LAB3 – VLAN Segmentation with Router-on-a-Stick (Packet Tracer)

Course: The Bits and Bytes of Computer Networking (Google)
Author: Florencia Horita
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Objective

Simulate and configure a network with two VLANs (Administration and Support) interconnected through a Cisco 2911 router using the **Router-on-a-Stick** technique, verifying communication between VLANs via subinterfaces with dot1Q encapsulation.

Implemented Configurations

Devices and Topology

- 1 Cisco 2911 Router
- 1 Cisco 2960 Switch (IOS 15)
- 4 PCs
- Physical Connection: Fa0/5 on switch ↔ Gig0/0 on router

VLAN	Name	PCs	Network	Gateway
10	Administration	PC1, PC2	192.168.10.0/24	192.168.10.1
20	Support	PC3, PC4	192.168.20.0/24	192.168.20.1

Switch Cisco 2960 – SW-LAB3

Commands used:

- `enable`
- `configure terminal`
- `vlan 10`
- `name Administracion`
- `vlan 20`

- *name Soporte*

- *interface fa0/1*
- *switchport mode access*
- *switchport access vlan 10*
- *exit*
- *interface fa0/2*
- *switchport mode access*
- *switchport access vlan 10*
- *exit*
- *interface fa0/3*
- *switchport mode access*
- *switchport access vlan 20*
- *exit*
- *interface fa0/4*
- *switchport mode access*
- *switchport access vlan 20*
- *exit*
- *interface fa0/5*
- *switchport mode trunk*
- *switchport trunk allowed vlan 10,20*
- *exit*
- *end*
- *show vlan brief*
- *show interfaces trunk*

Router Cisco 2911 – R-LAB3

Commands used:

- enable

- `configure terminal`
- `interface gig0/0.10`
- `encapsulation dot1Q 10`
- `ip address 192.168.10.1 255.255.255.0`
- `exit`
- `interface gig0/0.20`
- `encapsulation dot1Q 20`
- `ip address 192.168.20.1 255.255.255.0`
- `exit`
- `interface gig0/0`
- `no shutdown`
- `end`
- `show ip interface brief`

Subinterfaces GigabitEthernet0/0.10 and GigabitEthernet0/0.20 enable routing between VLANs 10 and 20 using **dot1Q encapsulation**.

PC	VLAN	IP Address	Subnet Mask	Default Gateway
PC1	10	192.168.10.2	255.255.255.0	192.168.10.1
PC2	10	192.168.10.3	255.255.255.0	192.168.10.1
PC3	20	192.168.20.2	255.255.255.0	192.168.20.1
PC4	20	192.168.20.3	255.255.255.0	192.168.20.1

Connectivity Tests

From **PC1 (VLAN 10):**

ping 192.168.10.3 → OK (same VLAN)

ping 192.168.10.1 → OK (gateway VLAN 10)

ping 192.168.20.2 → OK (inter-VLAN communication)

Result:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=127

This confirms successful communication between VLAN 10 and VLAN 20 through the router.

Conclusion

This lab demonstrates the operation of the **Router-on-a-Stick** configuration, where a single physical trunk link enables routing between multiple VLANs.
Successful connectivity tests confirm that subinterfaces and VLAN configurations were implemented correctly.

Included Files

- **LAB3_VLAN_SEGMENTACION_FLOR.pkt** : Cisco Packet Tracer project file
- **LAB3_VLAN_SEGMENTACION_FLOR.pdf** : Technical documentation of the lab

Suggested Screenshots

Figure 1 – Network Topology Overview
Shows the connection between the Cisco 2960 switch, Cisco 2911 router, and four PCs distributed among the VLANs.

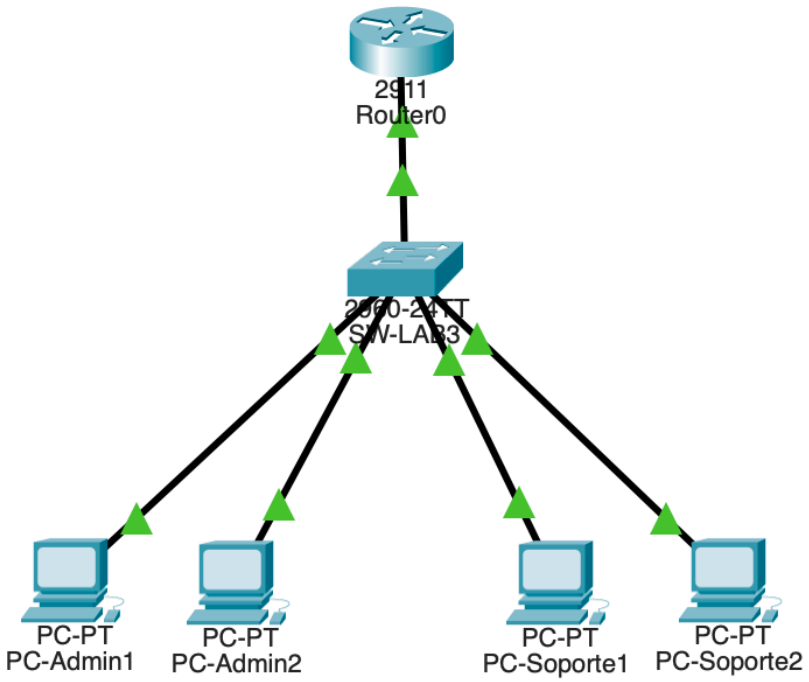

Figure 2 – VLAN and Trunk Verification
Commands: show vlan brief and show interfaces trunk
Confirm VLANs 10 and 20 are active and Fa0/5 is operating in trunk mode.

```
SW-LAB3>enable
SW-LAB3#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    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   Administracion                   active    Fa0/1, Fa0/2
20   Soporte                          active    Fa0/3, Fa0/4
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW-LAB3#show interfaces trunk
Port        Mode         Encapsulation  Status        Native vlan
Fa0/5       on           802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/5       10,20

Port        Vlans allowed and active in management domain
Fa0/5       10,20

Port        Vlans in spanning tree forwarding state and not pruned
Fa0/5       10,20

SW-LAB3#
```

Figure 3 – Router Subinterfaces
Command: show ip interface brief
Displays Gig0/0.10 and Gig0/0.20 in “up/up” state with correct IP configuration.

```
Router>enable
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/0.10  192.168.10.1    YES manual up                    up
GigabitEthernet0/0.20  192.168.20.1    YES manual up                    up
GigabitEthernet0/1     unassigned      YES unset  administratively down down
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router#
```

Figure 4 – Inter-VLAN Connectivity Test
Command: ping 192.168.20.2
Shows successful routing between VLANs through the route