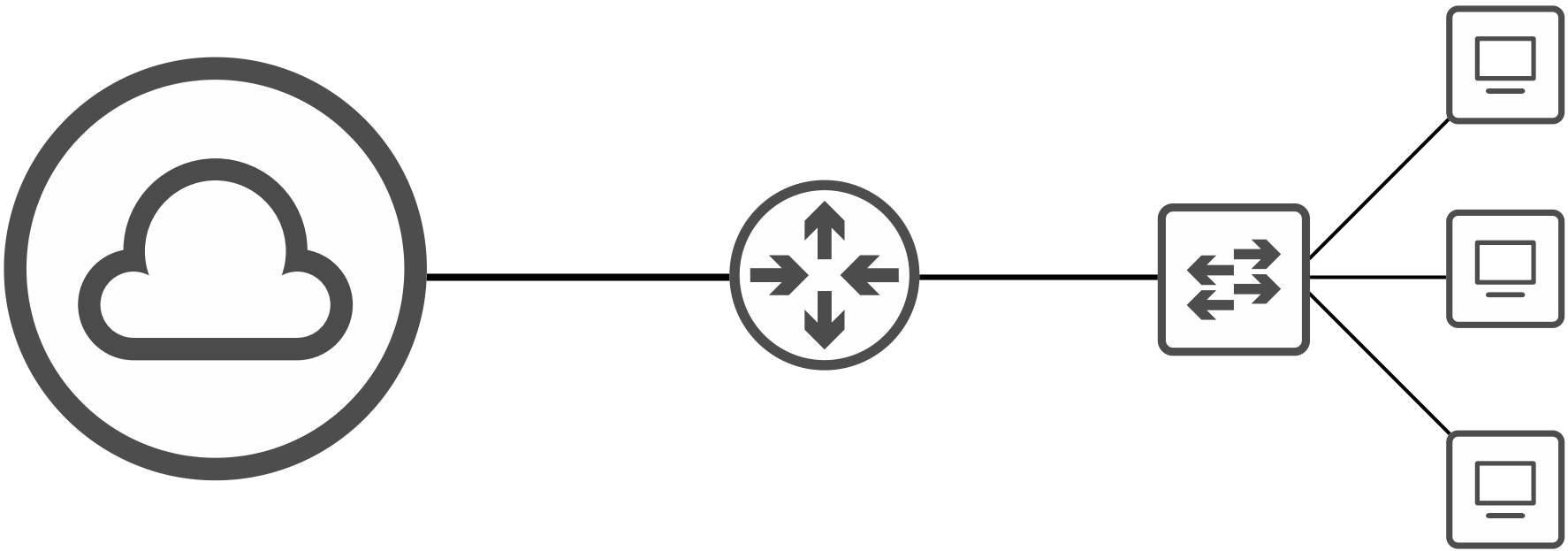
Jeremy's IT Lab

# 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?

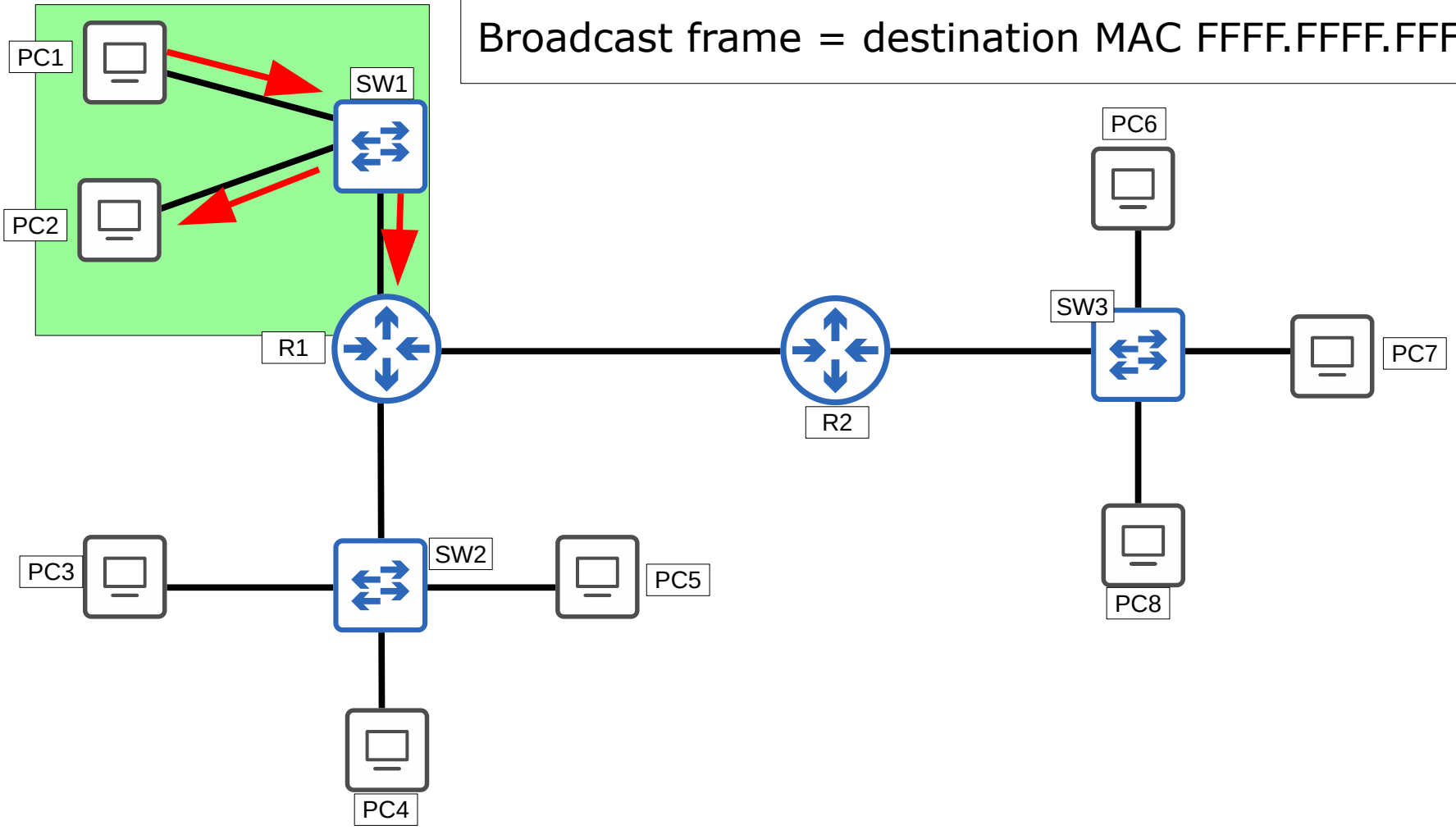
- Previously I said that a LAN is a group of devices (PCs, servers, routers, switches, etc.) in a single location (home, office, etc.)

- 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



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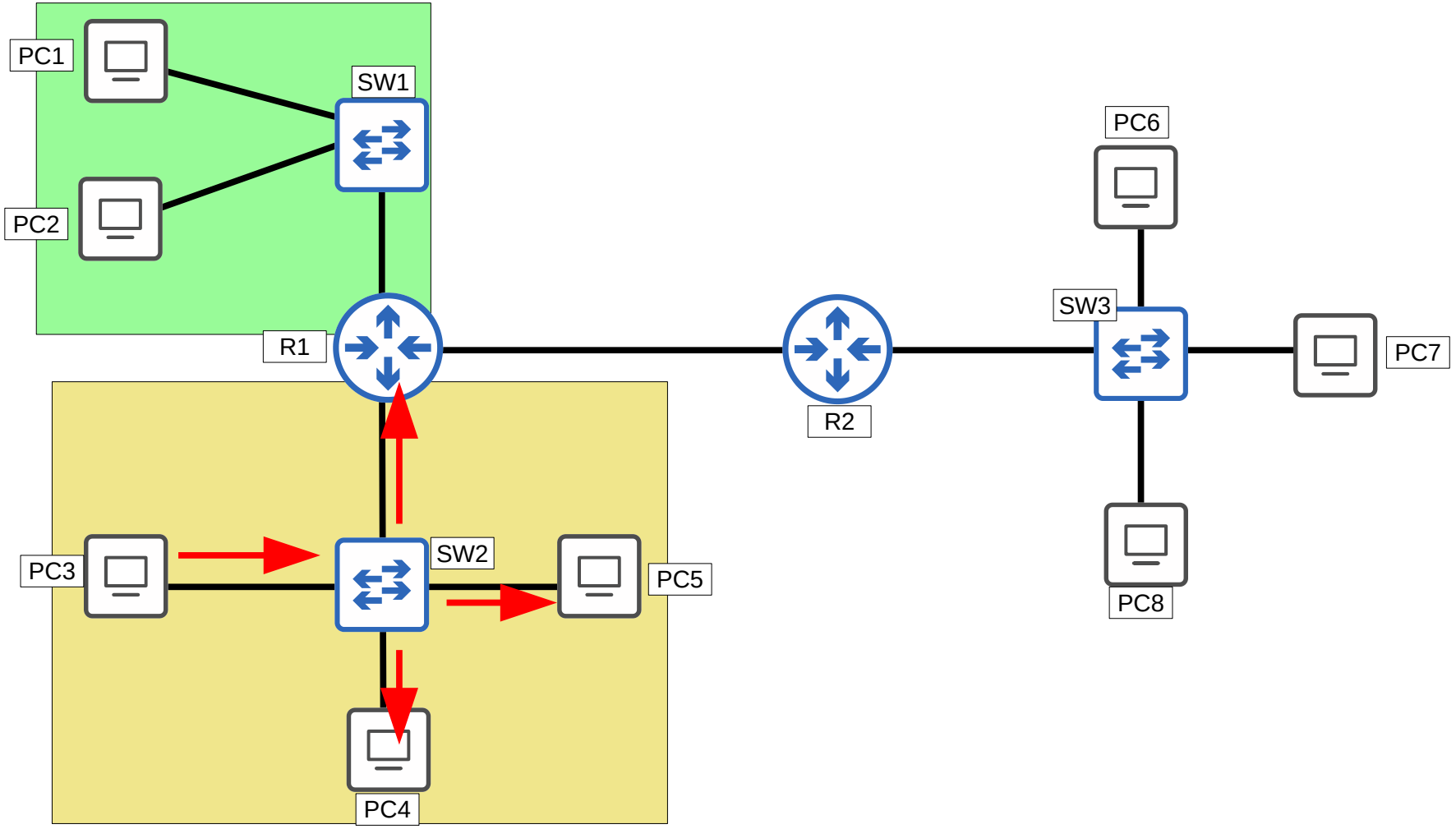
# LANs/Broadcast Domains



