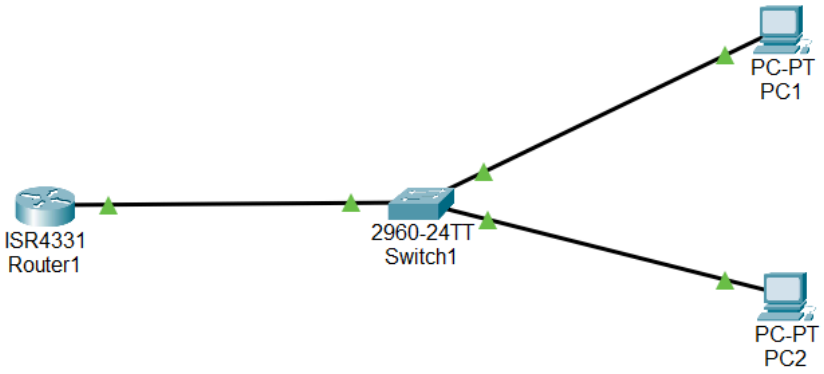
Multi VLAN DHCP Network

Configured a router as a DHCP server to dynamically assign IP addresses to devices in VLAN 10 and VLAN 20. Successfully verified that each PC received a valid IP address and default gateway from its respective DHCP pool, enabling full inter-VLAN connectivity without manual IP assignment.



```
Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW1
SW1(config)#vlan 10
SW1(config-vlan)#name USERS
SW1(config-vlan)#vlan 20
SW1(config-vlan)#name SERVERS
SW1(config-vlan)#int f0/1
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 10
SW1(config-if)#int f0/2
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 20
SW1(config-if)#int g0/1
SW1(config-if)#switchport mode trunk
SW1(config-if)#switchport trunk allowed vlan 10,20
SW1(config-if)#no shut
SW1(config-if)#end
SW1#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
SW1#
```

Configured Switch1 with VLAN 10 and VLAN 20, assigning access ports to each VLAN and enabling trunking on the router-facing interface to support inter-VLAN communication. Saved the configuration to ensure persistent VLAN membership and trunk settings for DHCP delivery and routing.

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#int g0/0/0
R1(config-if)#no shut

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

R1(config-if)#int g0/0/0.10
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.10, changed state to up

R1(config-subif)#encapsulation dot1q 10
R1(config-subif)#ip address 192.168.10.1
% Incomplete command.
R1(config-subif)#ip address 192.168.10.1 255.255.255.0
R1(config-subif)#int g0/0/0.20
R1(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0.20, changed state to up

R1(config-subif)#encapsulation dot1q 20
R1(config-subif)#ip address 192.168.20.1 255.255.255.0
R1(config-subif)#exit
R1(config)#
```

Configured router R1 with subinterfaces for VLAN 10 and VLAN 20 using 802.1Q encapsulation and assigned IP addresses to act as default gateways for each VLAN. This enables inter-VLAN routing by allowing tagged traffic from the switch trunk link to be properly routed between isolated broadcast domains

```
R1(config)#ip dhcp pool VLAN10
R1(dhcp-config)#network 192.168.10.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.10.1
R1(dhcp-config)#ip dhcp pool VLAN20
R1(dhcp-config)#
R1(dhcp-config)#network 192.168.20.0 255.255.255.0
R1(dhcp-config)#default-router 192.168.20.1
R1(dhcp-config)#exit
R1(config)#
```

Configured DHCP pools on router R1 for VLAN 10 and VLAN 20, allowing PCs in each subnet to receive IP addresses and default gateway settings automatically.

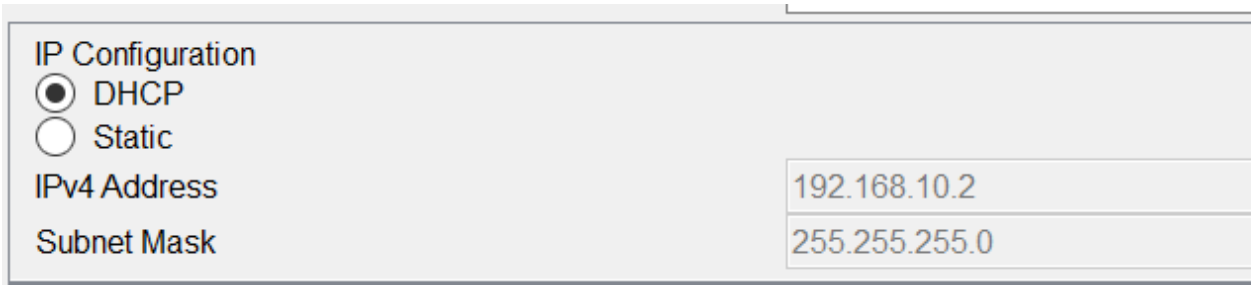
```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip dhcp excluded-address 192.168.10.1
R1(config)#ip dhcp excluded-address 192.168.20.1
R1(config)#do sh ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
192.168.10.2     00D0.97ED.7D70           --                     Automatic
192.168.20.2     00D0.58D3.E291           --                     Automatic
R1(config)#
```

Added DHCP excluded addresses for each VLAN to reserve the router's gateway IPs and prevent address conflicts. Verified that dynamic IP addresses were successfully leased to clients in VLAN 10 and VLAN 20 using the show ip dhcp binding command.

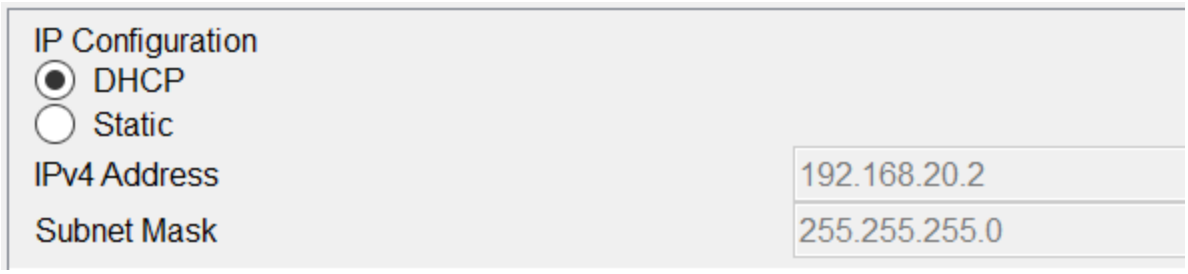
```
R1(dhcp-config)#lease 0 0 30
                  ^
% Invalid input detected at '^' marker.

R1(dhcp-config)#?
  default-router  Default routers
  dns-server      Set name server
  domain-name     Domain name
  exit            Exit from DHCP pool configuration mode
  network         Network number and mask
  no              Negate a command or set its defaults
  option          Raw DHCP options
R1(dhcp-config)#
```

Normally it would be best practice to set a lease time for hosts in the network, but since this is an emulation that option is not available



Verification of IP assignment on PC1



Verification of IP assignment on PC2

```
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 = 1ms, Maximum = 1ms, Average = 1ms

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 = 0ms, Average = 0ms

C:\>
```

Ping from PC1 confirming connectivity to PC2, note first ping lost due to ARP