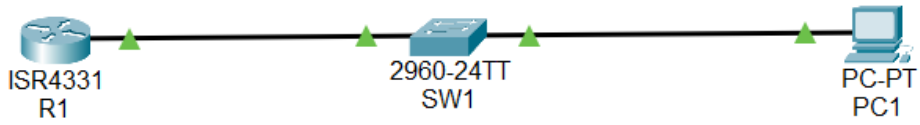
Router-on-a-Stick with Single VLAN and Static IP Routing

This lab demonstrates a basic router-on-a-stick configuration using a single VLAN for end-device connectivity. A Cisco router and switch were connected via a trunk port, with VLAN 10 configured to carry user traffic. The router was configured with a subinterface using IEEE 802.1Q encapsulation to support VLAN tagging, and a static IP was assigned to both the router and the PC to verify network-layer communication.



```
Switch>
Switch>
Switch>
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)#int f0/1
SW1(config-if)#switchport mode access
SW1(config-if)#switchport access vlan 10
SW1(config-if)#do sh vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/2, 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, Gig0/1
                                                Gig0/2
10   USERS                            active    Fa0/1
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW1(config-if)#exit
SW1(config)#write memory
           ^
% Invalid input detected at '^' marker.

SW1(config)#do write memory
Building configuration...
[OK]
SW1(config)#
```

Configured switch SW1 by creating VLAN 10 named "USERS" and assigning interface Fa0/1 to it as an access port. Saved the configuration to NVRAM to persist settings after reboot.

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
R1(config)#int g0/0/0.10
R1(config-subif)#encapsulation dot1q 10
R1(config-subif)#ip address 192.168.10.1 255.255.255.0
R1(config-subif)#no shut
R1(config-subif)#do sh ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES unset  administratively down down
GigabitEthernet0/0/0.10192.168.10.1    YES manual administratively down down
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(config-subif)#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

%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-if)#exit
R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#sh ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES unset  up                    up
GigabitEthernet0/0/0.10192.168.10.1    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#s
```

Configured Router R1 for VLAN 10 routing using a subinterface (Gig0/0/0.10) with 802.1Q encapsulation and IP 192.168.10.1. The physical interface was enabled and both layers confirmed operational (up/up) for trunk-based inter-VLAN communication.

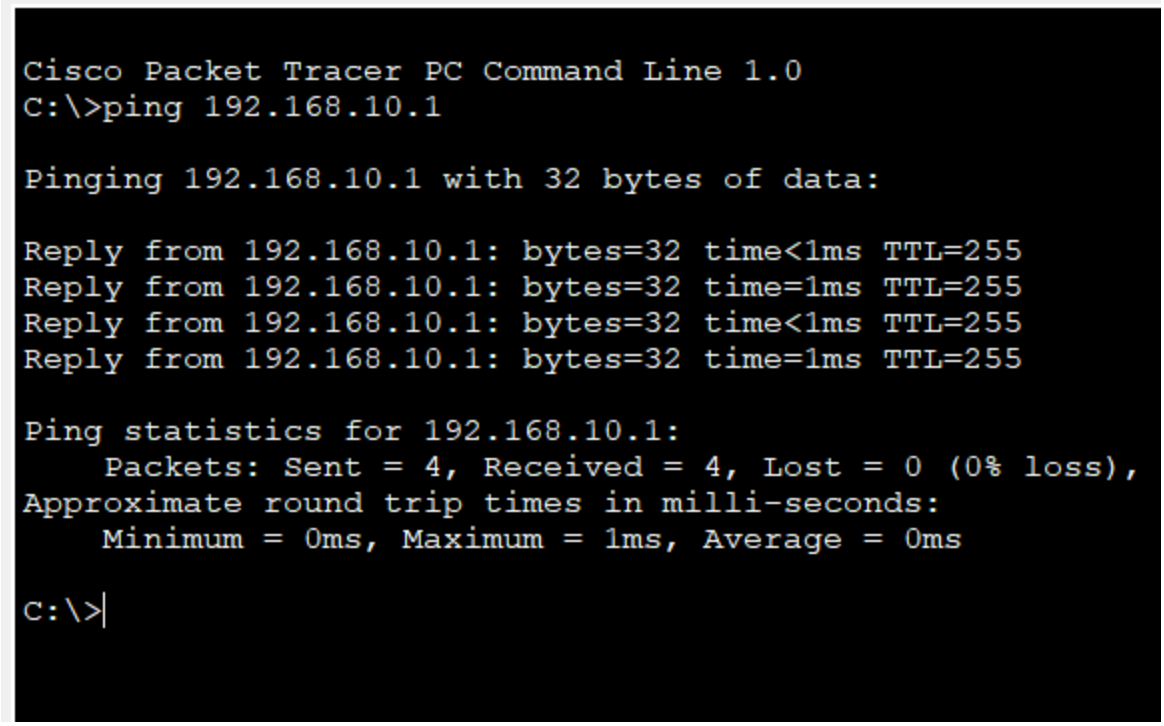
```
SW1#sh ip int brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/1        unassigned      YES manual up                    up
FastEthernet0/2        unassigned      YES manual down                  down
FastEthernet0/3        unassigned      YES manual down                  down
FastEthernet0/4        unassigned      YES manual down                  down
FastEthernet0/5        unassigned      YES manual down                  down
FastEthernet0/6        unassigned      YES manual down                  down
FastEthernet0/7        unassigned      YES manual down                  down
FastEthernet0/8        unassigned      YES manual down                  down
FastEthernet0/9        unassigned      YES manual down                  down
FastEthernet0/10       unassigned      YES manual down                  down
FastEthernet0/11       unassigned      YES manual down                  down
FastEthernet0/12       unassigned      YES manual down                  down
FastEthernet0/13       unassigned      YES manual down                  down
FastEthernet0/14       unassigned      YES manual down                  down
FastEthernet0/15       unassigned      YES manual down                  down
FastEthernet0/16       unassigned      YES manual down                  down
FastEthernet0/17       unassigned      YES manual down                  down
FastEthernet0/18       unassigned      YES manual down                  down
FastEthernet0/19       unassigned      YES manual down                  down
FastEthernet0/20       unassigned      YES manual down                  down
FastEthernet0/21       unassigned      YES manual down                  down
FastEthernet0/22       unassigned      YES manual down                  down
FastEthernet0/23       unassigned      YES manual down                  down
FastEthernet0/24       unassigned      YES manual down                  down
GigabitEthernet0/1     unassigned      YES manual up                    up
GigabitEthernet0/2     unassigned      YES manual down                  down
Vlan1                  unassigned      YES manual administratively down down
SW1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW1(config)#int g0/1
SW1(config-if)#switchport mode trunk

SW1(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

SW1(config-if)#switchport trunk allowed vlan 10
SW1(config-if)#no shut
SW1(config-if)#
```

Configured SW1’s GigabitEthernet0/1 as a trunk port, allowing VLAN 10 traffic to support router-on-a-stick inter-VLAN routing. Verified the link transitioned to up/up status, confirming that trunking is active and ready for tagged communication.



Successfully received ICMP echo replies from the router's VLAN 10 subinterface, confirming that Layer 3 connectivity is established. This verifies that the ICMP protocol is functioning end-to-end across the VLAN, trunk, and router interface.