



# Cisco Community Community Live event

## Understanding How Multicast Works with Cisco Wireless LAN Controllers

Estefania Pacheco, Technical Consulting Engineer

Jhosbell Verdesca, Customer Success Specialist, CCIE #5823

November 19<sup>th</sup> 2019

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Now through Friday November 22<sup>th</sup> 2019

With  
Estefania & Jhosbell

<http://bit.ly/ama-nov19-2019>



Estefania Pacheco  
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Customer Success Specialist  
CCIE #58023

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November 22<sup>th</sup> 2019

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11 - 22 NOV “Migrating Existing Networks to Cisco ACI”



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10hrs CDT (utc -6)

With  
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2014 2013



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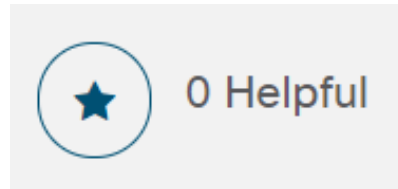


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Estefania Pacheco  
Technical Consulting Engineer



Jhosbell Verdesca  
Customer Success Specialist  
CCIE #58023



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# How Multicast with WLC really works?

Community Live event

Jhosbell Verdesca – Customer Success Specialist – Cisco DNA Center CCIE#58023  
Estefania Pacheco – Technical Consulting Engineer – Wireless

November 19<sup>th</sup> 2019

# Agenda

IGMP and PIM

Multicast on Cisco WLC

Common Scenarios

Demo

# Polling Question 1

Do you know the differences between PIM Dense Mode and PIM Sparse Mode?

- A. Yes
- B. No

# IGMP and PIM

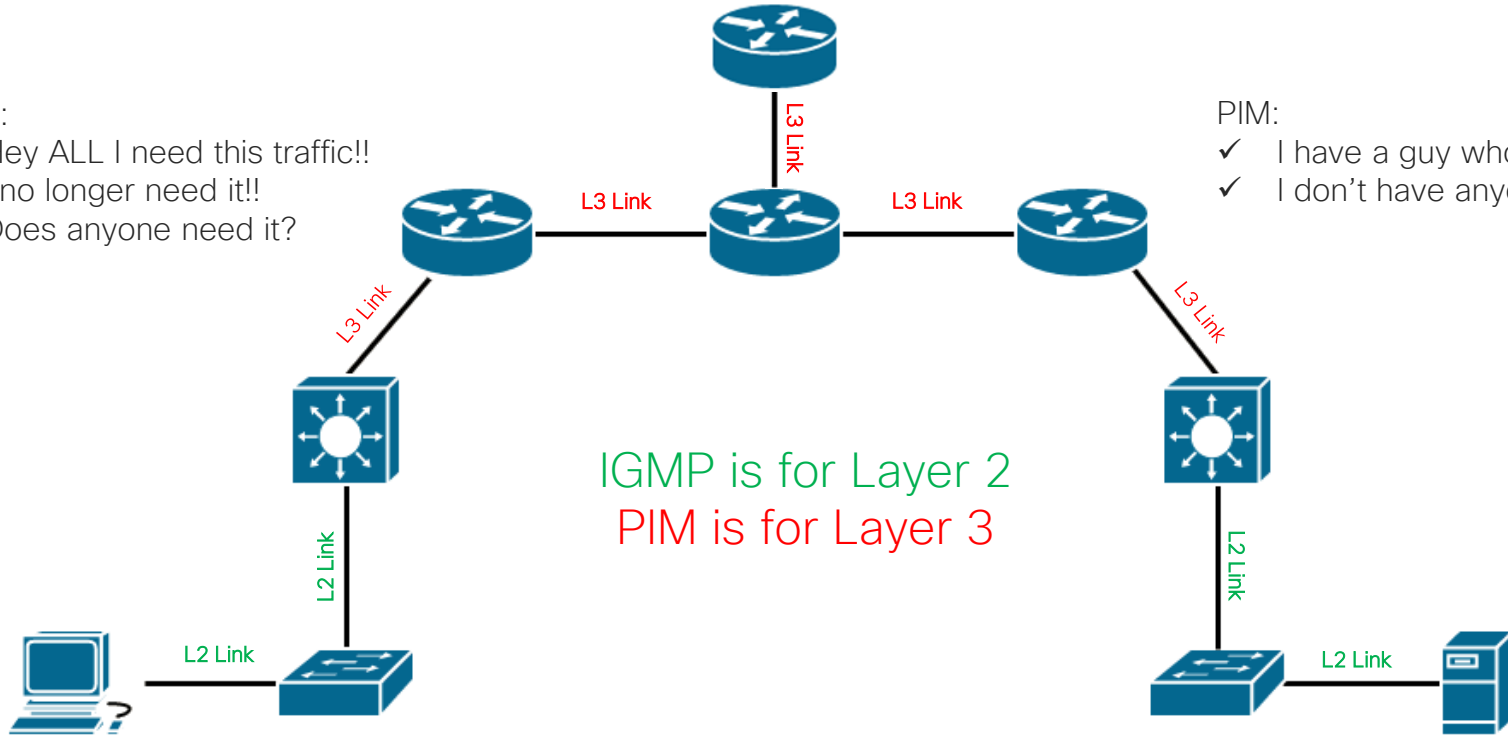
# IGMP vs PIM

IGMP:

- ✓ Hey ALL I need this traffic!!
- ✓ I no longer need it!!
- ✓ Does anyone need it?

PIM:

- ✓ I have a guy who needs it!!
- ✓ I don't have anyone interested!



# IGMP Snooping

Without it, Multicast is just like broadcast! (Not recommended to disable!)

Remember?

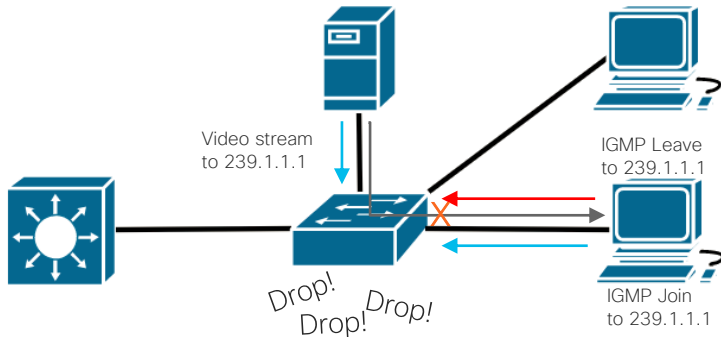
IGMP:

- ✓ Hey ALL I need this traffic!!
- ✓ I no longer need it!!
- ✓ Does anyone need it?

IGMP Membership Report (known as IGMP Join)

IGMP Explicit Leave

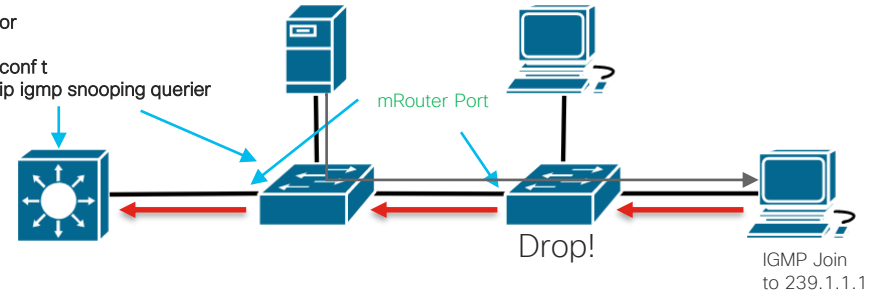
IGMP Membership Query (Sent by the mrouter of the segment OR the IGMP Querier)



```
conf t
int vlan x
ip pim <s/d> mode
```

or

```
conf t
ip igmp snooping querier
```





# PIM Modes – PIM Overview

- There are neighborships
- PIM packets are sent to 224.0.0.13

Remember??

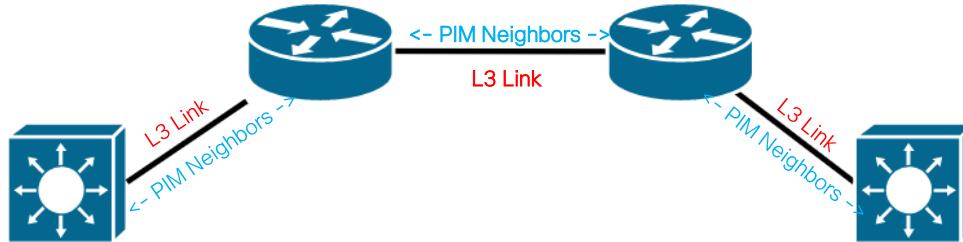
PIM:

✓ I have a guy who needs it!!

