Chương 11
Virtual LAN

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Nội Dung

- Giới thiệu VLAN
- Đặc điểm của VLAN
- VLAN Trunking/Tagging
- Hoạt động của Trunking
- Cấu hình VLAN

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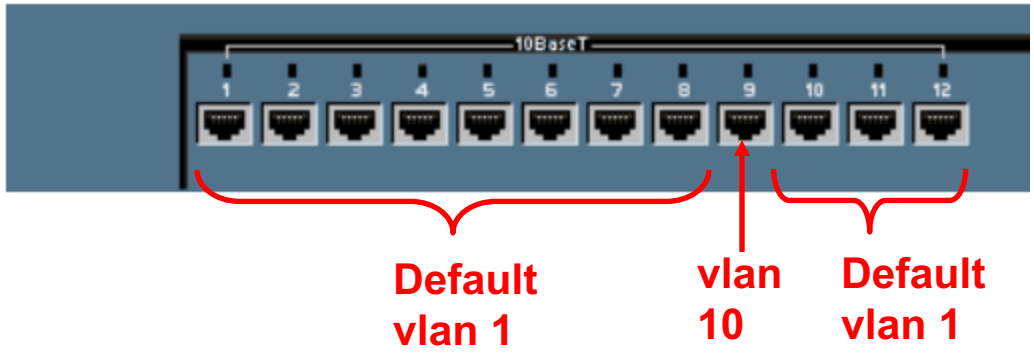
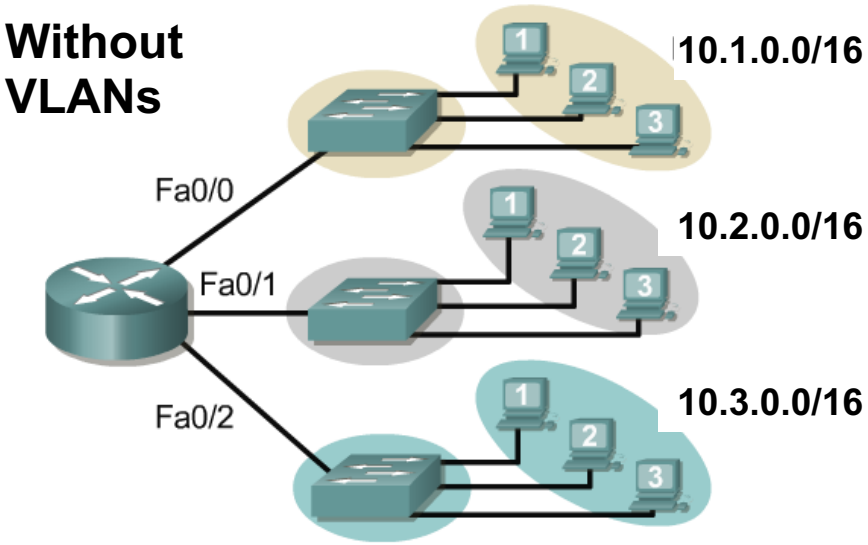
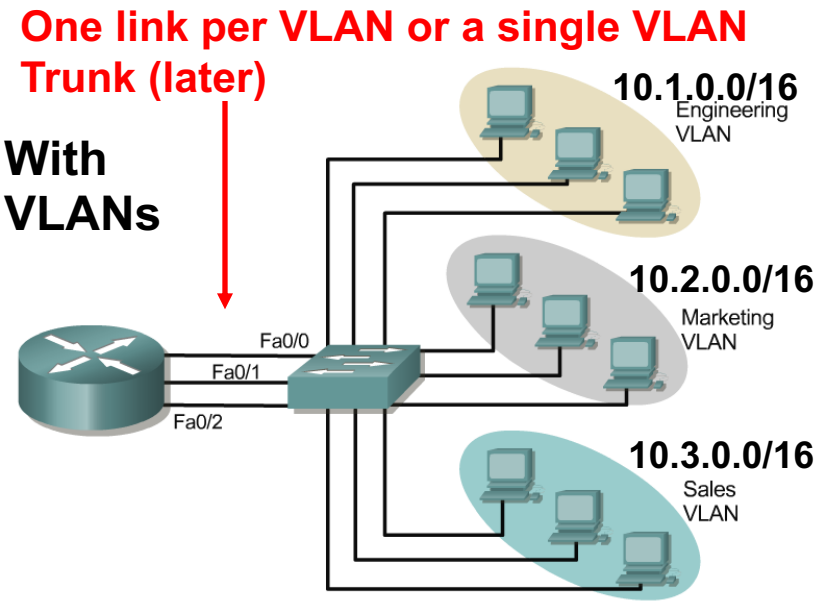
Giới thiệu VLAN



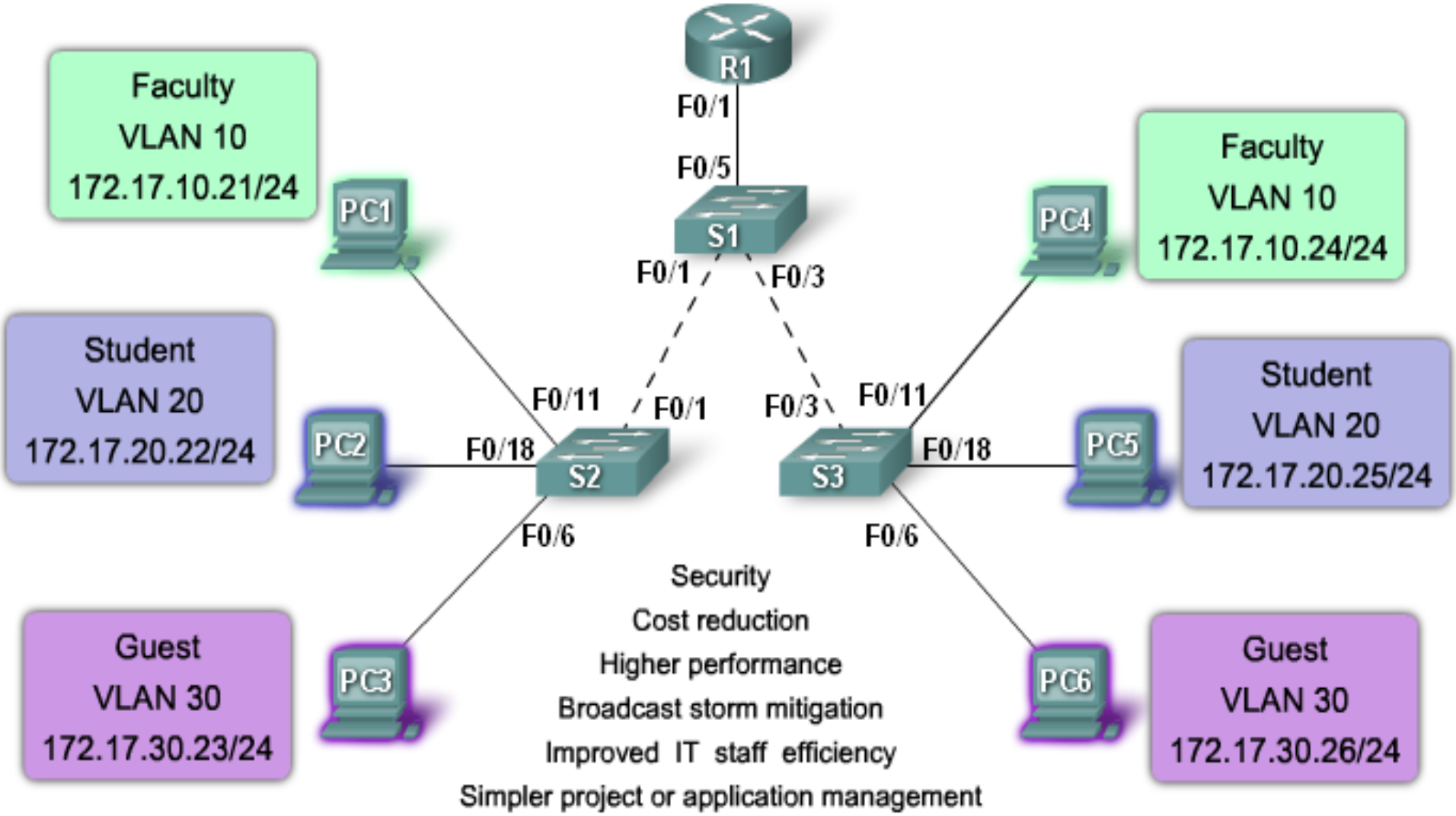
- VLAN chia từng phân đoạn mạng theo Broadcast Domain
- VLAN = subnet
- Một VLAN là một Mạng LAN độc lập

