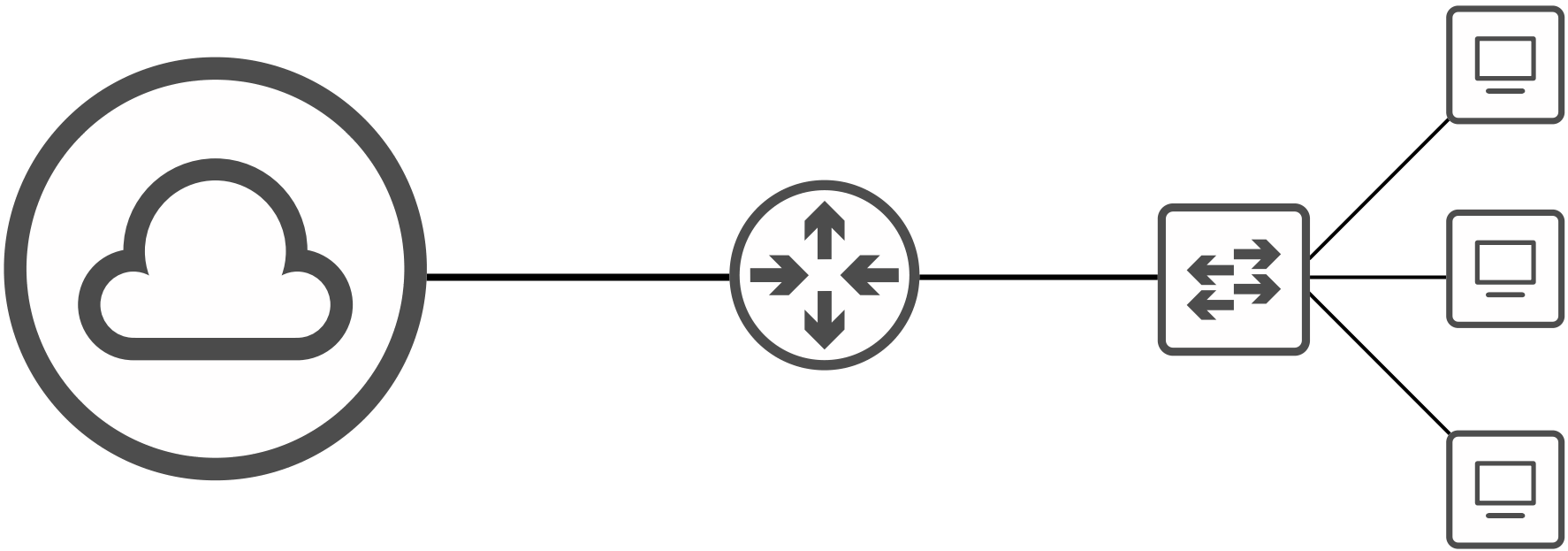
Jeremy's IT Lab

CCNA 200-301 Day 18

VLANs (Virtual Local Area Networks) Part 3



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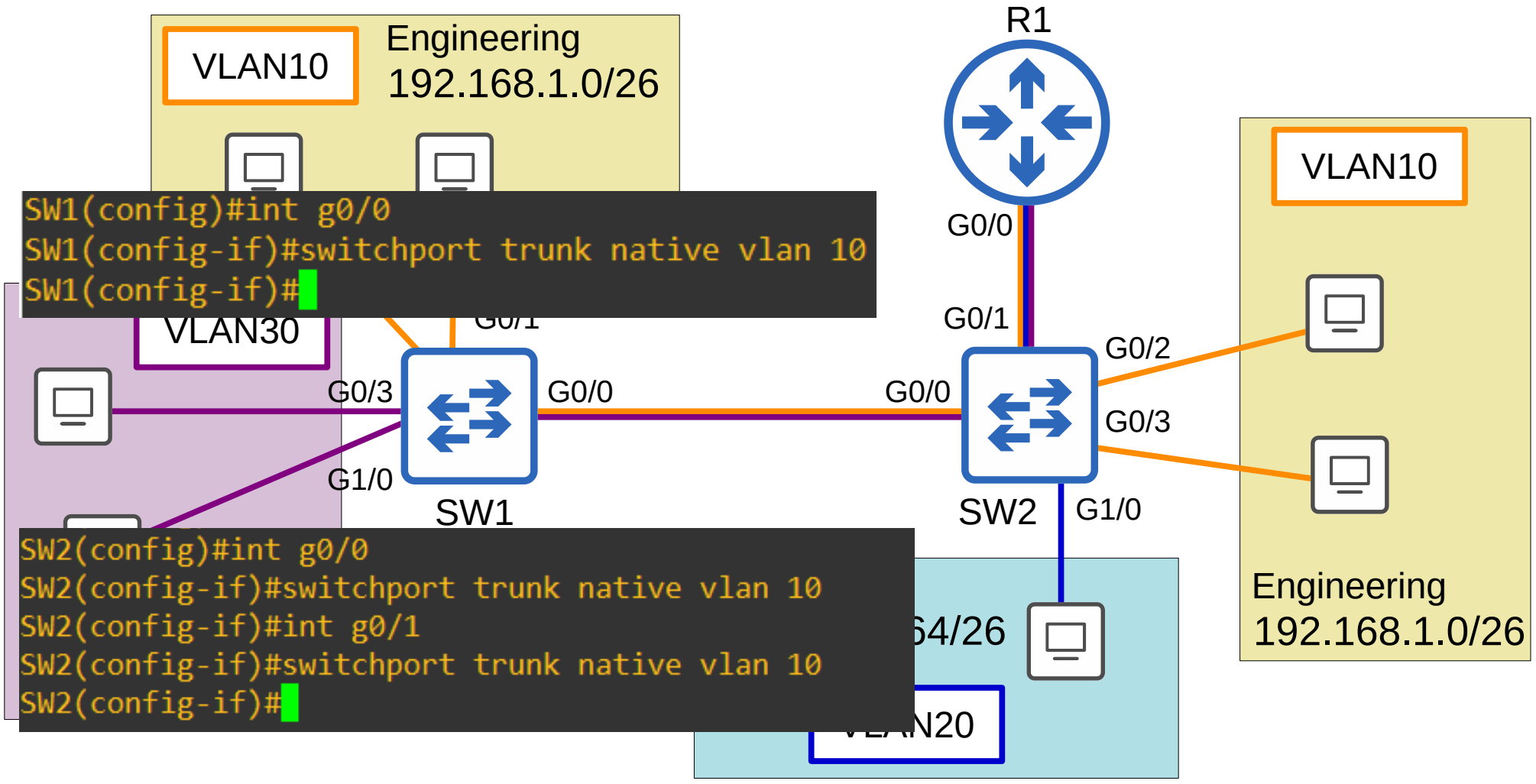
Things we'll cover

- Native VLAN on a router
- Wireshark analysis
- Layer 3 Switching/Multilayer Switching

- DTP (Dynamic Trunking Protocol)
- VTP (VLAN Trunking Protocol)

NEXT VIDEO

Native VLAN on a router (ROAS)



