

## Assignment 9:

In this exercise, you will troubleshoot network connectivity problems caused by wrong configurations related to VLANs and inter-VLAN routing

Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway	VLAN
R1	G0/1.10	172.17.10.1	255.255.255.0	N/A	VLAN 10
	G0/1.30	172.17.30.1	255.255.255.0	N/A	VLAN 30
PC1	NIC	172.17.10.10	255.255.255.0	172.17.10.1	VLAN 10
PC3	NIC	172.17.30.10	255.255.255.0	172.17.30.1	VLAN 30

### Instructions

Complete the following tasks:

#### **Part 1: Identify the Network Issues**

Examine the network and locate the source of any connectivity issues.

Commands you may find useful include:

R1# show ip interface brief

R1# show interface g0/1.10

R1# show interface g0/1.30

S1# show interface trunk

1. Test connectivity and use the necessary show commands to verify configurations.
2. Verify that all configured settings match the requirements shown in the Addressing Table.
3. List all of the problems and possible solutions in the Documentation Table.

#### **Part 2: Resolve the issues by Implementing appropriate solutions**

Implement your recommended solutions.

#### **Part 3 Validate your Implementation by verifying network connectivity**

Verify the PCs can ping each other and R1. If not, continue to troubleshoot until the pings are successful.

Pka:

**Packet Tracer - Troubleshooting Inter-VLAN Routing**

**Addressing Table**

Device	Interface	IP Address	Subnet Mask	Default Gateway	VLAN
R1	G0/1.10	172.17.10.1	255.255.255.0	N/A	VLAN
R1	G0/1.30	172.17.30.1	255.255.255.0	N/A	VLAN
PC1	NIC	172.17.10.10	255.255.255.0	172.17.10.1	VLAN
PC3	NIC	172.17.30.10	255.255.255.0	172.17.30.1	VLAN

**Objectives**

- Part 1: Locate Network Problems
- Part 2: Implement the Solution
- Part 3: Verify Network Connectivity

**Scenario**

In this activity, you will troubleshoot connectivity problems caused by improper configurations related to VLANs and inter-VLAN routing.

**Instructions**

**Part 1: Locate the Network Problems**

Examine the network and locate the source of any connectivity issues.

Commands you may find useful include:

```
R1# show ip interface brief
R1# show interface g0/1.10
R1# show interface g0/1.30
S1# show interface trunk
```

- Test connectivity and use the necessary show commands to verify configurations.
- Verify that all configured settings match the requirements shown in the Addressing Table.
- Use all of the problems and possible solutions in the Troubleshooting Table.

Time Elapsed: 00:15:41 Completion: 9%

Time: 00:14:31

Realtime Simulation

## Solution:

### What to check :

1. **Trunk to R1** — The switch port that connects to R1 must be a trunk (dot1q) and allow VLANs **10,30**.
2. **VLANs exist** — Create VLAN 10 and VLAN 30 on the switch.
3. **PC ports in right VLANs** — PC1's port = VLAN 10, PC3's port = VLAN 30.
4. **R1 subinterfaces** — Use router-on-a-stick:
  - o g0/1.10 → encapsulation dot1q 10 + ip 172.17.10.1 255.255.255.0
  - o g0/1.30 → encapsulation dot1q 30 + ip 172.17.30.1 255.255.255.0
  - o Parent g0/1 should be **no ip address** and **no shut**.
5. **Default gateways on PCs** —
  - o PC1 DG: **172.17.10.1**
  - o PC3 DG: **172.17.30.1**

6. **Native VLAN** — Keep default native **VLAN 1** on both sides of the trunk (no native subinterface needed).

R1:

The screenshot shows a Cisco R1 CLI window with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the following text:

```
export@cisco.com.  
  
Cisco CISC01941/K9 (revision 1.0) with 491520K/32768K bytes of memory.  
Processor board ID FTX152400KS  
2 Gigabit Ethernet interfaces  
DRAM configuration is 64 bits wide with parity disabled.  
255K bytes of non-volatile configuration memory.  
249856K bytes of ATA System CompactFlash 0 (Read/Write)  
  
Press RETURN to get started!  
  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.30, changed state to up  
  
R1>show ip interface brief  
Interface IP-Address OK? Method Status Protocol  
GigabitEthernet0/0 unassigned YES unset administratively down down  
GigabitEthernet0/1 unassigned YES unset up up  
GigabitEthernet0/1.10 172.17.10.1 YES manual administratively down down  
GigabitEthernet0/1.30 172.17.30.1 YES manual up up  
Vlan1 unassigned YES unset administratively down down  
R1>show interface g0/1.10  
GigabitEthernet0/1.10 is administratively down, line protocol is down (disabled)  
Hardware is PQUICC_FEC, address is 000d.bde7.0c02 (bia 000d.bde7.0c02)  
Internet address is 172.17.10.1/24  
MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,  
reliability 255/255, txload 1/255, rxload 1/255  
Encapsulation 802.1Q Virtual LAN, Vlan ID 30  
ARP type: ARPA, ARP Timeout 04:00:00,  
Last clearing of "show interface" counters never  
R1>show interface g0/1.30  
GigabitEthernet0/1.30 is up, line protocol is up (connected)  
Hardware is PQUICC_FEC, address is 000d.bde7.0c02 (bia 000d.bde7.0c02)  
Internet address is 172.17.30.1/24  
MTU 1500 bytes, BW 1000000 Kbit, DLY 100 usec,  
reliability 255/255, txload 1/255, rxload 1/255  
Encapsulation 802.1Q Virtual LAN, Vlan ID 10  
ARP type: ARPA, ARP Timeout 04:00:00,  
Last clearing of "show interface" counters never  
R1>
```

At the bottom right of the CLI window, there are 'Copy' and 'Paste' buttons. At the bottom left of the window, there is a 'Top' button.

