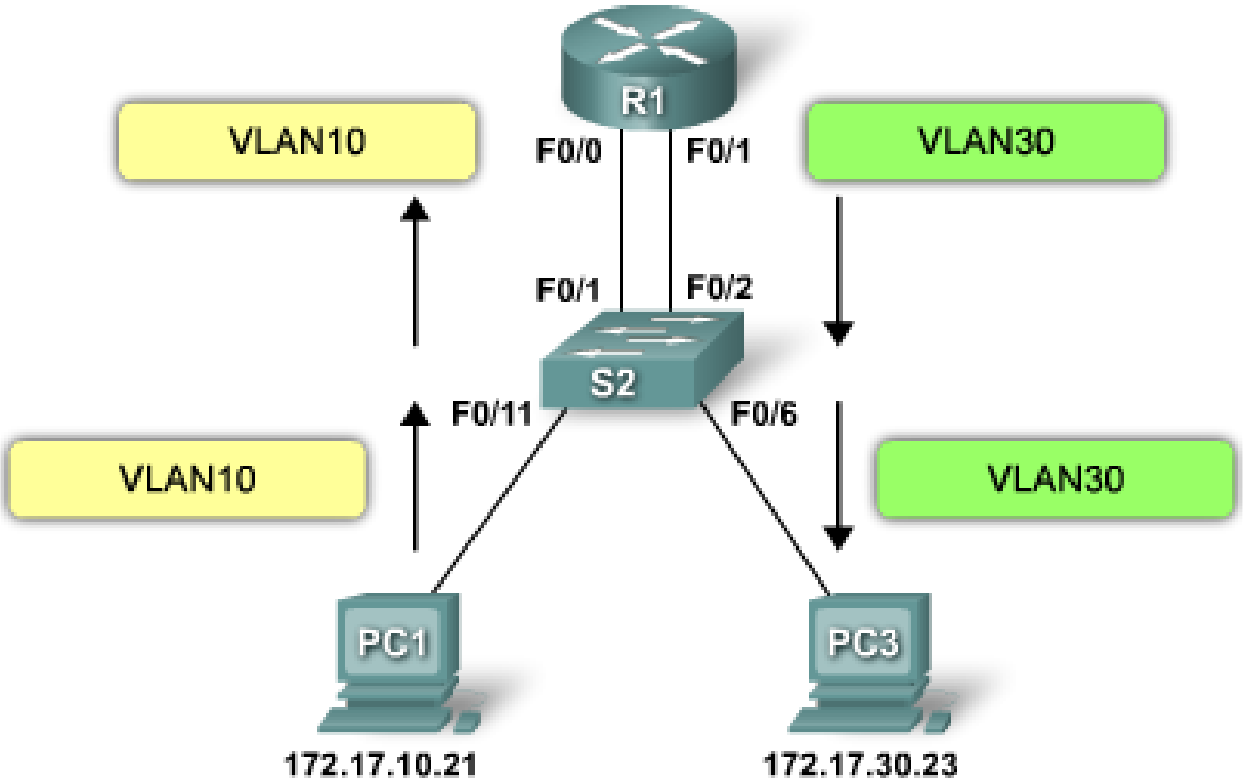
Le routage Inter-VLAN

Le routage Inter-VLAN

Objectifs

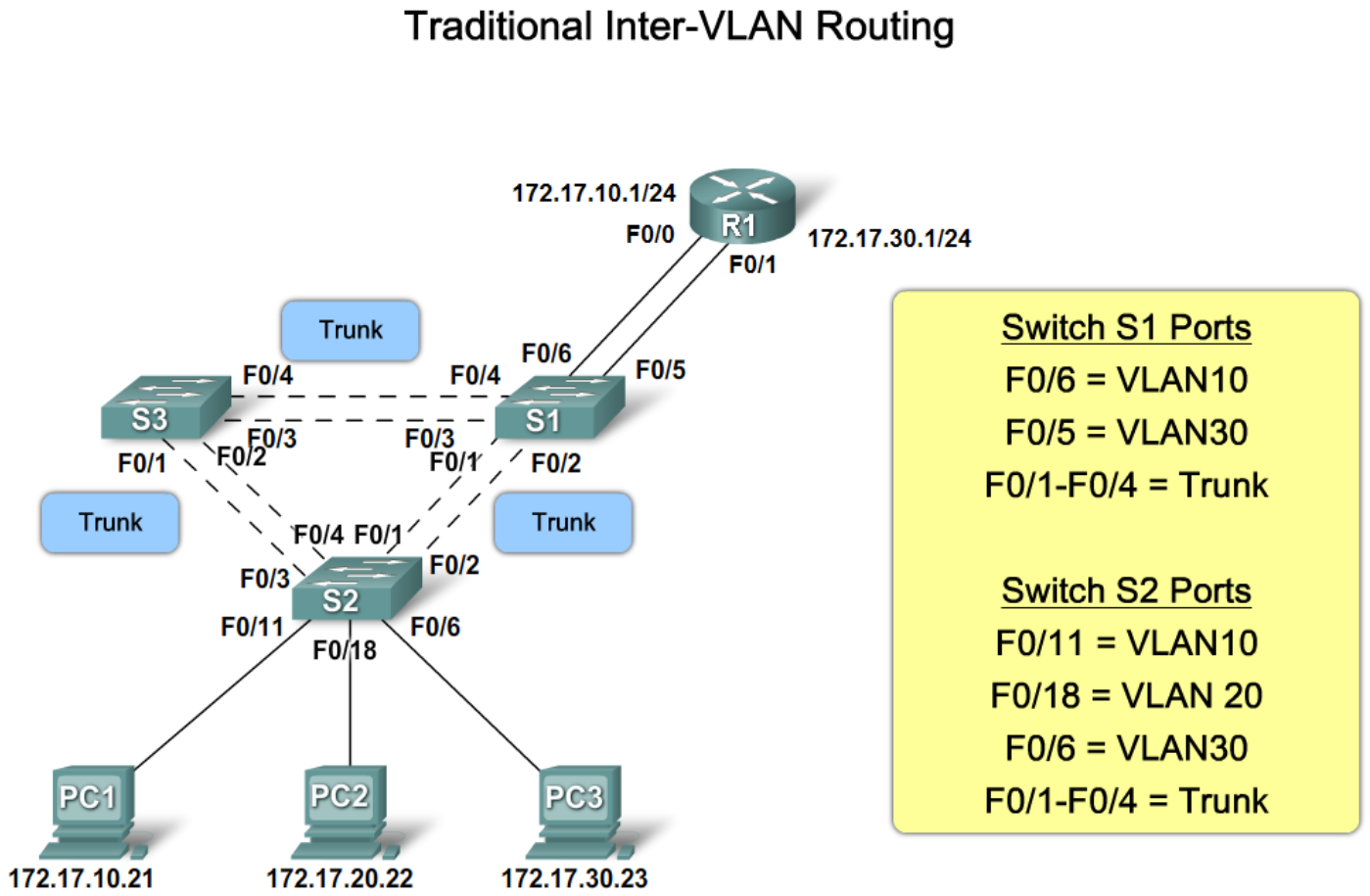
Le routage inter VLAN ?

- Comment peut-on router des paquets entre plusieurs VLAN ?
- Un sous-réseaux par VLAN pour faciliter le routage

