

Cisco Enterprise Networks: VLANs and Trunking

NORMAL AND VOICE VLANs



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Module Overview



VLAN identifiers

Default VLANs

Normal VLANs

Voice VLANs

VLANs and Security

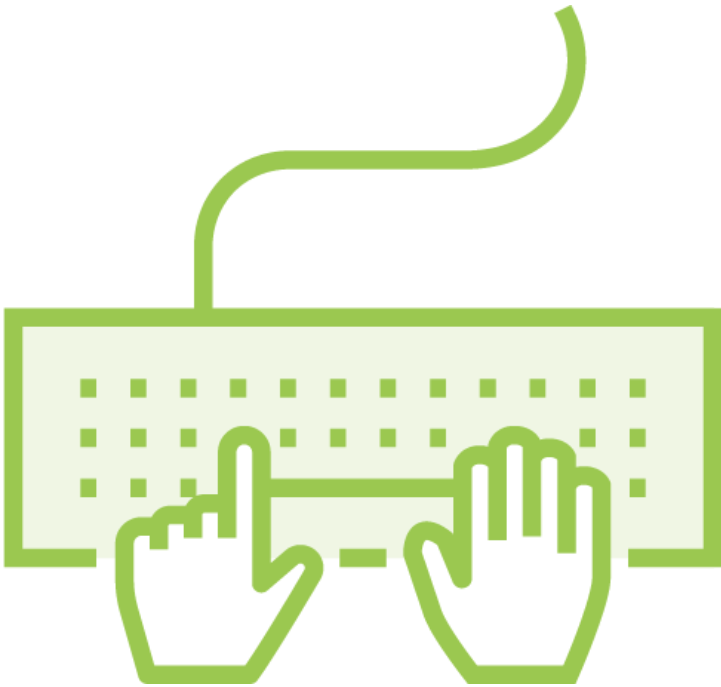
CCNA

CCNP

Equivalent experience

Prerequisite Knowledge

Lab Setup



Switch configurations and topology diagrams are available at <https://github.com/benpiper/ccnp-enterprise>

