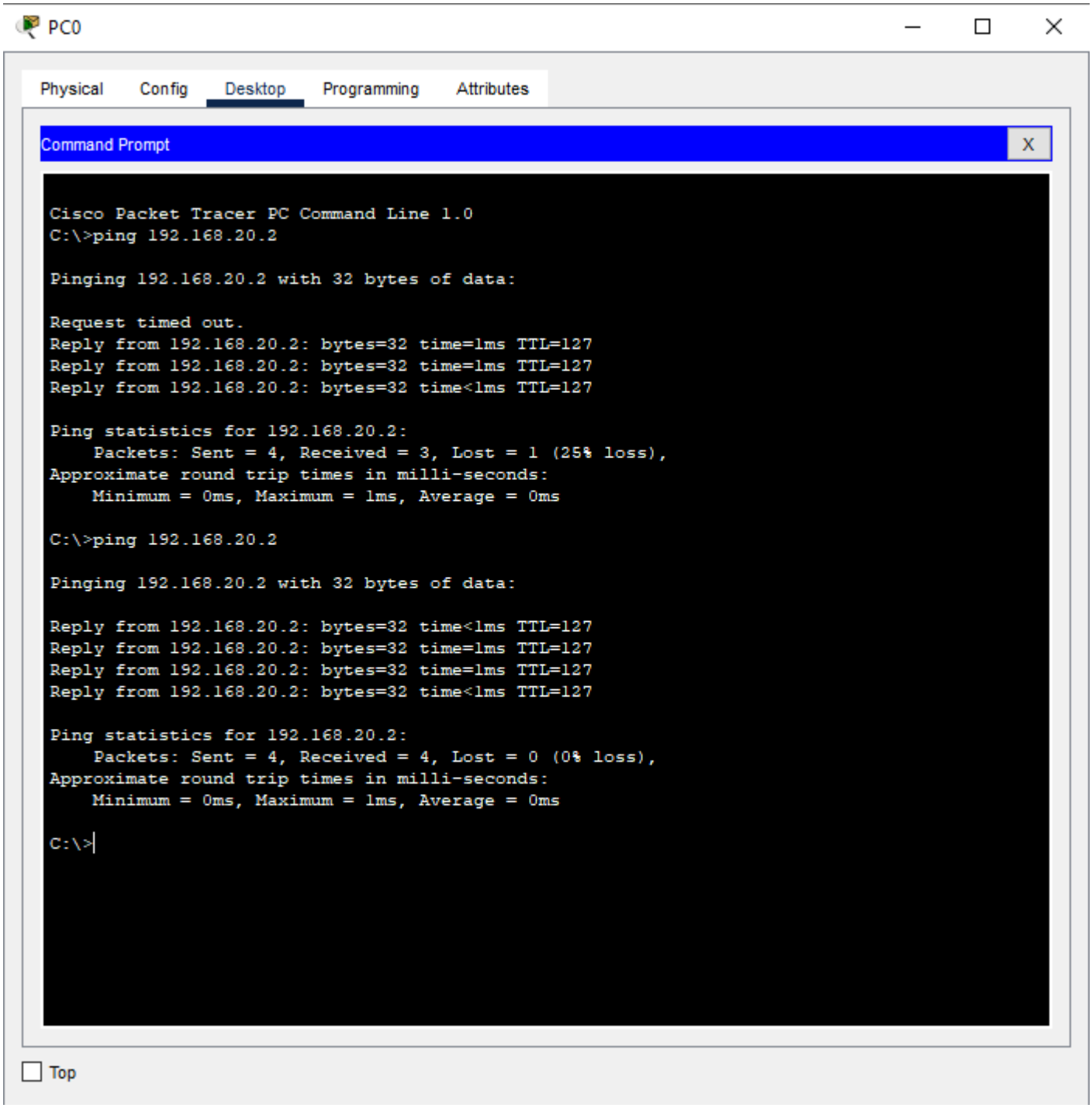




IP Address: Each PC gets a unique IP address from its VLAN subnet.

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.


