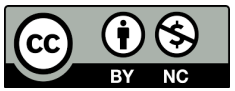
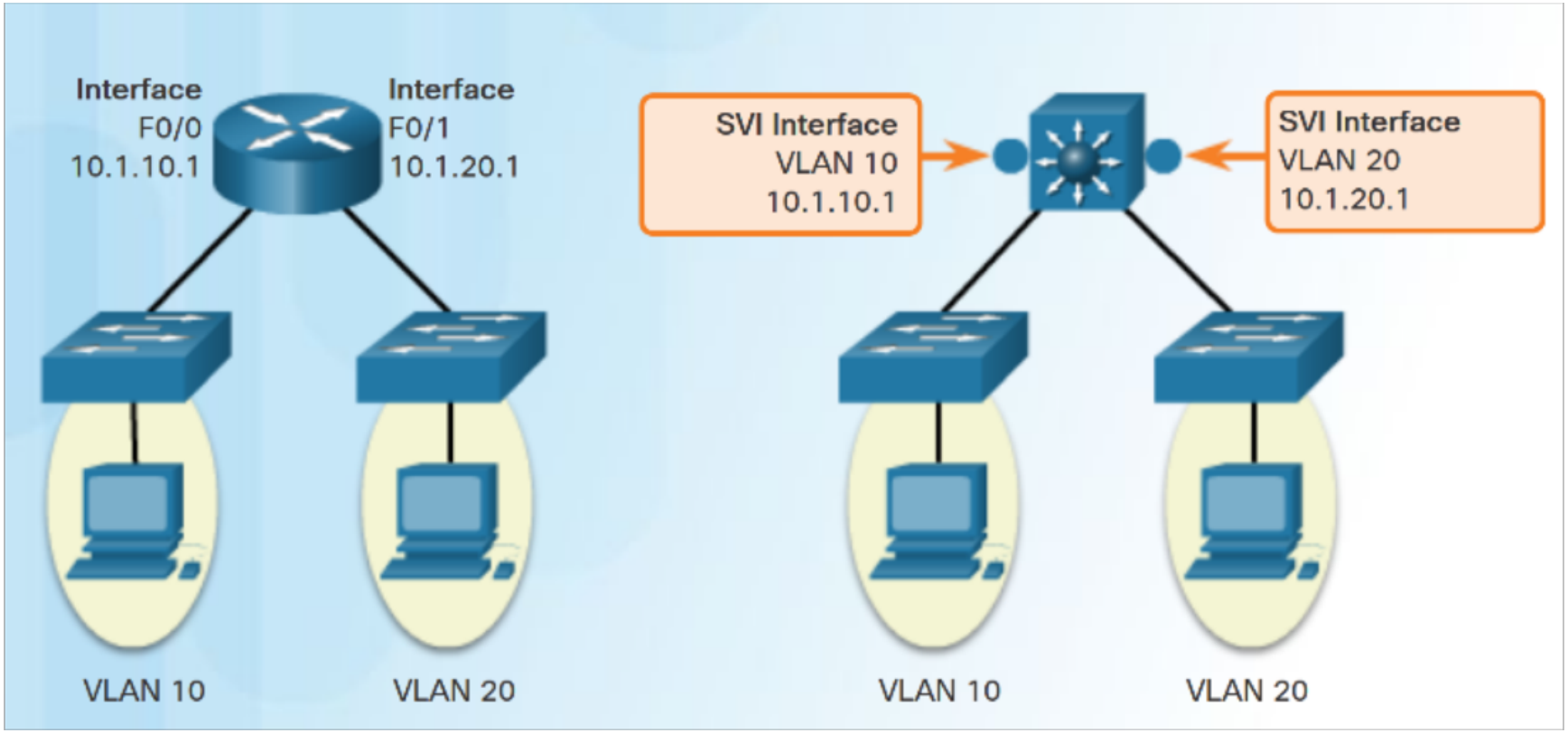
Inter VLAN Routing

