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 19th 2019

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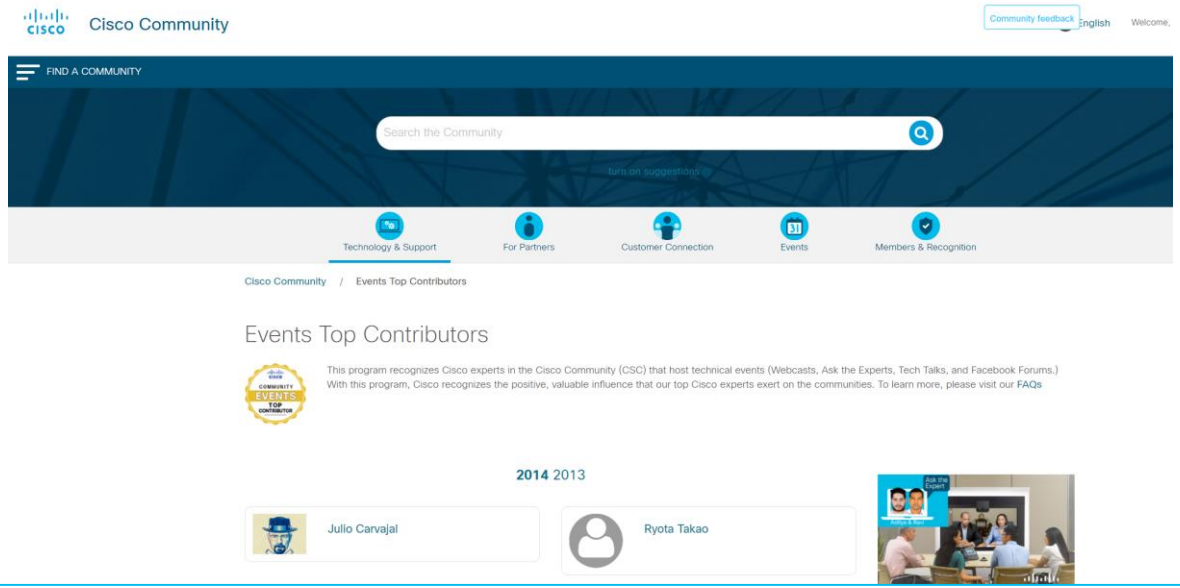

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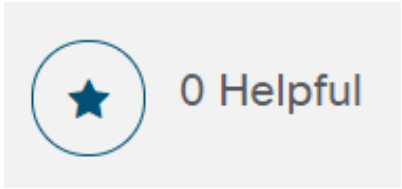

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How Multicast with WLC really works?

Community Live event

Jhosbell Verdesca – Customer Success Specialist – Cisco DNA Center CCIE#58023
Estefania Pacheco – Technical Consulting Engineer - Wireless
November 19th 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

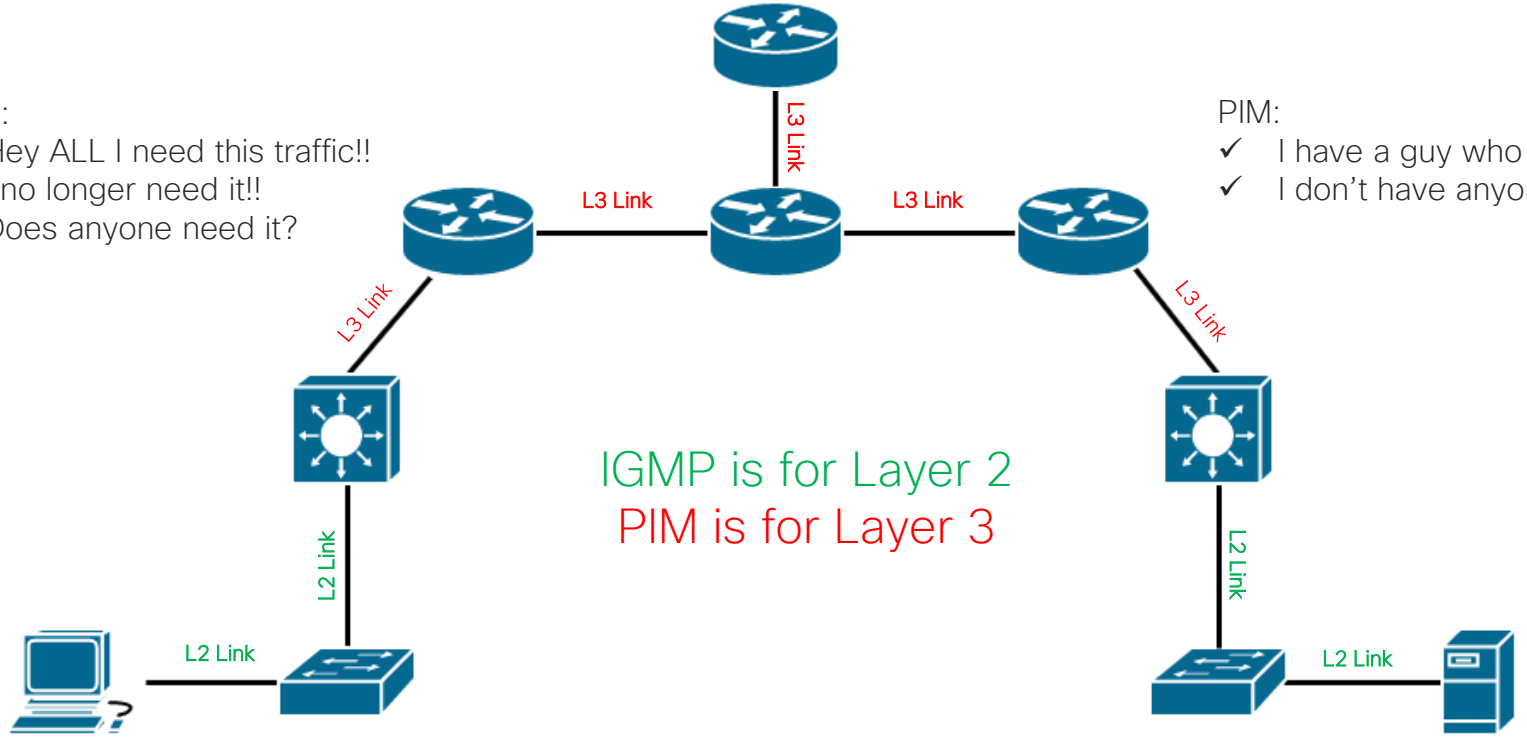
B. No

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!)

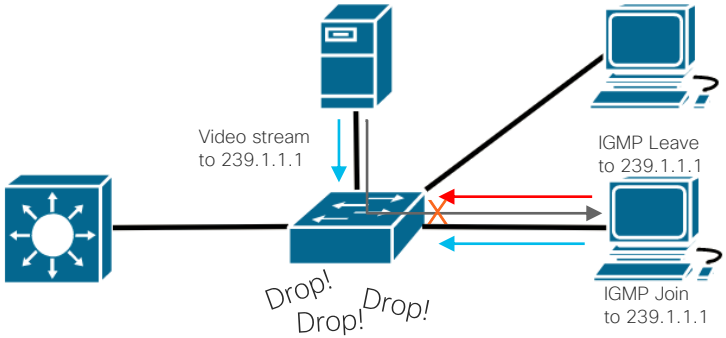
Remember?

