

Configuring VLANs



Jeremy's
IT Lab

Switch interfaces

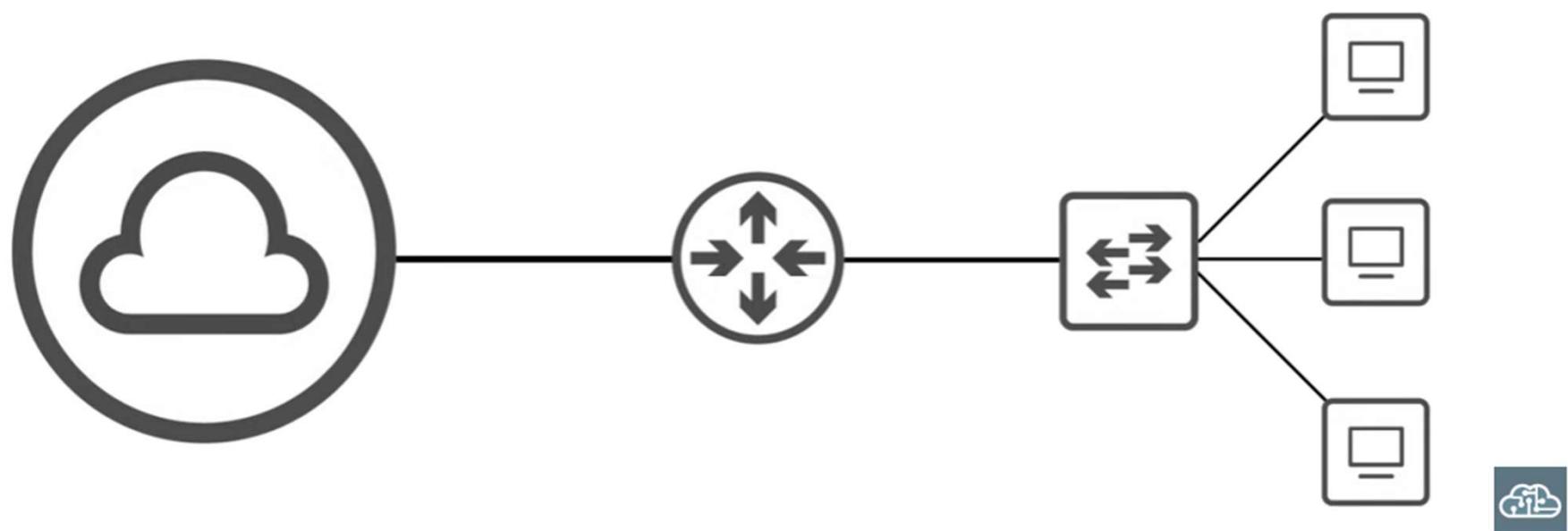


ASR 1000-X Router



Catalyst 9200 Switch

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

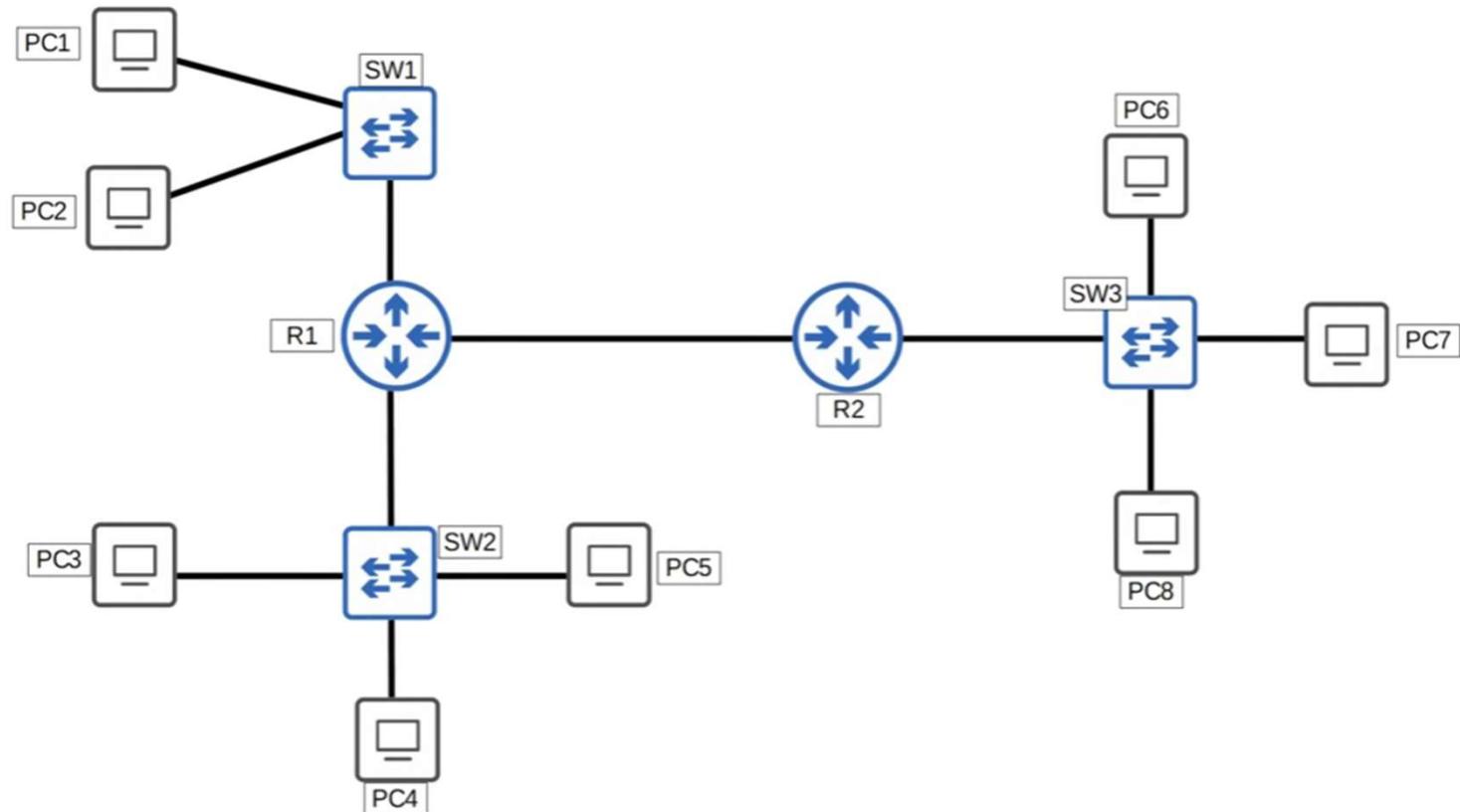


What is a LAN?

- 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.



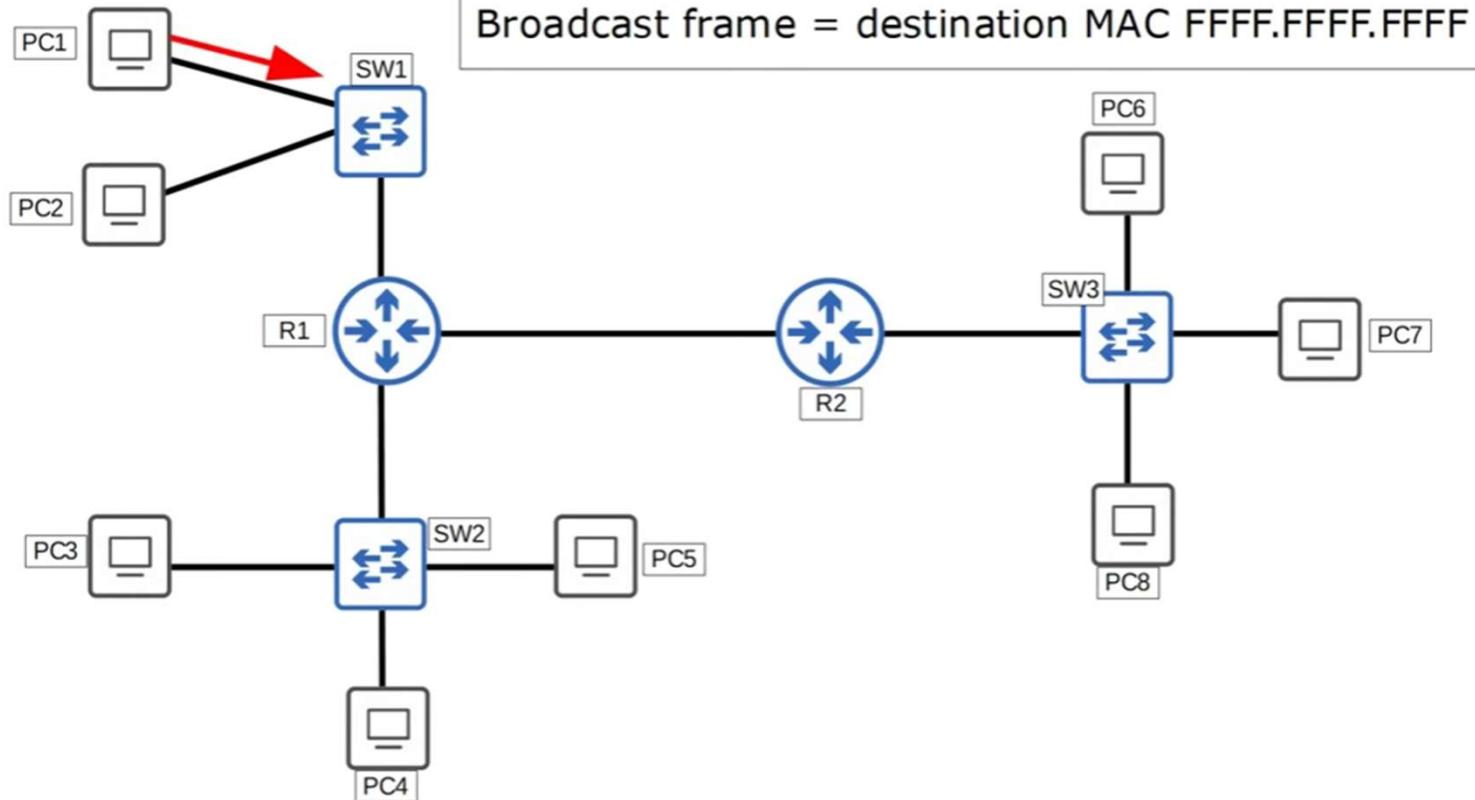
LANs/Broadcast Domains





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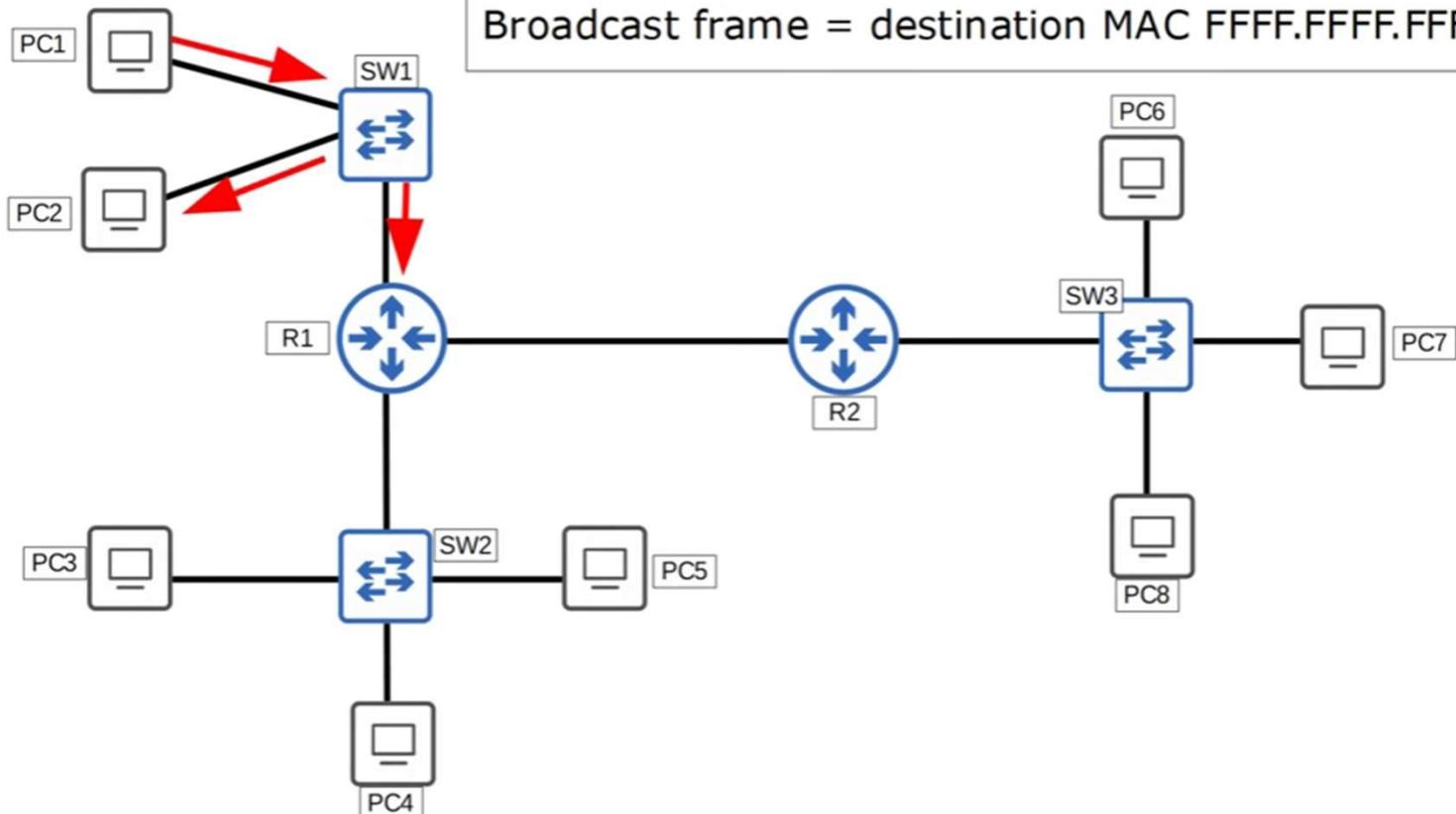
LANs/Broadcast Domains