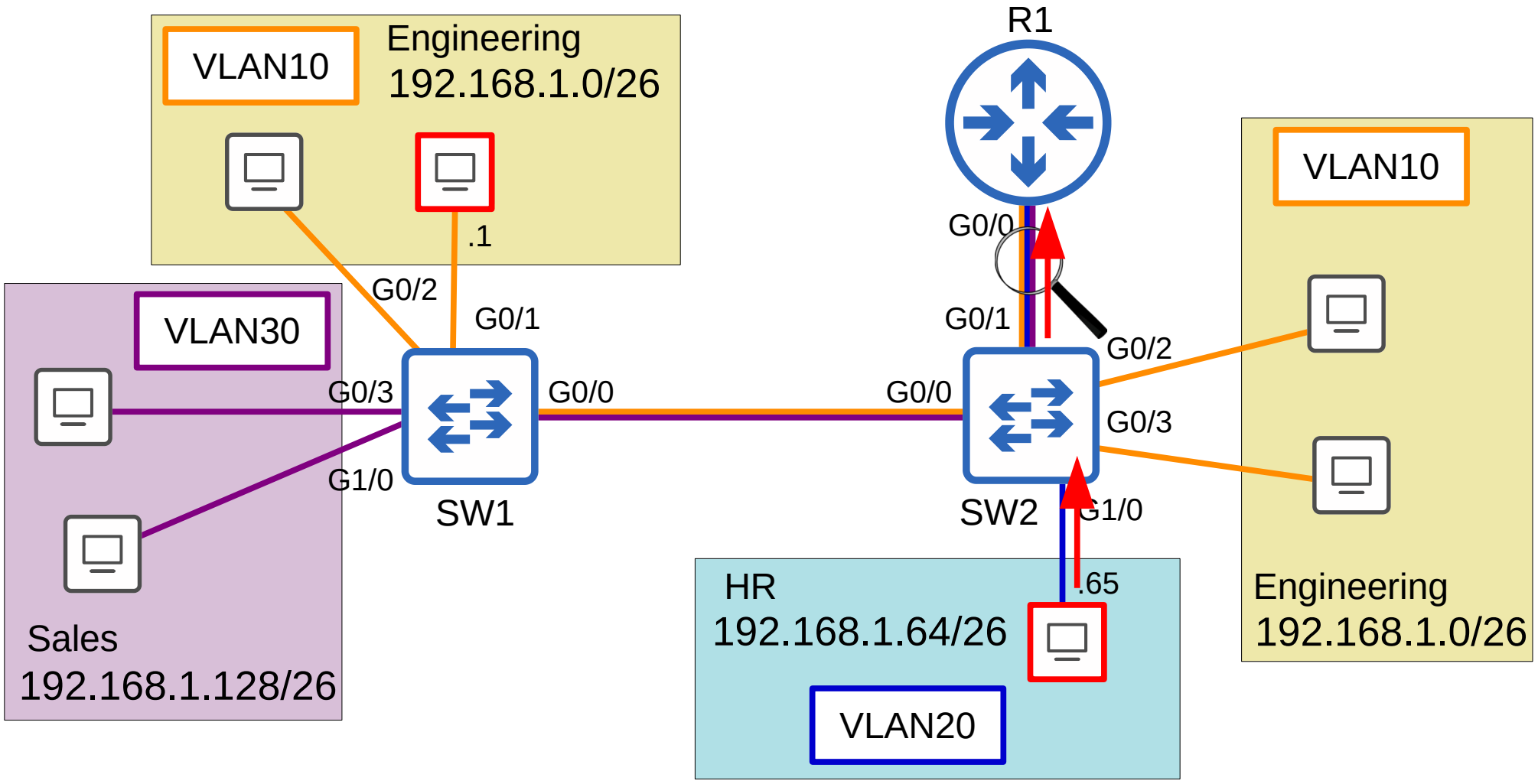
Native VLAN on a router (ROAS)

- There are **2 methods** of configuring the native VLAN on a router:

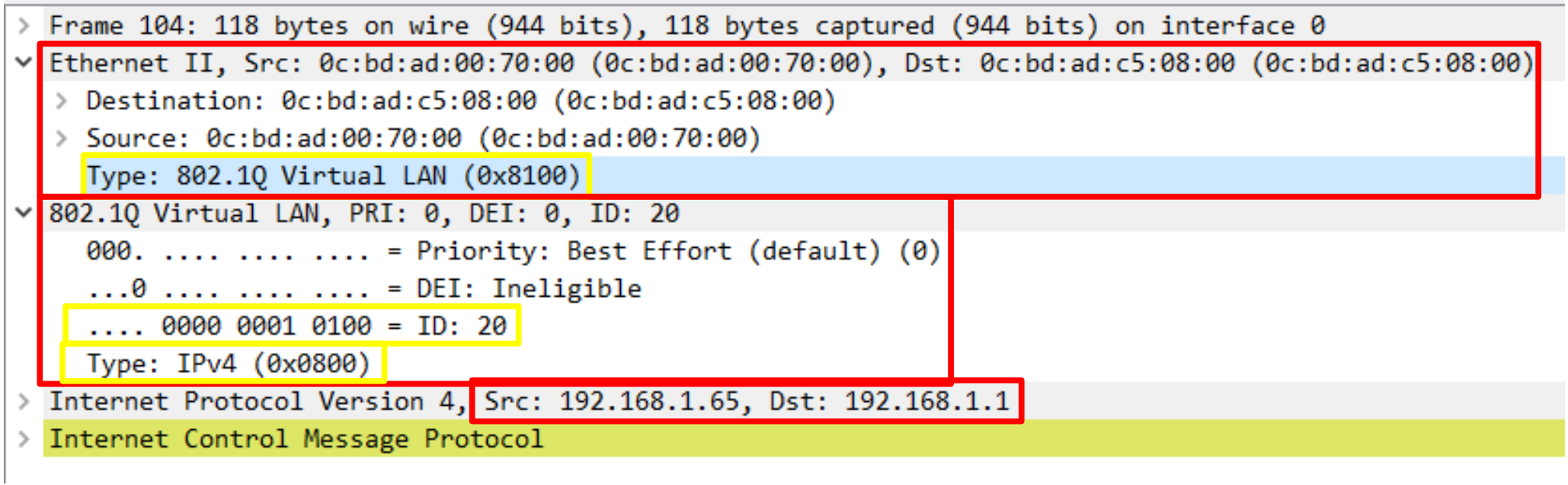
  -Use the command **`encapsulation dot1q`** *`vlan-id`* **`native`** on the router subinterface.

```
R1(config)#int g0/0.10
R1(config-subif)#encapsulation dot1q 10 native
R1(config-subif)#
```

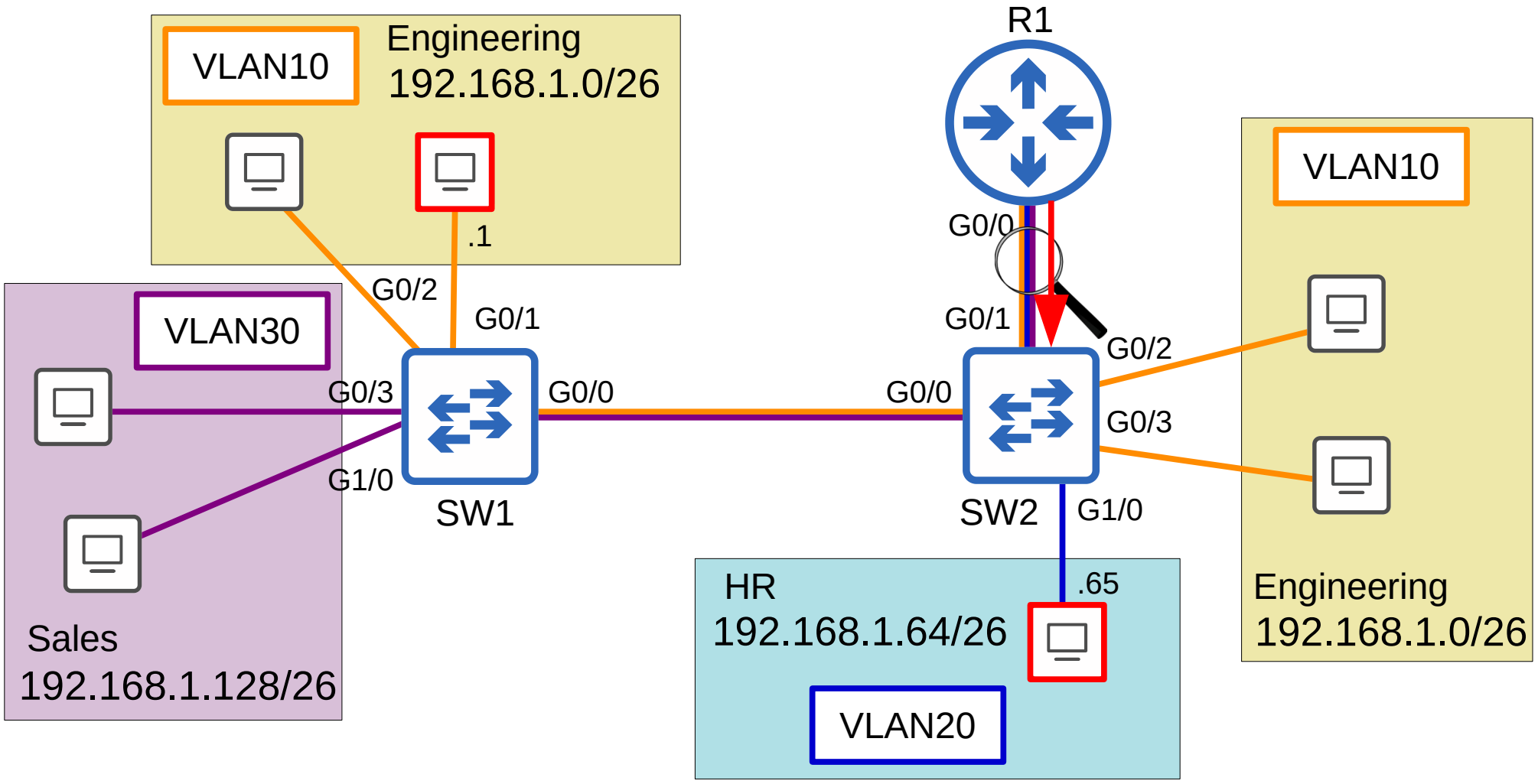
Native VLAN on a router (ROAS)