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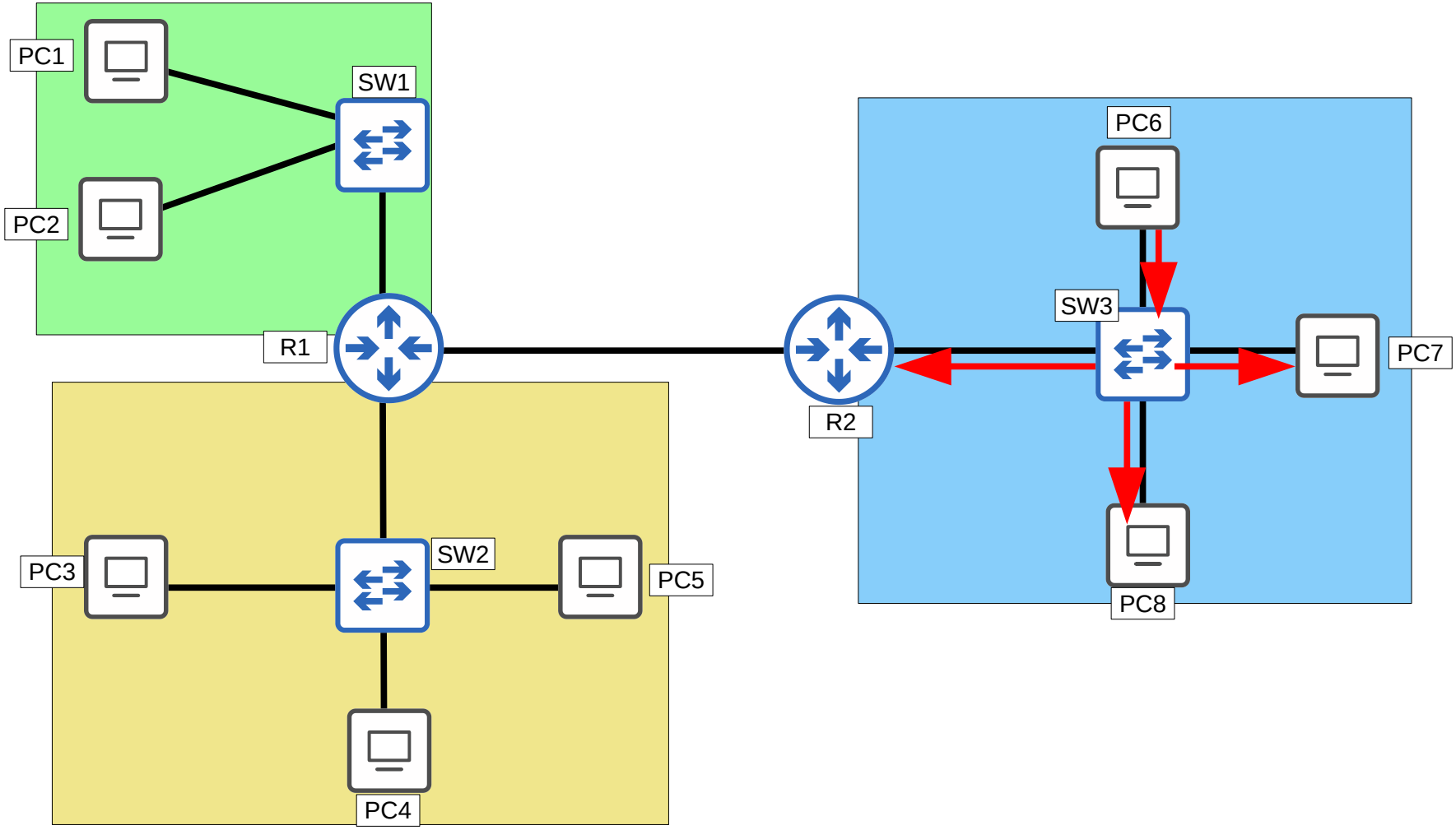
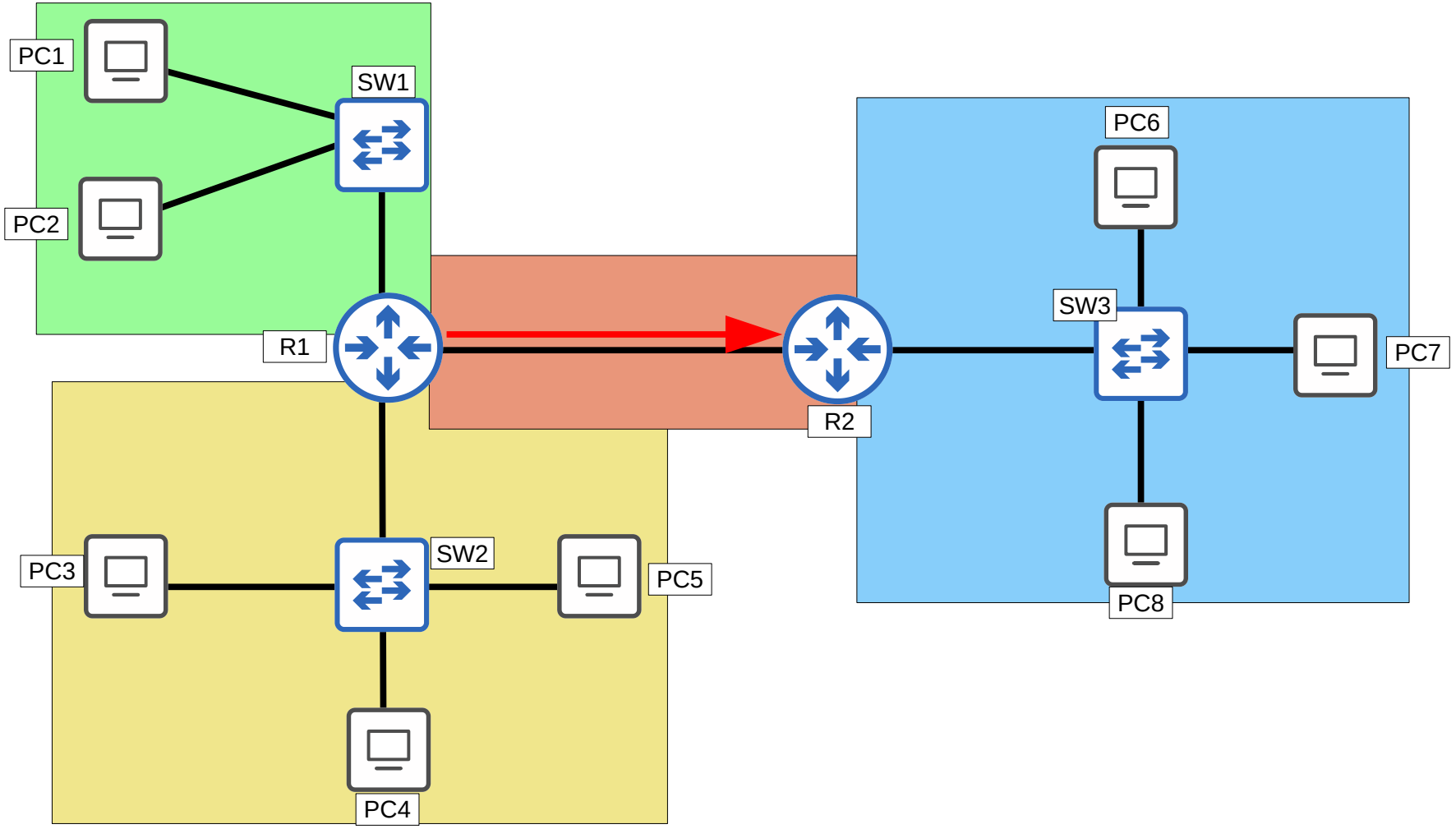
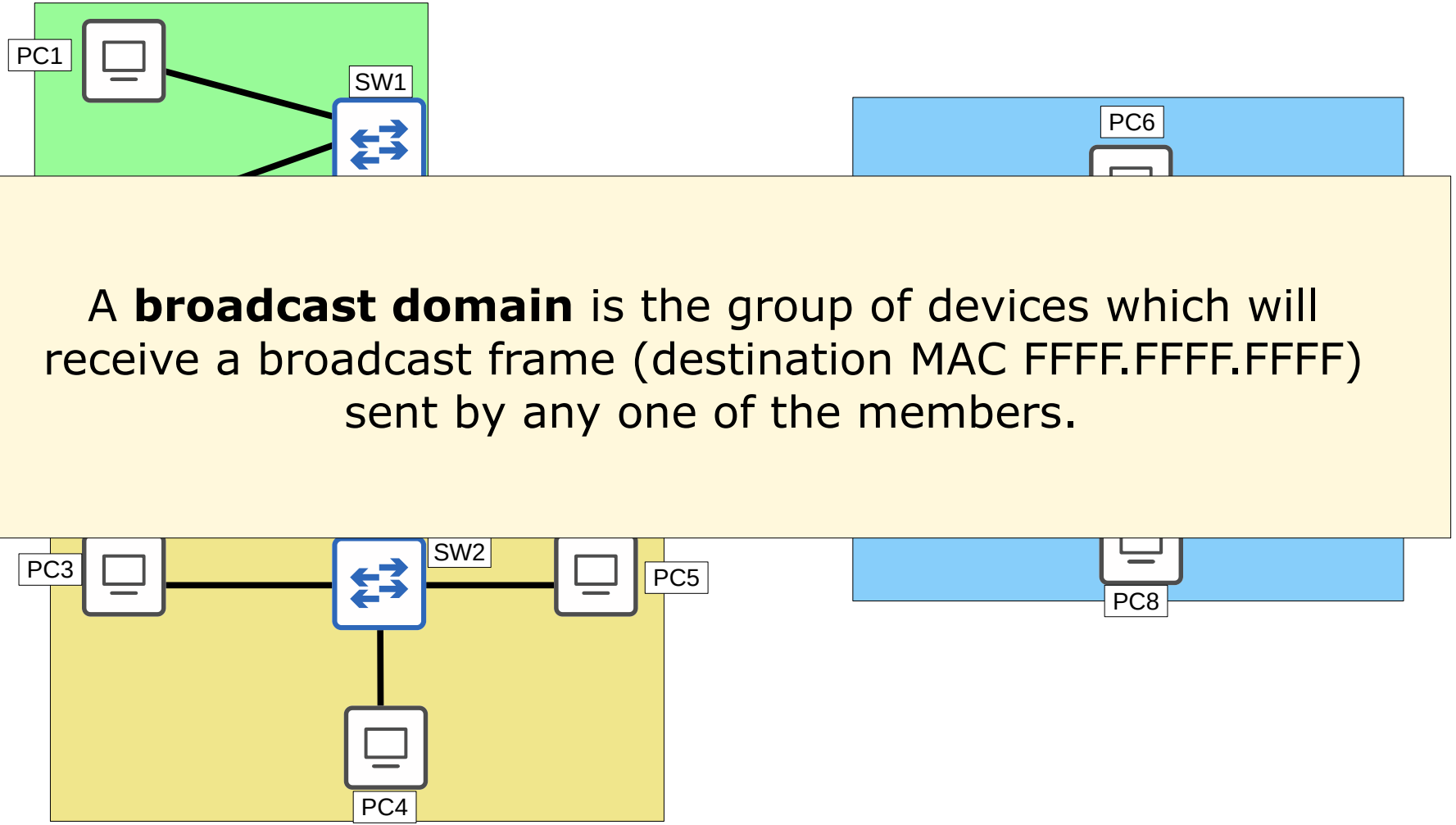
# LANs/Broadcast Domains