Cisco VIRL: <http://virl.cisco.com>

GNS3: <https://gns3.com>

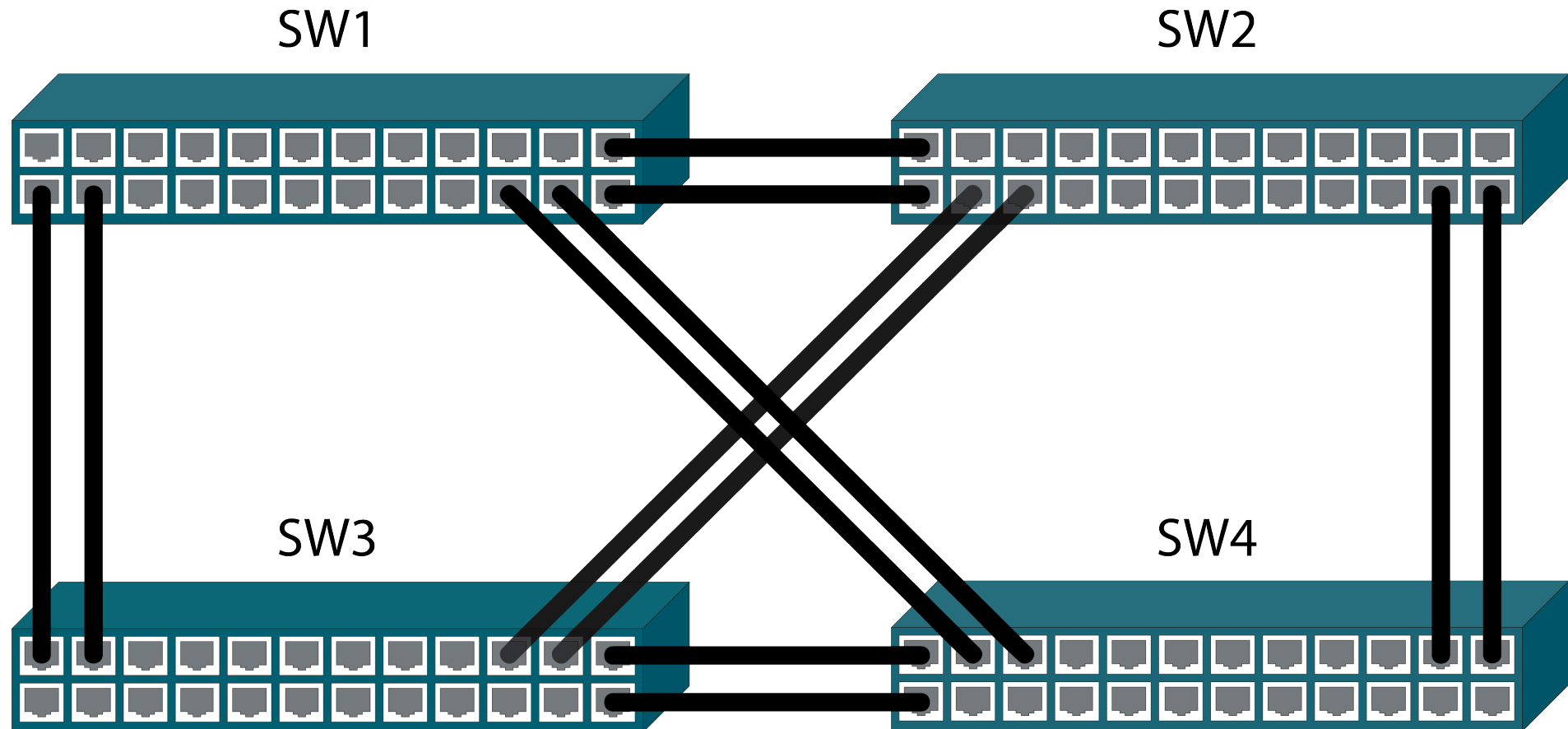
Lab Environment

**Four 24-port
Catalyst layer 3
switches**

IOS 15

**IP services
package**

Layer 2 Topology



Port Mappings

SW1 fa0/2 ⇔ SW3 fa0/1

SW1 fa0/20 ⇔ SW4 fa0/3

SW2 fa0/22 ⇔ SW4 fa0/21

SW1 fa0/4 ⇔ SW3 fa0/3

SW1 fa0/22 ⇔ SW4 fa0/5

SW2 fa0/24 ⇔ SW4 fa0/23

SW1 fa0/11 ⇔ SW2 fa0/1

SW2 fa0/4 ⇔ SW3 fa0/19

SW3 fa0/23 ⇔ SW4 fa0/1

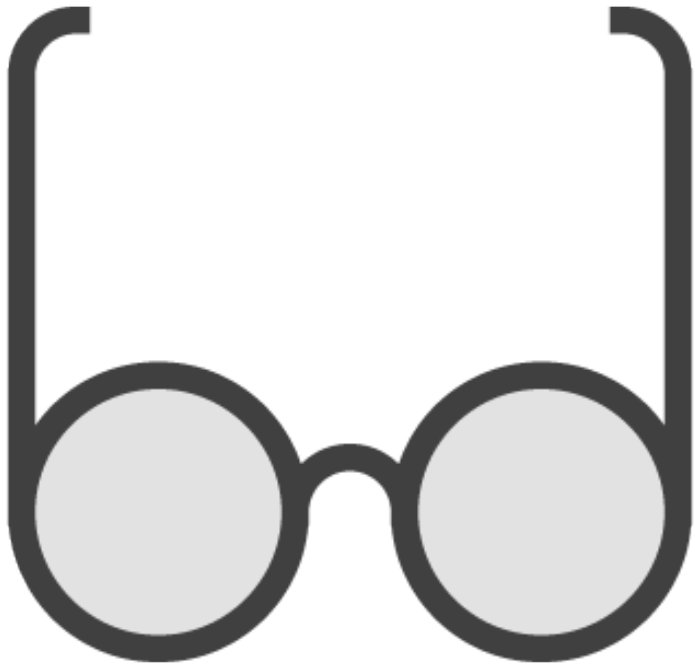
SW1 fa0/12 ⇔ SW2 fa0/2

SW2 fa0/6 ⇔ SW3 fa0/21

SW3 fa0/24 ⇔ SW4 fa0/2

How to Get the Most out of This Course

Watch Everything!



You can skip around, just make sure you don't miss anything!

Spend Extra Time on Difficult Topics



**Difficult topics make for good
exam questions**

Use the Course Assessments!



I designed the questions to thoroughly test your knowledge and skills

Work on Your Speed



To pass the exam, you need to be able to perform complex tasks quickly

What Is a VLAN?

