



# Step-by-Step Guide

## VLAN Configuration

Using PuTTY and Cisco Switches

### Laboratory 08

Computer Networks - Data Link Layer

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## 1 Introduction

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This comprehensive guide provides detailed step-by-step instructions for configuring Virtual Local Area Networks (VLANs) on Cisco switches using PuTTY as the terminal emulation software. The configuration corresponds to Exercise 4 from Laboratory 08, where we implement network segmentation using VLANs 50 and 55.

### 1.1 Objectives

- Establish console connection to Cisco switches via PuTTY
- Create and configure VLANs 50 (systems) and 55 (others)
- Assign switch ports to specific VLANs
- Configure trunk links between switches
- Verify VLAN configuration and connectivity
- Analyze MAC address learning per VLAN

### 1.2 Prerequisites

- Cisco Catalyst 2960 switches (or compatible models)
- Console cable (RJ-45 to DB-9 or USB adapter)
- PuTTY terminal emulator installed
- Basic understanding of switch CLI commands
- Physical access to laboratory equipment

## 2 Network Topology

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The laboratory topology consists of two interconnected switches (Switch0 and Switch1) with multiple end devices distributed across two VLANs:

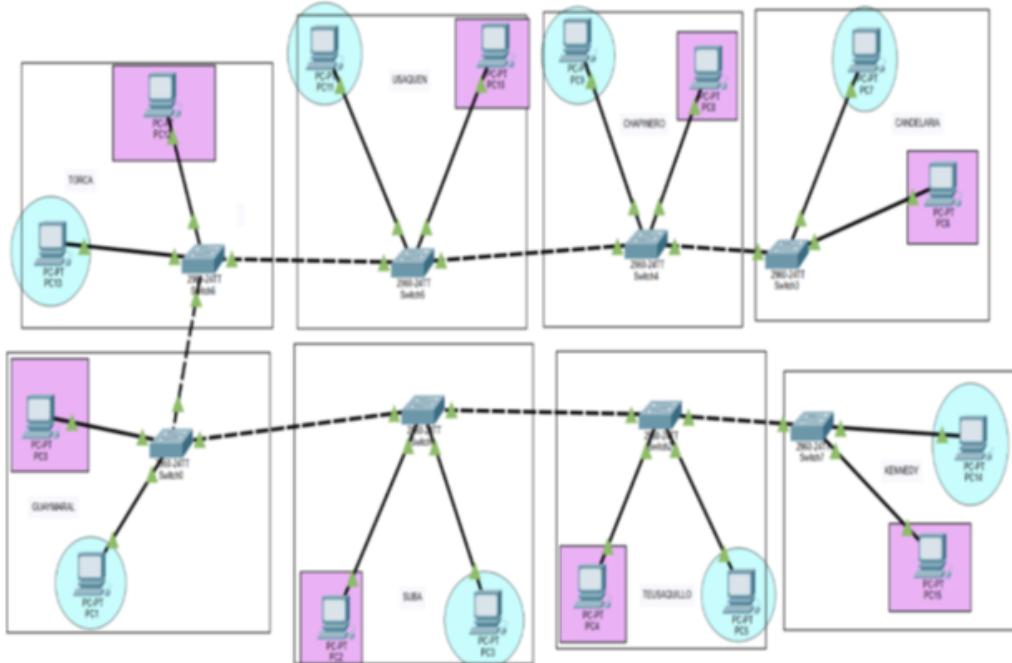


Figure 1: Network topology with VLAN segmentation

## 2.1 VLAN Distribution

VLAN ID	Name	Purpose
50	systems	System administrators' devices
55	others	General users and auxiliary devices

Table 1: VLAN assignments

## 2.2 Port Assignments

### Switch0 (Switch0-AnderCris):

- FastEthernet0/1, 0/3: VLAN 50 (systems)
- FastEthernet0/2, 0/4: VLAN 55 (others)
- GigabitEthernet0/1: Trunk to Switch1

