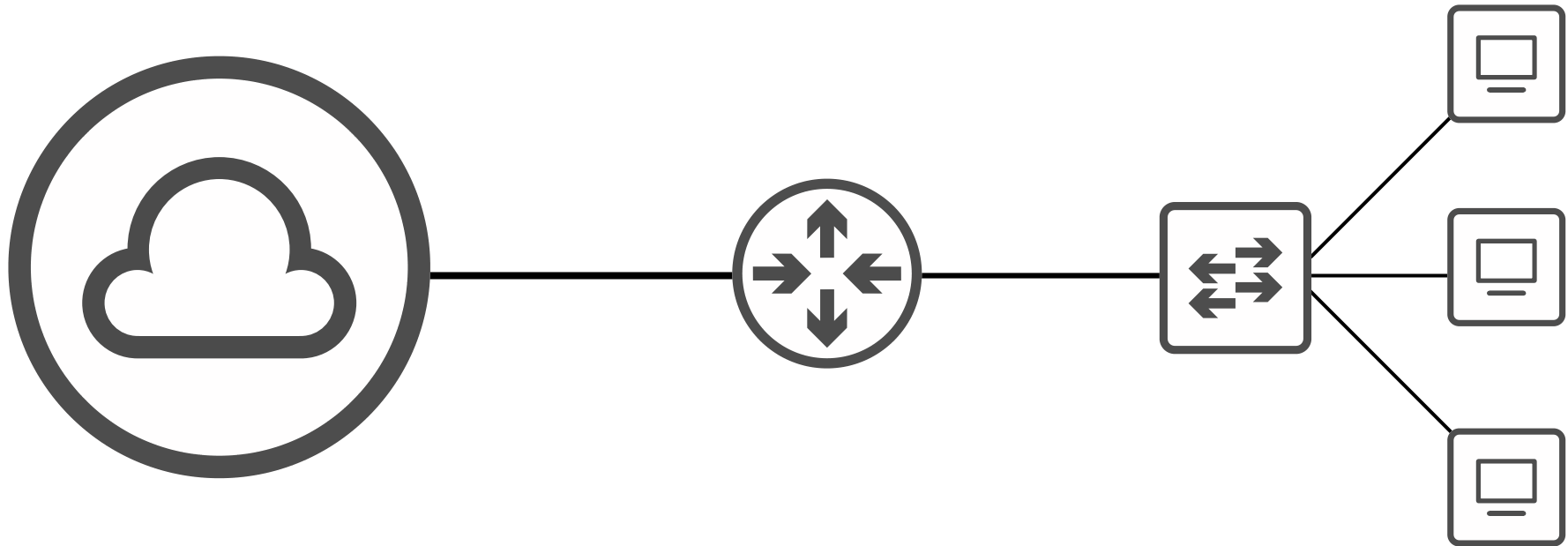


CCNA 200-301 Day 16

VLANs (Virtual Local Area Networks) Part 1



Things we'll cover

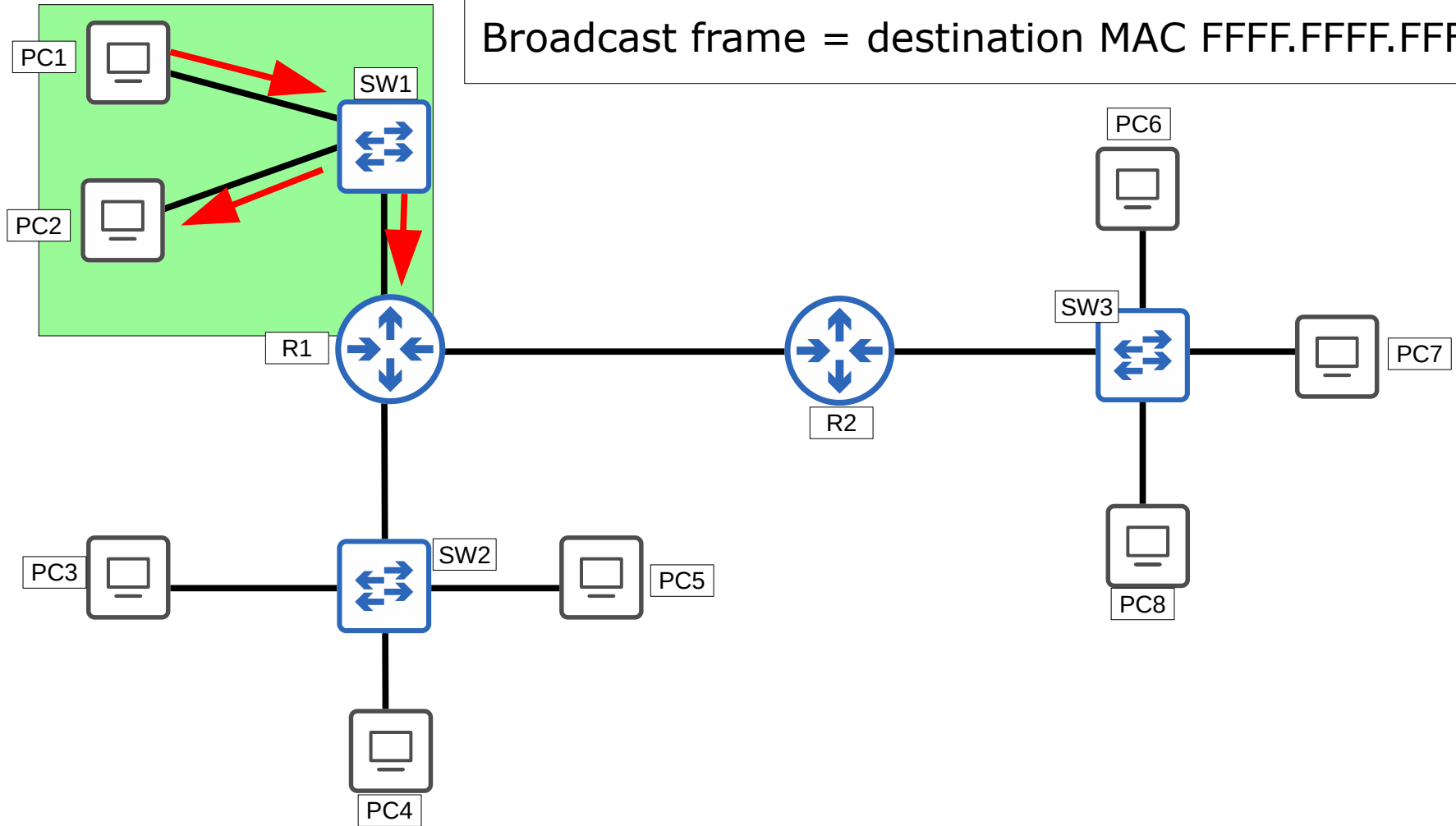
- What is a LAN?
- Broadcast domains
- What is a VLAN?
- What is the purpose of VLANs?
- How to configure VLANs on Cisco switches

What is a LAN?

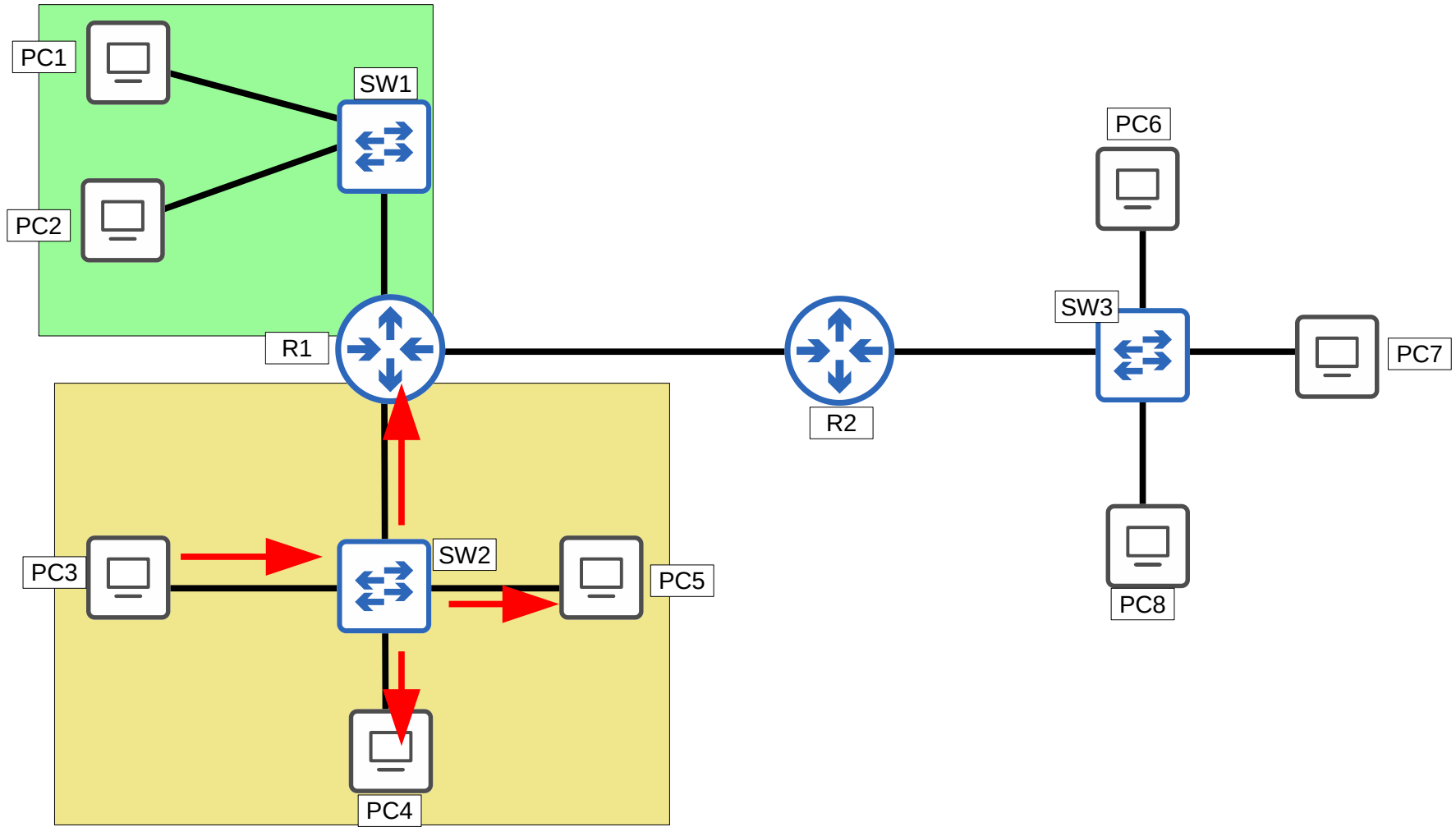
- Previously I said that a LAN is a group of devices (PCs, servers, routers, switches, etc.) in a single location (home, office, etc.)
- A more specific definition: A LAN is a single **broadcast domain**, including all devices in that broadcast domain.
- A **broadcast domain** is the group of devices which will receive a broadcast frame (destination MAC FFFF.FFFF.FFFF) sent by any one of the members.