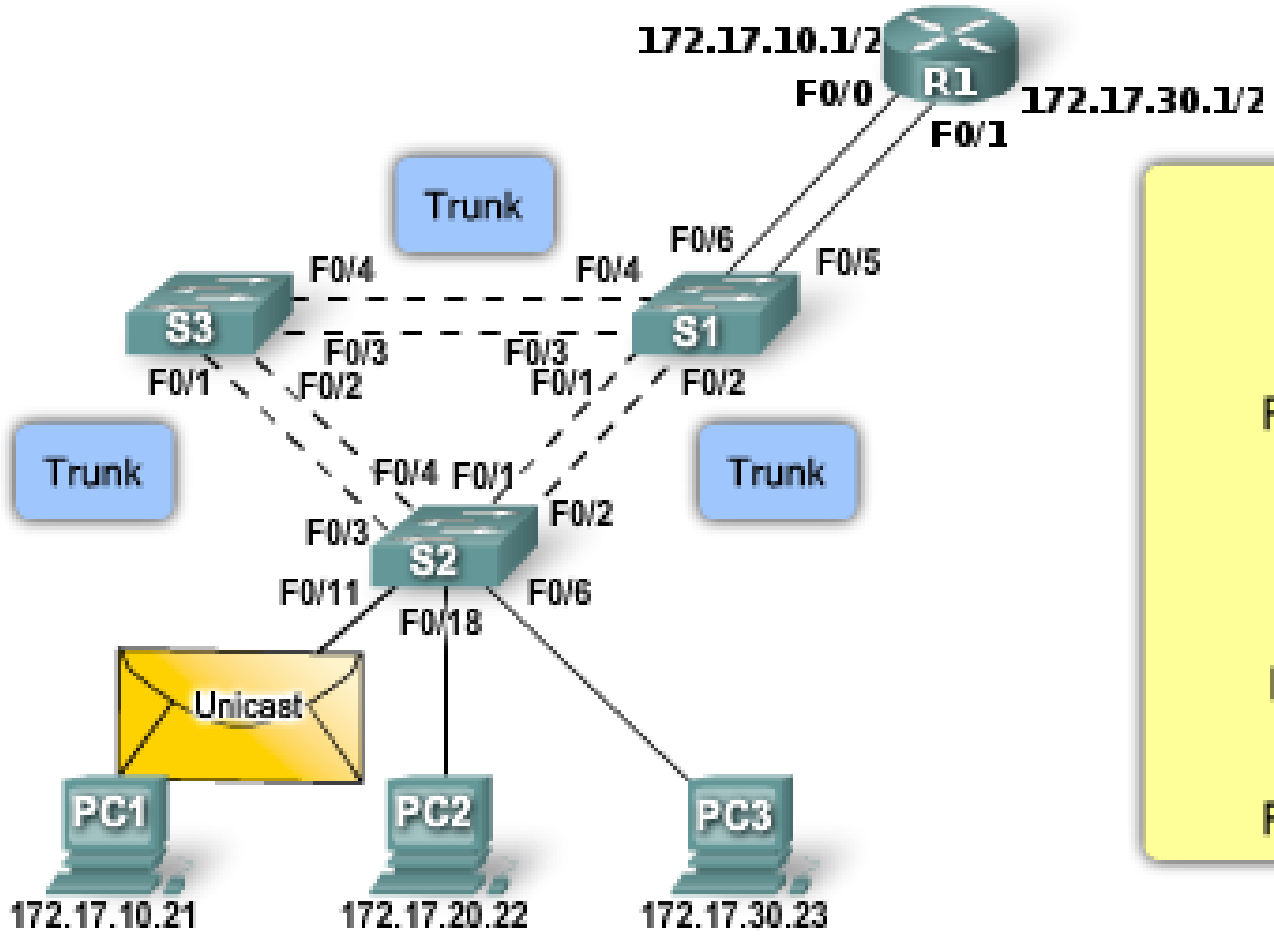


Fonctionnement

- Une connexion à chaque VLAN
- Suposons que PC1 envoie une trame à PC3



Fonctionnement



Switch S1 Ports

F0/6 = VLAN10

F0/5 = VLAN30

F0/1-F0/4 = Trunk

Switch S2 Ports

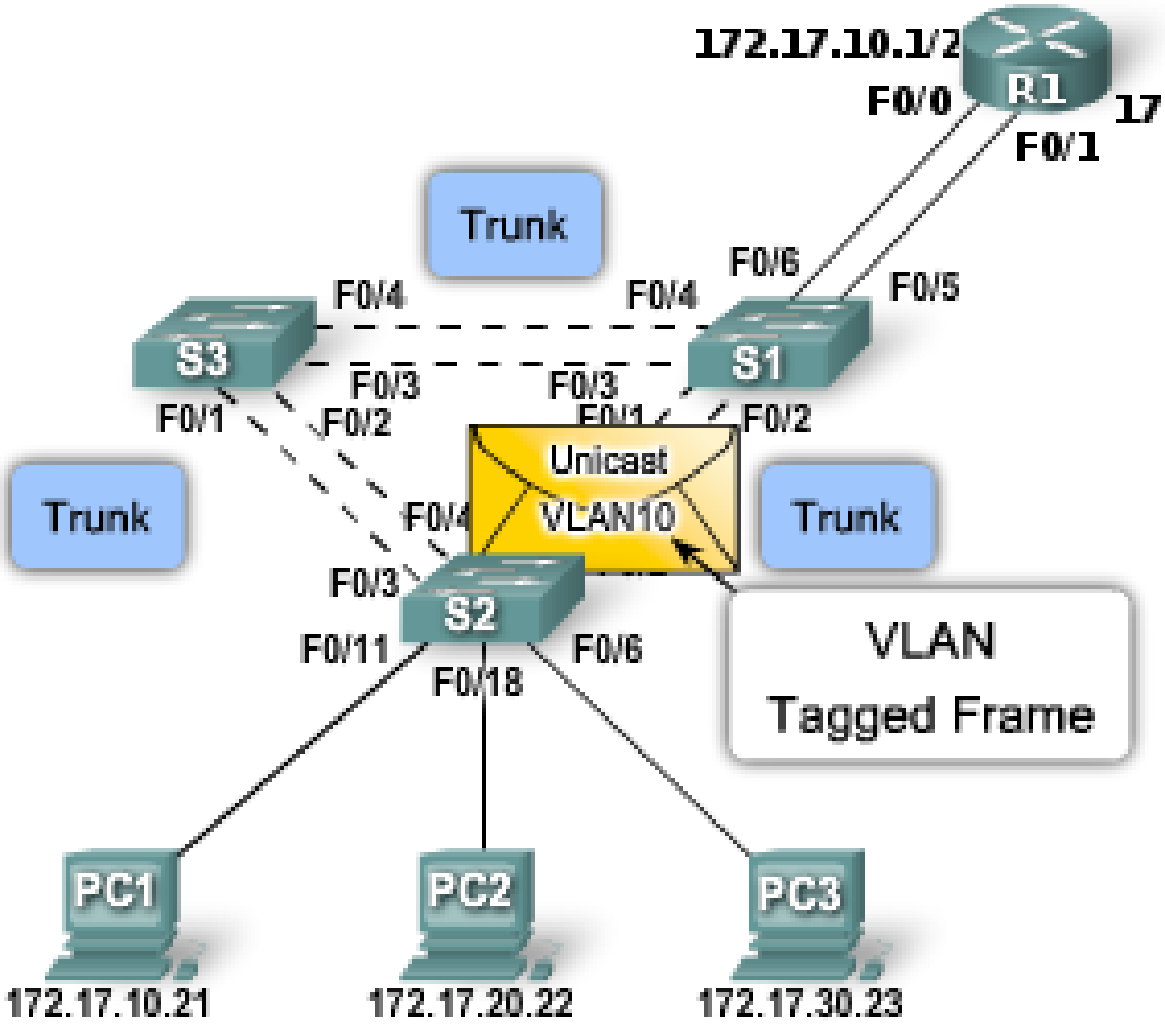
F0/11 = VLAN10

F0/18 = VLAN 20

F0/6 = VLAN30

F0/1-F0/4 = Trunk

Fonctionnement



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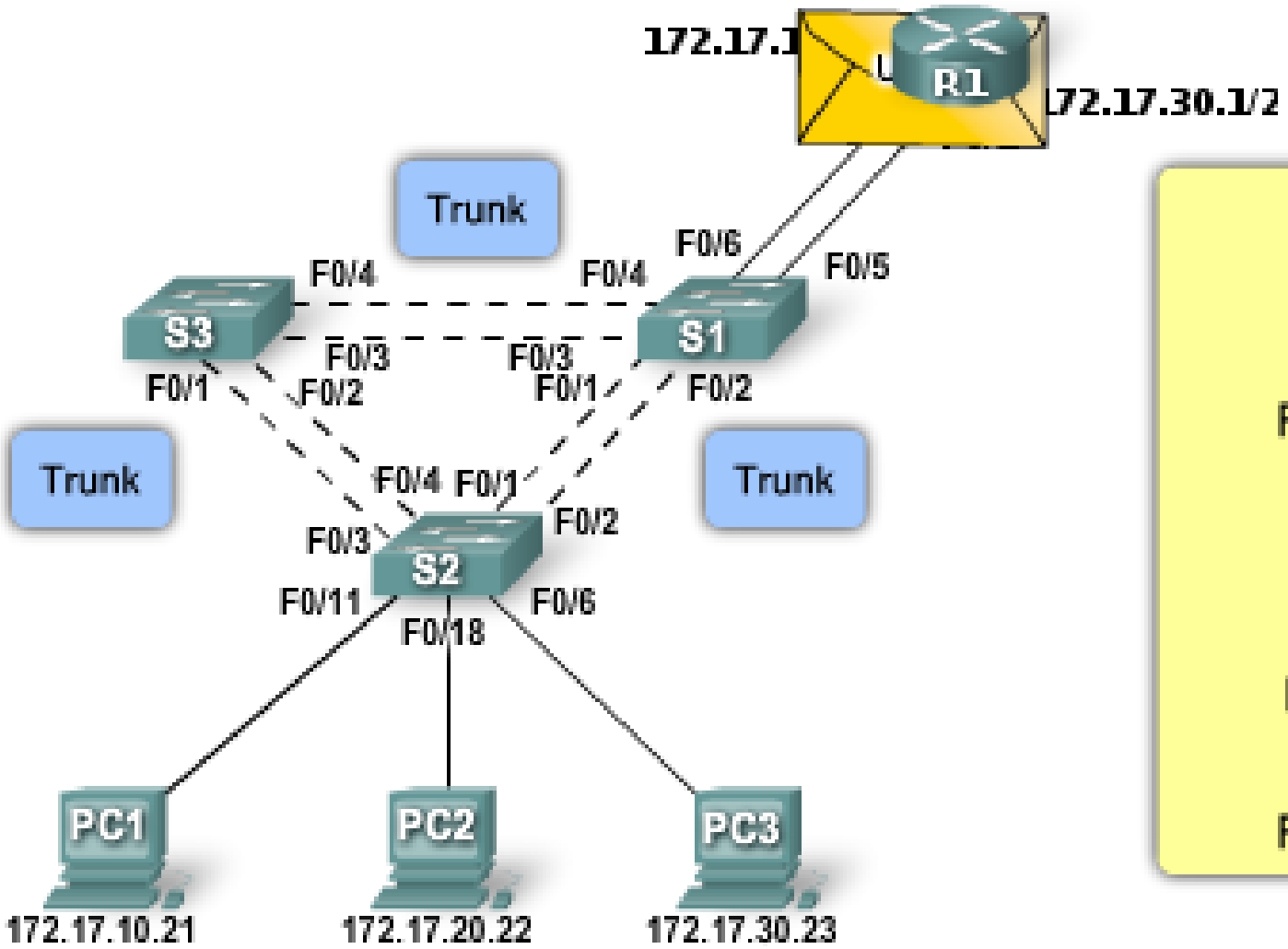
Fonctionnement



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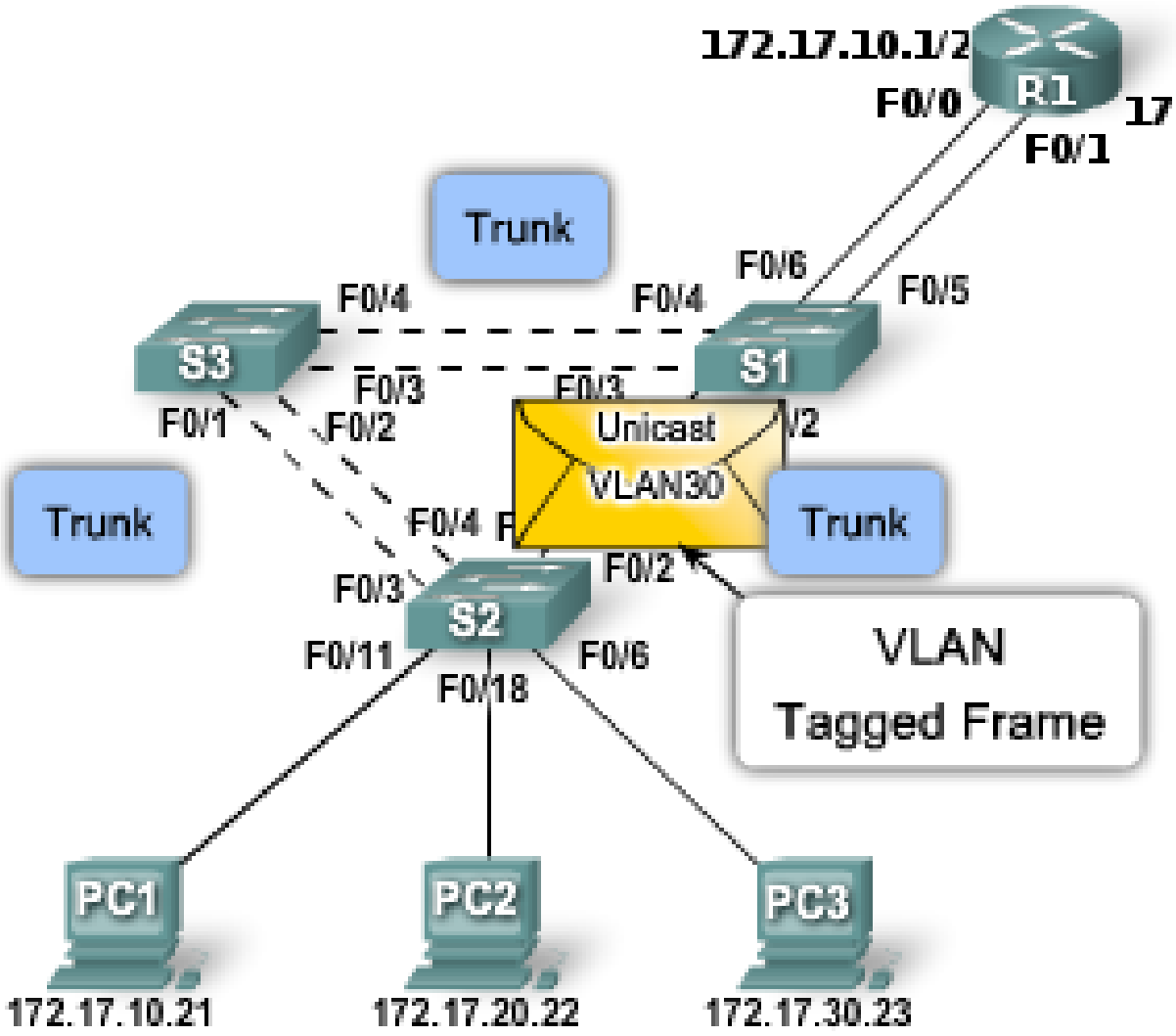
Fonctionnement