Giới thiệu VLAN





Giới thiệu VLAN



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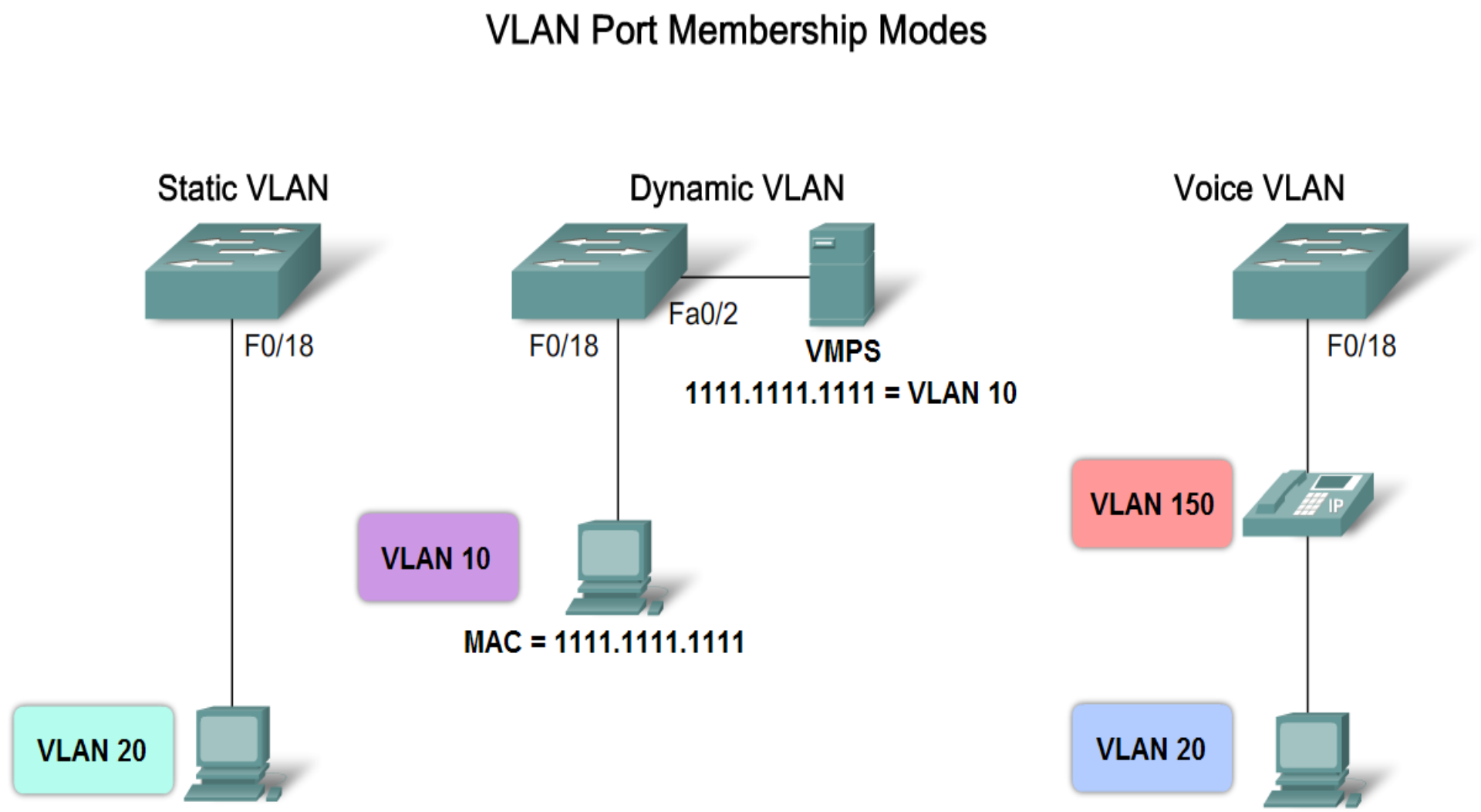
Đặc điểm của VLAN

- VLAN ID
  - Normal-range IDs
    - 1 – 1005
    - 1002 -1005 reserved for Token Ring and FDDI VLANs
    - 1 and 1002 to 1005 are automatically created and cannot be removed
    - Stored in the vlan.dat file in flash memory
  - Extended-range IDs
    - 1006 – 4094
    - Designed for service providers
    - Have fewer options than normal range VLANs
    - Stored in the running configuration file
- A Cisco Catalyst 2960 switch supports 255 normal and extended range VLANs

Các Mode của VLAN Port

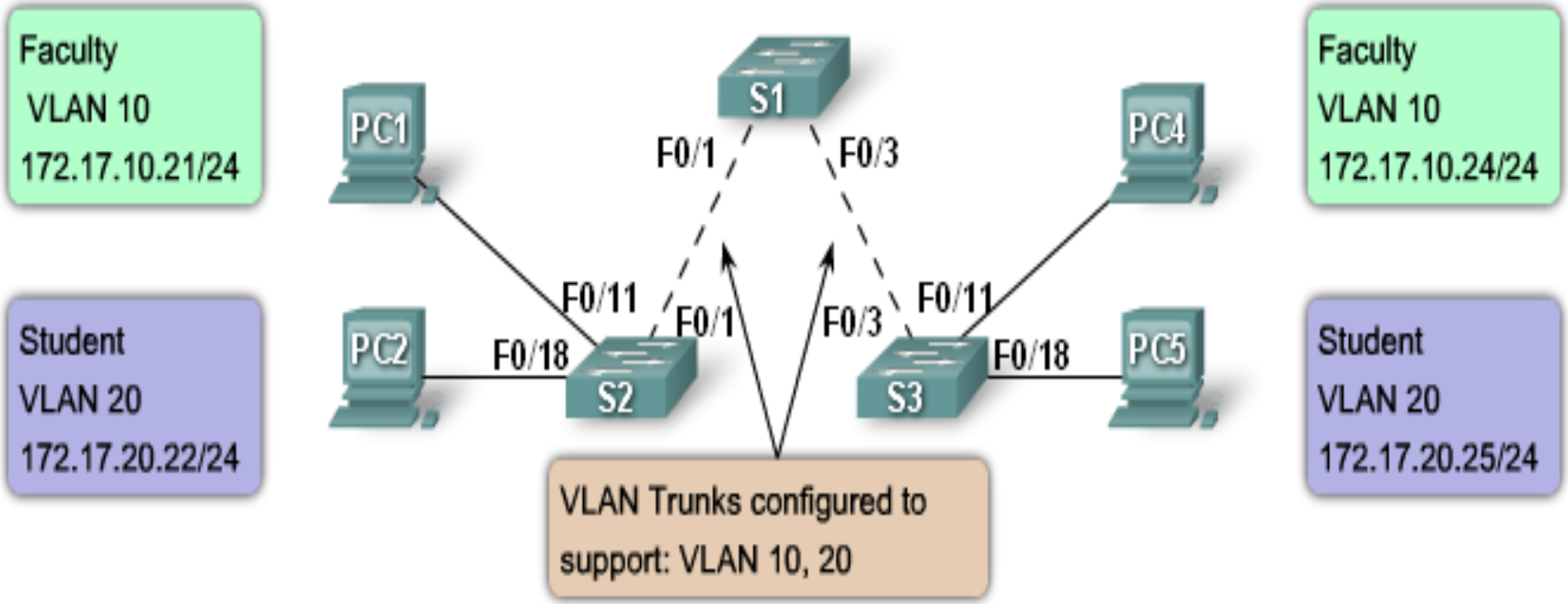


Các Mode của VLAN Port

- **Static VLAN :** Port trên Switch được cấu hình để tham gia vào VLAN
- **Dynamic VLAN :** Sử dụng **LAN Membership Policy Server (VMPS)** để cấu hình VLAN. Với VMPS, Port của Switch sẽ tham gia vào VLAN X cách tự động dựa vào Source MAC Address của thiết bị đầu cuối
- **Voice VLAN :** Port được cấu hình để hỗ trợ IP Phone. Port thuộc về cả 2 VLAN : VLAN hỗ trợ Voice và VLAN hỗ trợ Data

Control Broadcast

PC1 sends out a local layer 2 broadcast. The switches forward the broadcast frame only out ports configured for VLAN10.