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

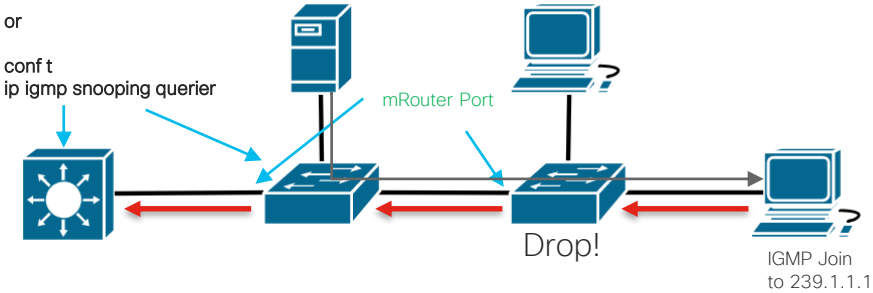
IGMP Membership Query (Sent by the mrouter of the segment OR the IGMP Querier)




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

or

conf t
ip igmp snooping querier
```



PIM Modes – PIM Overview

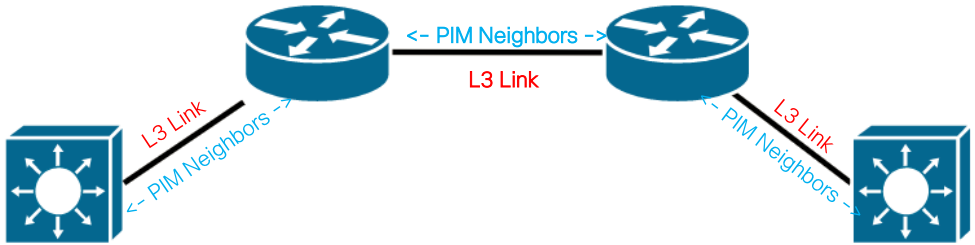
- There are neighborships
- PIM packets are sent to 224.0.0.13

Remember??

PIM:

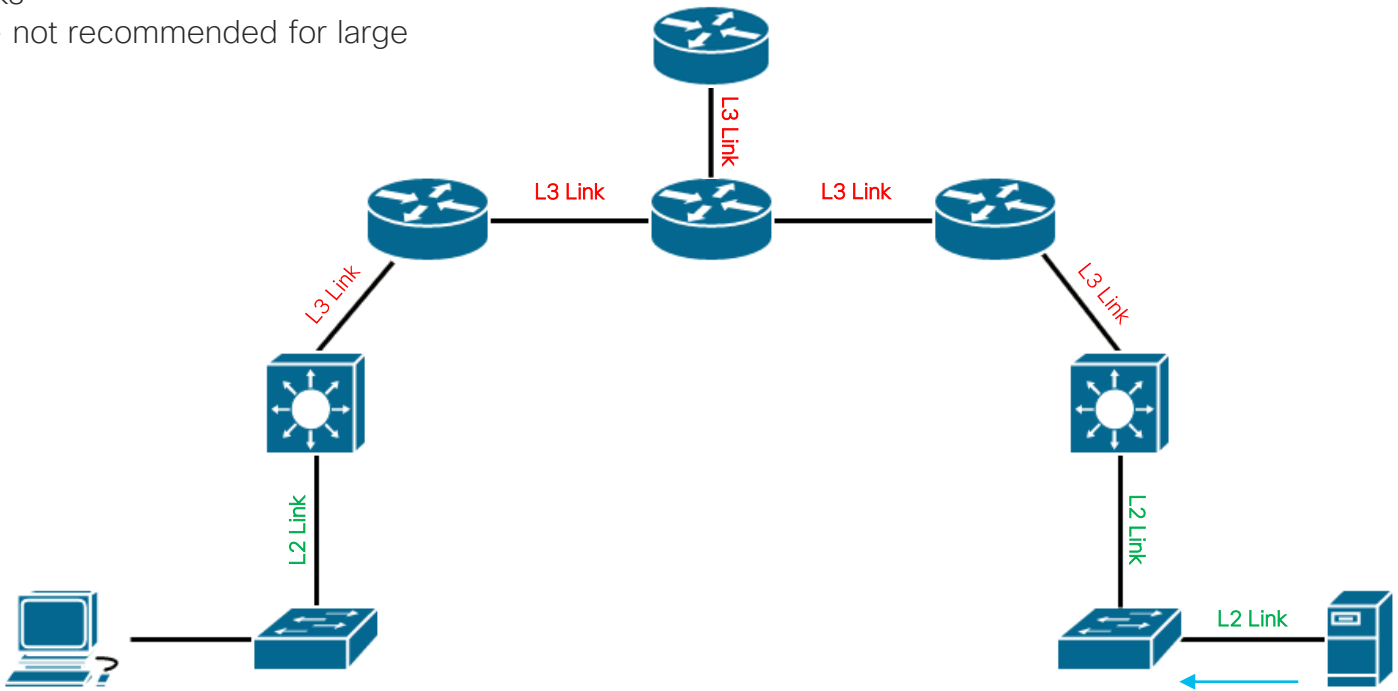
✓ I have a guy who needs it!! → PIM Join

✓ I don't have anyone interested! → PIM Prune



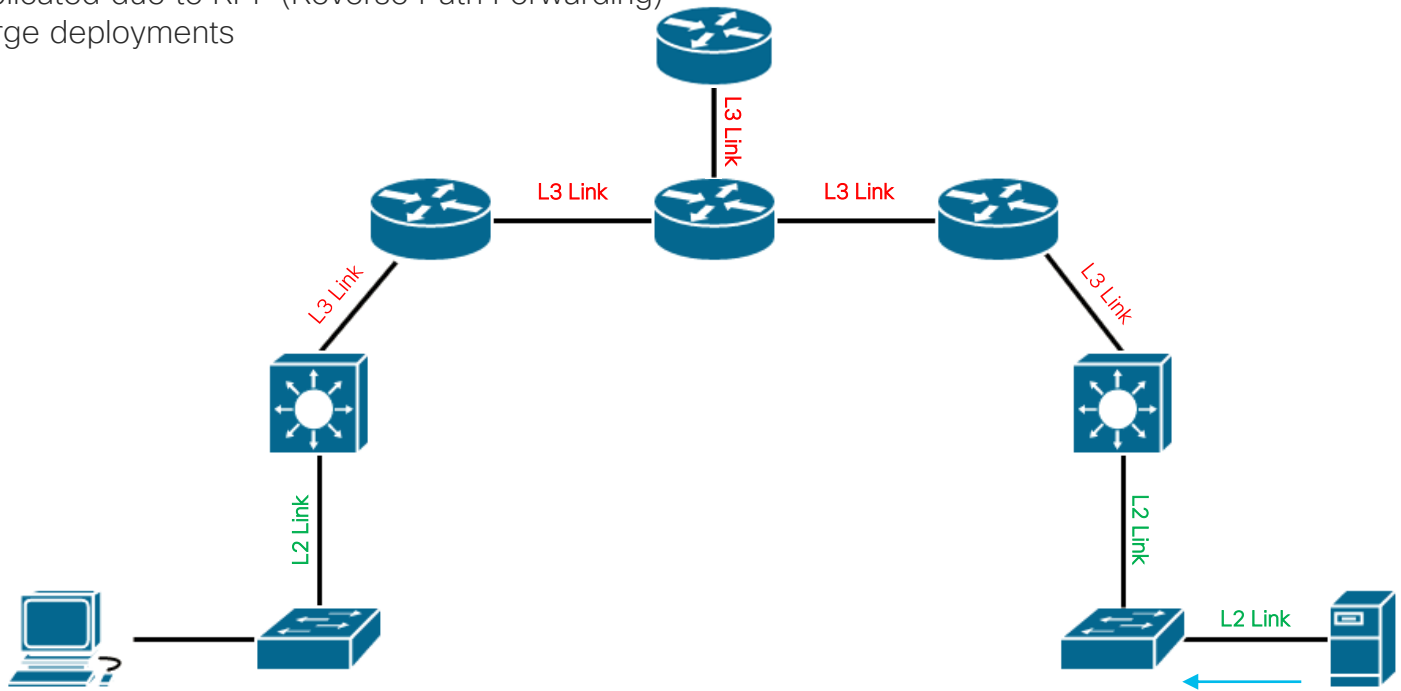
PIM Modes – Dense Mode

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



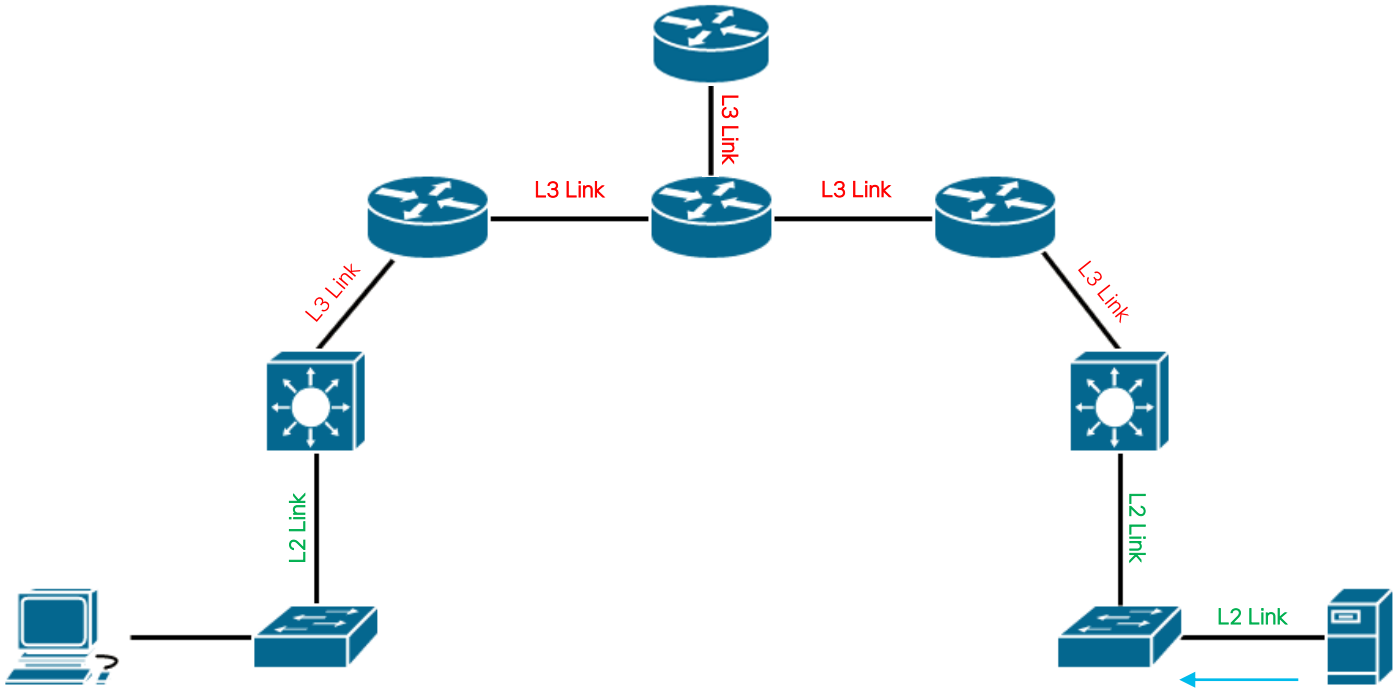
PIM Modes – Sparse Mode

- 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?

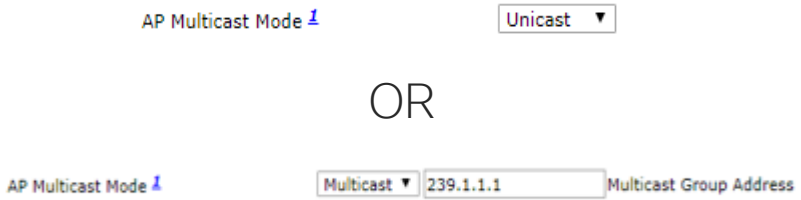
A. Yes

B. No

Multicast on WLC

