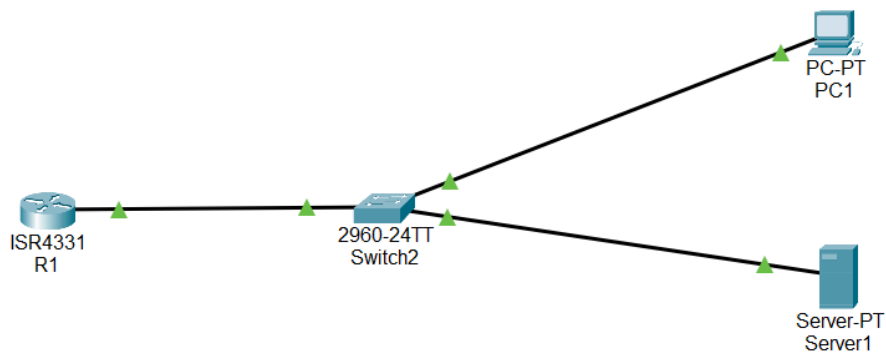


## Inter-VLAN Routing Using Router-on-a-Stick

This lab demonstrates how to enable communication between devices in separate VLANs using a single router interface configured with multiple subinterfaces. VLAN 10 and VLAN 20 were created on a switch, each assigned to a separate PC, with trunking enabled on the switch-to-router link to support 802.1Q tagging. Subinterfaces on the router were configured with appropriate IP addresses and VLAN encapsulation to route traffic between the two networks. Successful ICMP communication between the PCs confirmed proper VLAN assignment, trunking, routing, and gateway configuration.



```
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)#exit
SW1(config)#exit
SW1#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
SW1#
```

---

Configured the switch to support multiple VLANs and enable inter-VLAN communication through a trunk link. This setup allows segmented traffic from different VLANs to be forwarded to a router for Layer 3 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 192.168.20.1 255.255.255.0
R1(config-subif)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#write memory
Building configuration...
[OK]
R1#
```

---

Initially configured the VLAN 10 subinterface with an IP address from VLAN 20's subnet, preventing inter-VLAN communication.

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>

```

I realized something was wrong when my first ping failed so i started troubleshooting

```

SW1>show vlan brief

```

VLAN	Name	Status	Ports
1	default	active	Fa0/3, 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, Gig0/2
10	USERS	active	Fa0/1
20	SERVERS	active	Fa0/2
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```

SW1>
SW1>sh interfaces trunk

```

Port	Mode	Encapsulation	Status	Native vlan
Gig0/1	on	802.1q	trunking	1

```

Port
Gig0/1
Vlans allowed on trunk
10,20

Port
Gig0/1
Vlans allowed and active in management domain
10,20

Port
Gig0/1
Vlans in spanning tree forwarding state and not pruned
10,20

SW1>

```

I ran a show VLAN brief command and confirmed that the switch was configured correctly

```

R1#sh ip int brief
Interface                IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0/0    unassigned      YES unset    up              up
GigabitEthernet0/0/0.10 192.168.20.1    YES manual  up              up
GigabitEthernet0/0/1    unassigned      YES unset    administratively down down
GigabitEthernet0/0/2    unassigned      YES unset    administratively down down
Vlan1                    unassigned      YES unset    administratively down down
R1#sh running-config
Building configuration...

```

Discovered my initial misconfiguration of the router with the show IP interface brief command.

```

R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int g0/0/0.10
R1(config-subif)#no ip address
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)#no shut
R1(config-subif)#end
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#write memory
Building configuration...
[OK]
R1#sh ip int brief
Interface                IP-Address      OK? Method Status          Protocol
GigabitEthernet0/0/0    unassigned      YES unset    up              up
GigabitEthernet0/0/0.10 192.168.10.1    YES manual  up              up
GigabitEthernet0/0/0.20 192.168.20.1    YES manual  up              up
GigabitEthernet0/0/1    unassigned      YES unset    administratively down down
GigabitEthernet0/0/2    unassigned      YES unset    administratively down down
Vlan1                    unassigned      YES unset    administratively down down
R1#

```

Identified and corrected the VLAN 10 subinterface IP address to match its intended subnet, resolving the earlier addressing conflict. Then added and configured the VLAN 20 subinterface with the correct encapsulation and IP, restoring proper inter-VLAN routing.

```

!
interface GigabitEthernet0/0/0.10
 encapsulation dot1Q 10
 ip address 192.168.10.1 255.255.255.0
!
interface GigabitEthernet0/0/0.20
 encapsulation dot1Q 20
 ip address 192.168.20.1 255.255.255.0
!

```

Further verification from a show running-config.

```
Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    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 successful

```
Cisco Packet Tracer SERVER Command Line 1.0
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 from server1 to its default gateway successful.

```
C:\>ping 192.168.10.10

Pinging 192.168.10.10 with 32 bytes of data:

Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time=1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127
Reply from 192.168.10.10: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Server 1 can reach all devices on the network