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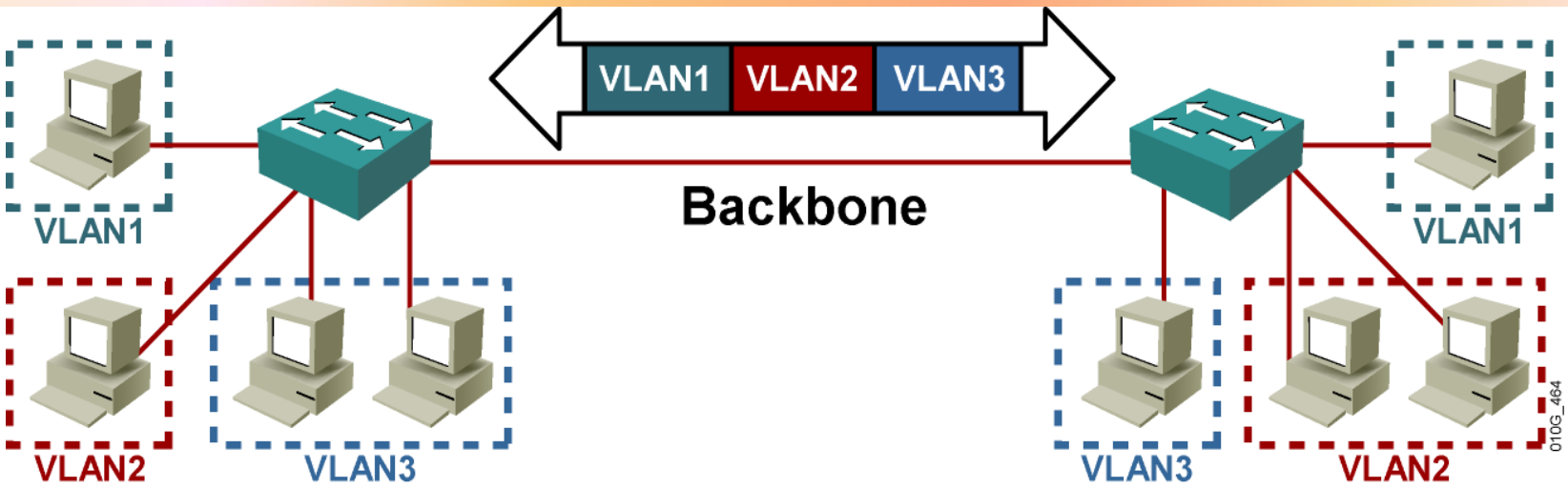
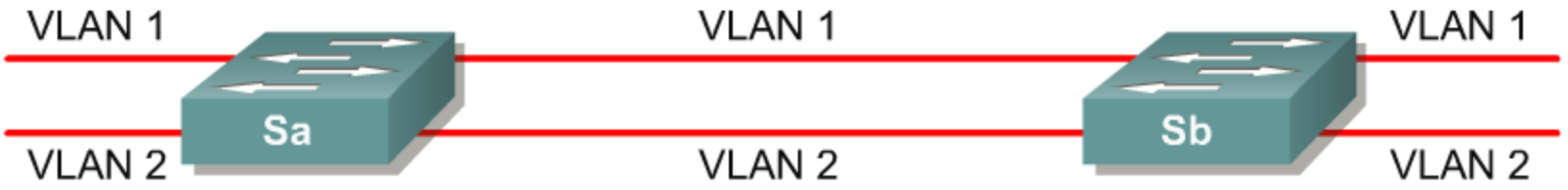
VLAN Trunking/Tagging



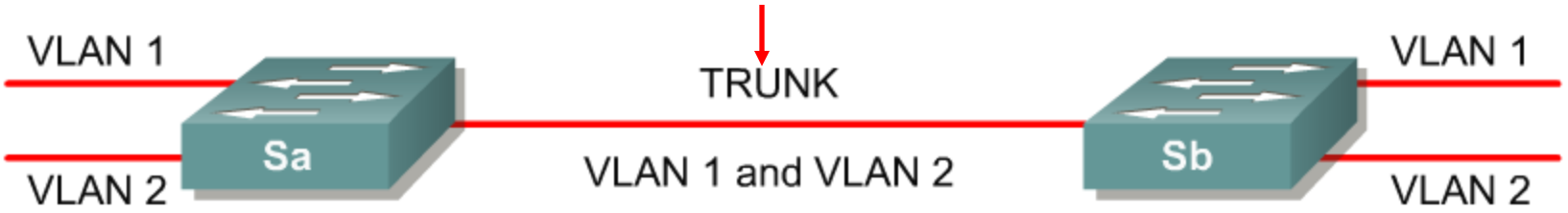
- VLAN Tagging được sử dụng khi Link cần cho phép traffic của nhiều VLAN đi qua
- VLAN Trunking :
  - Nâng cao hiệu quả quản lý việc lưu chuyển các Frame từ các VLAN khác nhau trên một đường truyền vật lý.
  - Giao thức trunking thiết lập các thoả thuận cho việc sắp sếp các Frame vào các cổng được liên kết với nhau ở hai đầu đường trunk.

VLAN Trunking/Tagging

No VLAN Tagging



VLAN Tagging



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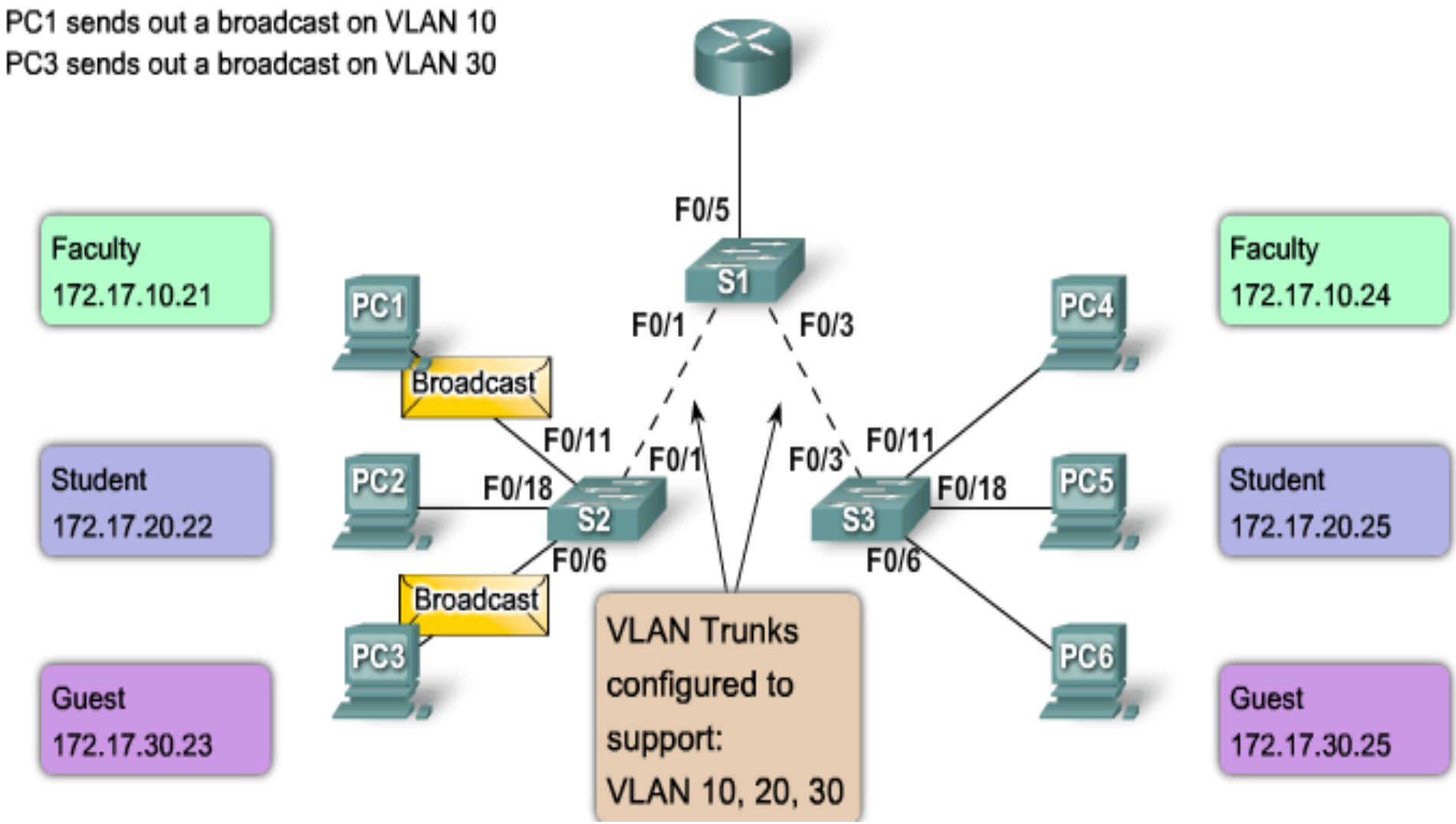
Hoạt động của Trunking