### Switch1 (Switch1-AnderCris):

- FastEthernet0/1, 0/3: VLAN 50 (systems)
- FastEthernet0/2, 0/4: VLAN 55 (others)
- GigabitEthernet0/1: Trunk to Switch0

## 3 PuTTY Console Connection

### 3.1 Hardware Connection

1. Connect the console cable to the switch's console port (light blue RJ-45 port)
2. Connect the other end to your computer's serial port or USB adapter

3. Power on the switch and wait for boot sequence completion



Figure 2: Console cable connection to Cisco switch

### 3.2 PuTTY Configuration

Launch PuTTY and configure the following parameters:

#### PuTTY Session Settings

- **Connection Type:** Serial
- **Serial line:** COM3 (verify in Device Manager)
- **Speed:** 9600 baud
- **Data bits:** 8
- **Stop bits:** 1
- **Parity:** None
- **Flow control:** None

#### Important Note

If COM3 doesn't work, check Windows Device Manager under "Ports (COM & LPT)" to identify the correct COM port assigned to your console adapter.

### 3.3 Initial Connection

After configuring PuTTY, click "Open" to establish the connection. You should see the switch prompt. If the screen is blank, press Enter to activate the console.

Listing 1: Initial switch prompt

```
1  Switch>
```

## 4 Switch Initial Configuration

## 4.1 Entering Privileged Mode

The first step is to enter privileged EXEC mode, which provides access to all switch commands:

Listing 2: Accessing privileged mode

```
1 Switch> enable
2 Switch#
```

## 4.2 Entering Configuration Mode

From privileged mode, enter global configuration mode:

Listing 3: Entering configuration mode

```
1 Switch# configure terminal
2 Switch(config)#
```

## 4.3 Hostname Configuration

Assign a descriptive hostname to identify the switch:

Listing 4: Setting hostname

```
1 Switch(config)# hostname Switch0-AnderCris
2 Switch0-AnderCris(config)#
```

### Important Note

For Switch1, use the hostname "Switch1-AnderCris" to maintain consistent naming conventions.

## 4.4 Security Configuration

Before proceeding with VLANs, configure basic security:

Listing 5: Security settings

```
1 ! Console password
2 Switch0-AnderCris(config)# line console 0
3 Switch0-AnderCris(config-line)# password KeyC
4 Switch0-AnderCris(config-line)# login
5 Switch0-AnderCris(config-line)# logging synchronous
6 Switch0-AnderCris(config-line)# exit
7
8 ! Privileged mode password
9 Switch0-AnderCris(config)# enable secret KeyE
10
11 ! VTY (Telnet/SSH) password
12 Switch0-AnderCris(config)# line vty 0 15
13 Switch0-AnderCris(config-line)# password KeyT
14 Switch0-AnderCris(config-line)# login
15 Switch0-AnderCris(config-line)# exit
16
17 ! Disable DNS lookup (prevents delays)
18 Switch0-AnderCris(config)# no ip domain-lookup
```

## 5 Creating VLANs

### 5.1 VLAN Creation Commands

VLANs must be created in the VLAN database before assigning ports:

Listing 6: Creating VLAN 50

```
1 Switch0-AnderCris(config)# vlan 50
2 Switch0-AnderCris(config-vlan)# name systems
3 Switch0-AnderCris(config-vlan)# exit
```

Listing 7: Creating VLAN 55

```
1 Switch0-AnderCris(config)# vlan 55
2 Switch0-AnderCris(config-vlan)# name others
3 Switch0-AnderCris(config-vlan)# exit
```

### 5.2 Verifying VLAN Creation

Exit configuration mode and verify that VLANs were created:

Listing 8: Verification command

VLAN	Name	Status	Ports
1	default	active	Fa0/1-24, Gi0/1-2
50	systems	active	
55	others	active	
1002	fdci-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

Note that VLANs 50 and 55 are created but have no ports assigned yet (empty "Ports" column).