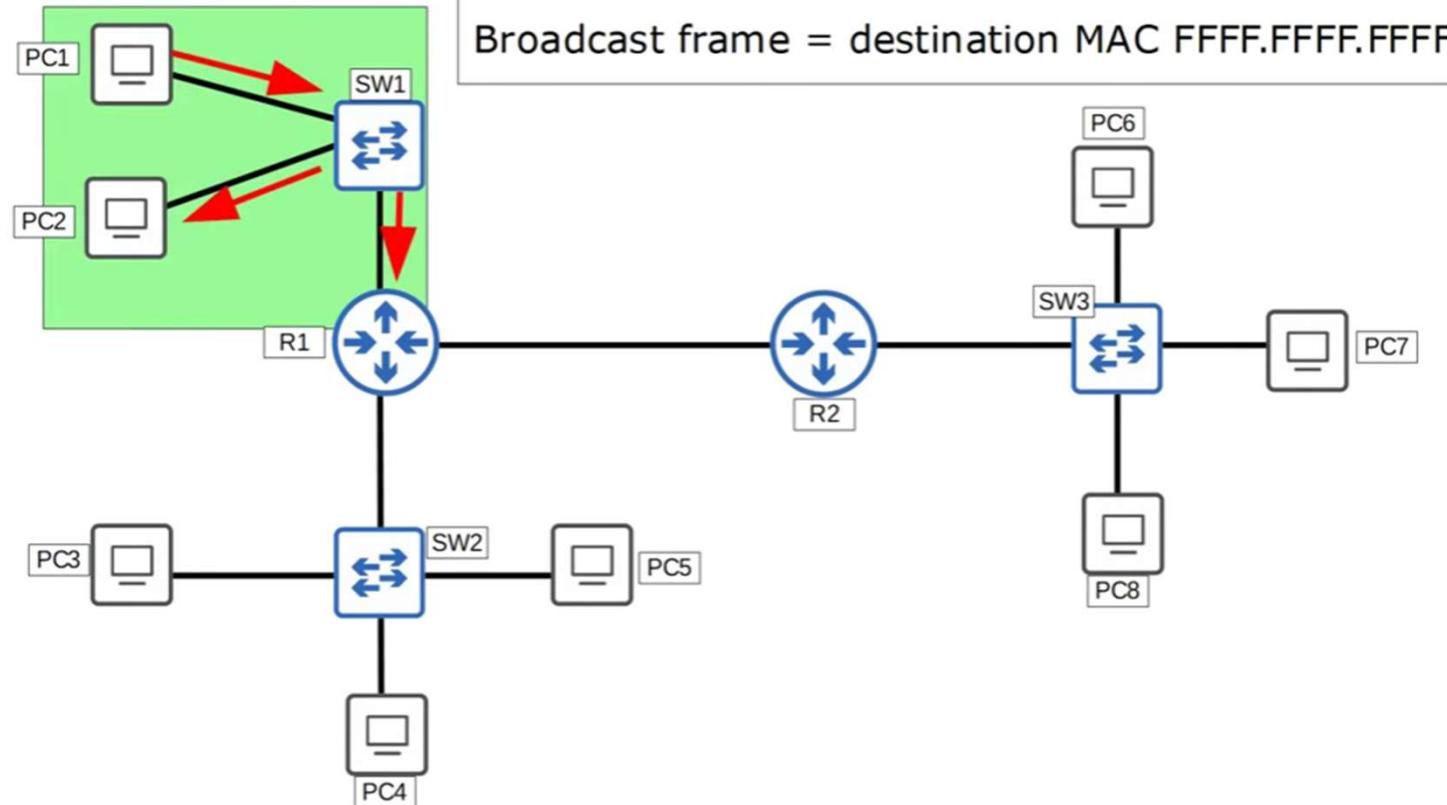


LANs/Broadcast Domains

Broadcast frame = destination MAC FFFF.FFFF.FFFF



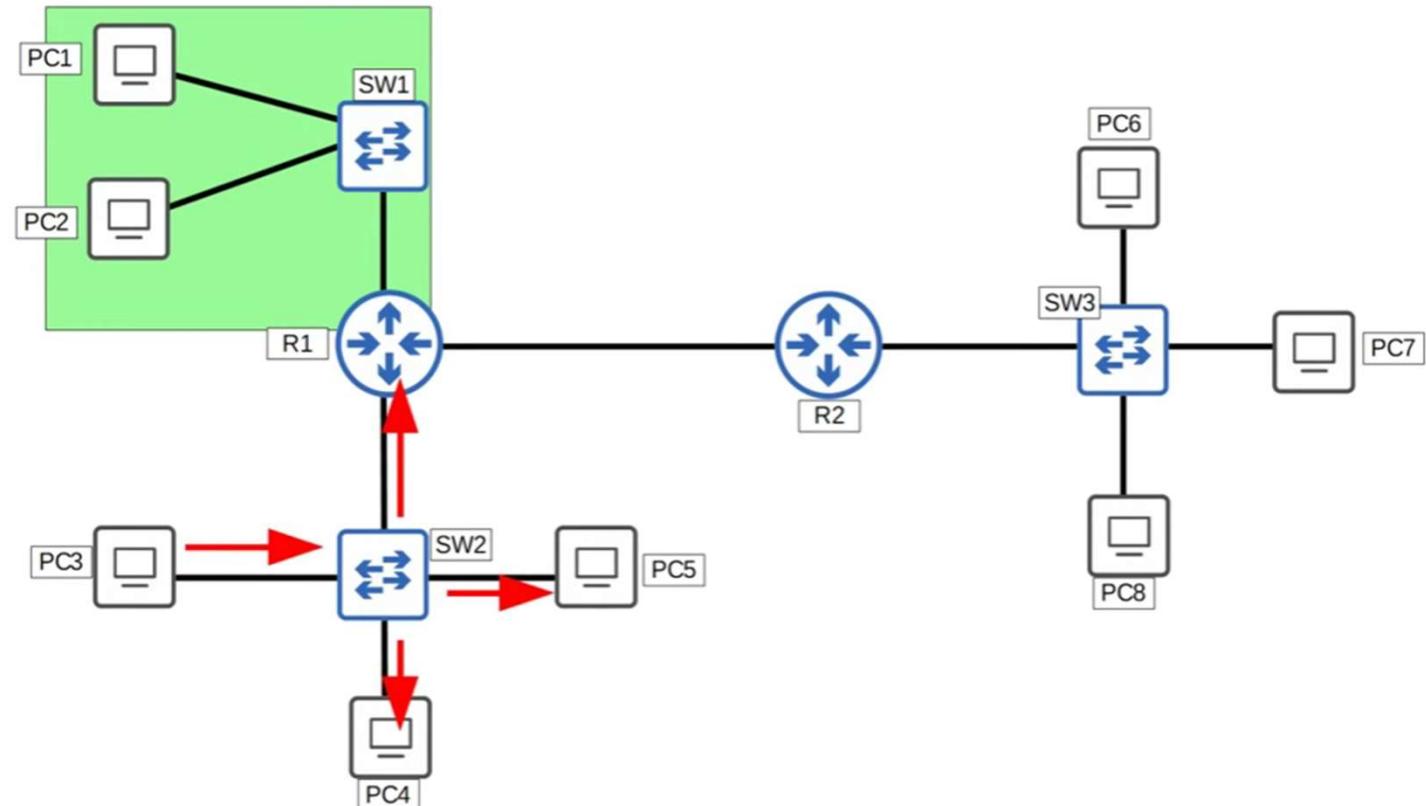
LANs/Broadcast Domains





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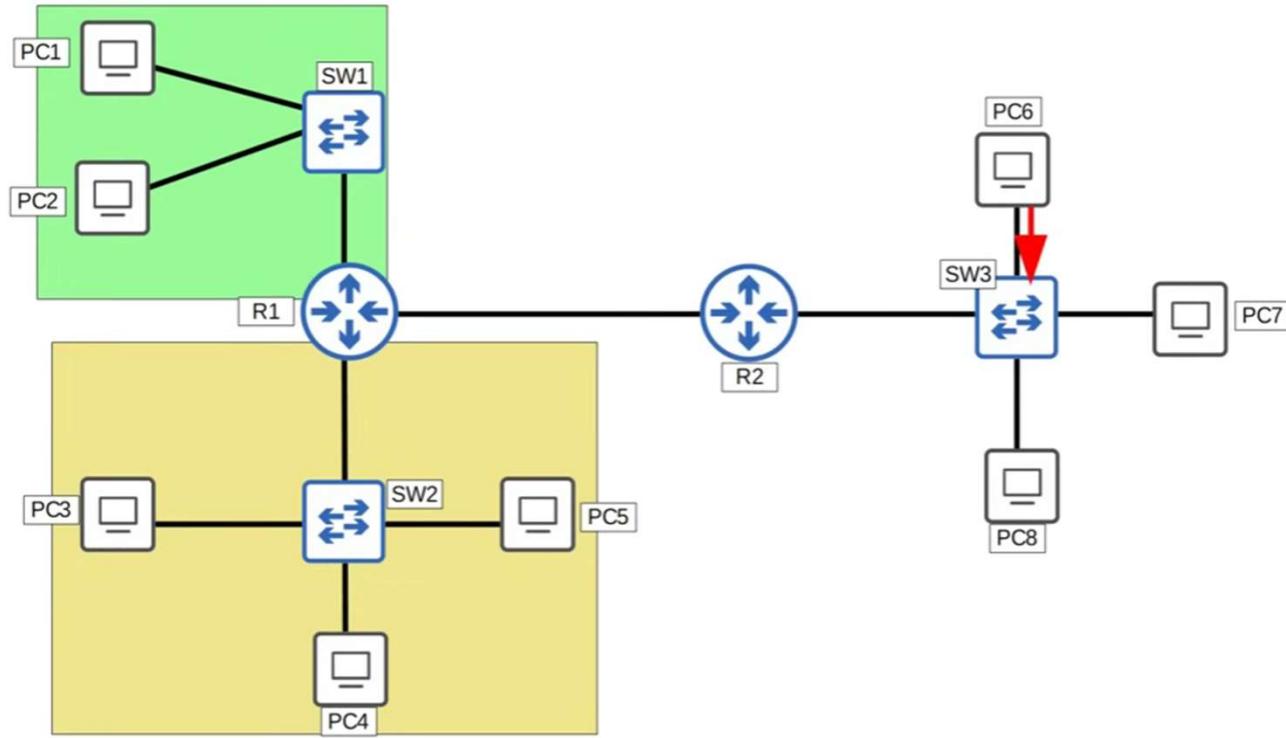
LANs/Broadcast Domains





