

**aruba**

a Hewlett Packard  
Enterprise company

## Otel Kablosuz Ağları Aruba Vizyonu

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Sistem Mühendisi

25 Nisan 2018  
Ceylan Intercontinental



# Ajanda

- Otel müşterisinin beklentileri ve alışkanlıkları
- WiFi Calling
- AOS 8 Kurulum Senaryoları
- Görünmeyen tehdit - Radar -
- Airmatch nasıl çalışıyor, Radar problemini nasıl çözüyor?
- AOS 8 ile canlı ve kesintisiz yazılım güncelleme
- 802.11ax

# Hotels.com Temmuz 2016 Anket Çalışması Sonuçları

– 9200 Otel Misafiri

– 31 Ülke

Katılımcıların;

- %76'sı akıllı telefonların en önemli seyahat aksesuarı olduğunu söylüyor.

Akıllı Telefon Vs Şezlong

- 3 saat telefon ekranına bakıyor
- 2.5 saat şezongta güneşleniyor

FoMo (Fear of Missing Out)

- %64'ü arkadaşlarının sosyal medya hesaplarını sürekli takip ettiğini itiraf ediyor.

THERE ARE 3 IMPORTANT AMENITIES THAT GUESTS FOCUS ON THE MOST



most popular apps  
used whilst travelling

- 40% social media
- 35% mapping
- 33% travel
- 32% messaging
- 31% music & entertainment

top 5  
favourite travel  
accessories

- 76% mobile device
- 37% camera
- 37% a loved one
- 27% laptop/tablet
- 18% headphones



## Müşteri ile Otel IT'sinin temas ettiği tek nokta – WiFi



# Performanslı bir kablosuz ağ müşterinin otel seçimini etkiler

hotelwifitest

For hotels Browser API Support Login

Home / Turkey / Istanbul

Search by hotel name  
Begin typing hotel name

Map showing Istanbul location with markers for Uskudar, Fatih, Eminonu, Zeytinburnu, and D100. Show map

Filter results Sort by: WiFi Rating

**WiFi**

WiFi Rating  
★★★★☆

Only free WiFi

Speed  
From 0 Mbps

**Hotel**

Nightly rate  
All rates

Traveler rating  
From 0  
provided by TripAdvisor

**Hotel Suadiye**  
Bagdat Caddesi, Plaj Yolu, No:25 Suadiye, Istanbul 34740, Turkey  
★★★★☆  
In Istanbul (Bostanci) Map  
126 reviews  
Nightly rate from \$99  
Free WiFi expected speed: 22.8 Mbps  
Confidence: 57.5%

**Hilton Istanbul Bosphorus**  
Cumhuriyet Caddesi Haribiye, Istanbul 34367, Turkey  
★★★★★  
Near Taksim Square Map  
1482 reviews  
Nightly rate from \$383  
Paid WiFi expected speed: 17.9 Mbps  
Confidence: 47.4%

**Nil Academic Hotel**  
Gulbag Mah. Oya Sk. No 9, Istanbul 34381, Turkey  
★★★★☆  
In Istanbul (Sisli) Map  
Free WiFi expected speed:

# Performanslı bir kablosuz ağ müşterinin otel seçimini etkiler

Use SpeedSpot's free mobile apps to test the speed of cellular & Wi-Fi connections, track your results over time and share your tests in hotels, cafés, restaurants and other public venues with the SpeedSpot Community. Also, you have access to the largest database of fast Wi-Fi hotspots around the globe.

3m  
DOWNLOADS

21m  
SPEED CHECKS

12k  
REVIEWS

94%  
5 STAR RATINGS

[App Store](#) [Google Play](#) [Speed Check](#)



# Wi-Fi Calling GSM'e alternatif yeni teknoloji

Kablosuz ađ altyapınız hazır mı ?

# Policy Enforcement Firewall (PEF) – Wi-Fi Calling



## Wi-Fi Calling GSM'e alternatif yeni teknoloji

- %100 Kapsama alanı
- Roaming problemi olmamalı
- Trafik önceliklendirme

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# AOS 8

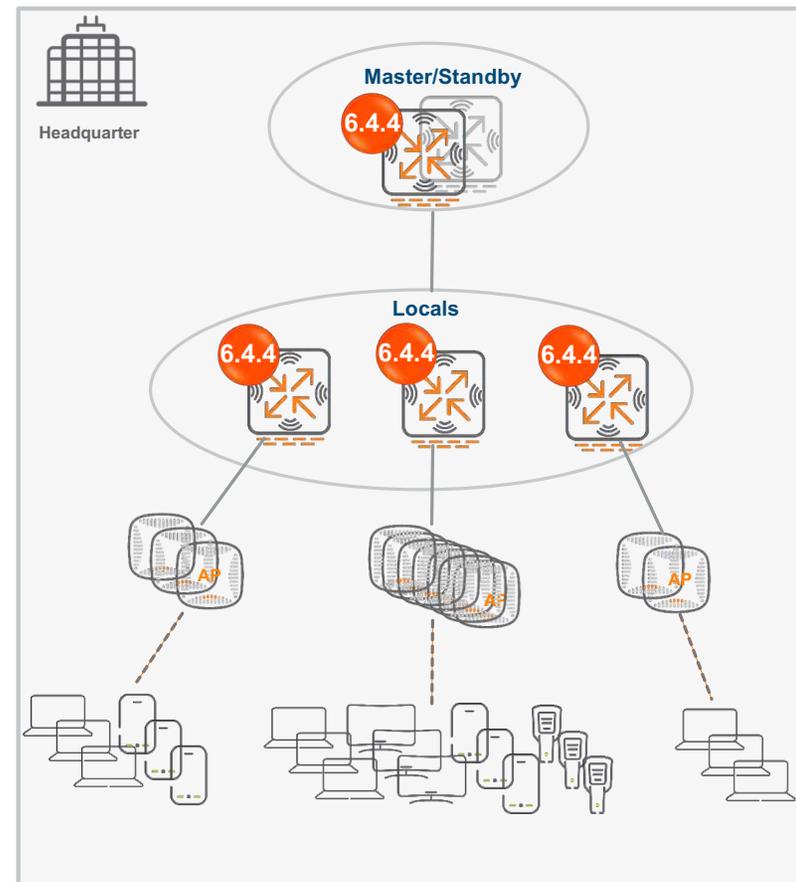
# Master/Local Deployment in 6.x

- Management point for global configuration, AP statistics, licensing and local controllers.
- WMS runs in master and its load may spike the CPU