Mastery Learning

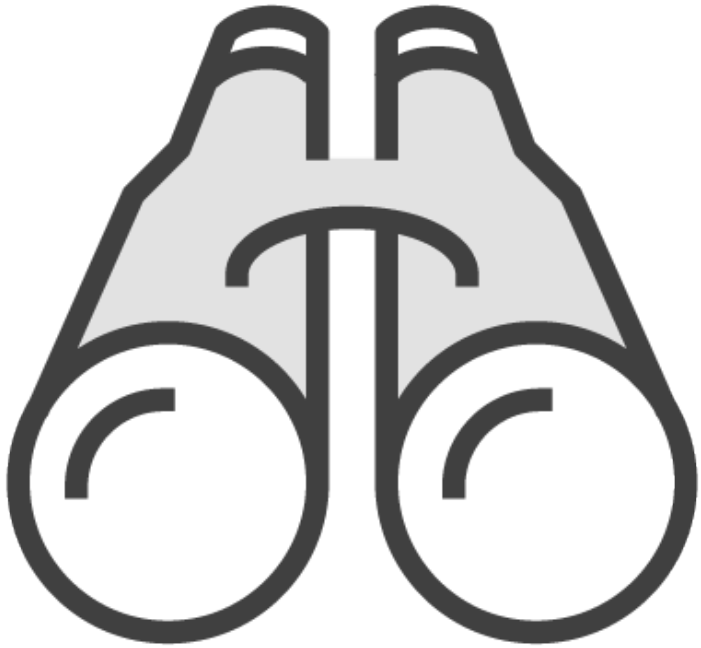


We'll build on the VLAN topics you already know

Virtual LAN (VLAN)