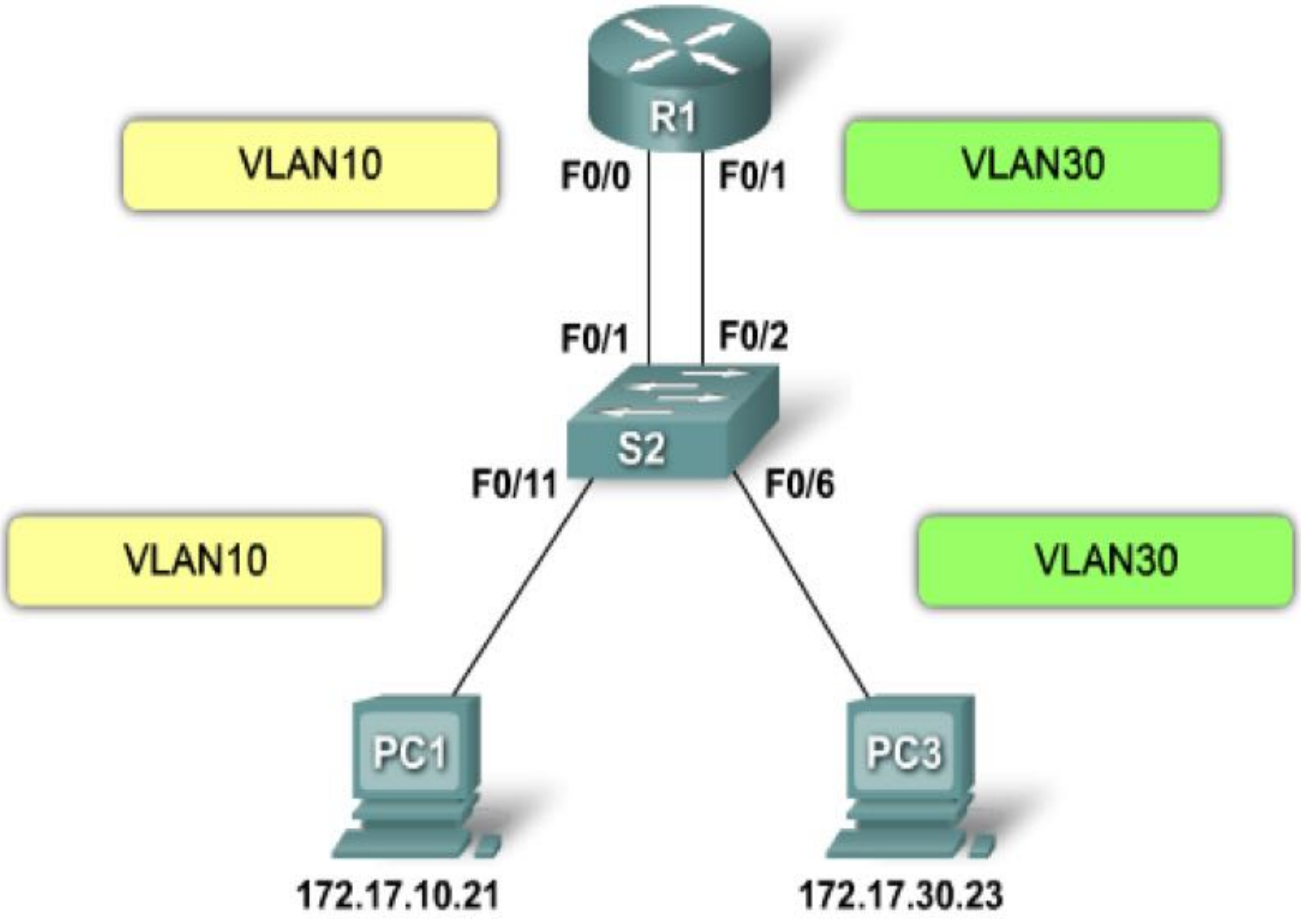
awal.ece@gmail.com



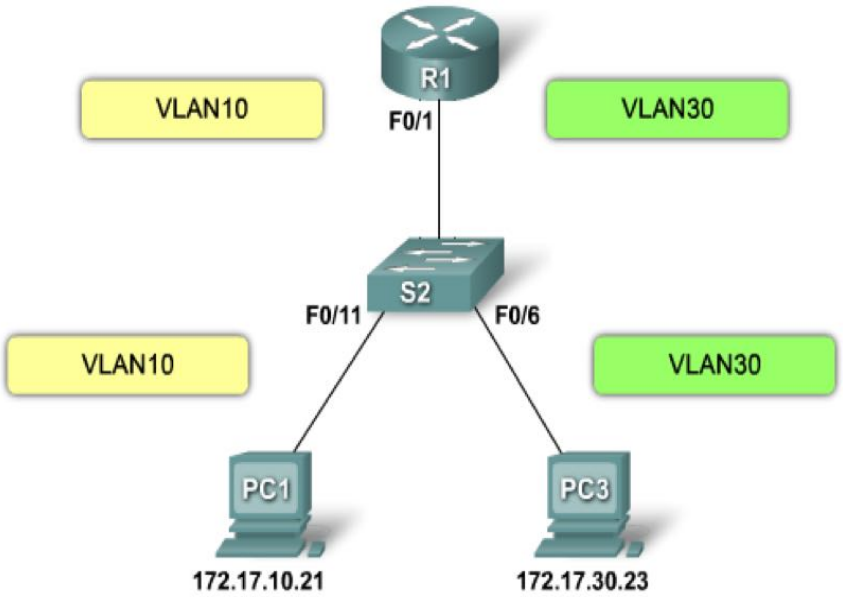
Switched Virtual Interface (SVI)