✓ I don't have anyone interested!

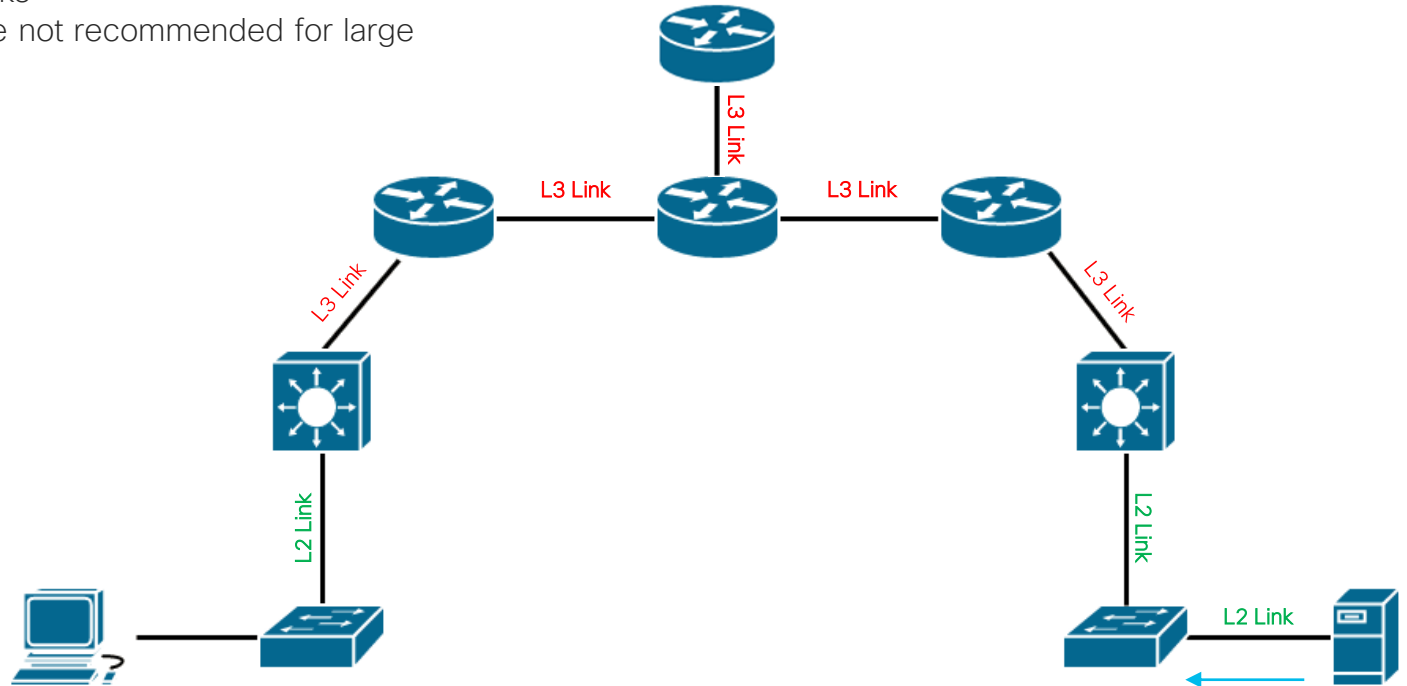
→ PIM Join

→ PIM Prune



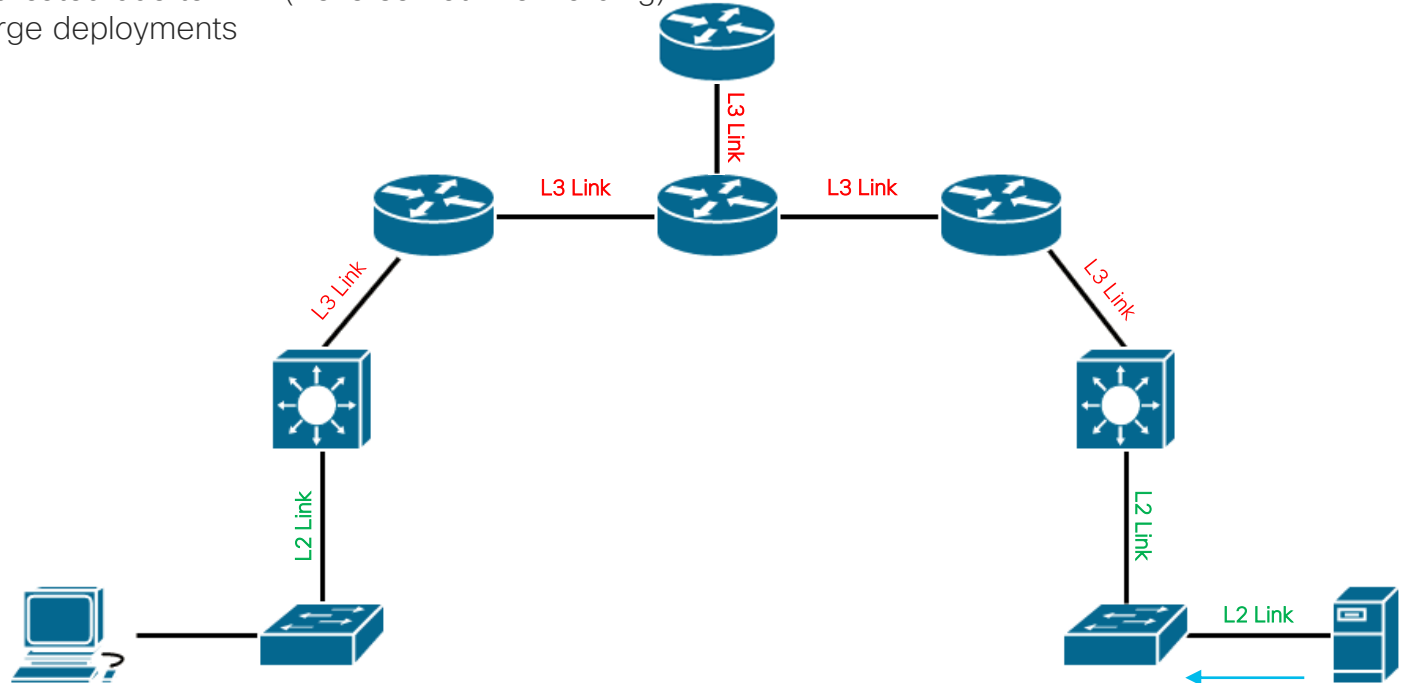
# PIM Modes - Dense Mode

- Flood and prune
- Easy to deploy
- Nice for small networks
- Not optimal, therefore not recommended for large deployments