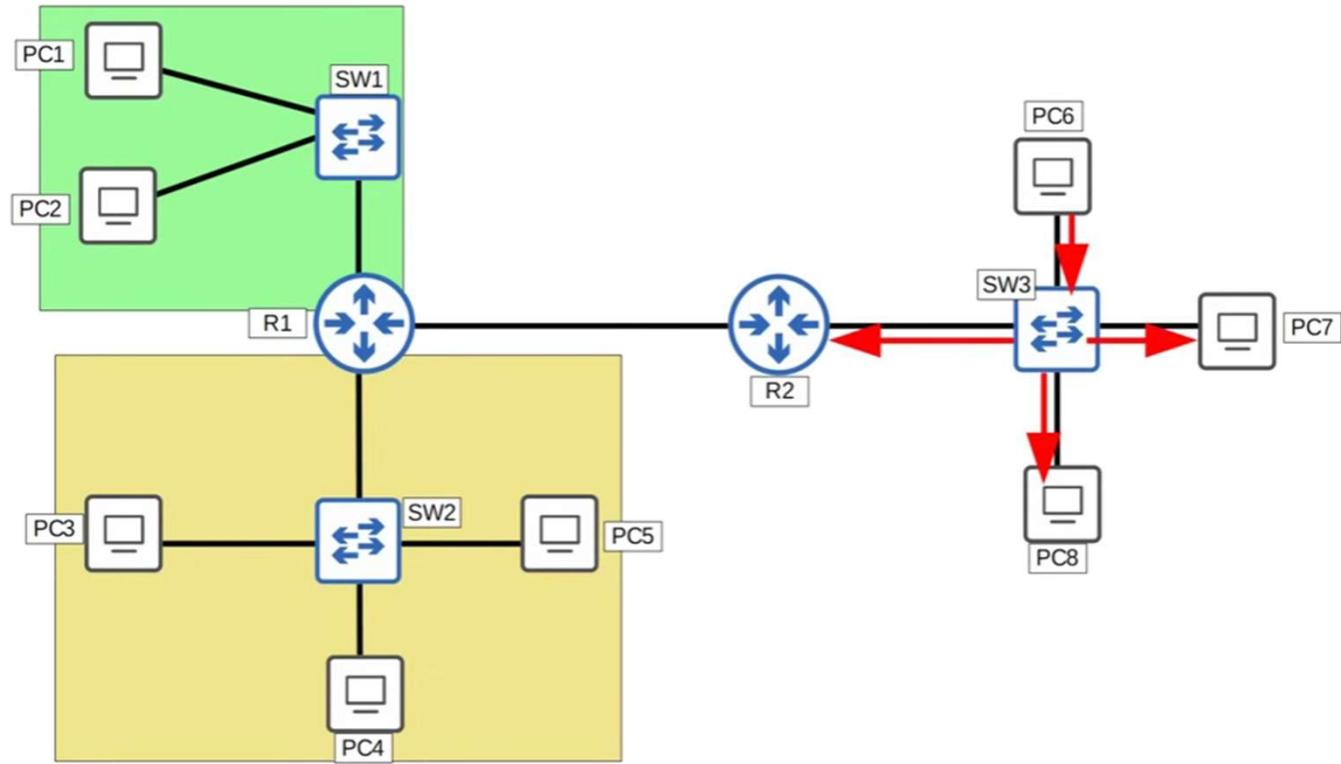
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LANs/Broadcast Domains

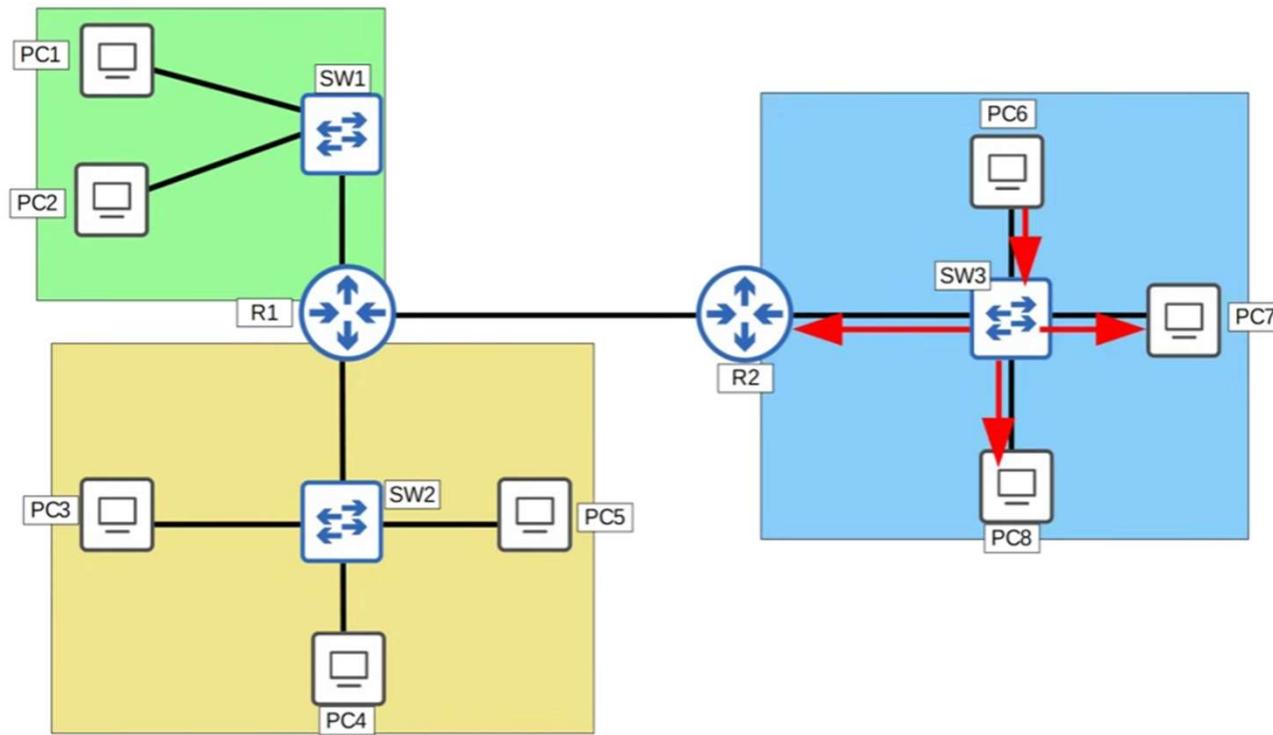


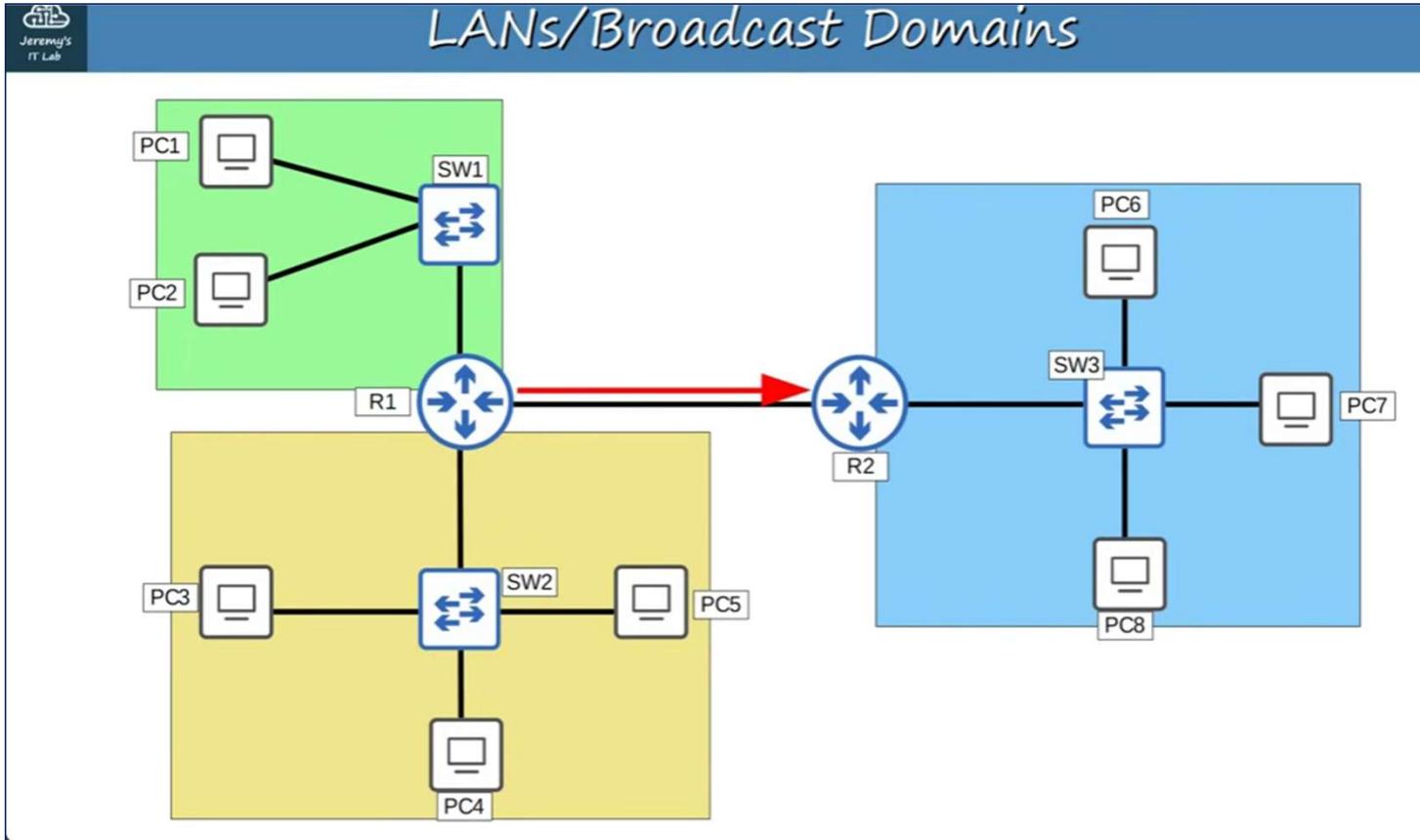


LANs/Broadcast Domains



LANs/Broadcast Domains

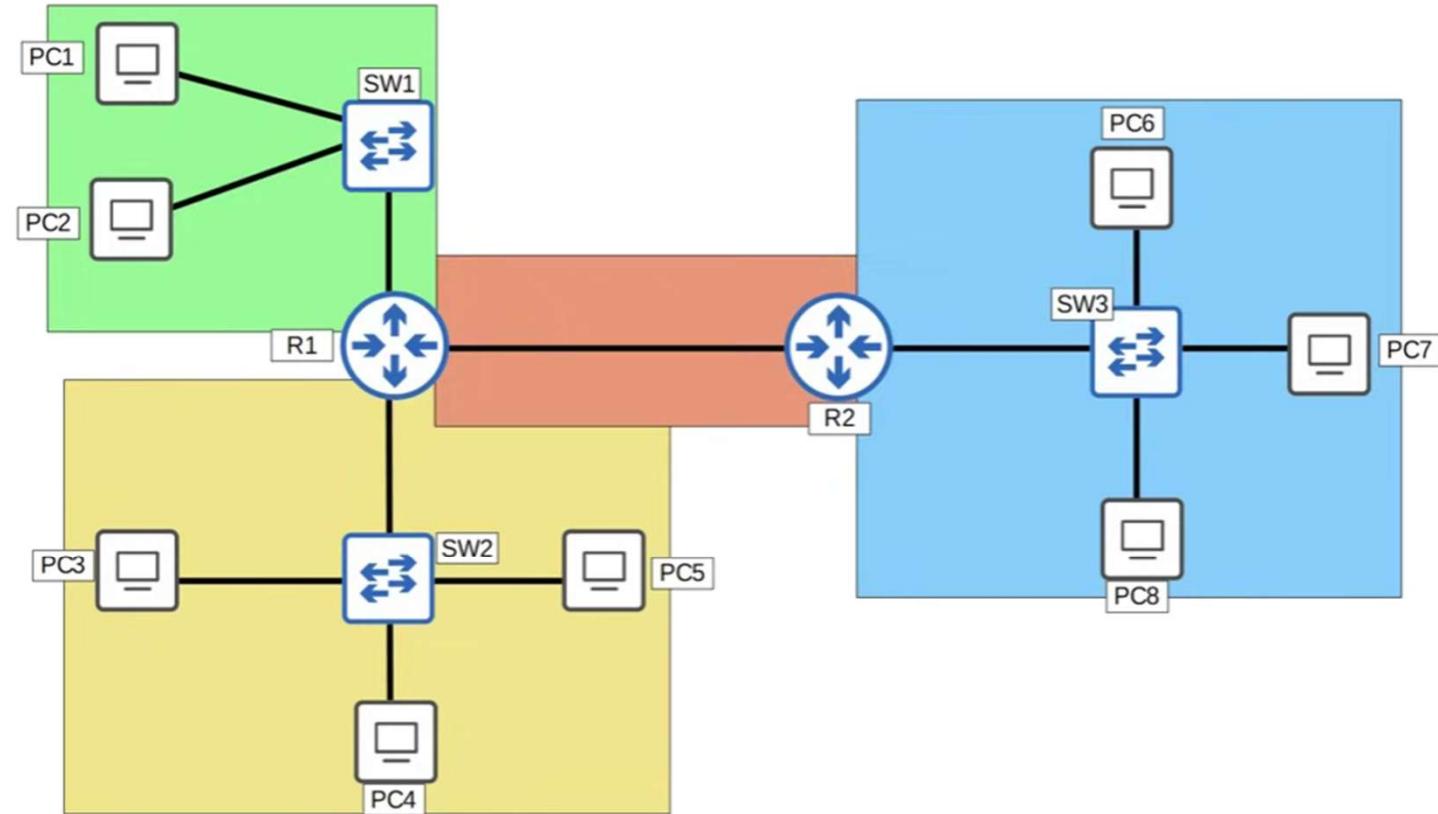






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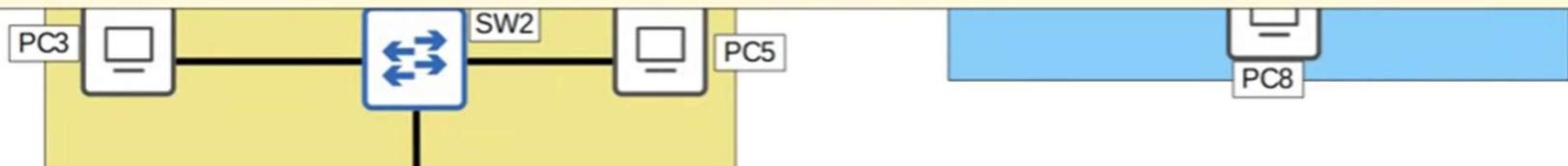
LANs/Broadcast Domains