Multicast on WLC

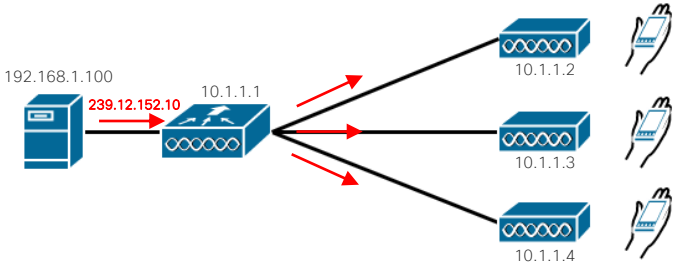
- WLC does not do PIM, only IGMP.
- Configuration is extremely straightforward

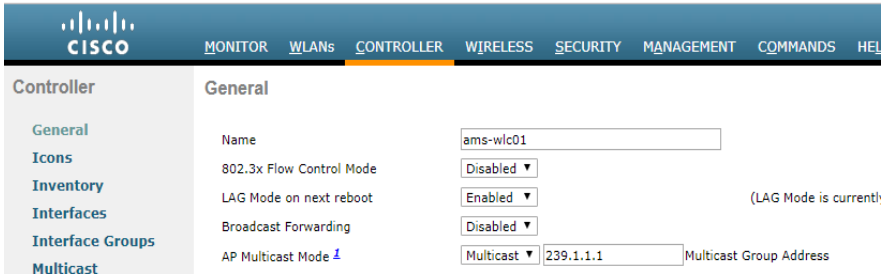


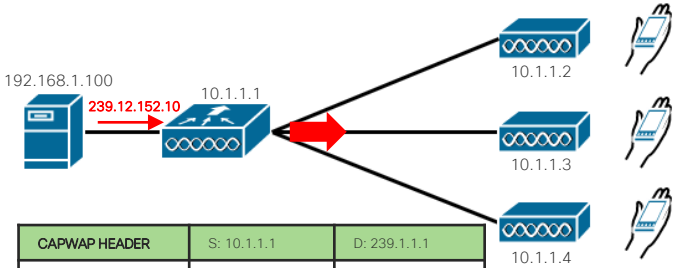
Multicast on WLC – Modes

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

AP Multicast Mode [1] Unicast

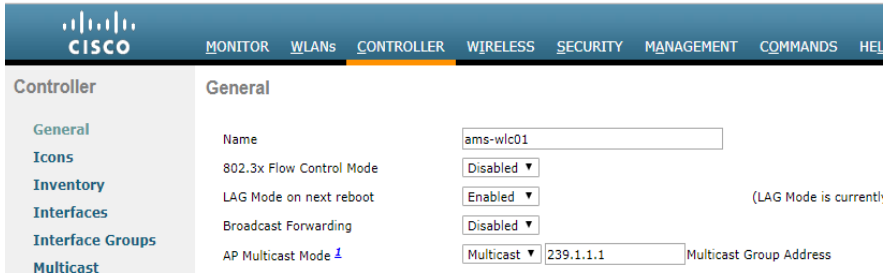




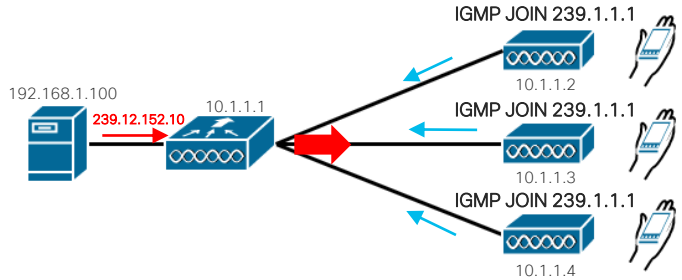


CAPWAP HEADER	S: 10.1.1.1	D: 239.1.1.1
ORIGINAL PACKET	S: 192.168.1.100	D: 239.12.152.10
	MCAST VIDEO	

Multicast on WLC – Modes



- 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



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	

**Remember the case when you have 2+ switches

Common Scenarios

Common scenarios

Now what?..

How will the WLC send the traffic to the client?

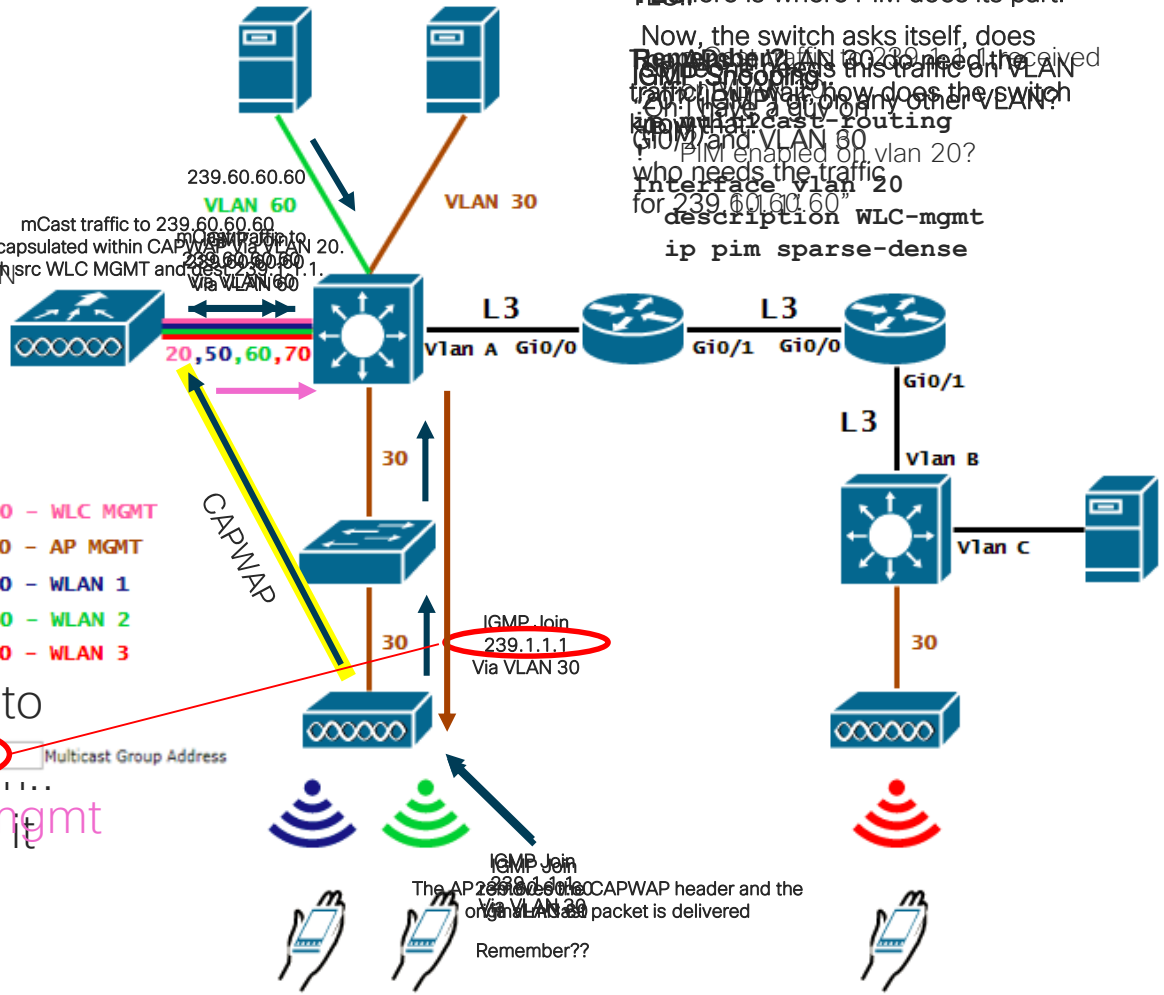
How to do it? Simple