# 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.

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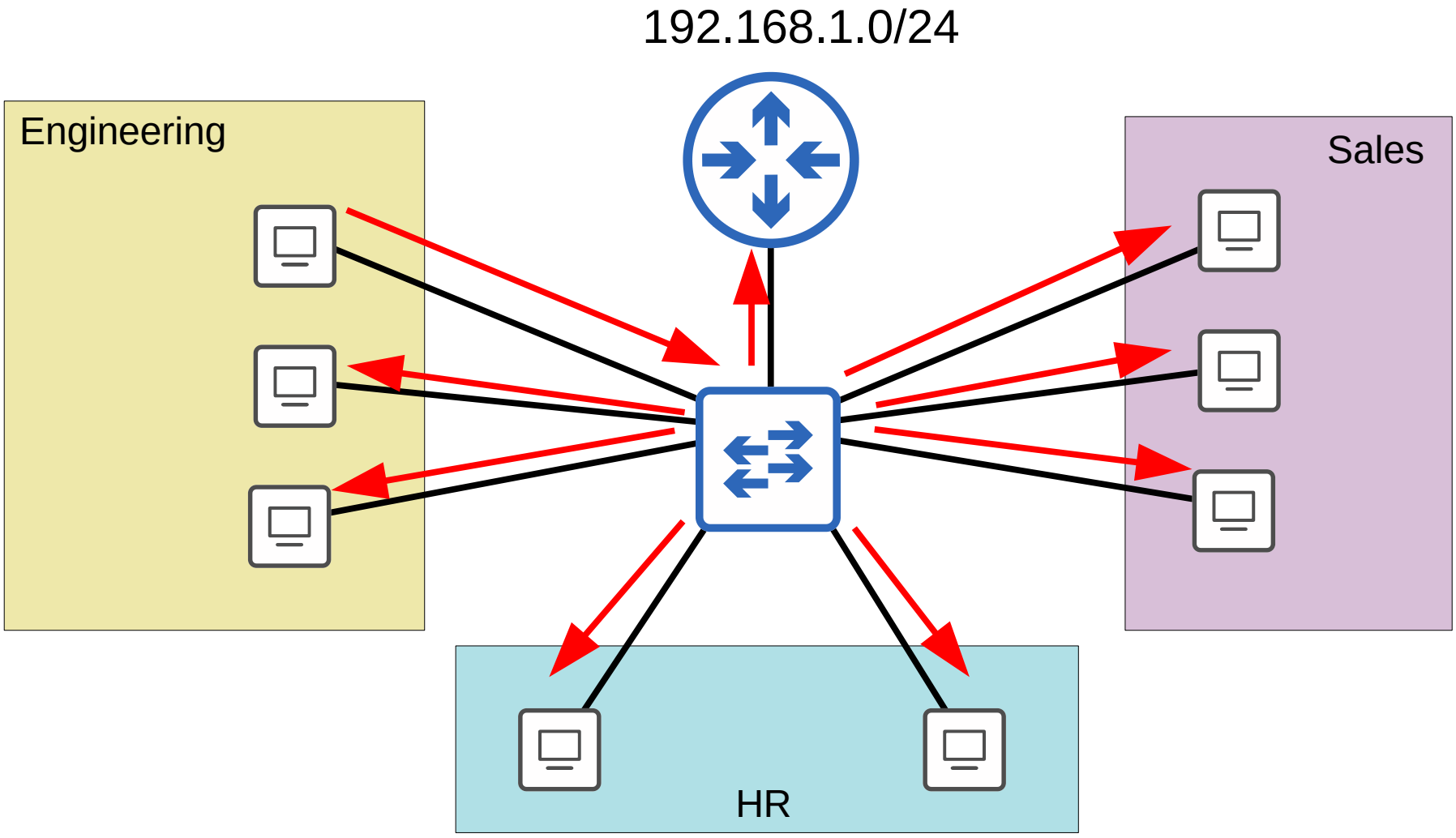
# What is a VLAN?



# What is a VLAN?

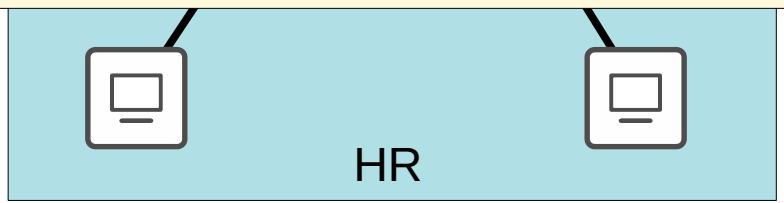
192.168.1.0/24

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

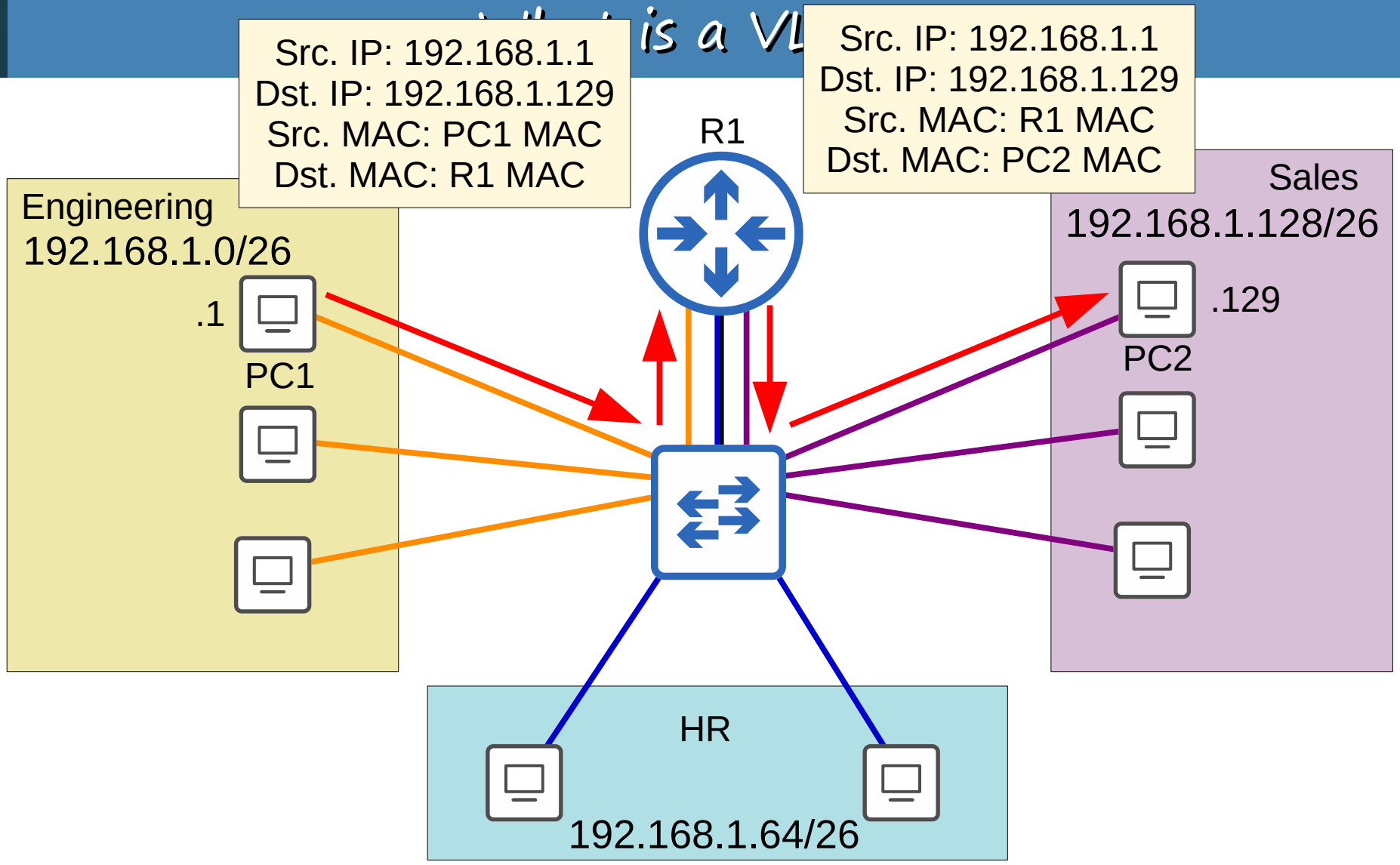
**Security:** Even within the same office, you want to limit who has access to what.
You can apply security policies on a router/firewall.

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.