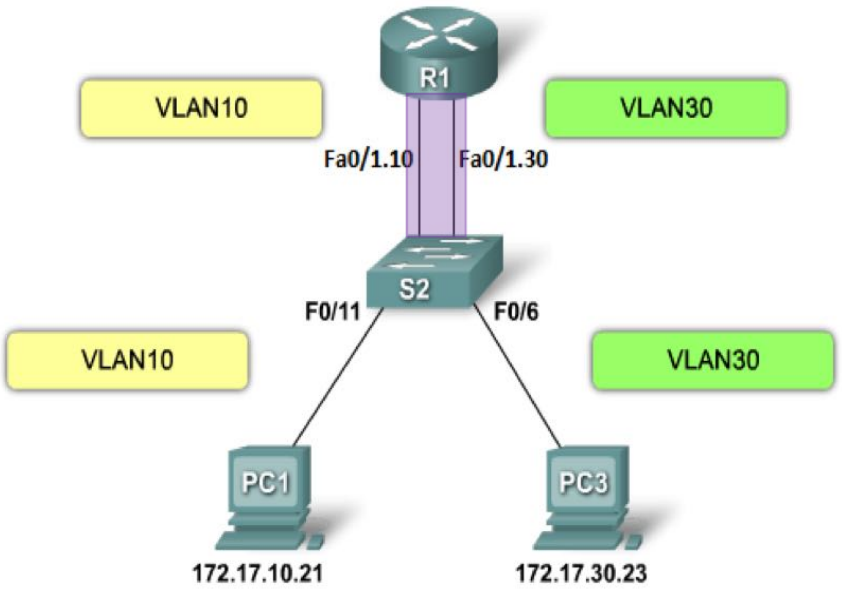


Router-on-a-Stick



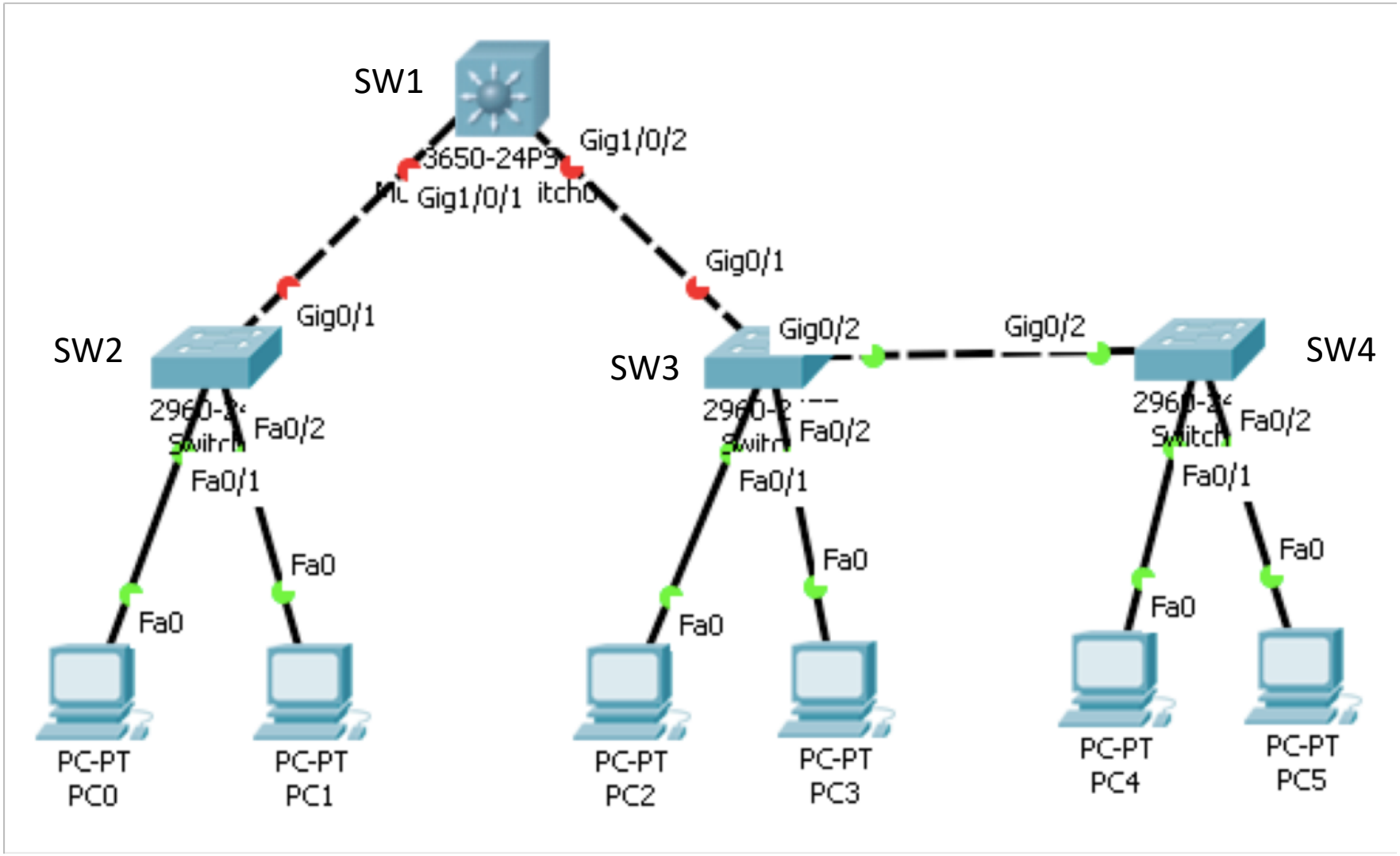
Router-on-a-Stick





SVI Lab

Lab Topology



Configuration: SW1

- Create SVI for VLAN 10 and 20 on switch SW1

  Example:

  ```
  SW1(config)# int vlan 10
  SW1(config-if)# ip address 10.0.10.254
  255.255.255.0
  ```