- Local configuration ie interfaces, VLANs, IP pool, VRRP etc has to be configured manually in each local.
- Run Airgroup, WebCC, appRF etc individually
- Have to run same code and upgrade at the same time

- Each AP runs ARM and calculates channel & power by its own
- AP has maximum 2 failover points for any redundant method ie HA, VRRP, LMS/Backup LMS

- Users always terminate on the same controller with Aps
- No user load balancing
- Users traffic may get impacted when AP failover happens
- All users are treated alike with one set of Client Match setting



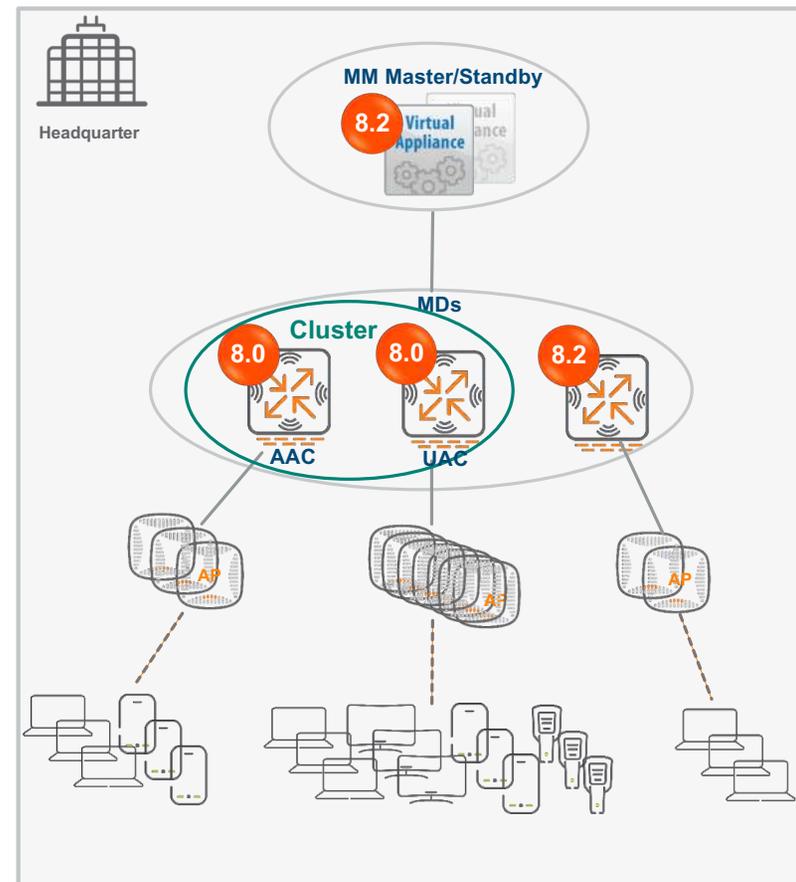
# How Master/Local Deployment Looks like in 8.0

- VM based Mobility Master (MM) as central point for configuration, image management and whitelist
- Loadable Service Module (LSM) ie Airgroup, Airmatch, WMS, WebCC run at MM and can be upgraded individually

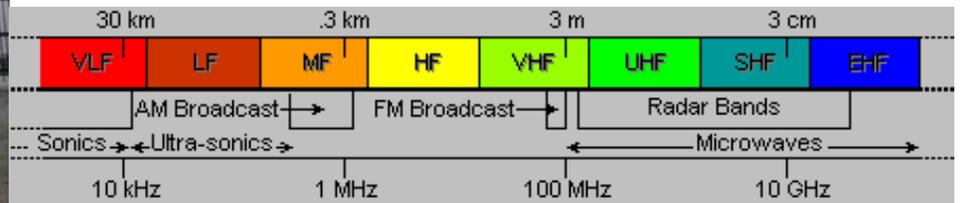
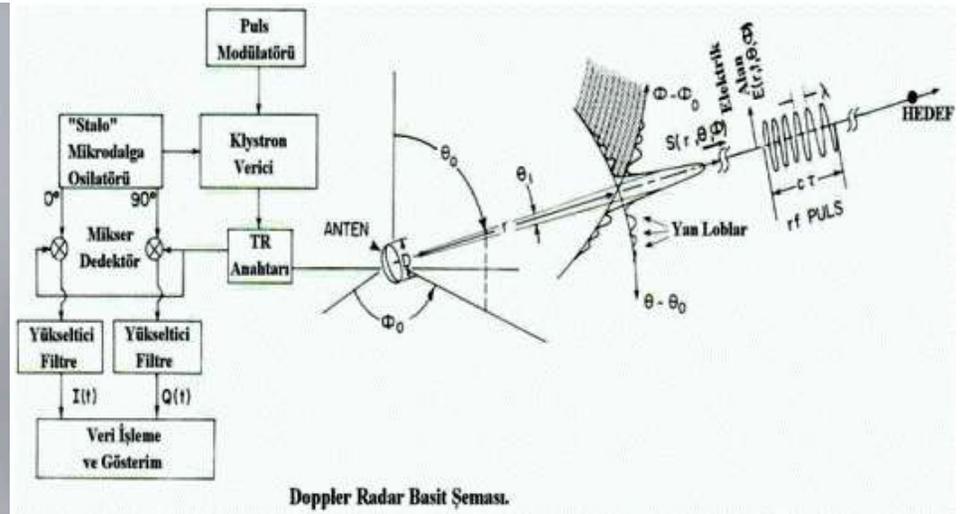
- All controllers configured as managed devices (MD) under MM
- Zero Touch Provision (ZTP) supported via Activate server
- Clustering supported for high availability and redundancy
- Multi-version supported

- APs terminate on AAC and can have maximum 12 (max MDs in one cluster) x 2 = 24 failure points
- Multi-zone supported

- Users terminate on UAC different from AAC for AP's termination
- User load load balancing automatically done by cluster manager
- Users won't get much impact when APs failover happens