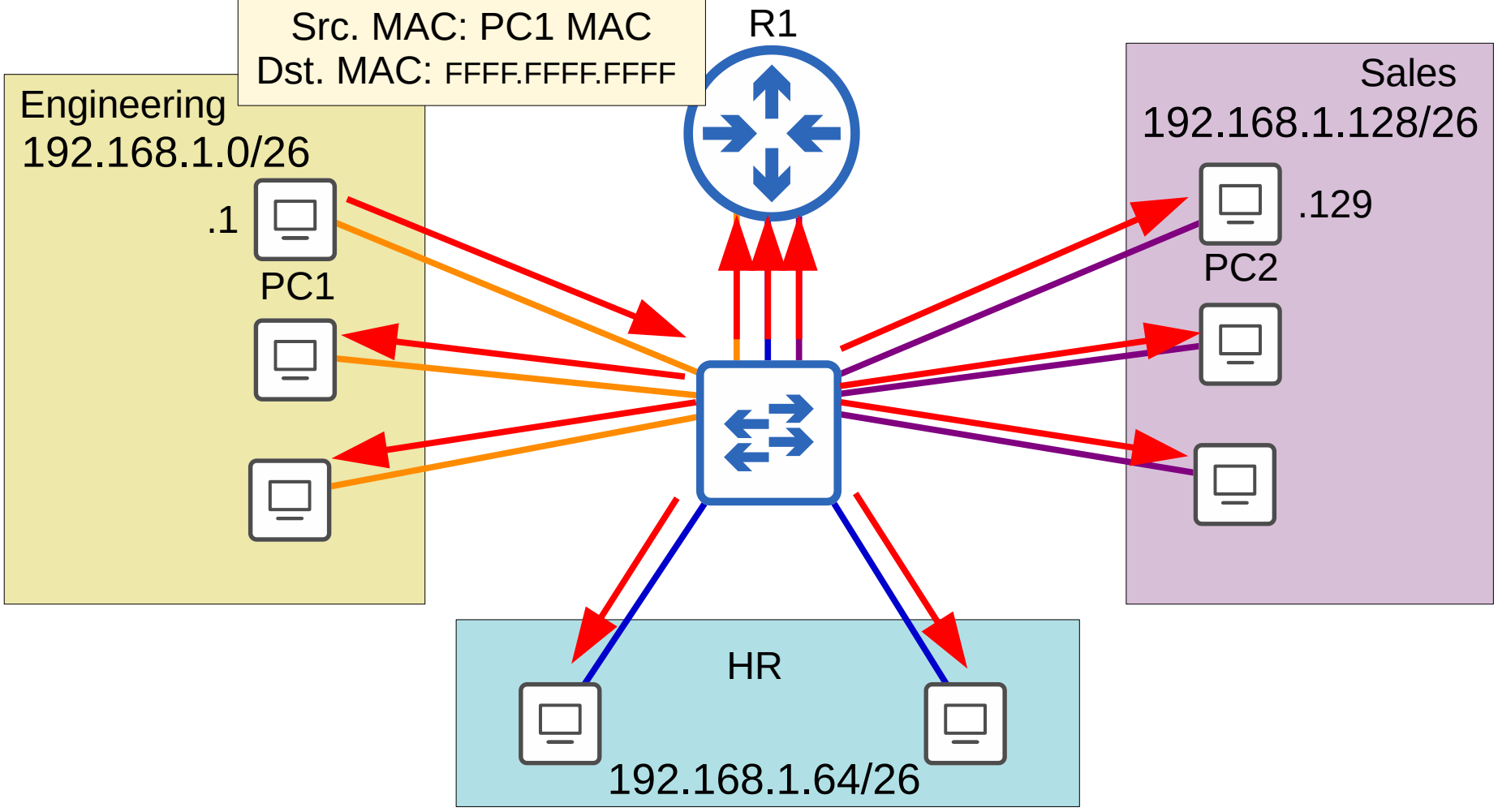


# ...is a VL...

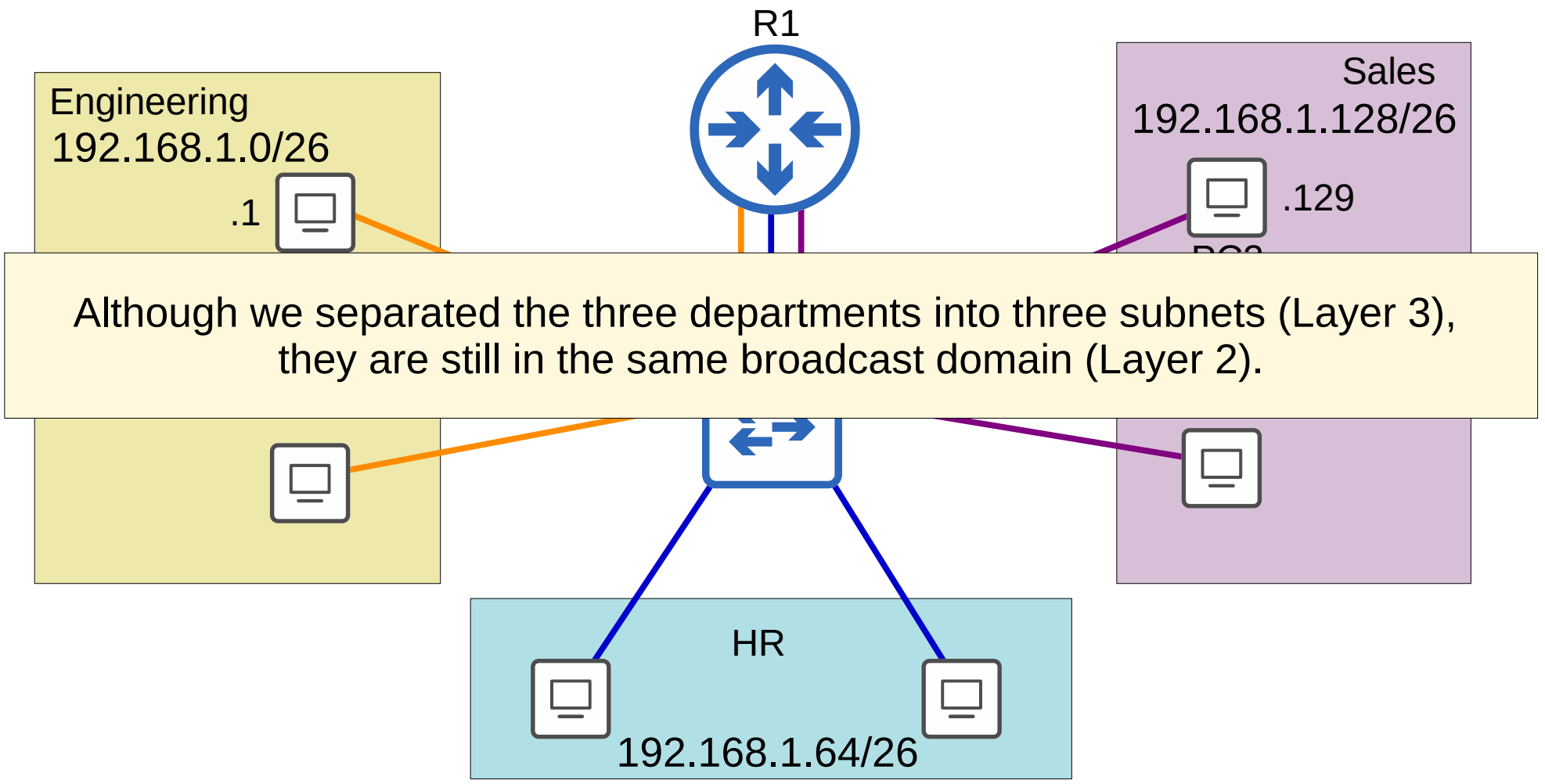

Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: PC1 MAC
Dst. MAC: R1 MAC
Src. IP: 192.168.1.1
Dst. IP: 192.168.1.129
Src. MAC: R1 MAC
Dst. MAC: PC2 MAC
R1
Engineering
192.168.1.0/26
.1
PC1
Sales
192.168.1.128/26
.129
PC2
HR
192.168.1.64/26

# s a VLAN?

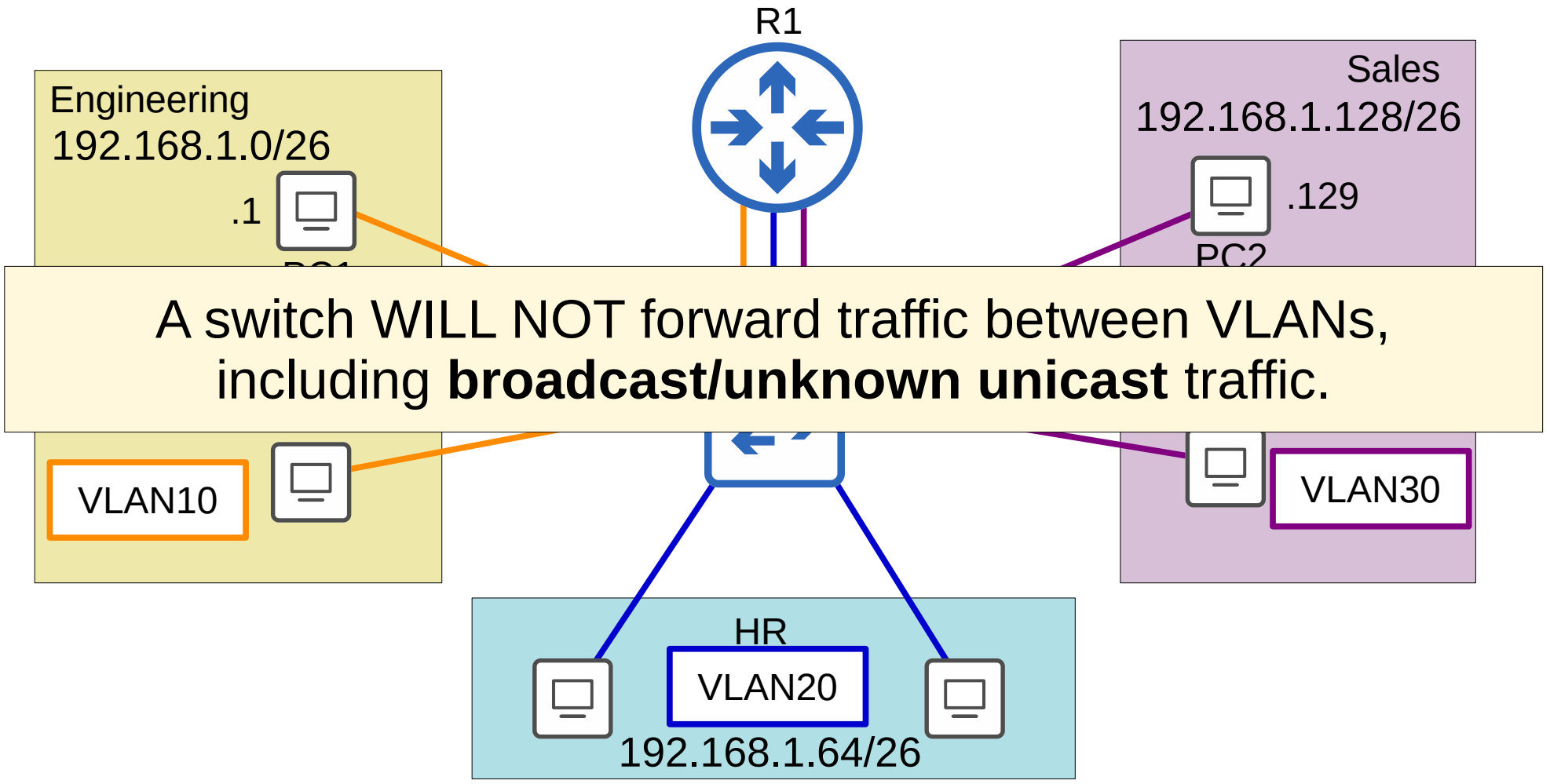
Src. IP: 192.168.1.1
Dst. IP: 192.168.1.63
Src. MAC: PC1 MAC
Dst. MAC: FFFF.FFFF.FFFF



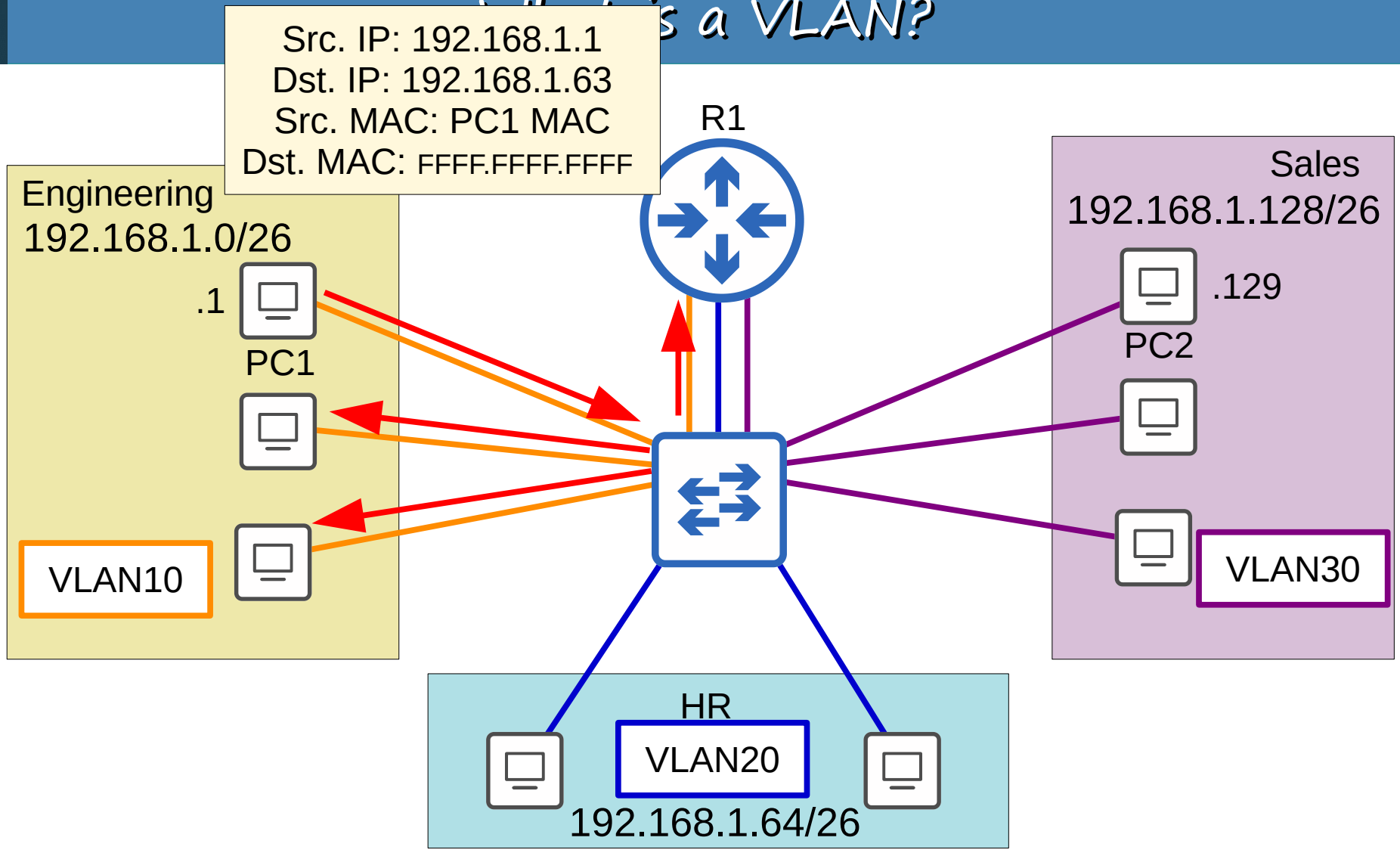
# What is a VLAN?