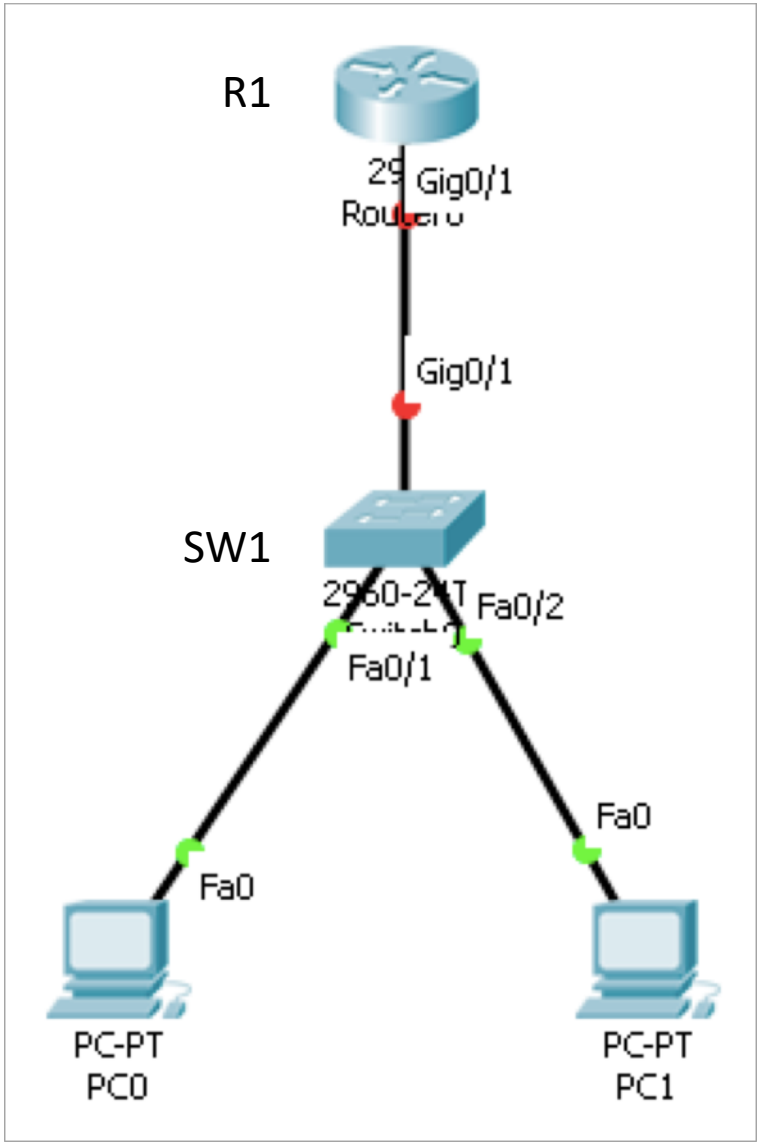
- Enable IP routing

  Example:

  ```
  SW1(config)# ip routing
  ```

Router-on-a-Stick Lab

Lab Topology



Configuration: SW1

- Create VLAN 10 (STAFF) and 20 (GUEST) on switch SW1

  Example:

```
SW1(config)# vlan 10
SW1(config-vlan)# name STAFF
```

- Configure the interface Gi0/1 (trunk), Fa0/1 (accesss vlan 10) and Fa0/2 (access vlan 20)

  Example:

```
SW1(config)# int gi0/1
SW1(config-if)# switchport mode trunk
SW1(config-if)# switchport trunk allowed
vlan 10,20
SW1(config)# int fa0/1