Switch S1 Ports

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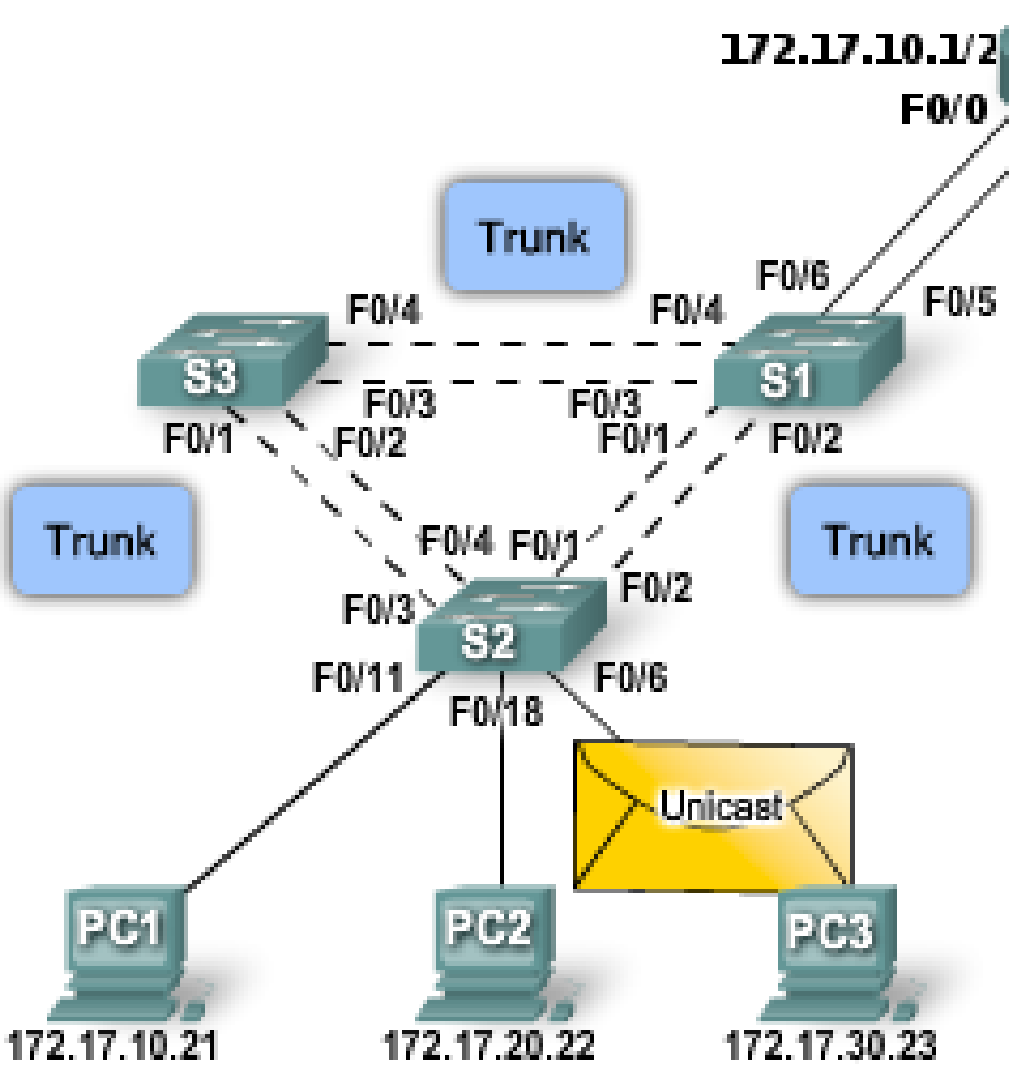
Fonctionnement



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F0/18 = VLAN 20

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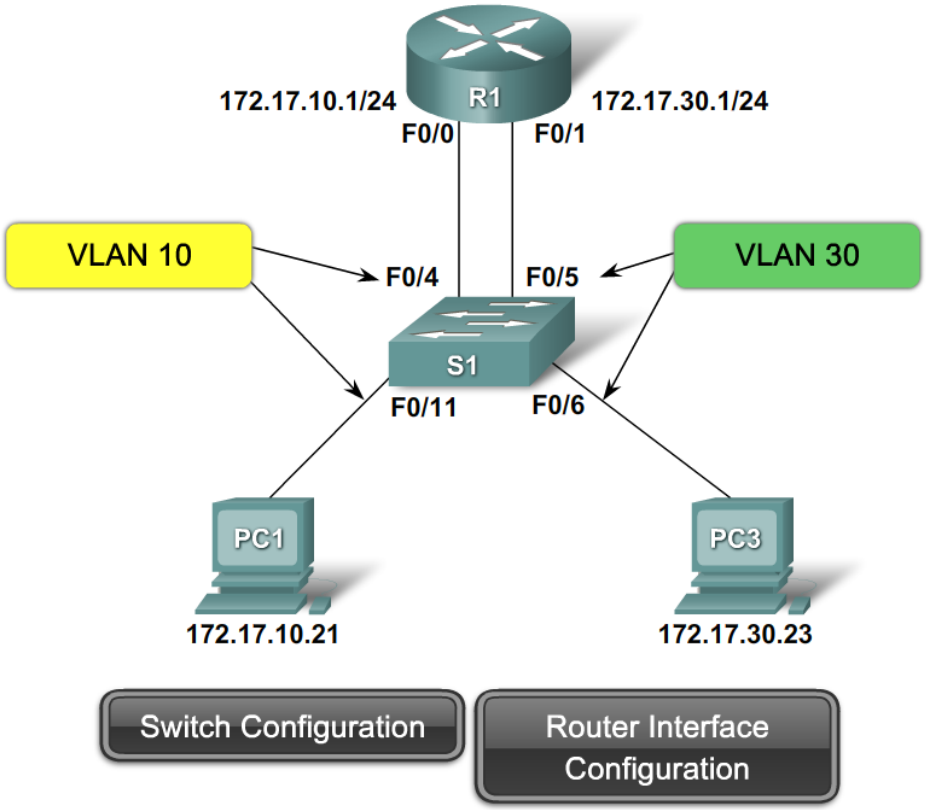
F0/1-F0/4 = Trunk

Configuration

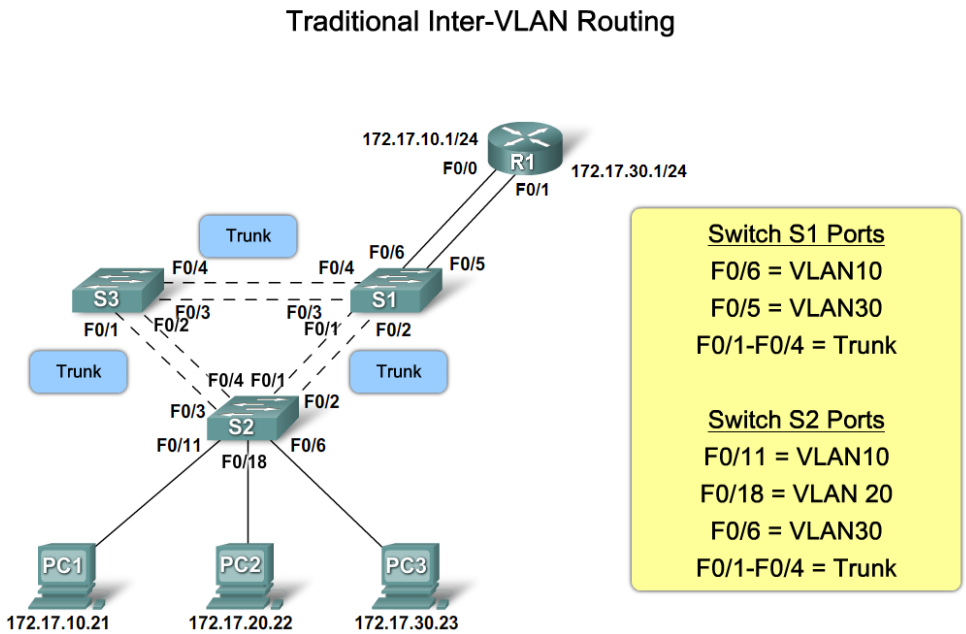
Configuring Traditional Inter-VLAN Routing