R1

Physical

Config

CLI

Attributes

Press RETURN to get started.

R1>enable

R1#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.

R1(config)#interface g0/1

R1(config-if)#no ip address

R1(config-if)#no shutdown

R1(config-if)#exit

R1(config)#interface g0/1.10

R1(config-subif)#encapsulation dot1q 10

%Configuration of multiple subinterfaces of the same main interface with the same VID (10) is not permitted.

This VID is already configured on GigabitEthernet0/1.30.

R1(config-subif)#ip address 172.17.10.1 255.255.255.0

R1(config-subif)#exit

R1(config)#interface g0/1.30

R1(config-subif)#encapsulation dot1q 30

%Configuration of multiple subinterfaces of the same main interface with the same VID (30) is not permitted.

This VID is already configured on GigabitEthernet0/1.10.

R1(config-subif)#ip address 172.17.30.1 255.255.255.0

R1(config-subif)#end

R1#

%SYS-5-CONFIG\_I: Configured from console by console

wr

Building configuration...

[OK]

R1#

Copy

Paste

Top

On S1:



The screenshot shows a terminal window titled 'S1' with tabs for Physical, Config, CLI, and Attributes. The CLI tab is active, displaying the following information:

```
Model revision number      : B0
Motherboard revision number : B0
Model number               : WS-C2960-24TT-L
System serial number       : FOC1010X104
Top Assembly Part Number   : 800-27221-02
Top Assembly Revision Number : A0
Version ID                 : V02
CLEI Code Number           : COM3L00BRA
Hardware Board Revision Number : 0x01
```

Switch	Ports	Model	SW Version	SW Image
*	1 26	WS-C2960-24TT-L	15.0(2)SE4	C2960-LANBASEK9-M

Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 15.0(2)SE4, RELEASE SOFTWARE (fc1)  
Technical Support: <http://www.cisco.com/techsupport>  
Copyright (c) 1986-2013 by Cisco Systems, Inc.  
Compiled Wed 26-Jun-13 02:49 by mnguyen

Press RETURN to get started!

%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/11, changed state to up  
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/6, changed state to up  
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up  
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