SW1(config-if)# switchport mode access
SW1(config-if)# switchport access vlan 10
```

Configuration: R1

- Configure Gi1/0 of Router R1 with sub interface for VLAN 10 and VLAN 20
  - Gi1/0.10 with IP address 10.0.10.254/24
  - Gi1/0.20 with IP address 20.0.20.254/24

  Example:

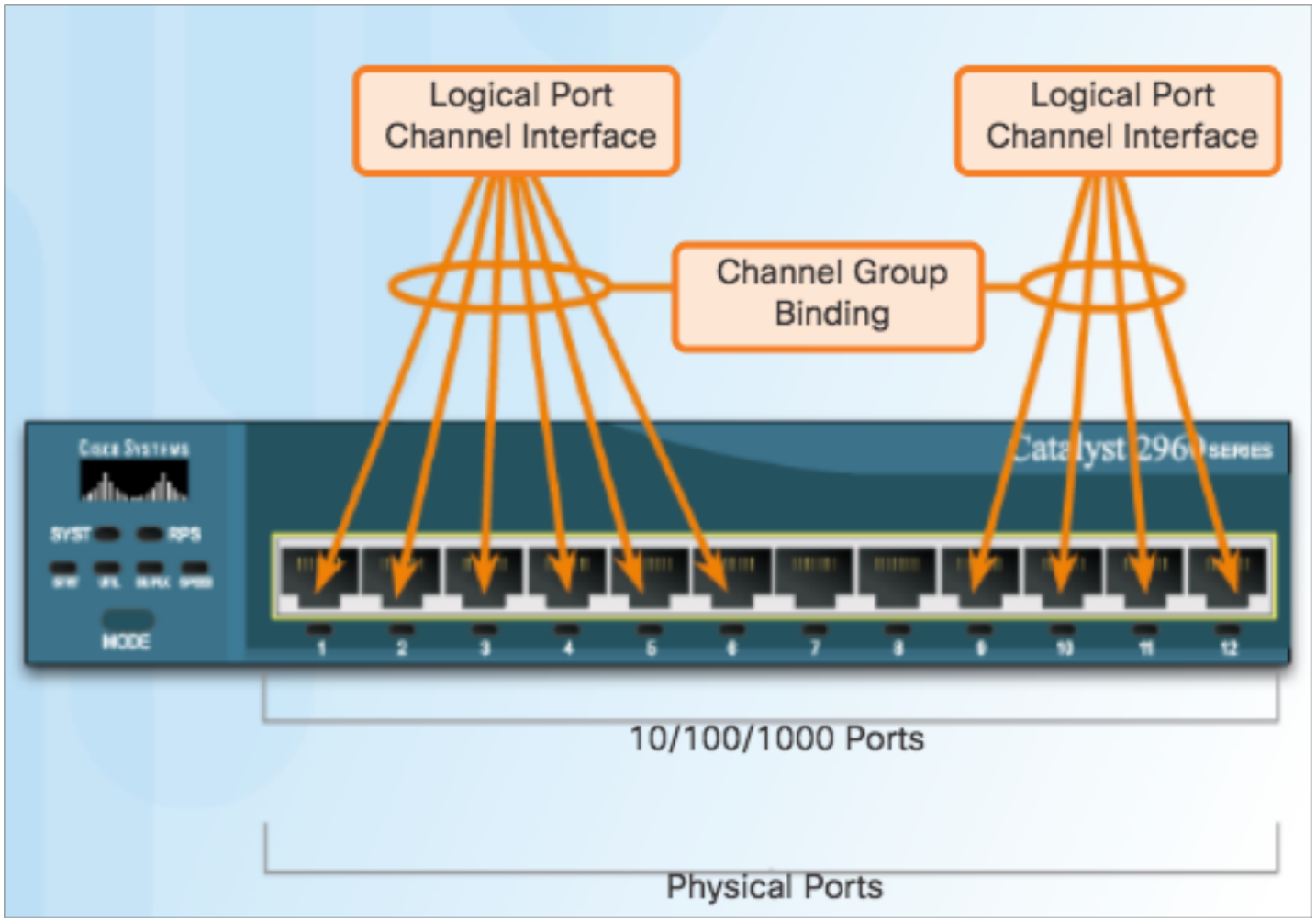
```
R1(config)# int gi0/1
R1(config-if)# no shutdown
R1(config-if)# no ip address
R1(config-if)# int gi0/1.10
R1(config-subif)# encapsulation dot1q 10
R1(config-subif)# ip address 10.0.10.254
255.255.255.0
```