LANs/Broadcast Domains



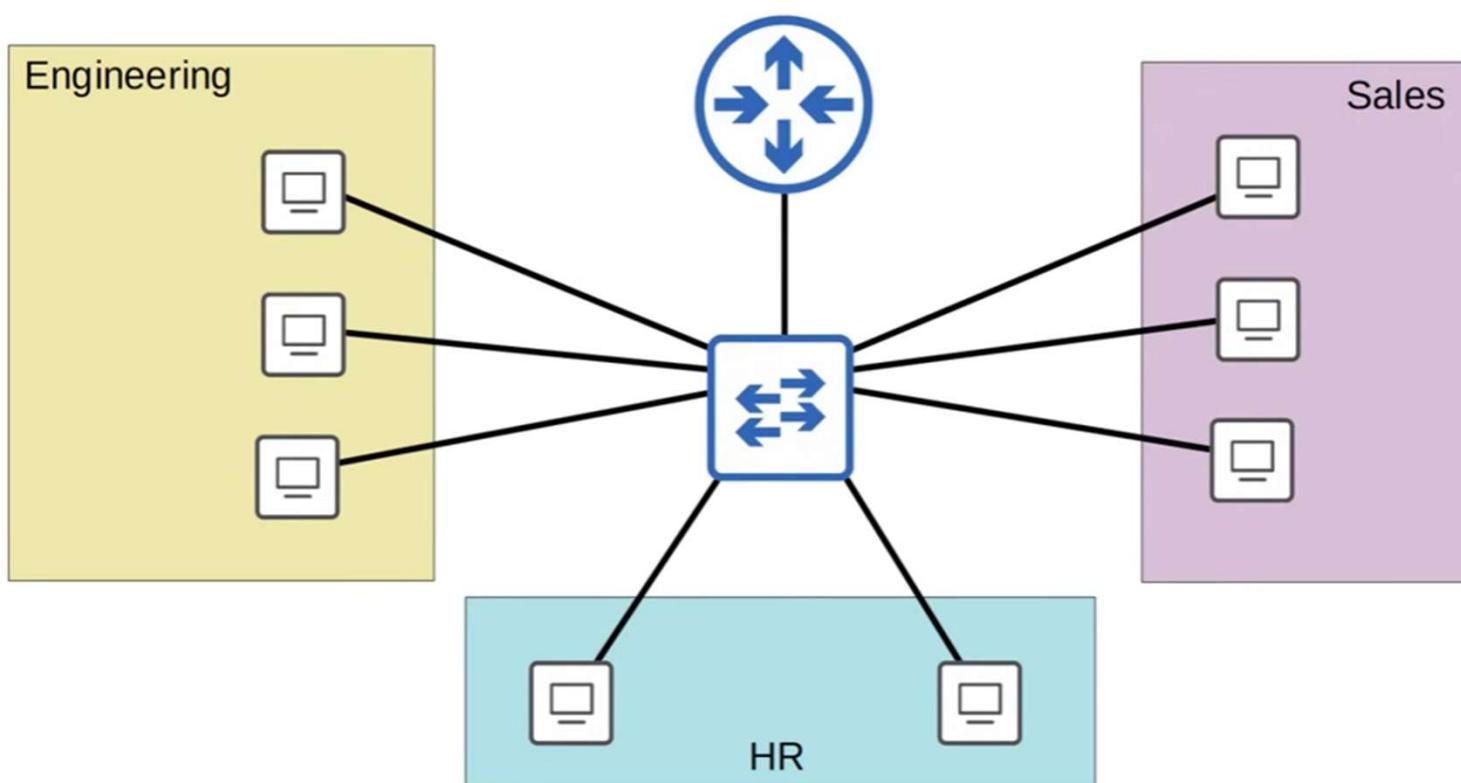
A **broadcast domain** is the group of devices which will receive a broadcast frame (destination MAC FFFF.FFFF.FFFF) sent by any one of the members.





What is a VLAN?

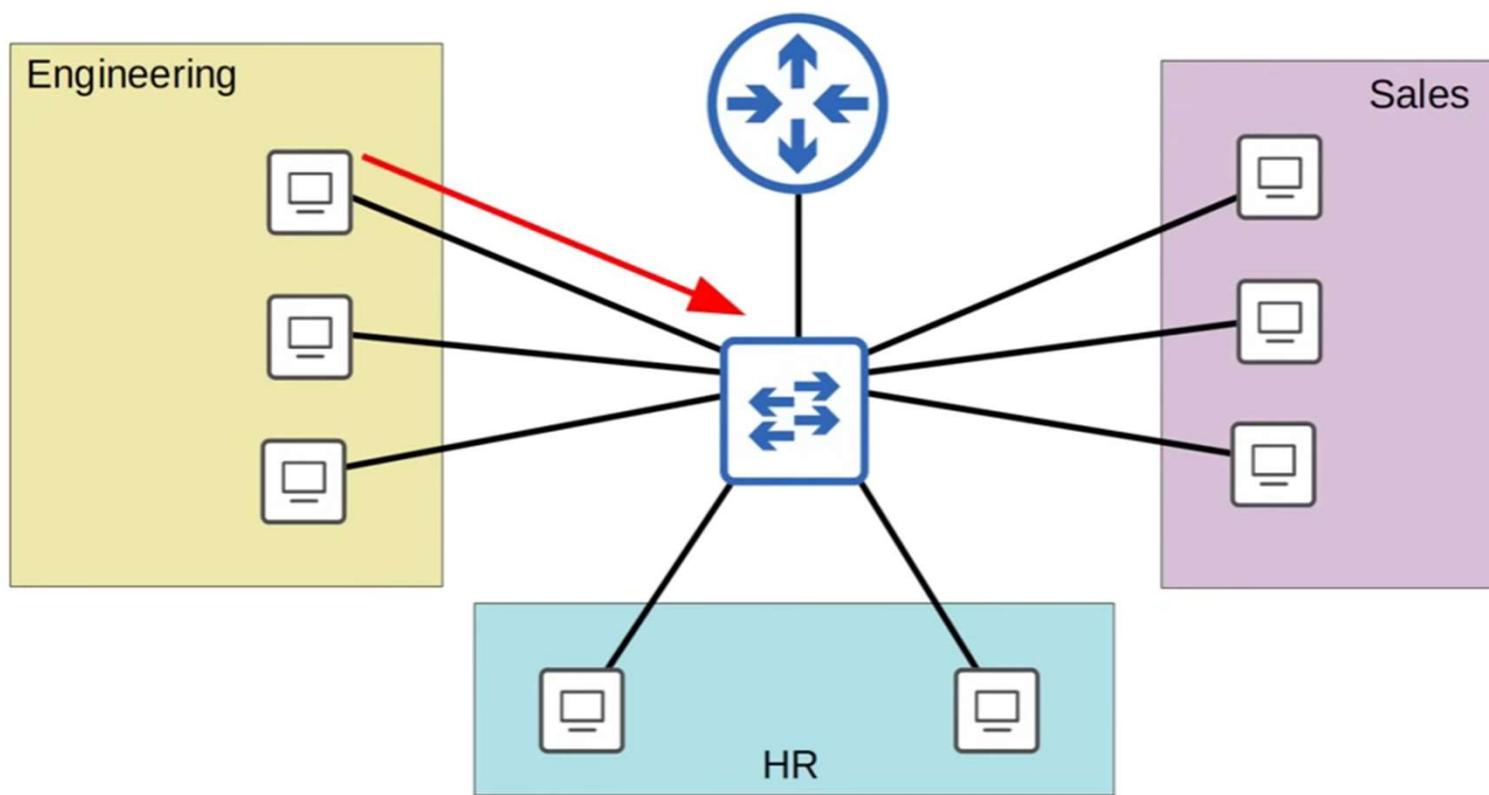
192.168.1.0/24





What is a VLAN?

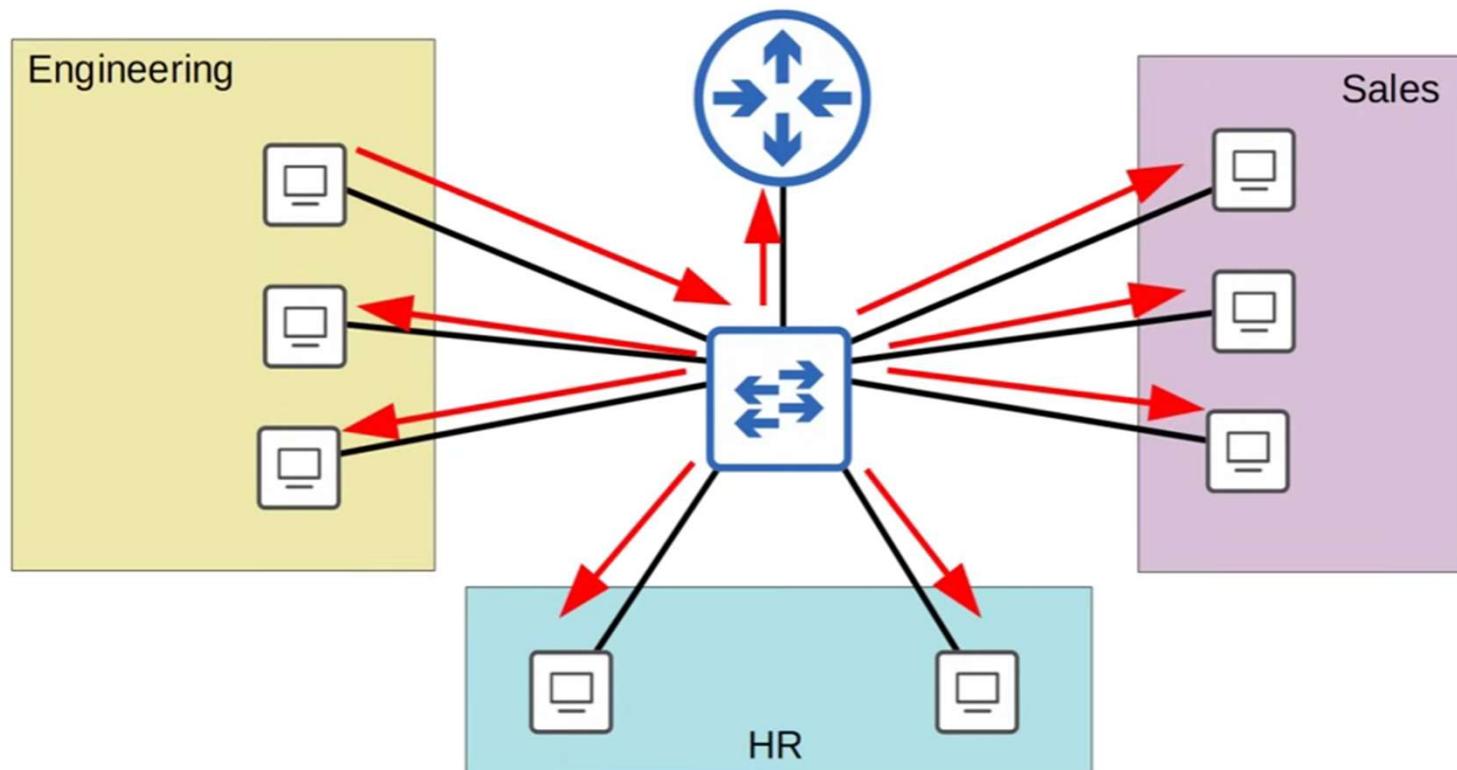
192.168.1.0/24





What is a VLAN?