S1>show interface trunk

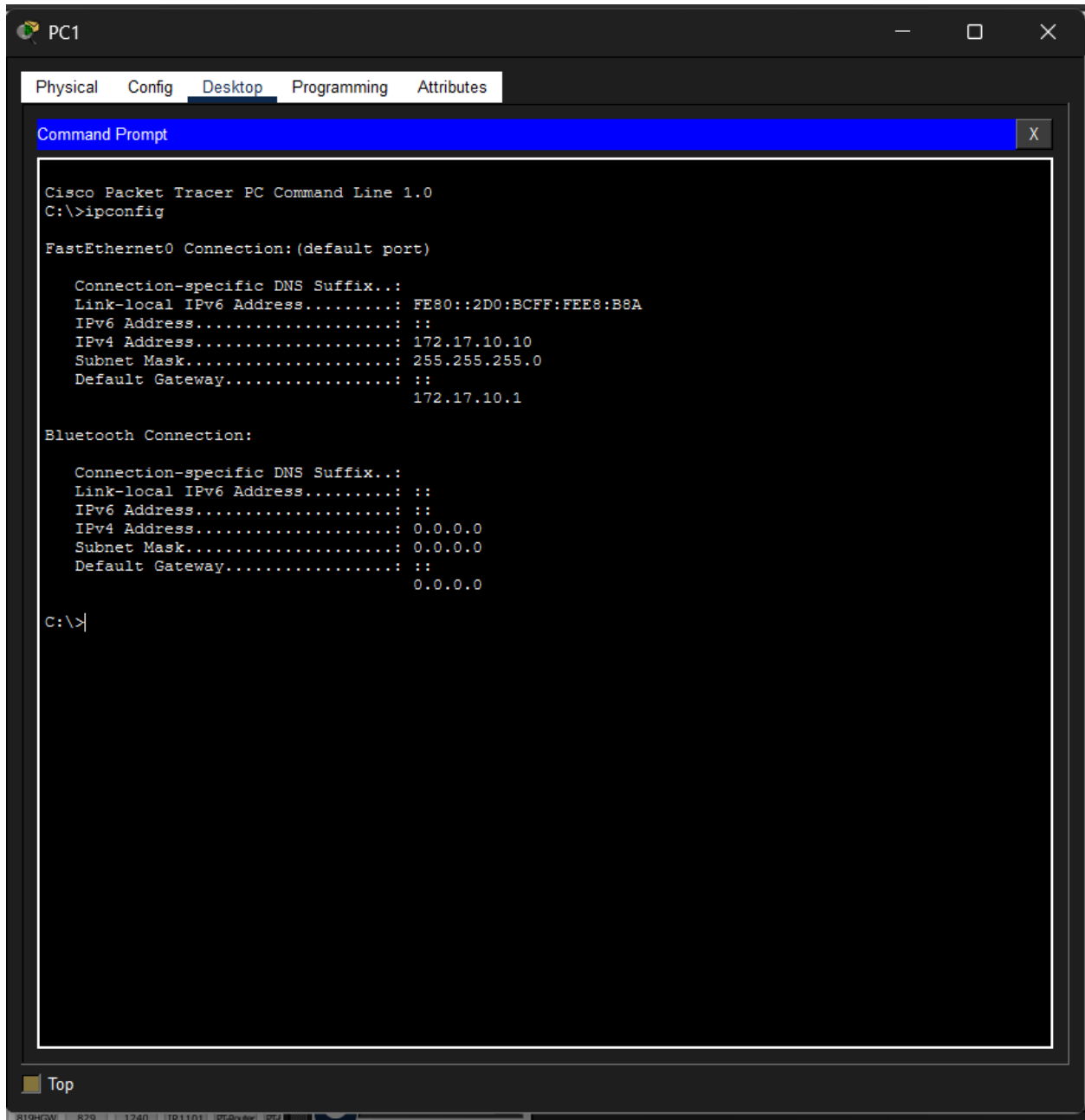
S1>enable  
S1#show interface trunk

S1#

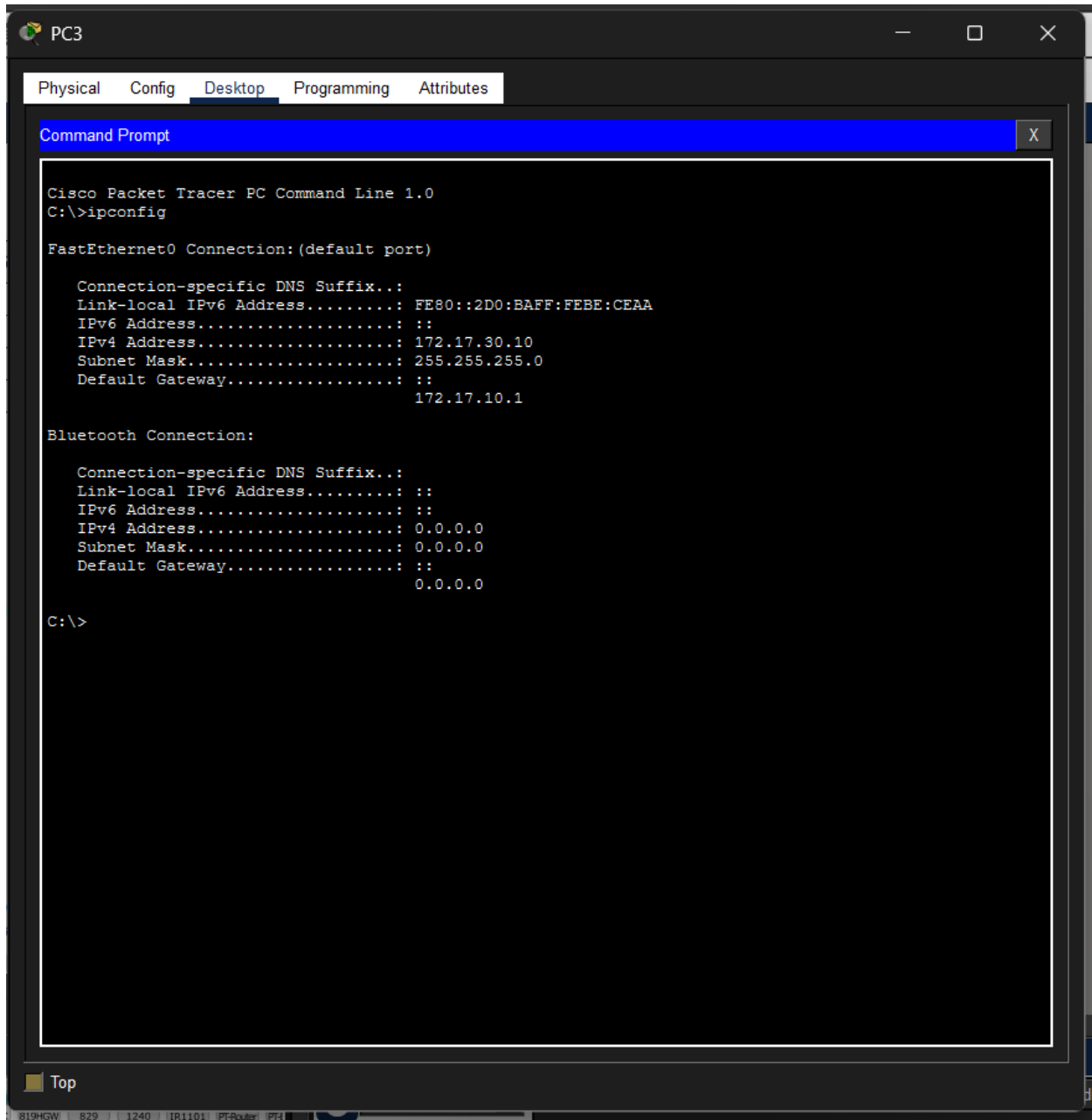