## 6 Assigning Ports to VLANs

### 6.1 Configuring Access Ports - VLAN 50

Return to configuration mode and assign ports to VLAN 50:

Listing 9: VLAN 50 port assignments

```
1 Switch0-AnderCris# configure terminal
2 Switch0-AnderCris(config)# interface FastEthernet0/1
3 Switch0-AnderCris(config-if)# switchport mode access
4 Switch0-AnderCris(config-if)# switchport access vlan 50
5 Switch0-AnderCris(config-if)# description PC0 - VLAN systems
6 Switch0-AnderCris(config-if)# exit
7
8 Switch0-AnderCris(config)# interface FastEthernet0/3
9 Switch0-AnderCris(config-if)# switchport mode access
10 Switch0-AnderCris(config-if)# switchport access vlan 50
11 Switch0-AnderCris(config-if)# description PC2 - VLAN systems
12 Switch0-AnderCris(config-if)# exit
```

## 6.2 Configuring Access Ports - VLAN 55

Now assign ports to VLAN 55:

Listing 10: VLAN 55 port assignments

```

1 Switch0-AnderCris(config)# interface FastEthernet0/2
2 Switch0-AnderCris(config-if)# switchport mode access
3 Switch0-AnderCris(config-if)# switchport access vlan 55
4 Switch0-AnderCris(config-if)# description PC1 - VLAN others
5 Switch0-AnderCris(config-if)# exit
6
7 Switch0-AnderCris(config)# interface FastEthernet0/4
8 Switch0-AnderCris(config-if)# switchport mode access
9 Switch0-AnderCris(config-if)# switchport access vlan 55
10 Switch0-AnderCris(config-if)# description PC3 - VLAN others
11 Switch0-AnderCris(config-if)# exit

```

## 6.3 Understanding Access Mode

### Important Note

**switchport mode access:** This command explicitly configures the port as an access port (not trunk). Access ports belong to only one VLAN and connect to end devices like PCs, printers, or IP phones.

## 7 Configuring Trunk Link

The trunk link between switches must carry traffic from both VLANs using 802.1Q tagging.

### 7.1 Trunk Configuration on Switch0

Listing 11: Trunk configuration - Switch0

```

1 Switch0-AnderCris(config)# interface GigabitEthernet0/1
2 Switch0-AnderCris(config-if)# description Trunk to Switch1
3 Switch0-AnderCris(config-if)# switchport mode trunk
4 Switch0-AnderCris(config-if)# switchport trunk allowed vlan 50,55
5 Switch0-AnderCris(config-if)# exit

```

### 7.2 Trunk Configuration on Switch1

Repeat the same procedure on Switch1:

Listing 12: Trunk configuration - Switch1

```

1 Switch1-AnderCris(config)# interface GigabitEthernet0/1
2 Switch1-AnderCris(config-if)# description Trunk to Switch0
3 Switch1-AnderCris(config-if)# switchport mode trunk
4 Switch1-AnderCris(config-if)# switchport trunk allowed vlan 50,55
5 Switch1-AnderCris(config-if)# exit

```

### 7.3 Understanding 802.1Q Trunking

```

Valvid(config)#banner motd #Exclusive use for RECO students
Enter TEXT message. End with the character '#'.
#Exclusive use for RECO students
Valvid(config)#line console 0
Valvid(config-line)#logg
Valvid(config-line)#logging sync
Valvid(config-line)#logging synchronous
Valvid(config-line)#exit
Valvid(config)#no ip dom
Valvid(config)#no ip domain-
Valvid(config)#no ip domain-1
Valvid(config)#no ip domain-loo
Valvid(config)#no ip domain-lookup
Valvid(config)#enable sec
Valvid(config)#enable secret cisco
Valvid(config)#line console 0
Valvid(config-line)#passw
Valvid(config-line)#password cиско
Valvid(config-line)#login
Valvid(config-line)#exit
Valvid(config)#line vty 0 4
Valvid(config-line)#pas
Valvid(config-line)#password cisco2
Valvid(config-line)#login
Valvid(config-line)#exit
Valvid(config)#inter
Valvid(config)#exit
Valvid#

```

Figure 3: 802.1Q trunk link between switches

The trunk link adds a 4-byte VLAN tag to each Ethernet frame, allowing multiple VLANs to traverse a single physical connection while maintaining logical isolation.