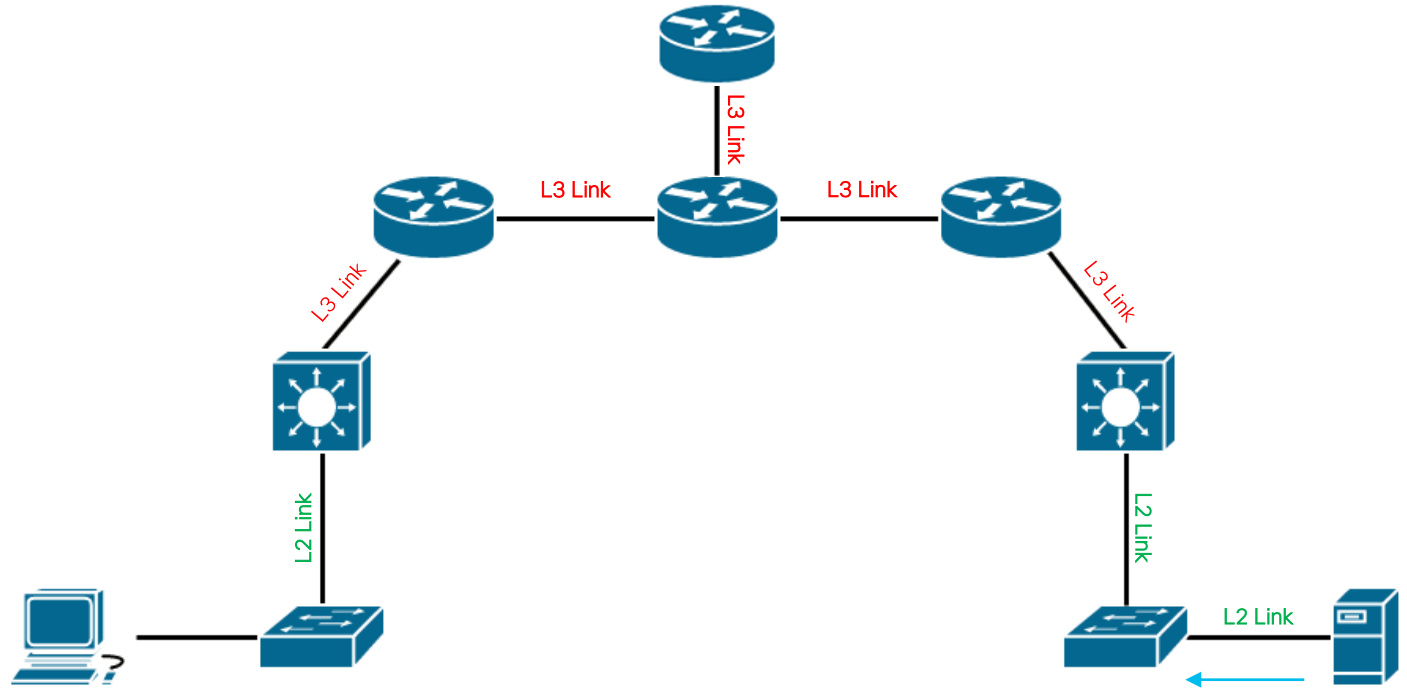
# PIM Modes - Sparse Mode

- Requires an RP (Rendezvous Point)
- All PIM routers will register with the RP and ask him for mcast traffic
- Design may get complicated due to RPF (Reverse Path Forwarding)
- Recommended for large deployments



# PIM Modes – Sparse/Dense Mode

- If there is an RP uses Sparse Mode
- If there isn't an RP uses Dense Mode



## Polling Question 2

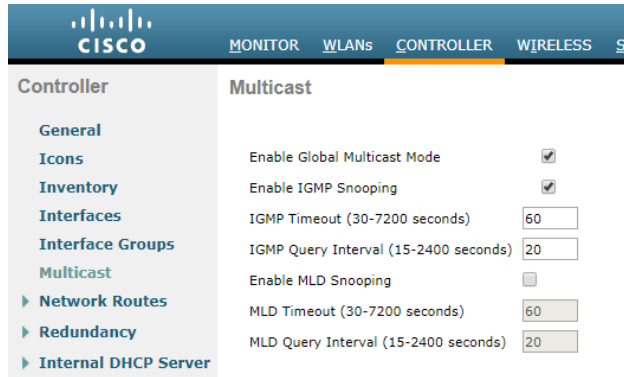
Are you using Multicast on your wireless network?

- A. Yes
- B. No

Multicast on WLC

# Multicast on WLC

- WLC does not do PIM, only IGMP.
- Configuration is extremely straightforward



The screenshot shows the Cisco WLC configuration interface. The top navigation bar includes 'MONITOR', 'WLANS', 'CONTROLLER', and 'WIRELESS'. The left sidebar lists various configuration sections: 'Controller', 'General', 'Icons', 'Inventory', 'Interfaces', 'Interface Groups', 'Multicast', 'Network Routes', 'Redundancy', and 'Internal DHCP Server'. The 'Multicast' section is selected, displaying the following settings:

Setting	Value
Enable Global Multicast Mode	<input checked="" type="checkbox"/>
Enable IGMP Snooping	<input checked="" type="checkbox"/>
IGMP Timeout (30-7200 seconds)	60
IGMP Query Interval (15-2400 seconds)	20
Enable MLD Snooping	<input type="checkbox"/>
MLD Timeout (30-7200 seconds)	60
MLD Query Interval (15-2400 seconds)	20

AP Multicast Mode [?](#)

Unicast ▼

OR

AP Multicast Mode [?](#)

Multicast ▼ 239.1.1.1

Multicast Group Address

# Multicast on WLC - Modes

AP Multicast Mode [↓](#)

Unicast

**CISCO** | MONITOR | WLANs | **CONTROLLER** | WIRELESS | SECURITY | MANAGEMENT | COMMANDS | HELP

**Controller**

**General**

Name:

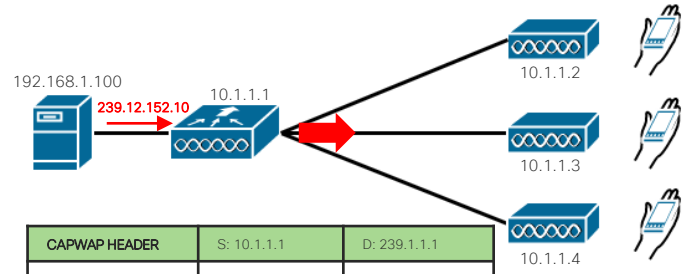
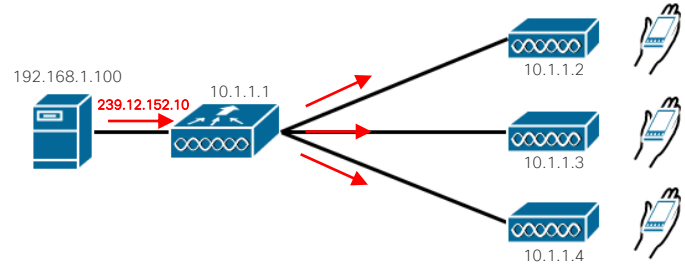
802.3x Flow Control Mode:

LAG Mode on next reboot:  (LAG Mode is currently disabled)

Broadcast Forwarding:

AP Multicast Mode [↓](#):   Multicast Group Address

CAPWAP HEADER	S: 10.1.1.1	D: 10.1.1.2
CAPWAP HEADER	S: 10.1.1.1	D: 10.1.1.3
CAPWAP HEADER	S: 10.1.1.1	D: 10.1.1.4
ORIGINAL PACKET	S: 192.168.1.100	D: 239.12.152.10
ORIGINAL PACKET	192.168.1.100 MCAST VIDEO	
	MCAST VIDEO	



CAPWAP HEADER	S: 10.1.1.1	D: 239.1.1.1
ORIGINAL PACKET	S: 192.168.1.100	D: 239.12.152.10
	MCAST VIDEO	

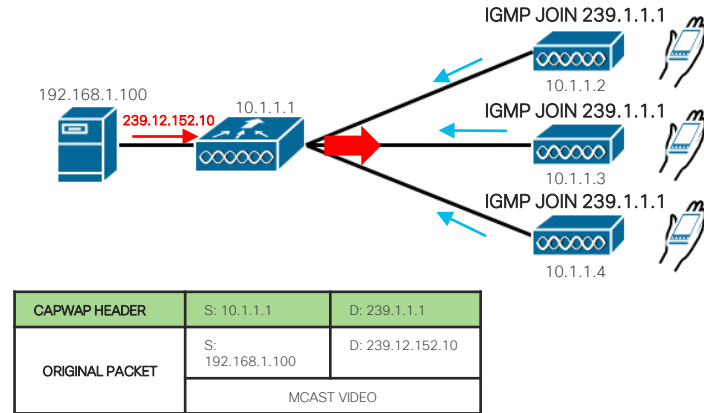


# Multicast on WLC - Modes

The screenshot shows the Cisco WLC configuration interface for the 'Multicast' mode. The 'General' tab is selected, showing the following settings:

- Name: ams-wlc01
- 802.3x Flow Control Mode: Disabled
- LAG Mode on next reboot: Enabled (LAG Mode is current)
- Broadcast Forwarding: Disabled
- AP Multicast Mode: Multicast
- Multicast Group Address: 239.1.1.1

- APs join the multicast group.
- GOAL: Ensure mcast traffic can flow between the WLC mgmt and the AP VLANs
- TIP:
  - Same VLAN? No problem\*\*
  - Different VLAN? PIM required



\*\*Remember the case when you have 2+ switches

# Common Scenarios

# Common scenarios

Now what?.. IGMP Snooping..