Buttons: Copy, Paste

Top

## On PC1 (Checking DG)



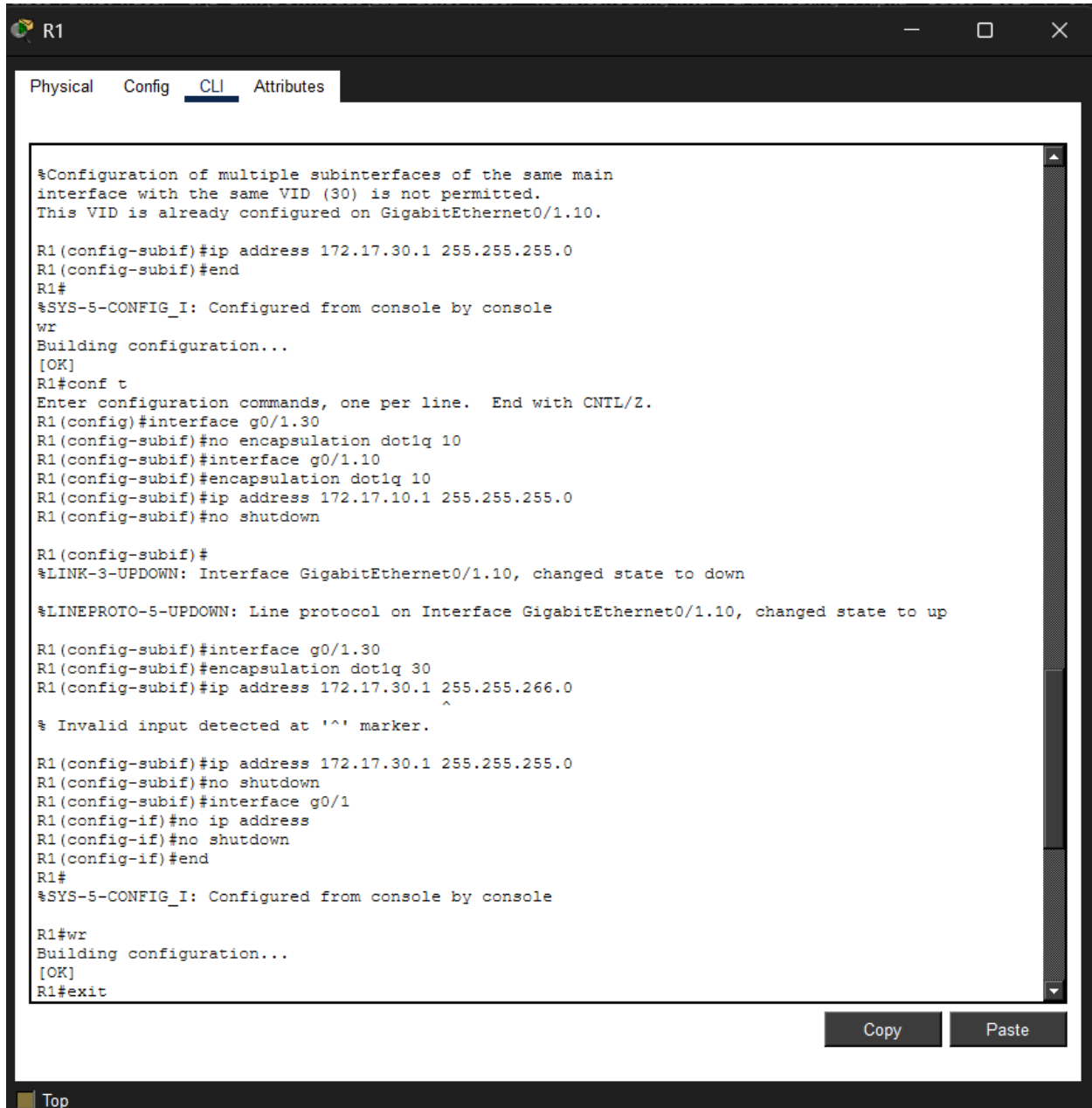
On PC3 (Checking DG):





