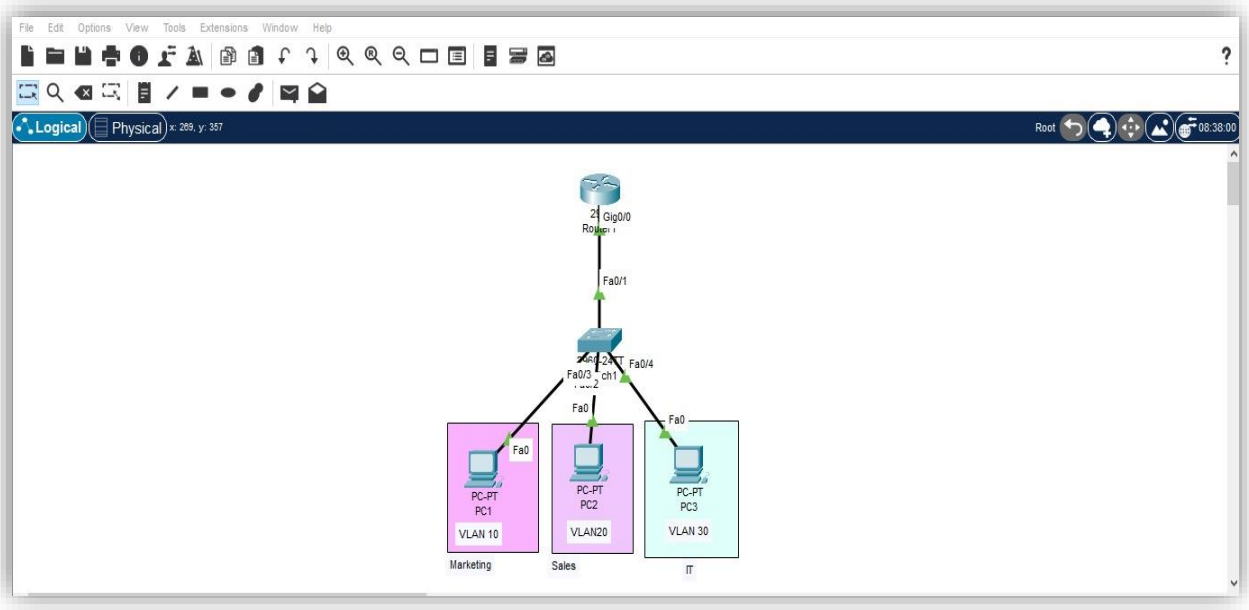
PROJECT NAME: MULTI-VLAN NETWORK WITH DHCP SERVER ON ROUTER(ROUTER-ON-A-STICK)



- **Core Device:**
  - One Layer 3 capable Router (e.g., Cisco 2911 router or similar)
- **Access Layer Device:**
  - One Layer 2 Switch (e.g., Cisco 2960 switch or similar)
- **End Devices:**
  - Three PCs (representing users in different departments).

Device	Interface	IP Address	Subnet Mask	Default Gateway	VLAN
Router	G0/0.10 (Subinterface)	192.168.10.1	255.255.255.0	N/A	10
Router	G0/0.20 (Subinterface)	192.168.20.1	255.255.255.0	N/A	20
Router	G0/0.30 (Subinterface)	192.168.30.1	255.255.255.0	N/A	30
Switch	F0/1 (Trunk Port)	N/A	N/A	N/A	N/A
Switch	F0/2	N/A	N/A	N/A	10
Switch	F0/3	N/A	N/A	N/A	20
Switch	F0/4	N/A	N/A	N/A	30