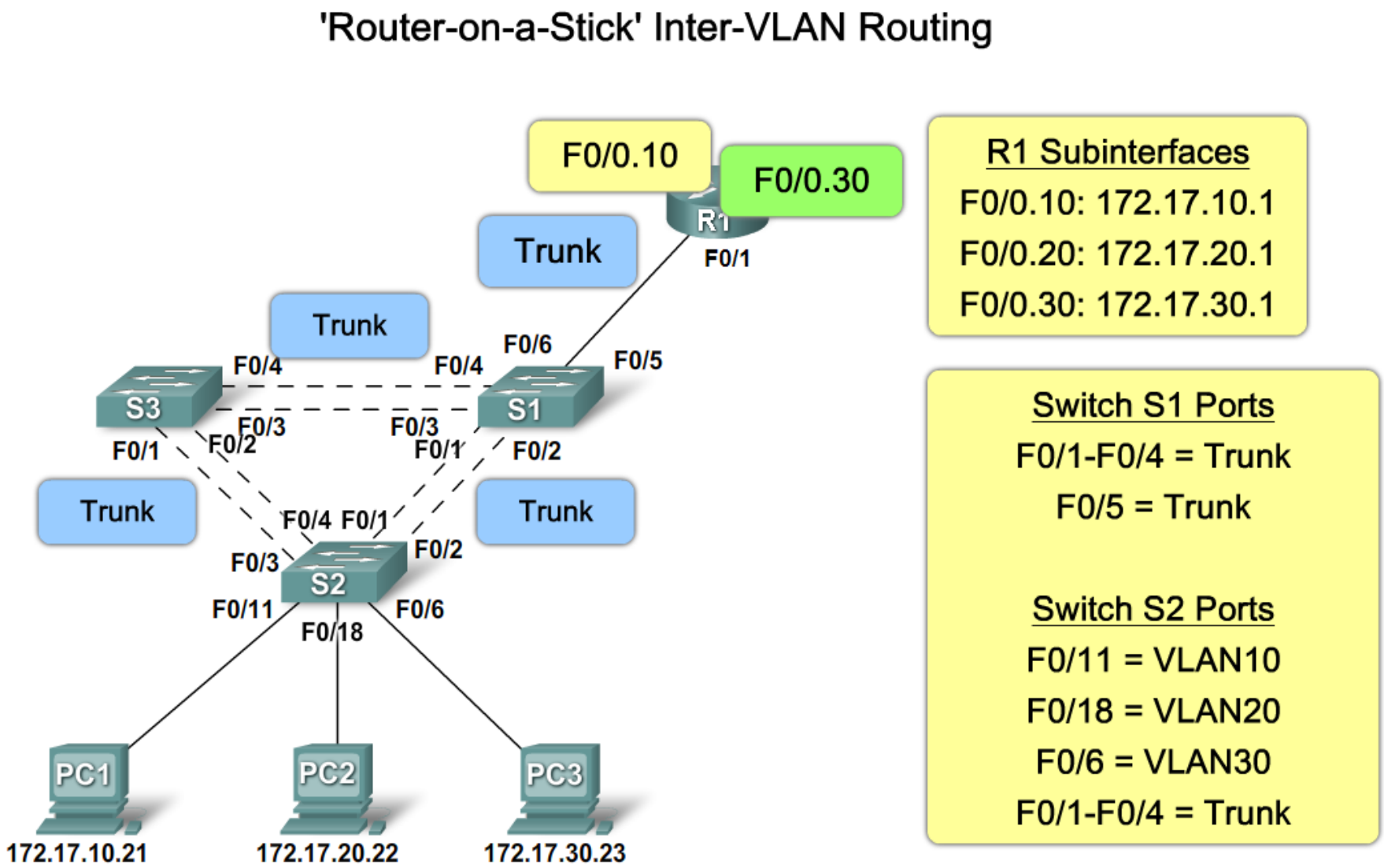

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface f0/0
R1(config-if)#ip address 172.17.10.1 255.255.255.0
R1(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
R1(config-if)#interface f0/1
R1(config-if)#ip address 172.17.30.1 255.255.255.0
R1(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up
R1(config-if)#end
R1#copy running-config startup-config
```

Problématique

- Une connexion à chaque VLAN !
- Sur un réseau avec 100 VLAN, comment peut-on faire ?

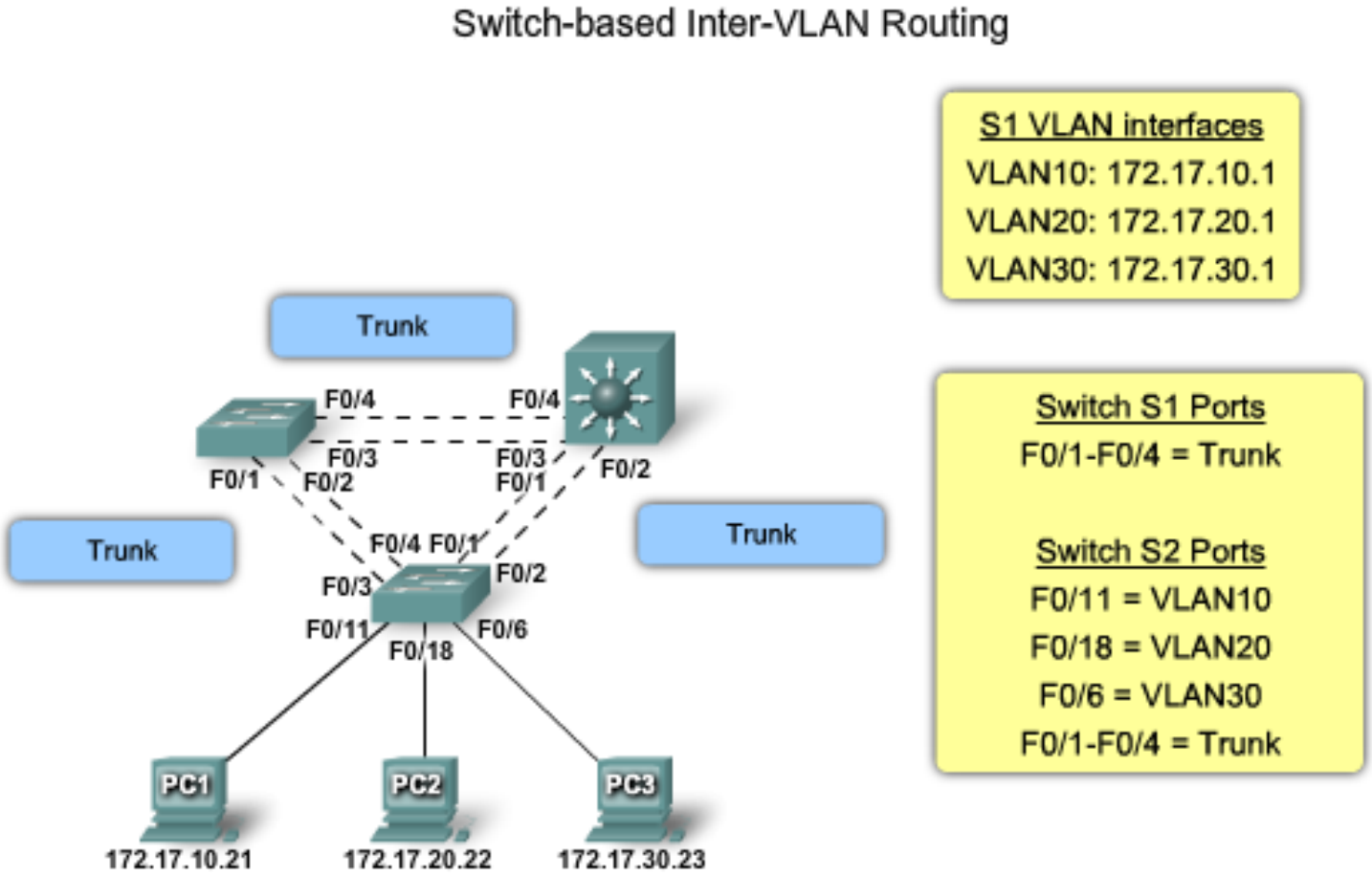


1ère solution



2ème solution

- Pas besoin d'interface physique sur chaque VLAN
- Switch de niveau 3 assurera le routage entre tous les VLAN qu'il connait grâce à la création de Bridge Virtual Interface (BVI)



Le routage Inter-VLAN

Solution Router-on-a-Stick

Fonctionnement Router-on-a-Stick

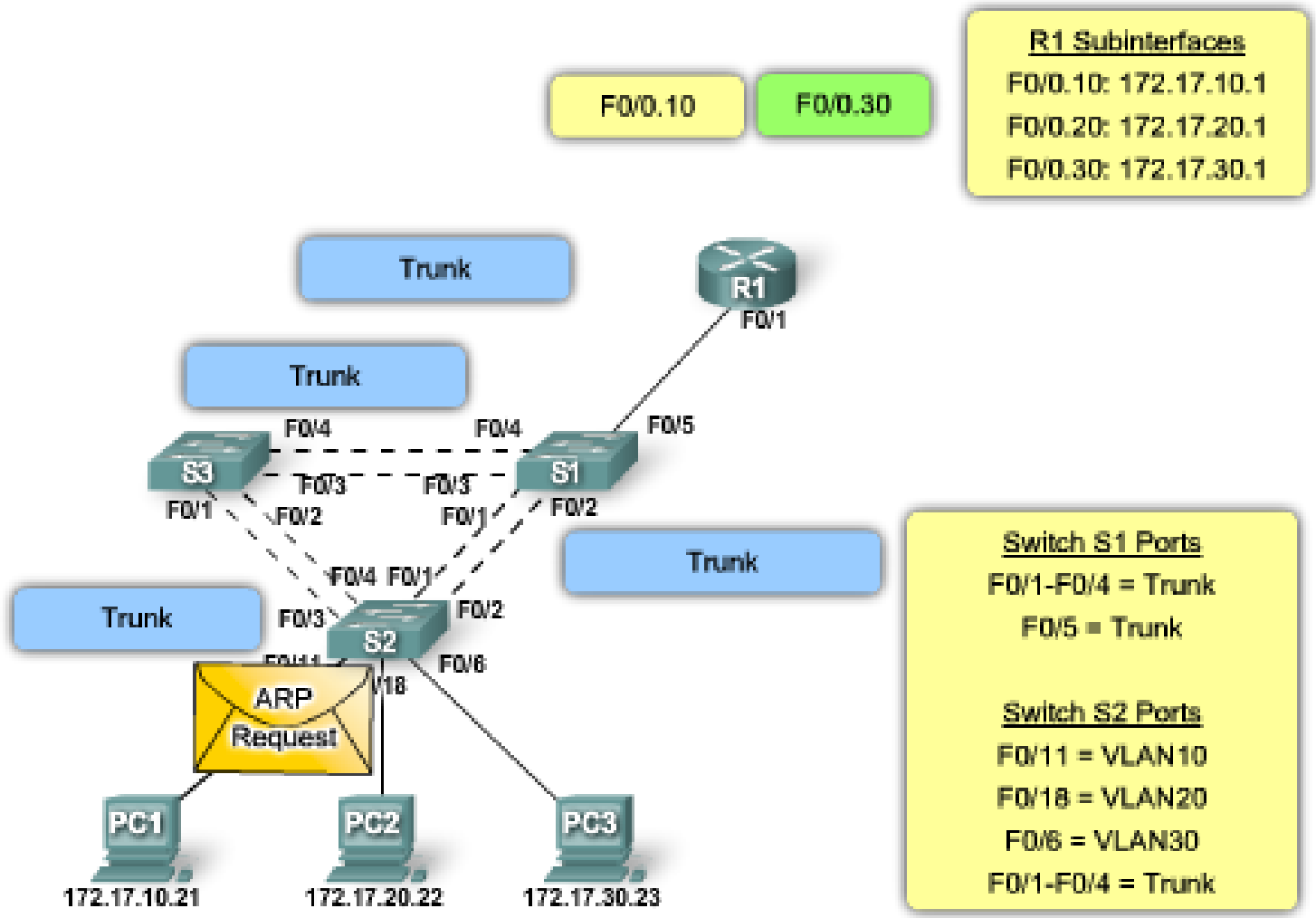
Router Subinterfaces and Inter-VLAN Routing