PC0
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:\>
Top

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

Switch0

Physical Config CLI Attributes

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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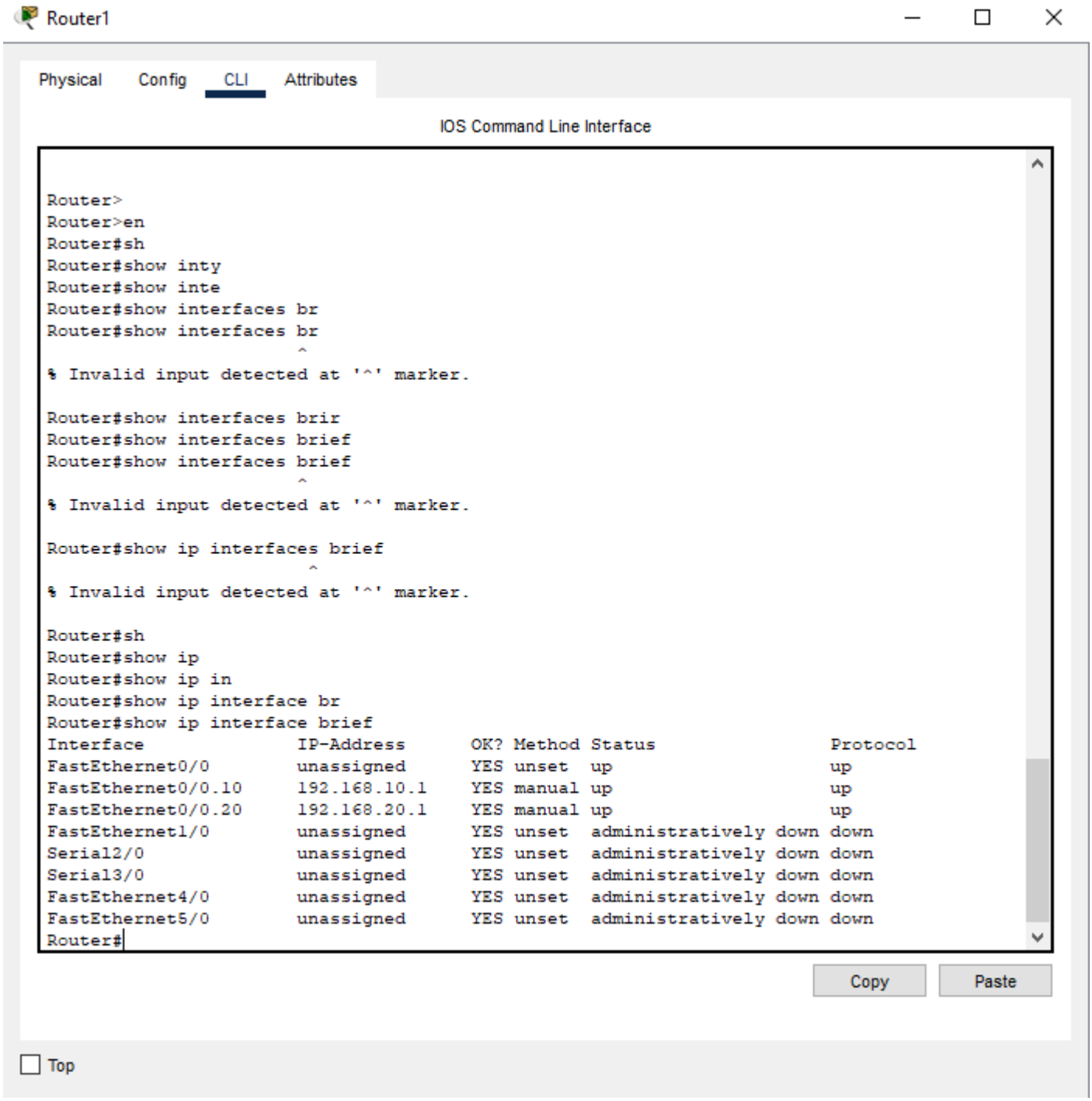
Router1
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router>
Router>en
Router#sh
Router#show inty
Router#show inte
Router#show interfaces br
Router#show interfaces br
% Invalid input detected at '^' marker.
Router#show interfaces brir
Router#show interfaces brief
Router#show interfaces brief
% 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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