LANs/Broadcast Domains

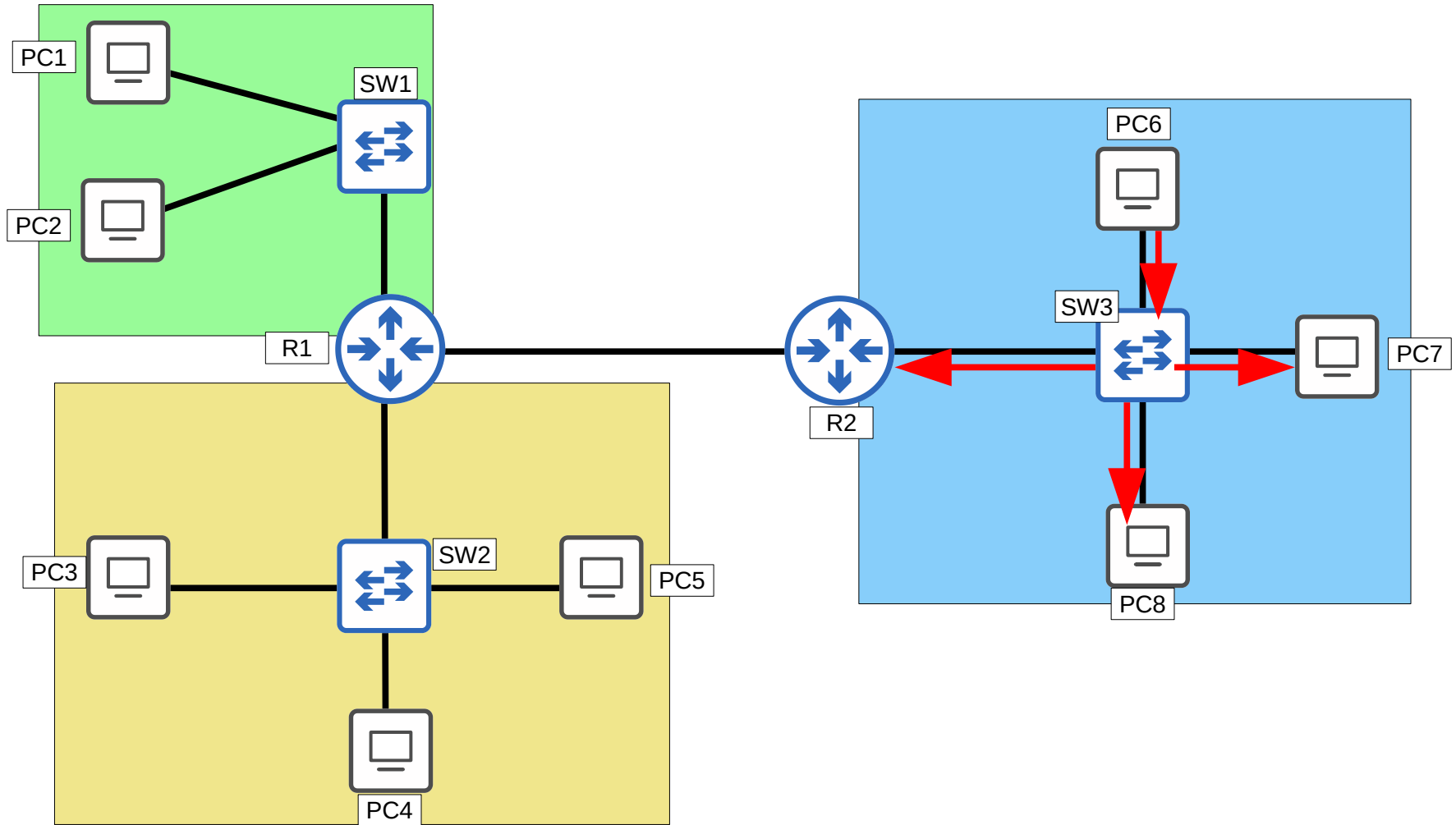
Broadcast frame = destination MAC FFFF.FFFF.FFFF



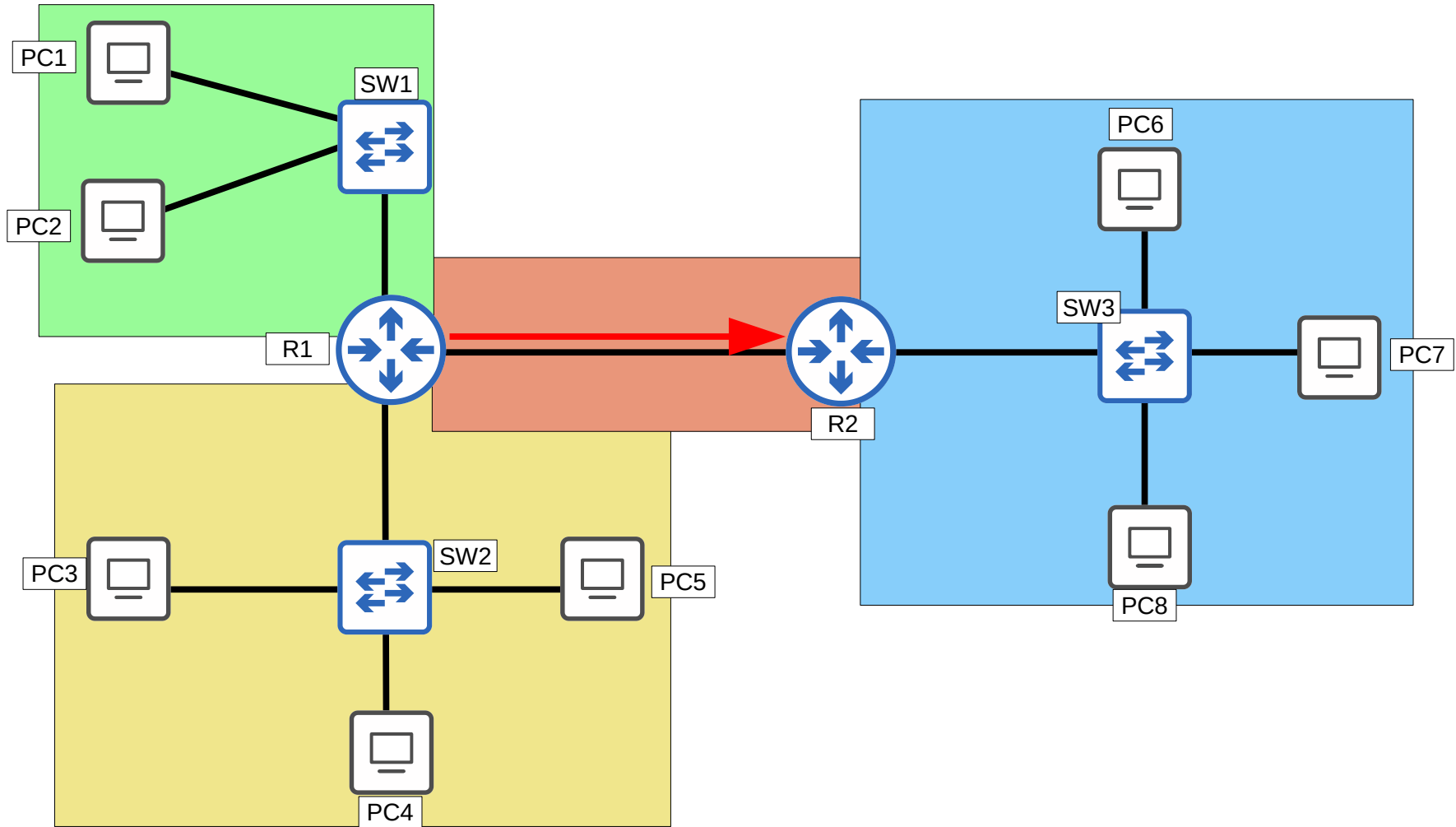
LANs/Broadcast Domains



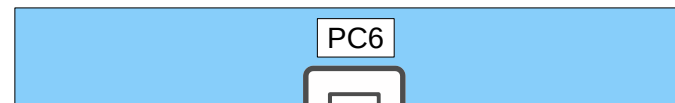
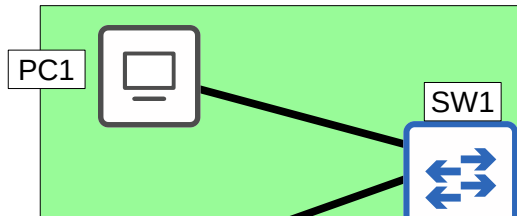
LANs/Broadcast Domains



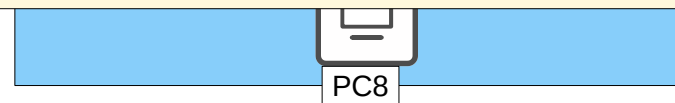
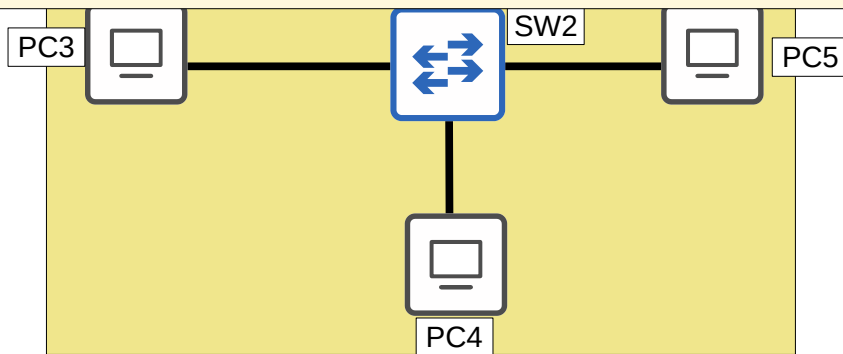
LANs/Broadcast Domains



LANs/Broadcast Domains

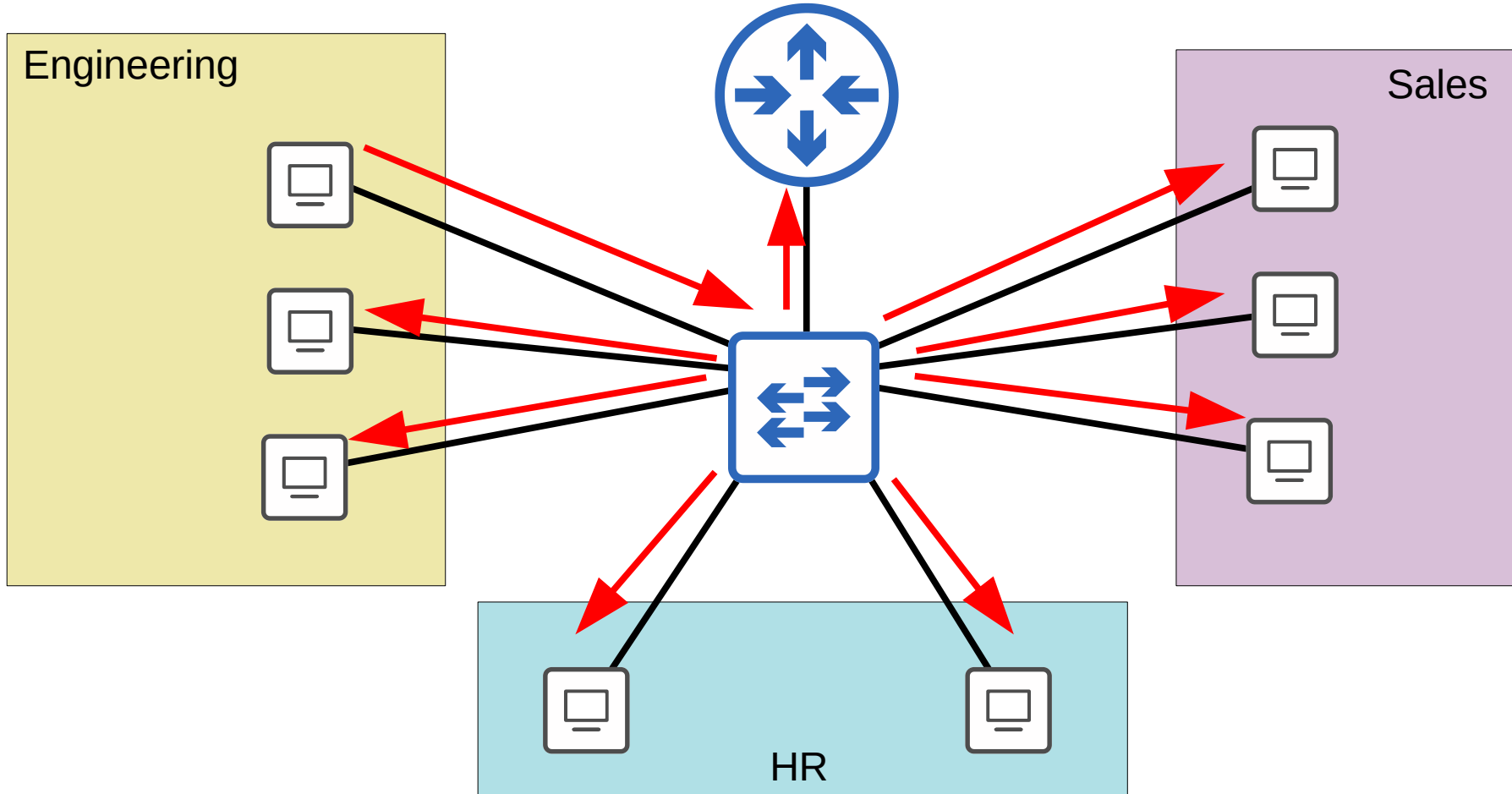


A **broadcast domain** is the group of devices which will receive a broadcast frame (destination MAC FFFF.FFFF.FFFF) sent by any one of the members.