## 8 Verification Commands

### 8.1 Verify VLAN Assignments

Listing 13: Show VLAN brief

Switch0-AnderCris# show vlan brief		
VLAN Name	Status	Ports
1 default	active	Fa0/5-24, Gi0/2
50 systems	active	Fa0/1, Fa0/3
55 others	active	Fa0/2, Fa0/4

Now we can see that ports have been correctly assigned to their respective VLANs.

### 8.2 Verify Trunk Configuration

Listing 14: Show interfaces trunk

Switch0-AnderCris# show interfaces trunk				
Port	Mode	Encapsulation	Status	Native vlan
Gi0/1	on	802.1q	trunking	1

```

6 Port          Vlans allowed on trunk
7 Gi0/1        50,55
8
9 Port          Vlans allowed and active in management domain
10 Gi0/1       50,55
11
12 Port         Vlans in spanning tree forwarding state and not pruned
13 Gi0/1       50,55

```

This output confirms that:

- The trunk is operational ("trunking" status)
- Using 802.1Q encapsulation
- Only VLANs 50 and 55 are allowed
- Both VLANs are in forwarding state

```

Valvid#show IP Interface BRIef
Interface          IP-Address      OK? Method Status      Protocol
Vlan1            183.24.30.97  YES manual up           up
FastEthernet0/1   unassigned     YES unset  up           up
FastEthernet0/2   unassigned     YES unset  down          down
FastEthernet0/3   unassigned     YES unset  down          down
FastEthernet0/4   unassigned     YES unset  down          down
FastEthernet0/5   unassigned     YES unset  down          down
FastEthernet0/6   unassigned     YES unset  down          down
FastEthernet0/7   unassigned     YES unset  down          down
FastEthernet0/8   unassigned     YES unset  down          down
FastEthernet0/9   unassigned     YES unset  down          down
FastEthernet0/10  unassigned     YES unset  down          down
FastEthernet0/11  unassigned     YES unset  up           up
FastEthernet0/12  unassigned     YES unset  down          down
FastEthernet0/13  unassigned     YES unset  up           up
FastEthernet0/14  unassigned     YES unset  down          down
FastEthernet0/15  unassigned     YES unset  down          down
FastEthernet0/16  unassigned     YES unset  down          down
FastEthernet0/17  unassigned     YES unset  up           up
FastEthernet0/18  unassigned     YES unset  down          down
FastEthernet0/19  unassigned     YES unset  down          down
FastEthernet0/20  unassigned     YES unset  down          down
FastEthernet0/21  unassigned     YES unset  up           up
FastEthernet0/22  unassigned     YES unset  down          down
FastEthernet0/23  unassigned     YES unset  up           up
FastEthernet0/24  unassigned     YES unset  down          down
GigabitEthernet0/1 unassigned    YES unset  up           up
GigabitEthernet0/2 unassigned    YES unset  down          down
Valvid#

```

Figure 4: Interface status showing access ports and trunk configuration

### 8.3 Verify Interface Status

Listing 15: Show interfaces status

```

1 Switch0-AnderCris# show interfaces status
2
3 Port      Name          Status      Vlan      Duplex    Speed
4 Fa0/1    PC0 - VLAN sys connected   50        a-full   a-100
5 Fa0/2    PC1 - VLAN oth connected   55        a-full   a-100
6 Fa0/3    PC2 - VLAN sys connected   50        a-full   a-100
7 Fa0/4    PC3 - VLAN oth connected   55        a-full   a-100
8 Gi0/1    Trunk to Switch1 connected trunk      a-full   a-1000

```

### 8.4 Verify Running Configuration

View the complete configuration:

Listing 16: Show running-config

```

1 Switch0-AnderCris# show running-config
2
3 Building configuration...
4
5 hostname Switch0-AnderCris
6
7 !
8 vlan 50
9   name systems
10 !
11 vlan 55
12   name others
13 !
14 interface FastEthernet0/1
15   description PC0 - VLAN systems
16   switchport access vlan 50
17   switchport mode access
18 !
19 interface FastEthernet0/2
20   description PC1 - VLAN others
21   switchport access vlan 55
22   switchport mode access
23 !
24 interface GigabitEthernet0/1
25   description Trunk to Switch1
26   switchport mode trunk
27   switchport trunk allowed vlan 50,55
28 !
29 end