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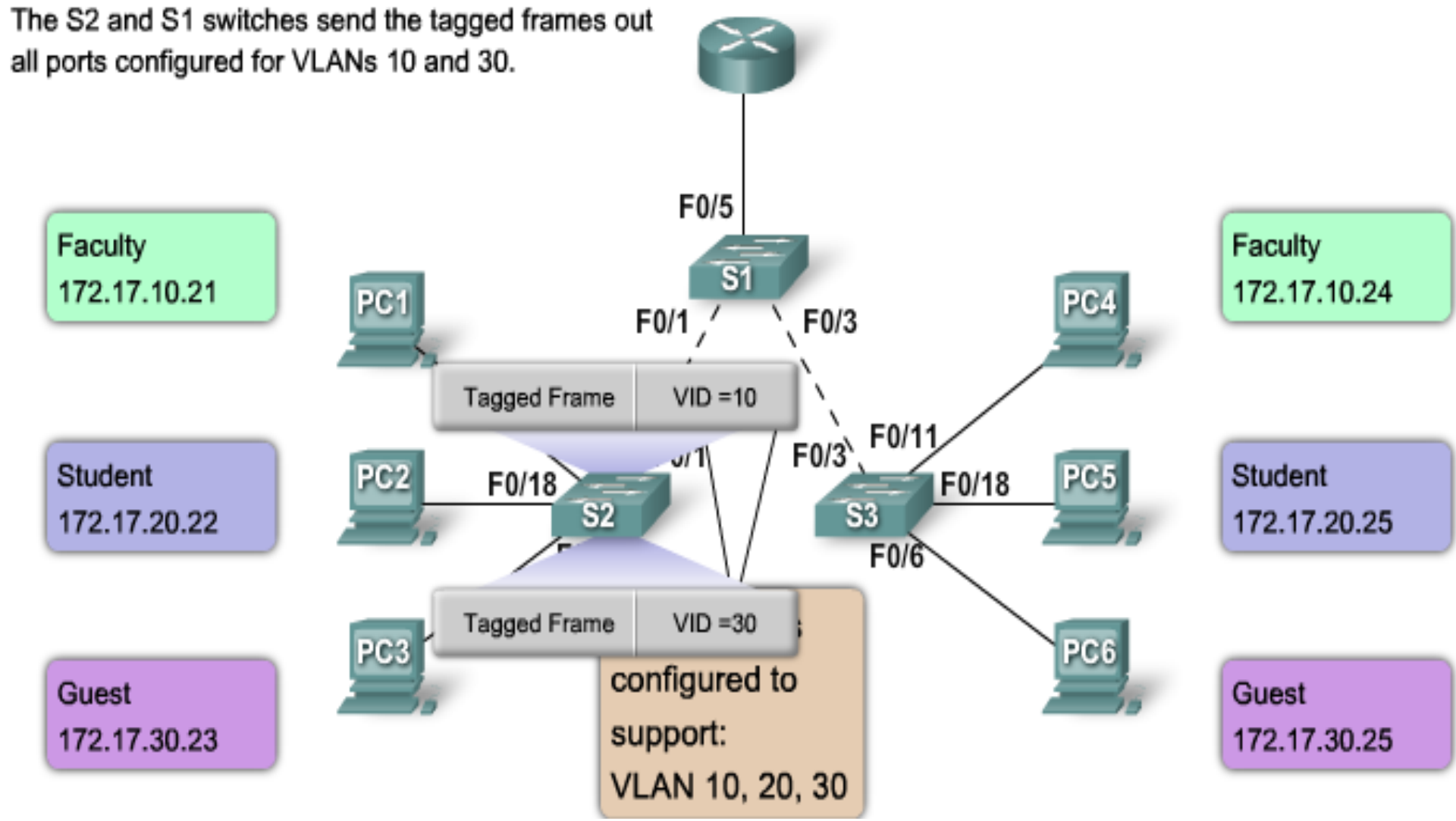
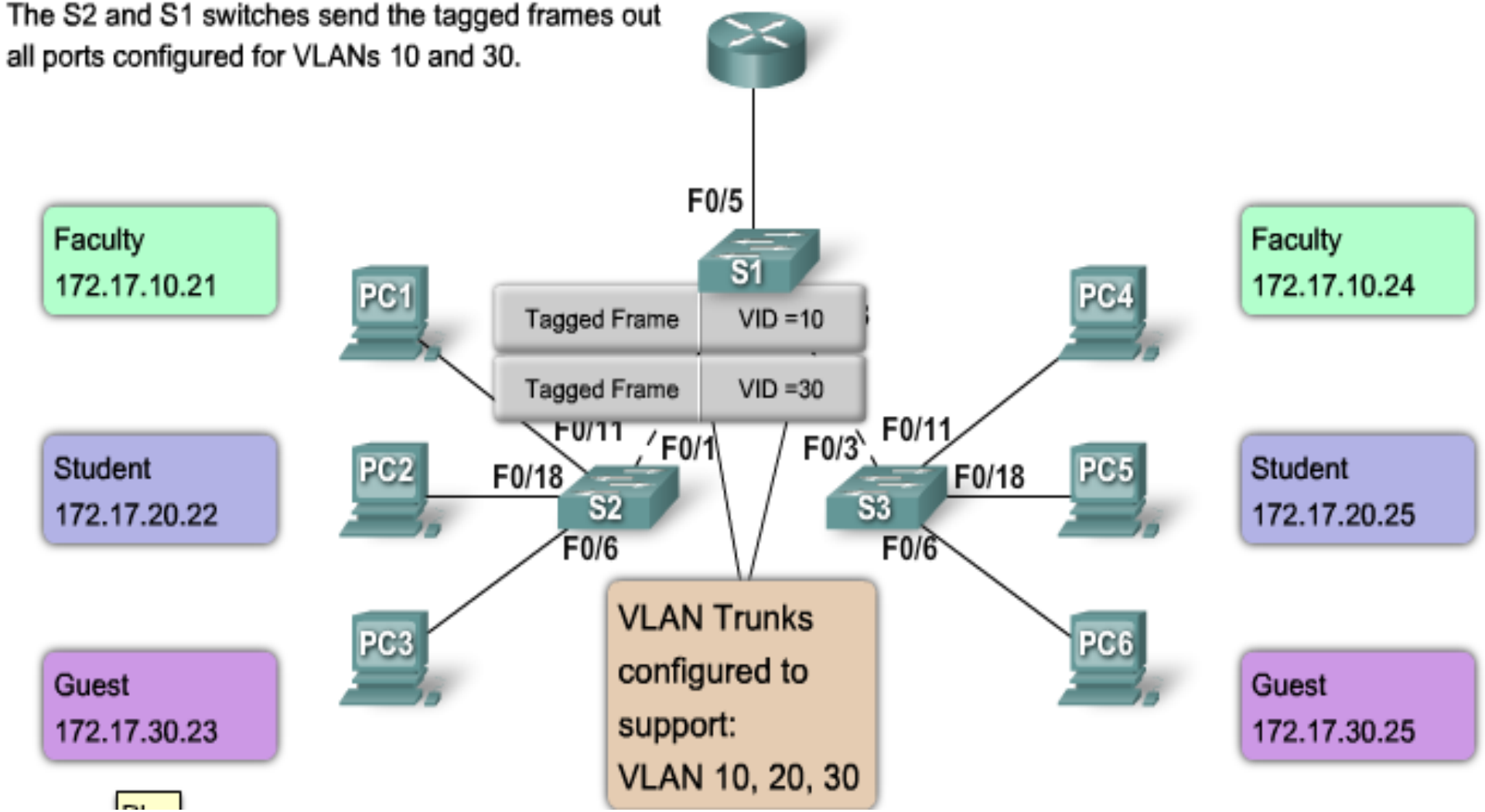


Hoạt động của Trunking

The S2 and S1 switches send the tagged frames out all ports configured for VLANs 10 and 30.