Configuration: PC

- Configure IP address in PC
  - PC0: 10.0.10.1/24, GW as 10.0.10.254
  - PC1: 10.0.20.1/24, GW as 10.0.20.254
- Perform ping test between PC1 and PC2

Link Aggregation

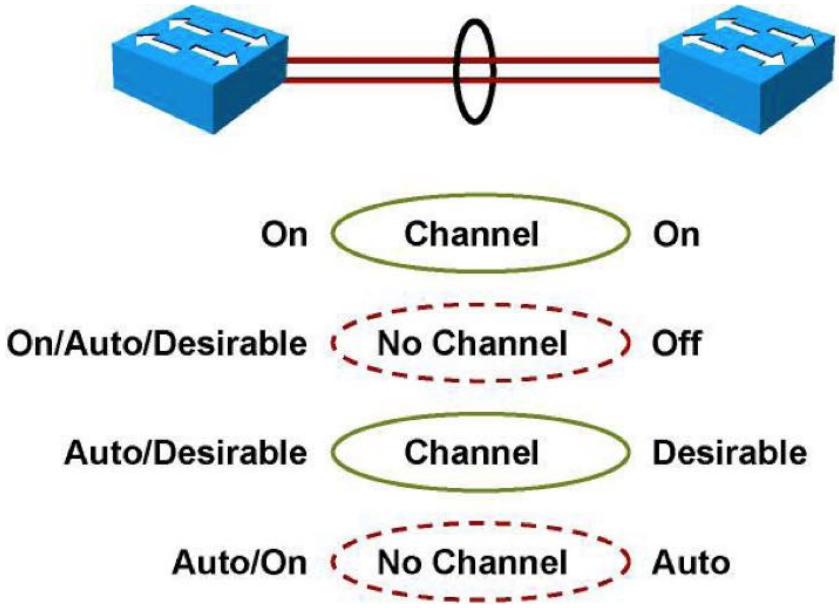
Link Aggregation



Link Aggregation Protocols

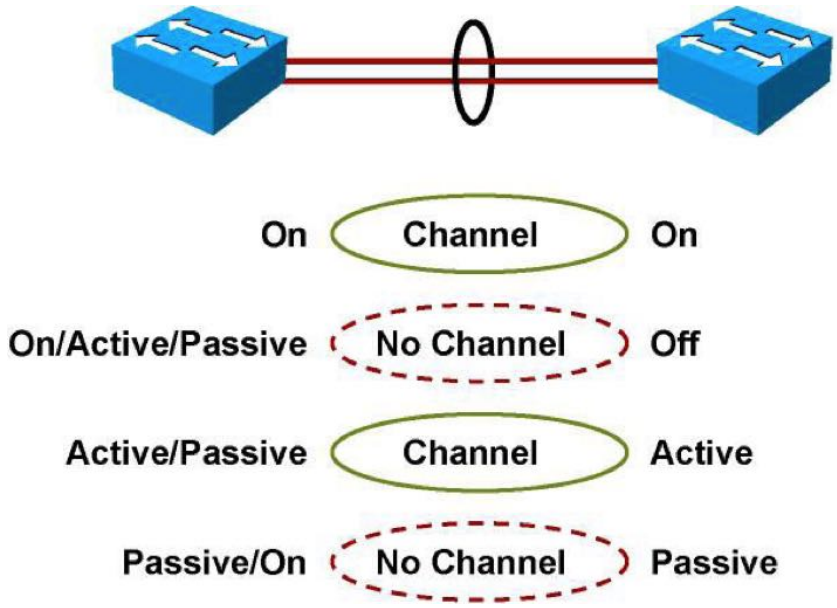
- Port Aggregation Protocol (PAgP) is a Cisco-proprietary protocol that aids in the automatic creation of Fast EtherChannel links.
  - When an EtherChannel link is configured using PAgP, PAgP packets are sent between Fast EtherChannel-capable ports to negotiate the forming of a channel.
  - When PAgP identifies matched Ethernet links, it groups the links into an EtherChannel. Spanning tree adds the EtherChannel as a single bridge port.
- Link Aggregation Control Protocol (LACP) is part of an IEEE specification (802.3ad) that also enables several physical ports to be bundled together to form an EtherChannel.
  - LACP enables a switch to negotiate an automatic bundle by sending LACP packets to the peer.
  - It performs a similar function as PAgP with Cisco EtherChannel.
  - Because LACP is an IEEE standard, you can use it to facilitate EtherChannels in mixed-switch environments. In a Cisco environment, both protocols are supported.

Port Aggregation Protocol (PAgP)



Mode	Purpose
Auto	Interface responds to the PAgP packets but does not initiate negotiation (default).
Desirable	Actively asking if the other side can or will participate.
On	Forces the interface to channel without PAgP.

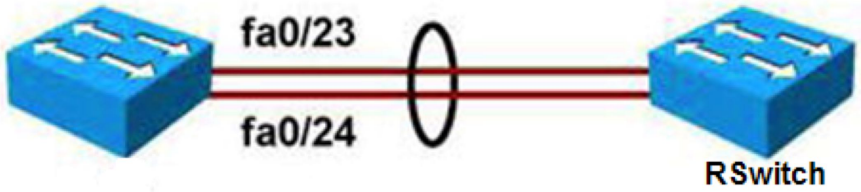
Link Aggregation Control Protocol (LACP)



Mode	Purpose
Passive	Interface responds to the LACP packets but does not initiate negotiation (default).
Active	Actively asking if the other side can or will participate.
On	Forces the interface to channel without LACP.

Configuration Example

```
Switch(config)# interface fastethernet 0/23
Switch(config-if)# channel-group 2 mode active
Switch(config)# interface fastethernet 0/24
Switch(config-if)# channel-group 2 mode active
Switch(config)# interface port-channel 2
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk native VLAN 99
Switch(config-if)# switchport trunk allowed VLAN 2,3,99
```