How will the WLC have a guy on VLAN 20? Who needs the traffic for 239.60.60.60"

How to do it? Simple send the traffic to the client?

configure terminal

```
!
ip multicast-routing
!
```

```
Interface vlan 20
description WLC-mgmt
ip pim sparse-dense
!
```

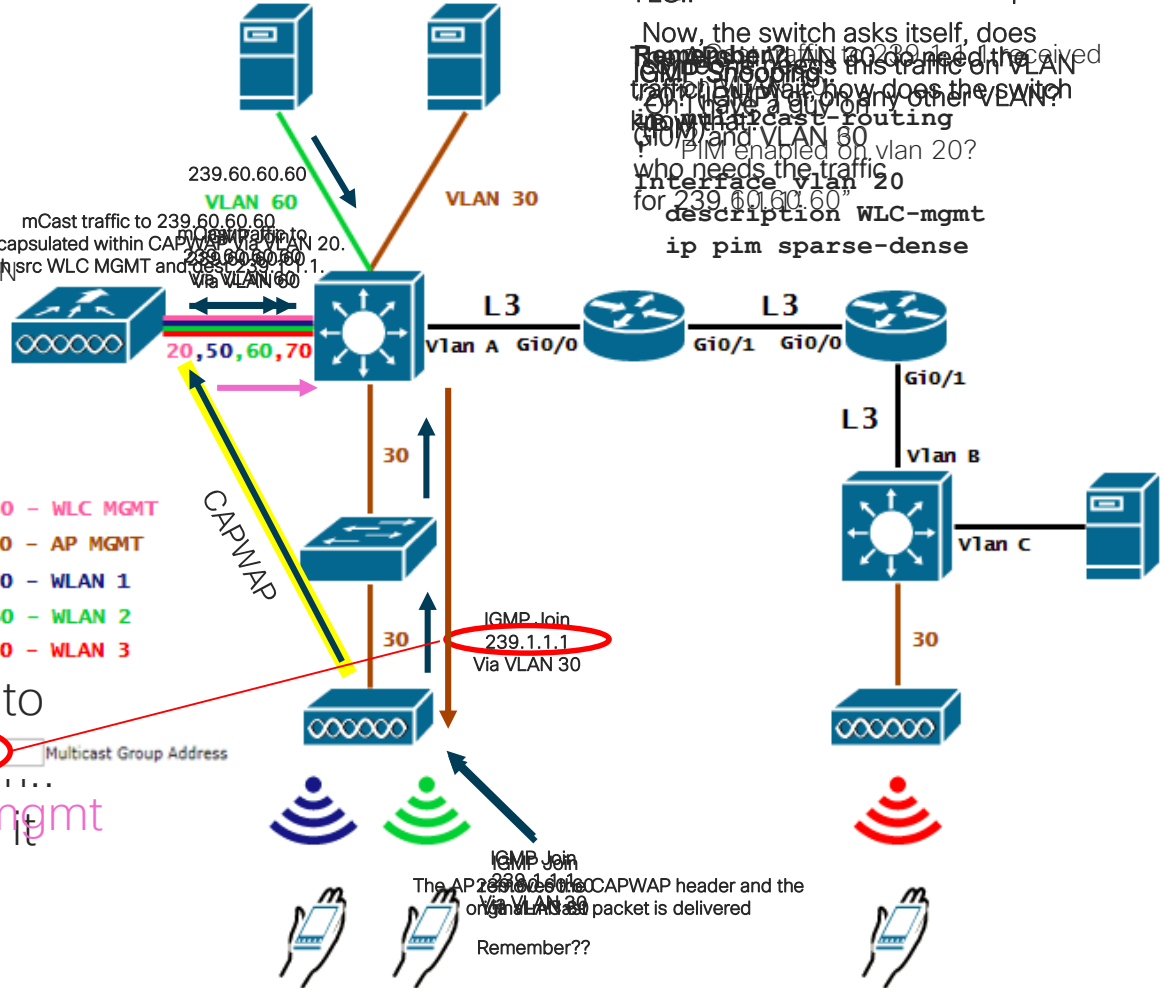
- VLAN 20 - WLC MGMT
- VLAN 30 - AP MGMT
- VLAN 50 - WLAN 1
- VLAN 60 - WLAN 2
- VLAN 70 - WLAN 3

Interface vlan 30 Multicast-Mcast, We need to

If I have a guy on VLAN 20 who needs the traffic for 239.60.60.60"

traffic between the WLC mgmt and the AP mgmt VLANs.

may overload the WLC



YES! Here is where PIM does its part. Now, the switch asks itself, does PIM Snooping on this traffic on VLAN 20? Who needs the traffic for 239.60.60.60? PIM enabled on vlan 20? who needs the traffic for 239.60.60.60"

```
description WLC-mgmt
ip pim sparse-dense
```

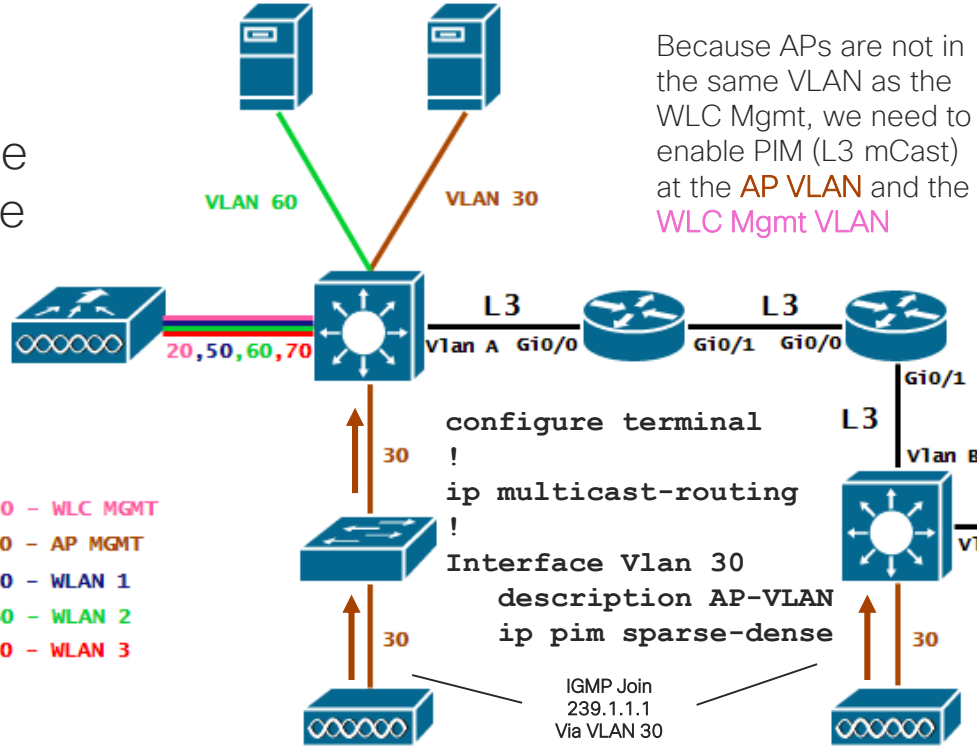
# Common scenarios

Next step, if the APs don't source same thing, let's go over the process of a 30.1.1.1 requesting the mcast traffic.

```

configure terminal
!
ip multicast-routing
!
Interface Vlan 20
  description WLC-Mgmt
  ip pim sparse-dense
!
Interface Vlan 30
  description AP-VLAN
  ip pim sparse-dense
  
```

- VLAN 20 - WLC MGMT
- VLAN 30 - AP MGMT
- VLAN 50 - WLAN 1
- VLAN 60 - WLAN 2
- VLAN 70 - WLAN 3



Because APs are not in the same VLAN as the WLC Mgmt, we need to enable PIM (L3 mCast) at the AP VLAN and the WLC Mgmt VLAN

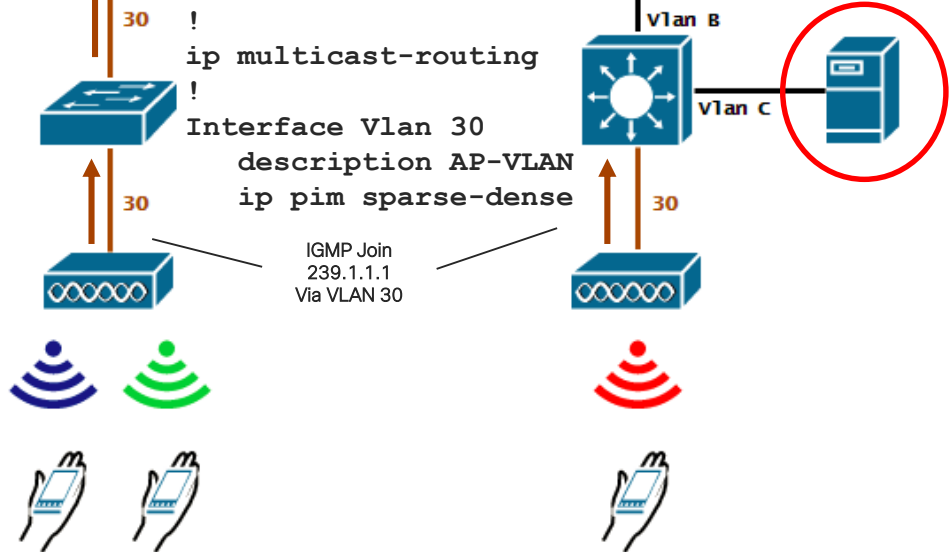
```

configure terminal
!
ip multicast-routing
!
Interface Vlan 30
  description AP-VLAN
  ip pim sparse-dense
  