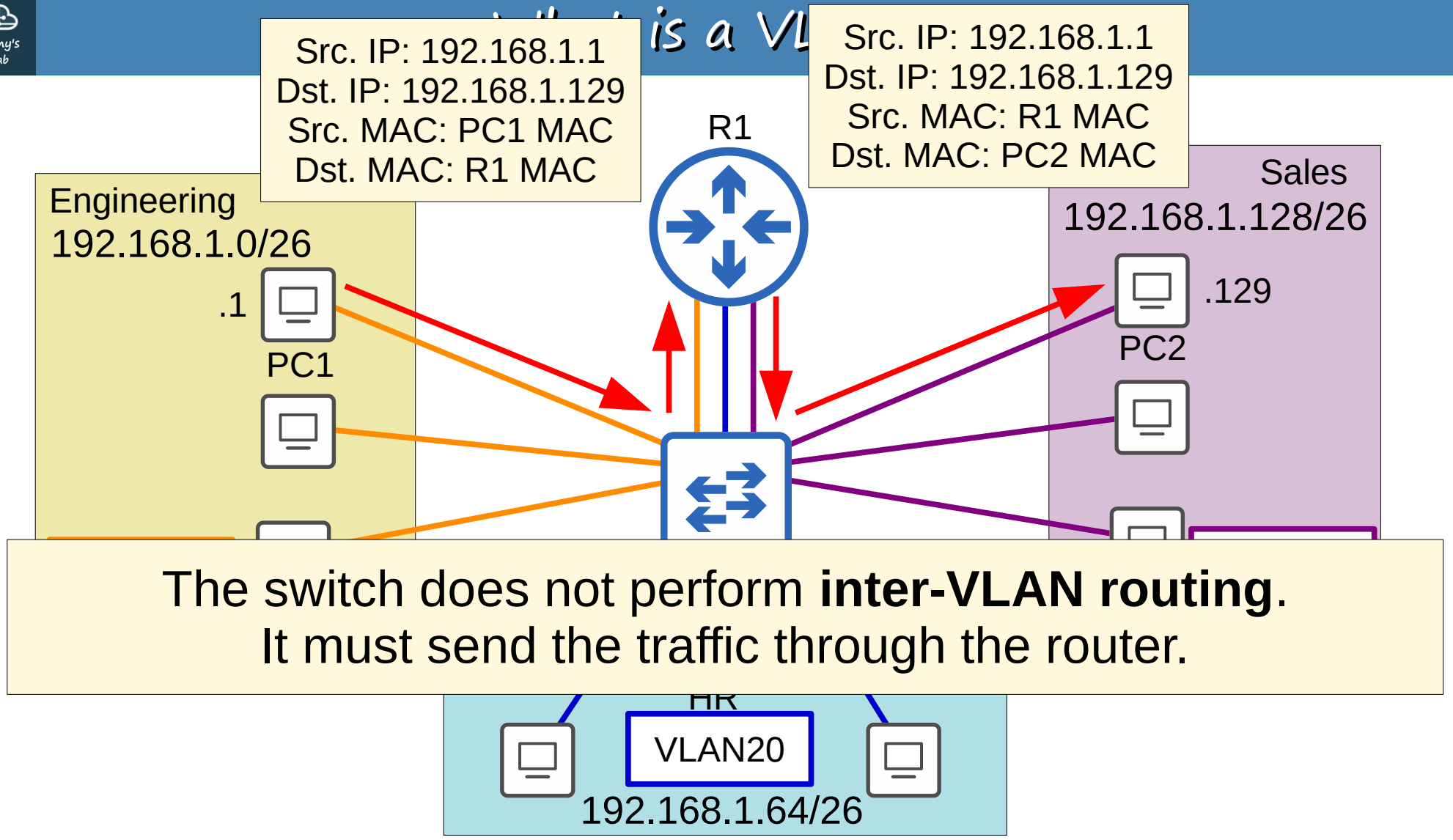
# What is a VLAN?



# s a VLAN?


Src. IP: 192.168.1.1
Dst. IP: 192.168.1.63
Src. MAC: PC1 MAC
Dst. MAC: FFFF.FFFF.FFFF
R1
Engineering
192.168.1.0/26
.1
PC1
VLAN10
Sales
192.168.1.128/26
.129
PC2
VLAN30
HR
VLAN20
192.168.1.64/26

# ...t 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
R1
Engineering
192.168.1.0/26
.1
PC1
Sales
192.168.1.128/26
.129
PC2
The switch does not perform **inter-VLAN routing**.
It must send the traffic through the router.
HR
VLAN20
192.168.1.64/26

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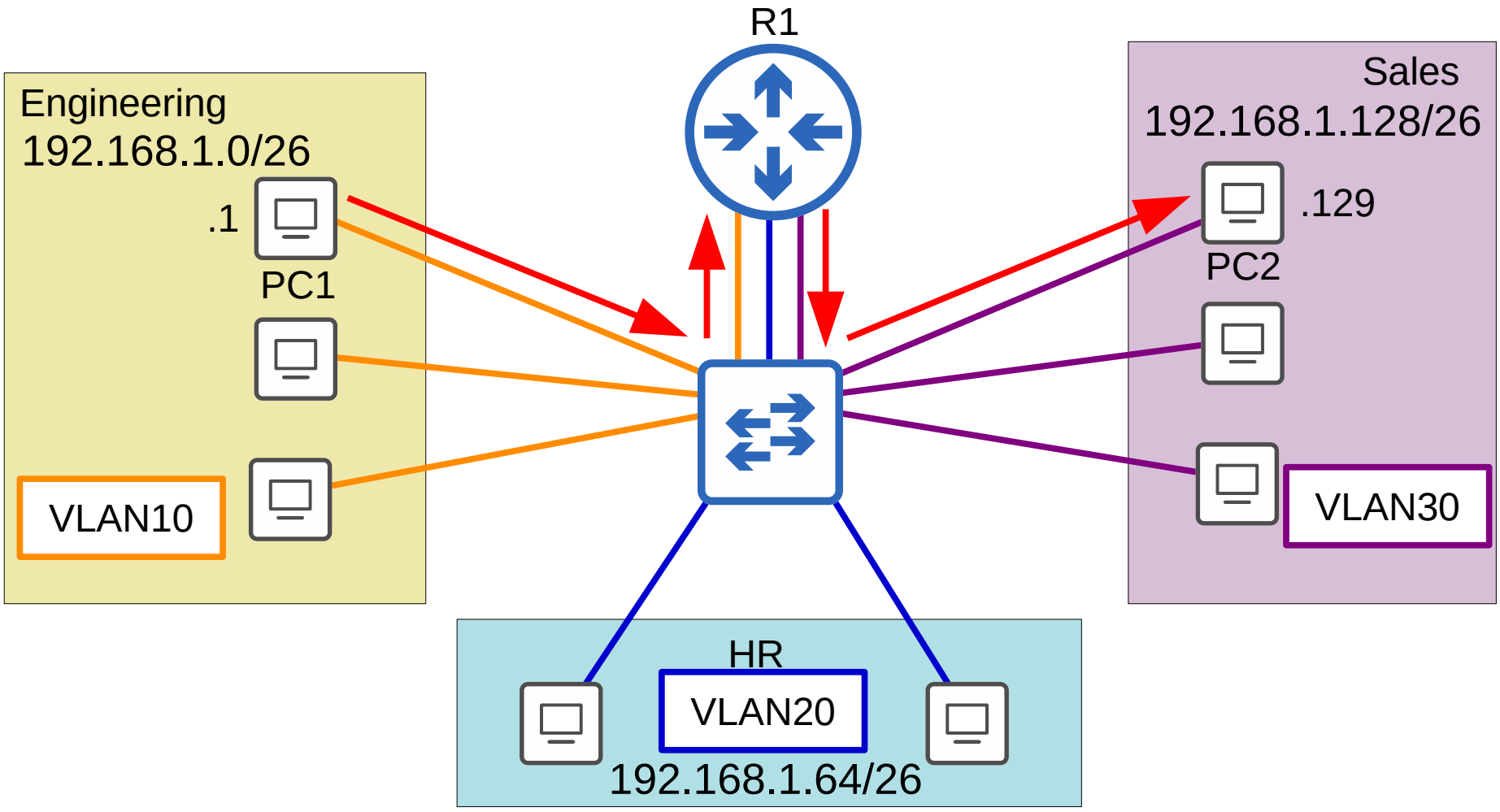
# What is a VLAN?



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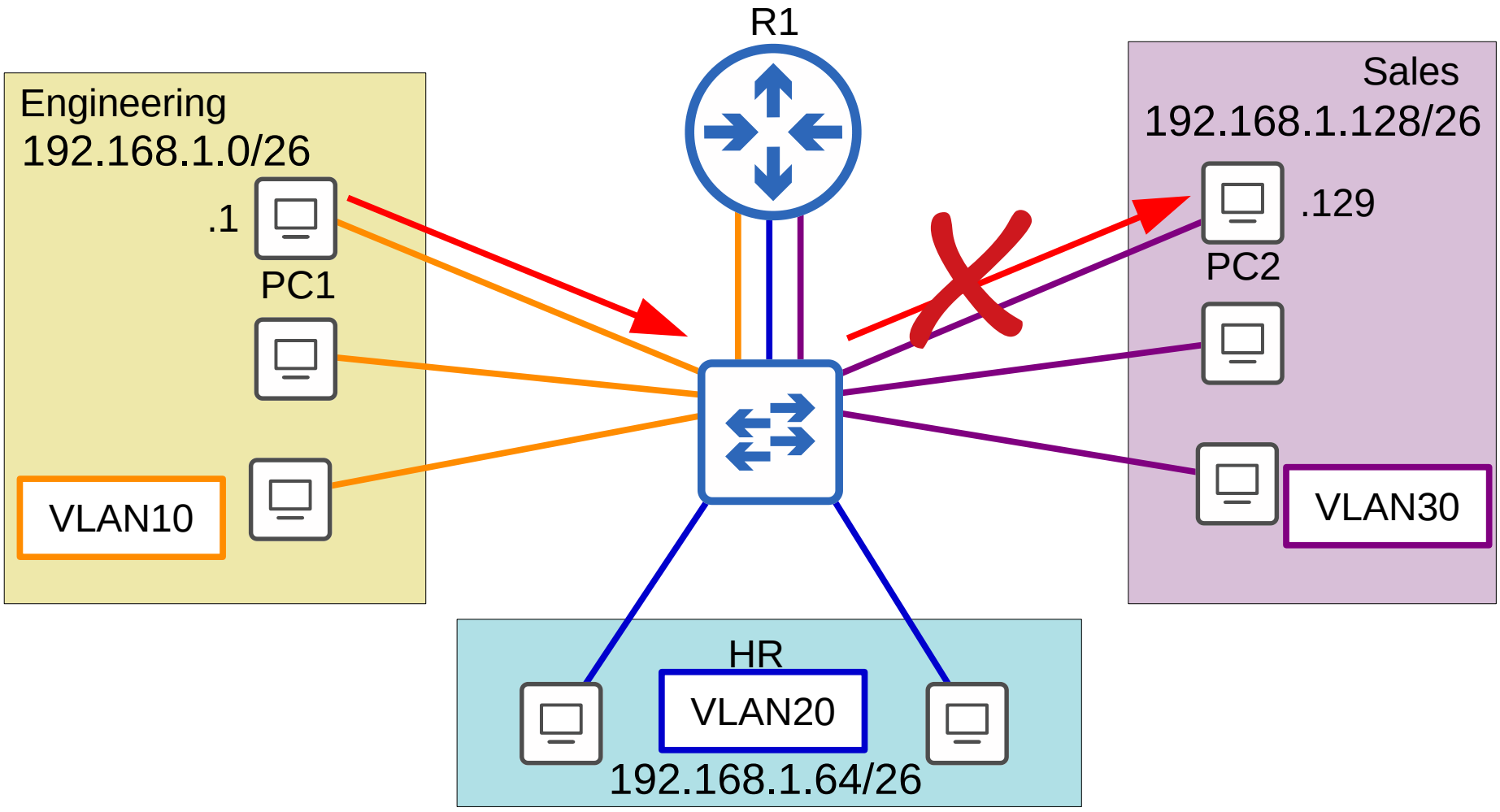
# What is a VLAN?