192.168.1.0/24



The screenshot shows a presentation slide with the title "What is a VLAN?" at the top. Below the title is the IP address "192.168.1.0/24". The slide content is organized into two main sections: "Performance" and "Security".

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

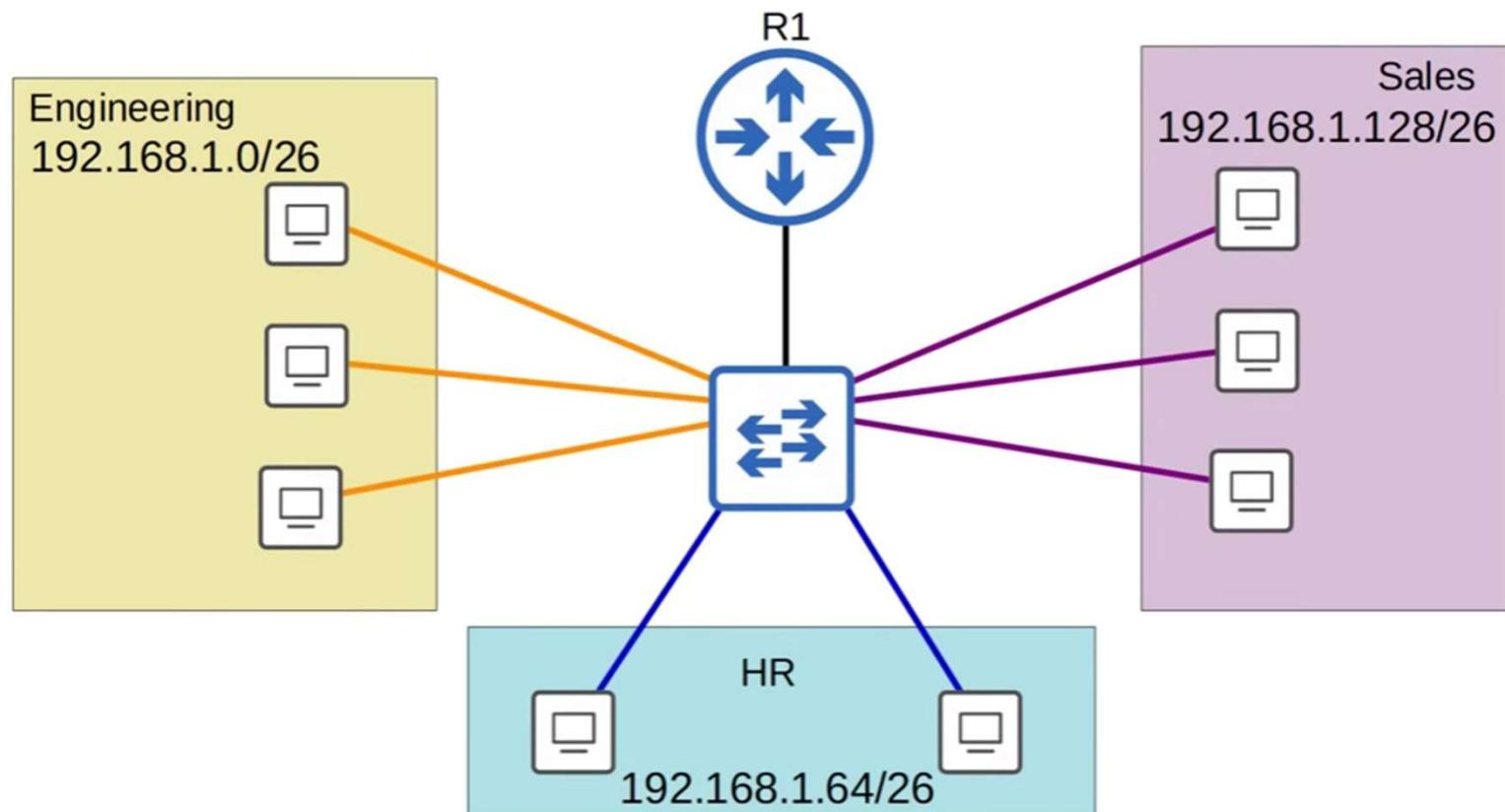
Security: Even within the same office, you want to limit who has access to what. You can apply security policies on a router/firewall.

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.



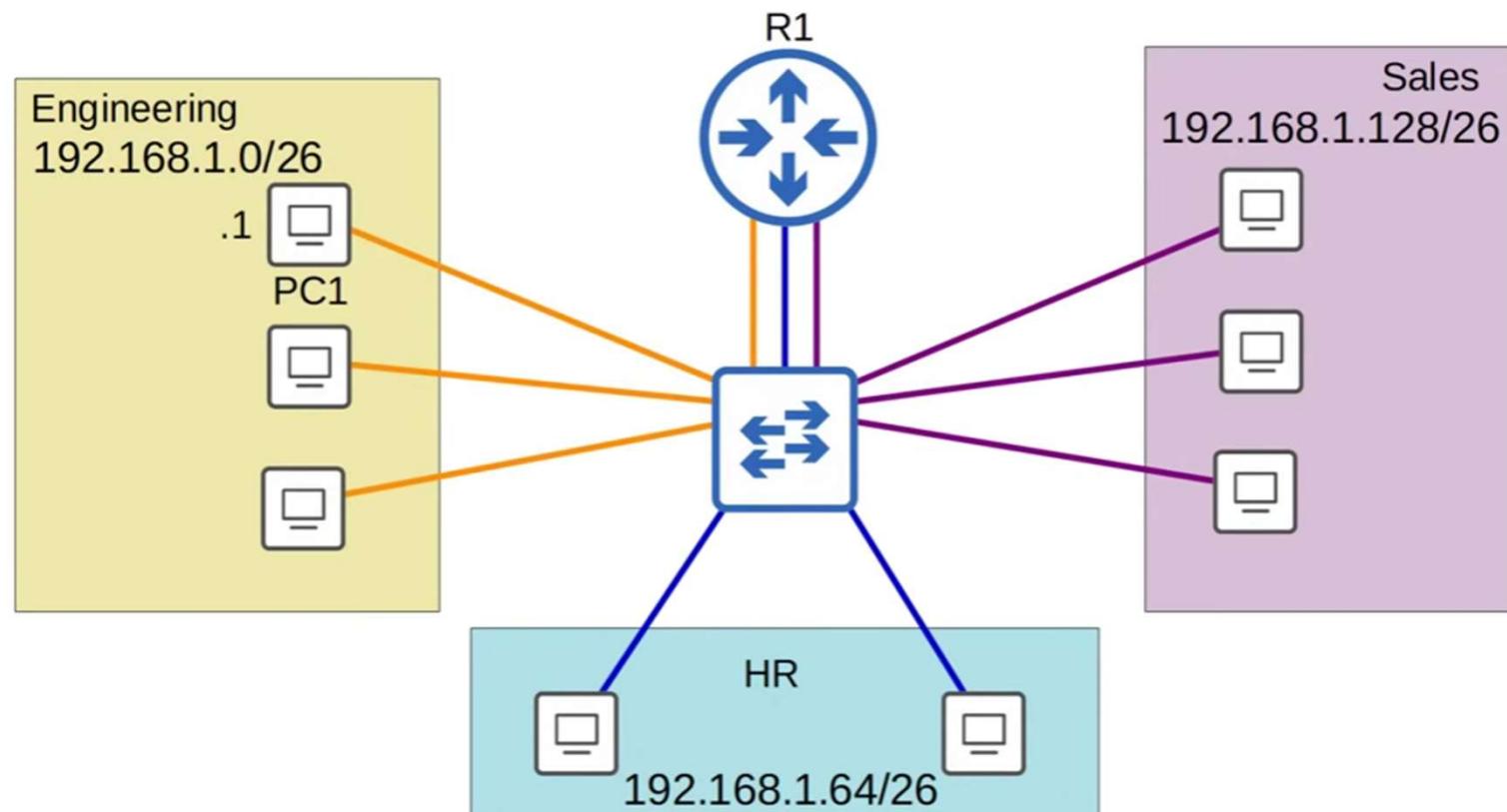
What is a VLAN?



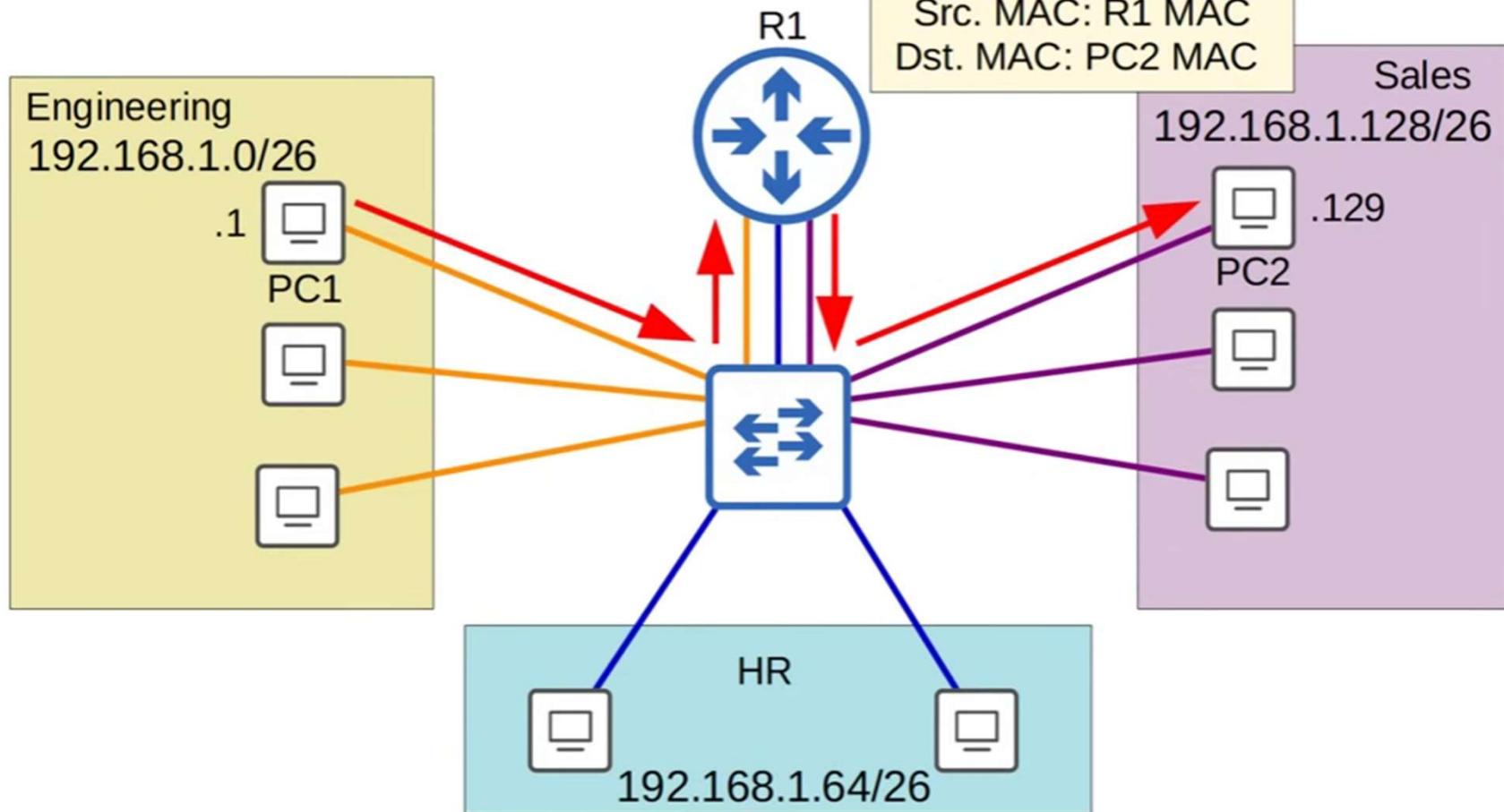


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What is a VLAN?