## Corrected Configurations:

On R1:



```
%Configuration of multiple subinterfaces of the same main
interface with the same VID (30) is not permitted.
This VID is already configured on GigabitEthernet0/1.10.

R1(config-subif)#ip address 172.17.30.1 255.255.255.0
R1(config-subif)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface g0/1.30
R1(config-subif)#no encapsulation dot1q 10
R1(config-subif)#interface g0/1.10
R1(config-subif)#encapsulation dot1q 10
R1(config-subif)#ip address 172.17.10.1 255.255.255.0
R1(config-subif)#no shutdown

R1(config-subif)#
%LINK-3-UPDOWN: Interface GigabitEthernet0/1.10, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.10, changed state to up

R1(config-subif)#interface g0/1.30
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip address 172.17.30.1 255.255.266.0
^
% Invalid input detected at '^' marker.

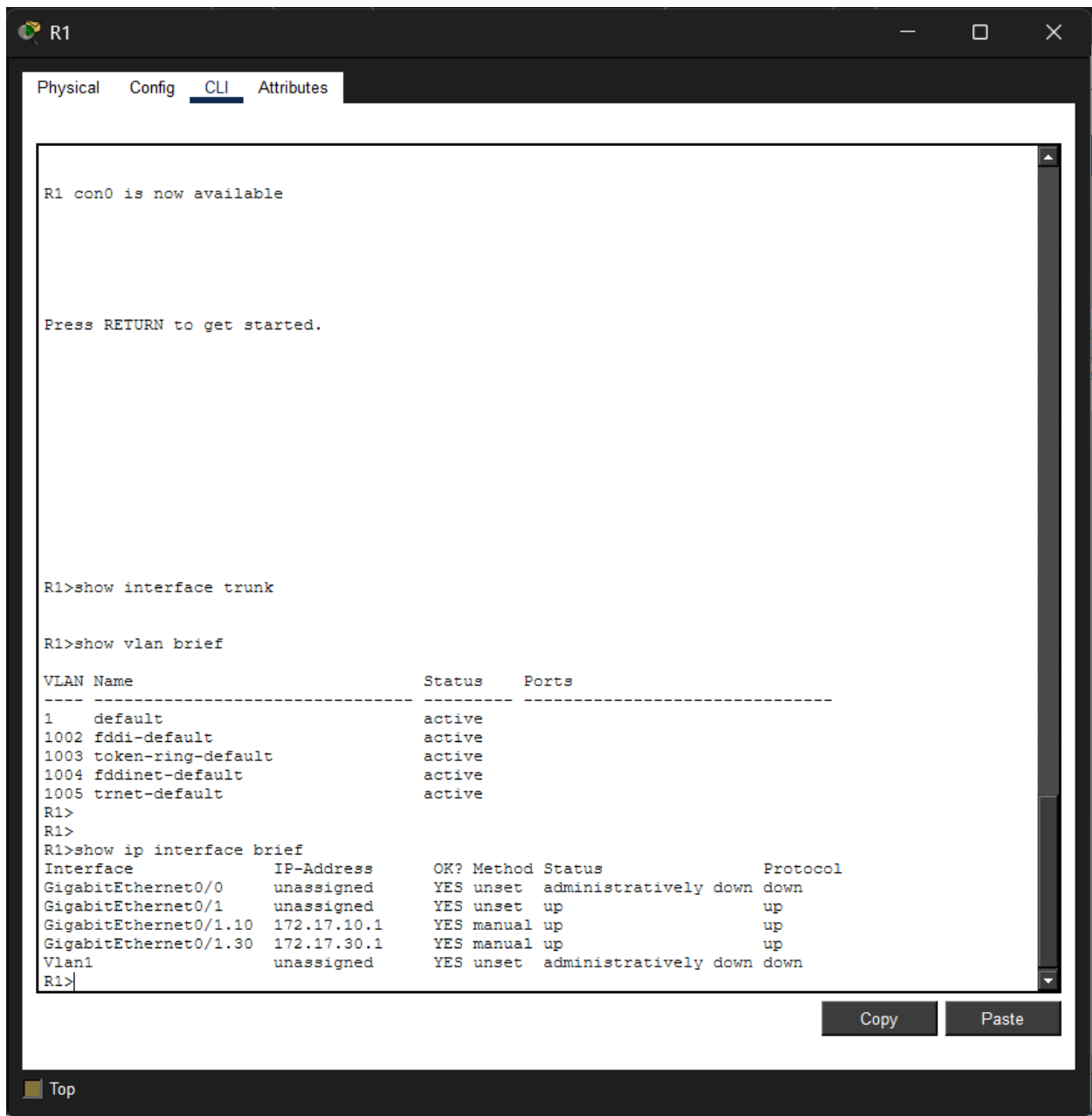
R1(config-subif)#ip address 172.17.30.1 255.255.255.0
R1(config-subif)#no shutdown
R1(config-subif)#interface g0/1
R1(config-if)#no ip address
R1(config-if)#no shutdown
R1(config-if)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#wr
Building configuration...
[OK]
R1#exit
```

Copy Paste

Top

## Verification on R1:



The screenshot shows the R1 CLI interface with the following content:

Physical Config CLI Attributes

R1 con0 is now available

Press RETURN to get started.

R1>show interface trunk

R1>show vlan brief

VLAN	Name	Status	Ports
1	default	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

R1>

R1>

R1>show ip interface brief

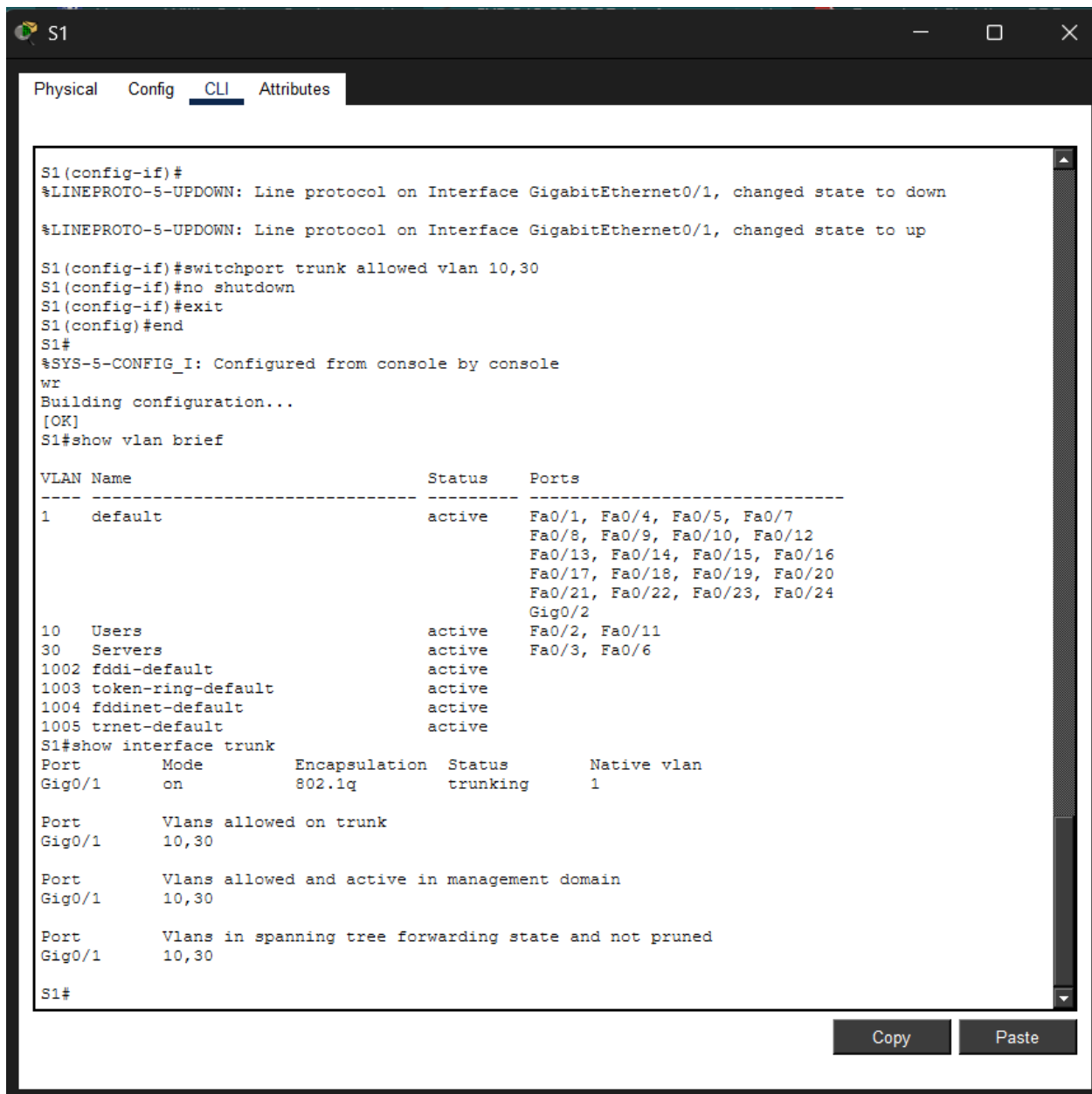
Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/1	unassigned	YES	unset	up	up
GigabitEthernet0/1.10	172.17.10.1	YES	manual	up	up
GigabitEthernet0/1.30	172.17.30.1	YES	manual	up	up
Vlan1	unassigned	YES	unset	administratively down	down