# 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.

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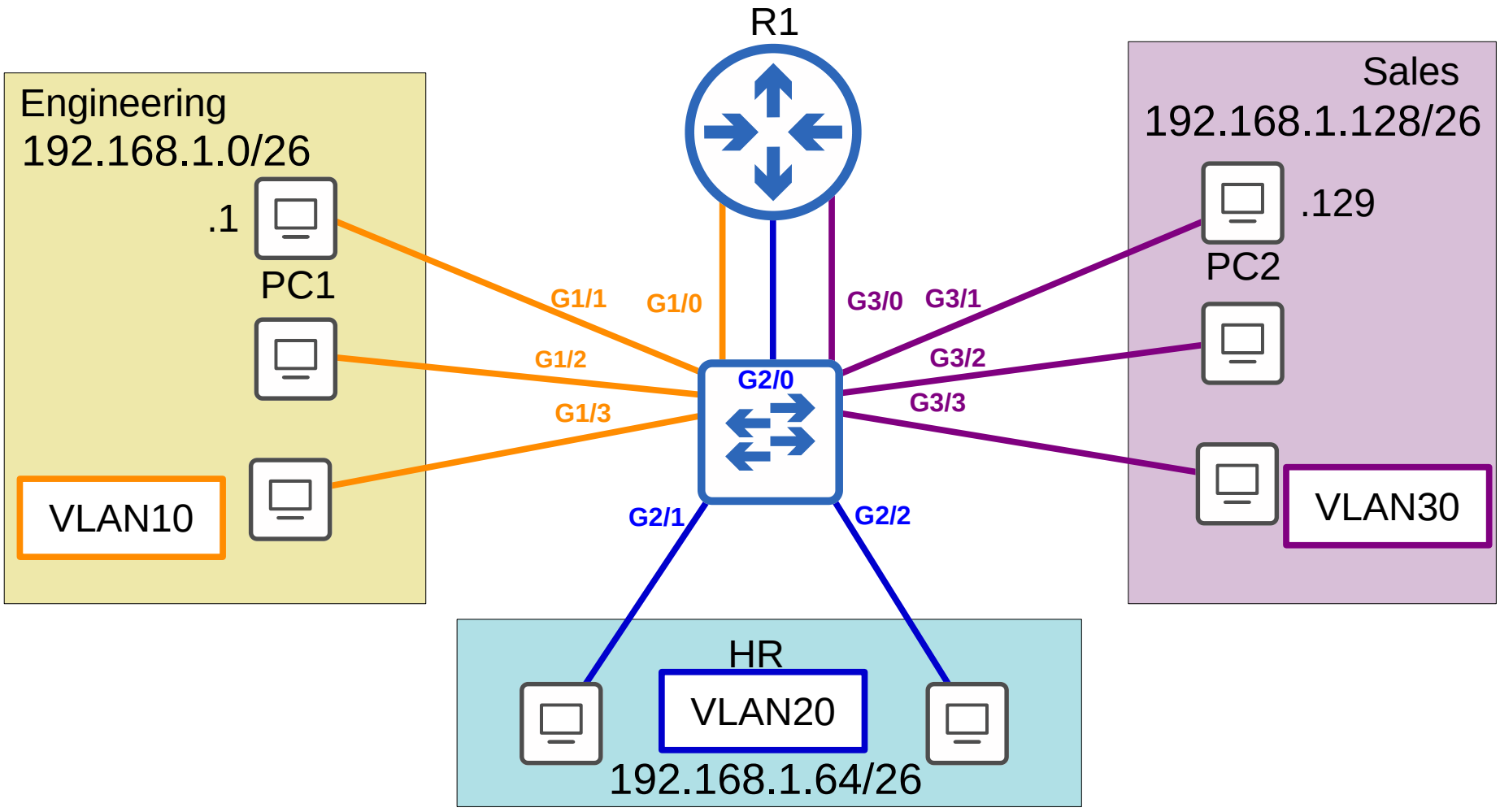
# VLAN Configuration



# 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**.

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# 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                        act/unsup
1003 token-ring-default                  act/unsup
1004 fddinet-default                     act/unsup
1005 trnet-default                       act/unsup
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
```

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

# 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)#
```

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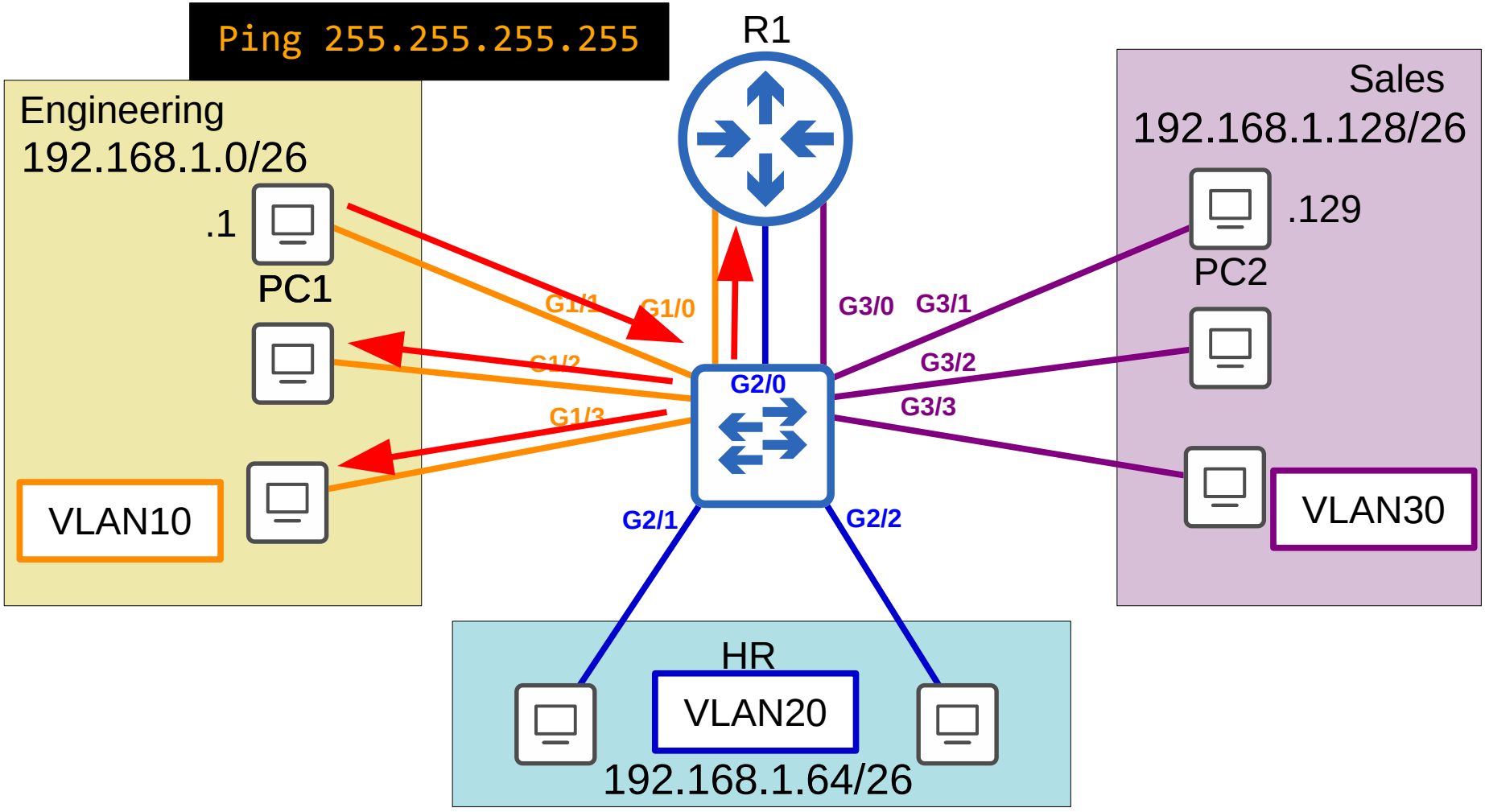
# VLAN Configuration



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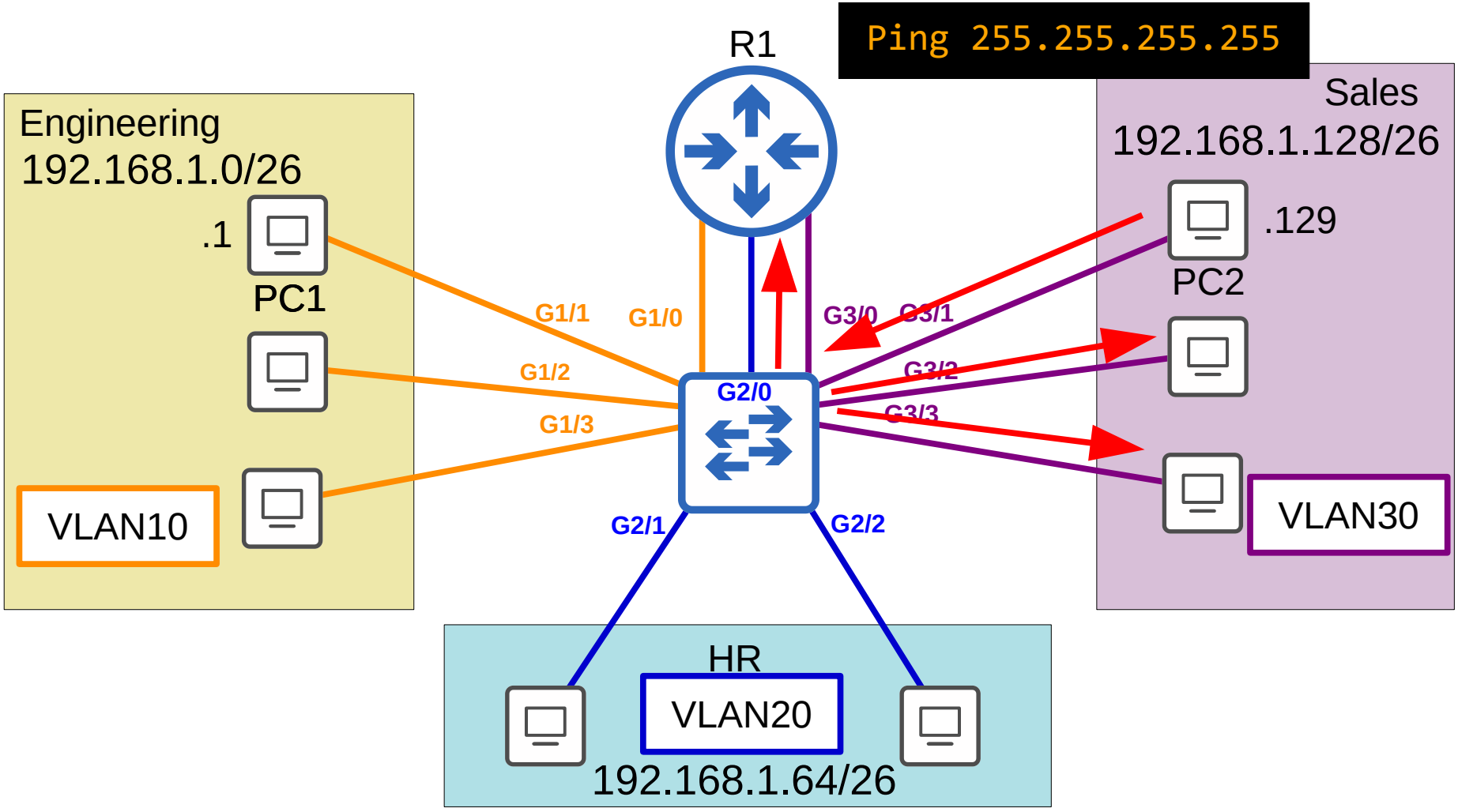
# VLAN Configuration