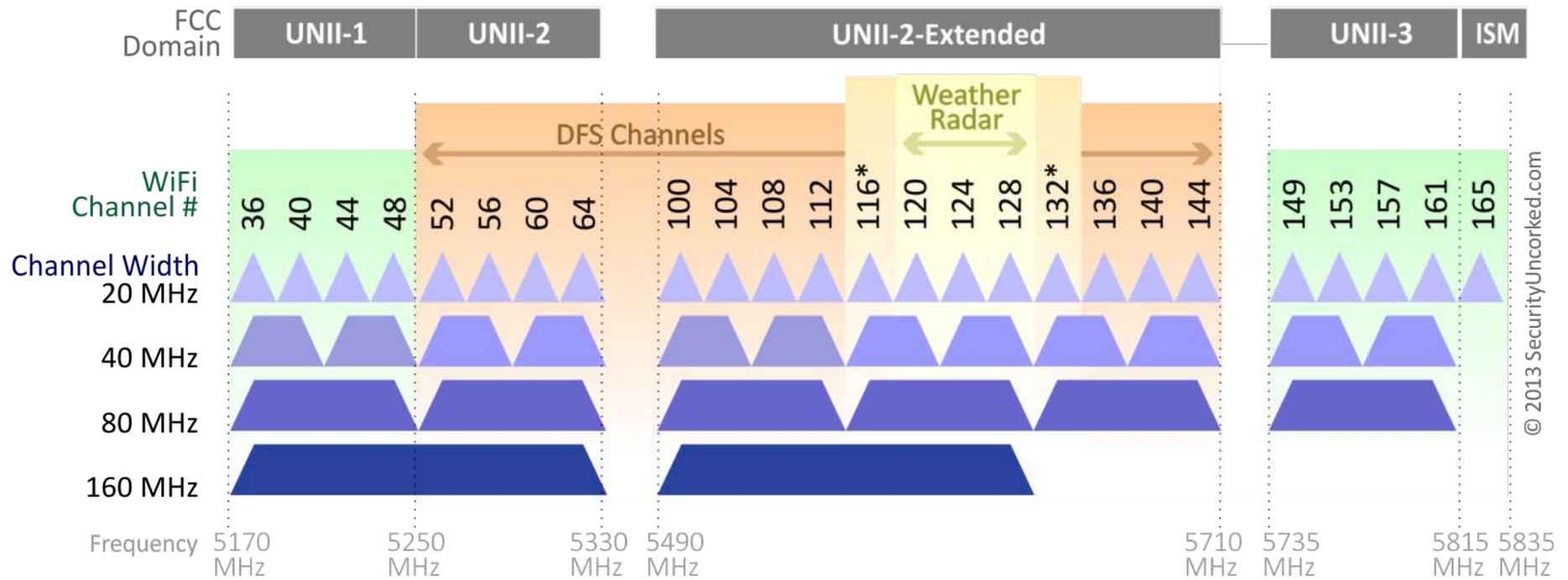






# 5GHz Spectrum

## 802.11ac Channel Allocation (N America)

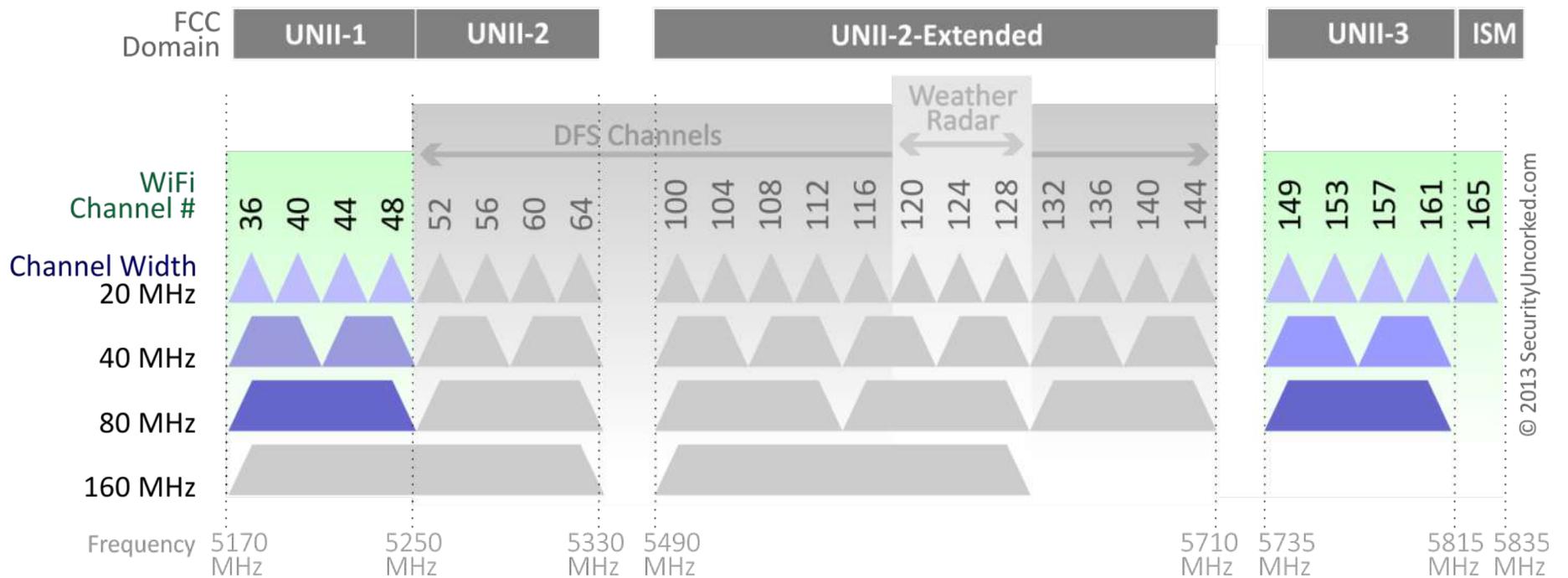


\*Channels 116 and 132 are Doppler Radar channels that may be used in some cases.