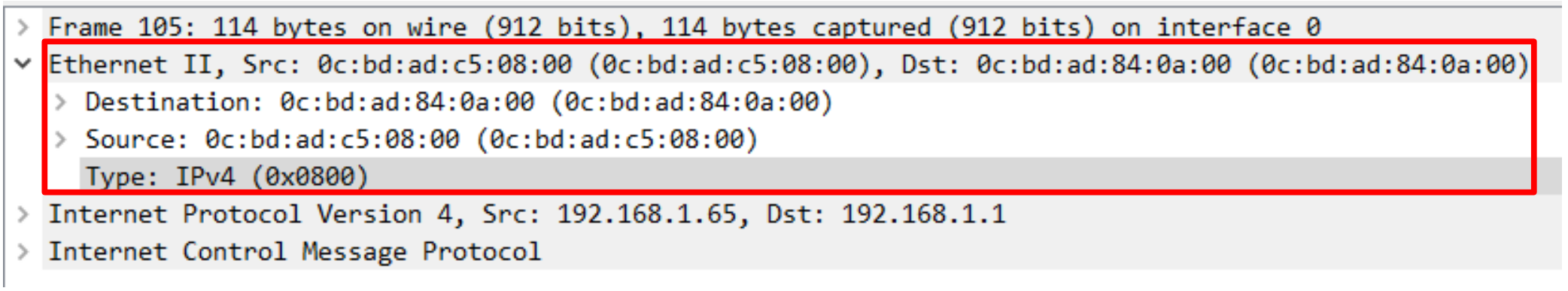
Wireshark Capture (SW2 → R1)



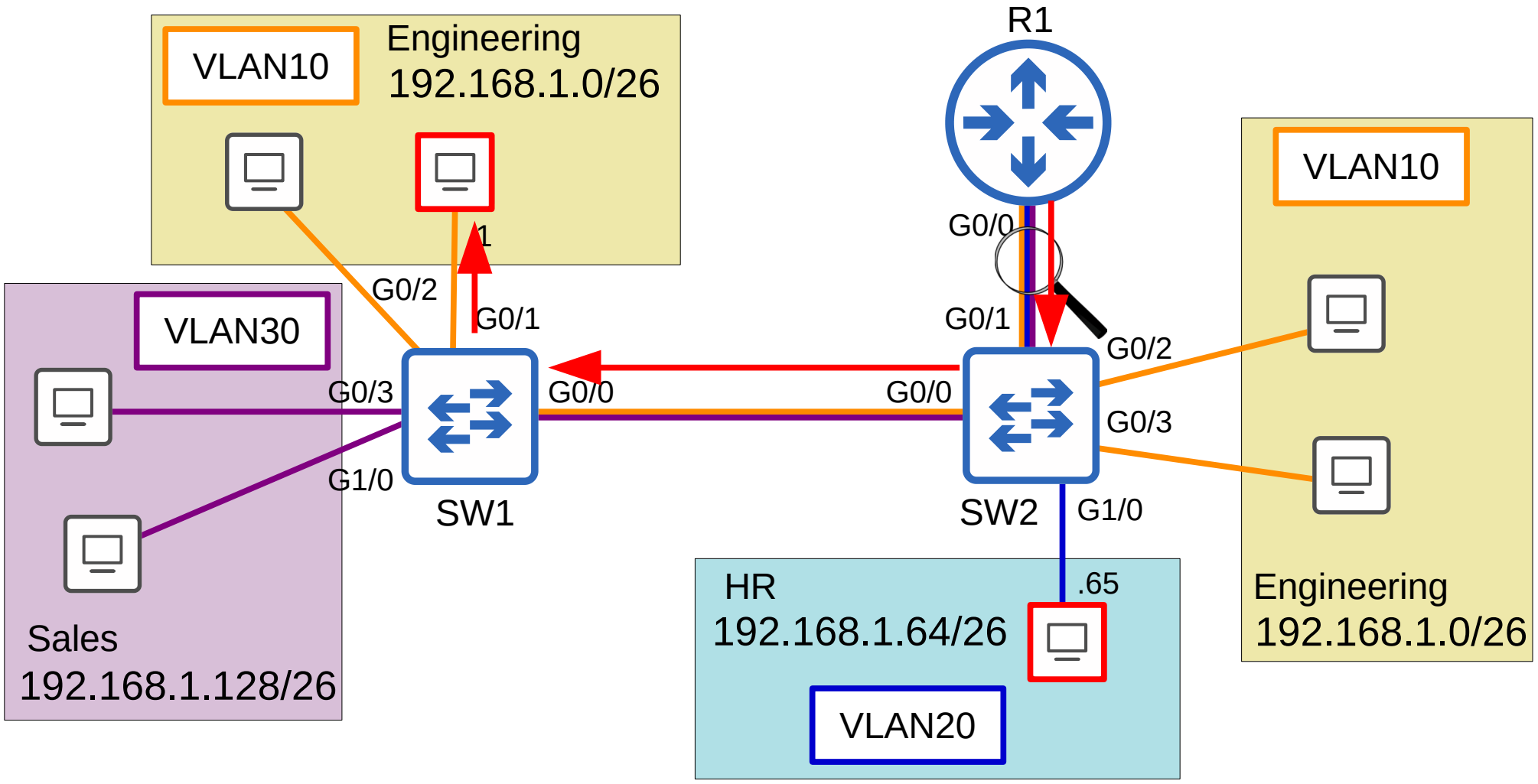
Native VLAN on a router (ROAS)



Wireshark Capture (R1 → SW2)



Native VLAN on a router (ROAS)



Native VLAN on a router (ROAS)

- There are **2 methods** of configuring the native VLAN on a

```
R1(config)#no interface g0/0.10
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.1.62 255.255.255.192
R1(config-if)#
```

-Configure the IP address for the native VLAN on the router's physical interface (the **`encapsulation dot1q`** *`vlan-id`* command is not necessary)

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Native VLAN on a router (ROAS)

```
!
interface GigabitEthernet0/0
 ip address 192.168.1.62 255.255.255.192
 duplex auto
 speed auto
 media-type rj45
!
interface GigabitEthernet0/0.20
 encapsulation dot1Q 20
 ip address 192.168.1.126 255.255.255.192
!
interface GigabitEthernet0/0.30
 encapsulation dot1Q 30
 ip address 192.168.1.190 255.255.255.192
!
```