```
configure terminal
!
ip multicast-routing
!
Interface vlan 20
  description WLC-mgmt
  ip pim sparse-dense
!
Int vlan 30
  ip pim sparse-dense
```

If Mcast-Mcast, We need to do ip pim sparse-dense problem...

If traffic between the WLC mgmt and the AP mgmt VLANs.

BUT with more than 50 APs it may overload the WLC



Common scenarios

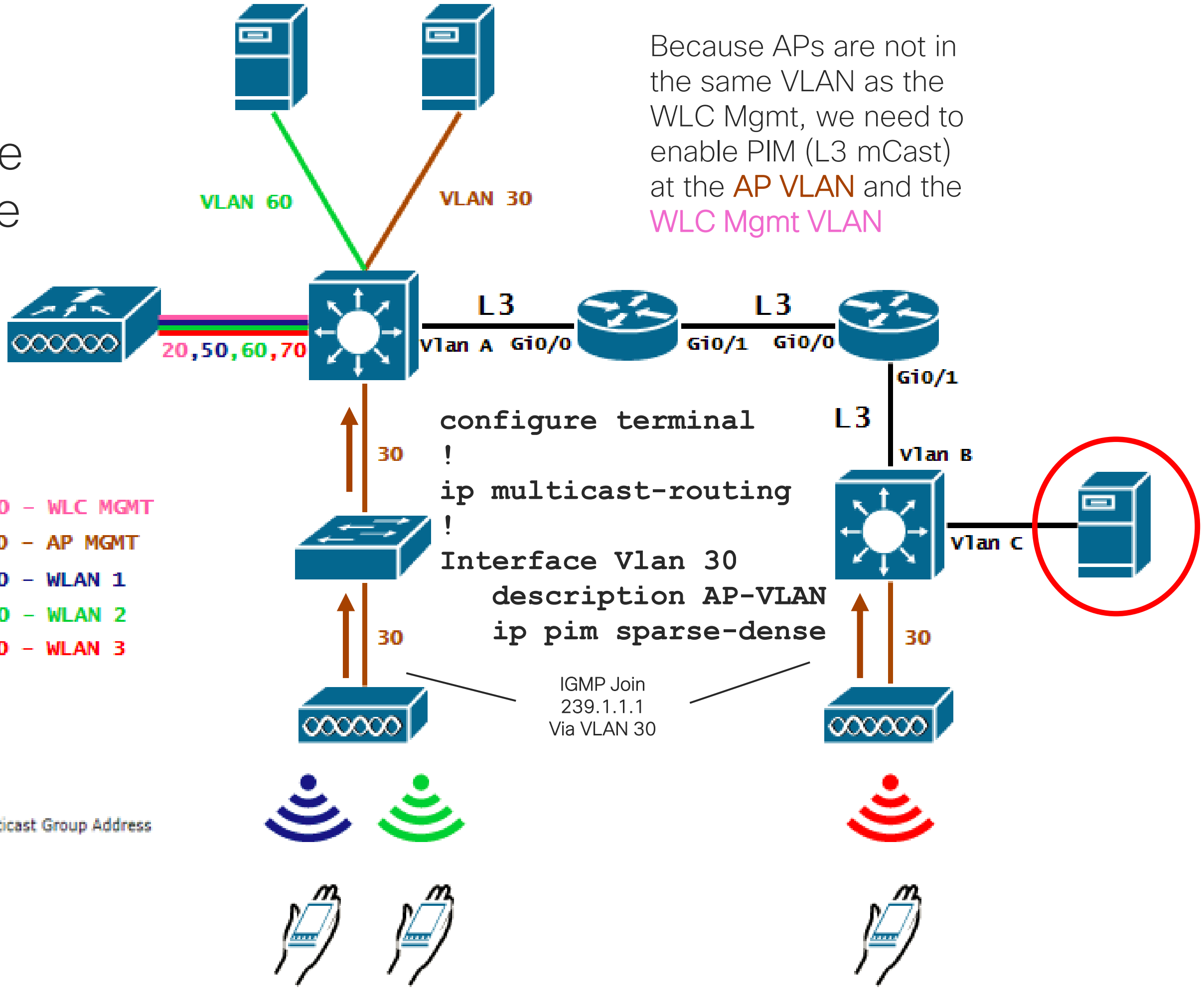
Same thing, let's go over the process

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
```