PC1 sends an ARP request for the MAC address of its default gateway, which is the VLAN subinterface on router R1.

The ARP request is sent out for the IP address 172.17.10.1, which corresponds to the subnet PC1 is connected to.

The ARP request is sent to switch S2 on VLAN10, and is tagged and forwarded out the trunk link to switch S1.

Switch S1 maintains the VLAN tag on the broadcast frame as it forwards it out the other trunk link connected to router R1.



Fonctionnement Router-on-a-Stick

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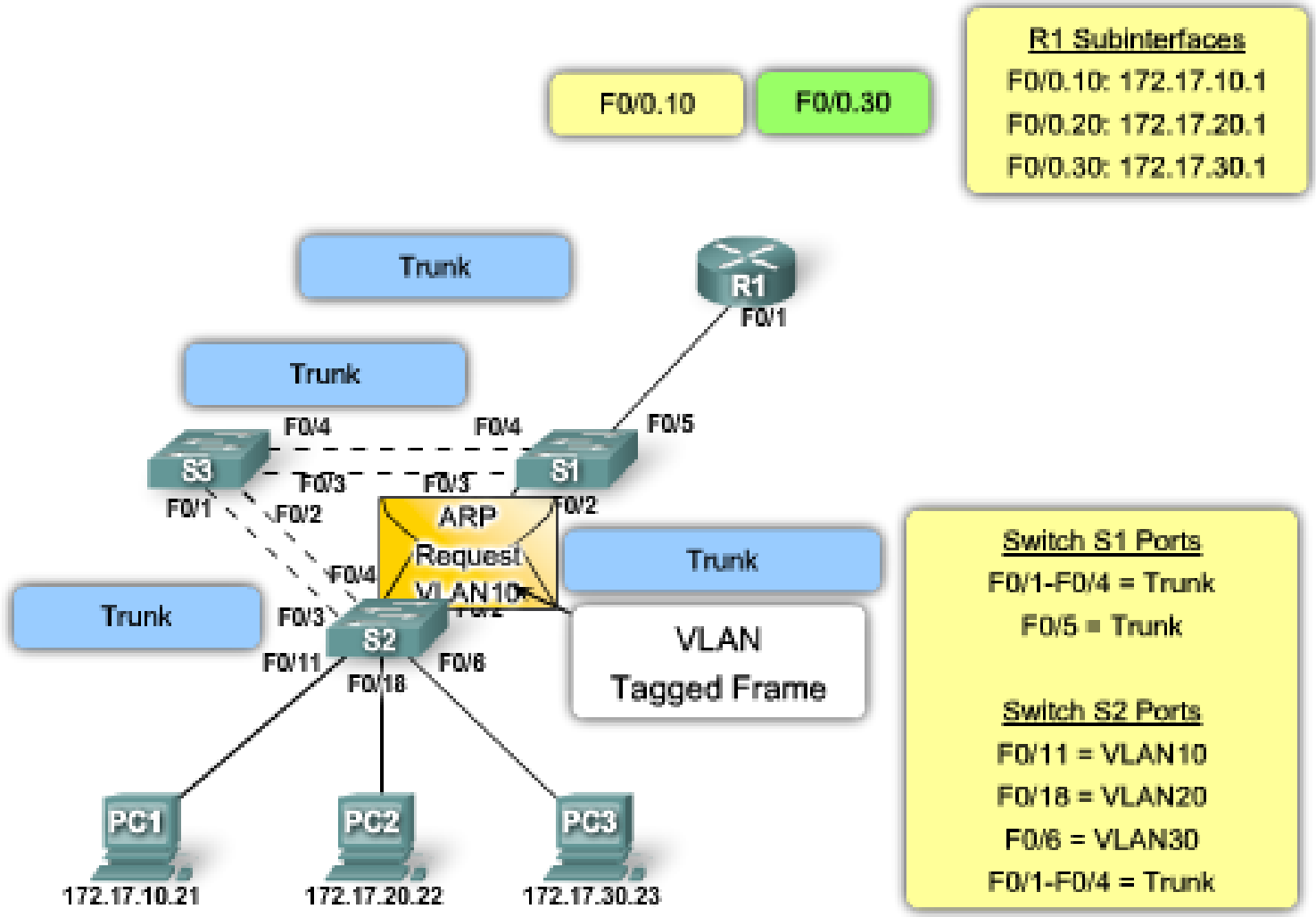
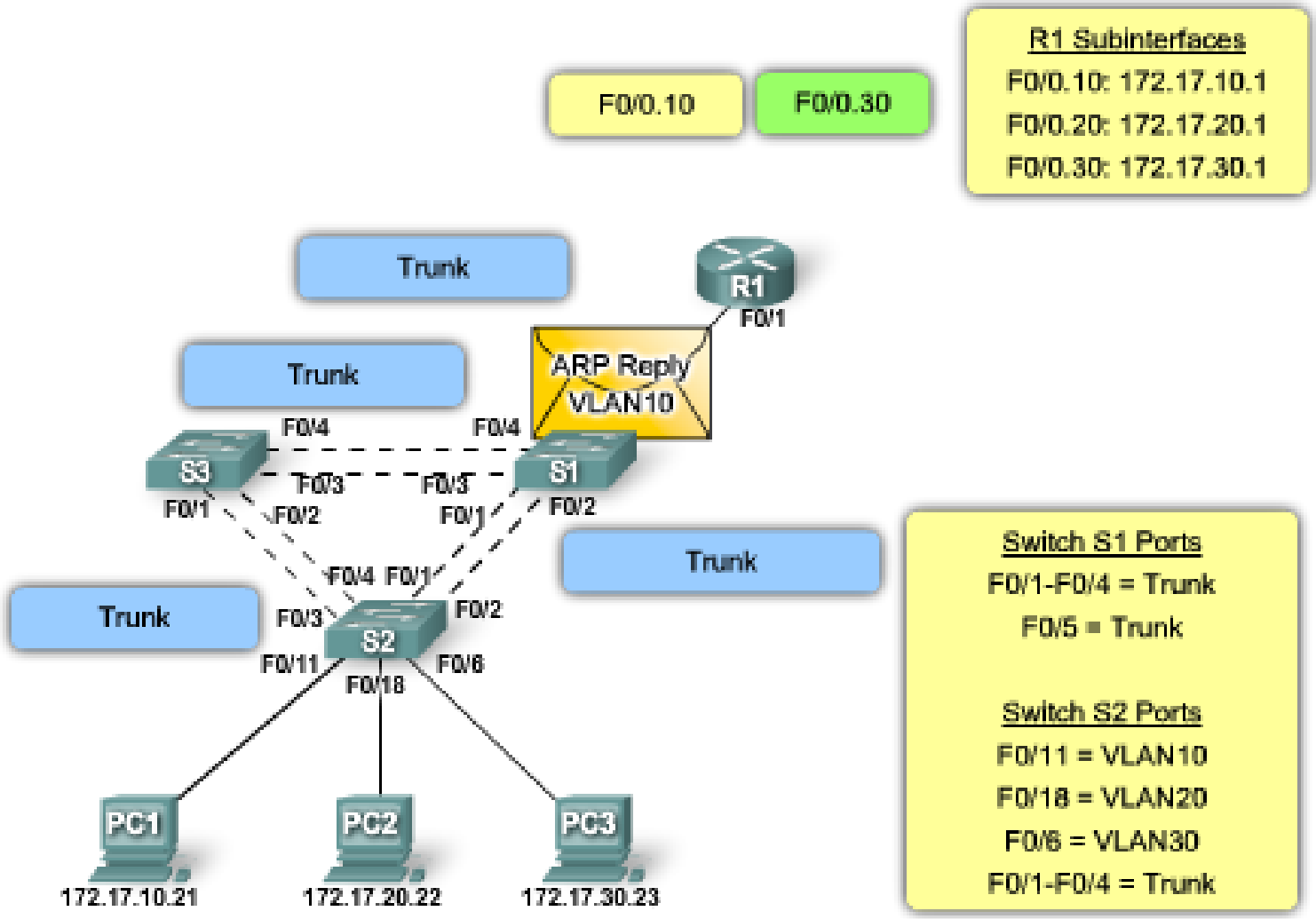


Fonctionnement Router-on-a-Stick

Router Subinterfaces and Inter-VLAN Routing

Router R1 examines the VLAN tag on the broadcast and recognizes that it was sent on VLAN10.

Since subinterface F0/0.10 has been configured for VLAN10, and has been configured with the IP address specified in the ARP request, the router responds back to PC1 with the MAC address of the physical interface.



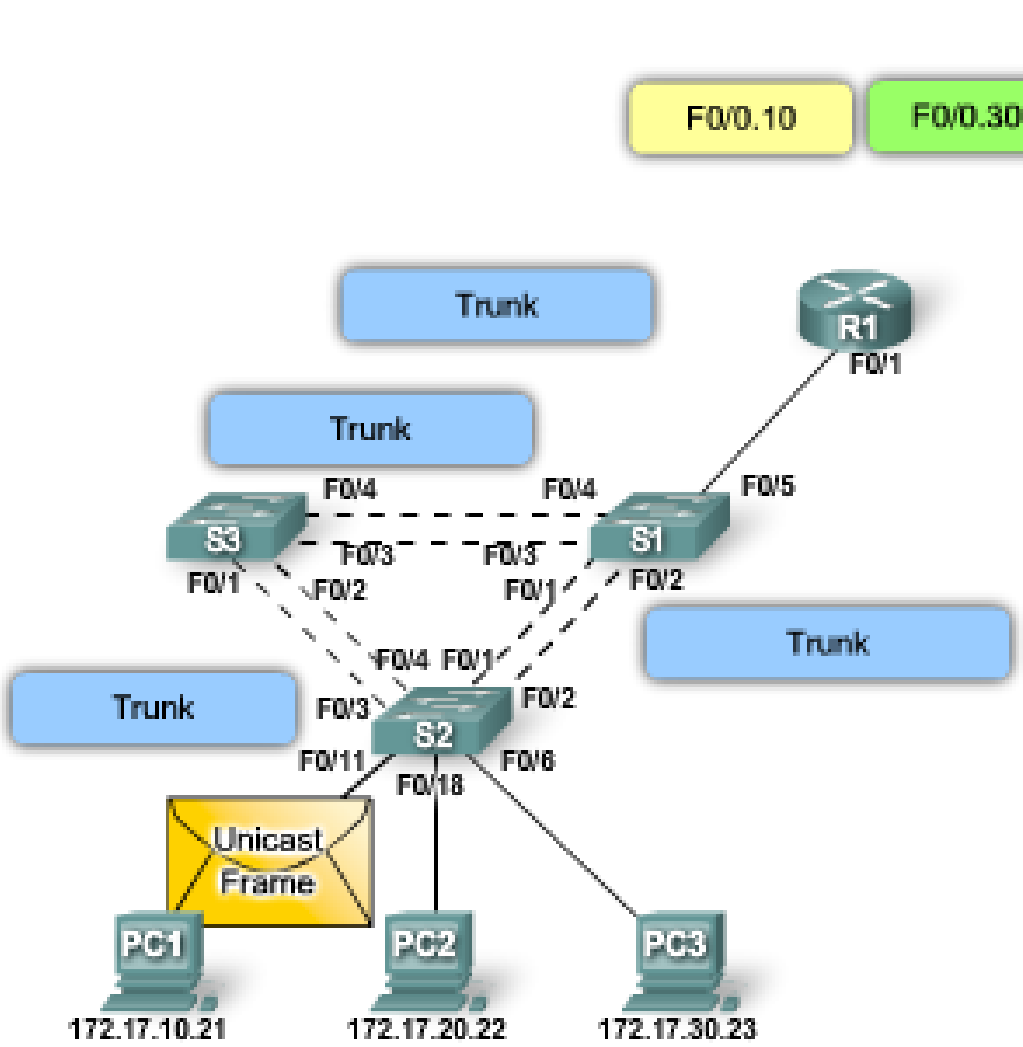