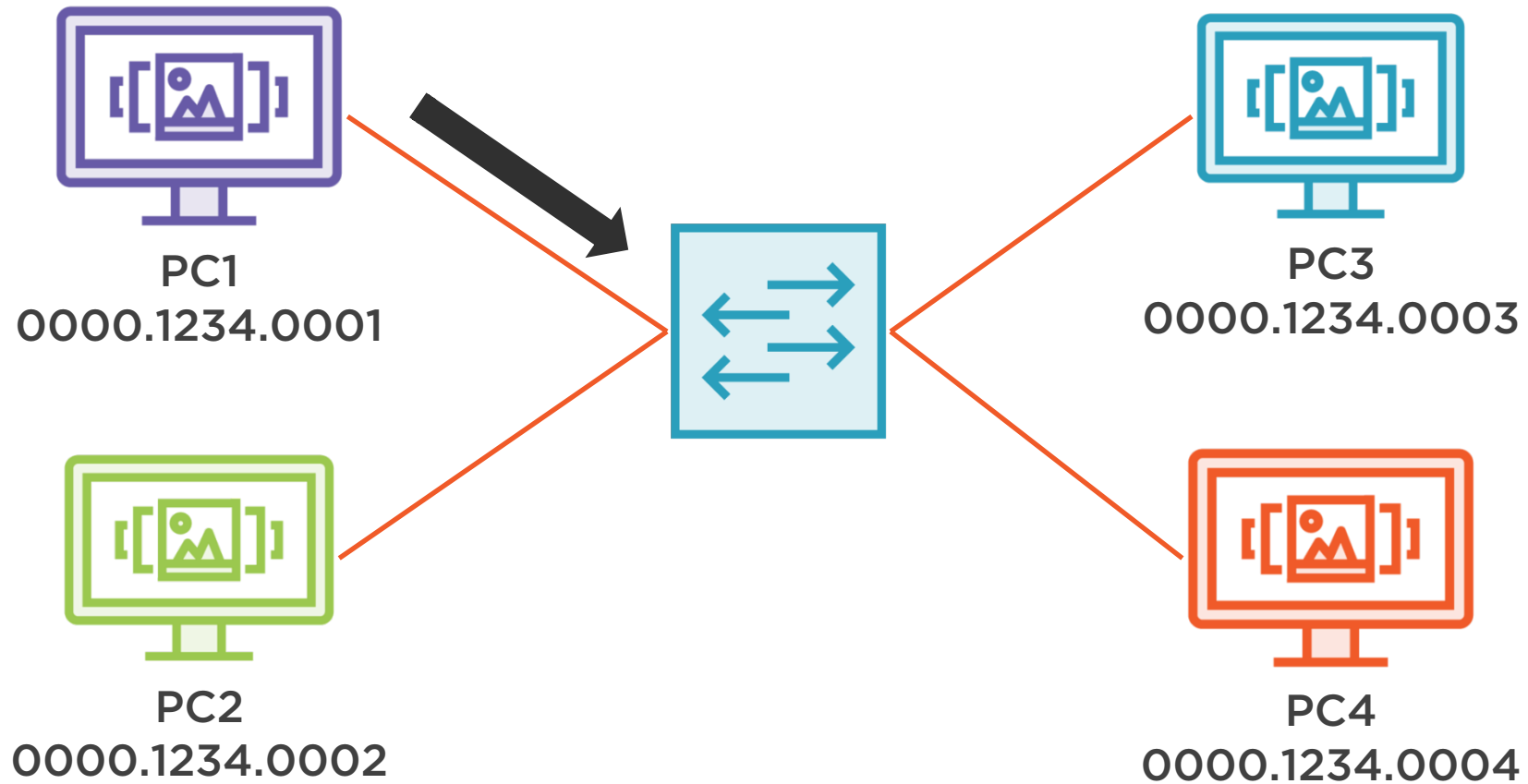
An arbitrarily defined broadcast domain

Broadcast Domain

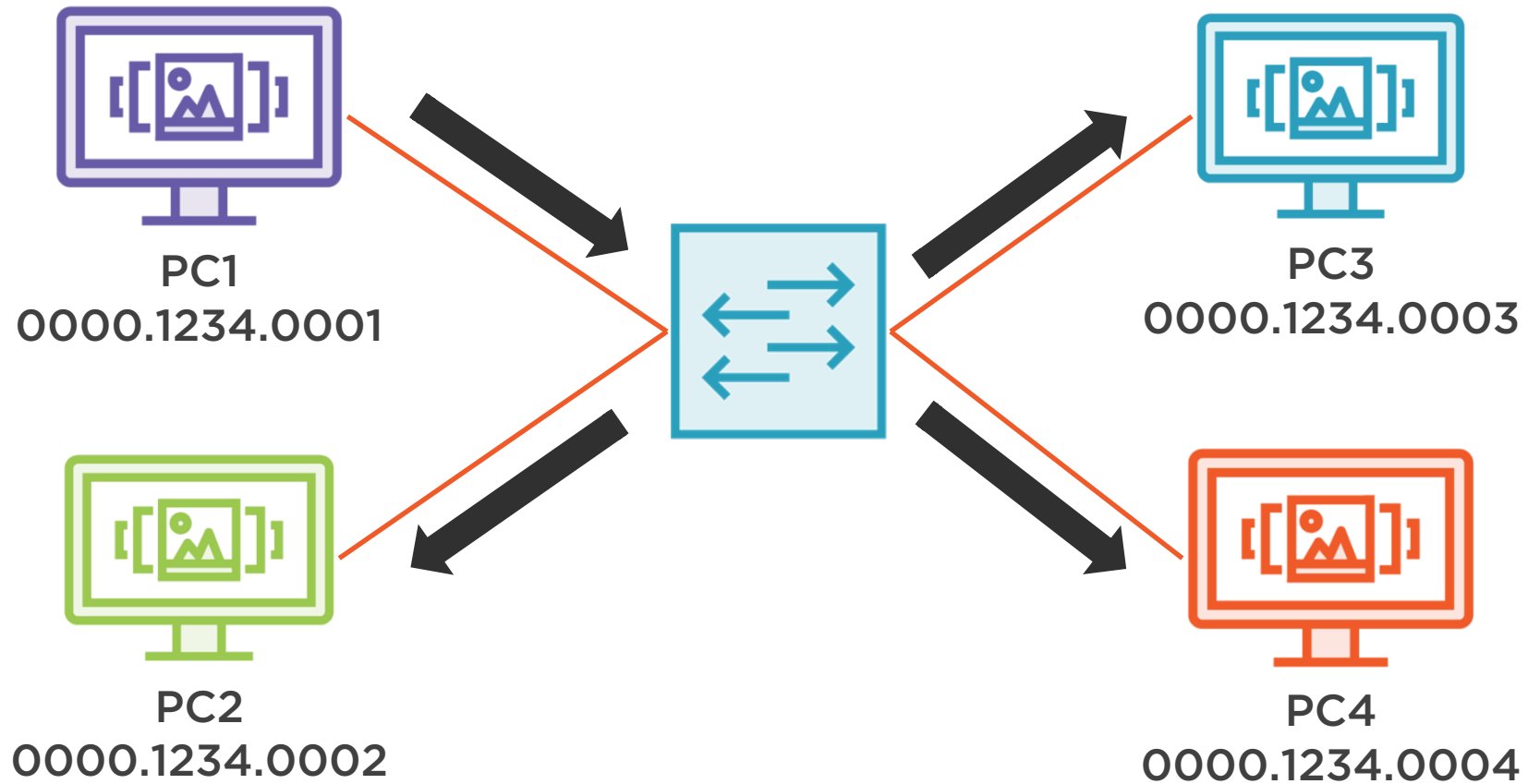


Devices in a broadcast domain can “see” the MAC addresses of other devices in the same broadcast domain