AP Multicast Mode: Multicast 239.1.1.1 Multicast Group Address

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

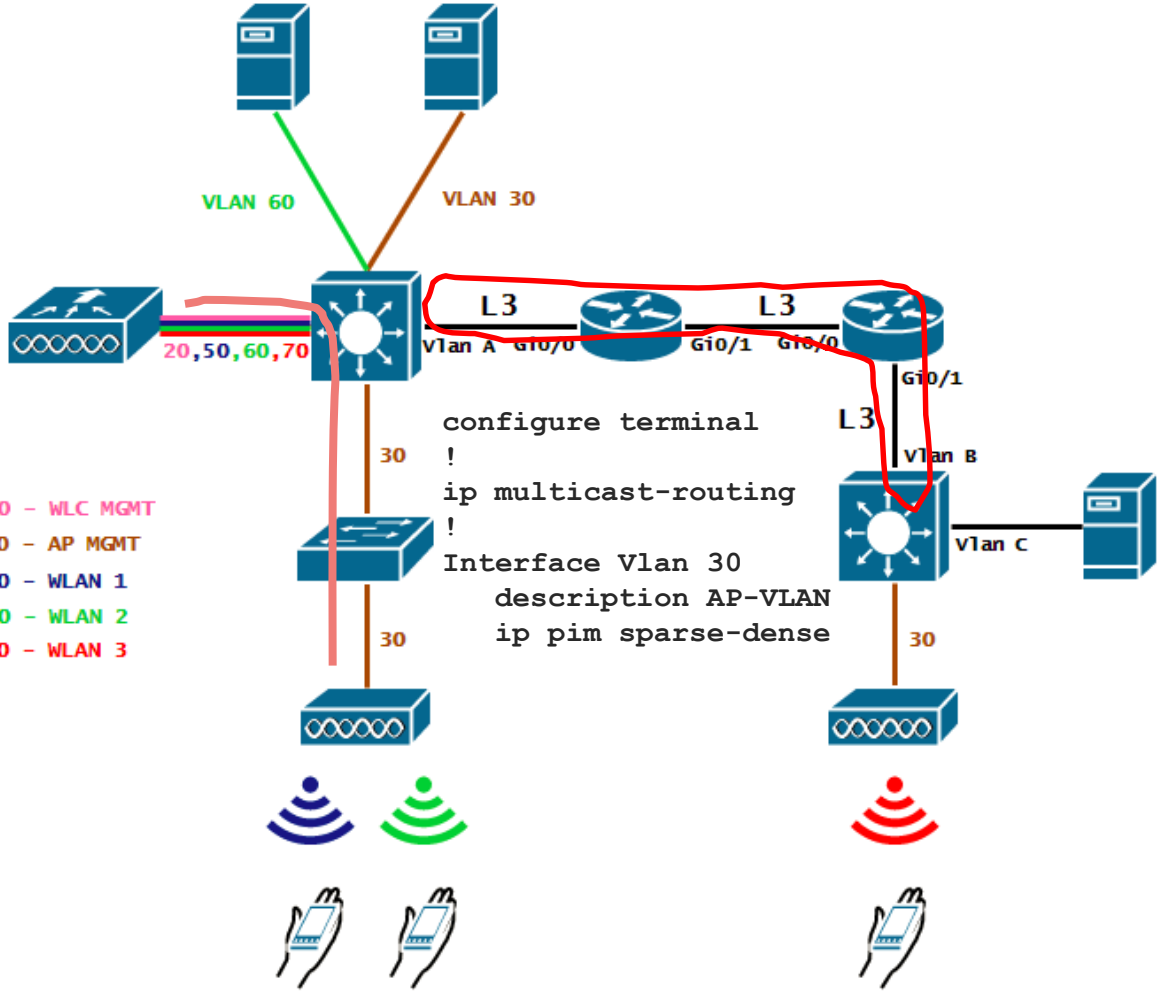


Common scenarios

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

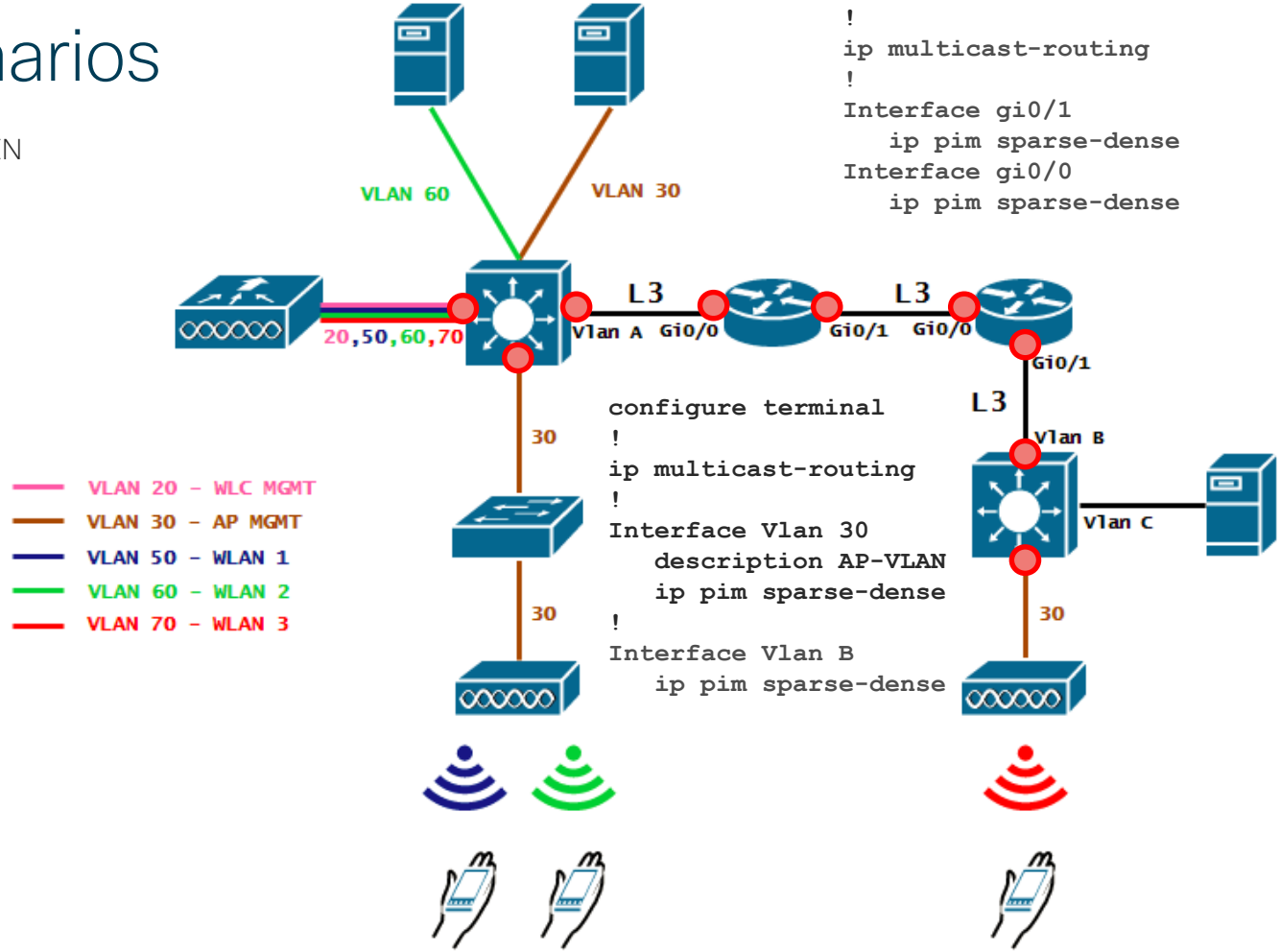


Common scenarios

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
```



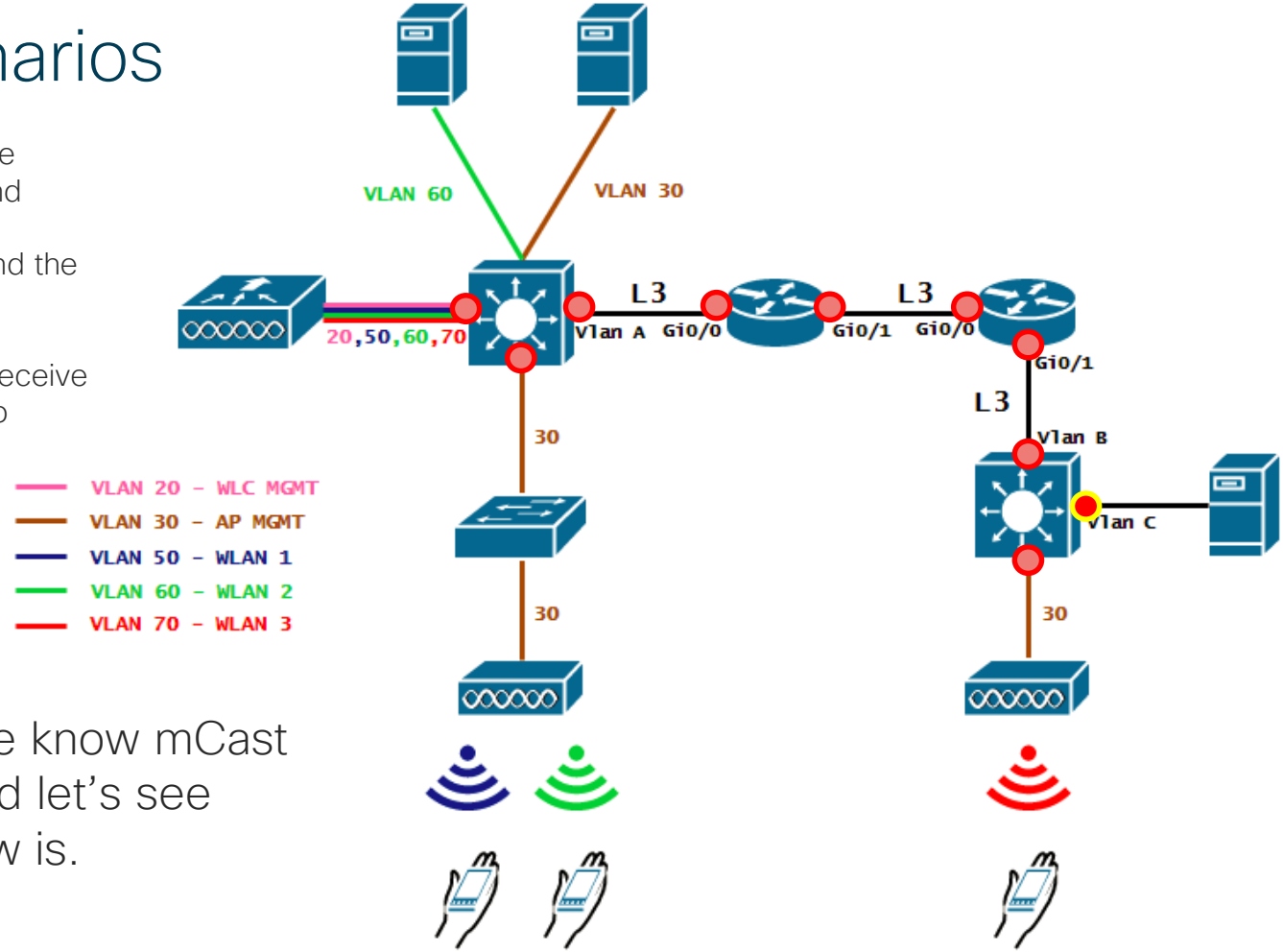

```
configure terminal
!
ip multicast-routing
!
Interface gi0/1
   ip pim sparse-dense
Interface gi0/0
   ip pim sparse-dense