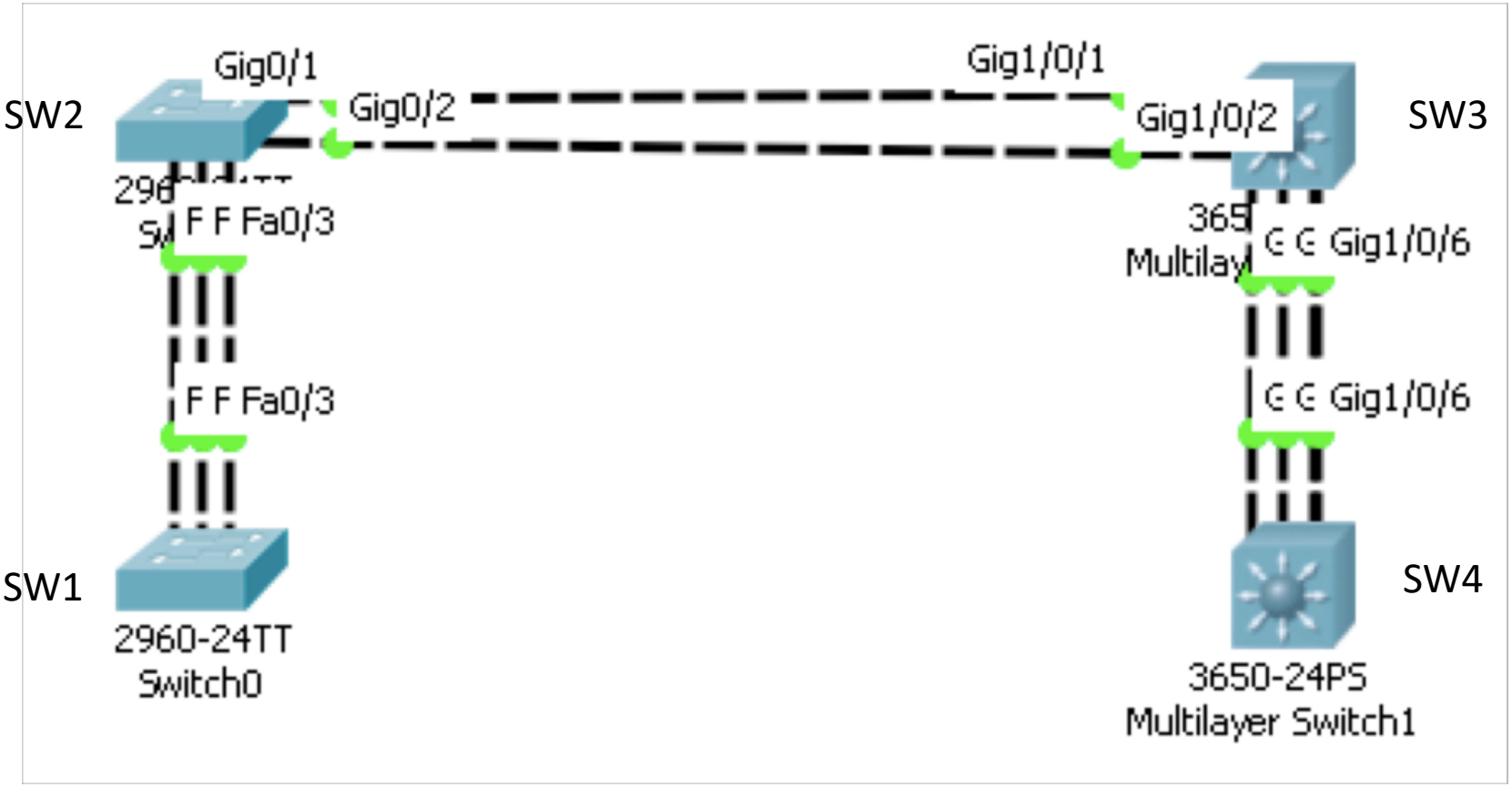


Remote Switch configuration

```
RSwitch(config)# interface fastethernet 0/23
RSwitch(config-if)# channel-group 5 mode on
RSwitch(config)# interface fastethernet 0/24
RSwitch(config-if)# channel-group 5 mode on
RSwitch(config)# interface port-channel 5
RSwitch(config-if)# switchport mode trunk
RSwitch(config-if)# switchport trunk native VLAN 99
RSwitch(config-if)# switchport trunk allowed VLAN 2,3,99
```

Link Aggregation Lab

Lab Topology



Connectivity Details

- SW1 (Fa0/1, Fa0/2 and Fa0/3) is connected to SW2 (Fa0/1, Fa0/2 and Fa0/3)
- SW2 (Gi0/1 and Gi0/2) is connected to SW3 (Gi1/0/1 and Gi1/0/2)
- SW3 (Gi1/0/3, Gi1/0/4, Gi1/0/5 and Gi1/0/6) is connected to SW4 (Gi1/0/3, Gi1/0/4, Gi1/0/5 and Gi1/0/6)

Goals

- Configure link aggregation in SW1, SW2, SW3 and SW4:
  - LACP mode active: Fa0/1 – 3 in SW1
  - LACP mode passive: Fa0/1 – 3 in SW2
  - PAgP mode desirable: Gi0/1 – 2 in SW2
  - PAgP mode auto: Gi1/0/1 – 2 in SW3
  - Mode On: Gi1/0/3 – 6 in SW3 and SW4

Example: SW2

```
int port-channel 1
 switchport mode trunk

interface range fa0/1-3
 switchport mode trunk
 channel-group 1 mode passive
 channel-protocol lacp

int port-channel 2
 switchport mode trunk

interface range gi0/1-2
 switchport mode trunk
 channel-group 2 mode desirable
 channel-protocol pagp
```

Example: SW4

```
int port-channel 34
 switchport trunk encapsulation dot1q
 switchport mode trunk

interface range gi1/0/3-6
 switchport trunk encapsulation dot1q
 switchport mode trunk
 channel-group 34 mode on
```

Verify

```
show etherchannel summary
show etherchannel port-channel
```

Questions?