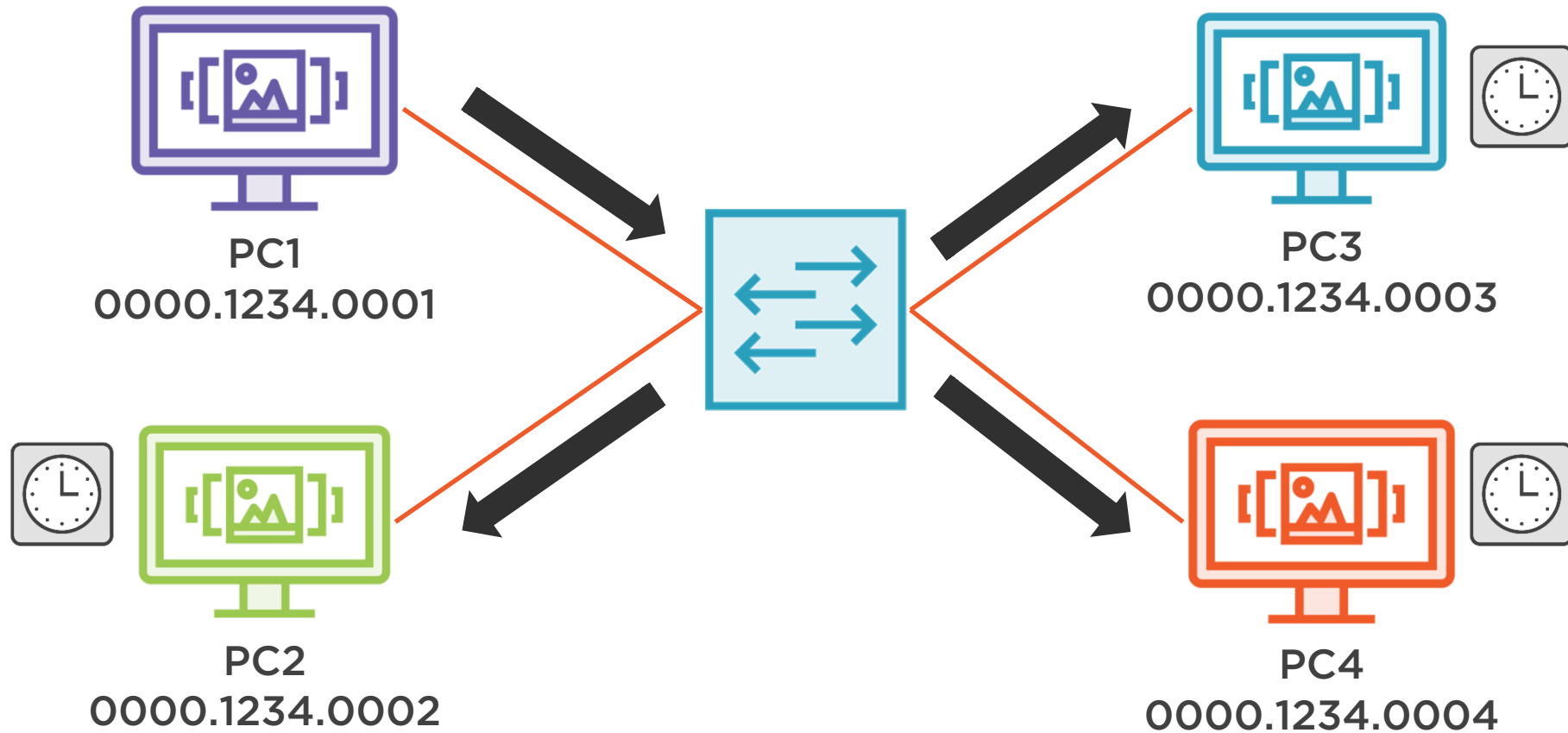
Broadcast Domain



Broadcast Domain



Broadcast Domain

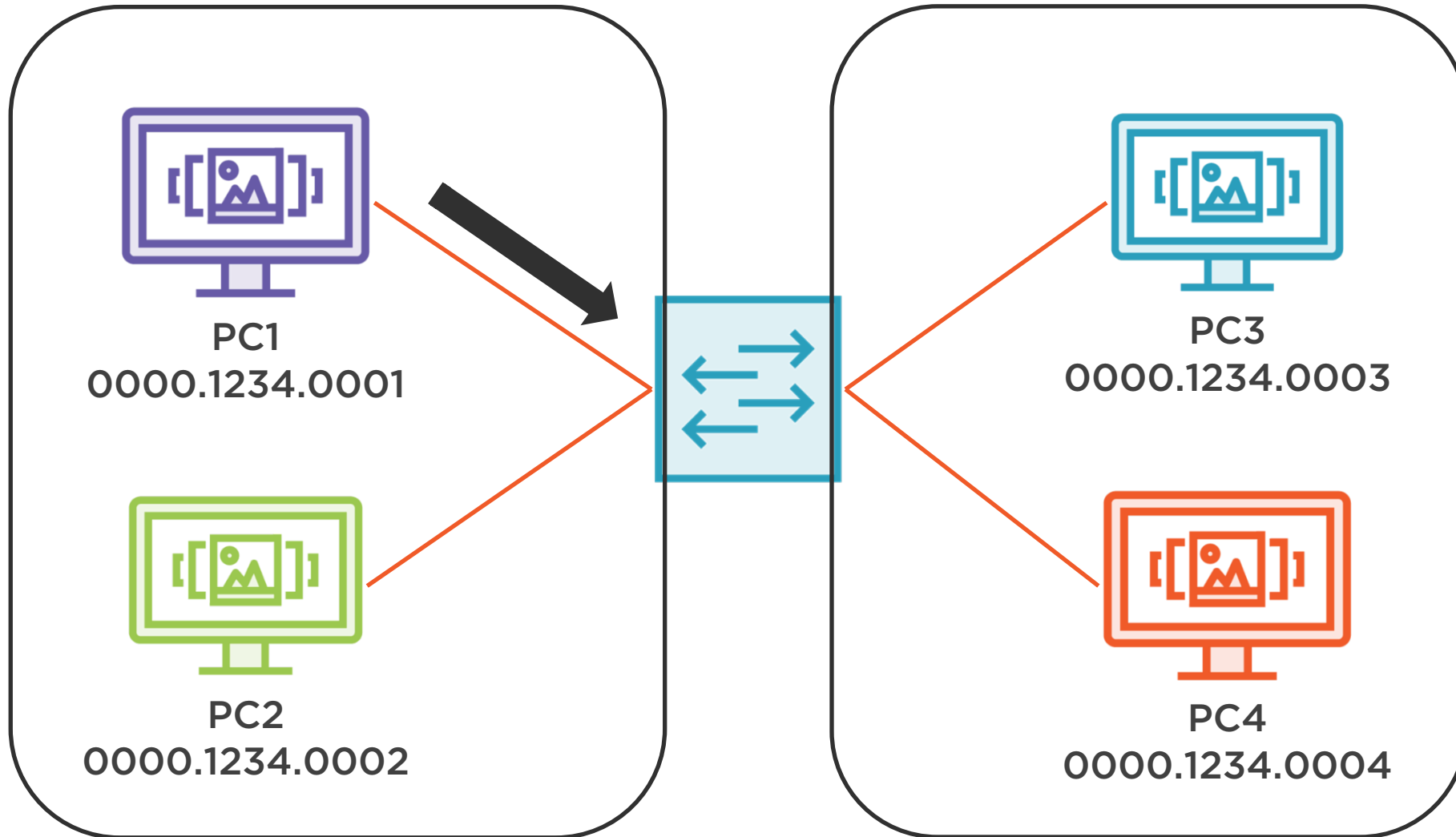


Keep broadcast domains
small to mitigate flooding

Broadcast Domain

VLAN 100

VLAN 200



VLAN Identifiers

VLAN Identifiers



Switches uniquely identify VLANs using a numerical identifier between 1 and 4094

Normal VLANs

VLAN identifiers 1
through 1001

Stored locally in
flash:vlan.dat

Normal VLANs

VLANs 1 through 1001 are not stored in the startup or running configuration

Deleting the startup configuration does not delete normal VLANs

```
SW1#delete flash:vlan.dat
```

```
Delete filename [vlan.dat]?
```

```
Delete flash:/vlan.dat? [confirm]
```

Deleting All Normal VLANs

Default VLANs

Default VLAN 1

Stored in vlan.dat

Considered a
normal VLAN

Comes
preconfigured

Default VLAN1

Carries control plane traffic by default
You can't delete or disable VLAN1!

VLAN1 Carries User Data Traffic by Default

```
SW1#show vlan brief
```

VLAN Name		Status	Ports
-----		-----	-----
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gi0/1, Gi0/2

Lab: Configuring Normal VLANs

Requirement

On SW1, configure VLAN 100 and name it DATA

Configure ports FastEthernet0/5-12 as access ports in VLAN 100

```
SW1(config)# int fa0/5
```

```
SW1(config-if)# switchport access vlan 100
```