```

IGMP Join  
239.1.1.1  
Via VLAN 30

AP Multicast Mode [1](#)

Multicast  Multicast Group Address

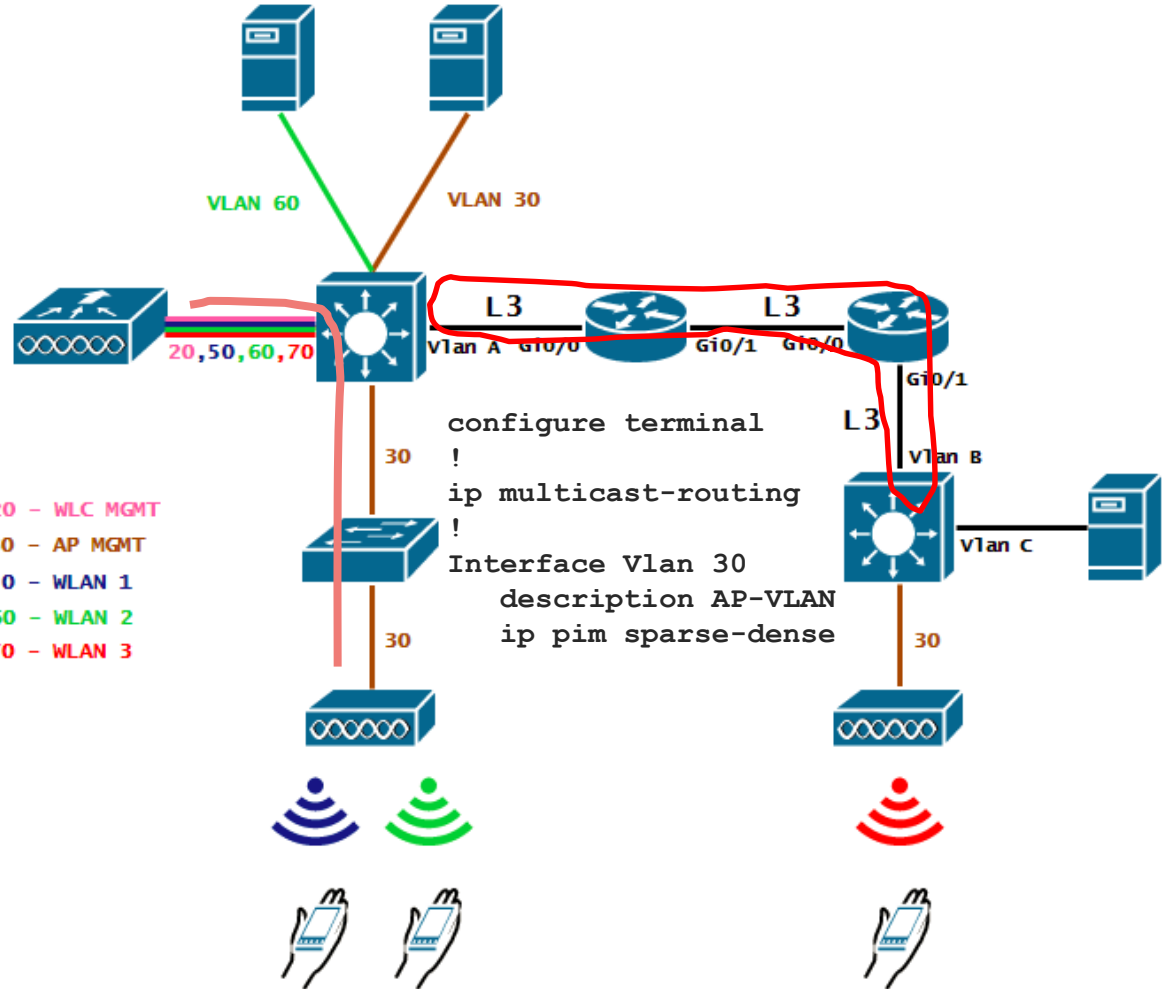


# Common scenarios

What's the issue here?

```
configure terminal
!  
ip multicast-routing
!  
Interface Vlan 20
  description WLC-Mgmt
  ip pim sparse-dense
!  
Interface Vlan 30
  description AP-VLAN
  ip pim sparse-dense
```

- VLAN 20 - WLC MGMT
- VLAN 30 - AP MGMT
- VLAN 50 - WLAN 1
- VLAN 60 - WLAN 2
- VLAN 70 - WLAN 3



# Common scenarios






TO CARRY MULTICAST BETWEEN THE **WLC MGMT** AND THE **APs MGMT** WE NEED PIM IN ALL INTERFACES IN THE PATH.

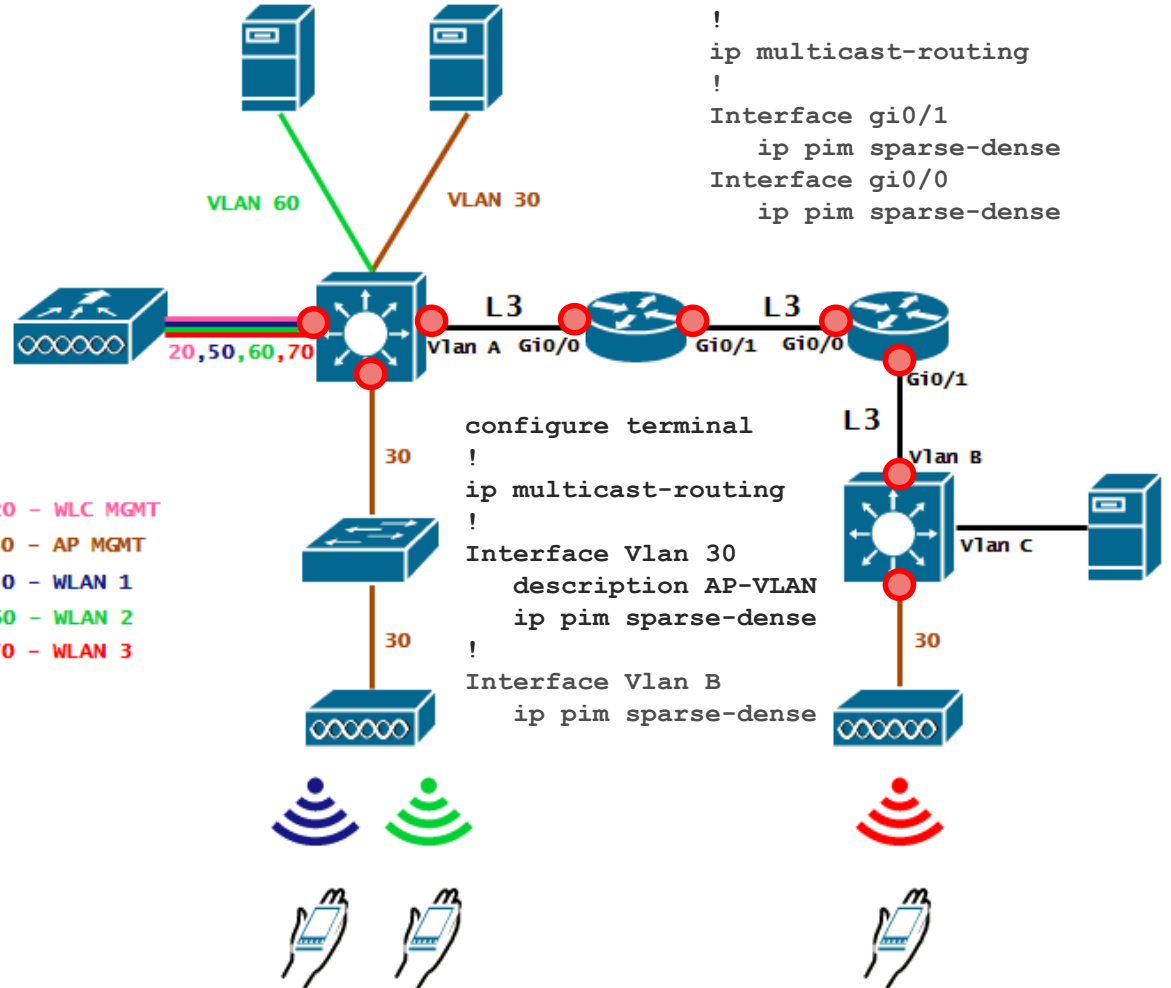
THEY ARE MARKED WITH 

```

configure terminal
!
ip multicast-routing
!
Interface Vlan 20
  description WLC-Mgmt
  ip pim sparse-dense
!
Interface Vlan 30
  description AP-VLAN
  ip pim sparse-dense
!
Interface Vlan A
  description L3-Link
  ip pim sparse-dense