© 2013 SecurityUncorked.com

# 5GHz spectrum excluding DFS channels

## 802.11ac Channel Allocation excluding DFS (N America)



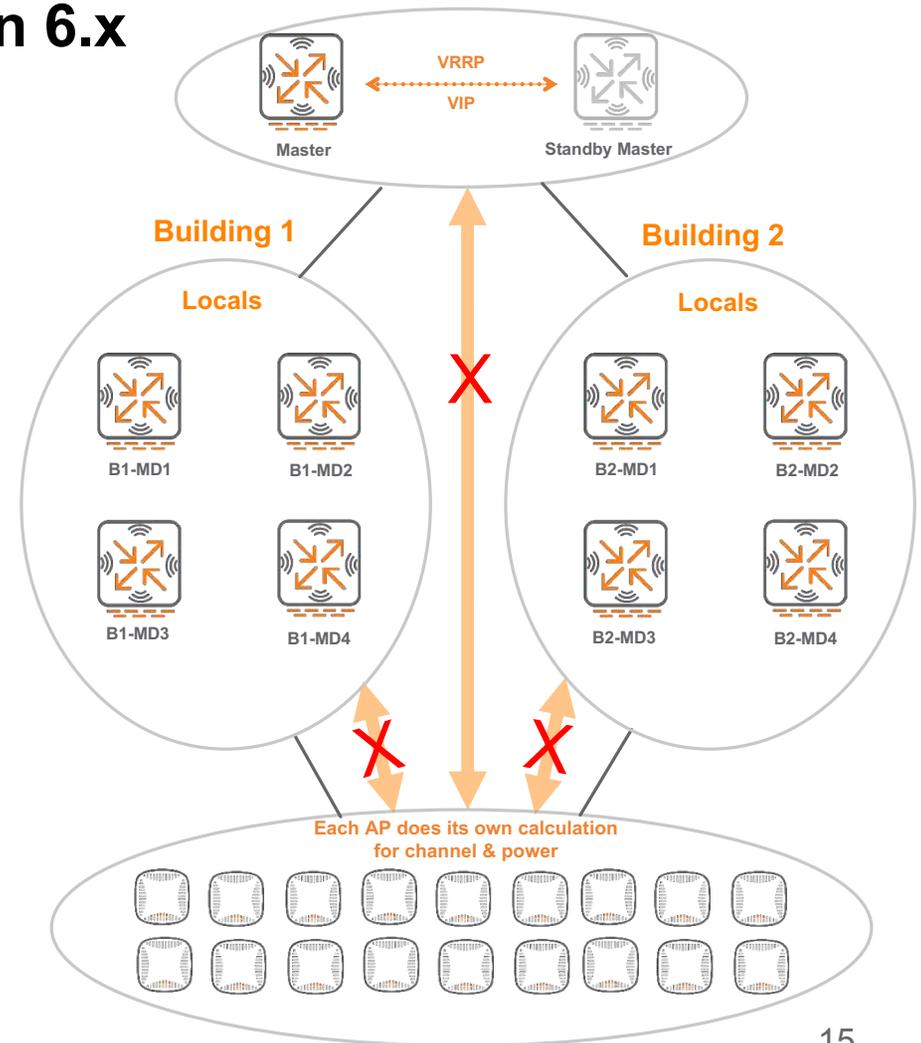
© 2013 SecurityUncorked.com

# AP Channel & Power Assignment in 6.x

## ARM

- 1 AP calculates its channel & power based on RF info of proximate neighbors only
- 2 Instantaneous RF snapshot is used for calculation
- 3 Frequent channel changes that lead to client disconnection & RF instability
- 4 Uneven use of channel

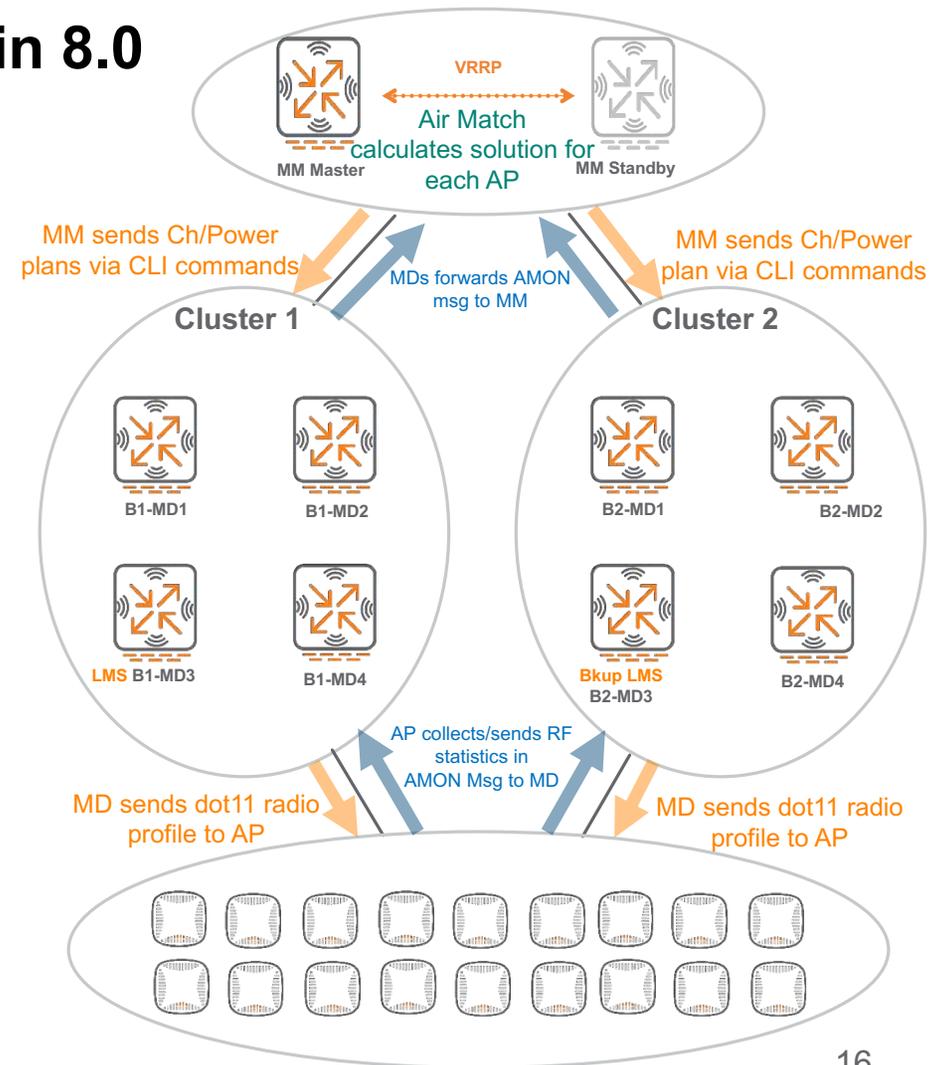
↔ Communication for AP channel & power assignment