Fonctionnement Router-on-a-Stick

Router Subinterfaces and Inter-VLAN Routing

PC1 uses the MAC address received from router R1 to frame the unicast packet before it is sent out on the network.

Switch S2 tags the frame on VLAN10 as it traverses the trunk link to switch S1.

Switch S1 maintains the VLAN tag as it continues to forward the frame to router R1.



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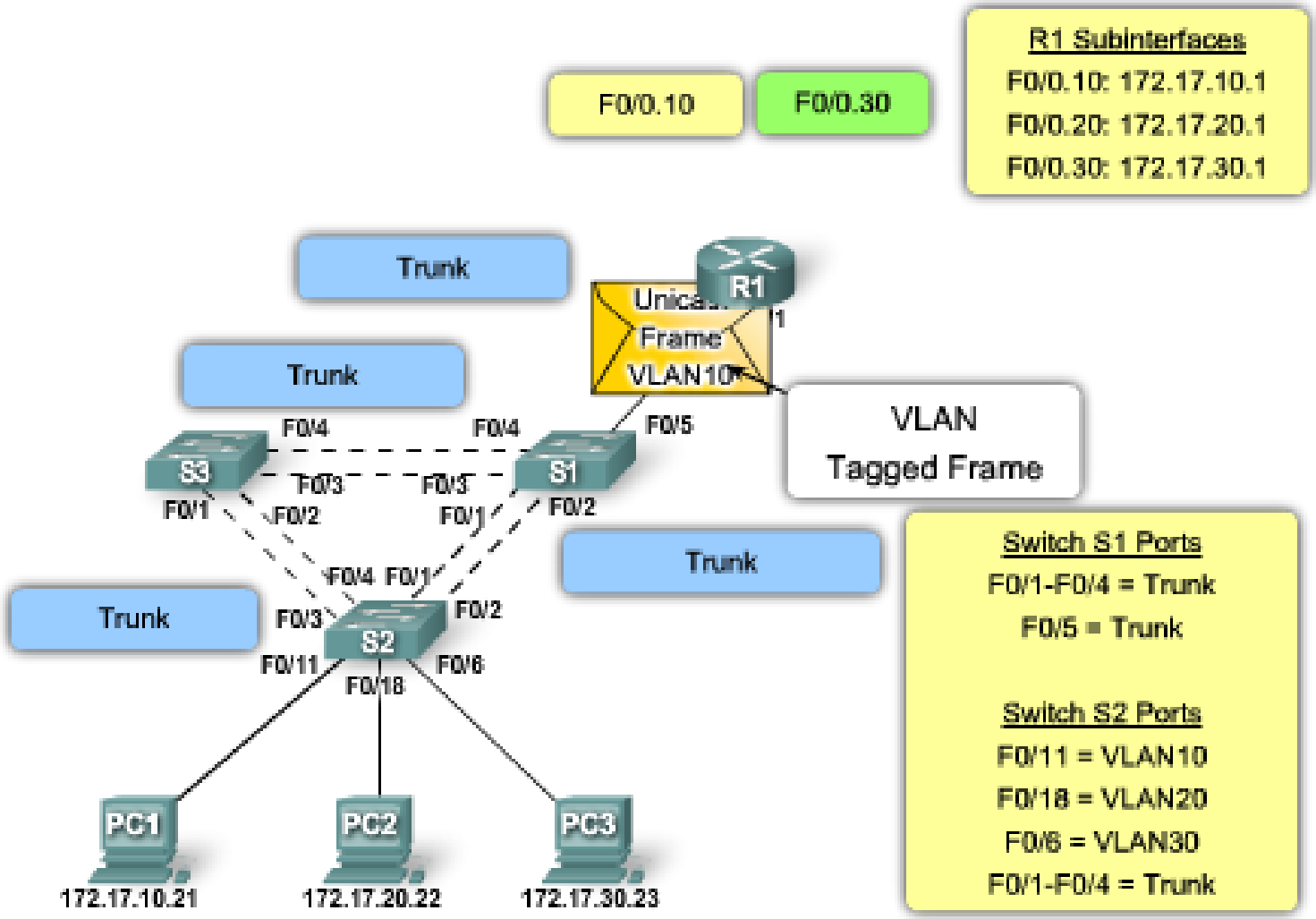
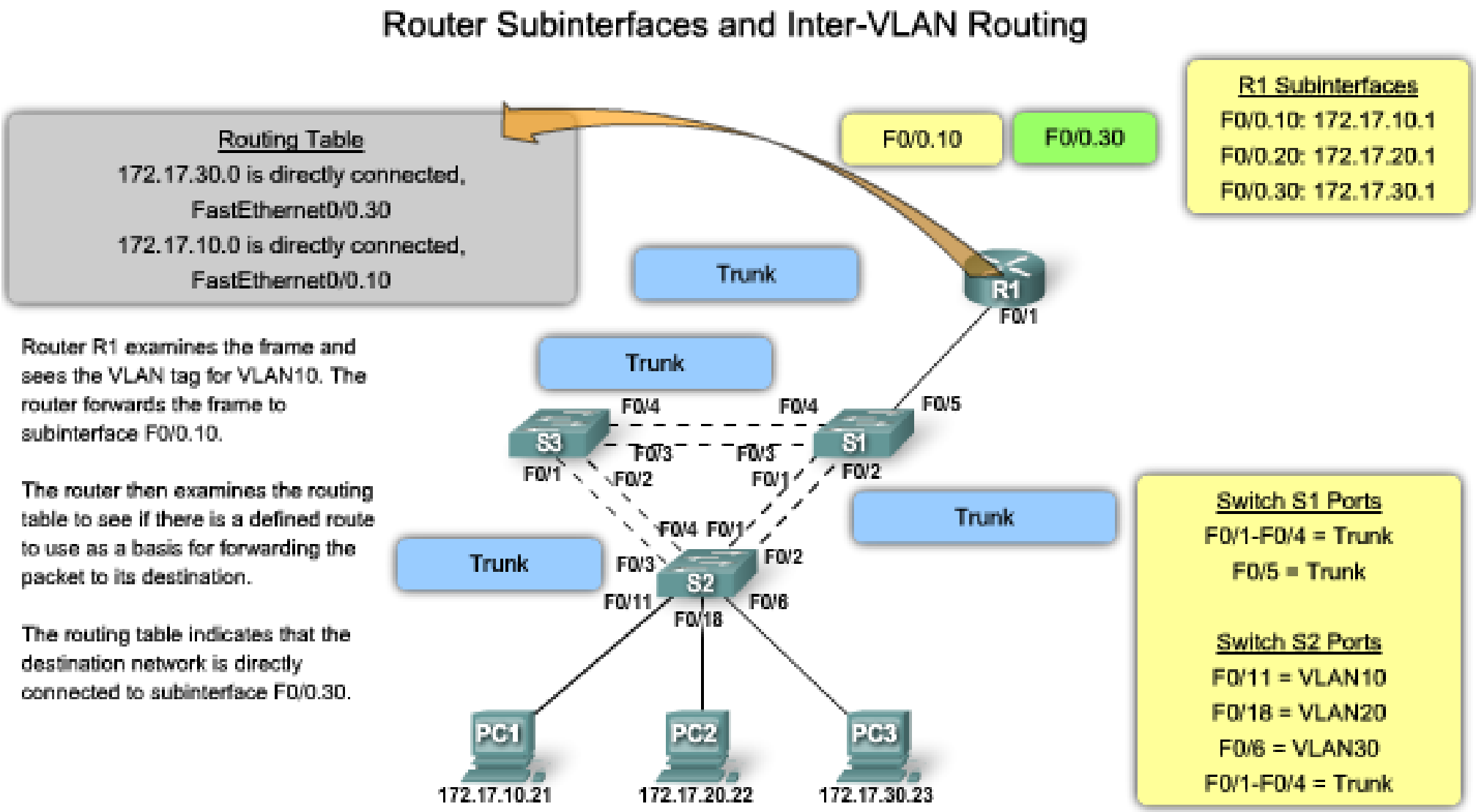
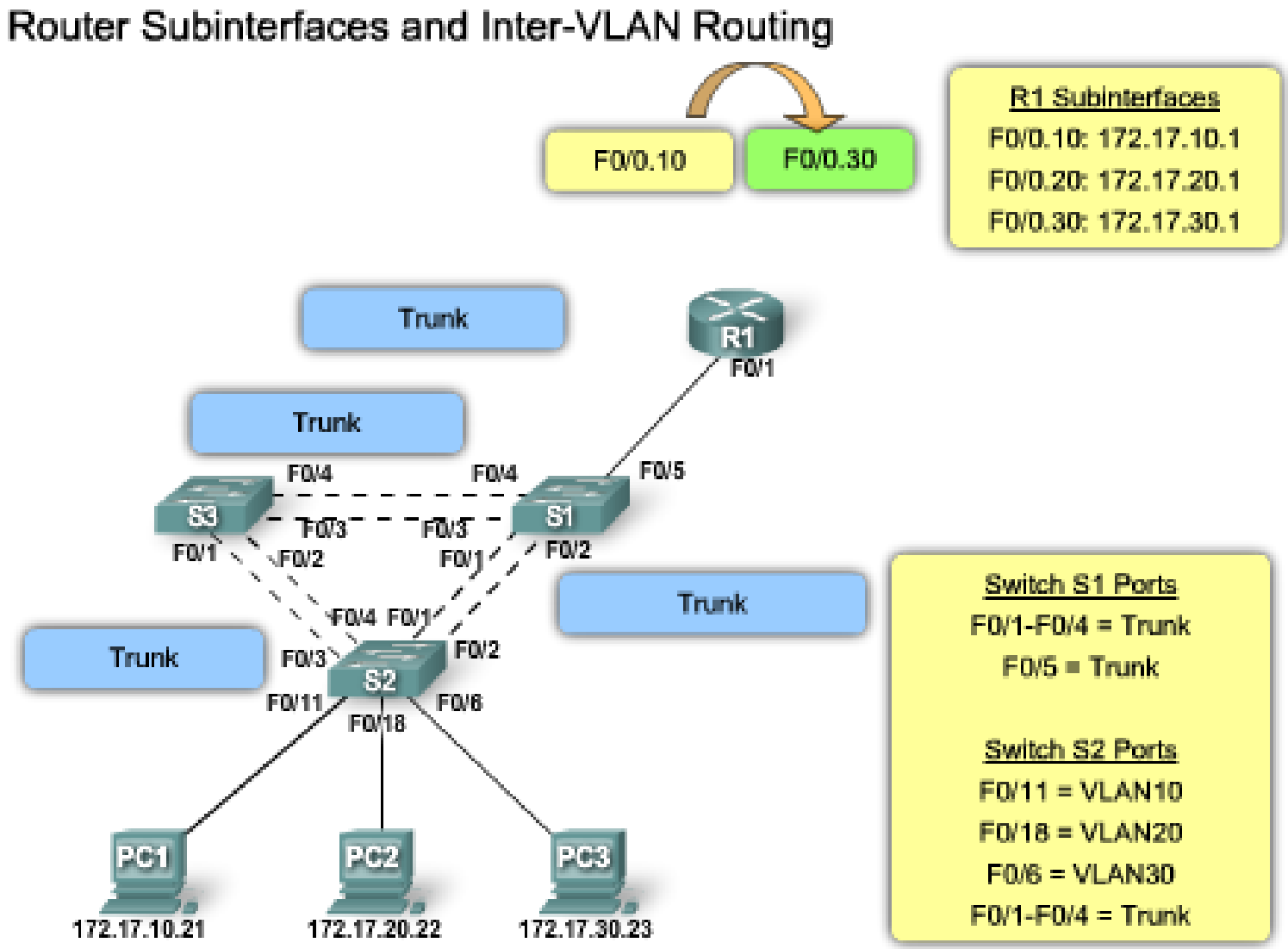


Fonctionnement Router-on-a-Stick



Fonctionnement Router-on-a-Stick



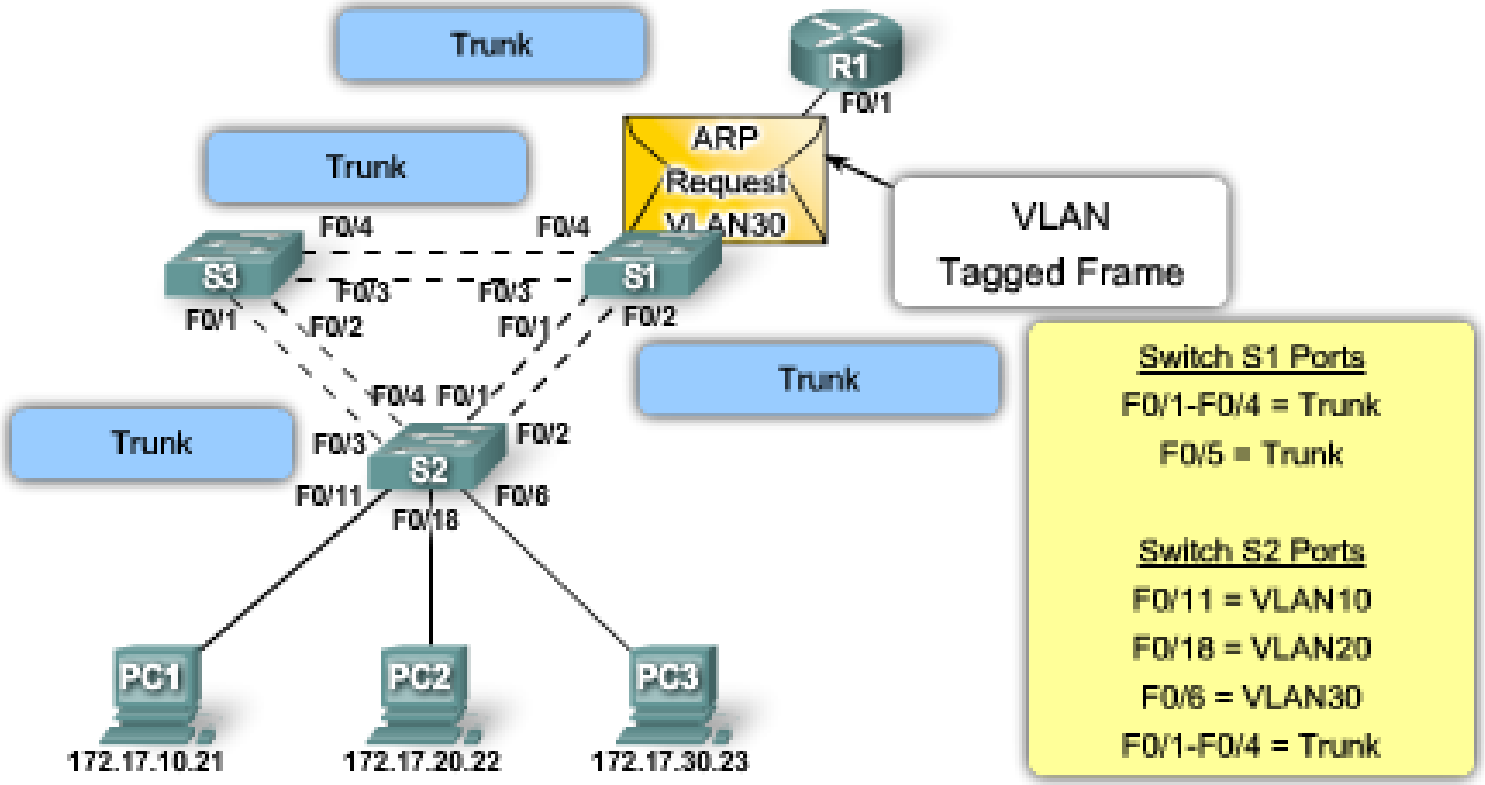
Fonctionnement Router-on-a-Stick

Router Subinterfaces and Inter-VLAN Routing

R1 sends a new ARP request for the MAC address of PC3.

The ARP request is sent out the router's physical interface tagged with VLAN30.

PC3 receives the ARP request.



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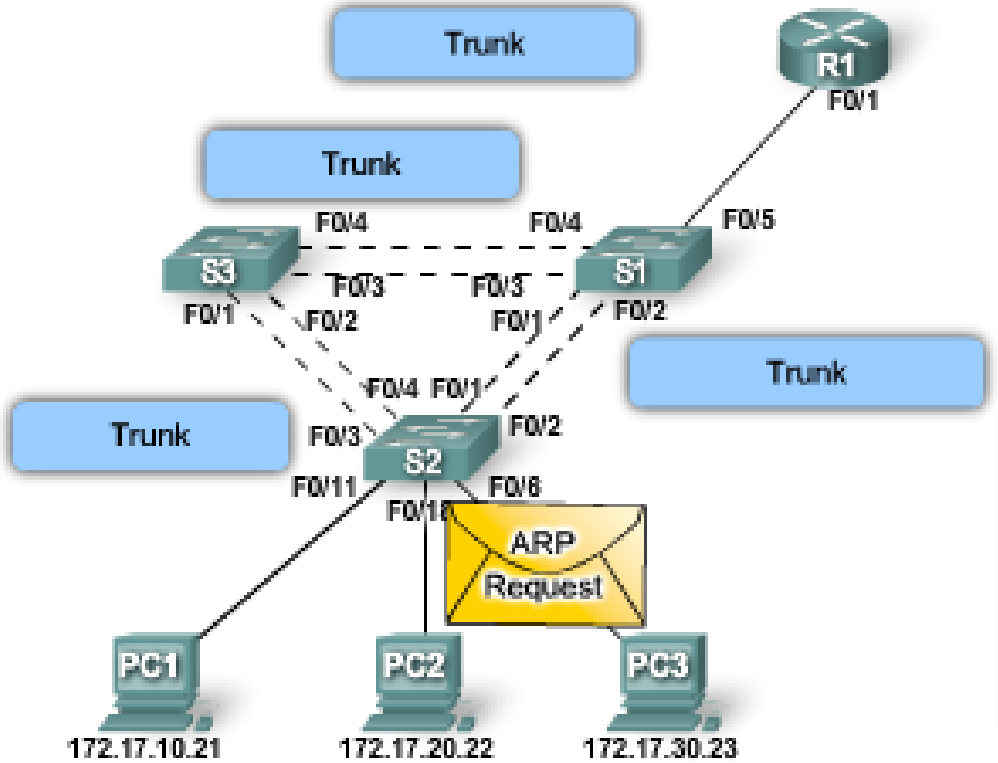