R1>

Copy Paste

Top

On S1:



The screenshot shows a network switch S1 with a CLI interface. The interface has tabs for Physical, Config, CLI (selected), and Attributes. The CLI window displays the following commands and their outputs:

```
S1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

S1(config-if)#switchport trunk allowed vlan 10,30
S1(config-if)#no shutdown
S1(config-if)#exit
S1(config)#end
S1#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
S1#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/4, Fa0/5, Fa0/7, Fa0/8, Fa0/9, Fa0/10, 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, Gig0/2
10	Users	active	Fa0/2, Fa0/11
30	Servers	active	Fa0/3, Fa0/6
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```
S1#show interface trunk
Port      Mode      Encapsulation  Status        Native vlan
Gig0/1    on        802.1q         trunking      1

Port      Vlans allowed on trunk
Gig0/1    10,30

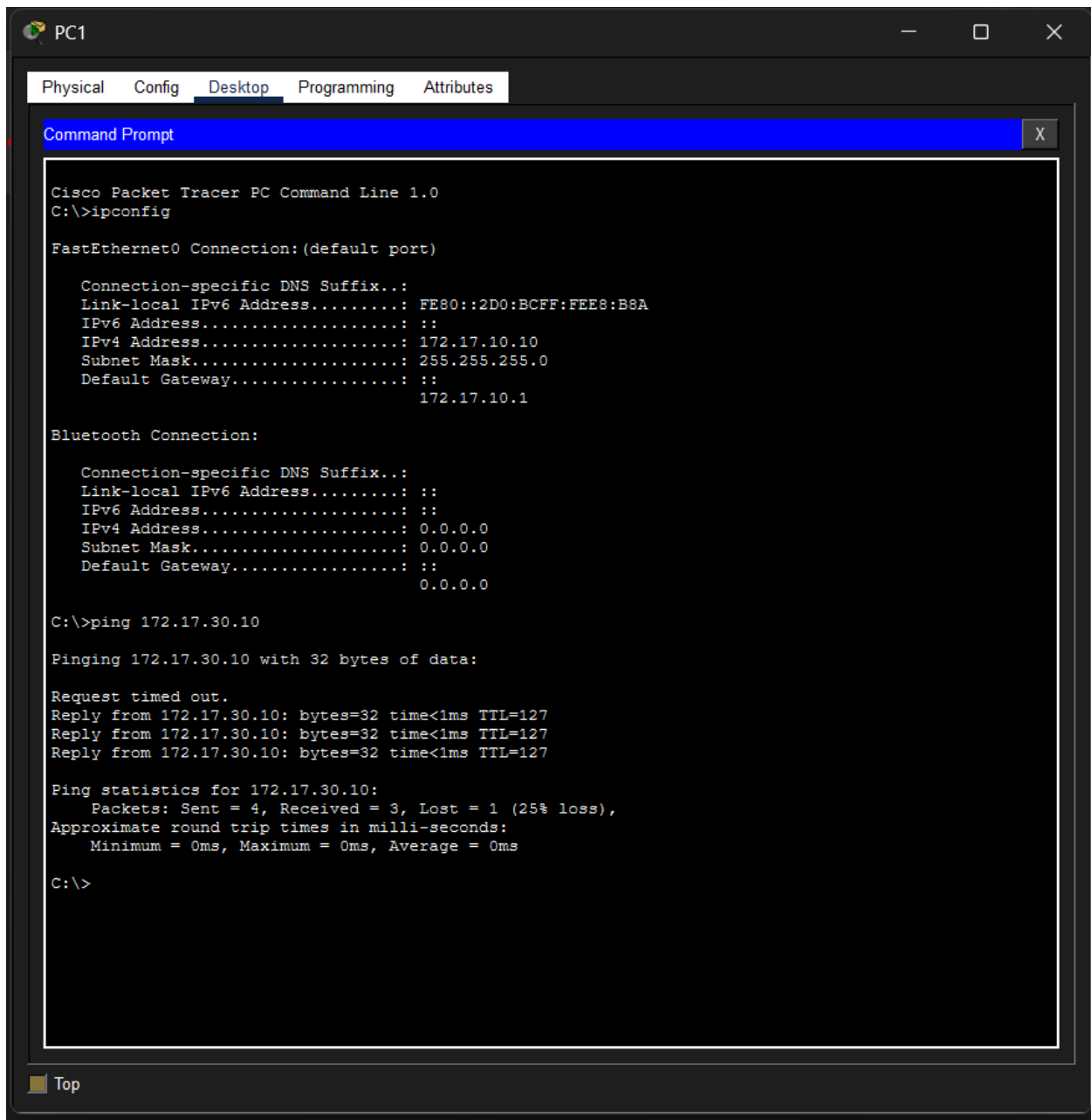
Port      Vlans allowed and active in management domain
Gig0/1    10,30

Port      Vlans in spanning tree forwarding state and not pruned
Gig0/1    10,30

S1#
```