```

-  VLAN 20 - WLC MGMT
-  VLAN 30 - AP MGMT
-  VLAN 50 - WLAN 1
-  VLAN 60 - WLAN 2
-  VLAN 70 - WLAN 3



```

configure terminal
!
ip multicast-routing
!
Interface gi0/1
  ip pim sparse-dense
Interface gi0/0
  ip pim sparse-dense

```

```

configure terminal
!
ip multicast-routing
!
Interface Vlan 30
  description AP-VLAN
  ip pim sparse-dense
!
Interface Vlan B
  ip pim sparse-dense

```

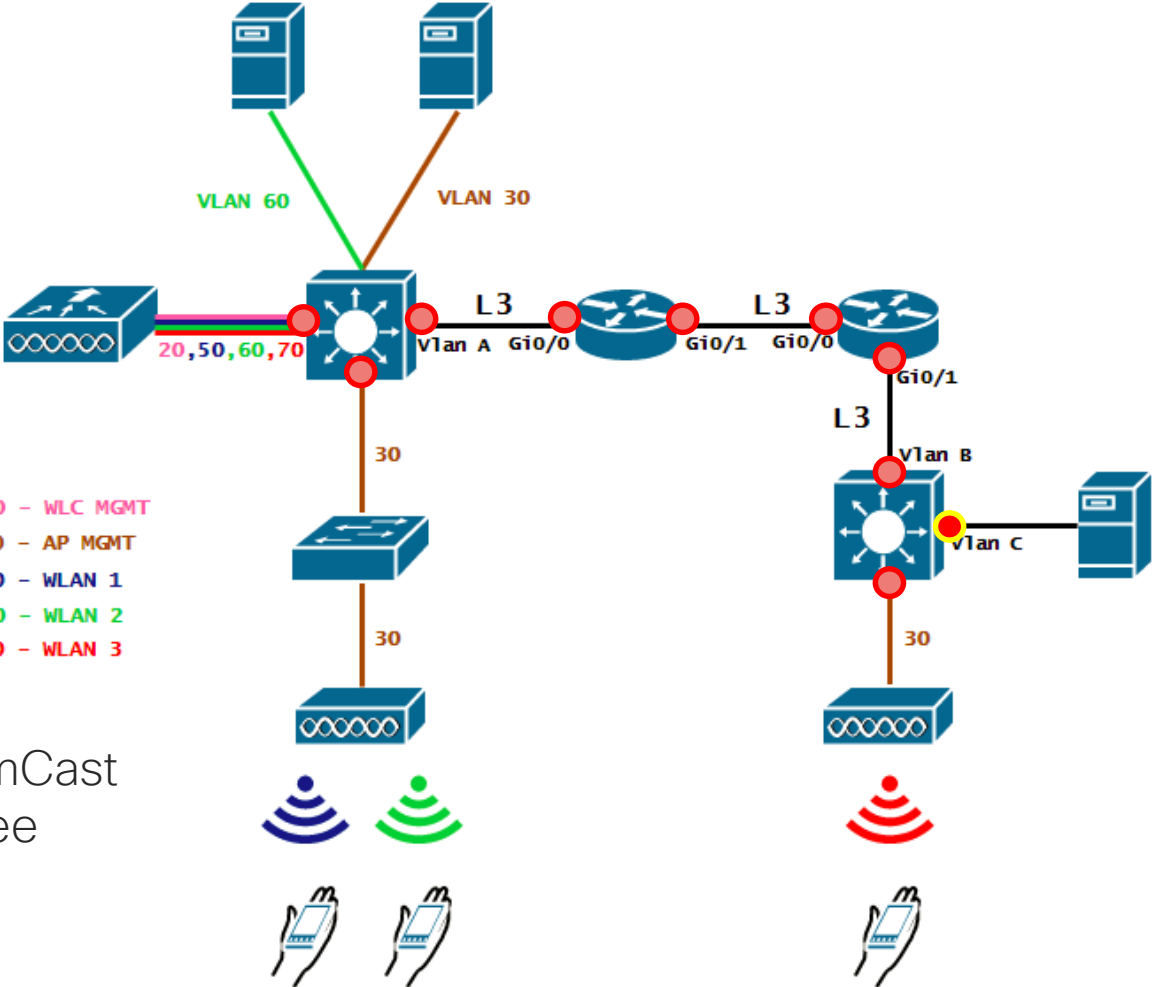
# Common scenarios

Once PIM is enabled on all the interfaces between the AP and WLC, we need to enable PIM between the Mcast source and the WLC.

Otherwise the WLC doesn't receive the stream and has nothing to forward to the APs.

- VLAN 20 - WLC MGMT
- VLAN 30 - AP MGMT
- VLAN 50 - WLAN 1
- VLAN 60 - WLAN 2
- VLAN 70 - WLAN 3

Now that we know mCast is configured let's see how the flow is.



# Common scenario

As no one has asked for the traffic it'll be dropped at the switch

Let's say, clients on vlan 50 and 70 are requesting multicast traffic.

Now, because the WLC has IGMP Snooping enabled, it knows there are clients on VLAN 50, and 70 that need the traffic. He will create an MGID for each vlan and ask for that traffic on those VLANs.

Unless you have the multicast VLAN feature enabled ☺

The screenshot shows the configuration for a WLAN profile. The 'Security' tab is active. The configuration includes:

- Profile Name: HERE
- Type: WLAN
- SSID: HERE
- Status:  Enabled
- Security Policies: [WPA2][Auth(PSK)] (Modifications done under security tab will appear)
- Radio Policy: 802.11a only
- Interface/Interface Group(G): wlan\_trusted
- Multicast Vlan Feature:  Enabled
- Multicast Interface: wlan\_trusted
- Broadcast SSID:  Enabled
- NAS-ID: none

A diagram on the right shows a server icon with a red arrow pointing to the 'Multicast Vlan Feature' setting, labeled 'IGMP Join 239.12.12.12 Via VLAN 70'. There are also some handwritten notes 'prop!' and 'an C' near the diagram.