Router Configuration

Router>enable

Router#configure terminal

Router(config)#hostname R1

R1(config)#int g0/0

R1(config-if)#no shut

! Create subinterfaces

R1(config)#int g0/0.10

R1(config-subif)#encapsulation dot1Q 10

R1(config-subif)#ip address 192.168.10.1 255.255.255.0

R1(config-subif)#ex

R1(config)#int g0/0.20

R1(config-subif)#encapsulation dot1Q 20

R1(config-subif)#ip address 192.168.20.1 255.255.255.0

R1(config-subif)#ex

R1(config)#int g0/0.30

R1(config-subif)#encapsulation dot1Q 30

R1(config-subif)#ip address 192.168.30.1 255.255.255.0

R1(config-subif)#ex

! Configure DHCP Pools

R1(config)#ip dhcp pool Marketing_Pool

R1(dhcp-config)#network 192.168.10.0 255.255.255.0

R1(dhcp-config)#default-router 192.168.10.1

R1(dhcp-config)#dns-server 8.8.8.8

R1(dhcp-config)#ex

R1(config)#ip dhcp pool Sales_Pool

R1(dhcp-config)#network 192.168.20.0 255.255.255.0

R1(dhcp-config)#default-router 192.168.20.1

R1(dhcp-config)#dns-server 8.8.8.8

R1(dhcp-config)#ex

R1(config)#ip dhcp pool IT_Pool

R1(dhcp-config)#network 192.168.30.0 255.255.255.0

R1(dhcp-config)#default-router 192.168.30.1

R1(dhcp-config)#dns-server 8.8.8.8

R1(dhcp-config)#ex

R1#copy running-config startup-config

Switch Configuration

Switch>enable

Switch#configure terminal

Switch(config)#hostname S1

S1(config)#vlan 10

S1(config-vlan)#name Marketing

S1(config-vlan)#ex

S1(config)#vlan 20

S1(config-vlan)#name Sales

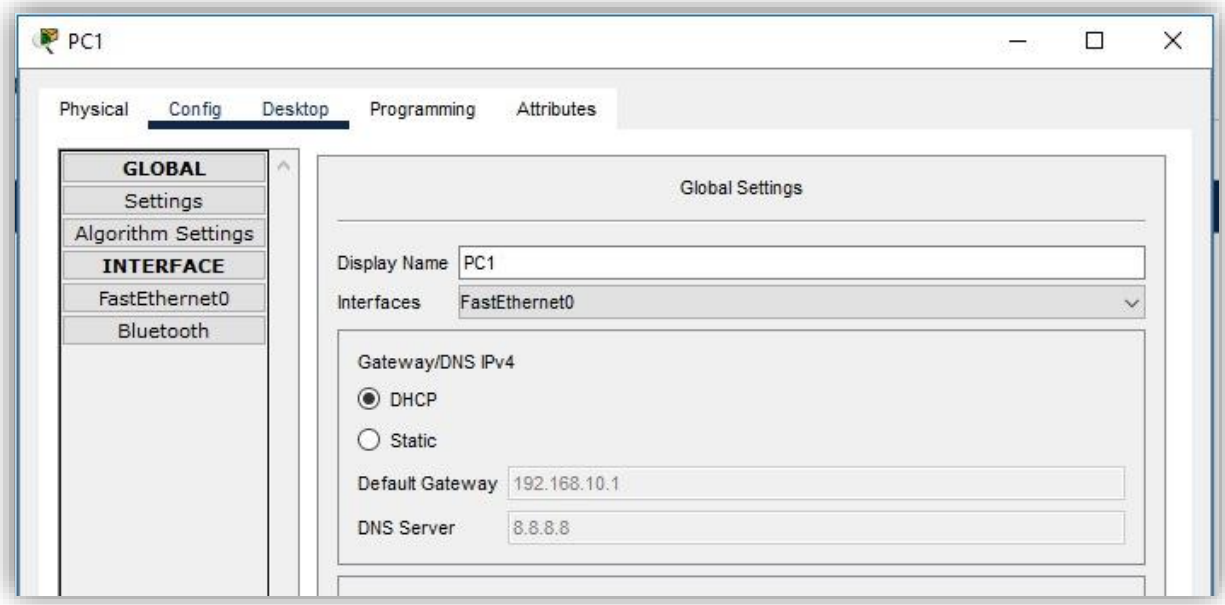
```
S1(config-vlan)#exit

S1(config)#vlan 30
S1(config-vlan)#name IT
S1(config-vlan)#ex

! Configure Trunk Port
S1(config)#int f0/1
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk allowed vlan 10,20,30
S1(config-if)#ex

! Assign Access Ports
S1(config)#int f0/2
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 10
S1(config-if)#ex

S1(config)#int f0/3
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 20
S1(config-if)#ex

S1(config)#int f0/4
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 30
S1(config-if)#ex
```