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

On PC1:



The screenshot shows a PC1 window in Cisco Packet Tracer. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window title is 'Command Prompt' with a close button (X). The text inside the command prompt is as follows:

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

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::2D0:BCFF:FEE8:B8A
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 172.17.10.10
    Subnet Mask . . . . .: 255.255.255.0
    Default Gateway . . . . .: ::
                                172.17.10.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                0.0.0.0

C:\>ping 172.17.30.10

Pinging 172.17.30.10 with 32 bytes of data:

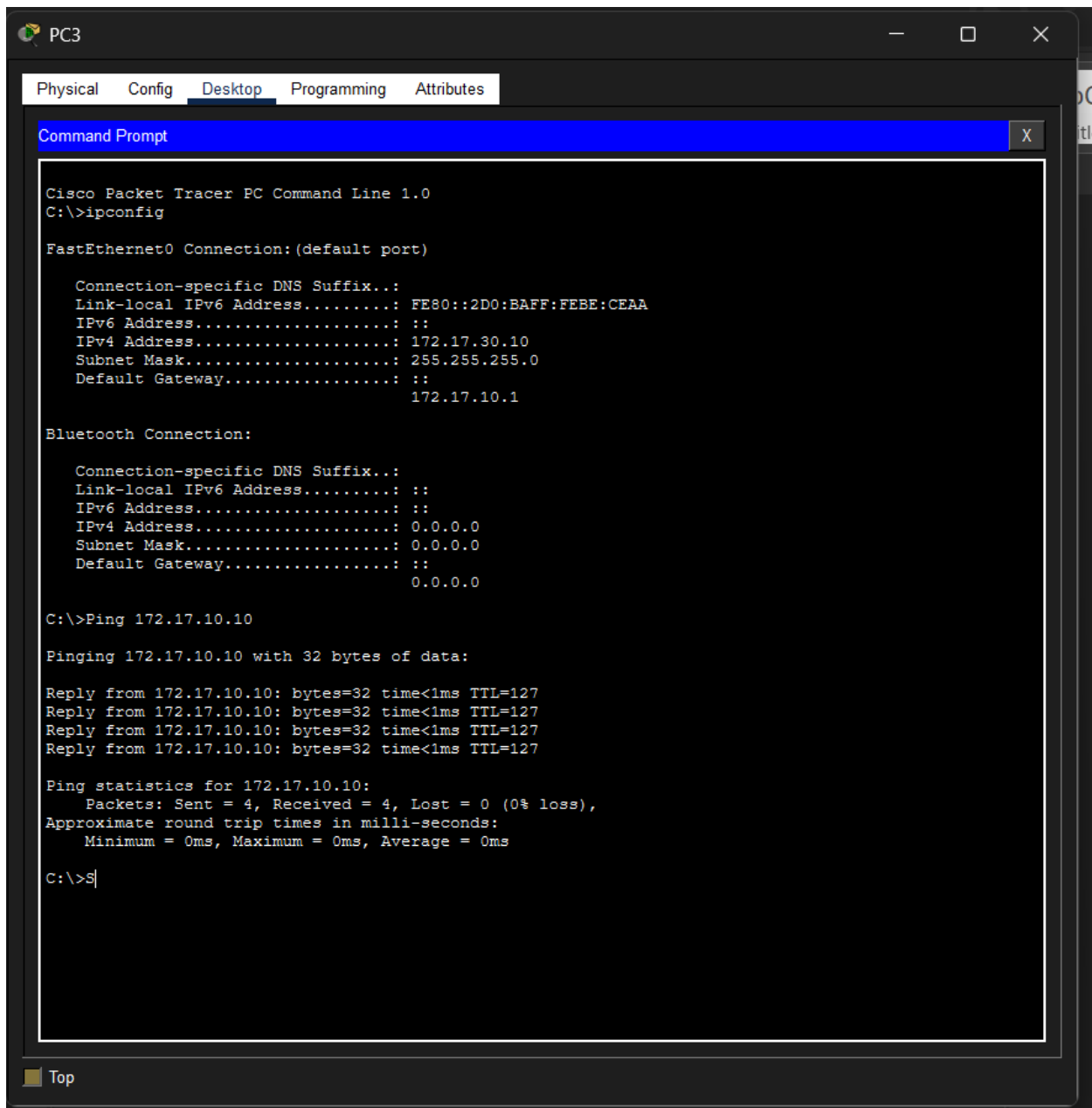
Request timed out.
Reply from 172.17.30.10: bytes=32 time<1ms TTL=127
Reply from 172.17.30.10: bytes=32 time<1ms TTL=127
Reply from 172.17.30.10: bytes=32 time<1ms TTL=127

Ping statistics for 172.17.30.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

At the bottom left of the PC1 window, there is a 'Top' button.