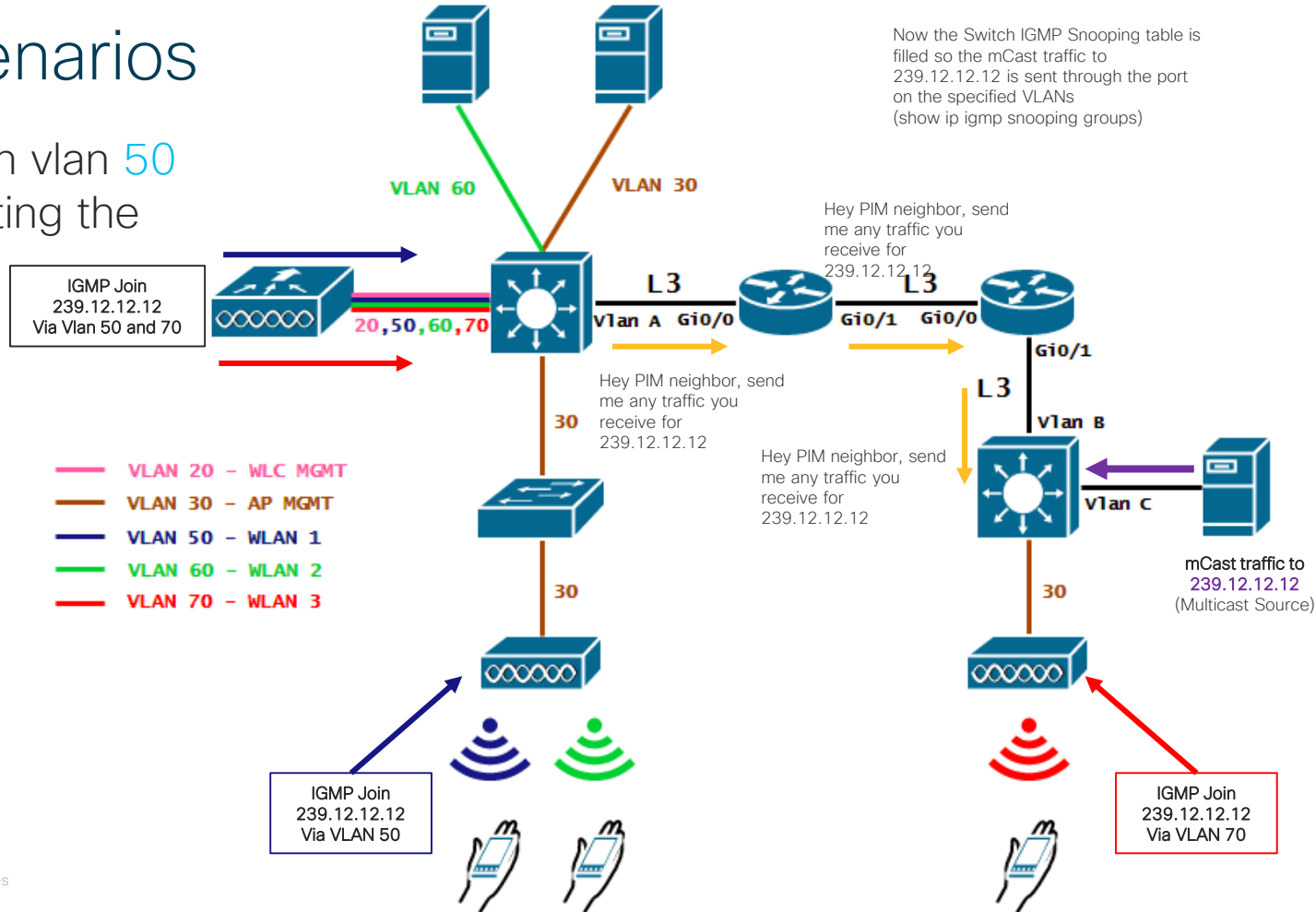


# Common scenarios

Let's say, clients on vlan 50 and 70 are requesting the mcast traffic.

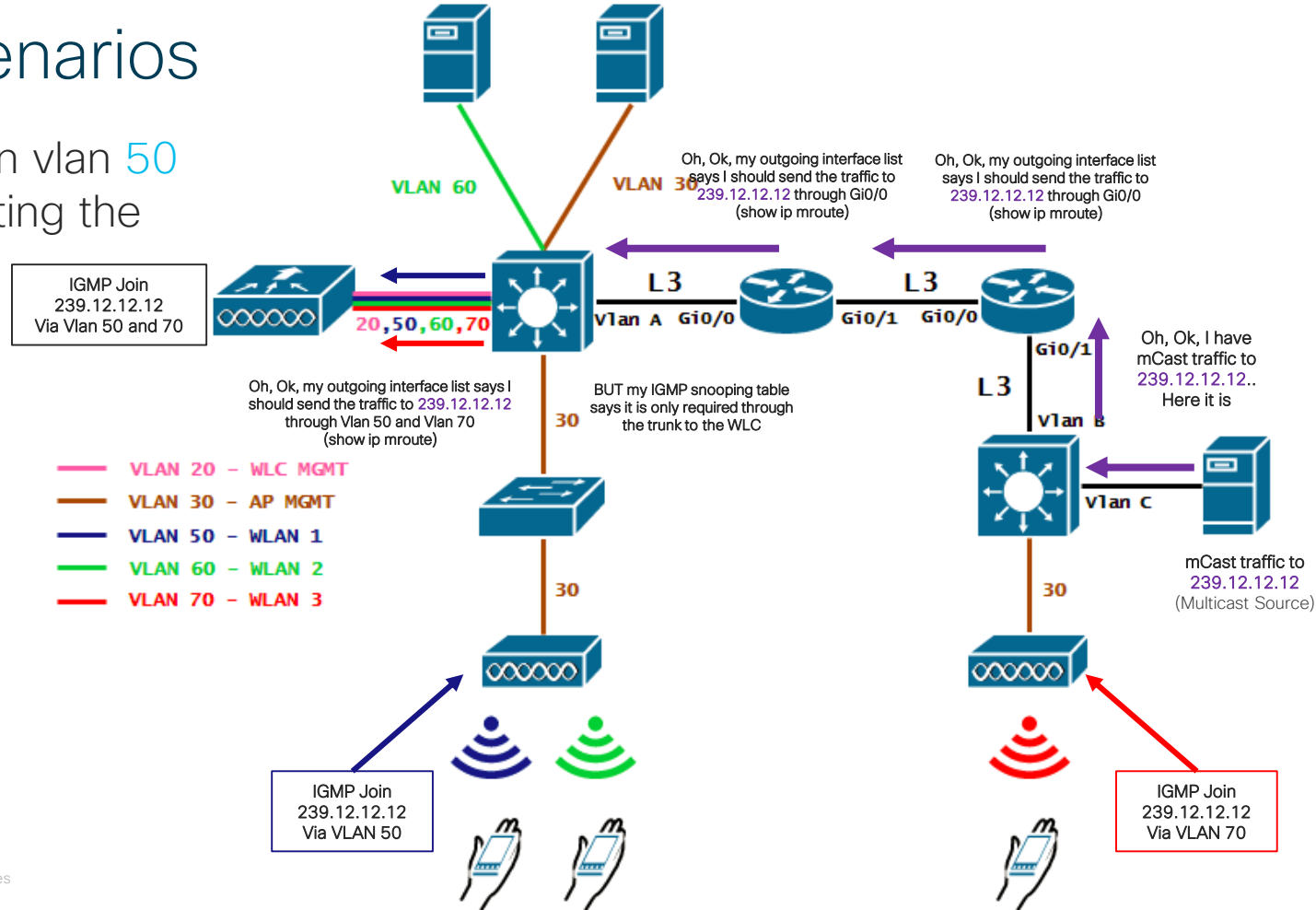
WLC will request the traffic on VLAN 50 and 70.

Also, as the switch is running PIM, it will ask its neighbors for the traffic on all the PIM enabled interfaces if Dense Mode or to the RP if Sparse Mode. (PIM Join)



# Common scenarios

Let's say, clients on vlan 50 and 70 are requesting the mcast traffic.



# Common scenarios

Let's say, clients on vlan 50 and 70 are requesting the mcast traffic.

Then the WLC will send a single multicast packet for each MGID.  
With Source WLC management and Destination 239.1.1.1  
MGID = same VLAN + same mCast Group

- VLAN 20 - WLC MGMT
- VLAN 30 - AP MGMT
- VLAN 50 - WLAN 1
- VLAN 60 - WLAN 2
- VLAN 70 - WLAN 3

AP Multicast Mode 1

Multicast  Multicast Group Address

ORIGINAL PACKET	Src: Server IP (mCast source)	Dst: 239.12.12.12 (Original mCast traffic)
-----------------	-------------------------------	--

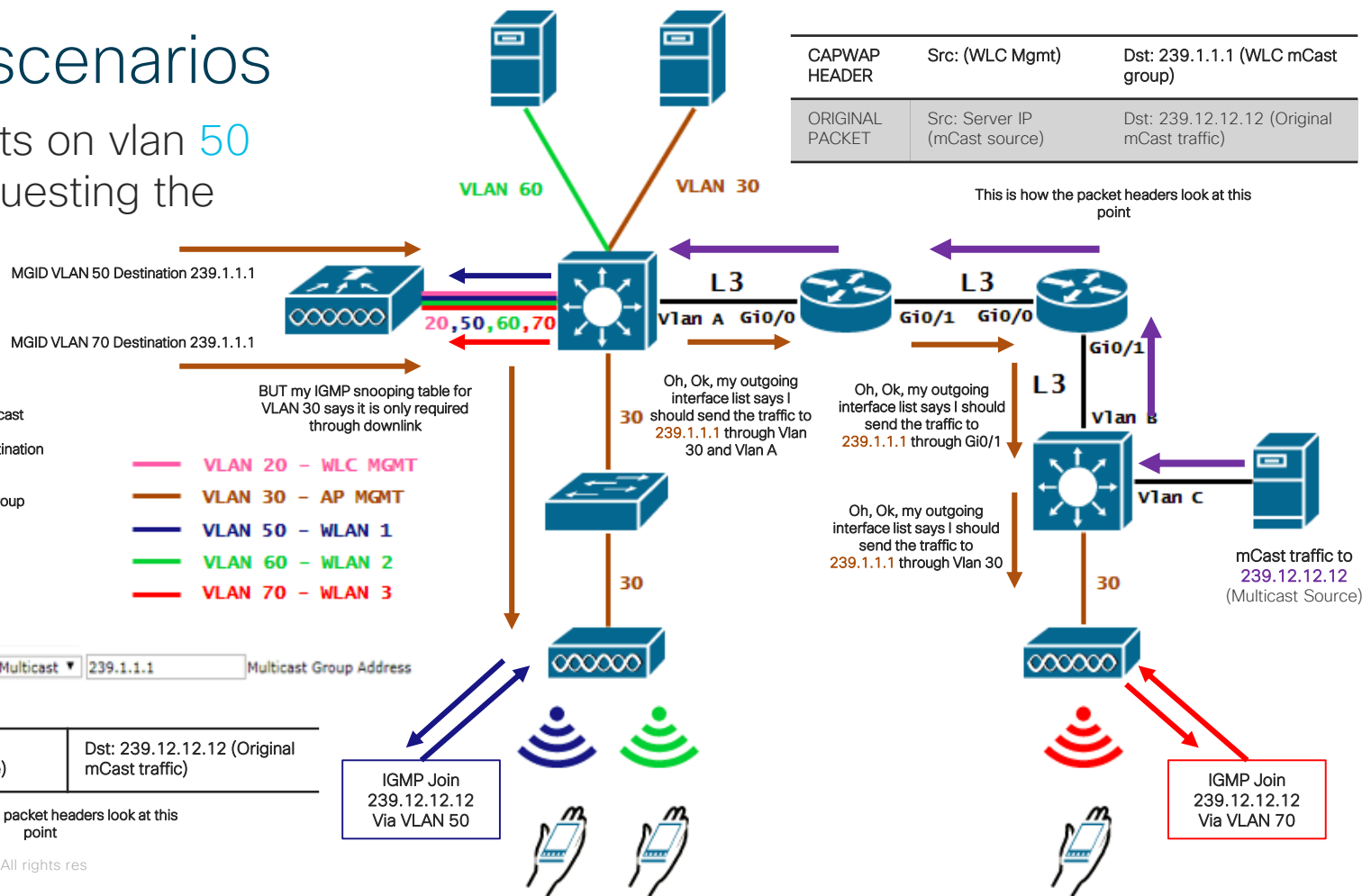
This is how the packet headers look at this point