```

```
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.



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

NOTE: We assume PIM is configured where needed.

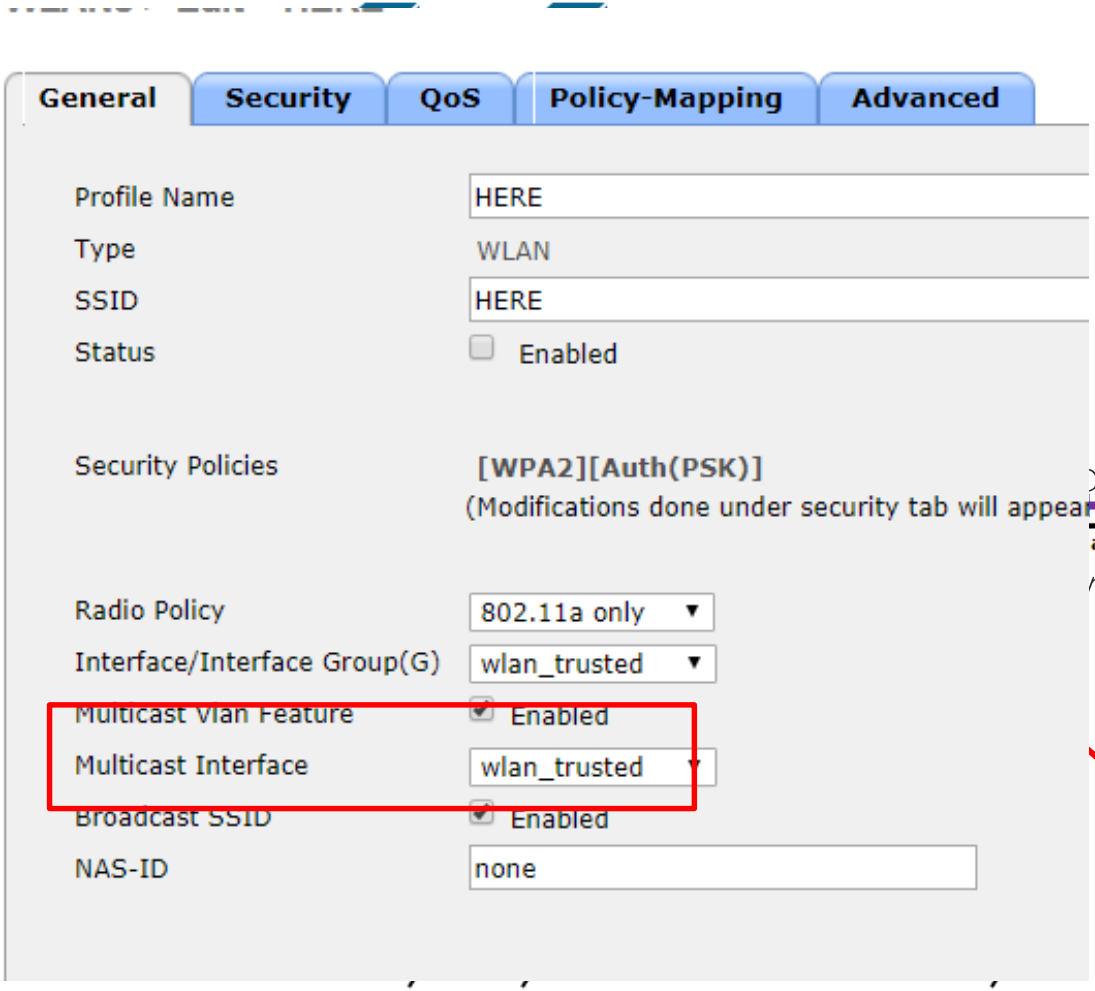
Common scenar

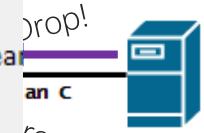
As no one has asked for the traffic it'll be dropped at the switch

Let's say, clients on vla
and 70 are requesting t
mcast 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 ☺





mCast traffic to
239.12.12.12
(Multicast Source)