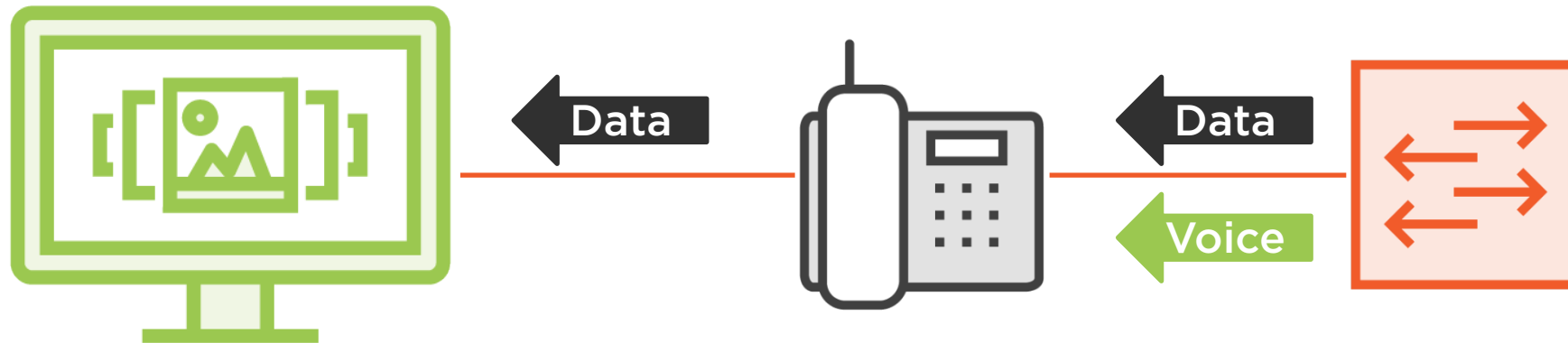
```
SW1(config-if)# switchport mode access
```

Configuring a VLAN Access Port

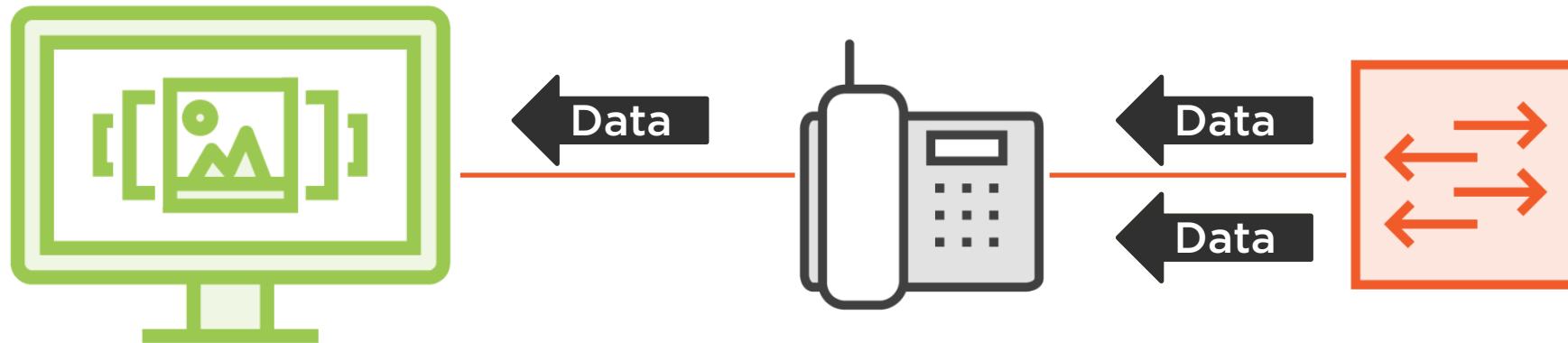
The switchport mode access command causes the port to become a member of one and only one VLAN

Configuring Voice VLANs

Voice-over-IP Configuration



Voice-over-IP Configuration



Voice (Auxiliary) VLAN

There's nothing special about the VLAN configuration itself

Can be created as a normal VLAN

The port configuration is what makes a voice VLAN special

Requirement

On SW1, configure voice VLAN 120 and name it VOICE

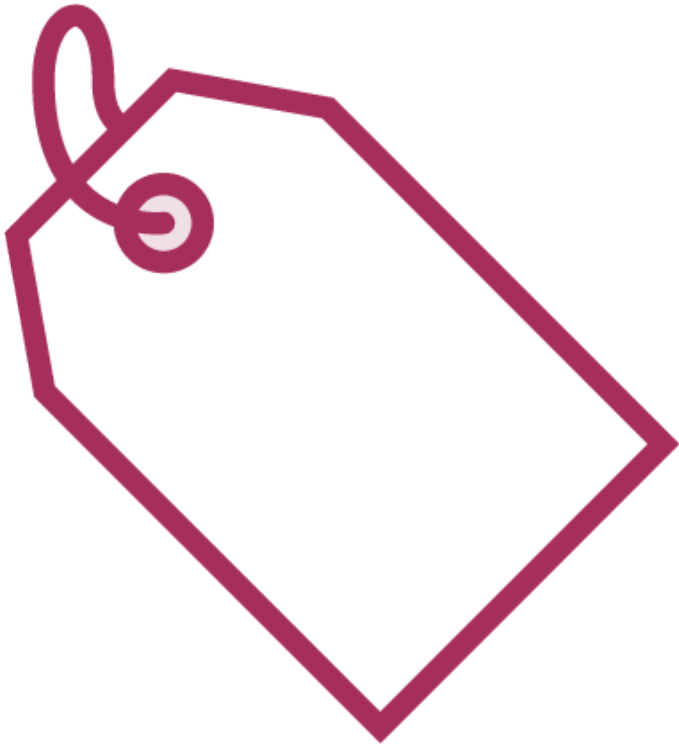
Configure FastEthernet0/5-10 to use VLAN120 as the voice VLAN