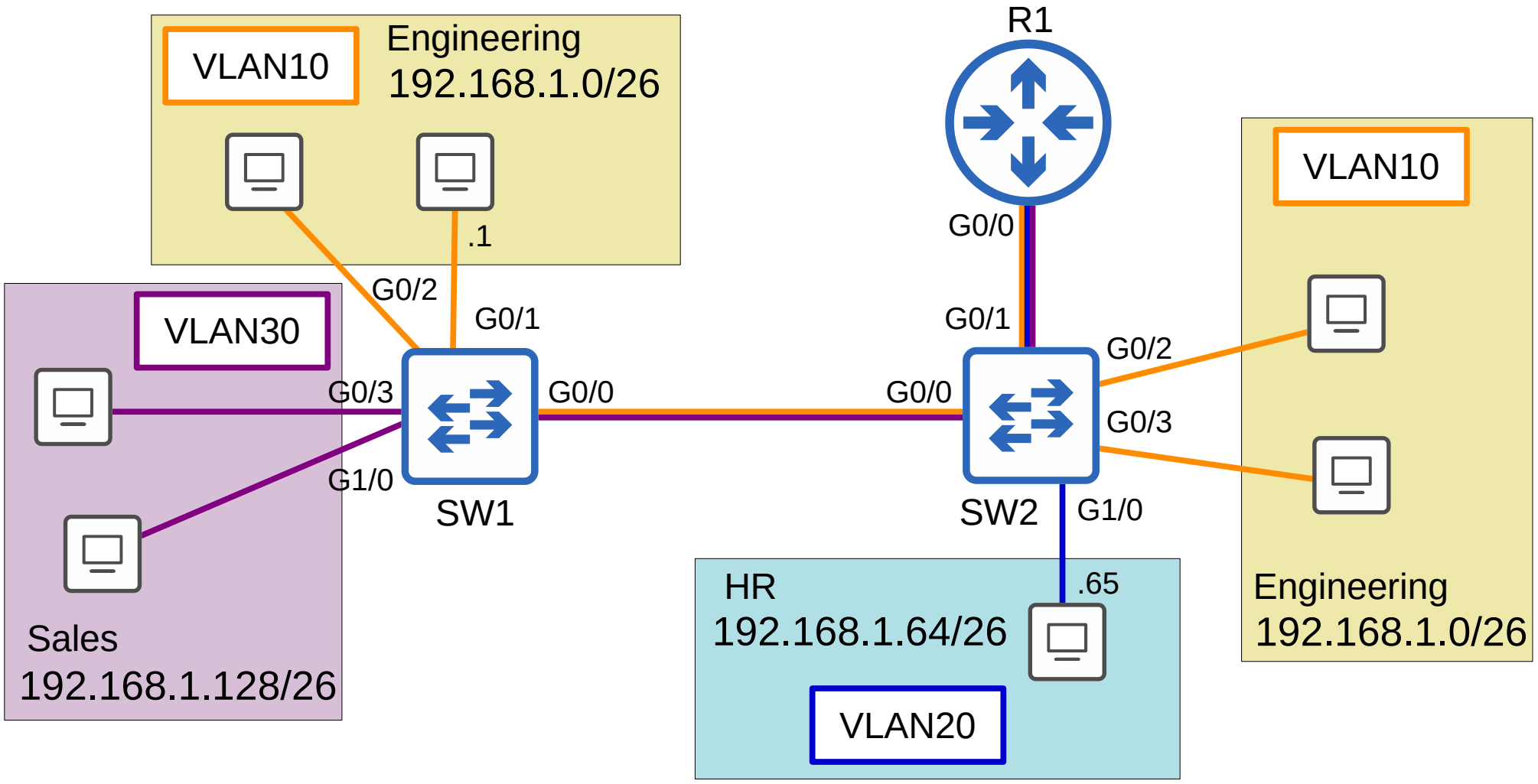
Native VLAN on a router (ROAS)

- There are **2 methods** of configuring the native VLAN on a router:

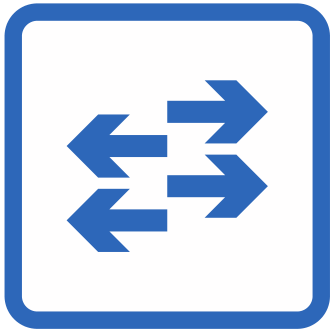
  -Use the command **`encapsulation dot1q`** *`vlan-id`* **`native`** on the router subinterface.

  -Configure the IP address for the native VLAN on the router's physical interface (the **`encapsulation dot1q`** *`vlan-id`* command is not necessary)