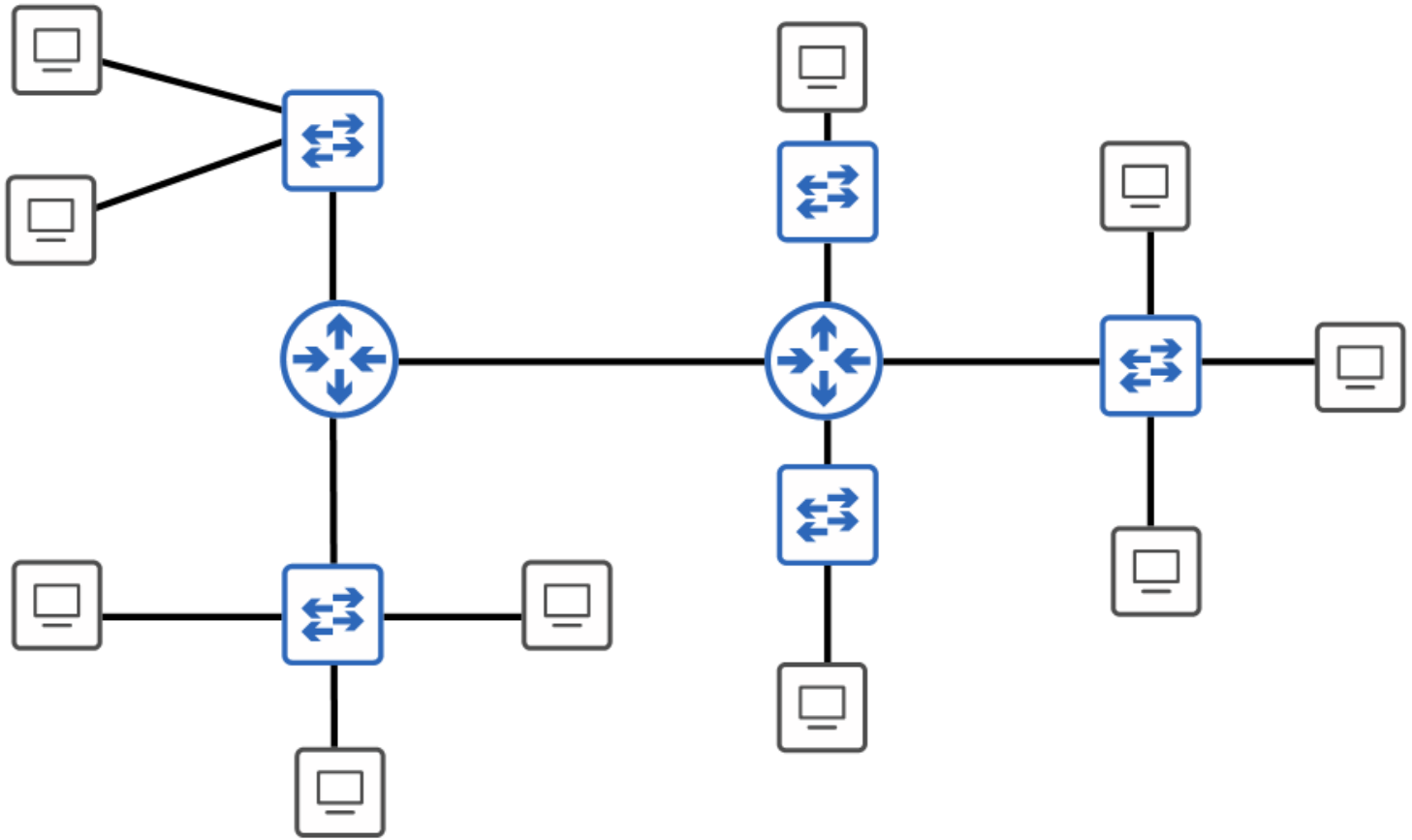
# Things we covered

- 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?



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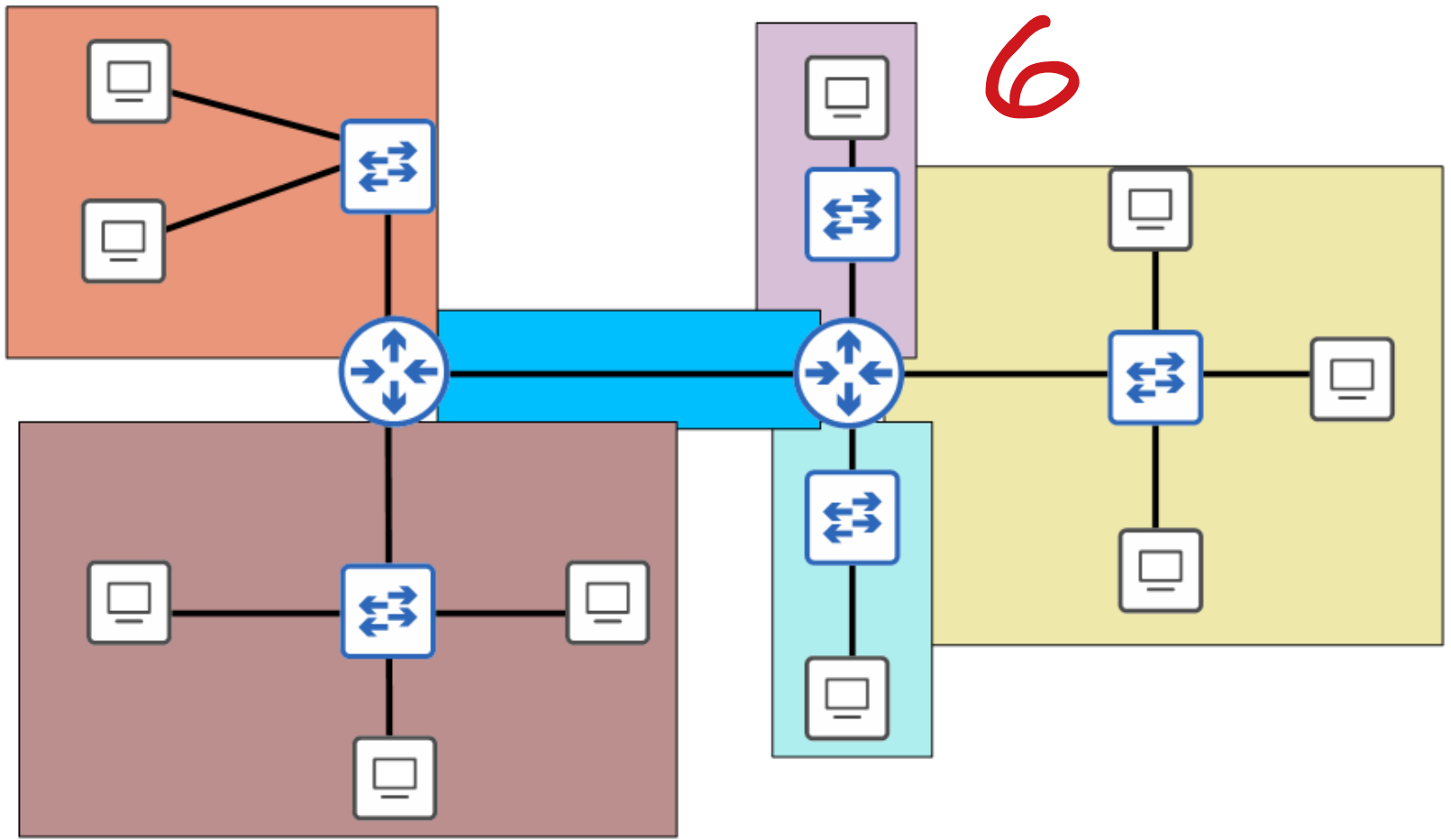
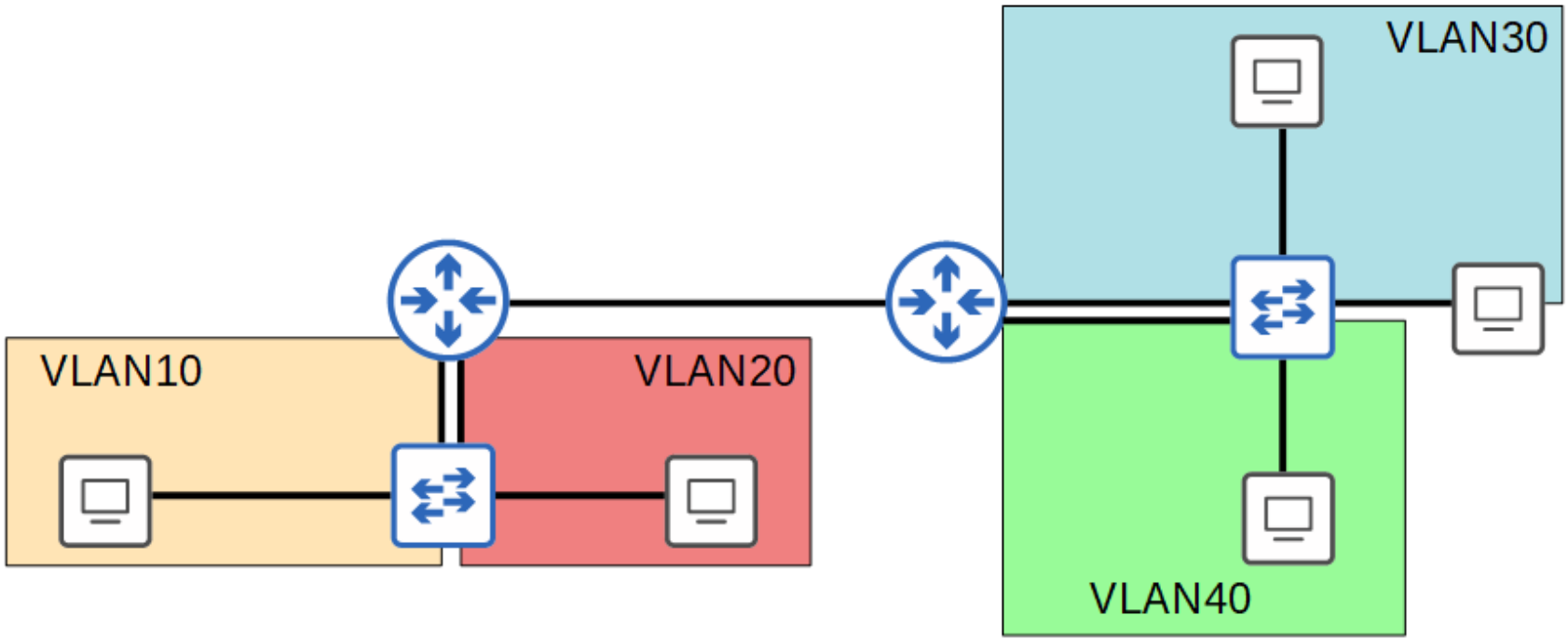
How many broadcast domains are shown in this network diagram?



# Quiz Question 2

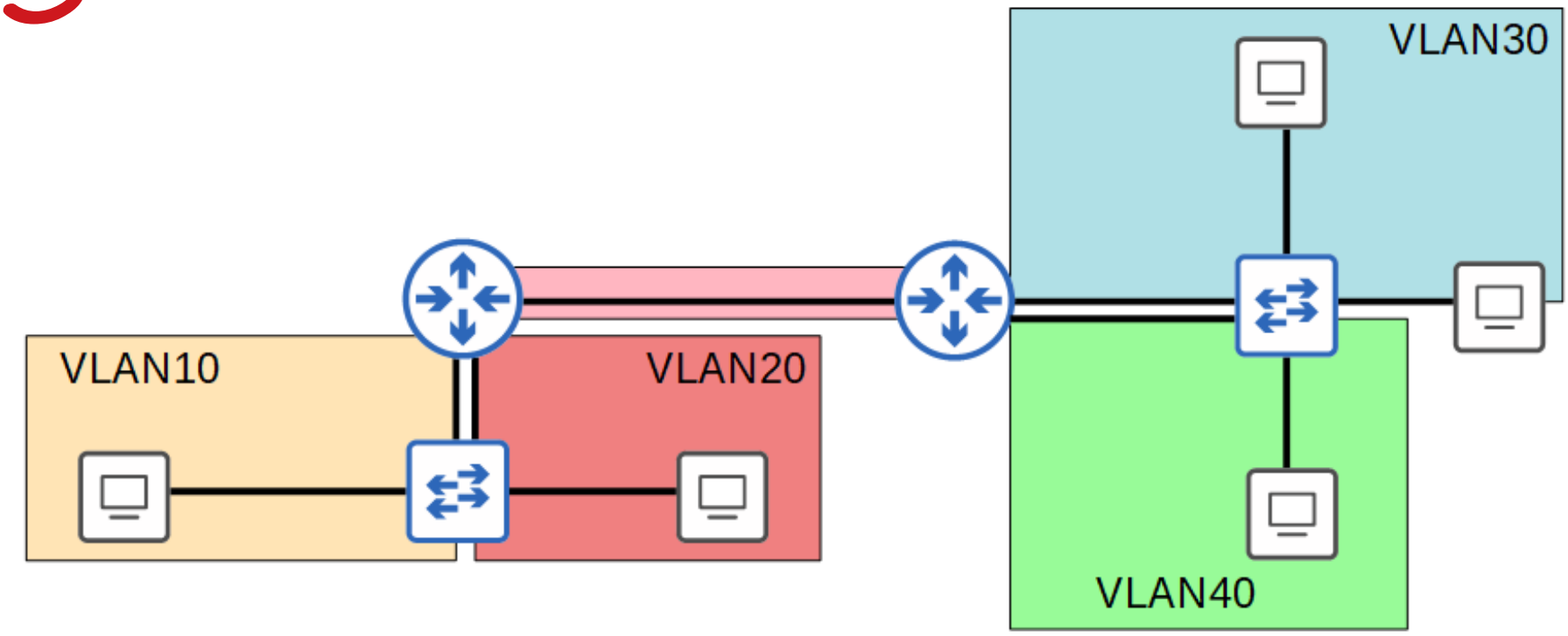
How many broadcast domains are shown in this network diagram?



