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Inter-VLAN Routing



Inter-VLAN Routing

- In a LAN with many VLANs, the communication among host belonging to different VLANs (inter-VLAN routing) is not possible.
- To allow inter-VLAN routing, a router must be present.
- To different ways to implement inter-VLAN routing:
 - ✓ Traditional Inter-VLAN;
 - ✓ "Router-on-a-stick" Inter-VLAN.



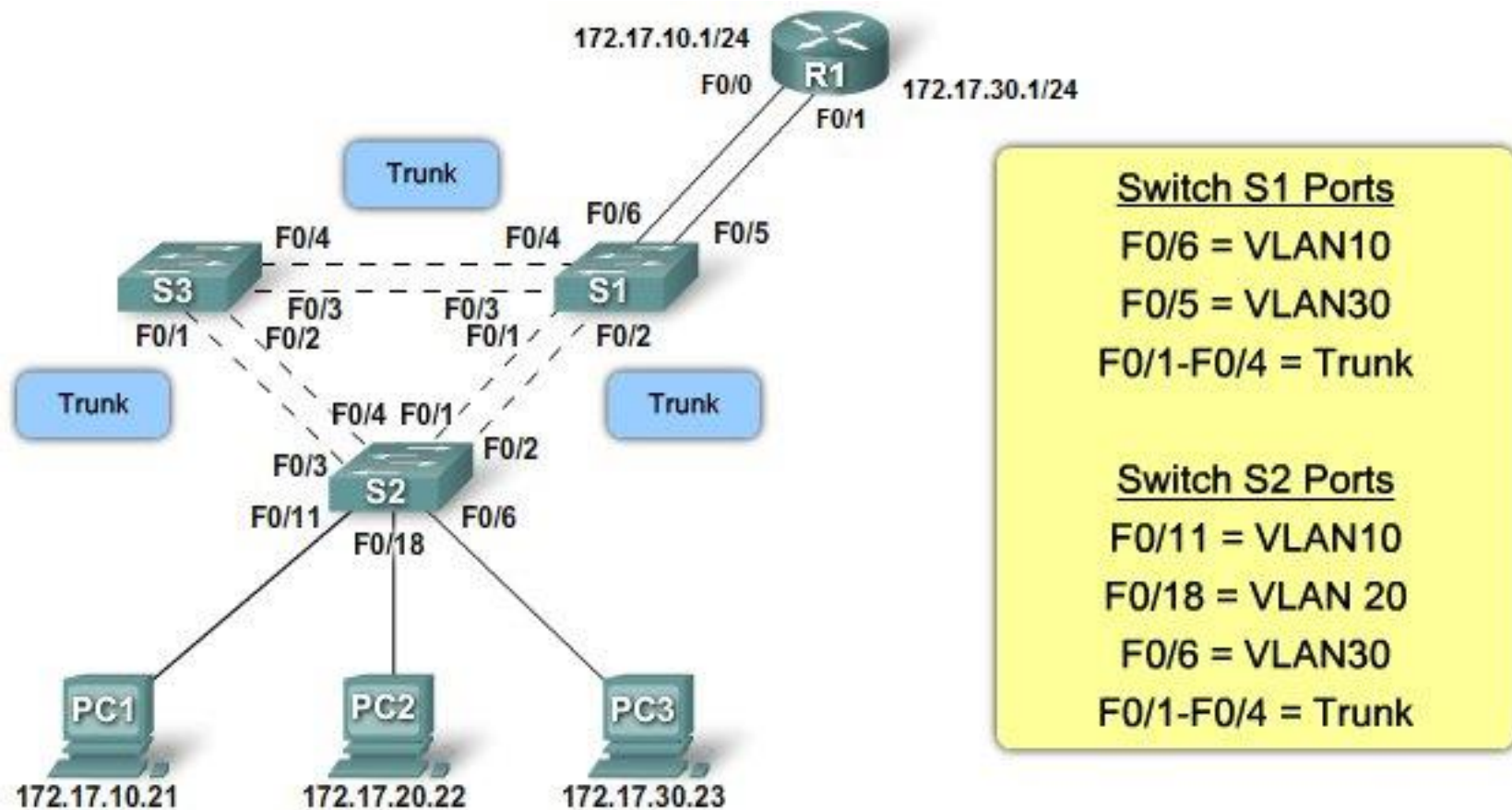
Traditional Inter-VLAN

- A router must be connected to a switch.
- The router must be connected to the switch with a certain amount of physical interfaces.
- The number of router-to-switch physical links is equal to the number of VLANs able to communicate each other.
- Each router interface is associated to a VLAN → an IP address of the VLAN block must be assigned to it.
- The switch ports connected to the router must be configured in **access** mode.



Traditional Inter-VLAN: example (1/3)

- Assumption: only VLAN 10 and VLAN 30 are allowed to communicate.





Traditional Inter-VLAN: example (2/3)

➤ Router: interfaces configuration

R1(config)# interface Fa 0/0

R1(config-if)#ip address 172.17.10.1 255.255.255.0

R1(config-if)# no shutdown

R1(config)# interface Fa 0/1

R1(config-if)#ip address 172.17.30.1 255.255.255.0

R1(config-if)# no shutdown



Traditional Inter-VLAN: example (3/3)

- **Switch:** configuration of the ports connected to the router

S1(config)# interface Fa 0/6

S1(config-if)# switchport access vlan 10

S1(config)# interface Fa 0/5

S1(config-if)# switchport access vlan 30



“Router-on-a-stick” Inter-VLAN

- Even in this case, a router is present.
- The router is connected to a switch by means of a single physical interface.
- The physical interface of the router is split into virtual interfaces (the number of virtual interfaces is equal to the number of VLANs able to communicate each other).
- Each virtual interface (subinterface) of the router is associated to a single VLAN (it must have an IP address of the VLAN block).
- The switch port connected to the router must be configured in **trunk** mode.



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```
F0/0.10: 172.17.10.1
F0/0.20: 172.17.20.1
F0/0.30: 172.17.30.1
```

F0/1-F0/4 = Trunk
F0/5 = Trunk

F0/11 = VLAN10
F0/18 = VLAN20
F0/6 = VLAN30
F0/1-F0/4 = Trunk



“Router-on-a-stick” Inter-VLAN: example (2/3)

- **Router:** the interface connected to the switch must be split in two subinterfaces, one belonging to VLAN 10 and one to VLAN 30

```
R1(config)# interface Fa 0/0.10
```

```
R1(config-subif)# encapsulation dot1q 10
```

```
R1(config-subif)#ip address 172.17.10.1 255.255.255.0
```

```
R1(config)# interface Fa 0/0.30
```

```
R1(config-subif)# encapsulation dot1q 30
```

```
R1(config-subif)# ip address 172.17.30.1 255.255.255.0
```

```
R1(config)# interface Fa 0/0
```

```
R1(config-if)# no shutdown
```



“Router-on-a-stick” Inter-VLAN: example (3/3)

- **Switch:** the port connected to the router is configured in trunk mode

S1(config)# vlan 10

S1(config)# vlan 20

S1(config)# vlan 30

S1(config)# interface Fa 0/5

S1(config-if)# switchport mode trunk