On PC3:



The screenshot shows a PC3 window with a dark theme. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window title is 'Command Prompt' with a close button. The text inside the window shows the output of the 'ipconfig' command, displaying details for the FastEthernet0 and Bluetooth connections. The FastEthernet0 connection is configured with an IPv4 address of 172.17.30.10 and a default gateway of 172.17.10.1. The Bluetooth connection is in its default state. Below the configuration, a 'Ping' command is executed to 172.17.10.10, showing four successful replies with 0ms round-trip times. The window has a 'Top' button at the bottom left.

```
PC3
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection: (default port)

    Connection-specific DNS Suffix.:
    Link-local IPv6 Address.....: FE80::2D0:BAFF:FEFE:CEAA
    IPv6 Address.....: ::
    IPv4 Address.....: 172.17.30.10
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                        172.17.10.1

Bluetooth Connection:

    Connection-specific DNS Suffix.:
    Link-local IPv6 Address.....: ::
    IPv6 Address.....: ::
    IPv4 Address.....: 0.0.0.0
    Subnet Mask.....: 0.0.0.0
    Default Gateway.....: ::
                        0.0.0.0

C:\>Ping 172.17.10.10

Pinging 172.17.10.10 with 32 bytes of data:

Reply from 172.17.10.10: bytes=32 time<1ms TTL=127
Reply from 172.17.10.10: bytes=32 time<1ms TTL=127
Reply from 172.17.10.10: bytes=32 time<1ms TTL=127
Reply from 172.17.10.10: bytes=32 time<1ms TTL=127

Ping statistics for 172.17.10.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>S|

Top
```

# VLAN & Inter-VLAN Routing – Troubleshooting Report

This report documents findings and fixes for connectivity issues related to VLANs and inter-VLAN routing. The topology uses router-on-a-stick with subinterfaces on R1 and VLANs 10 and 30 on switch S1. PC1 is in VLAN 10 and PC3 is in VLAN 30.

## Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	VLAN
R1	G0/1.10	172.17.10.1	255.255.255.0	N/A	VLAN 10
R1	G0/1.30	172.17.30.1	255.255.255.0	N/A	VLAN 30
PC1	NIC	172.17.10.10	255.255.255.0	172.17.10.1	VLAN 10
PC3	NIC	172.17.30.10	255.255.255.0	172.17.30.1	VLAN 30

## Problems and Solutions

Problems	Solutions
Trunk not configured (or down) between S1 and R1.	On S1: configure trunk on G0/1 and allow VLANs 10,30. On R1: ensure G0/1 is up and has no IP.
VLANs 10 and/or 30 missing on S1.	On S1: vlan 10; name Users; vlan 30; name Servers.
PC ports in wrong VLAN.	On S1: assign PC1 to VLAN 10 and PC3 to VLAN 30.
Subinterfaces missing or wrong encapsulation.	On R1: configure G0/1.10 (dot1Q 10) and G0/1.30 (dot1Q 30) with correct IPs.
Parent interface administratively down.	On R1: no shutdown on G0/1.
PC default gateways incorrect or missing.	Set PC1 DG to 172.17.10.1 and PC3 DG to 172.17.30.1.
Native VLAN mismatch.	Keep native VLAN 1 on both sides.

## Verification Steps & Useful Commands

- 1) From PCs: ping the default gateway and opposite PC.
- 2) On S1: show vlan brief, show interface trunk.
- 3) On R1: show ip interface brief, show interfaces g0/1.10, show interfaces g0/1.30.
- 4) Ensure subinterfaces have the correct dot1Q tags and IPs.

## Expected Result

PC1 and PC3 should ping each other and R1 subinterface IPs. If pings fail, re-check VLAN

Pka:

**Packet Tracer - Troubleshoot Inter-VLAN Routing**

**Addressing Table**

Device	Interface	IP Address	Subnet Mask	Default Gateway	VLAN
R1	G0/1.10	172.17.10.1	255.255.255.0	N/A	VLAN
	G0/1.30	172.17.30.1	255.255.255.0	N/A	VLAN
PC1	NIC	172.17.10.10	255.255.255.0	172.17.10.1	VLAN
PC3	NIC	172.17.30.10	255.255.255.0	172.17.30.1	VLAN

**Objectives**

- Part 1: Locate Network Problems
- Part 2: Implement the Solution
- Part 3: Verify Network Connectivity

**Scenario**

In this activity, you will troubleshoot connectivity problems caused by improper configurations related to VLANs and inter-VLAN routing.

**Instructions**

**Part 1: Locate the Network Problems**

Examine the network and locate the source of any connectivity issues.

Commands you may find useful include

- R1# show ip interface brief
- R1# show interface g0/1.10
- R1# show interface g0/1.30
- S1# show interface trunk

- Test connectivity and use the necessary show commands to verify configurations.
- Verify that all configured settings match the requirements shown in the Addressing Table.

List all the problems and possible solutions in the Troubleshooting Table.

Time Elapsed: 01:25:35 Completion: 0/50

Check Results Back 1/1 Next

The network diagram shows a central switch S1 connected to a router R1. S1 has two VLANs: VLAN 10 (172.17.10.0/24) and VLAN 30 (172.17.30.0/24). R1 has two subinterfaces: G0/1.10 and G0/1.30. PC1 is in VLAN 10 and PC3 is in VLAN 30. The physical connections are S1 F0/11 to R1 G0/1 and S1 F0/6 to R1 G0/1.