# 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.

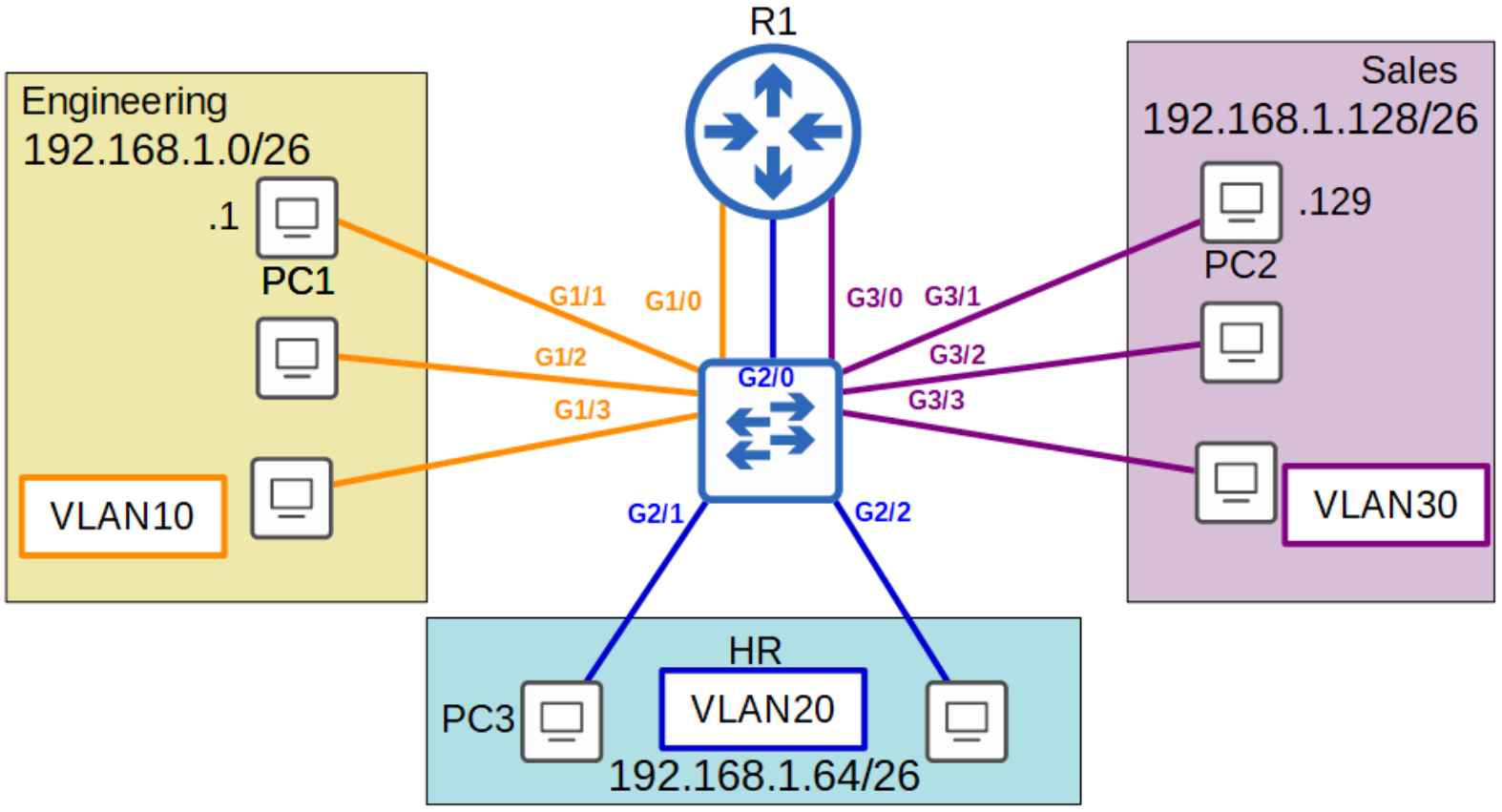
# Quiz Question 3

★ 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

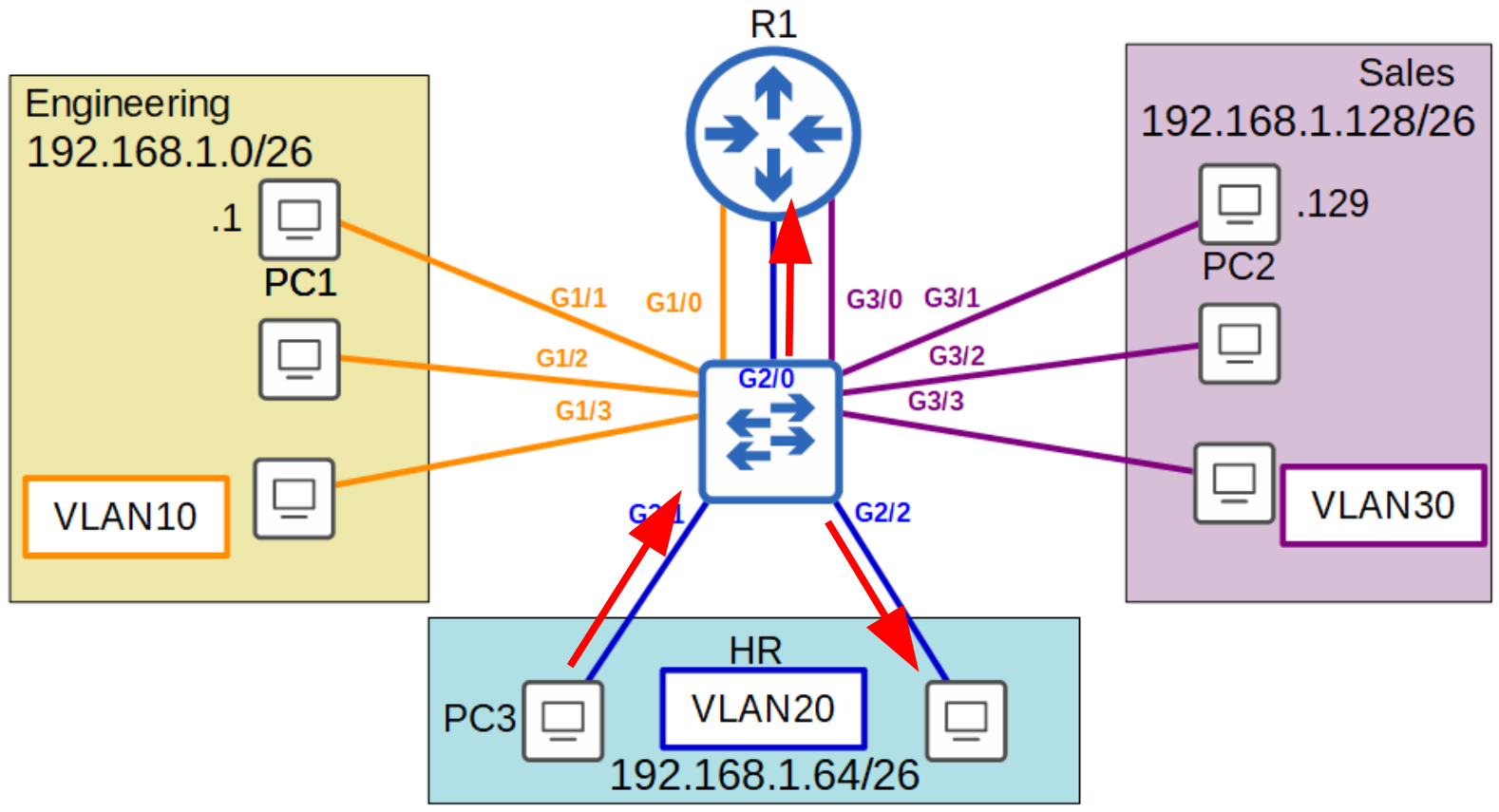
If PC3 sends a broadcast message, how many devices will receive it?



# 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

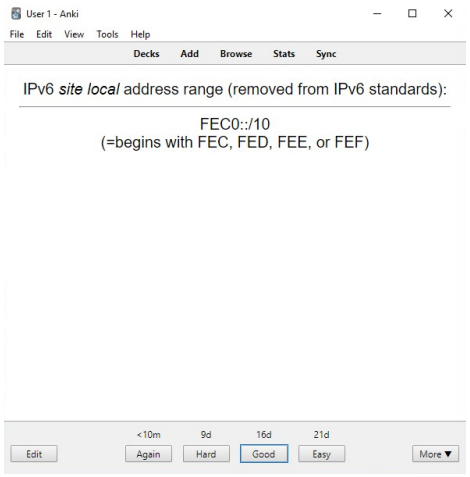
# Quiz Question 5

★ c) 8

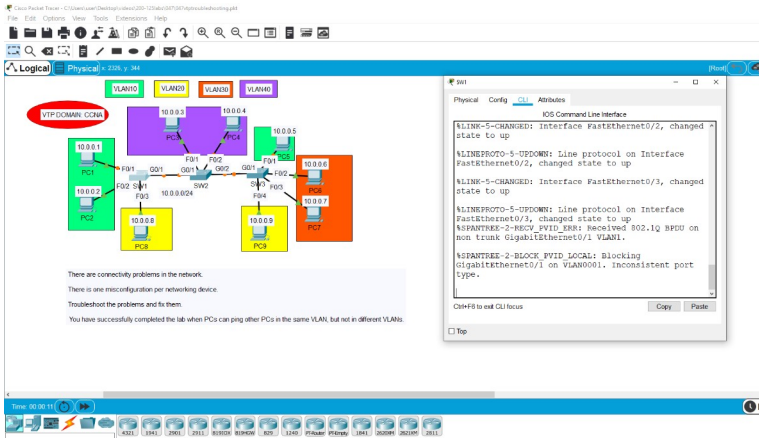
```
SW1(config)#do show vlan brief

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
```

# Supplementary Materials

- Review flash cards
  (link in the description)




- Packet Tracer lab



# JCNP-Level Channel Members

- C — Charlesetta Estelle
- L — Lito Castillejo
- Y — Yonatan Makara
- M — Mike Achee
-  — Aleksander Zakrzewski
-  — Vance Simmons
- M — M Yousif
-  — Samil Cañas
- Boson — Boson Software
- S — Sidi Ndoye
-  — Magrathea
-  — Devin Sukhu