What is a VLAN?

192.168.1.0/24



What is a VLAN?

192.168.1.0/24

Performance: Lots of unnecessary broadcast traffic can reduce network performance.

Security: Even within the same office, you want to limit who has access to what.
You can apply security policies on a router/firewall.

Because this is one LAN, PCs can reach each other directly,
without traffic passing through the router.

So, even if you configure security policies,
they won't have any effect.

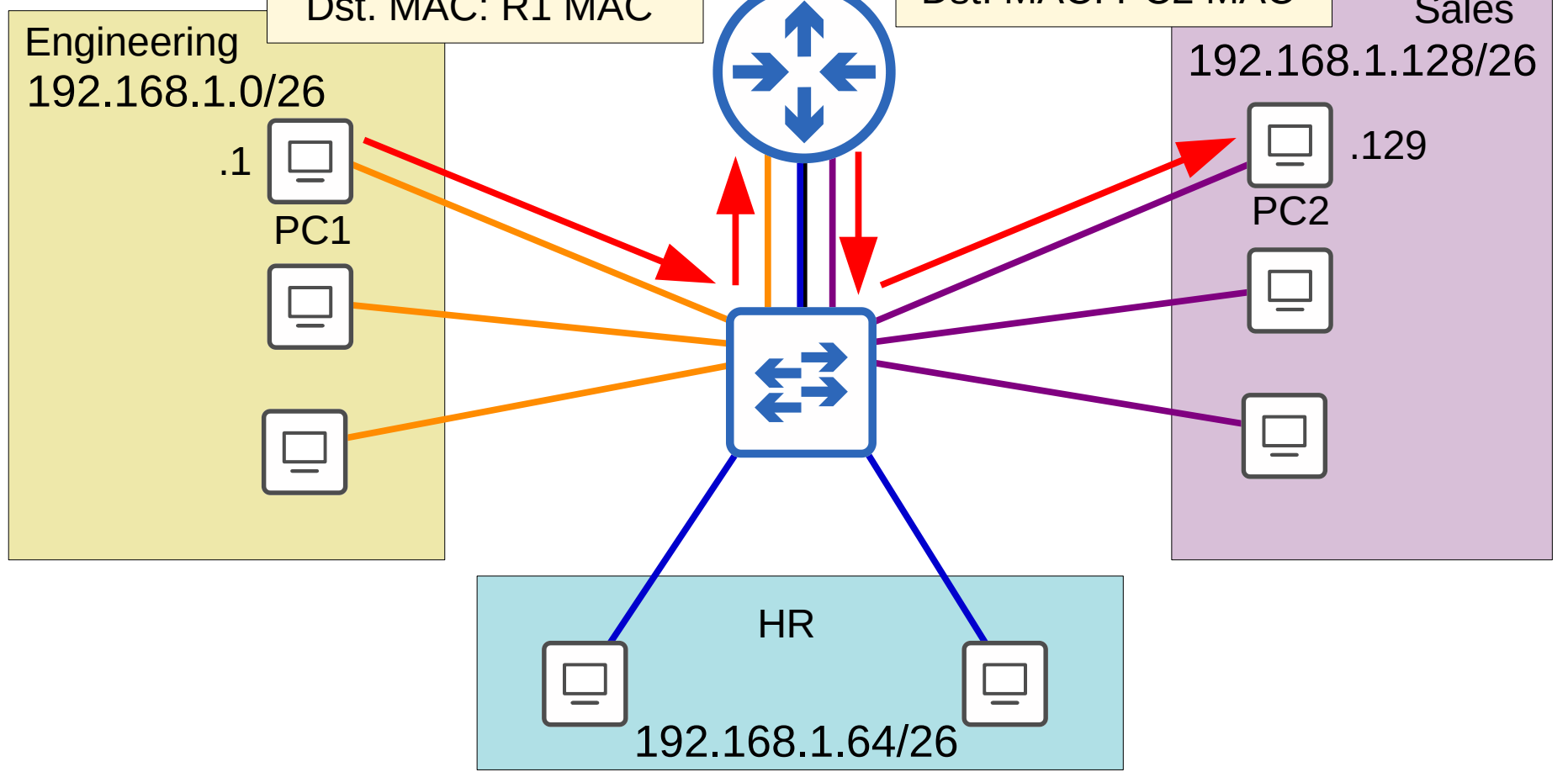


HR

is a VL

Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: PC1 MAC
Dst. MAC: R1 MAC

Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: R1 MAC
Dst. MAC: PC2 MAC



Engineering
192.168.1.0/26

.1
PC1

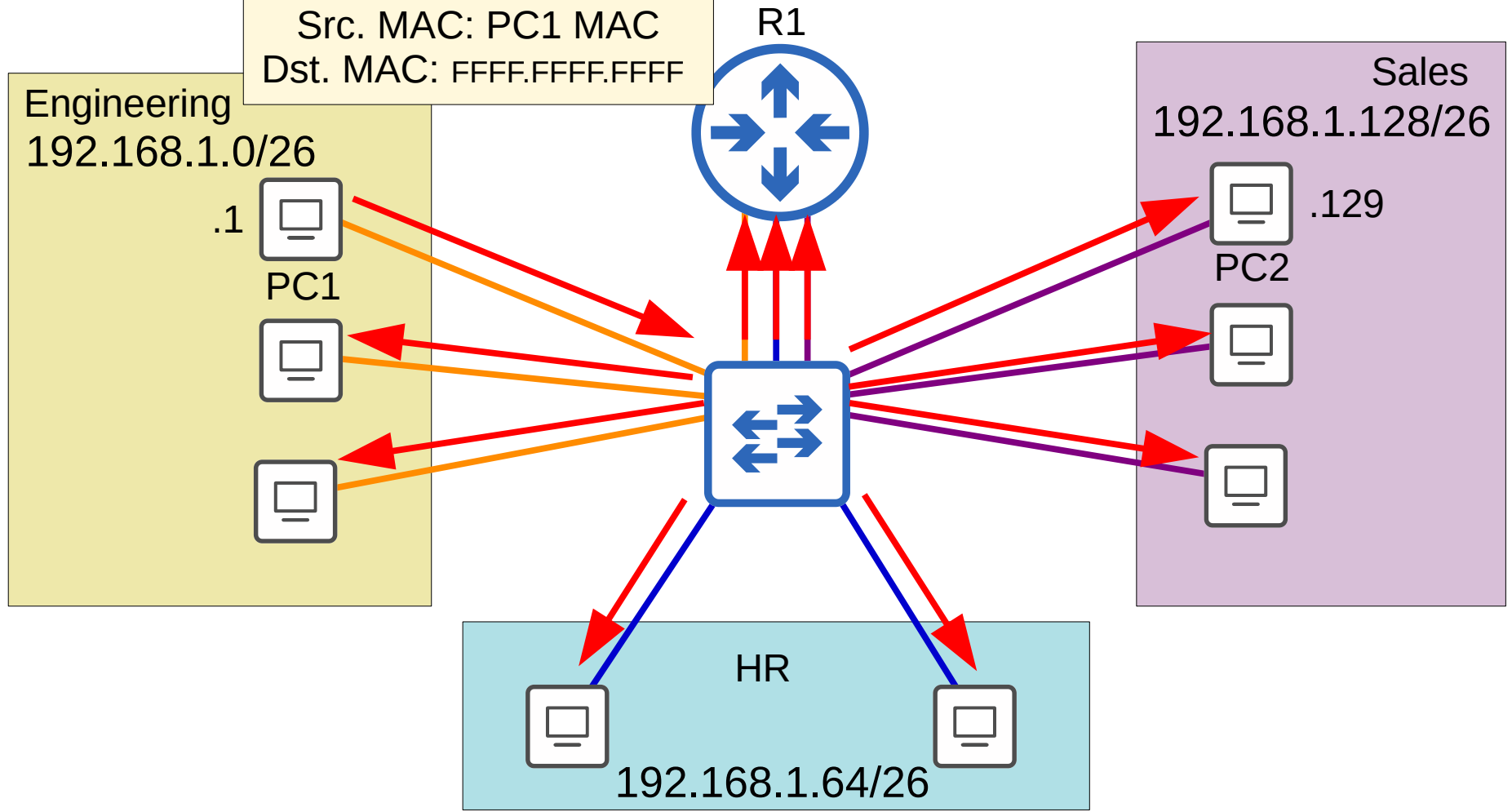
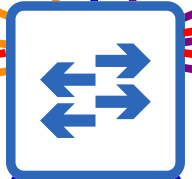
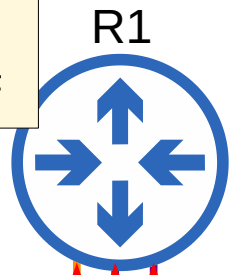
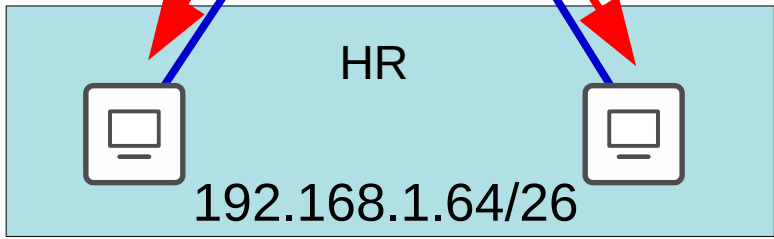
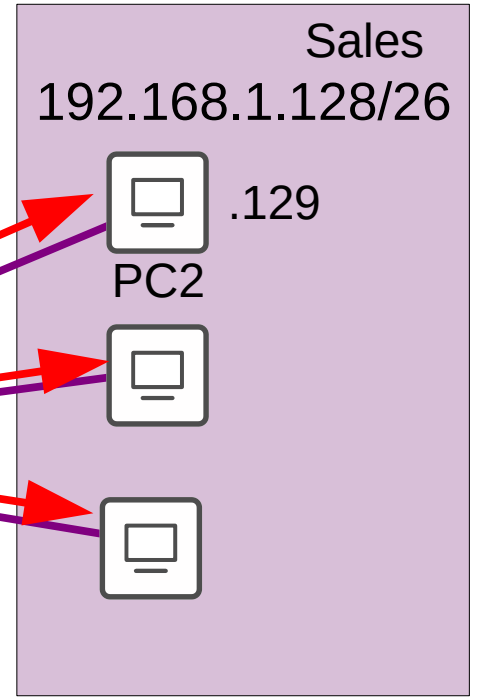
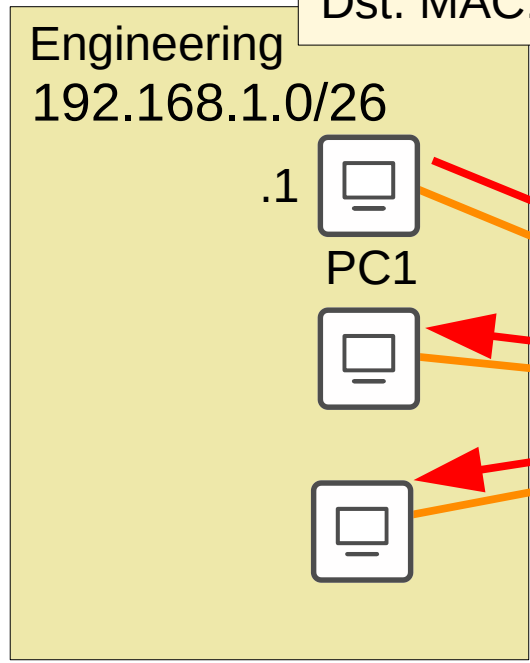
HR
192.168.1.64/26