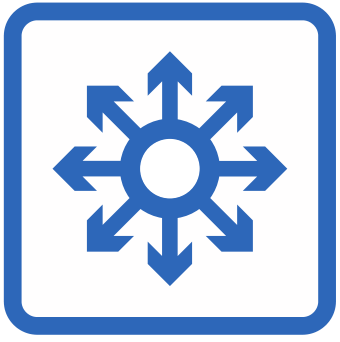
Layer 3 (Multilayer) Switches



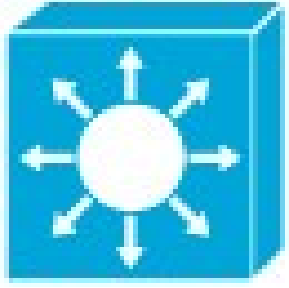
Layer 3 (Multilayer) Switches



Layer 2 switch



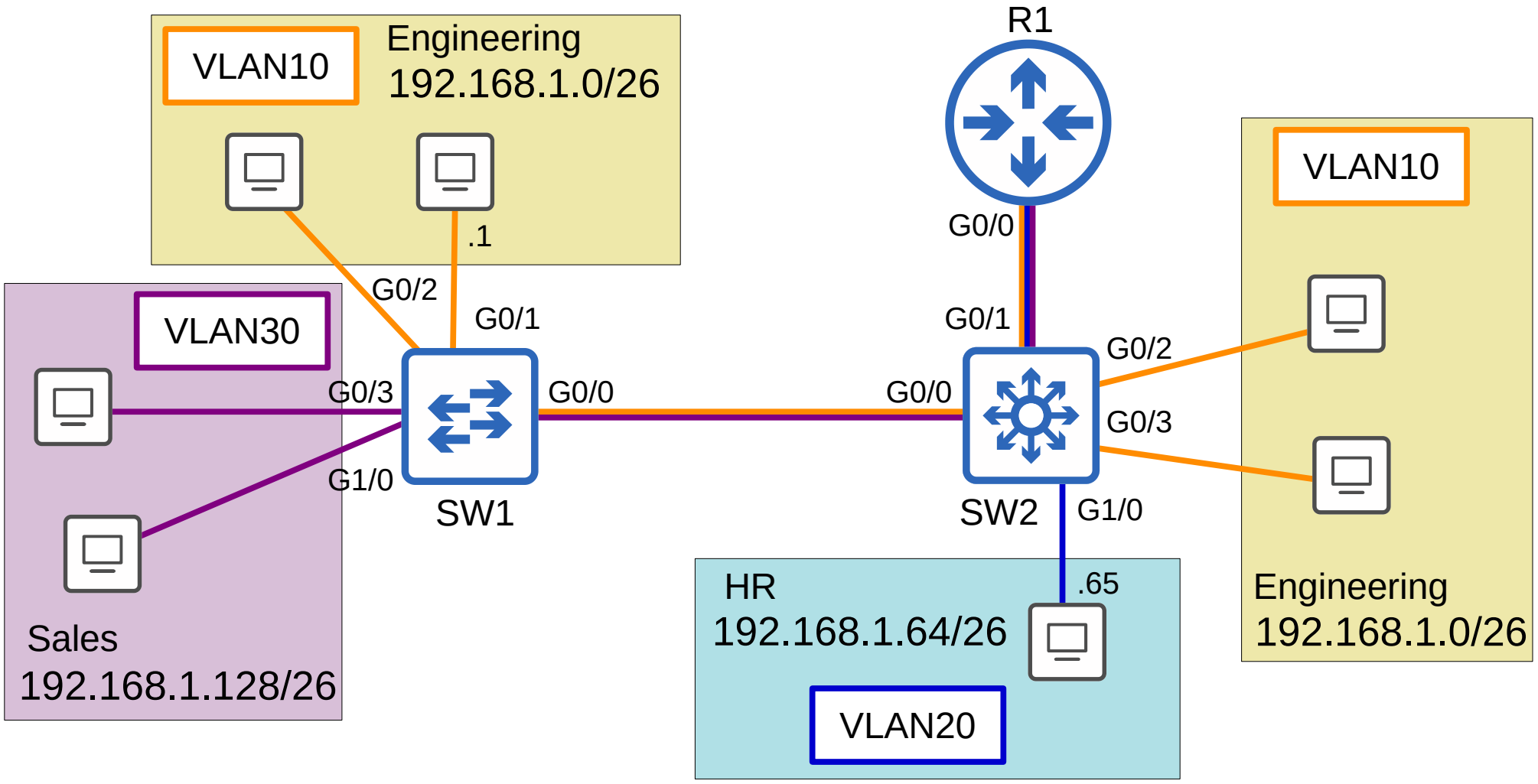
Layer 3 switch



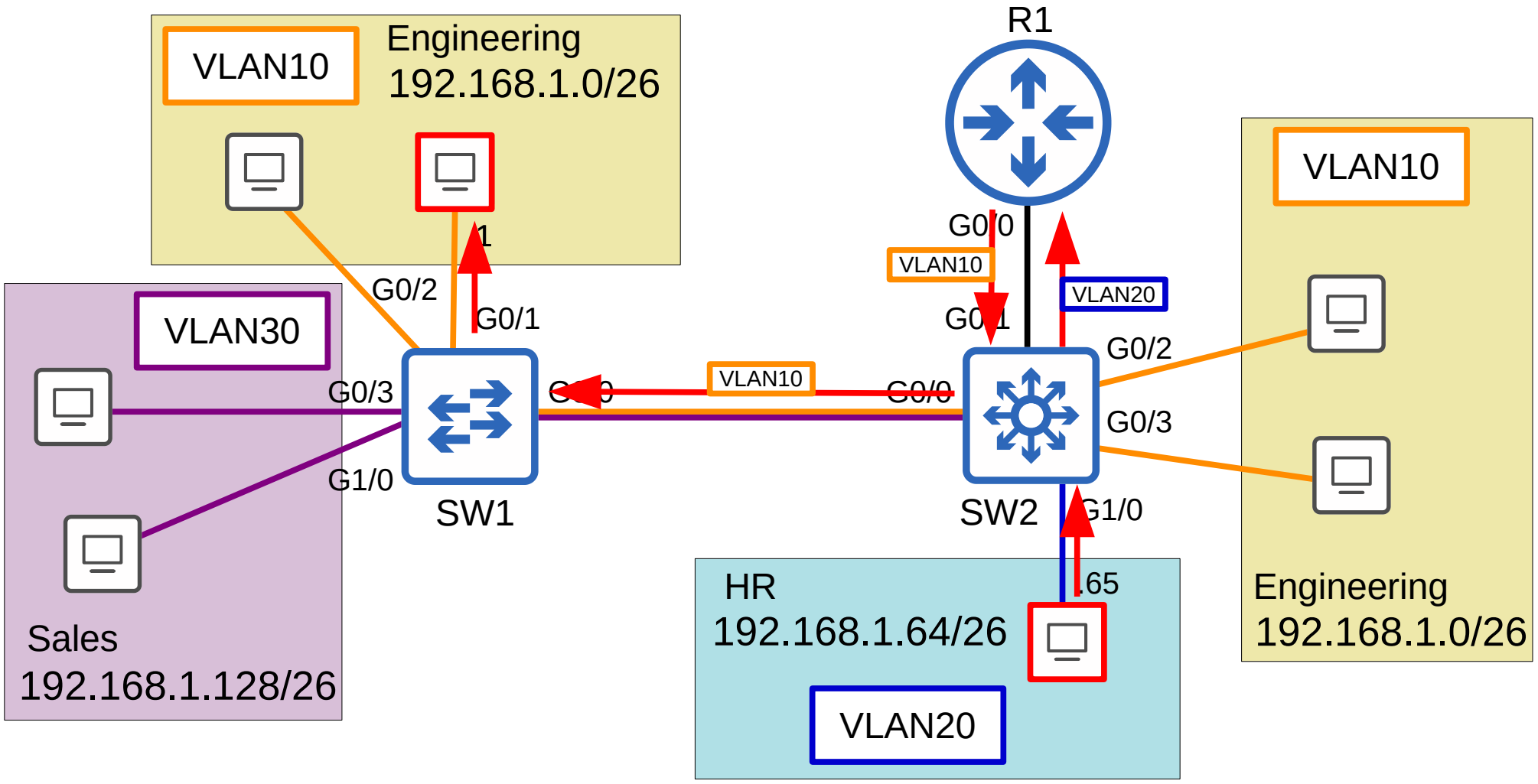
Layer 3 (Multilayer) Switches

- A multilayer switch is capable of both *switching* AND *routing*.
- It is ‘Layer 3 aware’.
- You can assign IP addresses to its interfaces, like a router.
- You can create virtual interfaces for each VLAN, and assign IP addresses to those interfaces.
- You can configure routes on it, just like a router.
- It can be used for inter-VLAN routing.