# AP Channel & Power Assignment in 8.0

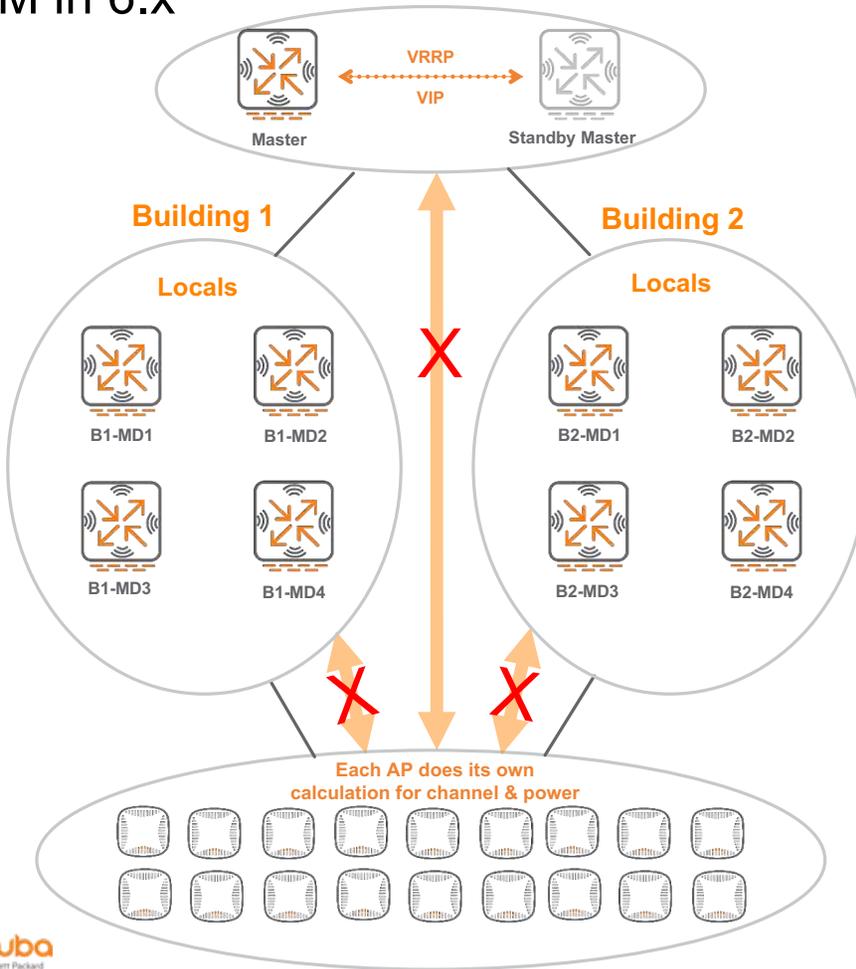
## Air Match

- 1 Centralized RF optimization service, models/solves the network as a whole
- 2 One of LSM in MM and can be upgraded independently
- 3 Past 24 hours RF info used for calculation
- 4 Channel & Power deployment only once a day