Sales
192.168.1.128/26

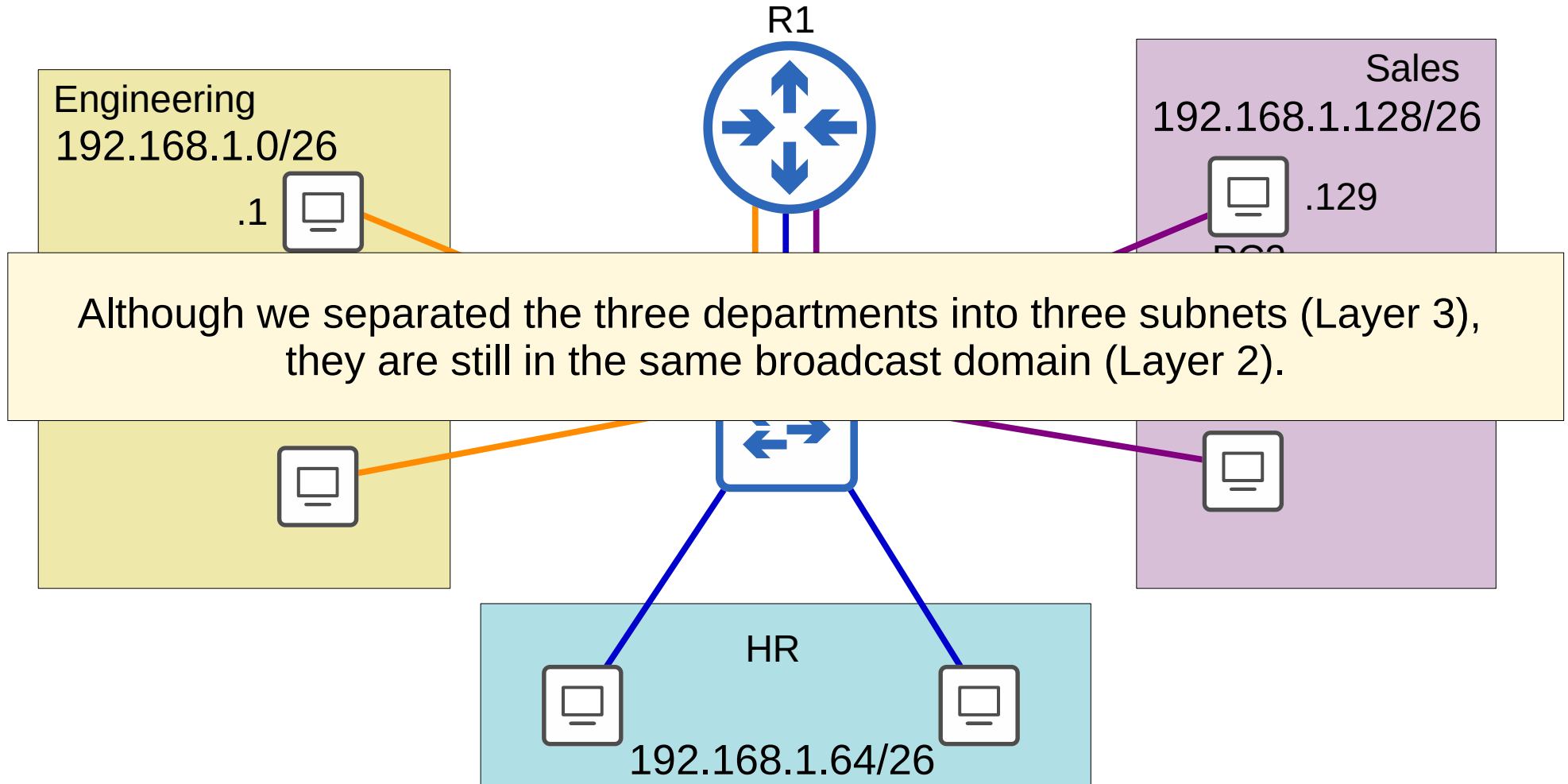
.129
PC2

... is a VLAN?

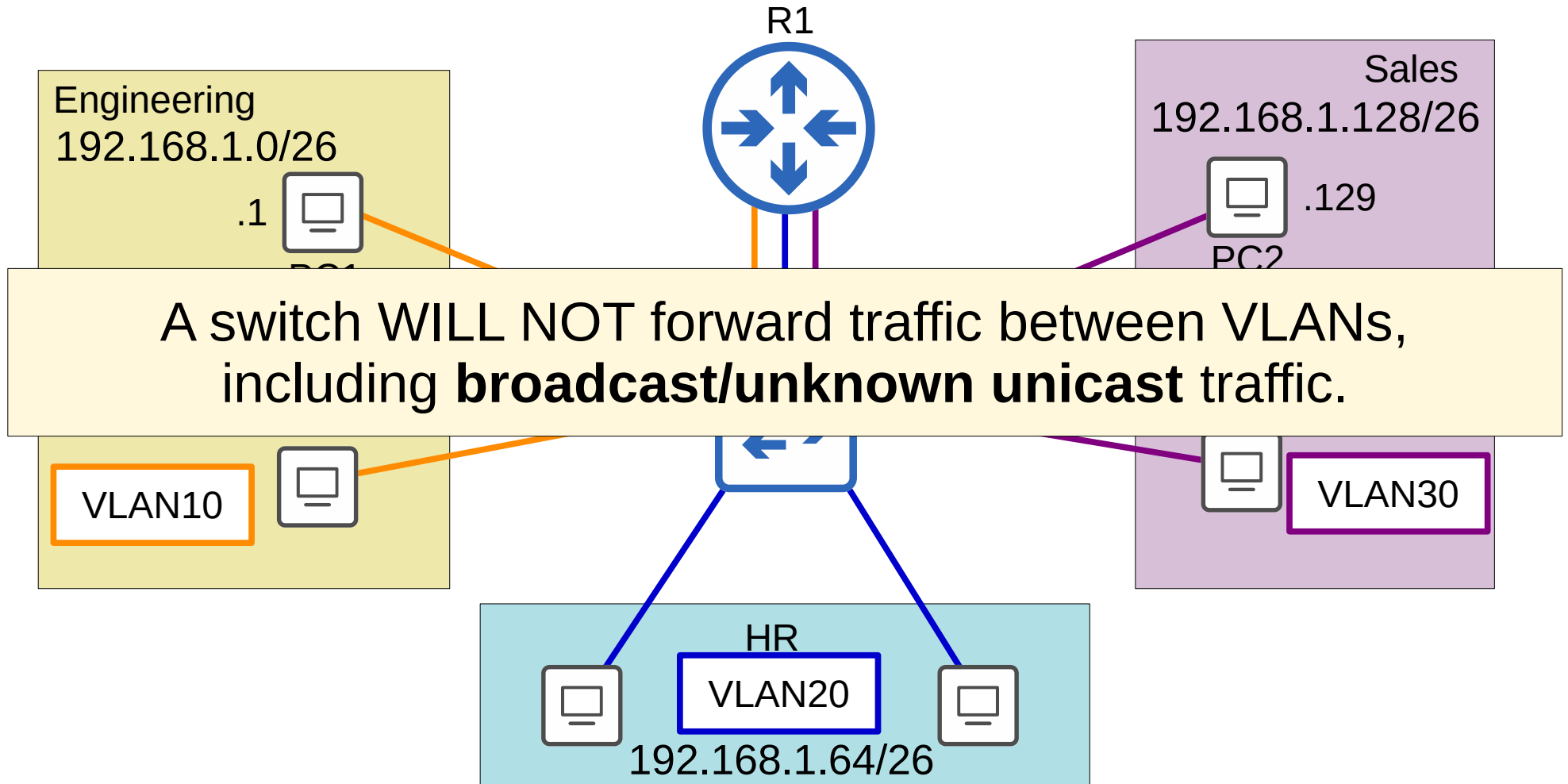
Src. IP: 192.168.1.1
Dst. IP: 192.168.1.63
Src. MAC: PC1 MAC
Dst. MAC: FFFF.FFFF.FFFF



What is a VLAN?

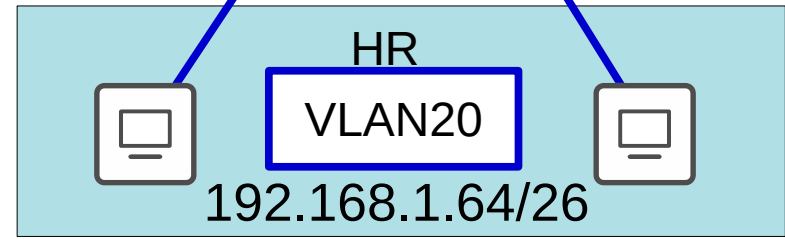
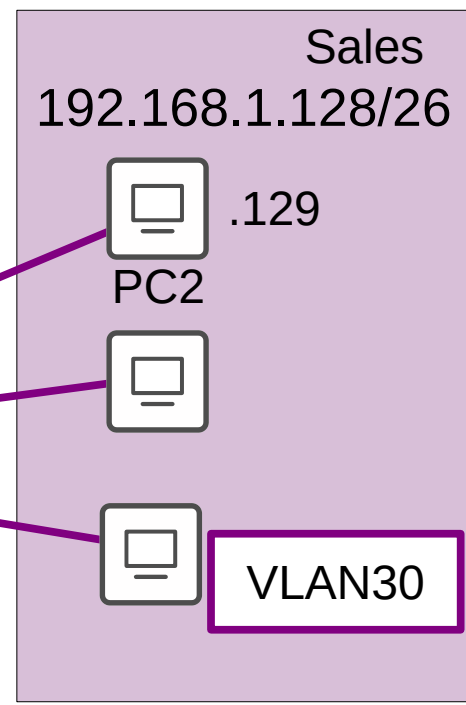
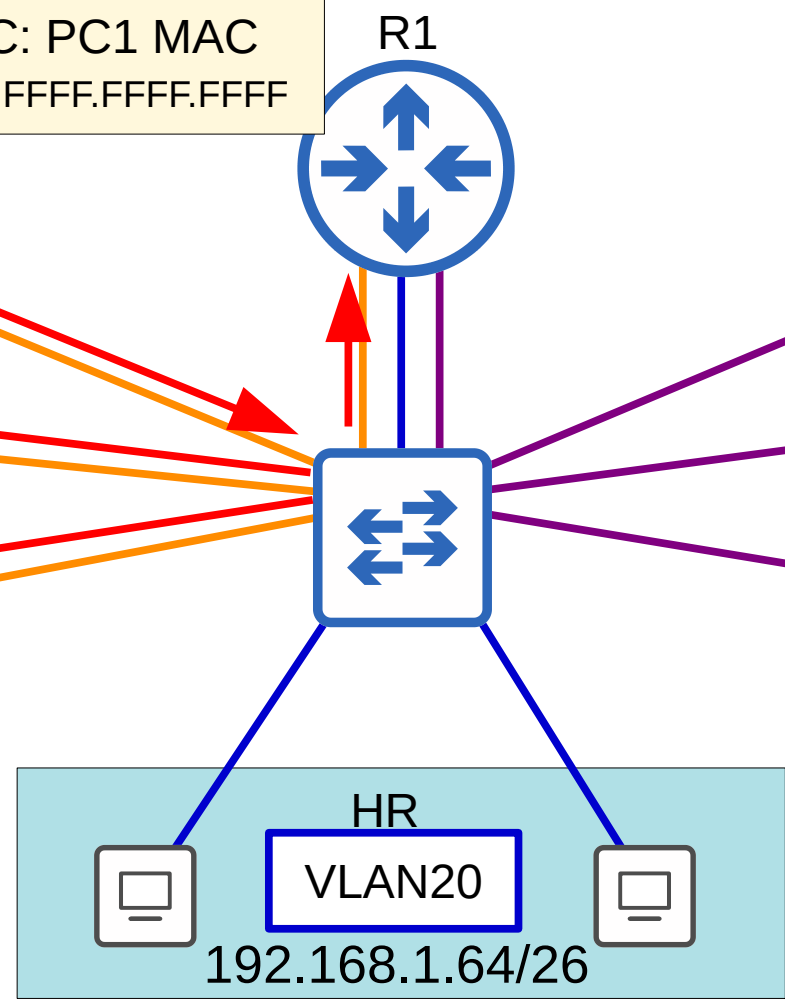
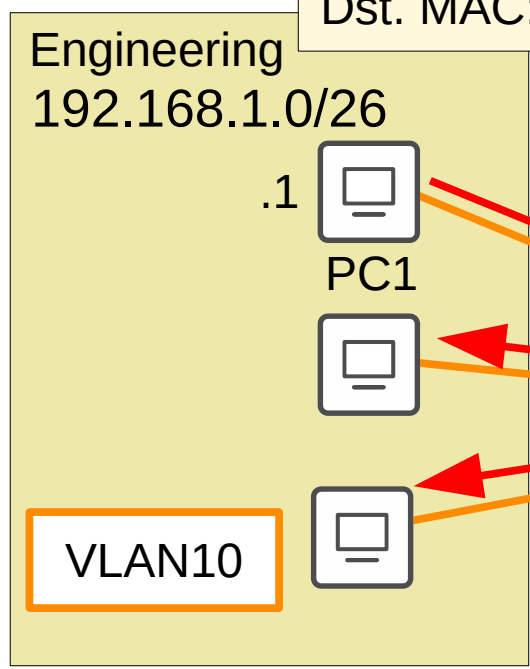