Voice VLAN



A port with both a static access and voice VLAN configured is called a multi-VLAN access port

Multi-VLAN Access Ports



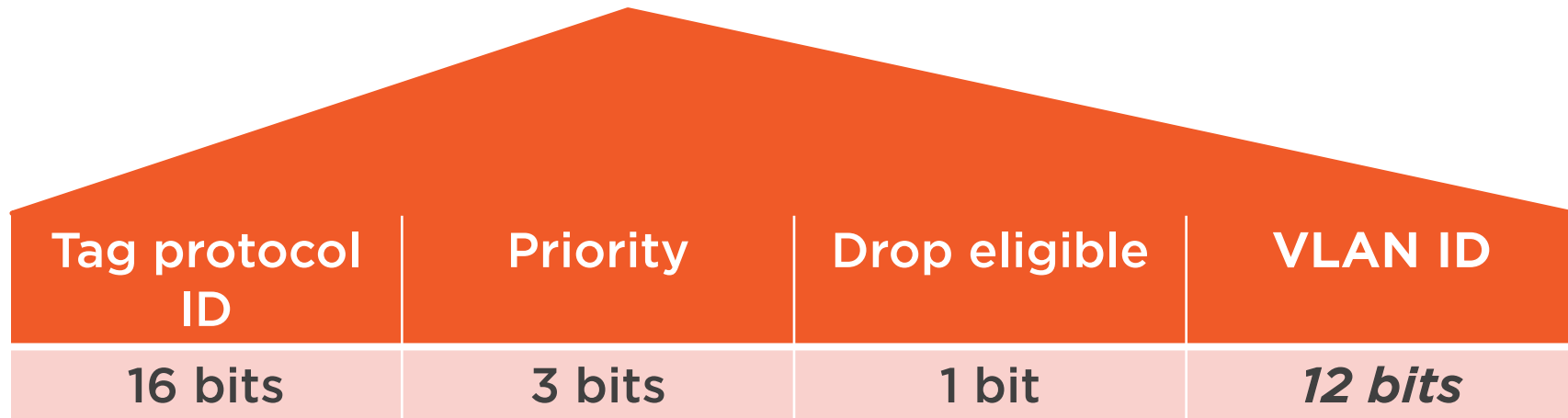
Voice frames have 802.1q tags

Ethernet IEEE 802.3 Layer 2 Frame

Destination MAC	Source MAC	Type/ length	Data	FCS
6 bytes	6 bytes	2 bytes	Variable	4 bytes

Ethernet IEEE 802.3 Frame with 802.1q Tag

Destination MAC	Source MAC	802.1q VLAN Tag	Type/ length	Data	FCS
6 bytes	6 bytes	4 bytes	2 bytes	Variable	4 bytes



Multi-VLAN Access Ports



A multi-VLAN access port can be a member of only the access and voice VLANs

VLANs and Security

Shutting Down VLAN1?

**All interfaces are
members of
VLAN1 by default**

**It's one big, open
broadcast domain!**

**Any bad guy can
plug in and start
hacking**

You can't shutdown VLAN1!

But you can secure it... a
little

Requirement

Configure SW1 so that layer 2 user traffic does not traverse VLAN1

```
SW1(config)#int range fa0/1-24
```

```
SW1(config-if-range)#switchport access vlan 100
```

```
SW1(config-if-range)#switchport mode access
```

Removing User Access to VLAN1

VLAN1 is more secure, but now VLAN100 is open!

Summary

Summary



**A VLAN is an arbitrarily defined
broadcast domain**

Summary



What's it mean for devices to be in the same broadcast domain?

They can communicate with each other by using MAC addresses

Summary



What's a normal VLAN?

**A VLAN with an identifier between 1-1001
and stored in flash:vlan.dat**

Summary



What's special about VLAN1?

It's the default Ethernet VLAN and cannot be deleted, renamed, or shut down

Summary



VLANs are open broadcast domains and inherently insecure

In the Next Module



We're going to cover private VLANs!