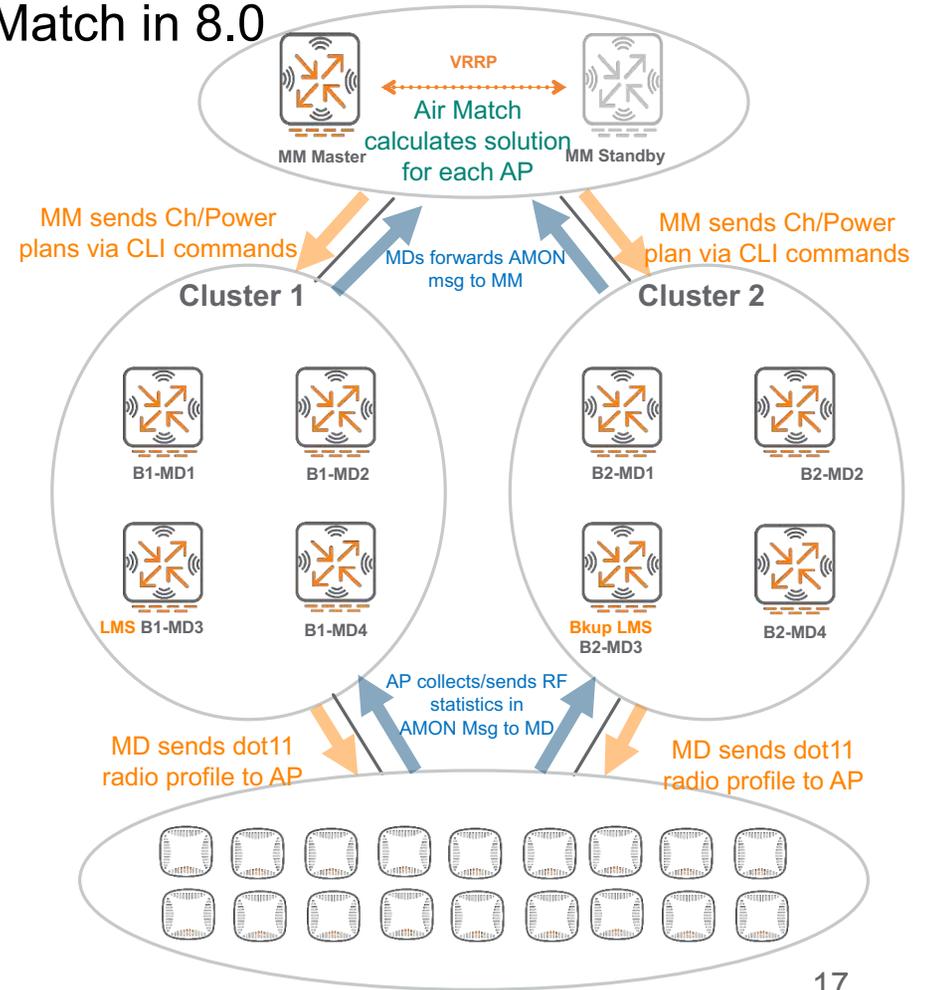


# AP Channel & Power Assignment

## ARM in 6.x

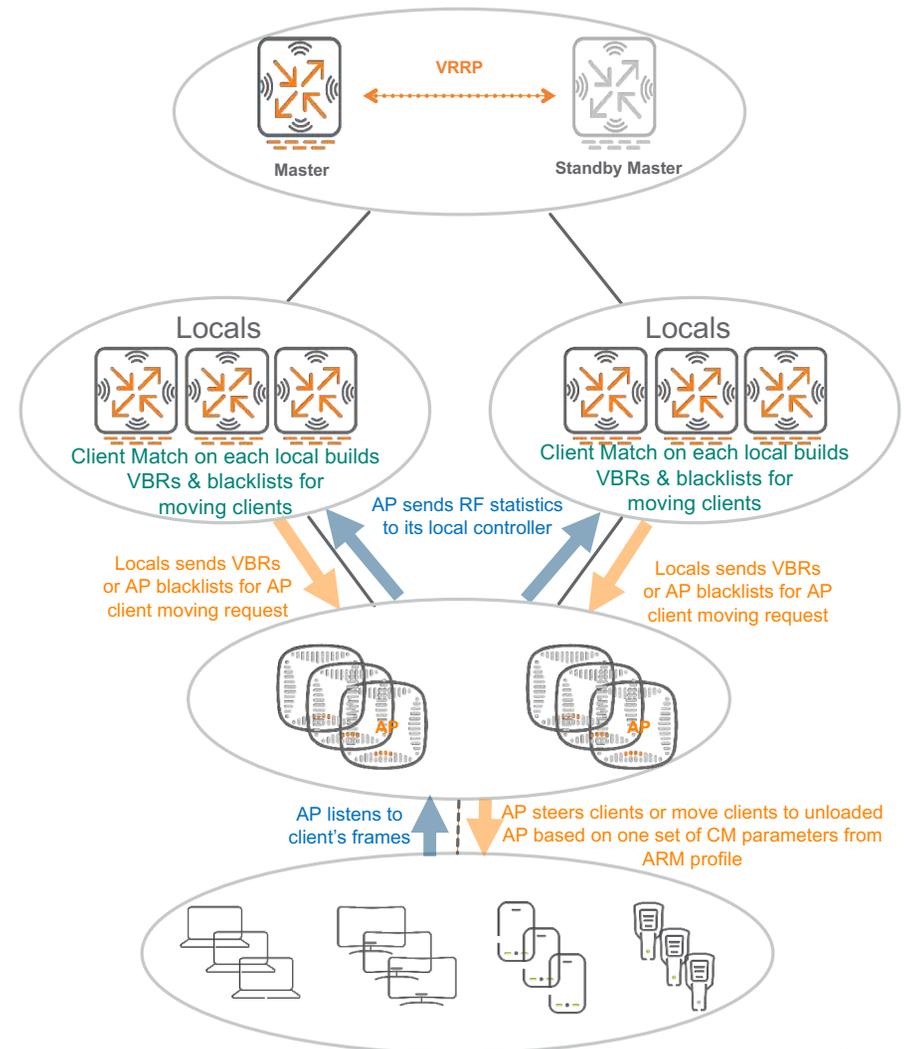


## Air Match in 8.0



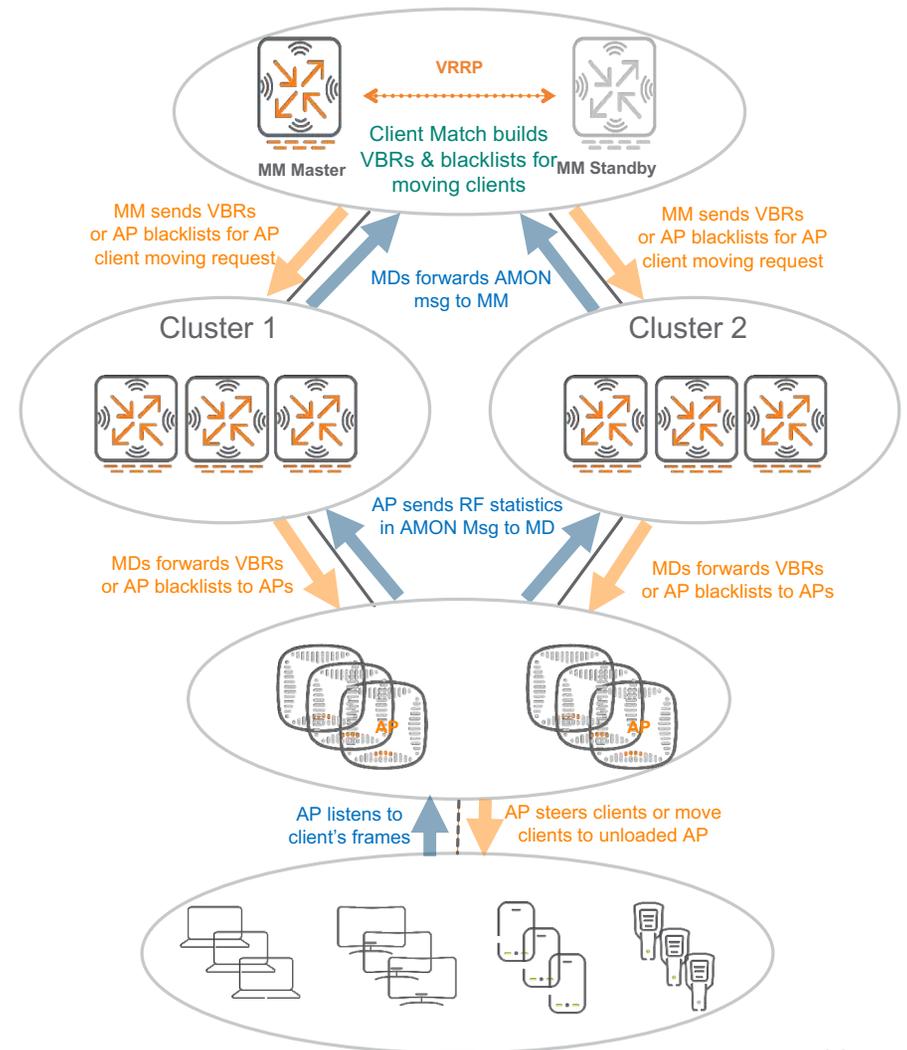
# Client Match in 6.x

- 1 AP collects/sends RF info to its terminating controller for VBR creation
- 2 Local controller co-ordinates the client steering and load balancing
- 3 Only single set of CM configuration, all clients are treated alike
- 4 No rule based CM support
- 5 Some clients' connectivity may be impacted