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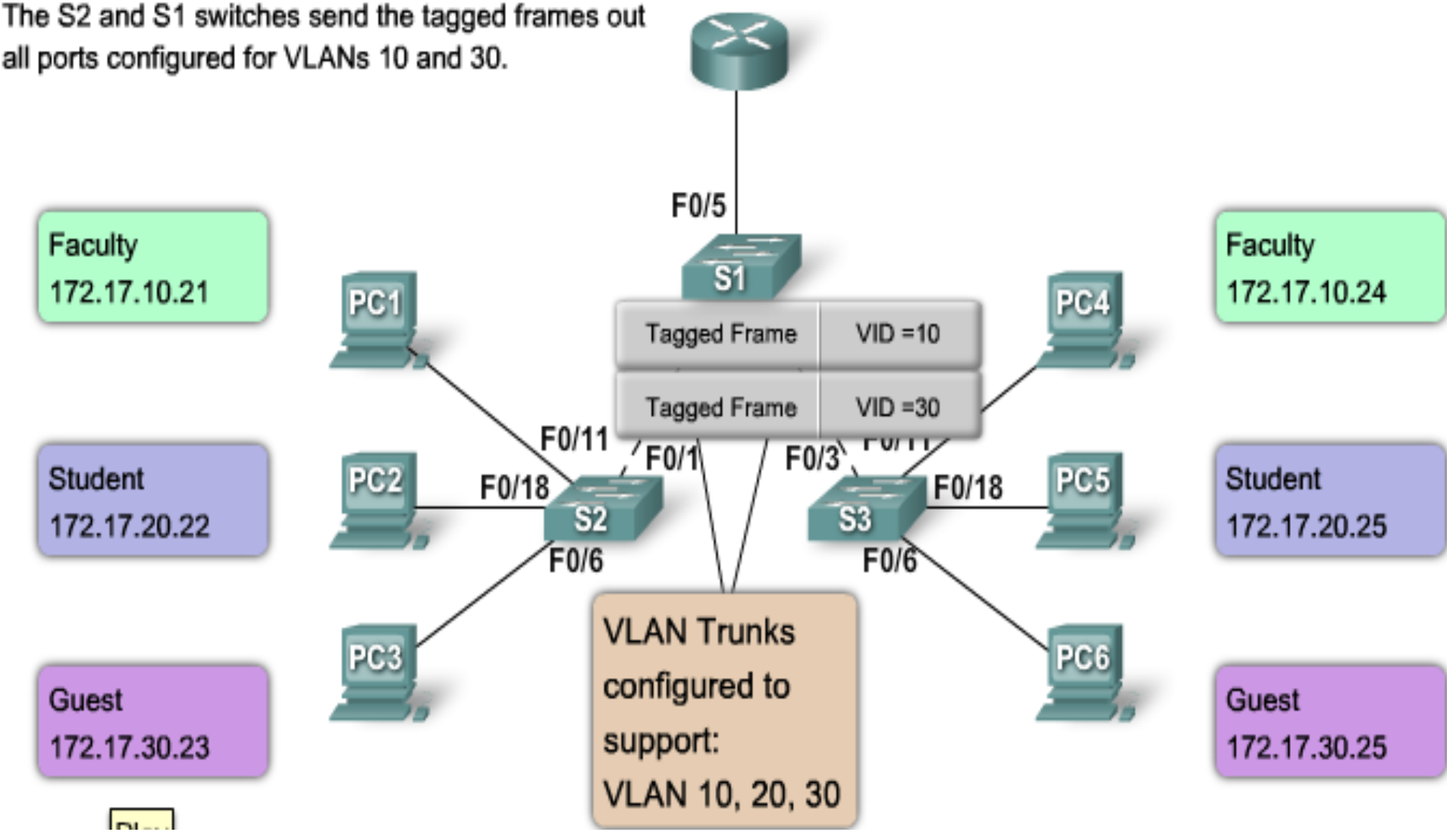
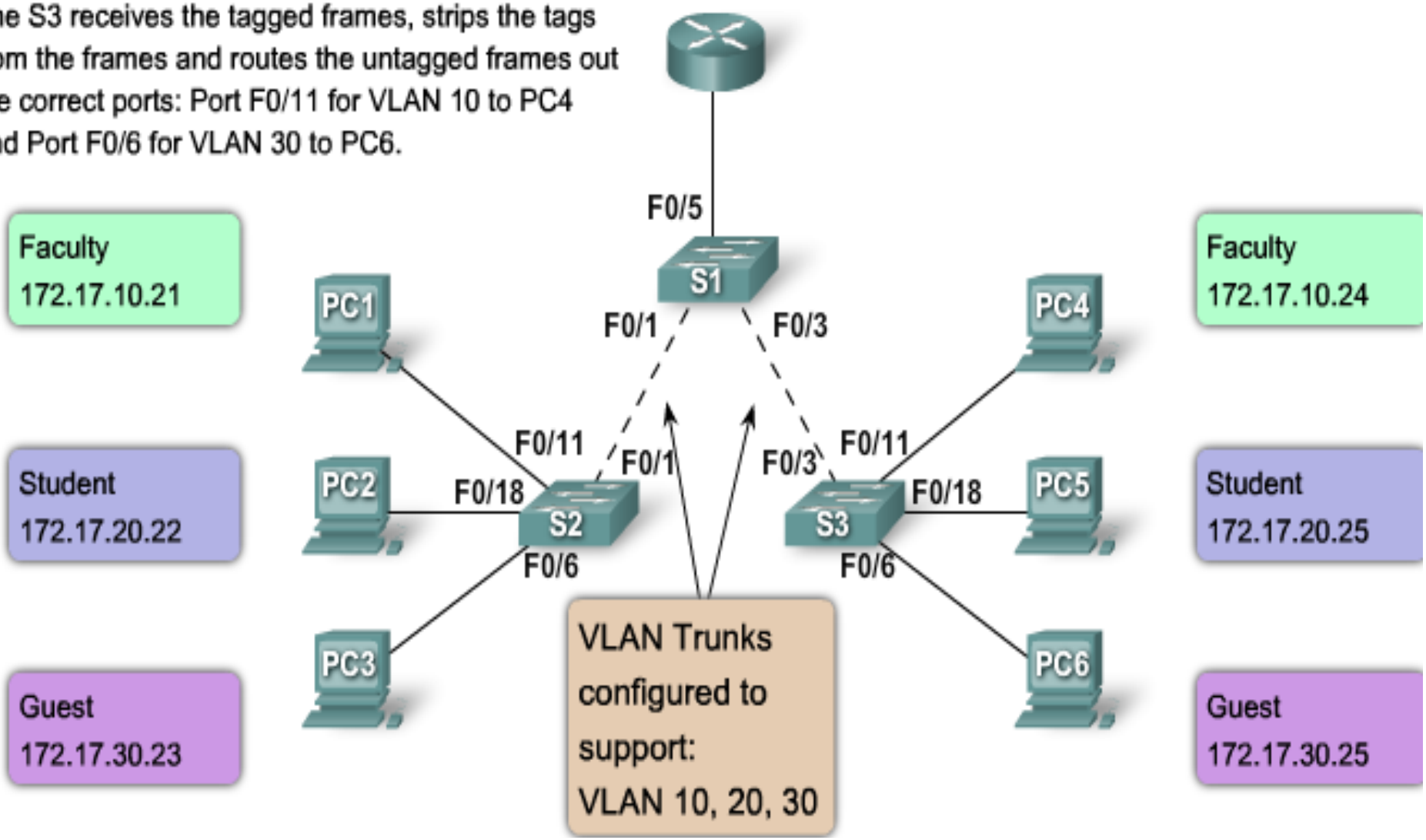


Hoạt động của Trunking

The S3 receives the tagged frames, strips the tags from the frames and routes the untagged frames out the correct ports: Port F0/11 for VLAN 10 to PC4 and Port F0/6 for VLAN 30 to PC6.