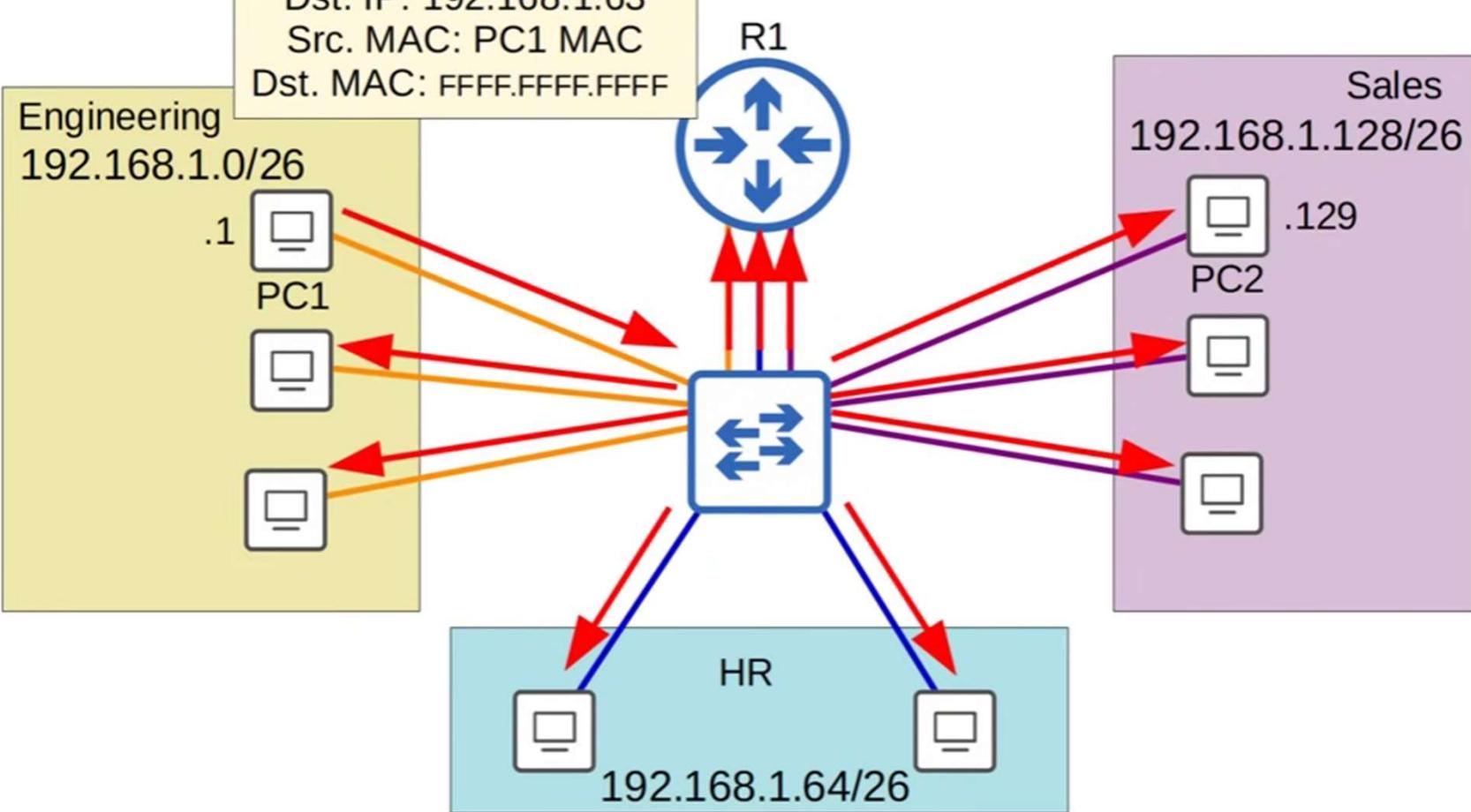


What is a VLAN?





What is a VLAN?





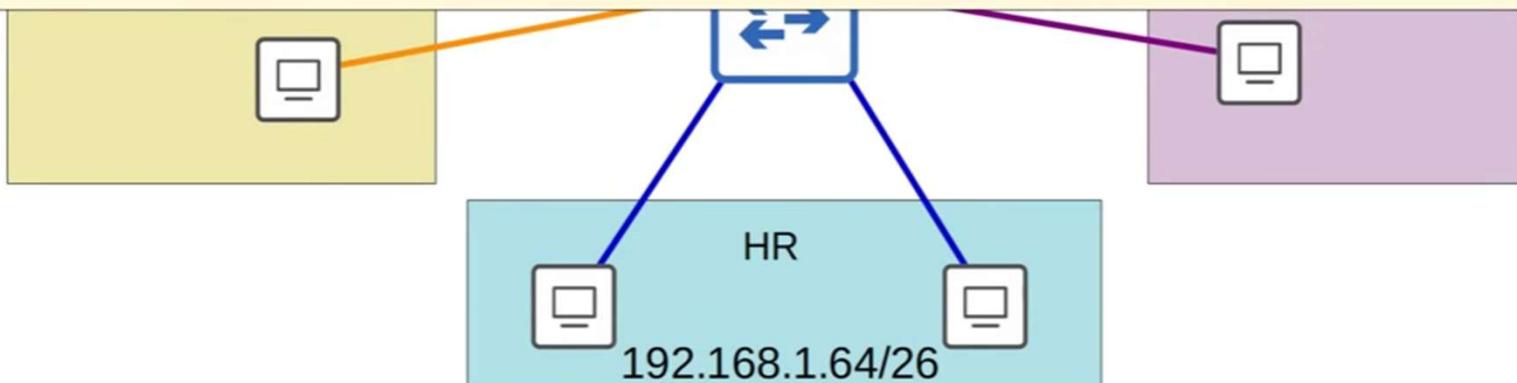
What is a VLAN?

Engineering
192.168.1.0/26
.1



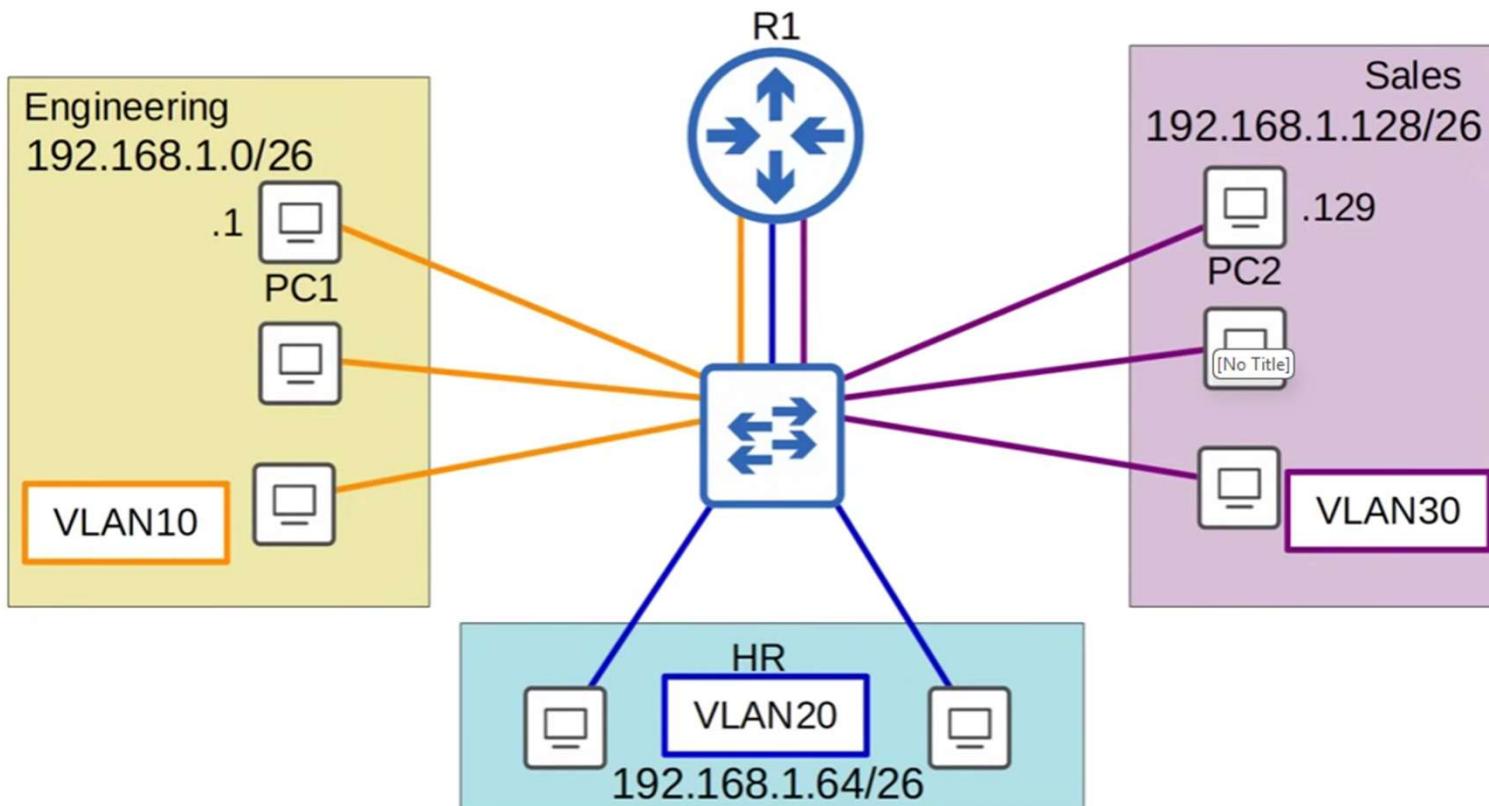
Sales
192.168.1.128/26
.129

Although we separated the three departments into three subnets (Layer 3),
they are still in the same broadcast domain (Layer 2).





What is a VLAN?

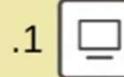




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What is a VLAN?