# Client Match in 8.0

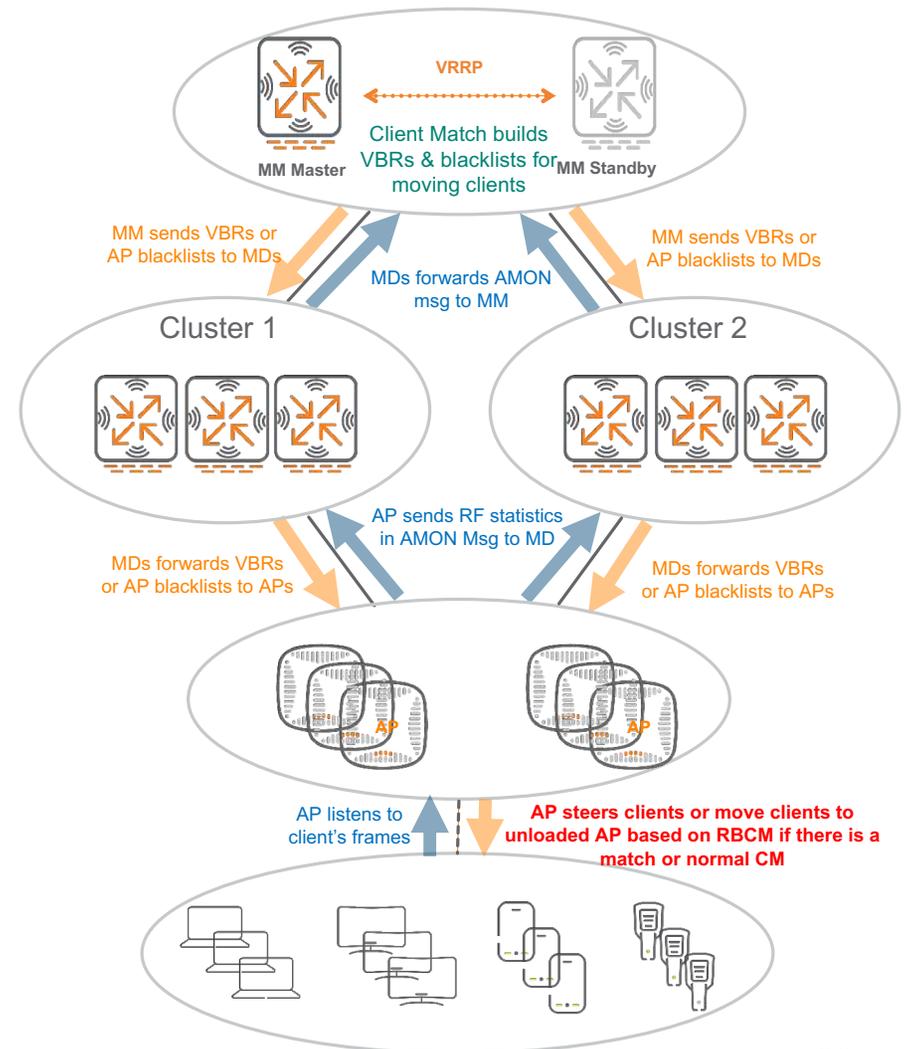
- 1 AP collects/sends RF info to MM via MD
- 2 One of LSM in MM and can be upgraded independently
- 3 MM co-ordinates the client steering and load balancing



# Client Match in 8.0

## Rule Based Client Match

- 1 Unique behaviors of specific type of clients is addressed by rule based CM
- 2 Rule based CM supported for specific device type/MAC OUI/MAC
- 3 Sticky/Bandsteer parameters, device capability etc can be defined in the rule
- 4 Steering efficiency & client stability improved greatly



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# Live Upgrades

# Live Upgrade - Introduction

## Features

1

Seamless In-Service Cluster Upgrade  
Upgrade of all cluster nodes and attached APs

2

No Manual Intervention with minimal  
RF impact

3

Available with AOS 8.1 and higher

4

Applicable to a Cluster in a MM  
environment



# COFFEE BREAK

## w/ LIVE UPGRADE

# Introduction

## Prerequisites

1

Stateful Failover

Cluster in L2-Connected state w/ Redundancy ON

2

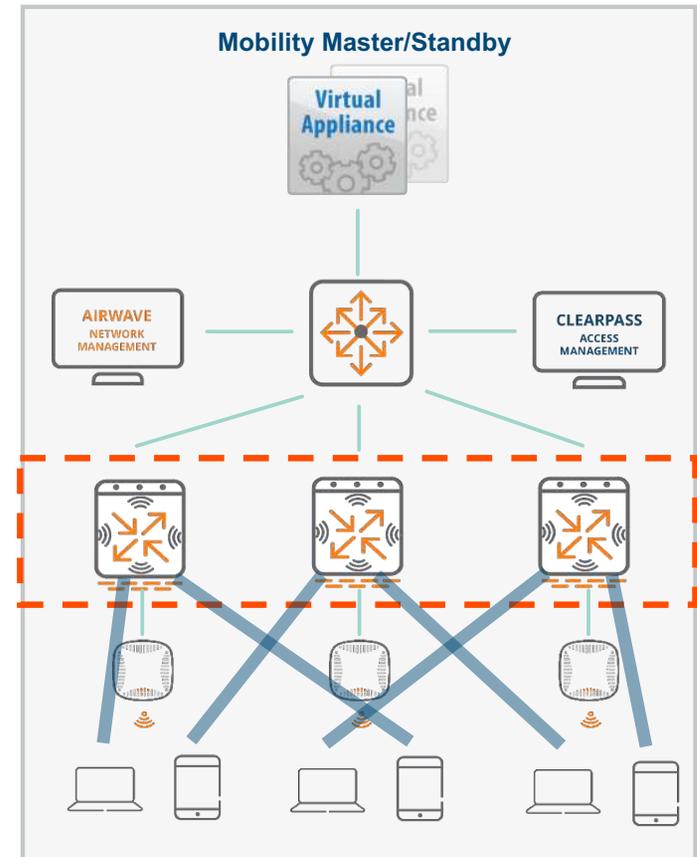
Centralized Image Upgrade

3

Airmatch (schedule enabled)

4

Aruba WLAN best practices (recommended)