Layer 3 (Multilayer) Switches



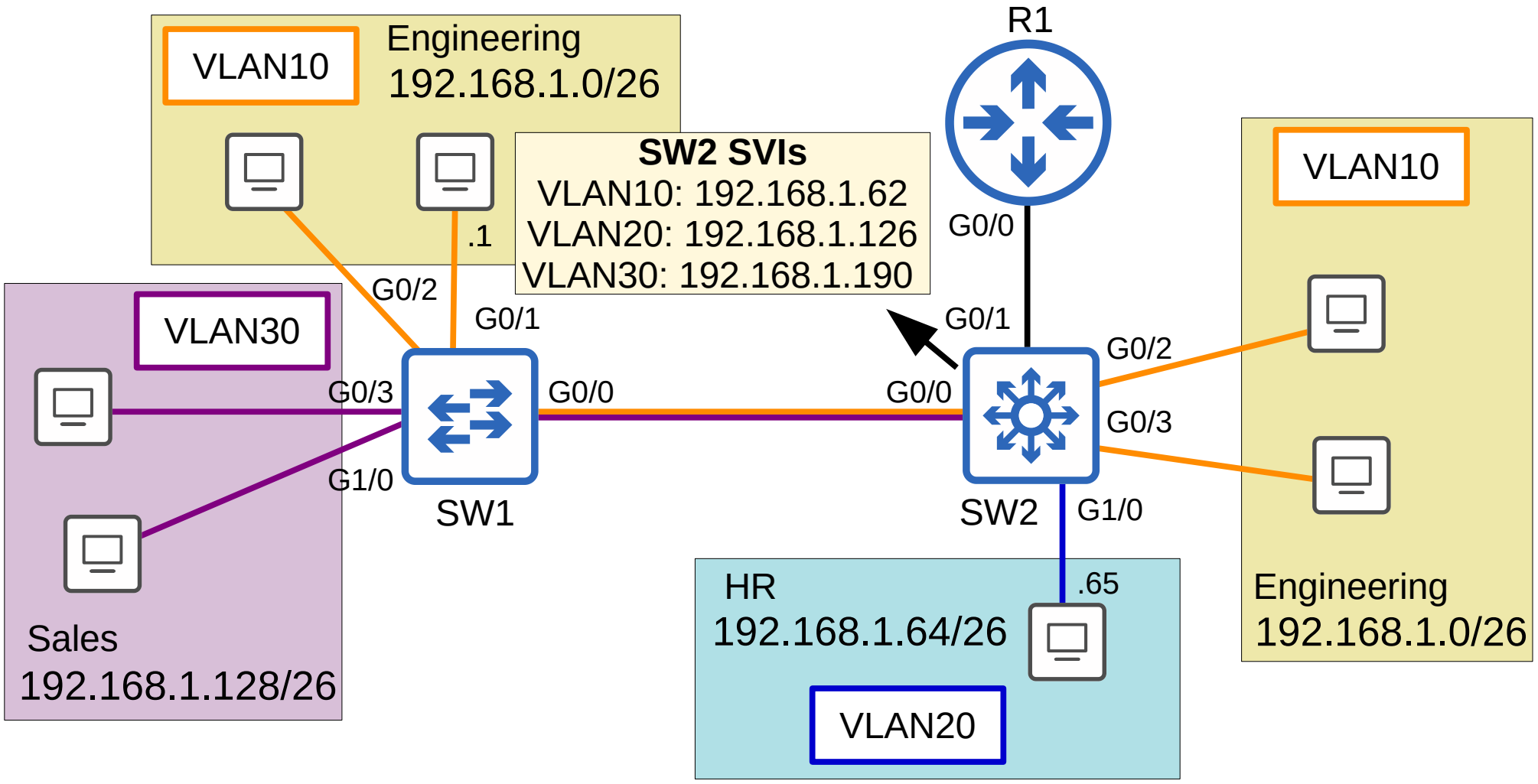
Inter-VLAN Routing via SVI



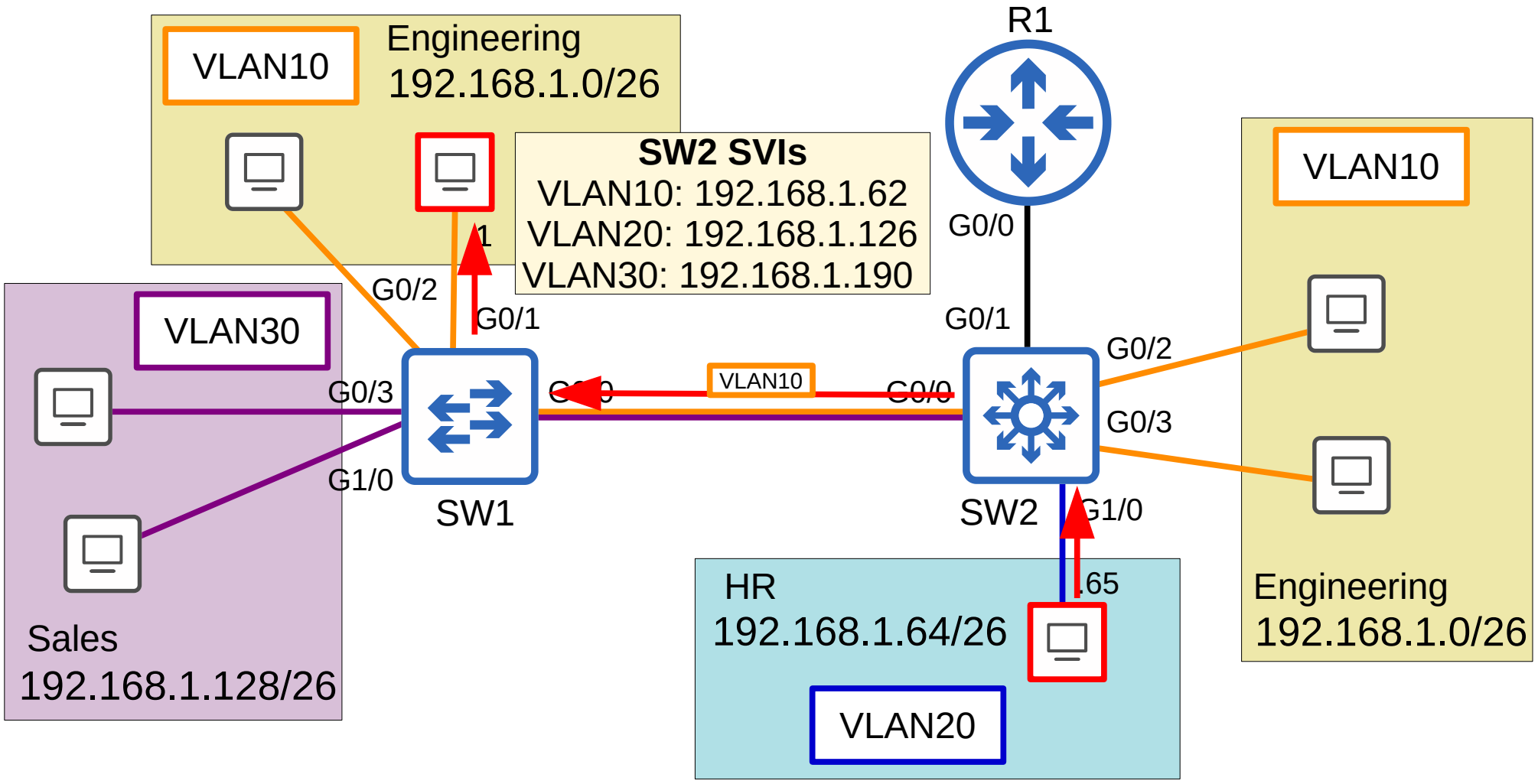
Inter-VLAN Routing via SVI

- SVIs (Switch Virtual Interfaces) are the virtual interfaces you can assign IP addresses to in a multilayer switch.
- Configure each PC to use the SVI (NOT the router) as their gateway address.
- To send traffic to different subnets/VLANs, the PCs will send traffic to the switch, and the switch will route the traffic.