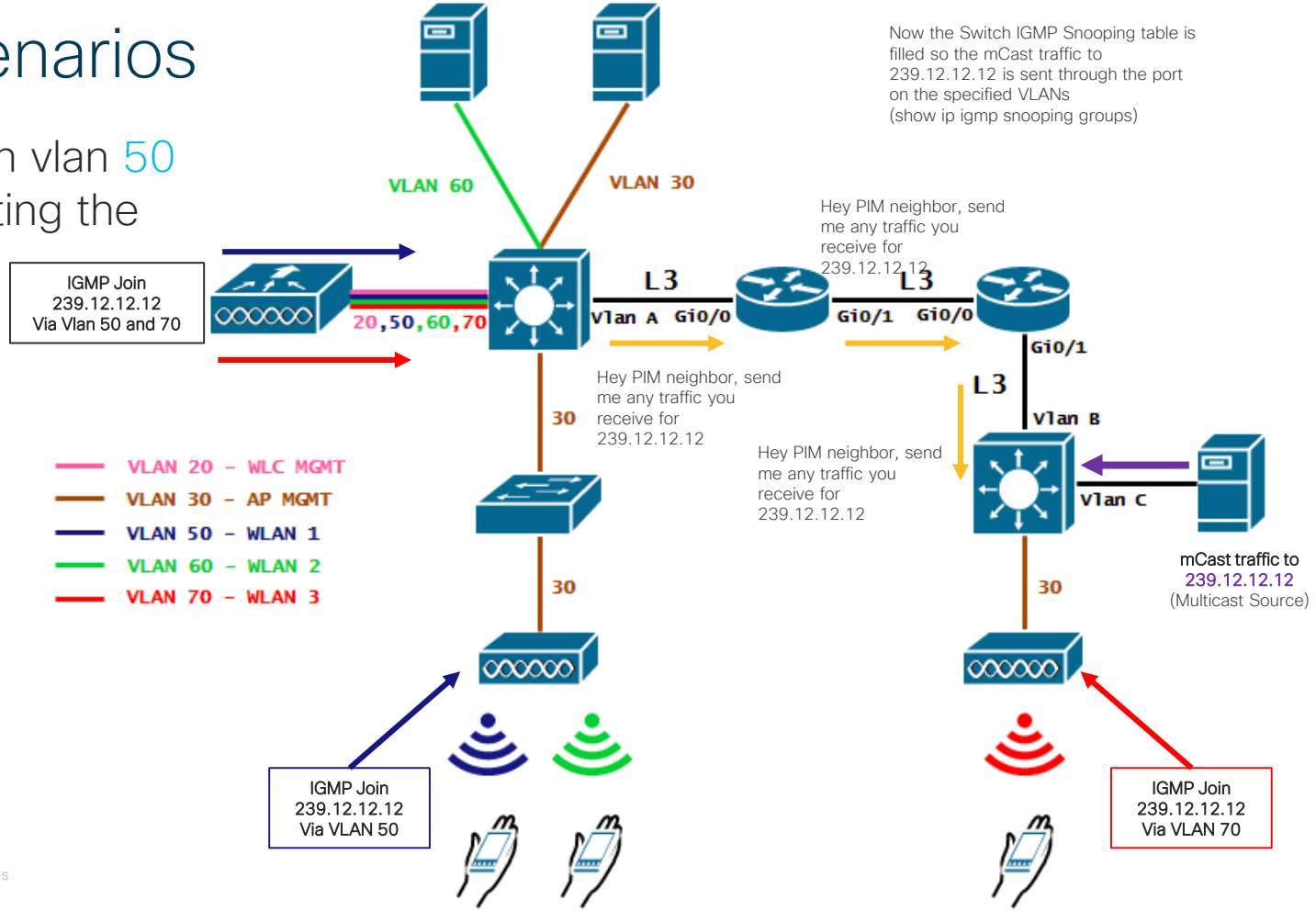
IGMP Join
239.12.12.12
Via VLAN 70

Common scenarios

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

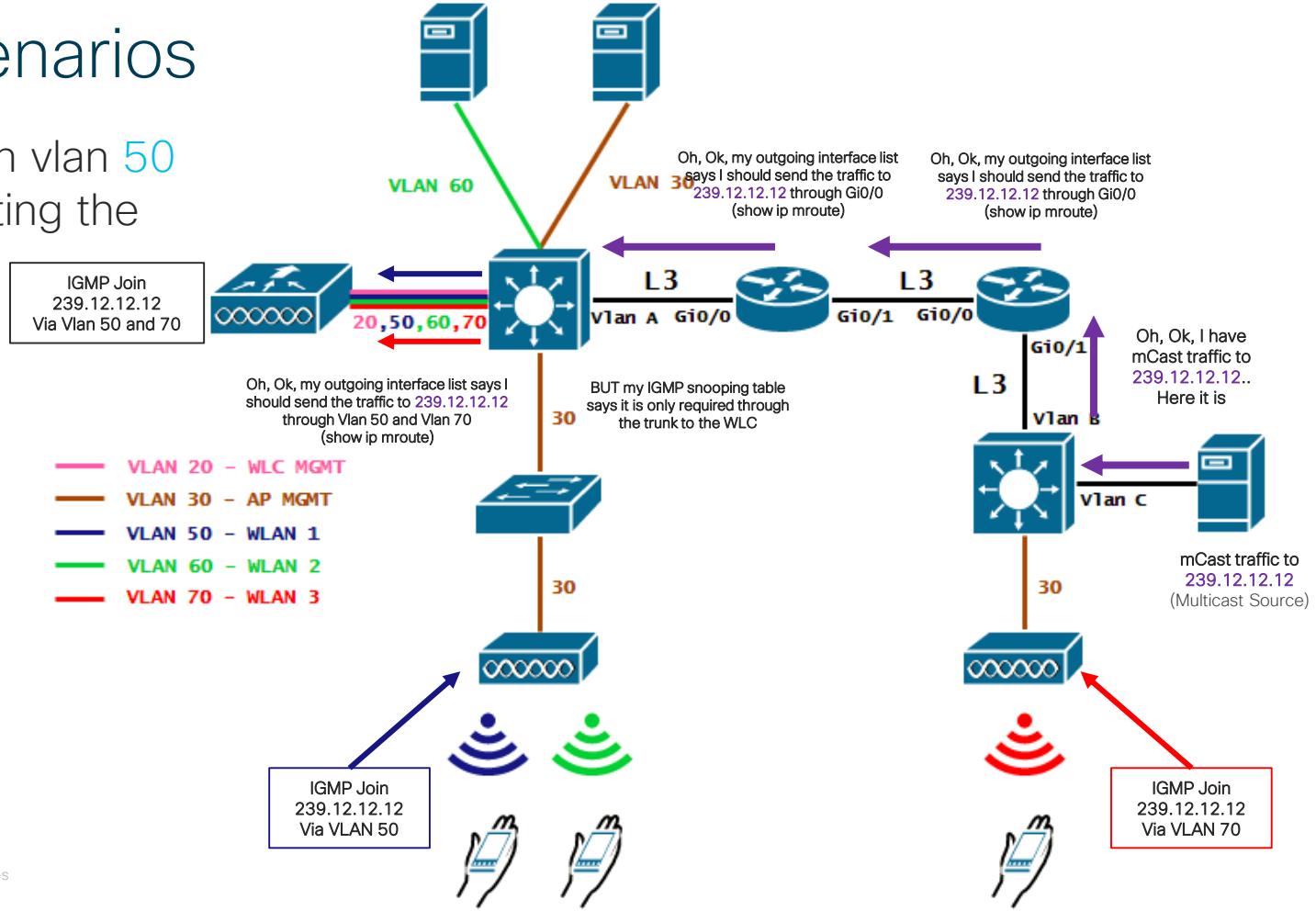
WLC will request the traffic on VLAN 50 and 70.

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.