What is a VLAN?



What's a VLAN?

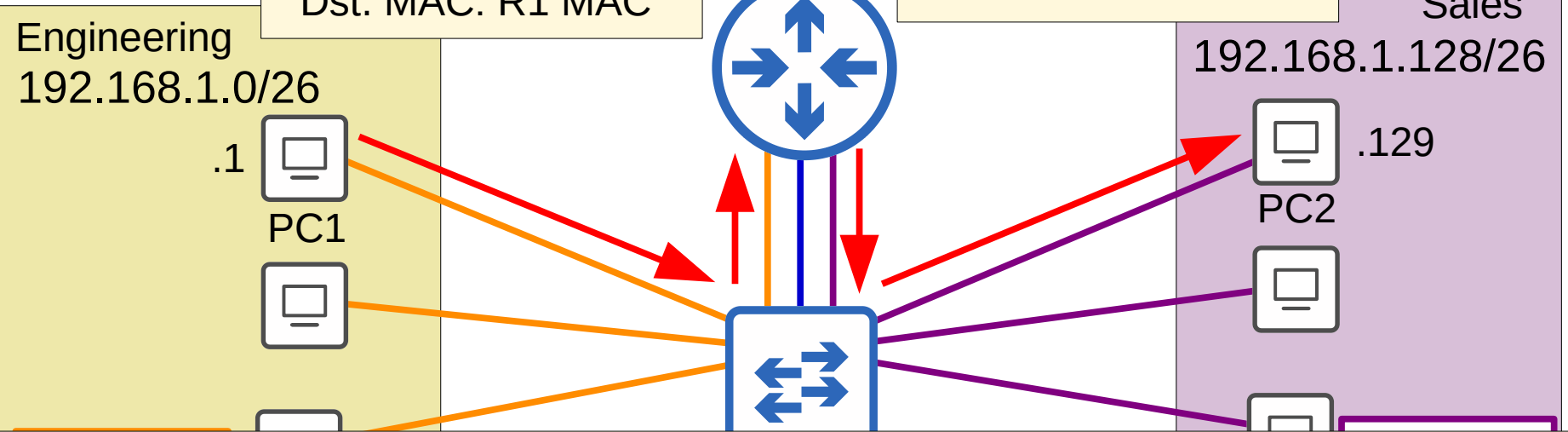
Src. IP: 192.168.1.1
Dst. IP: 192.168.1.63
Src. MAC: PC1 MAC
Dst. MAC: FFFF.FFFF.FFFF



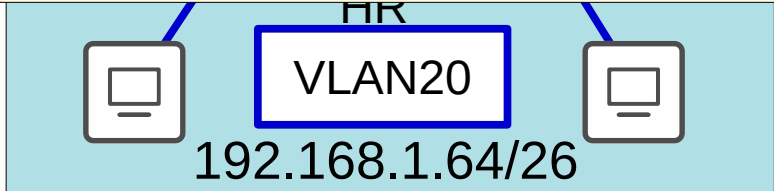
is a VL

Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: PC1 MAC
Dst. MAC: R1 MAC

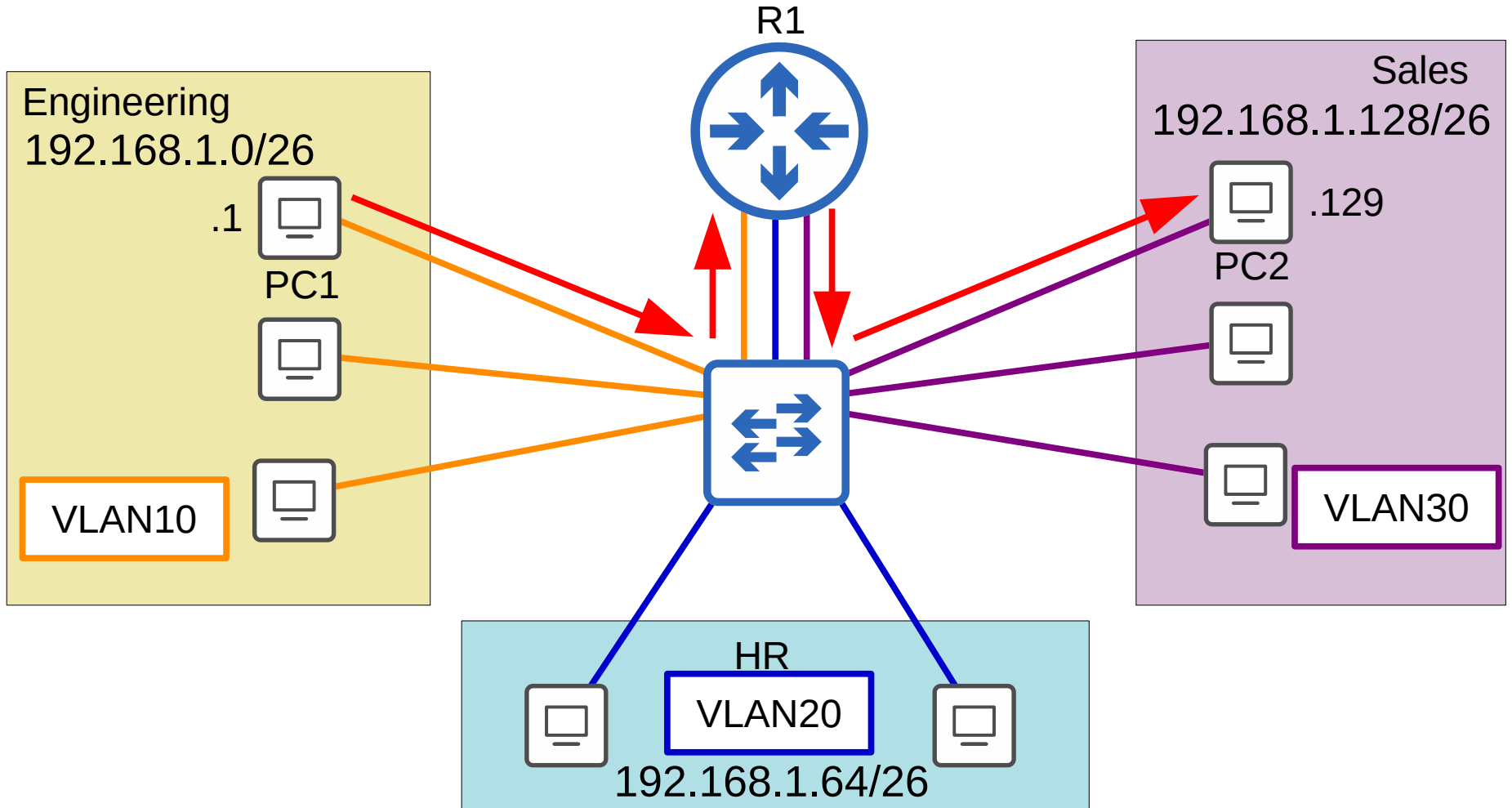
Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: R1 MAC
Dst. MAC: PC2 MAC



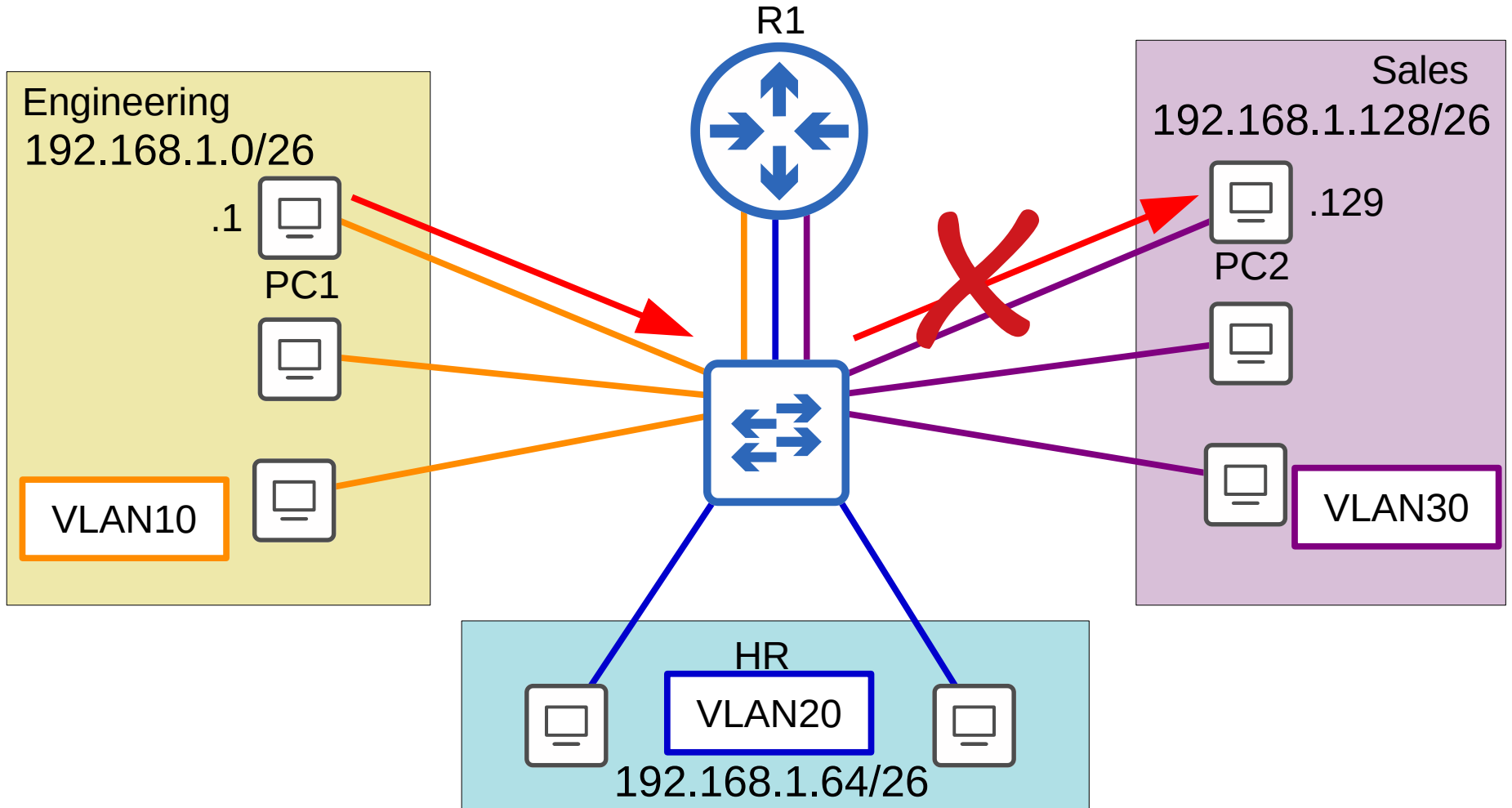
The switch does not perform **inter-VLAN routing**. It must send the traffic through the router.