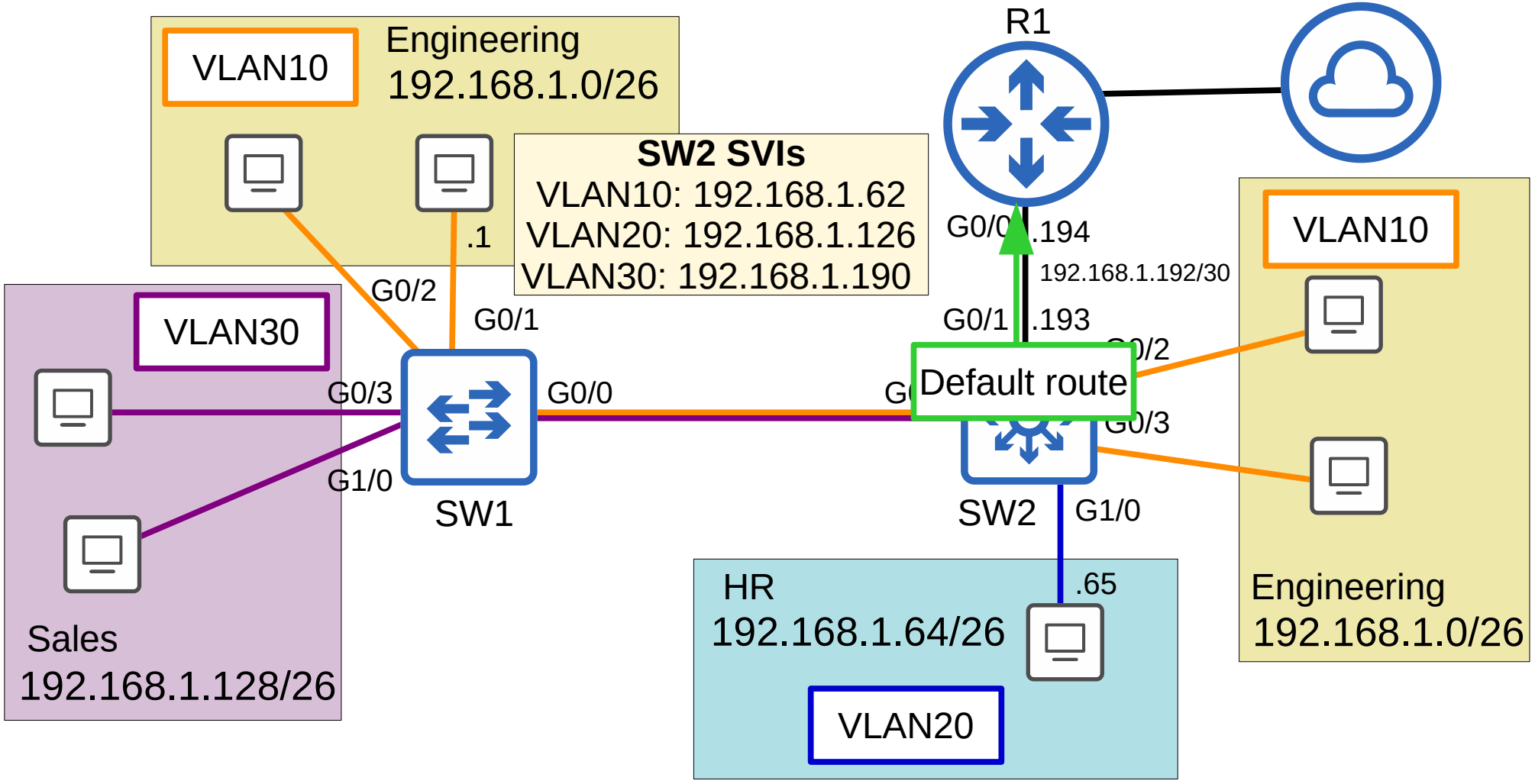
Inter-VLAN Routing via SVI



Inter-VLAN Routing via SVI



Inter-VLAN Routing via SVI



Inter-VLAN Routing via SVI

```
R1(config)#no interface g0/0.10
R1(config)#no interface g0/0.20
R1(config)#no interface g0/0.30
R1(config)#default interface g0/0
Interface GigabitEthernet0/0 set to default configuration
R1(config)#do show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         unassigned      YES NVRAM  up                    up
GigabitEthernet0/0.10      unassigned      YES manual deleted               down
GigabitEthernet0/0.20      unassigned      YES manual deleted               down
GigabitEthernet0/0.30      unassigned      YES manual deleted               down
GigabitEthernet0/1         unassigned      YES NVRAM  administratively down down
GigabitEthernet0/2         unassigned      YES NVRAM  administratively down down
GigabitEthernet0/3         unassigned      YES NVRAM  administratively down down
R1(config)#
```

Inter-VLAN Routing via SVI

```
R1(config)#interface g0/0
R1(config-if)#ip address 192.168.1.194 255.255.255.252
R1(config-if)#do show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         192.168.1.194   YES manual up                    up
GigabitEthernet0/0.10      unassigned      YES manual deleted               down
GigabitEthernet0/0.20      unassigned      YES manual deleted               down
GigabitEthernet0/0.30      unassigned      YES manual deleted               down
GigabitEthernet0/1         unassigned      YES NVRAM  administratively down down
GigabitEthernet0/2         unassigned      YES NVRAM  administratively down down
GigabitEthernet0/3         unassigned      YES NVRAM  administratively down down
R1(config-if)#
```

Inter-VLAN Routing via SVI

```
SW2(config)#default interface g0/1
Interface GigabitEthernet0/1 set to
SW2(config)#ip routing
SW2(config)#interface g0/1
SW2(config-if)#no switchport
SW2(config-if)#ip address 192.168.1.193 255.255.255.252
SW2(config-if)#do show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         unassigned      YES unset  up                    up
GigabitEthernet0/2         unassigned      YES unset  up                    up
GigabitEthernet0/3         unassigned      YES unset  up                    up
GigabitEthernet0/1         192.168.1.193   YES manual up                    up
GigabitEthernet1/0         unassigned      YES unset  up                    up
GigabitEthernet1/1         unassig
GigabitEthernet1/2         unassig
GigabitEthernet1/3         unassigned      YES unset  up                    up
GigabitEthernet2/0         unassigned      YES unset  up                    up
GigabitEthernet2/1         unassigned      YES unset  up                    up
GigabitEthernet2/2         unassigned      YES unset  up                    up
GigabitEthernet2/3         unassigned      YES unset  up                    up
```

This command enables Layer 3 routing on the switch.
DO NOT FORGET

This configures the interface as a ‘routed port’
(Layer 3 port, not a Layer 2/switchport)

Configure an IP address on the interface
like a regular router interface.

Inter-VLAN Routing via SVI

```
SW2(config-if)#exit
SW2(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.194
SW2(config)#do show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override

Gateway of last resort is 192.168.1.194 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 192.168.1.194
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.192/30 is directly connected, GigabitEthernet0/1
L        192.168.1.193/32 is directly connected, GigabitEthernet0/1
SW2(config)#
```

Inter-VLAN Routing via SVI

```
SW2#show interfaces status

Port      Name               Status       Vlan       Duplex  Speed Type
Gi0/0                        connected    trunk        auto   auto unknown
Gi0/2                        connected    10           auto   auto unknown
Gi0/3                        connected    10           auto   auto unknown
Gi0/1                        connected    routed       auto   auto unknown
Gi1/0                        connected    20           auto   auto unknown
Gi1/1                        connected    1            auto   auto unknown
Gi1/2                        connected    1            auto   auto unknown
Gi1/3                        connected    1            auto   auto unknown
Gi2/0                        connected    1            auto   auto unknown
Gi2/1                        connected    1            auto   auto unknown
Gi2/2                        connected    1            auto   auto unknown
Gi2/3                        connected    1            auto   auto unknown
Gi3/0                        connected    1            auto   auto unknown
Gi3/1                        connected    1            auto   auto unknown
Gi3/2                        connected    1            auto   auto unknown
Gi3/3                        connected    1            auto   auto unknown
SW2#
```

Inter-VLAN Routing via SVI

```
SW2(config)#interface vlan10
SW2(config-if)#ip address 192.168.1.62 255.255.255.192
SW2(config-if)#no shutdown
SW2(config-if)#interface vlan20
SW2(config-if)#ip address 192.168.1.126 255.255.255.192
SW2(config-if)#no shutdown
SW2(config-if)#interface vlan30
SW2(config-if)#ip address 192.168.1.190 255.255.255.192
SW2(config-if)#no shutdown
```

SVIs are **shutdown** by default, so remember to use **no shutdown**.

Inter-VLAN Routing via SVI

```
SW2(config-if)#interface vlan40
SW2(config-if)#ip address 40.40.40.40 255.255.255.0
SW2(config-if)#no shutdown
SW2(config-if)#do show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet0/2     unassigned      YES unset  up                    up
GigabitEthernet0/3     unassigned      YES unset  up                    up
GigabitEthernet0/1     192.168.1.193   YES manual up                    up

Vlan10                 192.168.1.62    YES manual up                    up
Vlan20                 192.168.1.126   YES manual up                    up
Vlan30                 192.168.1.190   YES manual up                    up
Vlan40                 40.40.40.40     YES manual down                  down
```

1) The VLAN must exist on the switch.
2) The switch must have at least one access port in the VLAN in an up/up state, AND/OR one trunk port that allows the VLAN that is in an up/up state.
3) The VLAN must not be shutdown (you can use the **shutdown** command to disable a VLAN.
4) The SVI must not be shutdown (SVIs are disabled by default)