Engineering
192.168.1.0/26



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

Sales

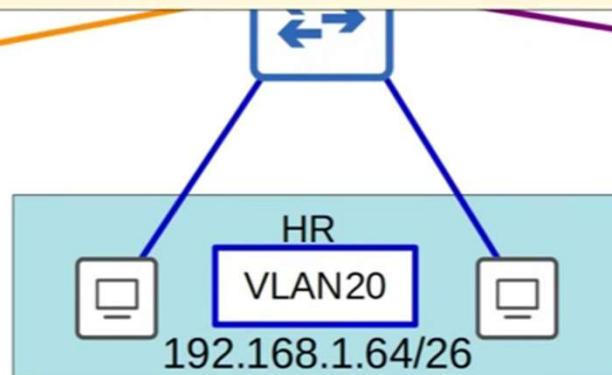
192.168.1.128/26

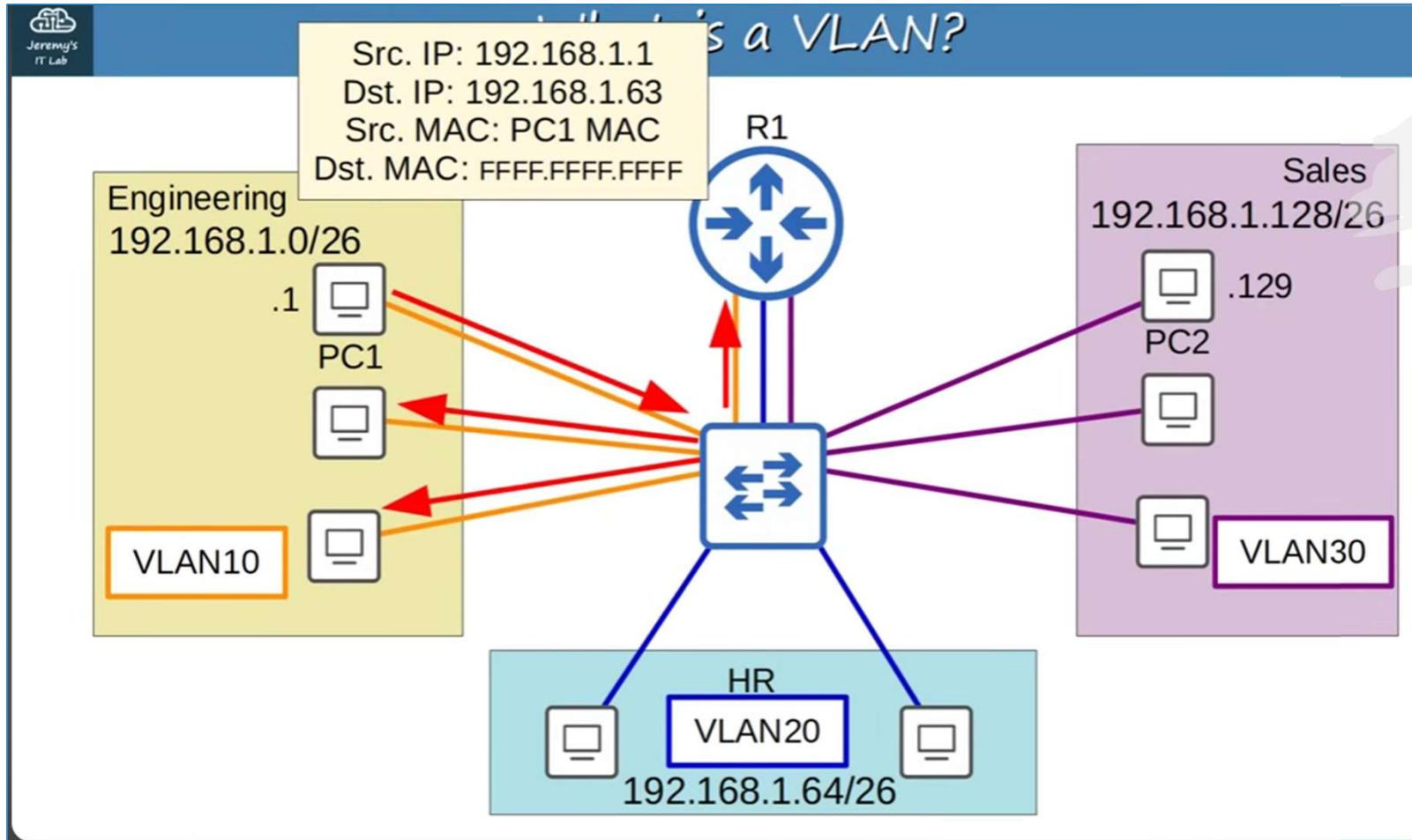


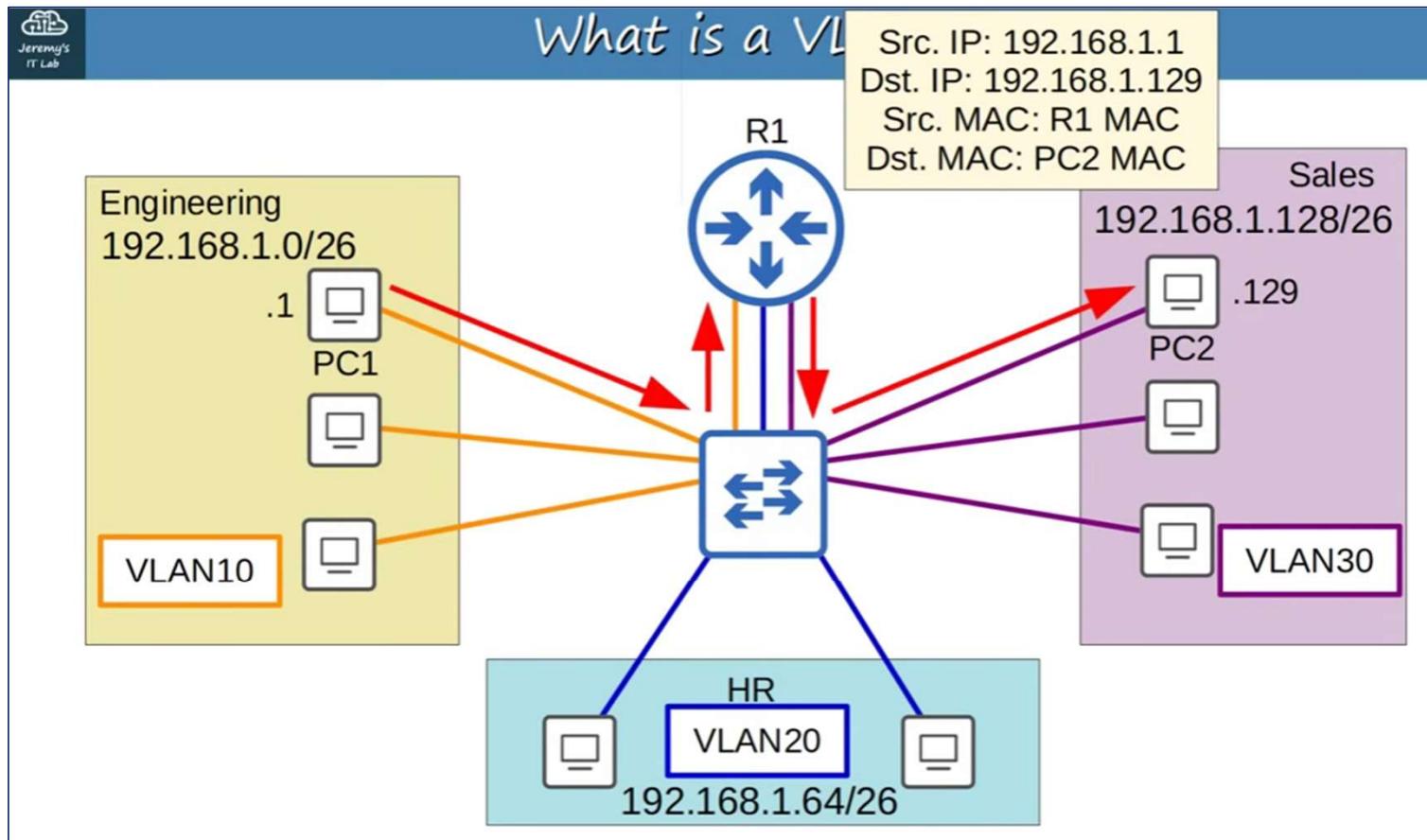
.129

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

VLAN10

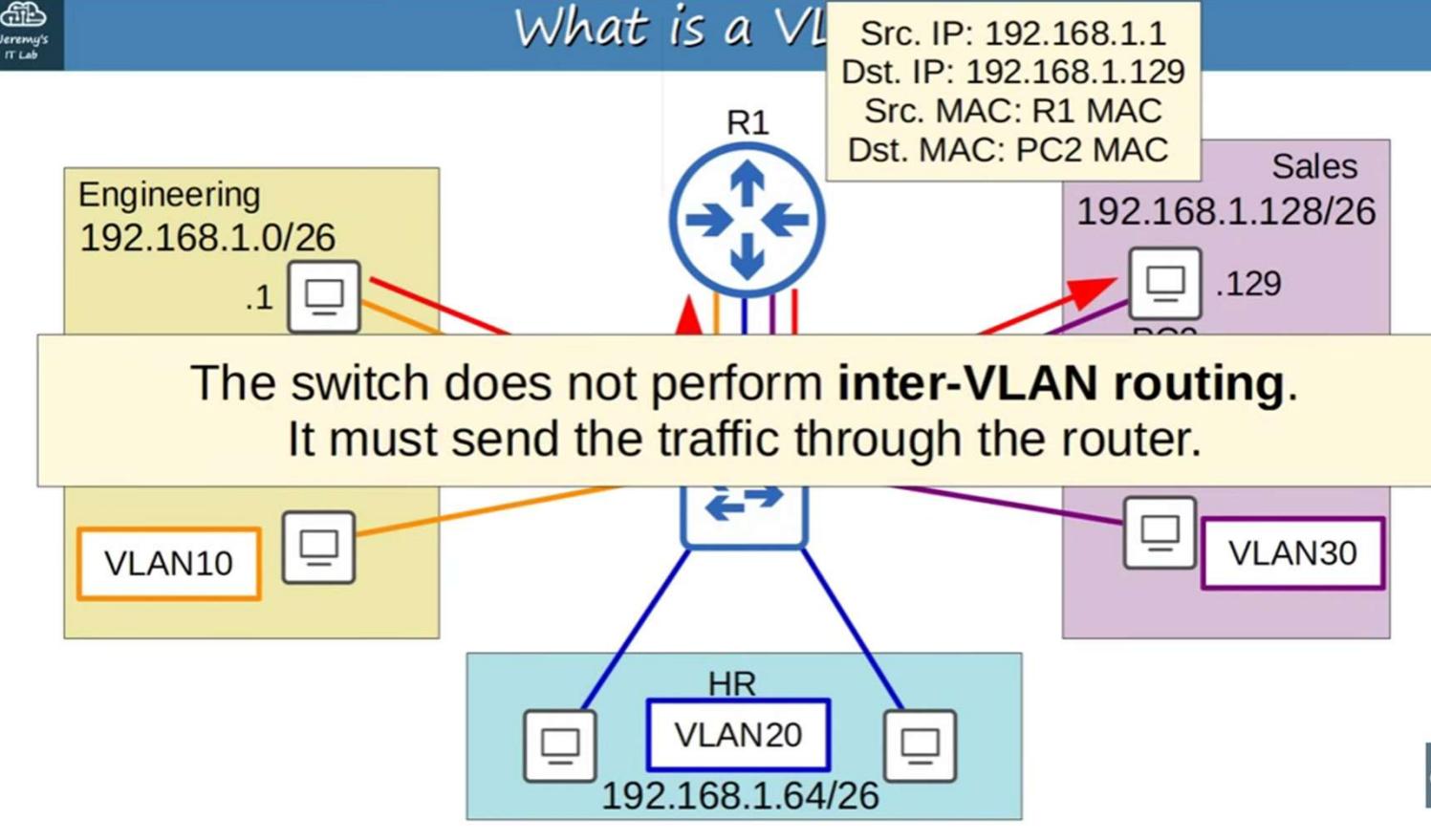






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What is a VLAN?



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

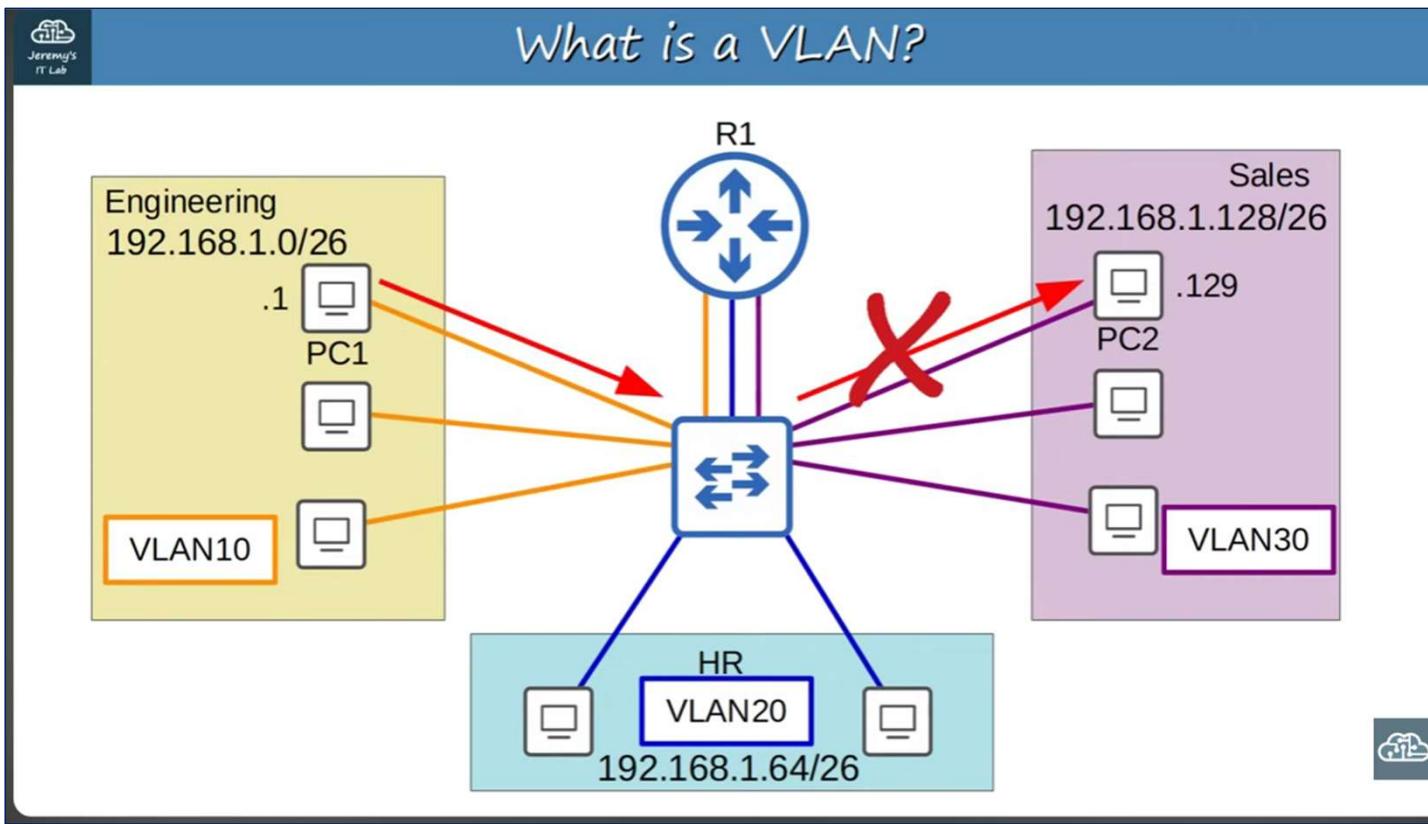
Sales
192.168.1.128/26
.129

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

VLAN10

HR
VLAN20
192.168.1.64/26

VLAN30





What is a VLAN?