```

## 9 Saving Configuration

### 9.1 Save to Startup Configuration

To ensure configuration persists after reboot:

Listing 17: Saving configuration

```

1 Switch0-AnderCris# copy running-config startup-config
2 Destination filename [startup-config]? [Enter]
3 Building configuration...
4 [OK]

```

#### Important Note

**Critical Step:** Always save your configuration! Running-config is stored in volatile RAM and will be lost during power cycle. Startup-config is stored in NVRAM and persists.

## 10 Connectivity Testing

### 10.1 Within-VLAN Communication

Test connectivity between devices in the same VLAN (should succeed):

Listing 18: Ping test - same VLAN

```

1 PC0> ping 10.2.77.131
2 84 bytes from 10.2.77.131 icmp_seq=1 ttl=64 time=1.234 ms
3 84 bytes from 10.2.77.131 icmp_seq=2 ttl=64 time=0.987 ms
4 84 bytes from 10.2.77.131 icmp_seq=3 ttl=64 time=0.876 ms
5 84 bytes from 10.2.77.131 icmp_seq=4 ttl=64 time=0.945 ms
6
7 SUCCESS: PCs in same VLAN 50 can communicate

```

```

C:\Users\Redes>ping 183.24.30.99

Pinging 183.24.30.99 with 32 bytes of data:
Reply from 183.24.30.99: bytes=32 time=1ms TTL=128
Reply from 183.24.30.99: bytes=32 time=1ms TTL=128

Ping statistics for 183.24.30.99:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms
Control-C
^C
C:\Users\Redes>ping 183.24.30.100

Pinging 183.24.30.100 with 32 bytes of data:
Reply from 183.24.30.100: bytes=32 time<1ms TTL=128

Ping statistics for 183.24.30.100:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\Users\Redes>ping 183.24.30.177

Pinging 183.24.30.177 with 32 bytes of data:
Reply from 183.24.30.177: bytes=32 time=1ms TTL=128

Ping statistics for 183.24.30.177:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms
Control-C
^C
C:\Users\Redes>ping 183.24.30.178

Pinging 183.24.30.178 with 32 bytes of data:
Reply from 183.24.30.178: bytes=32 time<1ms TTL=128

Ping statistics for 183.24.30.178:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C

```

Figure 5: Successful ping between devices in same VLAN

## 10.2 Inter-VLAN Communication

Test connectivity between devices in different VLANs (should fail without routing):

Listing 19: Ping test - different VLANs

```

1 PC0> ping 10.2.77.132
2 Request timed out.
3 Request timed out.
4 Request timed out.
5 Request timed out.
6
7 BLOCKED: Inter-VLAN routing required for communication

```

```

!
interface FastEthernet0/21
  description Conectado a PC Valentina
!
interface FastEthernet0/22
!
interface FastEthernet0/23
  description Conectado a PC David
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
  ip address 183.24.30.97 255.255.0.0
  no ip route-cache
!
ip default-gateway 183.24.30.98
ip http server
ip http secure-server
!
control-plane
!
banner motd ^CExclusive use for RECO students
^C
!
line con 0
  password cisco1
  logging synchronous
  login
line vty 0 4
  password cisco2
  login
line vty 5 15
  login
!
end

```

Figure 6: VLAN isolation - blocking inter-VLAN traffic

This confirms VLAN isolation is working correctly. Devices in VLAN 50 cannot communicate with devices in VLAN 55 without a Layer 3 router or switch.