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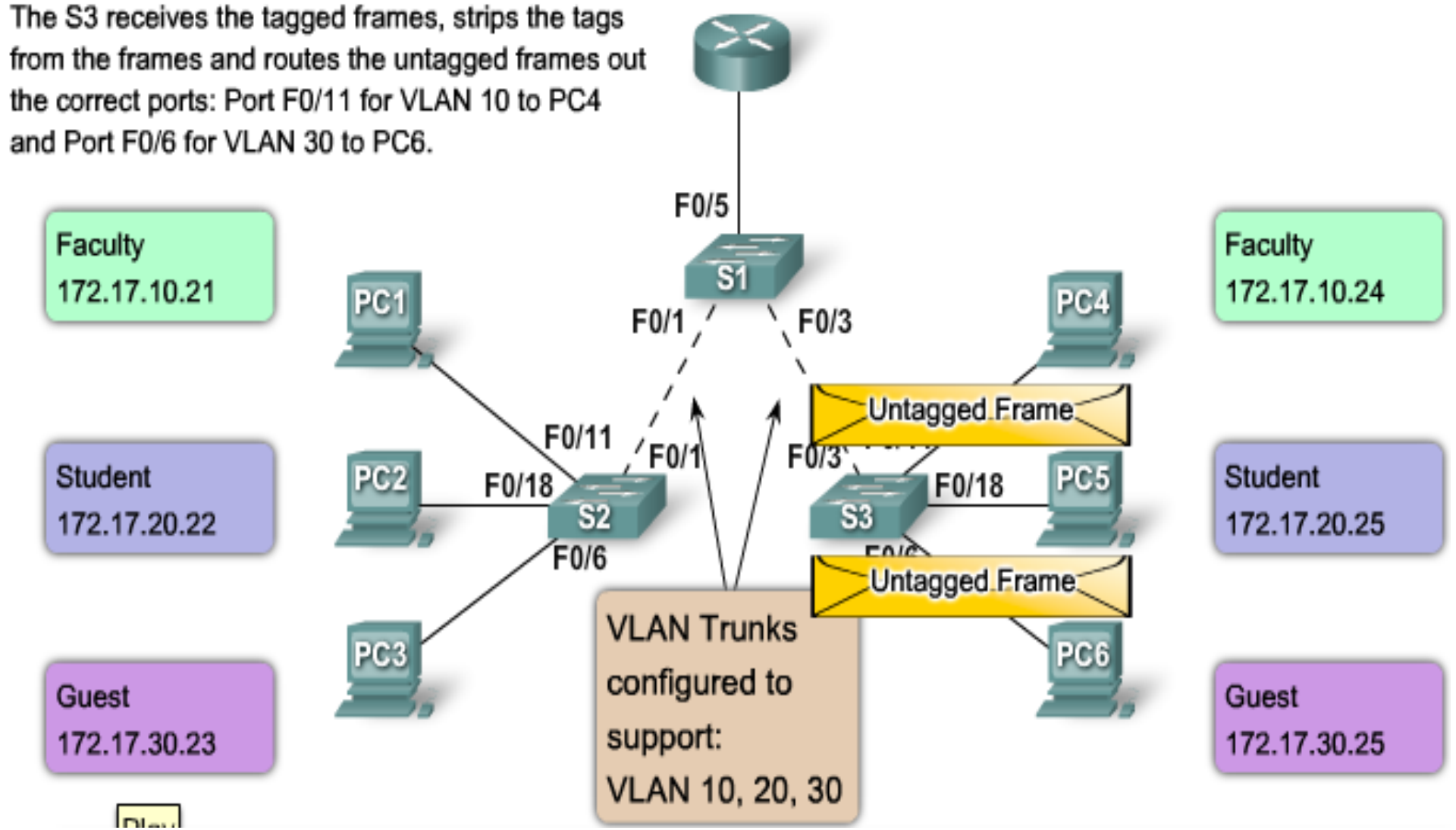
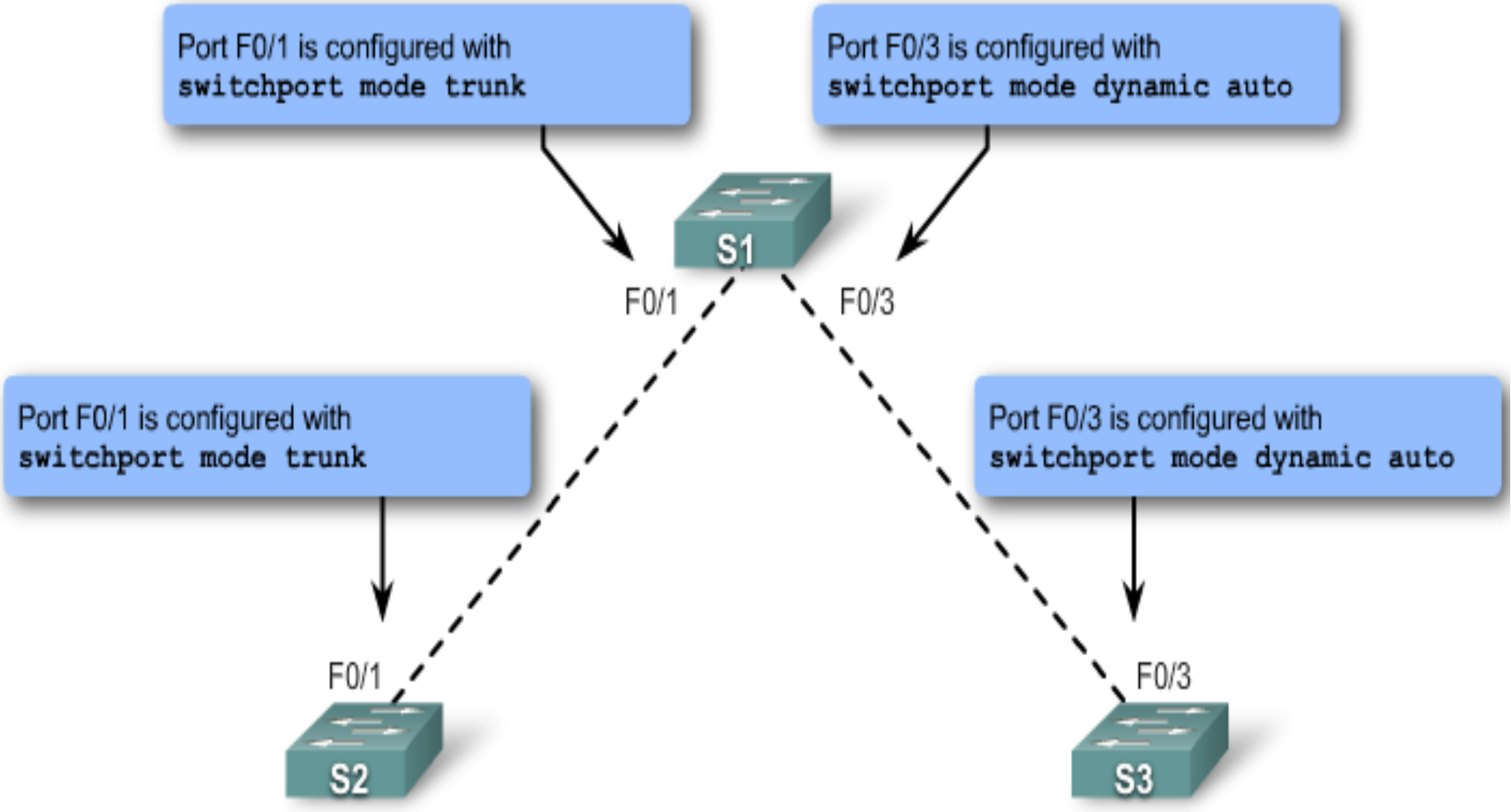
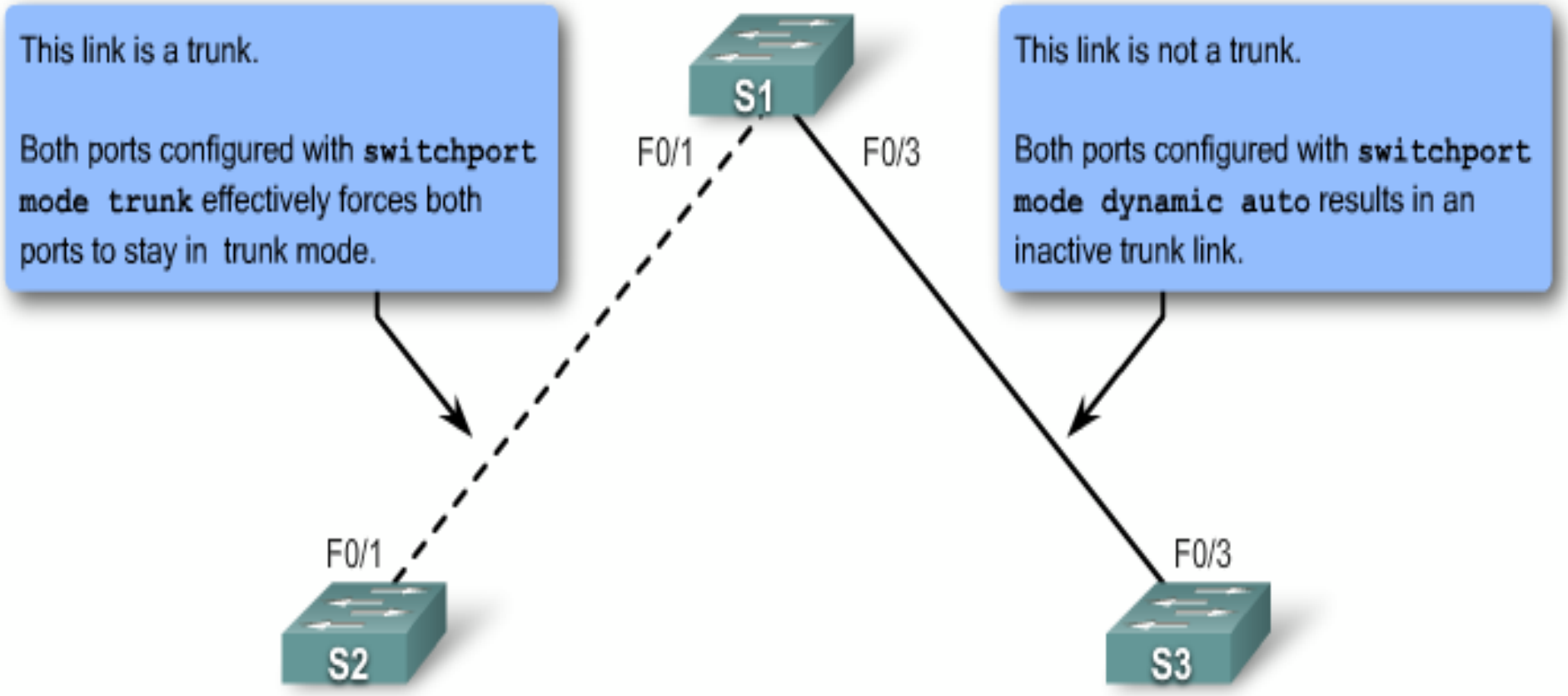


Port Mode Trunking



Trunking Link



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Cấu hình VLAN

Use the following steps to configure and verify VLANs and trunks on a switched network:

1. Create the VLANs.

2. Assign switch ports to VLANs statically

3. Verify VLAN configuration

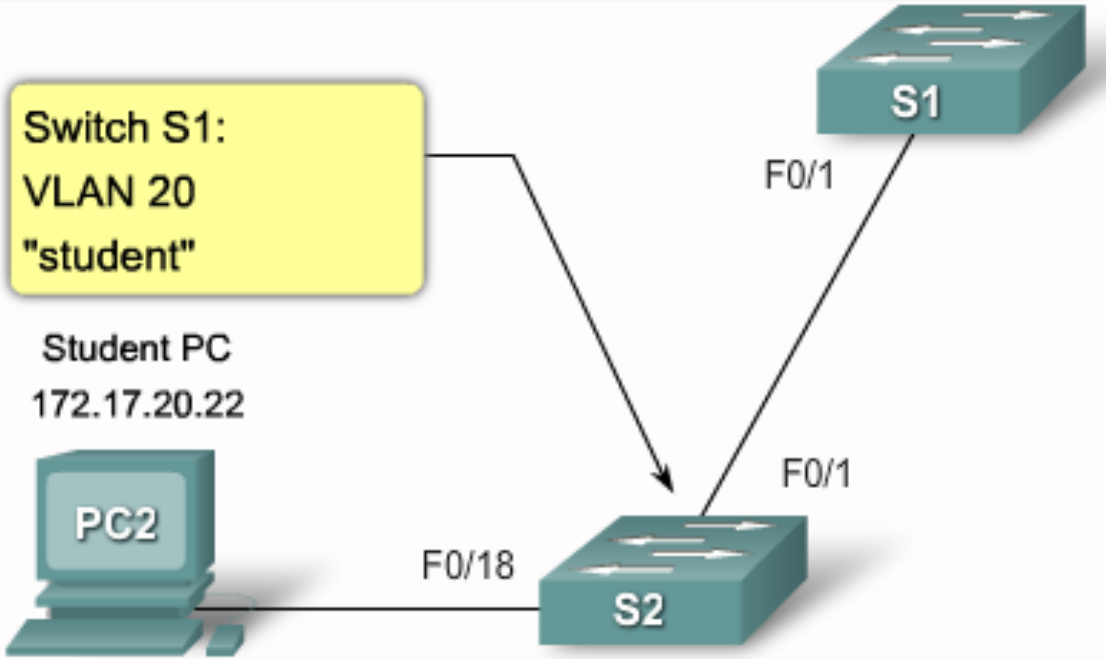
4. Enable trunking on the inter-switch connections.

5. Verify trunk configuration.

1. Tạo VLAN

Cisco IOS CLI Command Syntax	
Switch from privileged EXEC mode to global configuration mode.	`#configure terminal`
Create a VLAN. Vlan id is the VLAN number that is to be created. Switches to VLAN configuration mode for VLAN vlan id.	`(config)#vlan vlan id`
(Optional) Specify a unique VLAN name to identify the VLAN. If no name is entered the VLAN number, padded zeros, is appended the word 'VLAN', for example, VLAN0020.	`(config-vlan)#name vlan name`
Return to privileged EXEC mode.You must end your configuration session for the configuration to be saved in the vlan.dat file and for configuration to take effect.	`(config-vlan)#end`

```
S1#configure terminal
S1(config)#vlan 20
S1(config-vlan)#name student
S1(config-vlan)#end
```



1. Tạo VLAN

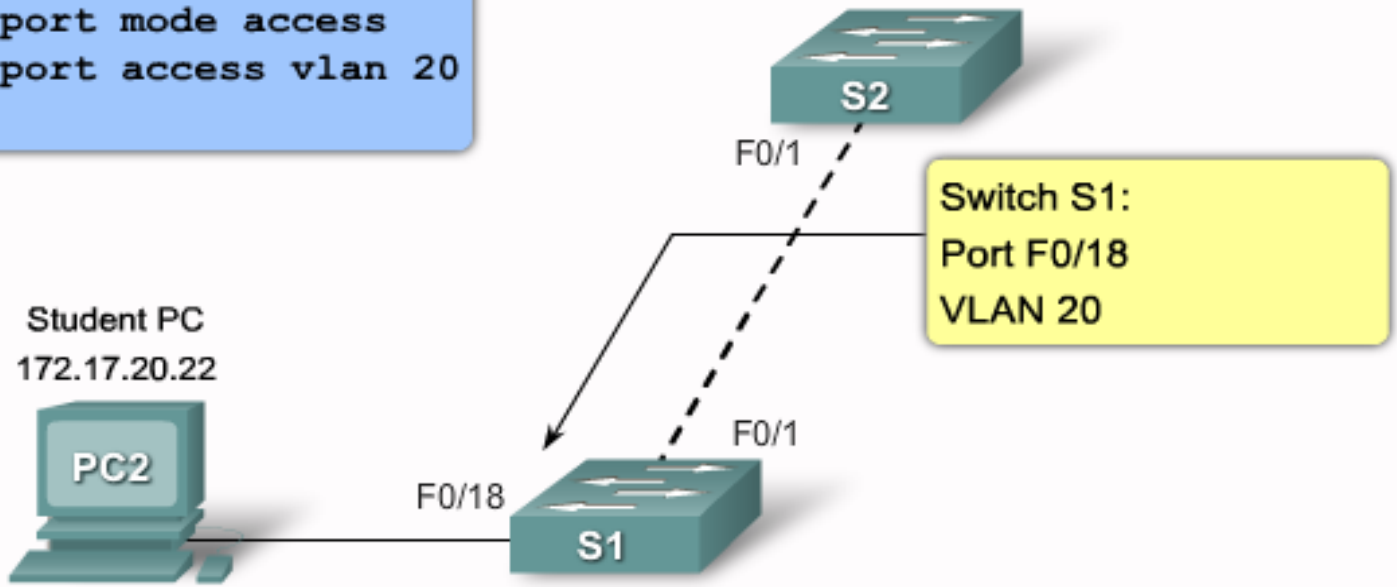
```
S1#show vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, 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
                                                 Gi0/1, Gi0/2
20   student                           active
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
```

2. Gán Port của Switch vào VLAN

Cisco IOS CLI Command Syntax	
Enter global configuration mode.	`#configure terminal`
Enter the interface to assign the VLAN.	`(config)#interface interface id`
Define the VLAN membership mode for the port.	`(config-if)#switchport mode access`
Assign the port to a VLAN.	`(config-if)#switchport access vlan vlan id`
Return to privileged EXEC mode.	`(config-if)#end`

```
S1#configure terminal
S1(config)#interface F0/18
S1(config-if)#switchport mode access
S1(config-if)#switchport access vlan 20
S1(config-if)#end
```



2. Gán Port của Switch vào VLAN

```
S1#show vlan brief

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/1, 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, Fa0/19, Fa0/20, Fa0/21
                                                Fa0/22, Fa0/23, Fa0/24, Gi0/1
                                                Gi0/2
20   student                          active    Fa0/18
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
S1#
```

3. Kiểm tra VLAN và Port

Cisco IOS CLI Command Syntax	
show vlan [brief | id *vlan-id* **| name** *vlan-name* **| summary].**	
Display one line for each VLAN with the VLAN name, status, and its ports.	**brief**
Display information about a single VLAN identified by VLAN ID number. For vlan-id, the range is 1 to 4094.	**id** *vlan-id*
Display information about a single VLAN identified by VLAN name. The VLAN name is an ASCII string from 1 to 32 characters.	**name** *vlan-name*
Display VLAN summary information.	**summary**

Show Interfaces Command

Cisco IOS CLI Command Syntax	
show interfaces *[interface-id* **| vlan** *vlan-id]* **| switchport**	
Valid interfaces include physical ports (including type, module, and port number) and port channels. The port-channel range is 1 to 6.	*interface-id*
VLAN identification. The range is 1 to 4094.	**vlan** *vlan-id*
Display the administrative and operational status of a switching port, including port blocking and port protection settings.	**switchport**

3. Kiểm tra VLAN và Port

```
S1#show vlan name student

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
20   student                          active    Fa0/18

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
20   enet  100020     1500  -      -      -        -    -        0      0

Remote SPAN VLAN
----------------
Disabled

Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------


S1#show vlan summary
```

3. Kiểm tra VLAN và Port

```
S1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
S1(config)#int vlan 20
S1(config-if)#no shut
1w1d: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed state to dow
S1(config-if)#^Z

S1#show interfaces vlan 20
Vlan20 is up, line protocol is down
  Hardware is EtherSVI, address is 001c.57ec.0641 (bia 001c.57ec.0641)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
```

4. Cấu hình Trunking với 802.1Q

Cisco IOS CLI Command Syntax	
Enter global configuration mode.	#configure terminal
Enters the interface configuration mode for the defined interface.	(config)#interface *interface id*
Force the link connecting the switches to be a trunk link.	(config-if)#switchport mode trunk
Specify another VLAN as the native VLAN for untagged for IEEE 802.1Q trunks.	(config)#switchport trunk native vlan *vlan-id*
Add the VLANs allowed on this trunk.	(config-if)#switchport trunk allowed vlan add *vlan-list*
Return to privileged EXEC mode.	(config-if)#end