VLANs...

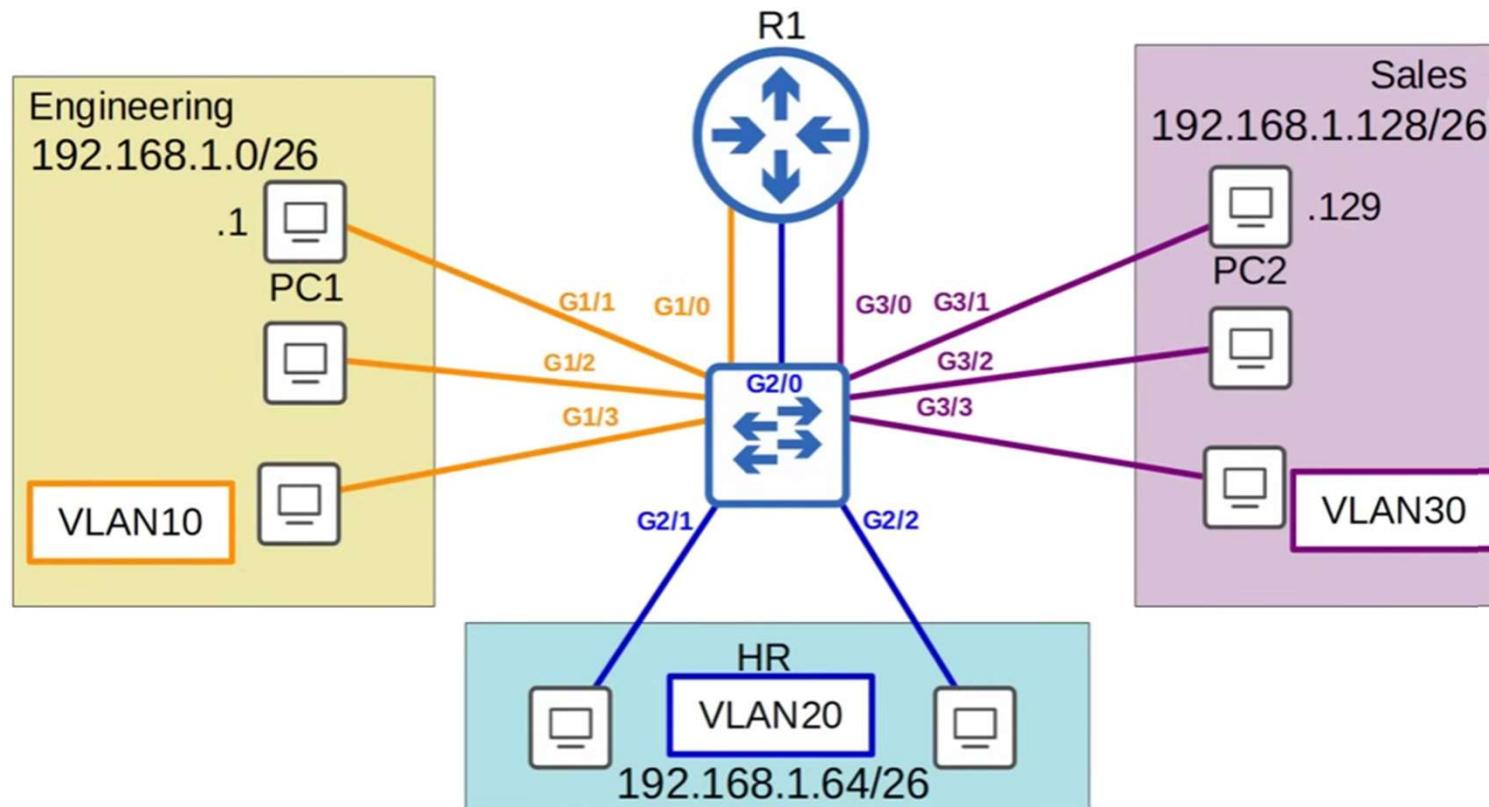
- are configured on switches on a **per-interface** basis.
- **logically** separate end hosts at Layer 2.

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



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VLAN Configuration





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

```
SW1#
```



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#
```

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)#[
```

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.



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)#[
```

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.



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 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  
1003 token-ring-default  
1004 fddinet-default  
1005 trnet-default
```

```
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
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
```



IT Lab

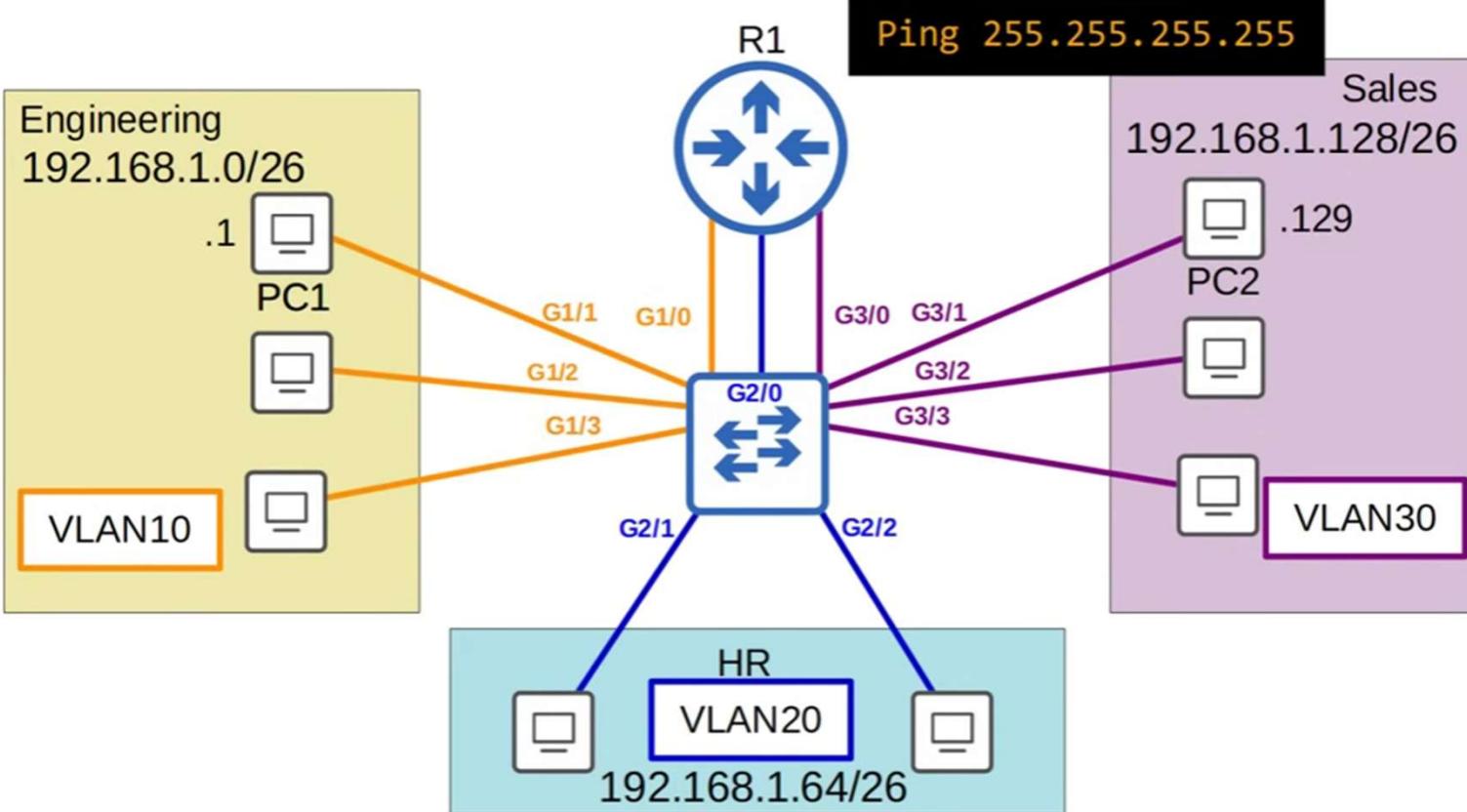
VLAN Configuration

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



VLAN Configuration





Things we covered

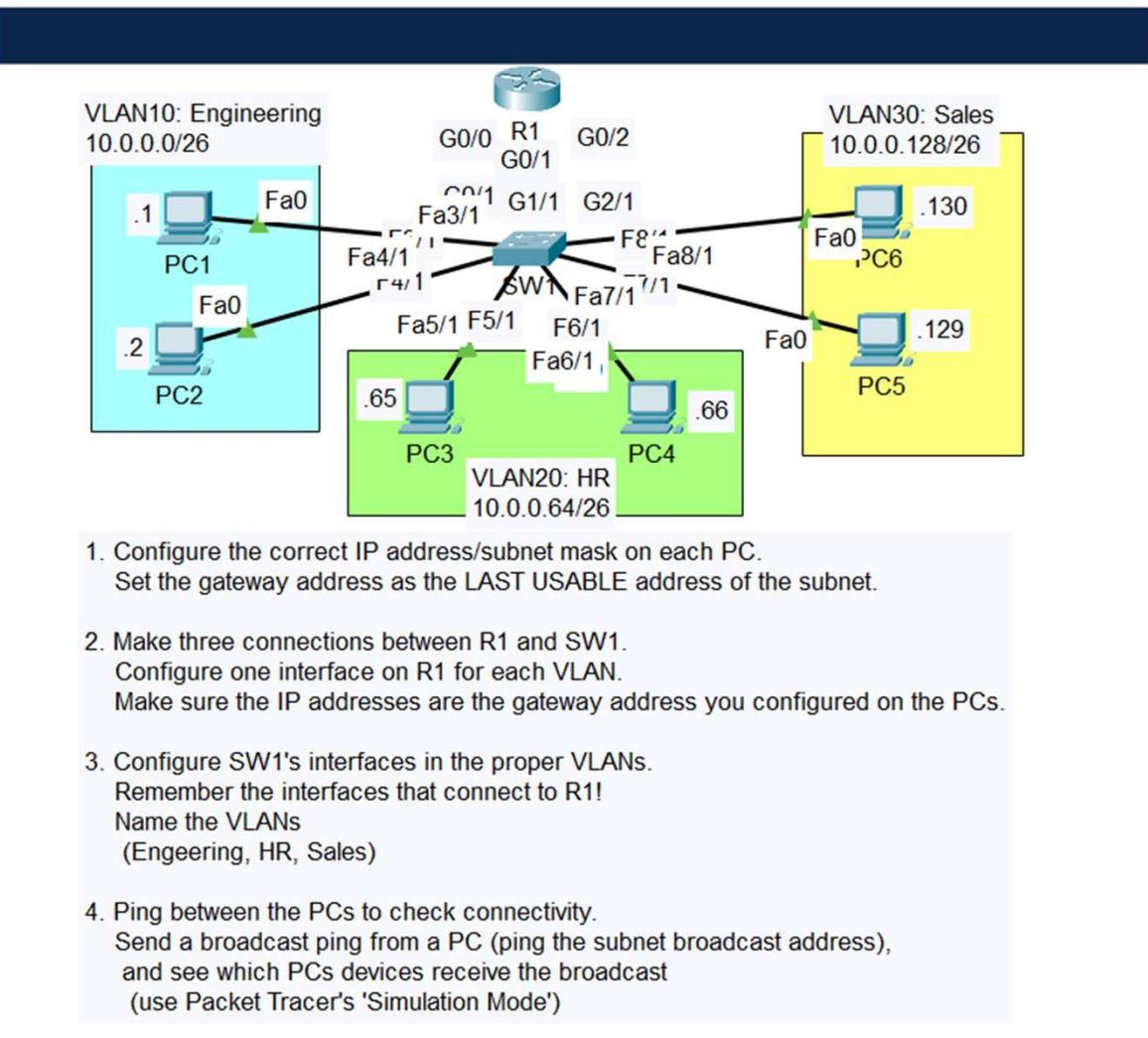
- What is a LAN?
- Broadcast domains
- What is a VLAN?
- What is the purpose of VLANs?
- How to configure VLANs on Cisco switches

Configuring VLANs

Lab 9

In-class Exercise:

VLAN and Access Ports Configuration



Let's get to work

Thank you