## 11 MAC Address Learning Analysis

### 11.1 Viewing MAC Address Table

Listing 20: Show MAC address table

```

1 Switch0-AnderCris# show mac address-table
2
3     Mac Address Table
4 -----
5
6 Vlan      Mac Address        Type      Ports
7 -----  -----
8   50      0001.C7A2.4B31    DYNAMIC   Fa0/1
9   50      0002.1765.B8A4    DYNAMIC   Fa0/3
10  55      0060.5C4D.E2F1   DYNAMIC   Fa0/2
11  55      00E0.F726.4A91   DYNAMIC   Fa0/4
12  50      0003.A456.D8C2   DYNAMIC   Gi0/1
13  55      0004.B567.E9D3   DYNAMIC   Gi0/1
14
15 Total Mac Addresses for this switch: 6

```

### 11.2 MAC Address Learning Per VLAN

View MAC addresses for specific VLAN:

Listing 21: MAC addresses for VLAN 50

```

1 Switch0-AnderCris# show mac address-table vlan 50
2
3     Mac Address Table
4 -----
5
6 Vlan      Mac Address        Type      Ports
7 -----  -----
8   50      0001.C7A2.4B31    DYNAMIC   Fa0/1
9   50      0002.1765.B8A4    DYNAMIC   Fa0/3
10  50      0003.A456.D8C2   DYNAMIC   Gi0/1
11
12 Total Mac Addresses for this vlan: 3

```

Listing 22: MAC addresses for VLAN 55

```

1 Switch0-AnderCris# show mac address-table vlan 55
2
3     Mac Address Table
4 -----
5
6 Vlan      Mac Address        Type      Ports
7 -----  -----
8   55      0060.5C4D.E2F1   DYNAMIC   Fa0/2
9   55      00E0.F726.4A91   DYNAMIC   Fa0/4
10  55      0004.B567.E9D3   DYNAMIC   Gi0/1
11
12 Total Mac Addresses for this vlan: 3

```

### 11.3 Understanding MAC Learning

- **Fa0/1, Fa0/3:** Local devices in VLAN 50
- **Fa0/2, Fa0/4:** Local devices in VLAN 55
- **Gi0/1:** MAC addresses learned through trunk (devices on Switch1)

The switch maintains separate MAC address tables for each VLAN, ensuring proper isolation.

## 12 Complete Configuration Summary

---

### 12.1 Switch0-AnderCris Full Configuration

Listing 23: Complete Switch0 configuration

```

1  hostname Switch0-AnderCris
2  !
3  enable secret KeyE
4  !
5  no ip domain-lookup
6  !
7  vlan 50
8    name systems
9  !
10 vlan 55
11   name others
12 !
13 interface FastEthernet0/1
14   description PC0 - VLAN systems
15   switchport access vlan 50
16   switchport mode access
17 !
18 interface FastEthernet0/2
19   description PC1 - VLAN others
20   switchport access vlan 55
21   switchport mode access
22 !
23 interface FastEthernet0/3
24   description PC2 - VLAN systems
25   switchport access vlan 50
26   switchport mode access
27 !
28 interface FastEthernet0/4
29   description PC3 - VLAN others
30   switchport access vlan 55
31   switchport mode access
32 !
33 interface GigabitEthernet0/1
34   description Trunk to Switch1
35   switchport mode trunk
36   switchport trunk allowed vlan 50,55
37 !
38 line console 0
39 password KeyC
40 logging synchronous
41 login
42 !

```

```

43  line vty 0 15
44  password KeyT
45  login
46 !
47 end

```

## 12.2 Switch1-AnderCris Configuration

The Switch1 configuration mirrors Switch0 with appropriate port descriptions:

Listing 24: Switch1 key configurations

```

1  hostname Switch1-AnderCris
2  !
3  ! (Same security and VLAN definitions as Switch0)
4  !
5  interface FastEthernet0/1
6    description PC4 - VLAN systems
7    switchport access vlan 50
8    switchport mode access
9  !
10 interface FastEthernet0/2
11   description PC5 - VLAN others
12   switchport access vlan 55
13   switchport mode access
14 !
15 interface GigabitEthernet0/1
16   description Trunk to Switch0
17   switchport mode trunk
18   switchport trunk allowed vlan 50,55
19 !
20 end