What is a VLAN?



What is a VLAN?



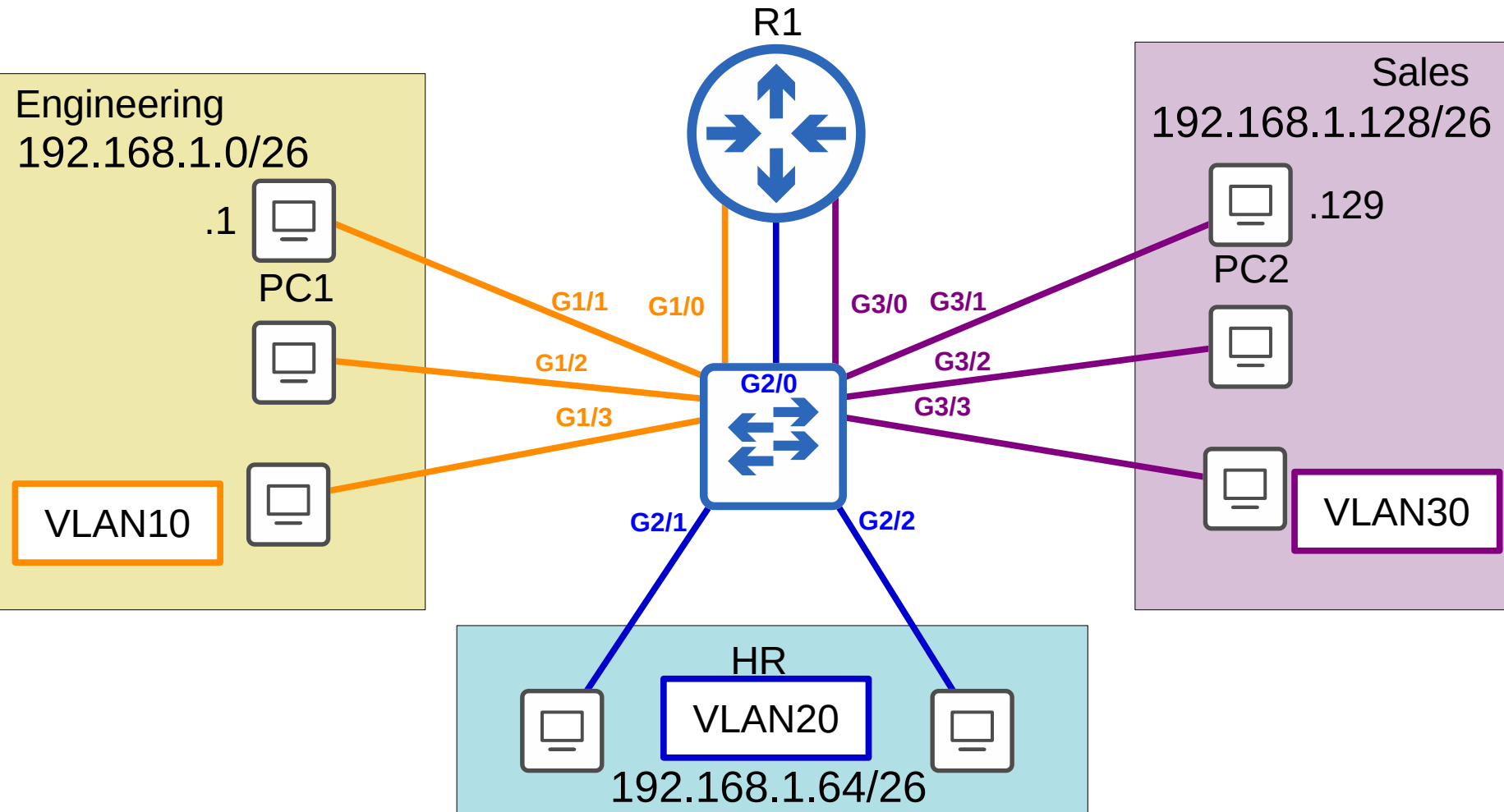
What is a VLAN?

VLANs...

- are configured on switches on a **per-interface** basis.
- **logically** separate end hosts at Layer 2.

Switches do not forward traffic directly between hosts in different VLANs.

VLAN Configuration



VLAN Configuration

```
SW1#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Gi0/0, Gi0/1, Gi0/2, Gi0/3 Gi1/0, Gi1/1, Gi1/2, Gi1/3 Gi2/0, Gi2/1, Gi2/2, Gi2/3 Gi3/0, Gi3/1, Gi3/2, Gi3/3
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

```
SW1#
```

VLANs 1,1002-1005 exist by default and **cannot be deleted**.

VLAN Configuration

```
SW1(config)#interface range g1/0 - 3
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
SW1(config-if-range)#interface range g2/0 - 2
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 20
% Access VLAN does not exist. Creating vlan 20
SW1(config-if-range)#interface range g3/0 - 3
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
SW1(config-if-range)#
```

An access port is a switchport which belongs to a single VLAN, and usually connects to end hosts like PCs.

Switchports which carry multiple VLANs are called 'trunk ports'.
(More information on trunks in the next video!)

VLAN Configuration

```
SW1(config)#do show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Gi0/0, Gi0/1, Gi0/2, Gi0/3
10 VLAN0010		1/2, Gi1/3
20 VLAN0020		2/2
30 VLAN0030		3/2, Gi3/3
1002 fddi-default		
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

This command creates a VLAN.
 (In this case, it was already automatically
 created when we assigned the interfaces)

```
SW1(config)#vlan 10
SW1(config-vlan)#name ENGINEERING
SW1(config-vlan)#vlan 20
SW1(config-vlan)#name HR
SW1(config-vlan)#vlan 30
SW1(config-vlan)#name SALES
```

VLAN Configuration

```
SW1(config)#do show vlan brief
```

VLAN Name	Status	Ports
1 default	active	Gi0/0, Gi0/1, Gi0/2, Gi0/3 Gi2/3
10 ENGINEERING	active	Gi1/0, Gi1/1, Gi1/2, Gi1/3
20 HR	active	Gi2/0, Gi2/1, Gi2/2
30 SALES	active	Gi3/0, Gi3/1, Gi3/2, Gi3/3
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

```
SW1(config)#
```