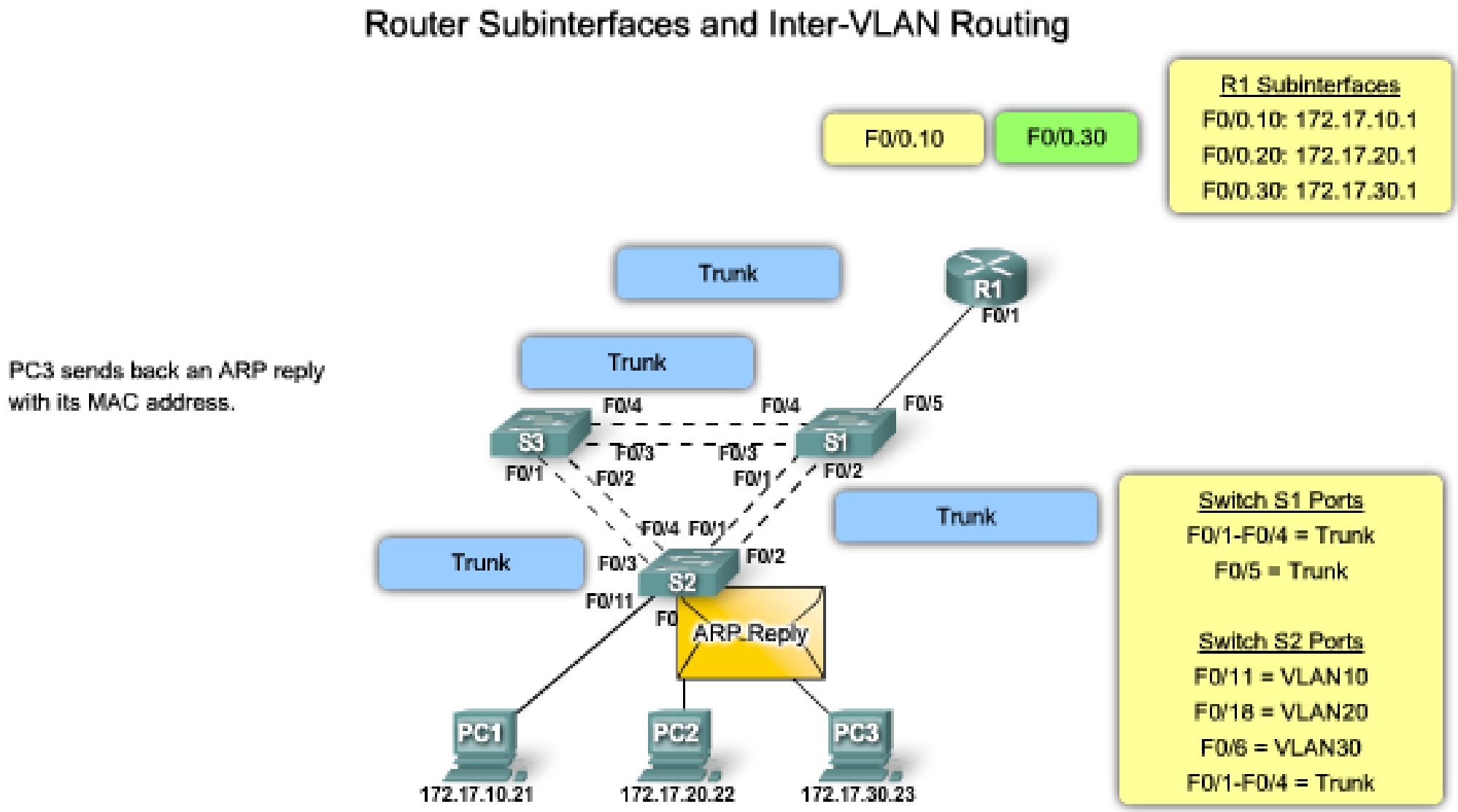
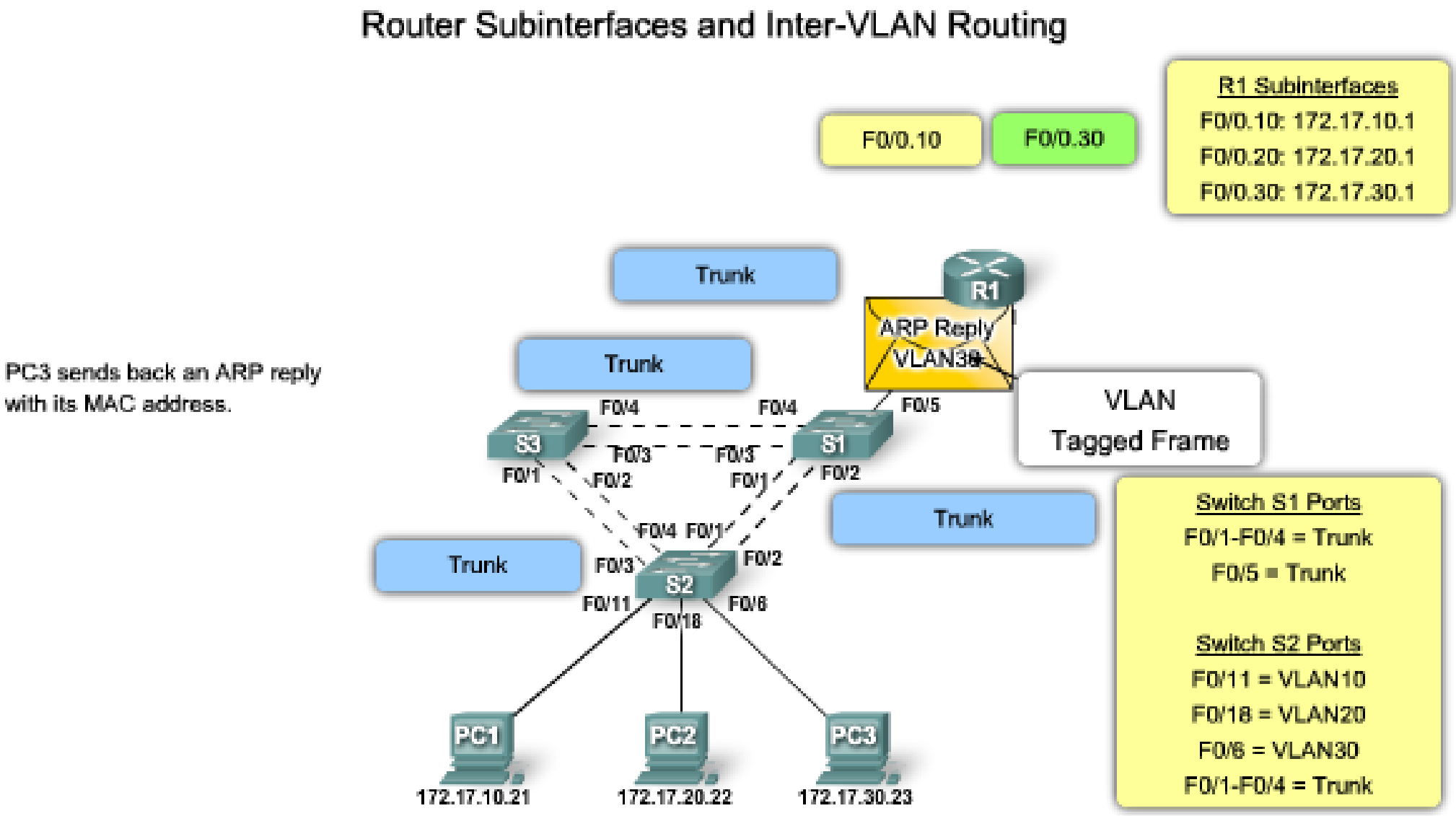


Fonctionnement Router-on-a-Stick



Fonctionnement Router-on-a-Stick

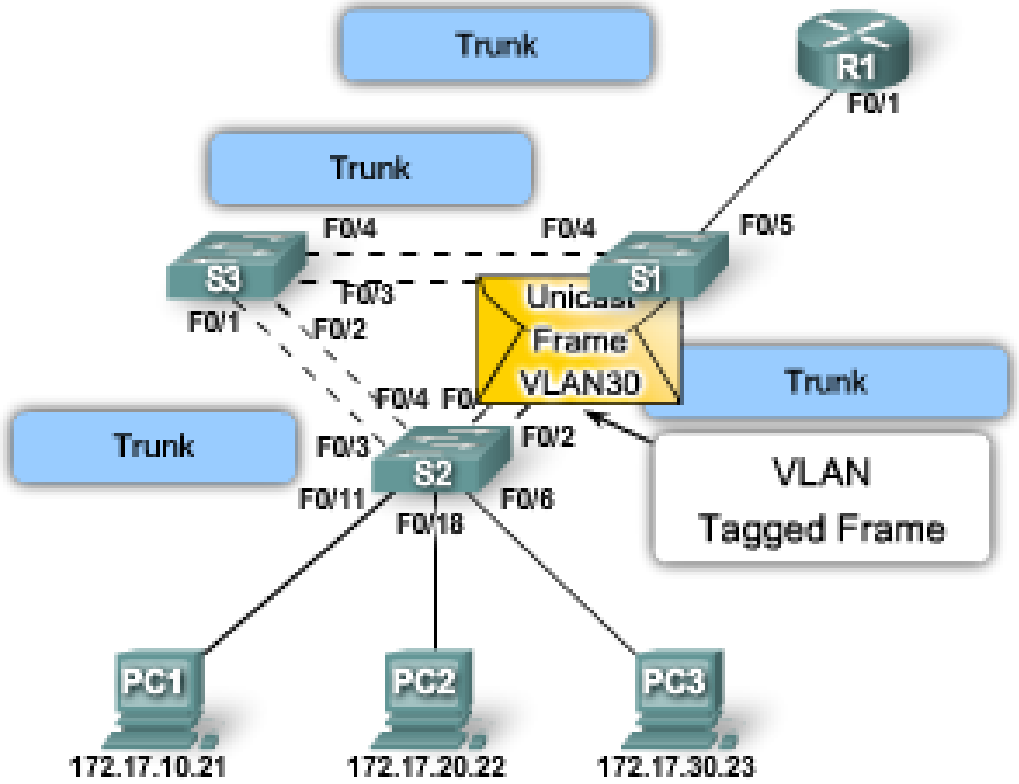


Fonctionnement Router-on-a-Stick

Router Subinterfaces and Inter-VLAN Routing

Router R1 receives the ARP reply and finishes framing the packet before it sends it out on to the network.

Switch S1 forwards the frame to switch S2, which then finally delivers the frame to PC3.



Configuration Router-on-a-stick

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface f0/0.10
R1(config-subif)#encapsulation dot1q 10
R1(config-subif)#ip address 172.17.10.1 255.255.255.0
R1(config-subif)#interface f0/0.30
R1(config-subif)#encapsulation dot1q 30
R1(config-subif)#ip address 172.17.30.1 255.255.255.0
R1(config-subif)#interface f0/0
R1(config-if)#no shutdown
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.10,
changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.30,
```