Inter-VLAN Routing via SVI

```
SW2(config-if)#do show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
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S*    0.0.0.0/0 [1/0] via 192.168.1.194
      192.168.1.0/24 is variably subnetted, 8 subnets, 3 masks
C        192.168.1.0/26 is directly connected, Vlan10
L        192.168.1.62/32 is directly connected, Vlan10
C        192.168.1.64/26 is directly connected, Vlan20
L        192.168.1.126/32 is directly connected, Vlan20
C        192.168.1.128/26 is directly connected, Vlan30
L        192.168.1.190/32 is directly connected, Vlan30
C        192.168.1.192/30 is directly connected, GigabitEthernet0/1
L        192.168.1.193/32 is directly connected, GigabitEthernet0/1
SW2(config-if)#
```
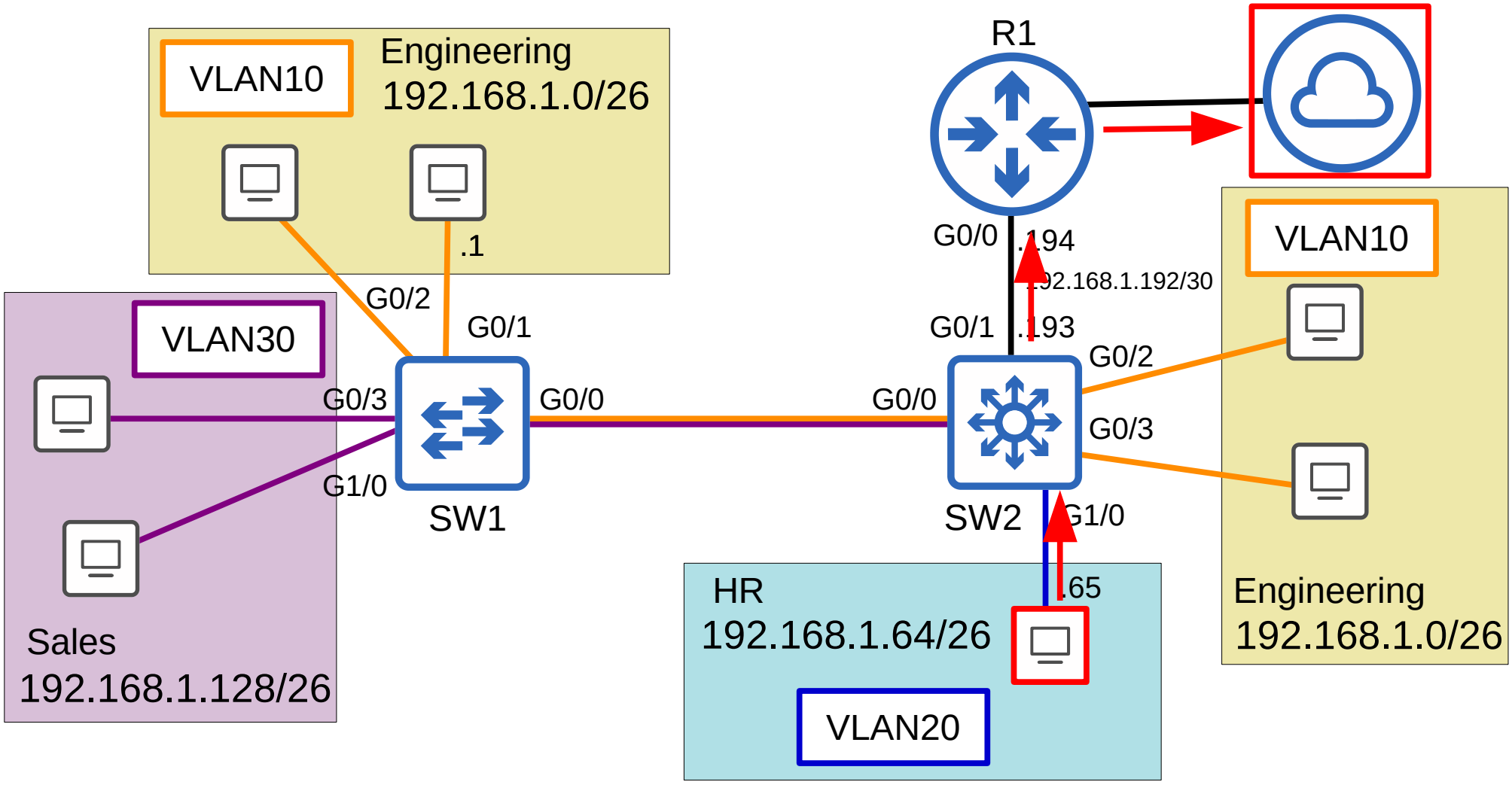
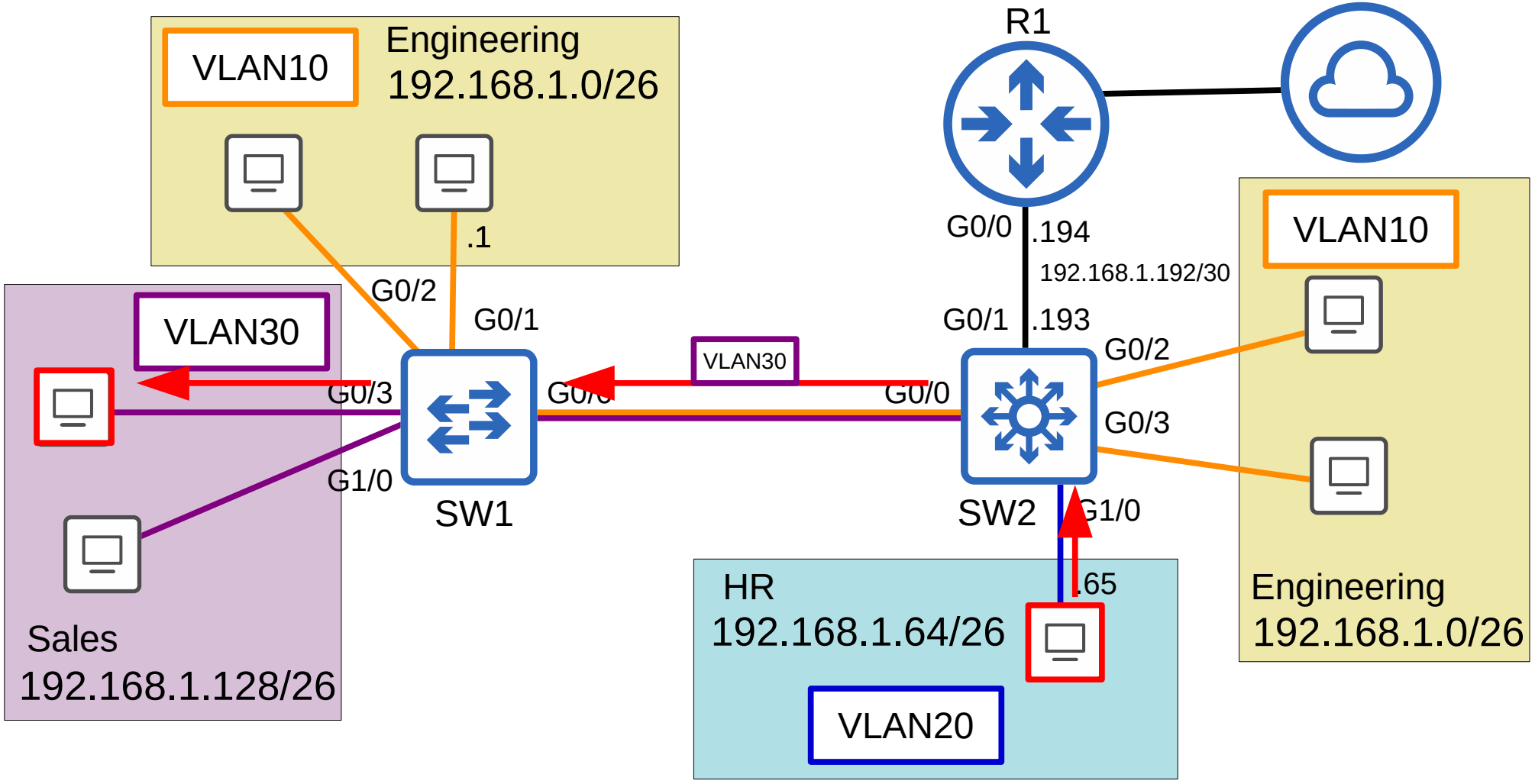

Inter-VLAN Routing via SVI



Inter-VLAN Routing via SVI



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- Layer 3 Switching/Multilayer Switching

- DTP (Dynamic Trunking Protocol)
- VTP (VLAN Trunking Protocol)

NEXT VIDEO

QUIZ

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Quiz Question 1

Which TWO answers are valid options to configure the native VLAN on a router in a ROAS configuration? (select the two best answers, each answer is a complete solution)

a)
```
R1(config-if)# encapsulation dot1q 112
R1(config-if)# ip address 192.168.1.1 255.255.255.0
```

b)
```
R1(config-subif)# encapsulation dot1q 112 native
R1(config-subif)# ip address 192.168.1.1 255.255.255.0
```

c)
```
R1(config-if)# ip address 192.168.1.1 255.255.255.0
```

d)
```
R1(config-subif)# switchport trunk native vlan 112
R1(config-subif)# ip address 192.168.1.1 255.255.255.0
```

Quiz Question 2

You create an SVI for VLAN225 on SW1, assign an IP address, and enable it with **no shutdown**, but the interface remains down/down. Which TWO options might be causing this? (select two)

a) VLAN225 doesn't exist on the switch.

b) You didn't issue the **switchport mode trunk** command on VLAN225's SVI.

c) You didn't issue the **switchport access vlan 225** command on VLAN225's SVI.

d) No interfaces in VLAN225 are up/up.

Quiz Question 3

Which command is used to configure a switch interface as a routed port?

a) **`no switchport`**

b) **`ip address`** *`ip-address subnet-mask`*

c) **`ip routing`**

d) **`switchport mode route`**