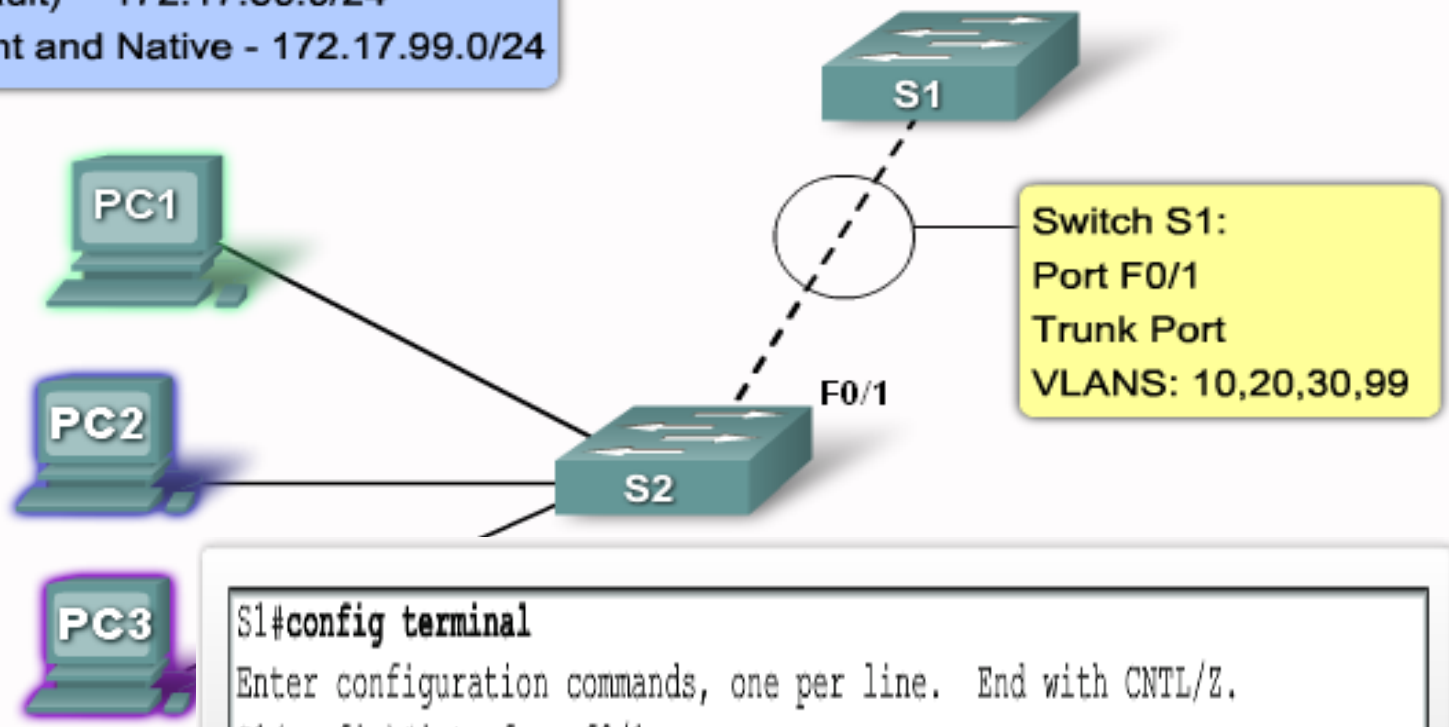
4. Cấu hình Trunking với 802.1Q

VLAN 10 -Faculty/Staff - 172.17.10.0/24
VLAN 20 - Students - 172.17.20.0/24
VLAN 30 - Guest (Default) - 172.17.30.0/24
VLAN 99 - Management and Native - 172.17.99.0/24

Faculty
VLAN 10
172.17.10.21

Student
VLAN 20
172.17.20.22

Guest
VLAN 30
172.17.30.23

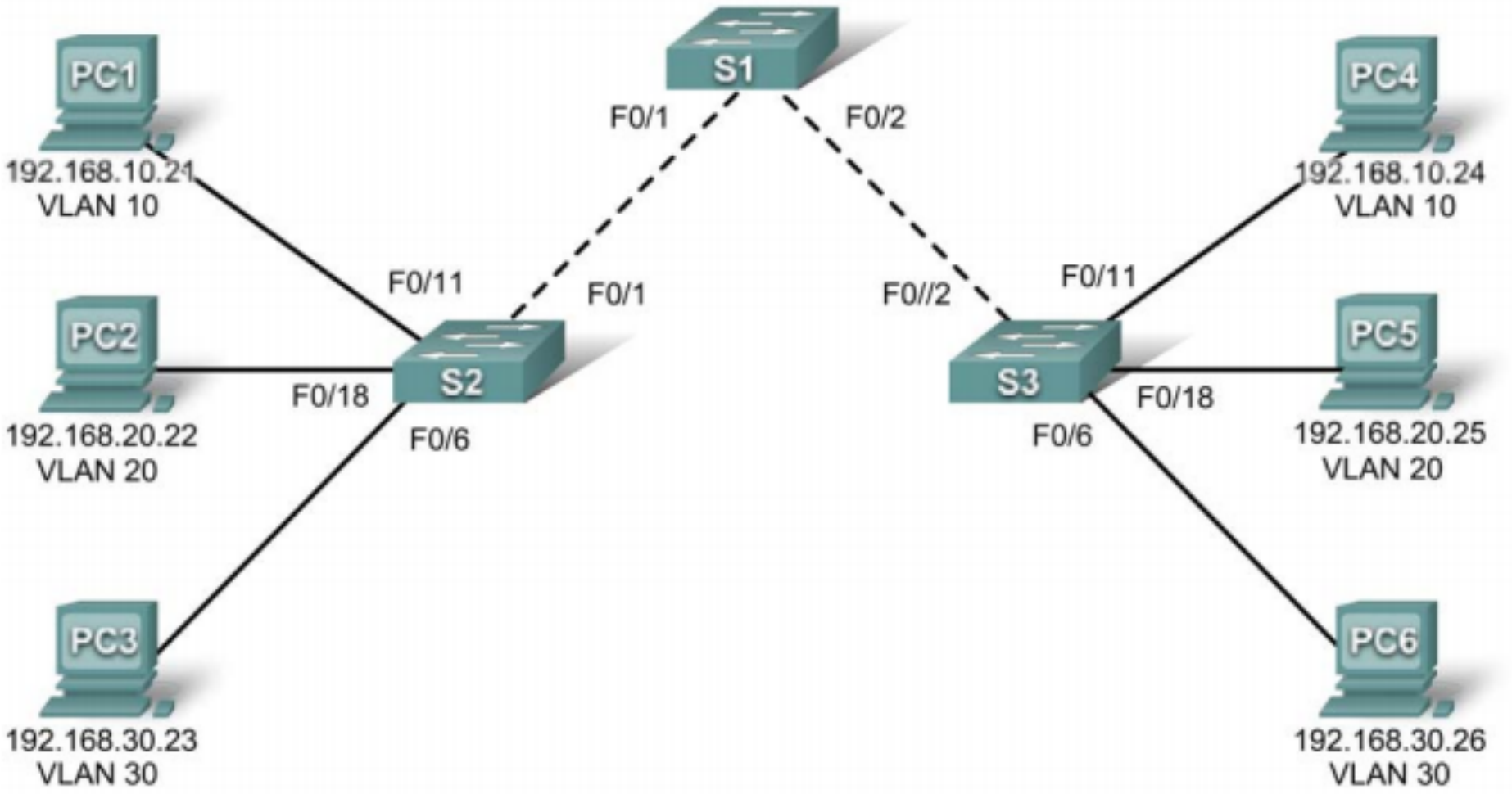



```
S1#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
S1(config)#interface f0/1
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 99
S1(config-if)#switchport trunk allowed vlan add 10,20,30
S1(config-if)#end
```

4. Kiểm tra Trunking

```
S1#show interfaces f0/1 switchport
Name: Fa0/1
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: down
Administrative Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 99 (management)
Administrative Native VLAN tagging: enabled
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk Native VLAN tagging: enabled
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
```

LAB


S1
F0/1
F0/2
PC1
192.168.10.21
VLAN 10
PC4
192.168.10.24
VLAN 10
F0/11
F0/1
F0//2
F0/11
PC2
192.168.20.22
VLAN 20
S2
F0/18
F0/6
S3
F0/18
F0/6
PC5
192.168.20.25
VLAN 20
PC3
192.168.30.23
VLAN 30
PC6
192.168.30.26
VLAN 30

Câu hỏi ôn tập

1) VLAN là gì ?
2) Lợi ích của VLAN
3) Trunking và Tagging là gì ?
4) Mô tả các bước cấu hình VLAN