Le routage Inter-VLAN

Etude des 2 solutions

Différences

Physical Interface	Subinterface
One physical interface per VLAN	One physical interface for many VLANs
No bandwidth contention	Bandwidth contention
Connected to access mode switch port	Connected to trunk mode switch port
More expensive	Less expensive
Less complex connection configuration	More complex connection configuration

Le routage Inter-VLAN

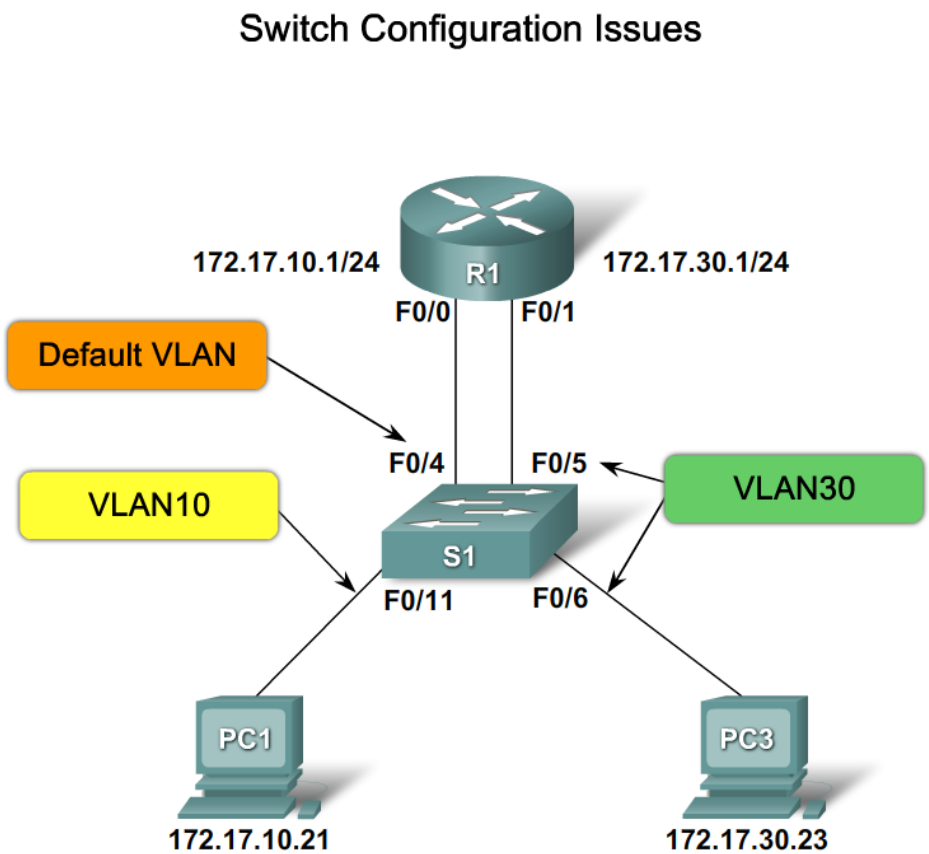
Erreurs de configuration

Erreurs classiques

- Utilisation de sous interface
  - Port du switch en mode trunk
  - Pas de DTP car le routeur ne supporte pas ce protocole
- Utilisation d'une interface physique
  - Port du switch en mode access
- Vérifiez la table de routage de votre routeur
  - Vous devez pouvoir accéder à tous les VLAN que vous routez
- Mauvais marquage des trames
  - Oublie du type d'encapsulation et du VLAN à utiliser sur la sous interface

Erreur de configuration du switch

- Quelle est l'erreur ?

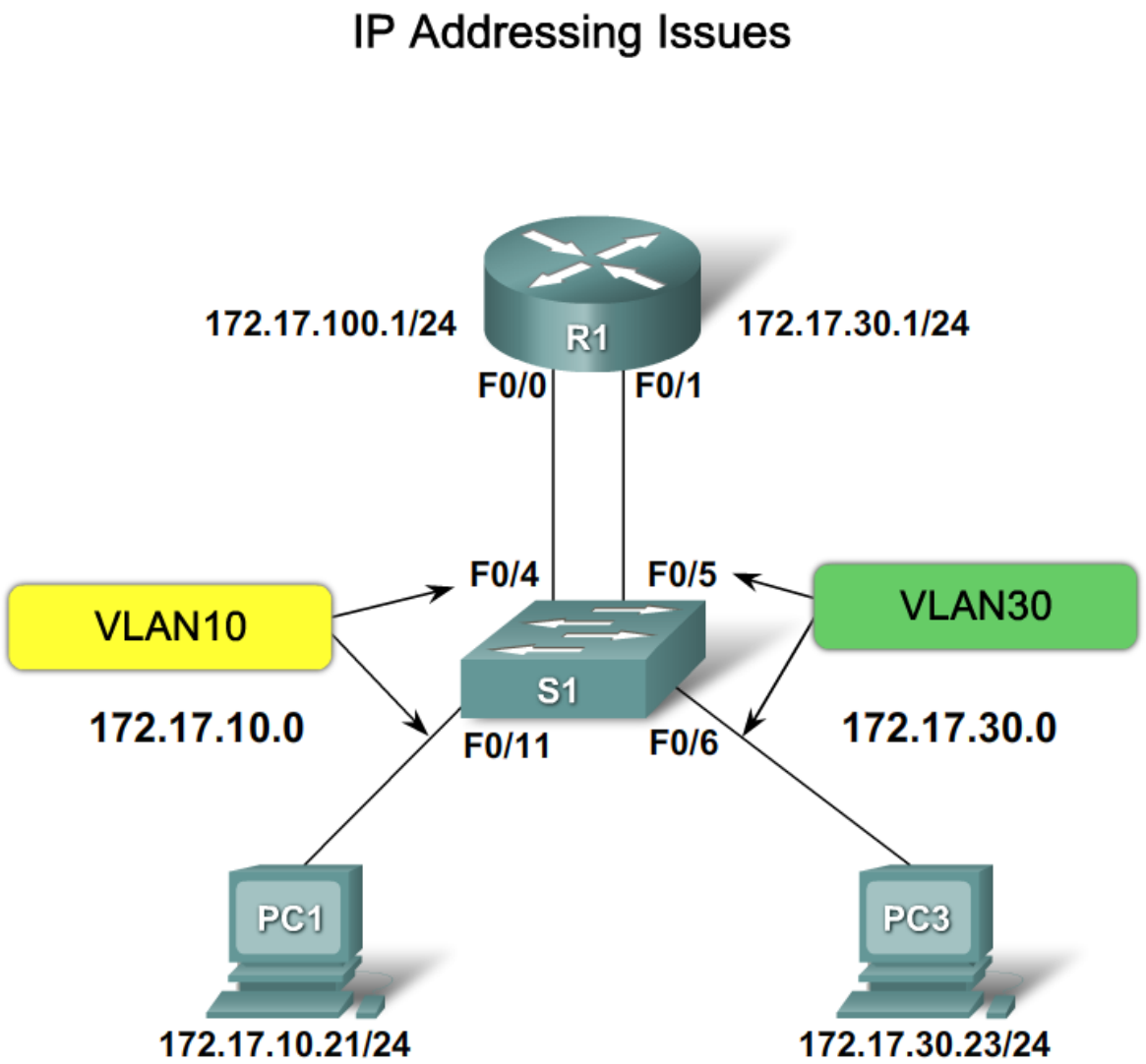


Vérifiez votre configuration

Verify Router Configuration

```
R1#show interface
<output truncated>
FastEthernet0/0.10 is up, line protocol is down (disabled)
  Encapsulation 802.1Q Virtual LAN, Vlan ID 100
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last clearing of "show interface" counters never
<output truncated>
R1#
R1#show run
Building configuration...
Current configuration : 505 bytes
<output truncated>
!
interface FastEthernet0/0.10
 encapsulation dot1Q 100
 ip address 172.17.10.1 255.255.255.0
!
interface FastEthernet0/0.30
```

Problème d'adressage



Le routage Inter-VLAN

Questions ?