VLAN Configuration

Ping 255.255.255.255

Engineering
192.168.1.0/26

.1
PC1

VLAN10

R1

G2/0

G2/1

G2/2

HR
VLAN20
192.168.1.64/26

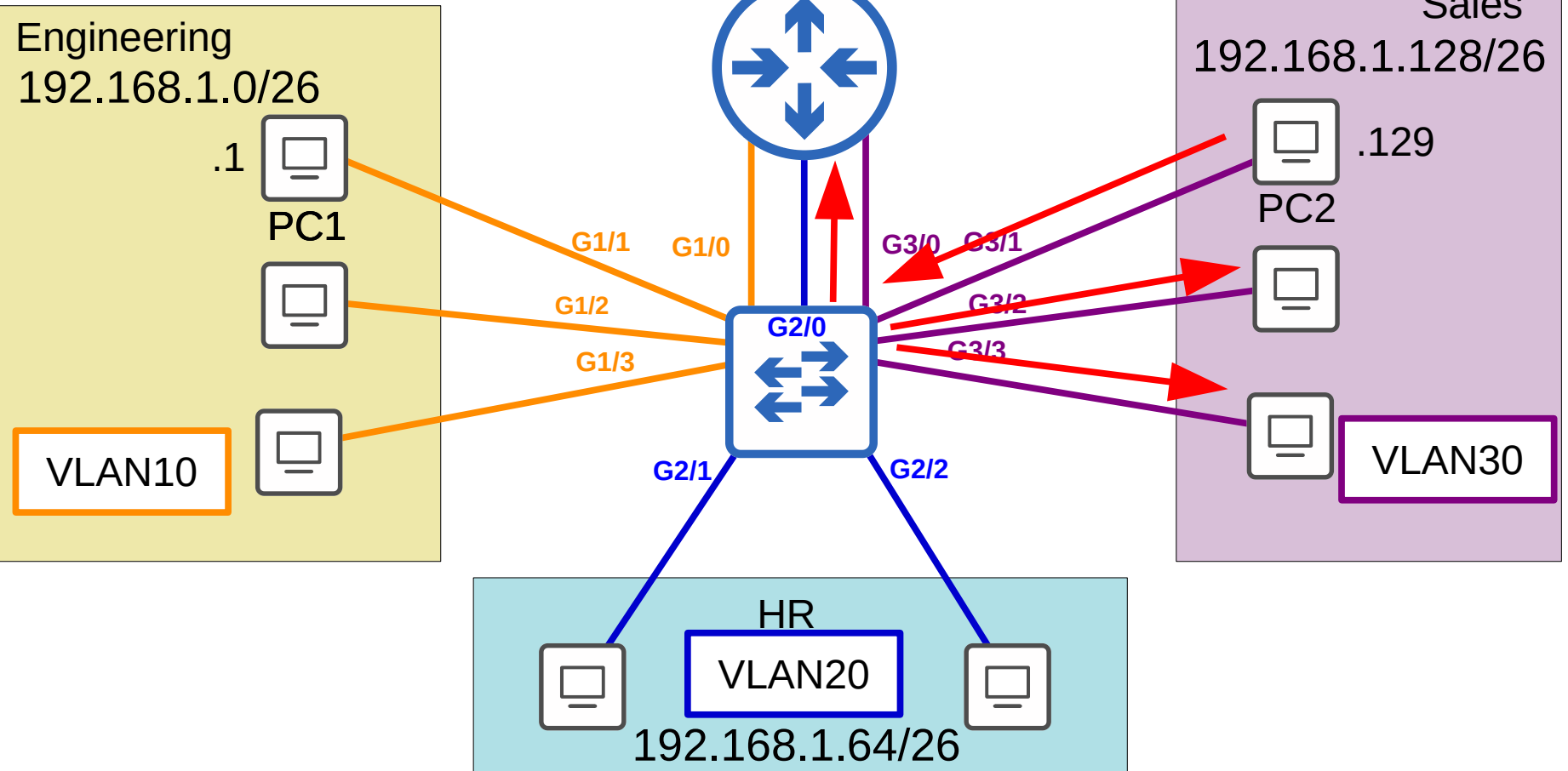
Sales
192.168.1.128/26

.129
PC2

VLAN30

VLAN Configuration

Ping 255.255.255.255

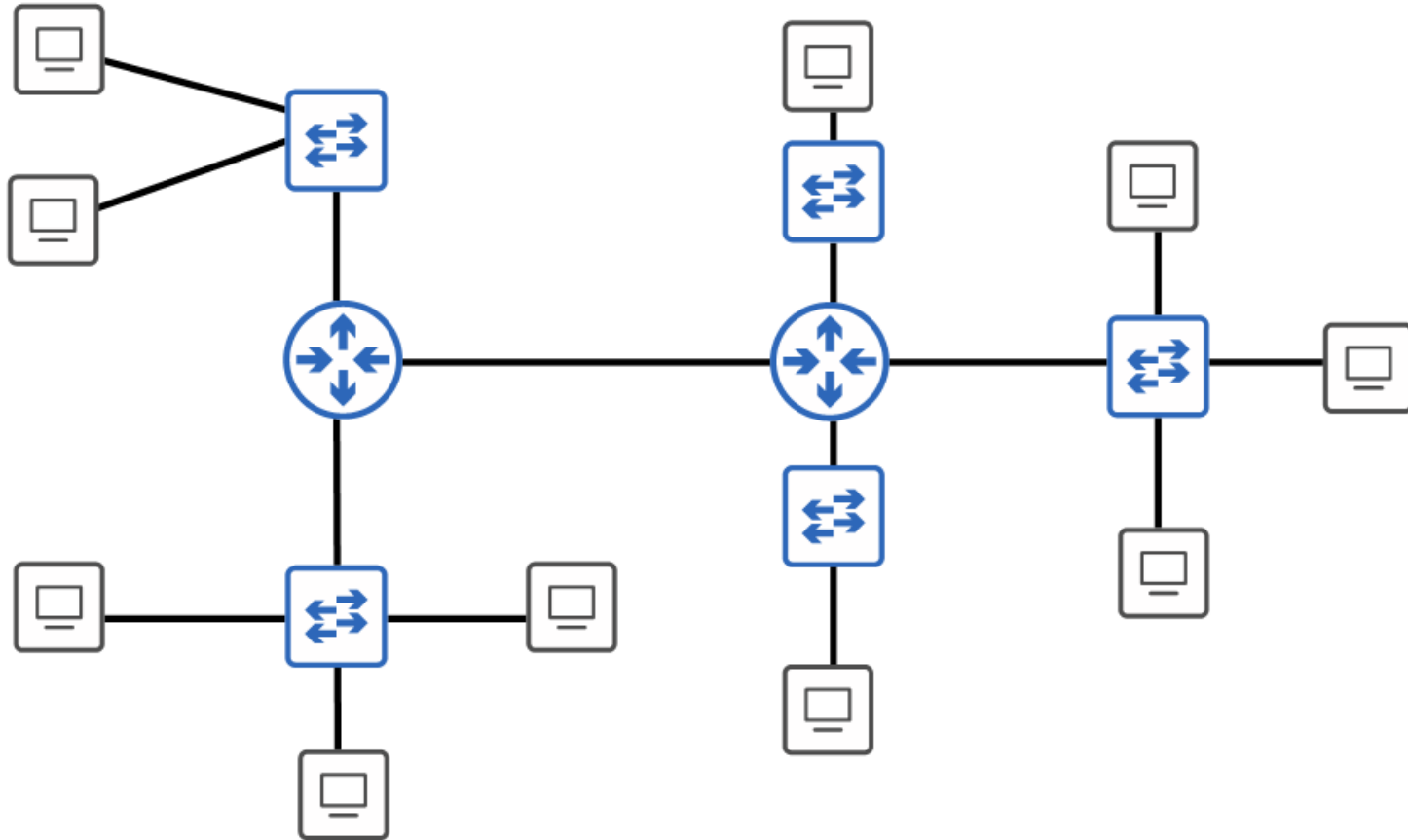


- What is a LAN?
- Broadcast domains
- What is a VLAN?
- What is the purpose of VLANs?
- How to configure VLANs on Cisco switches

QUIZ

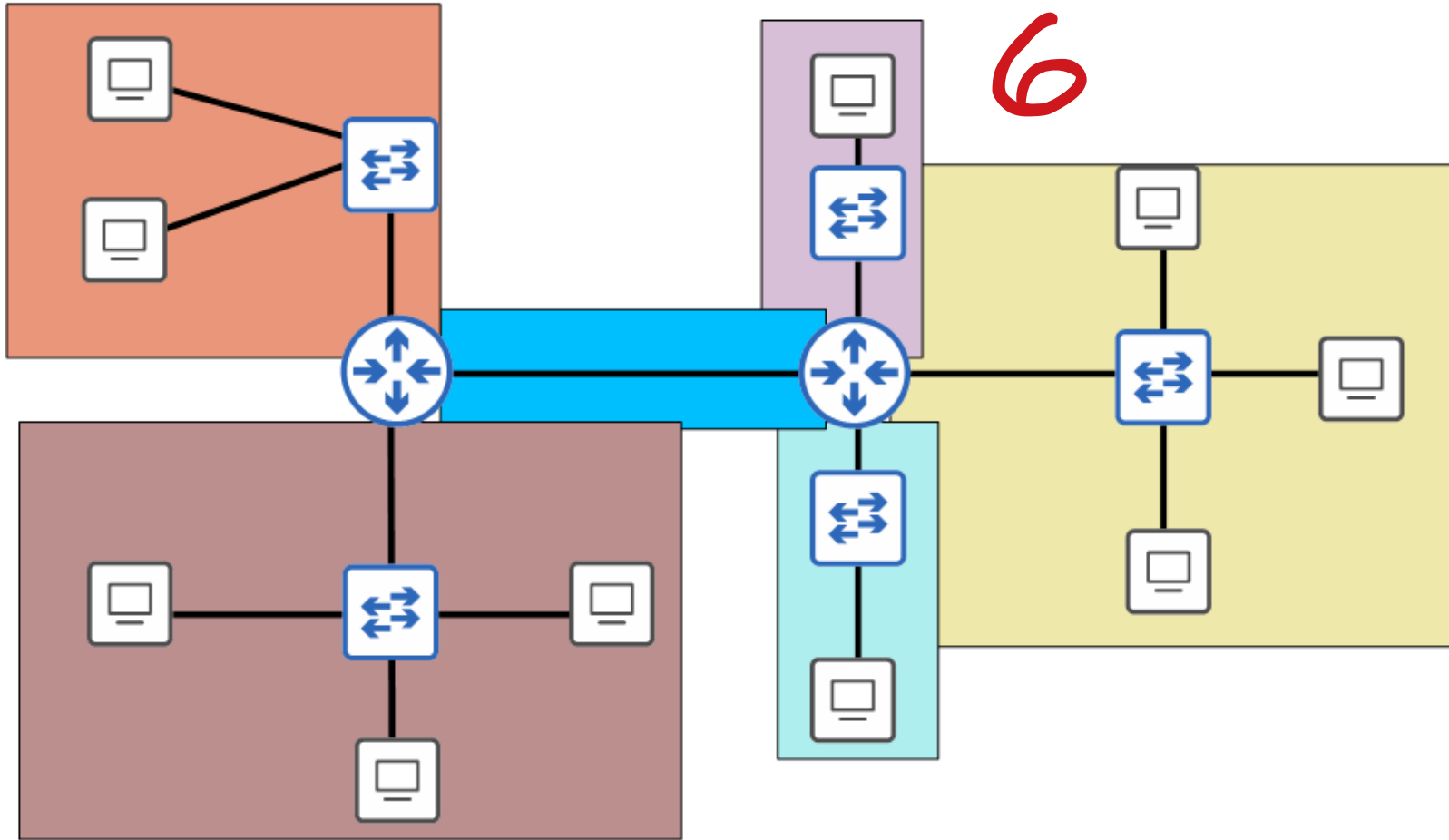
Quiz Question 1

How many broadcast domains are shown in this network diagram?



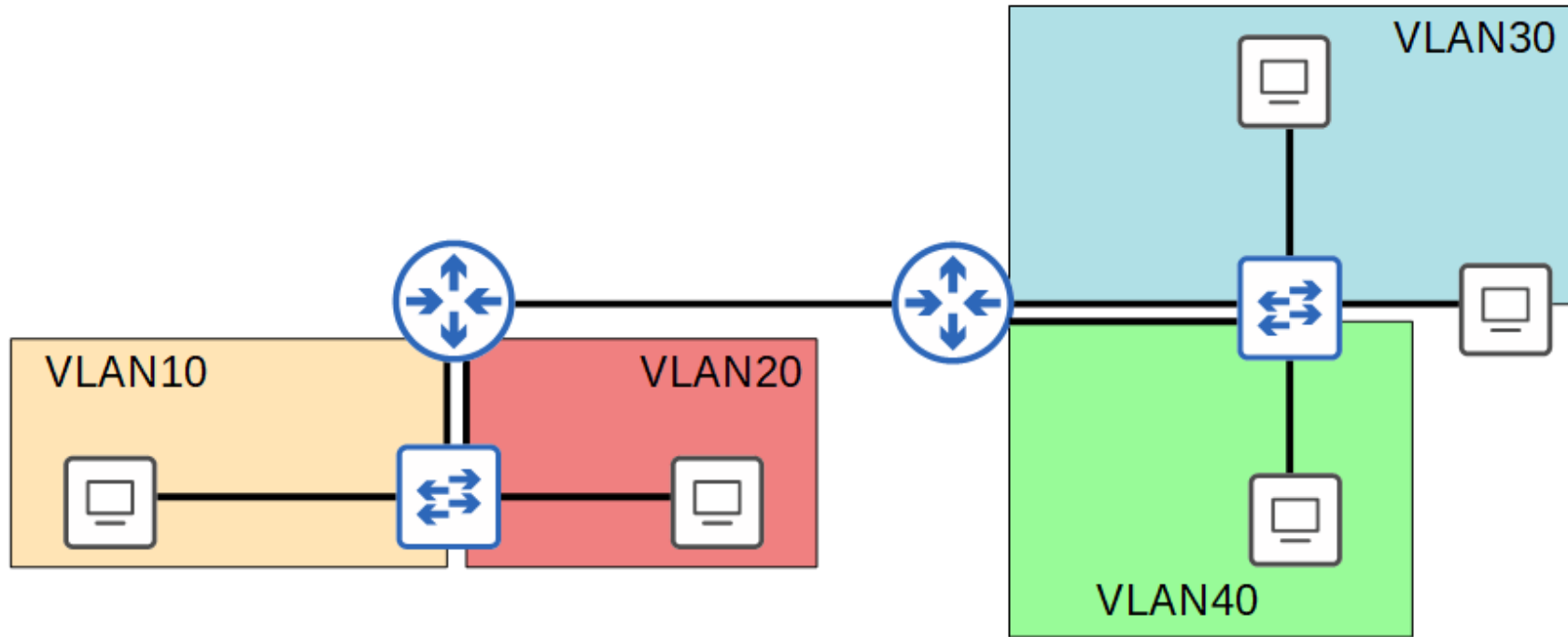
Quiz Question 1

How many broadcast domains are shown in this network diagram?