IGMP Join 239.12.12.12 Via VLAN 50

IGMP Join 239.12.12.12 Via VLAN 70

CAPWAP HEADER	Src: (WLC Mgmt)	Dst: 239.1.1.1 (WLC mCast group)
ORIGINAL PACKET	Src: Server IP (mCast source)	Dst: 239.12.12.12 (Original mCast traffic)

This is how the packet headers look at this point



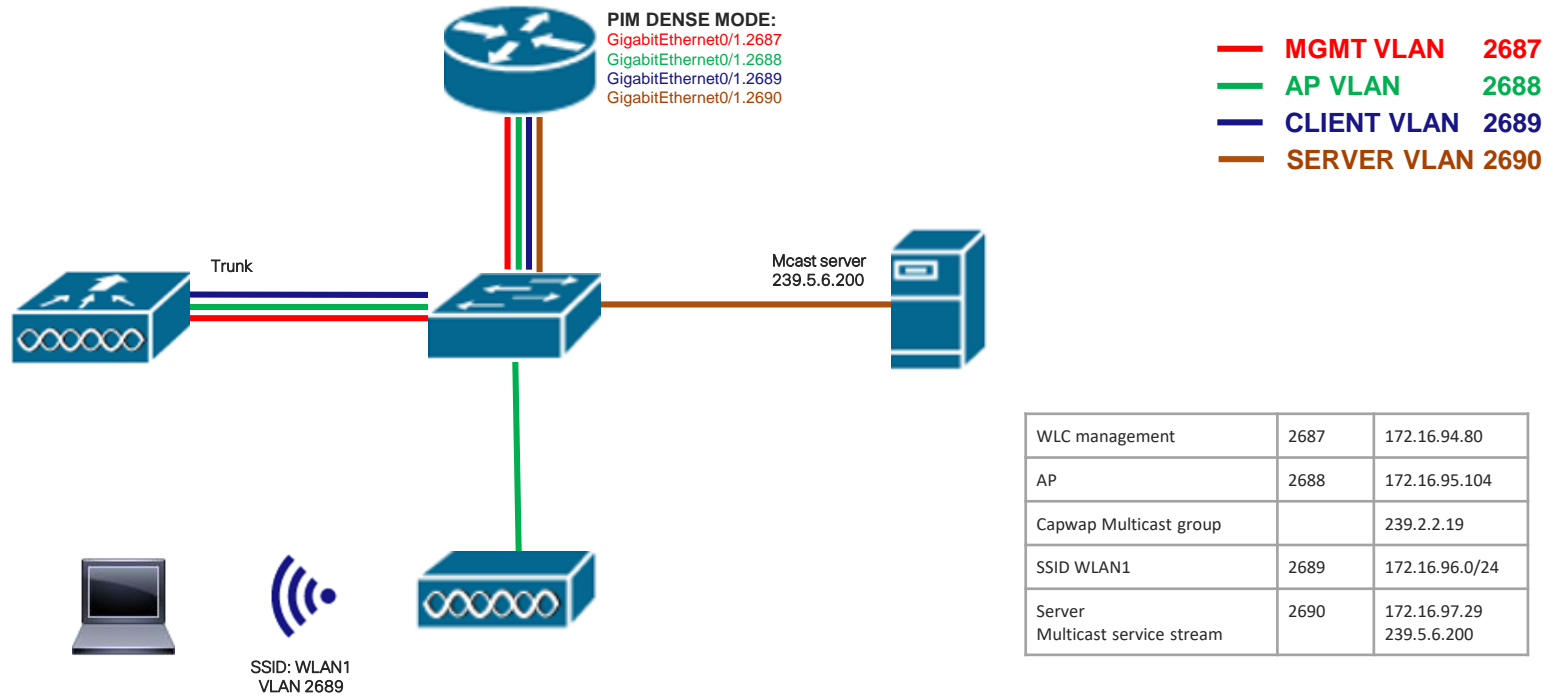
## Polling Question 3

Did you know the importance of the Multicast configuration on your wired network before this session?

- A. Yes
- B. No

Demo

# Network Diagram



WLC management	2687	172.16.94.80
AP	2688	172.16.95.104
Capwap Multicast group		239.2.2.19
SSID WLAN1	2689	172.16.96.0/24
Server Multicast service stream	2690	172.16.97.29 239.5.6.200

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Questions Now!



Use the Q&A panel to submit your  
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# Ask Me Anything following the event

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Customer Success Specialist  
CCIE #58023



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Time!

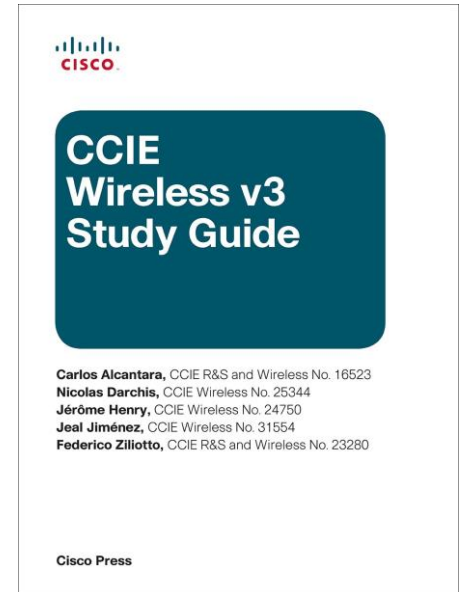
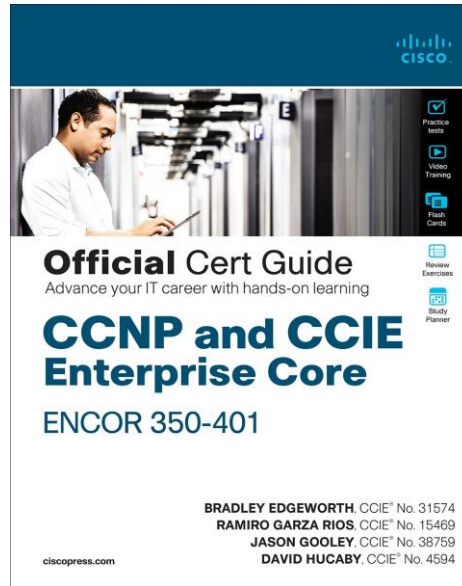
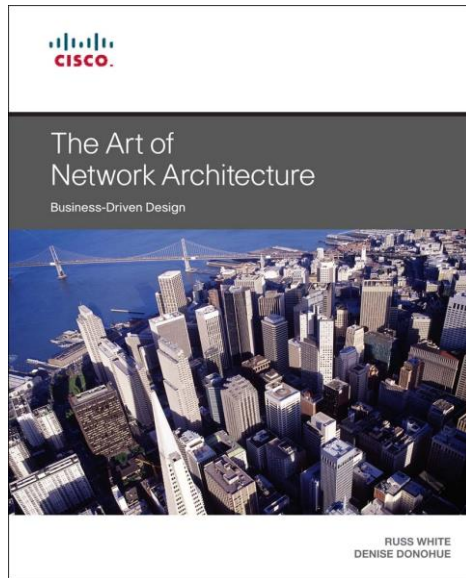
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