S1(config)#ex

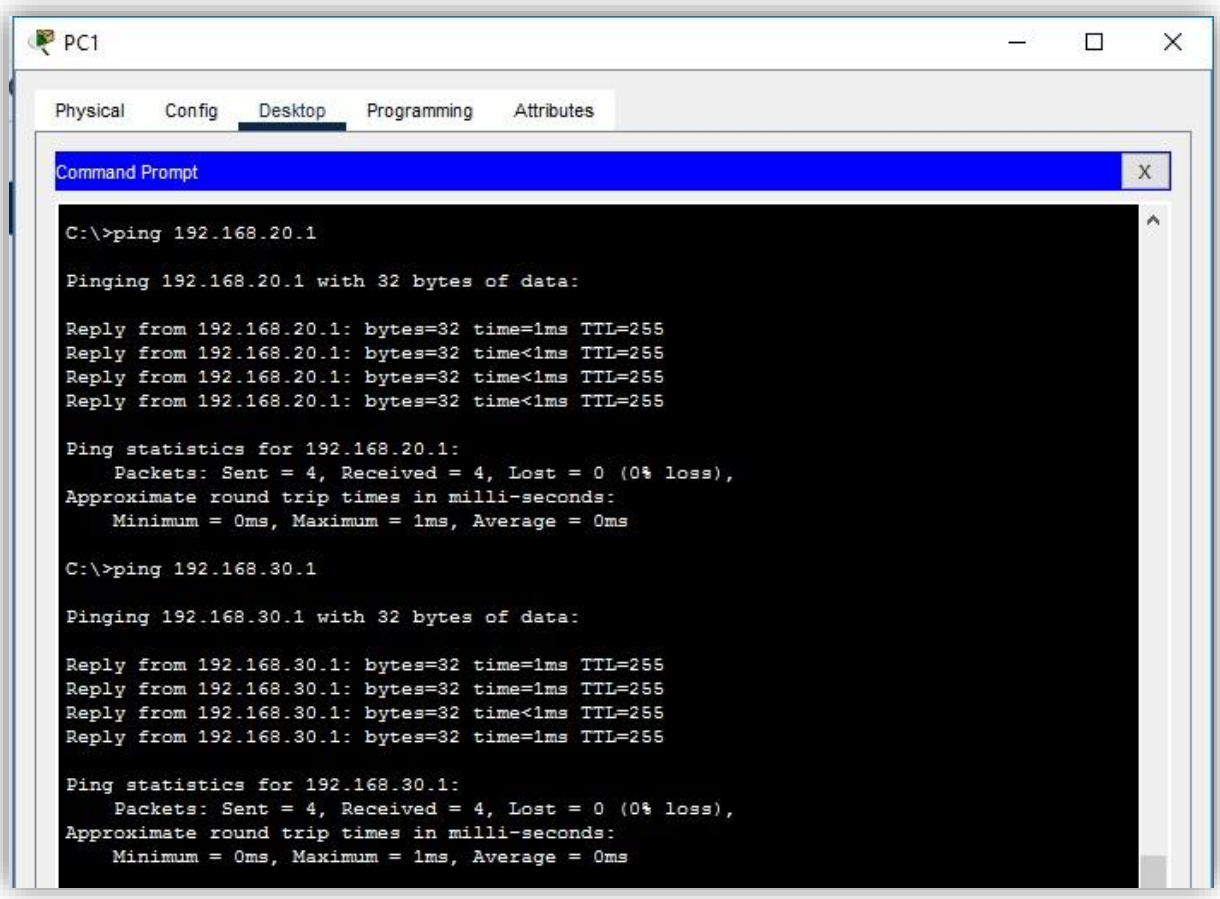
S1#copy running-config startup-config

Verification:

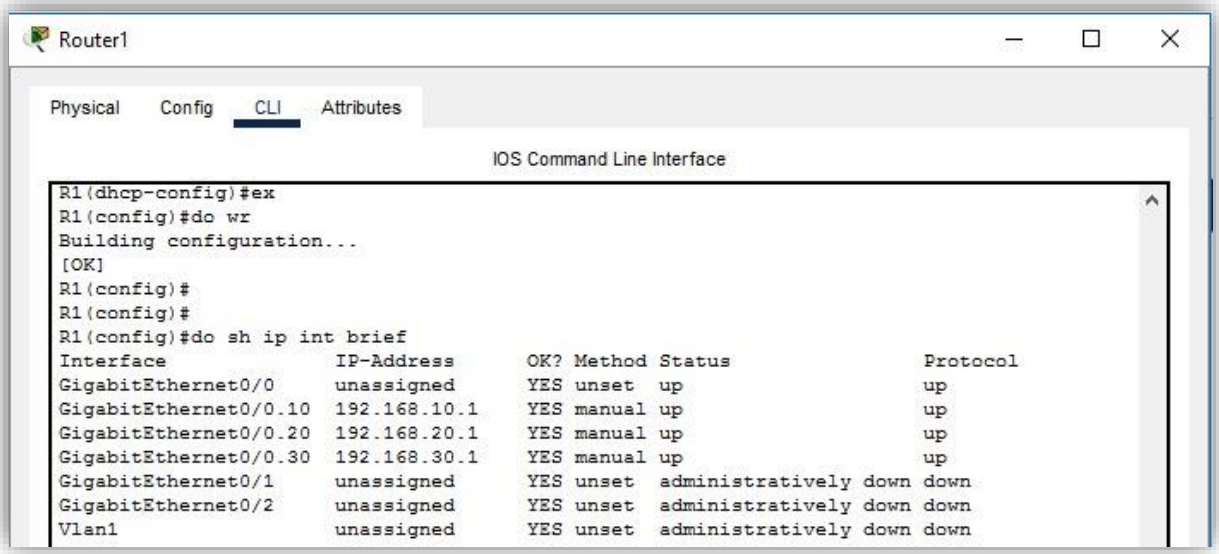
1. **DHCP Address Assignment:** Check the IP configuration on each PC. Each PC should have received an IP address from the router.Use ipconfig (Windows) or ifconfig (Linux) to view the assigned IP address, subnet mask, and default gateway.



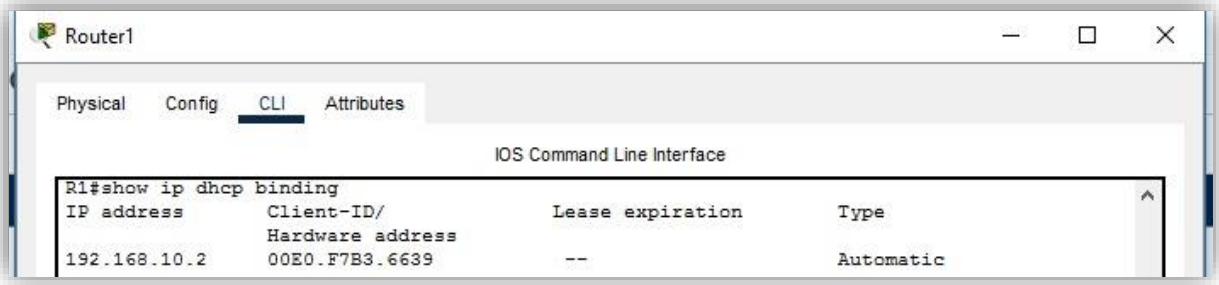
2. **Ping between PCs in the same VLAN:**
    - PC-MKT to another PC on VLAN 10, and so on,
    - This should work.
3. **Ping between PCs in different VLANs:**
    - PC-MKT (VLAN 10) to PC-SAL (VLAN 20), PC-IT(VLAN 30) etc.
    - This should work because of inter-VLAN routing.


PC1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>ping 192.168.20.1
Pinging 192.168.20.1 with 32 bytes of data:
Reply from 192.168.20.1: bytes=32 time=1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.20.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
C:\>ping 192.168.30.1
Pinging 192.168.30.1 with 32 bytes of data:
Reply from 192.168.30.1: bytes=32 time=1ms TTL=255
Reply from 192.168.30.1: bytes=32 time=1ms TTL=255
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Reply from 192.168.30.1: bytes=32 time=1ms TTL=255
Ping statistics for 192.168.30.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms

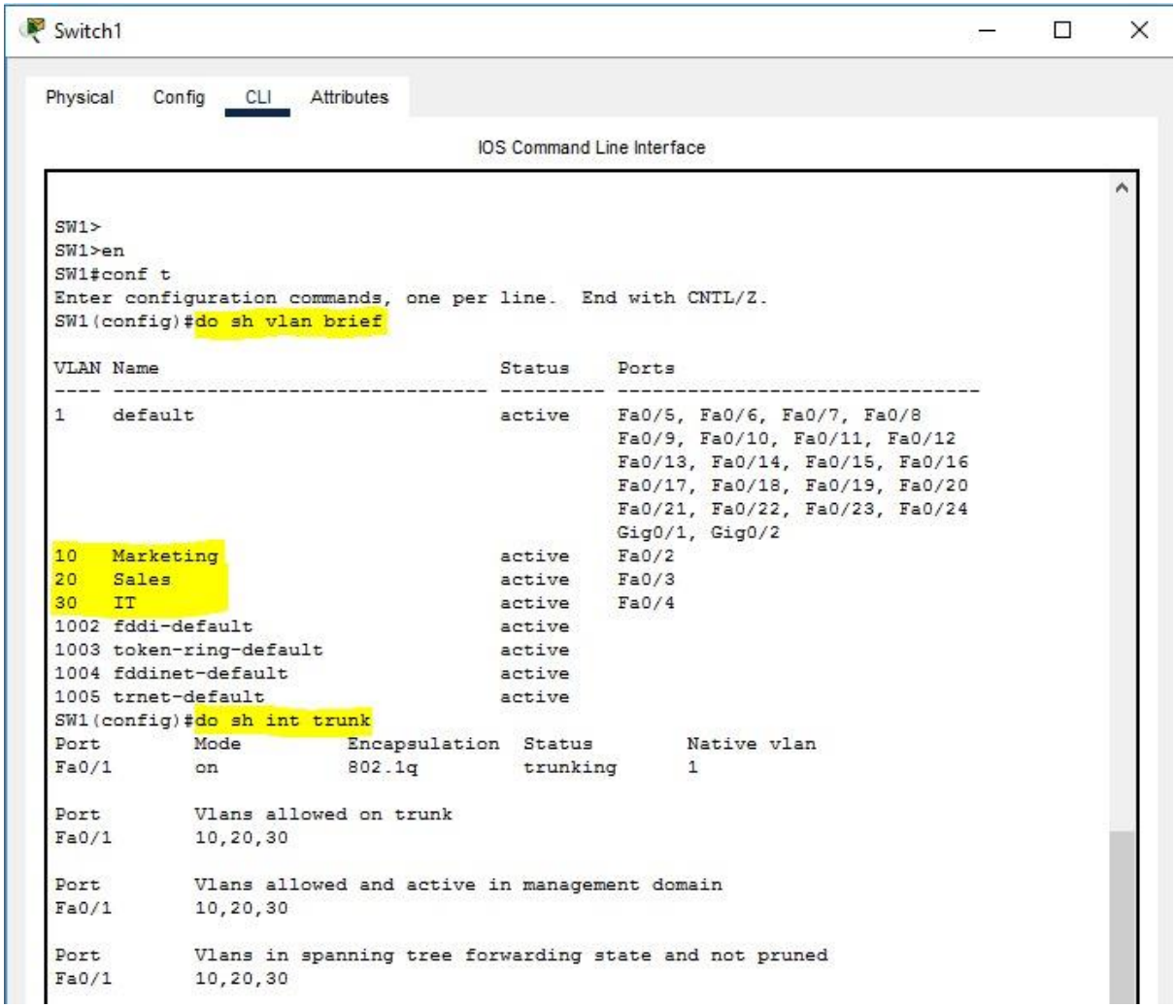
4. **Use show ip interface brief** on the Router to see subinterface IP addresses.



5. **Use show ip dhcp binding** on the Router to check DHCP address leases.



6. **Use show vlan brief on the switch** to check VLAN port assignments.
7. **Use show interface trunk on the switch** to check the trunk link status.


Switch1
Physical
Config
CLI
Attributes
IOS Command Line Interface
SW1>
SW1>en
SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#do sh vlan brief
VLAN Name Status Ports
1 default active 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 Marketing active Fa0/2
20 Sales active Fa0/3
30 IT active Fa0/4
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active
SW1(config)#do sh int trunk
Port Mode Encapsulation Status Native vlan
Fa0/1 on 802.1q trunking 1
Port Vlans allowed on trunk
Fa0/1 10,20,30
Port Vlans allowed and active in management domain
Fa0/1 10,20,30
Port Vlans in spanning tree forwarding state and not pruned
Fa0/1 10,20,30