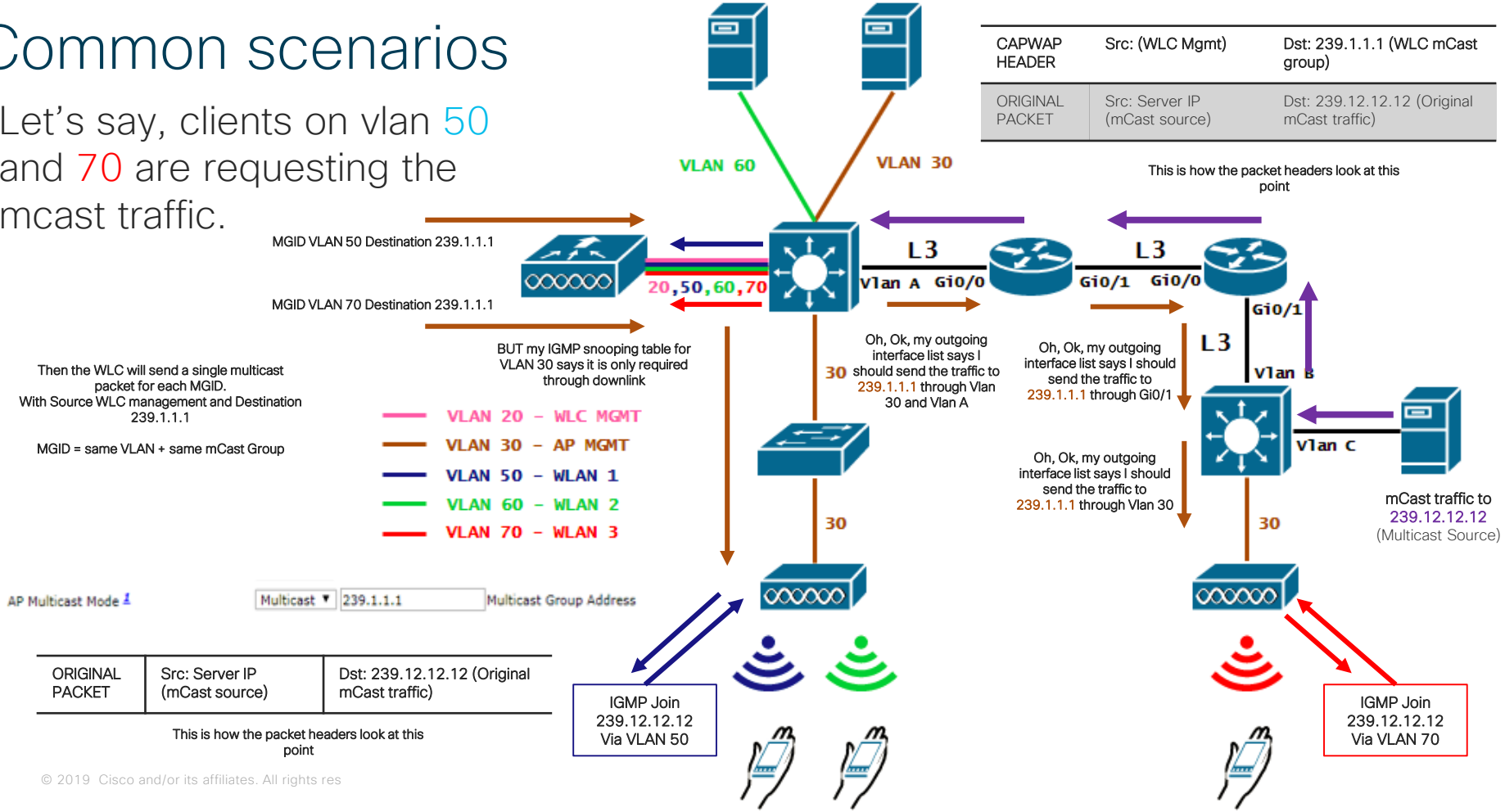


Common scenarios

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

NOTE: We assume PIM is configured where needed.

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)



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

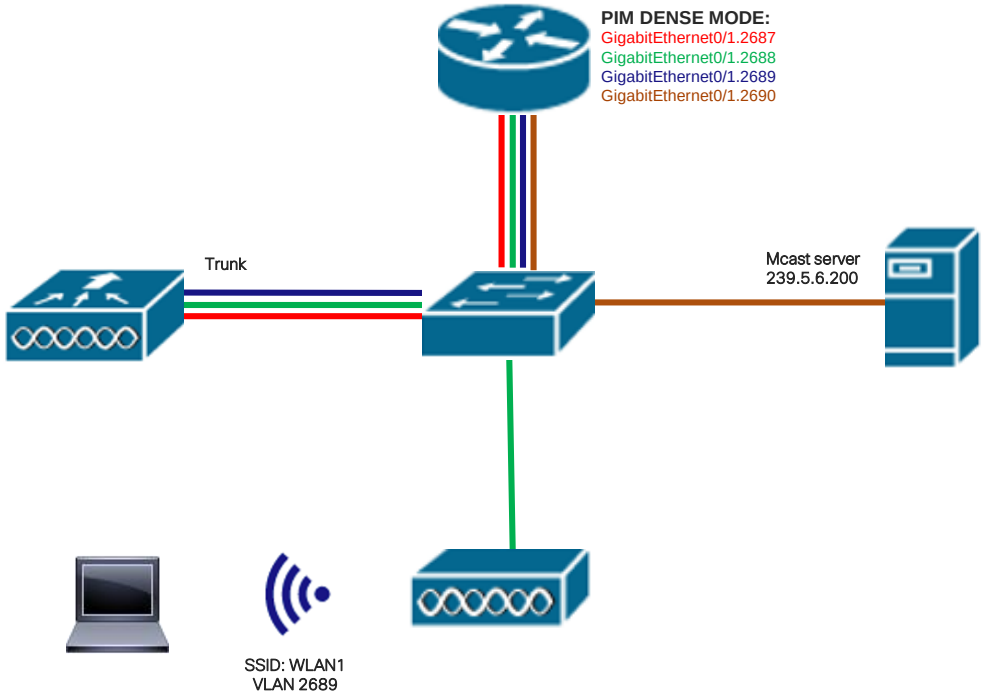
Did you know the importance of the Multicast configuration on your wired network before this session?

A. Yes

B. No

Demo

Network Diagram



MGMT VLAN 2687
AP VLAN 2688
CLIENT VLAN 2689
SERVER VLAN 2690

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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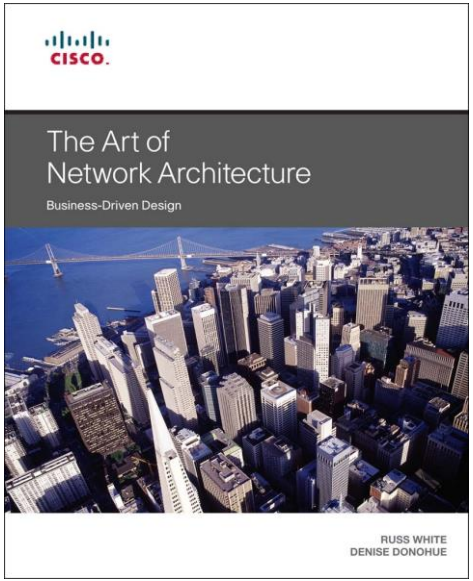

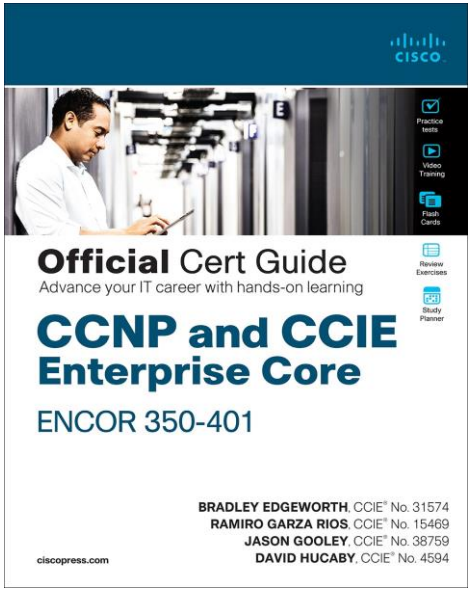

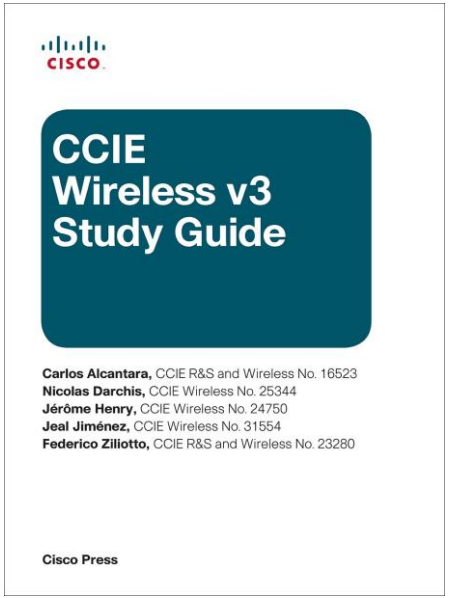

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