Quiz Question 2

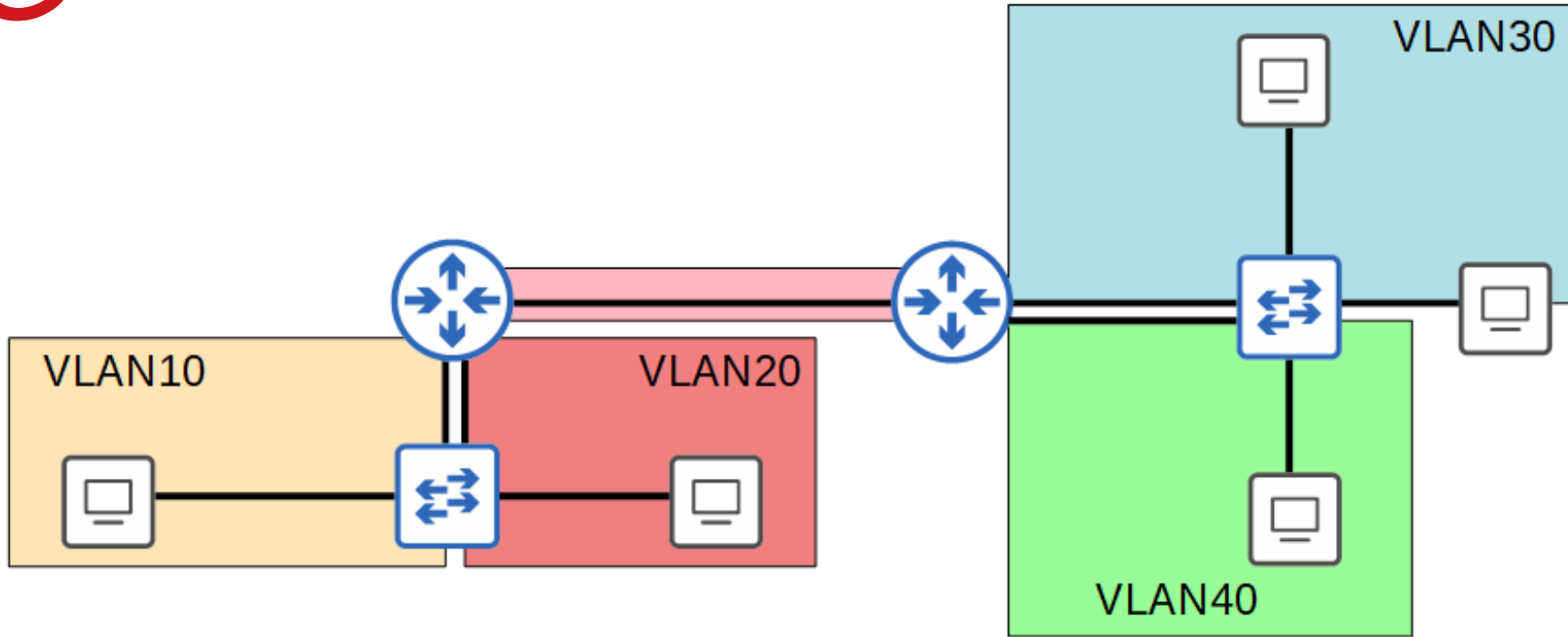
How many broadcast domains are shown in this network diagram?



Quiz Question 2

How many broadcast domains are shown in this network diagram?

5



Quiz Question 3

What happens if you try to assign a switch interface to a VLAN that doesn't exist?

- a) The command will fail.
- b) The switch will create the VLAN.
- c) The interface will be disabled until you create the VLAN.
- d) All VLANs exist by default.

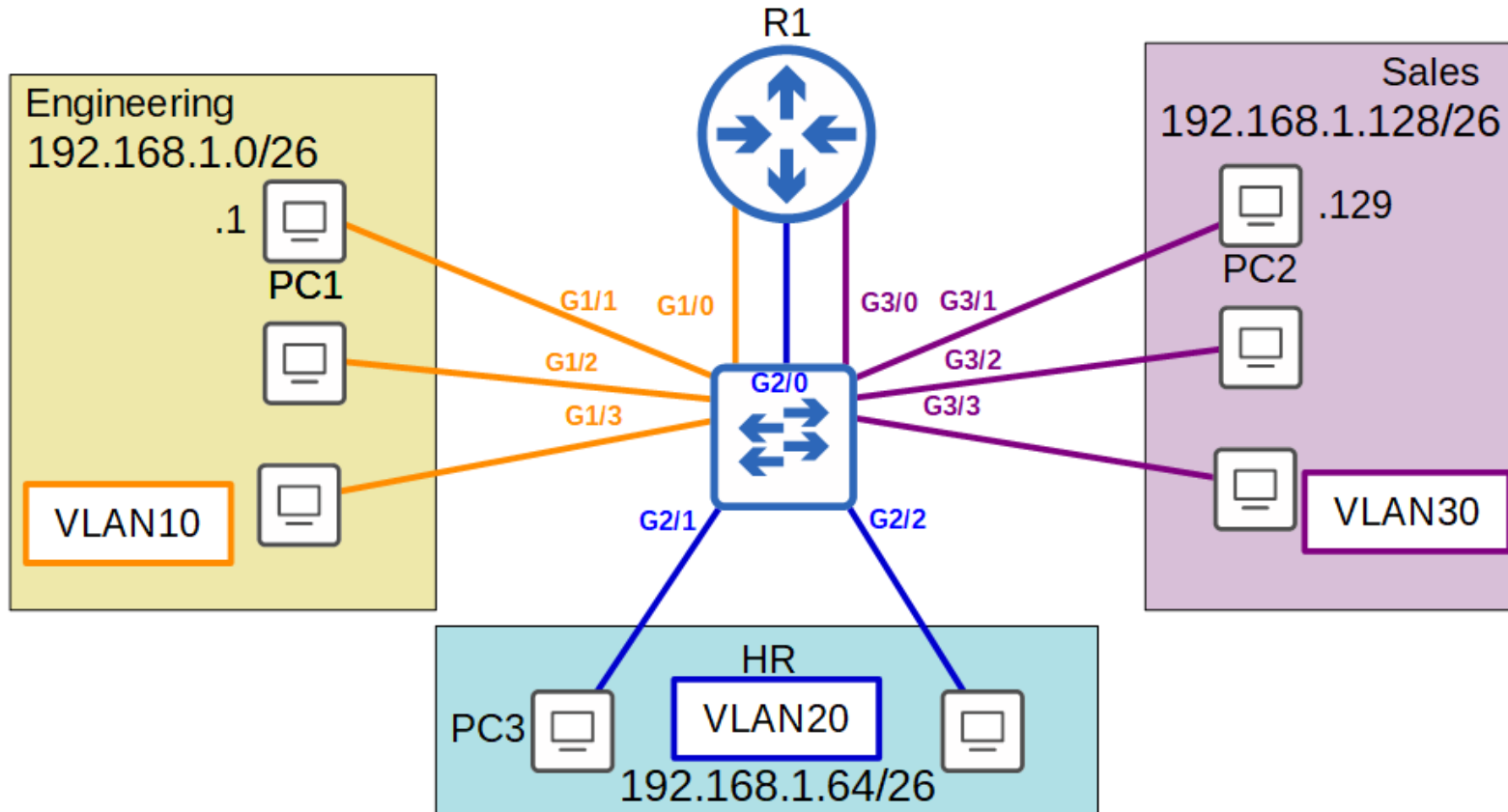
★ b) The switch will create the VLAN.

```

SW1(config)#interface range g1/0 - 3
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 10
% Access VLAN does not exist. Creating vlan 10
SW1(config-if-range)#interface range g2/0 - 2
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 20
% Access VLAN does not exist. Creating vlan 20
SW1(config-if-range)#interface range g3/0 - 3
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#switchport access vlan 30
% Access VLAN does not exist. Creating vlan 30
SW1(config-if-range)#
  
```

Quiz Question 4

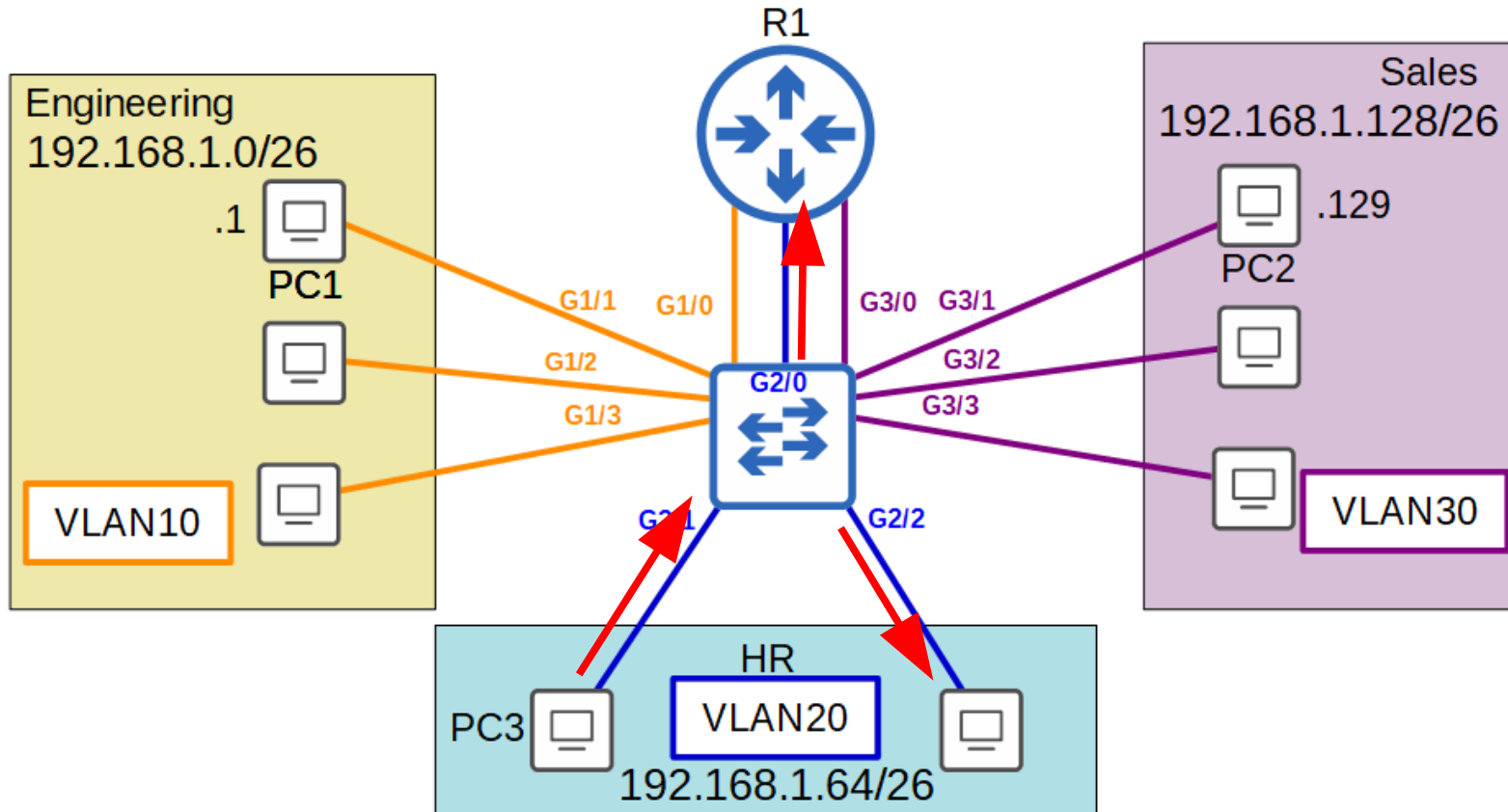
If PC3 sends a broadcast message, how many devices will receive it?



Quiz Question 4

If PC3 sends a broadcast message, how many devices will receive it?
(including

3



Quiz Question 5

You create VLANs 10, 20, and 30 on a Cisco switch. How many VLANs will be displayed in the output of the `show vlan brief` command?

- a) 3
- b) 5
- c) 8
- d) 10

★ c) 8

```
SW1(config)#do show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gi0/0, Gi0/1, Gi0/2, Gi0/3 Gi2/3
10	VLAN0010	active	Gi1/0, Gi1/1, Gi1/2, Gi1/3
20	VLAN0020	active	Gi2/0, Gi2/1, Gi2/2
30	VLAN0030	active	Gi3/0, Gi3/1, Gi3/2, Gi3/3
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	