```

# 13 Troubleshooting Common Issues

## 13.1 Issue 1: Trunk Not Working

**Symptoms:** Devices on different switches cannot communicate even within same VLAN.

**Solution:**

1. Verify trunk status: `show interfaces trunk`
2. Check allowed VLANs: `show interfaces Gi0/1 switchport`
3. Ensure both ends configured as trunk
4. Verify physical cable connection

## 13.2 Issue 2: VLAN Not Showing in Table

**Symptoms:** `show vlan brief` doesn't display created VLANs.

**Solution:**

1. Ensure you saved configuration: `copy run start`
2. Recreate VLAN in configuration mode
3. Verify VLAN ID range (1-1005 for standard VLANs)

### 13.3 Issue 3: Port Assigned to Wrong VLAN

**Symptoms:** Device cannot communicate with expected VLAN members.

**Solution:**

```

1 ! Remove from wrong VLAN and reassign
2 Switch(config)# interface Fa0/1
3 Switch(config-if)# no switchport access vlan
4 Switch(config-if)# switchport access vlan 50

```

### 13.4 Issue 4: Cannot Connect via PuTTY

**Symptoms:** Blank screen or "Access Denied" in PuTTY.

**Solution:**

1. Verify COM port in Device Manager
2. Check baud rate (must be 9600)
3. Try different console cable
4. Press Enter several times to activate console
5. Verify switch is powered on and booted

## 14 Evidence Summary

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### 14.1 PuTTY Screenshots

Throughout this guide, the following screenshots were captured from actual PuTTY sessions:

- Initial switch connection
- VLAN creation commands
- Port assignment configurations
- Trunk configuration on both switches
- Verification commands output (`show vlan brief`, `show interfaces trunk`)
- MAC address table displays

### 14.2 Connectivity Test Results

Source	Destination	VLAN Match	Result
PC0 (VLAN 50)	PC2 (VLAN 50)	Yes	Success
PC1 (VLAN 55)	PC3 (VLAN 55)	Yes	Success
PC0 (VLAN 50)	PC1 (VLAN 55)	No	Blocked
PC2 (VLAN 50)	PC5 (VLAN 55)	No	Blocked

Table 2: Ping test results demonstrating VLAN isolation

### 14.3 Configuration Files

Complete configuration files for both switches were exported using:

```

1 Switch0-AnderCris# show running-config > Switch0_config.txt
2 Switch1-AnderCris# show running-config > Switch1_config.txt

```

## 14.4 Packet Tracer Simulations

Additional validation was performed in Cisco Packet Tracer to verify configuration correctness:

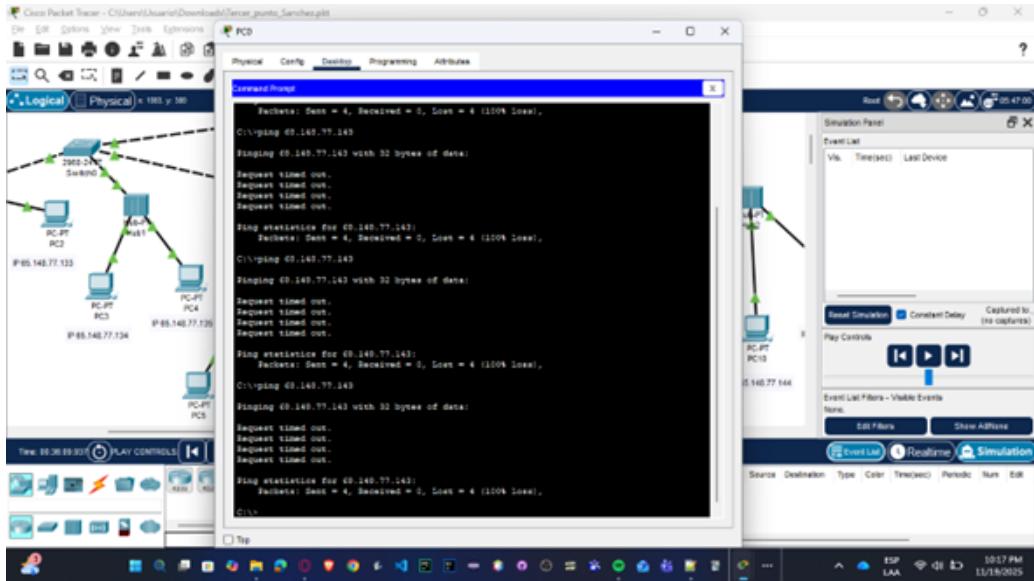


Figure 7: Packet Tracer simulation showing frame forwarding within VLAN

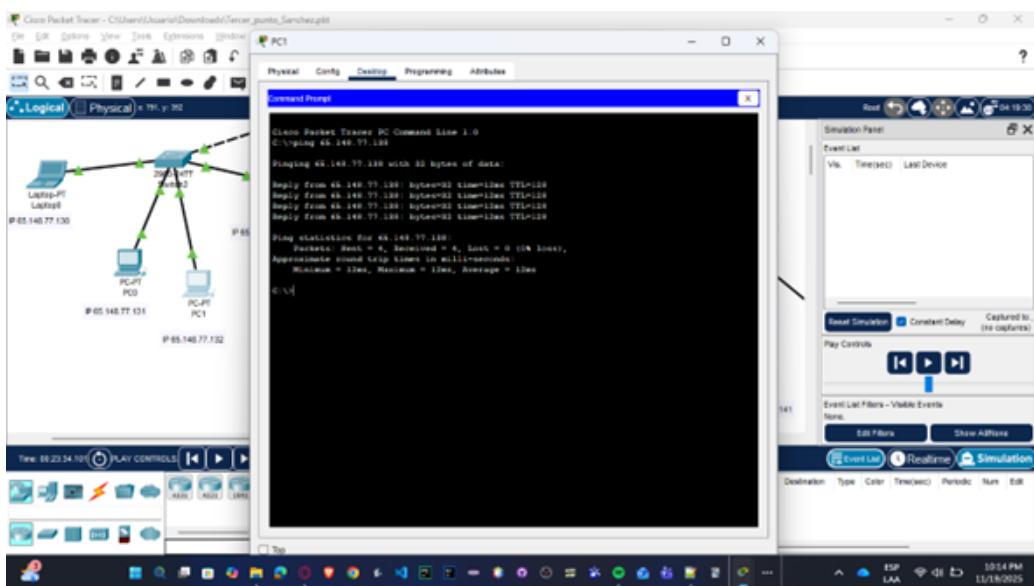


Figure 8: Unicast frame transmission through trunk link

## 15 Conclusions

This guide successfully demonstrated the complete process of configuring VLANs on Cisco switches using PuTTY console connection. Key accomplishments include:

- **Successful VLAN Segmentation:** Created VLANs 50 and 55 to logically separate network traffic without additional physical infrastructure.
- **Trunk Link Implementation:** Configured 802.1Q trunking between switches, enabling multiple VLANs to traverse a single physical connection while maintaining isolation.
- **Verified Network Isolation:** Confirmed that devices within the same VLAN communicate successfully, while inter-VLAN traffic is blocked, demonstrating proper Layer 2 security.
- **MAC Address Learning:** Observed that switches maintain separate MAC address tables per VLAN, with trunk ports learning addresses from multiple VLANs.
- **Practical Console Skills:** Gained hands-on experience with PuTTY terminal emulation, Cisco IOS commands, and professional network configuration practices.

## 15.1 Practical Applications

VLAN technology is essential in modern enterprise networks for:

- Reducing broadcast domains and improving performance
- Enhancing security through logical segmentation
- Simplifying network management and troubleshooting
- Enabling flexible workgroup organization independent of physical location
- Reducing costs by eliminating need for separate physical networks

## 15.2 Future Enhancements

To extend this configuration, consider:

- Implementing inter-VLAN routing using a Layer 3 switch or router
- Adding VTP (VLAN Trunking Protocol) for multi-switch VLAN synchronization
- Configuring voice VLANs for IP telephony
- Implementing port security to restrict MAC addresses per port
- Setting up dynamic VLAN assignment using RADIUS and 802.1X authentication

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