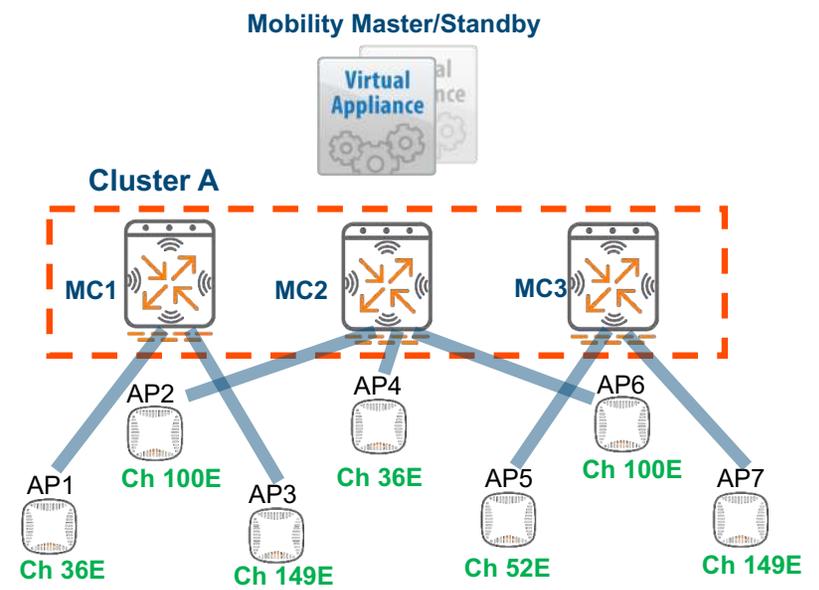


# Live Upgrade Flow

# Live Upgrade Flow

## Flow Logic

- 1 Logical AP grouping by channel (AP partitions)
- 2 Every cluster member **except one** assigned as target to an AP partition
- 3 Cluster members download new code using upgrade-profile
- 4 One Cluster member is rebooted at a time
- 5 AP Pre-load, Reboot, Adoption to assigned Target



# Live Upgrade Flow

## Initial Lab AP Distribution

MOBILITY MASTER  
Acme-MM1

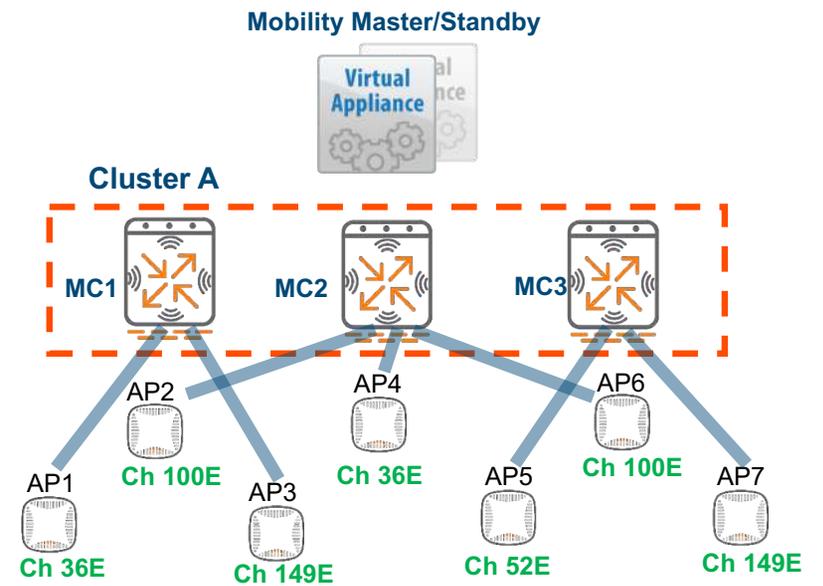
CONTROLLERS 3 0

ACCESS POINTS 7 -

CLIENTS 7

>

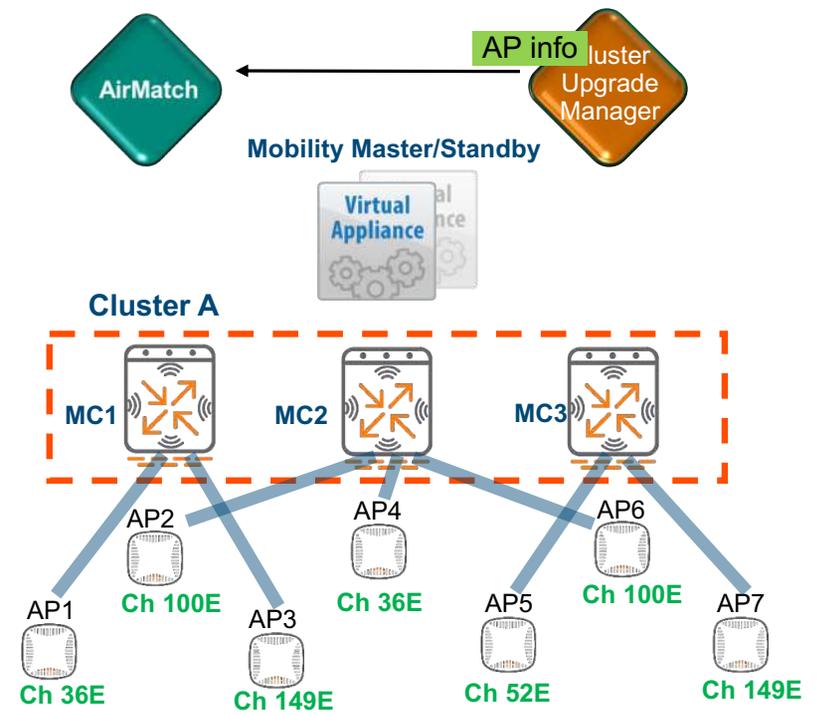
Access Points (7)		Radios (7)				
AP Name	Active Controller	Standby Controller	LMS IP	Status	Provisioned	Up time
ap225-1	10.70.149.11	10.70.149.13	10.70.149.11	● up	Yes	4d:3h:3m:45s
ap225-5	10.70.149.13	10.70.149.12	10.70.149.13	● up	Yes	4d:2h:58m:19s
ap224-3	10.70.149.11	10.70.149.12	10.70.149.11	● up	Yes	4d:2h:42m:9s
ap224-2	10.70.149.12	10.70.149.11	10.70.149.12	● up	Yes	4d:2h:54m:7s
ap224-4	10.70.149.12	10.70.149.11	10.70.149.12	● up	Yes	4d:3h:3m:45s
ap325-6	10.70.149.12	10.70.149.11	10.70.149.12	● up	Yes	4d:2h:54m:6s
ap225-7	10.70.149.13	10.70.149.11	10.70.149.13	● up	Yes	4d:2h:42m:37s



# Live Upgrade - Workflow

## Step 1: AP Partition

1.1 Cluster Upgrade Manager sends AP Info to AirMatch



# Live Upgrade - Workflow

## Step 1: AP Partition

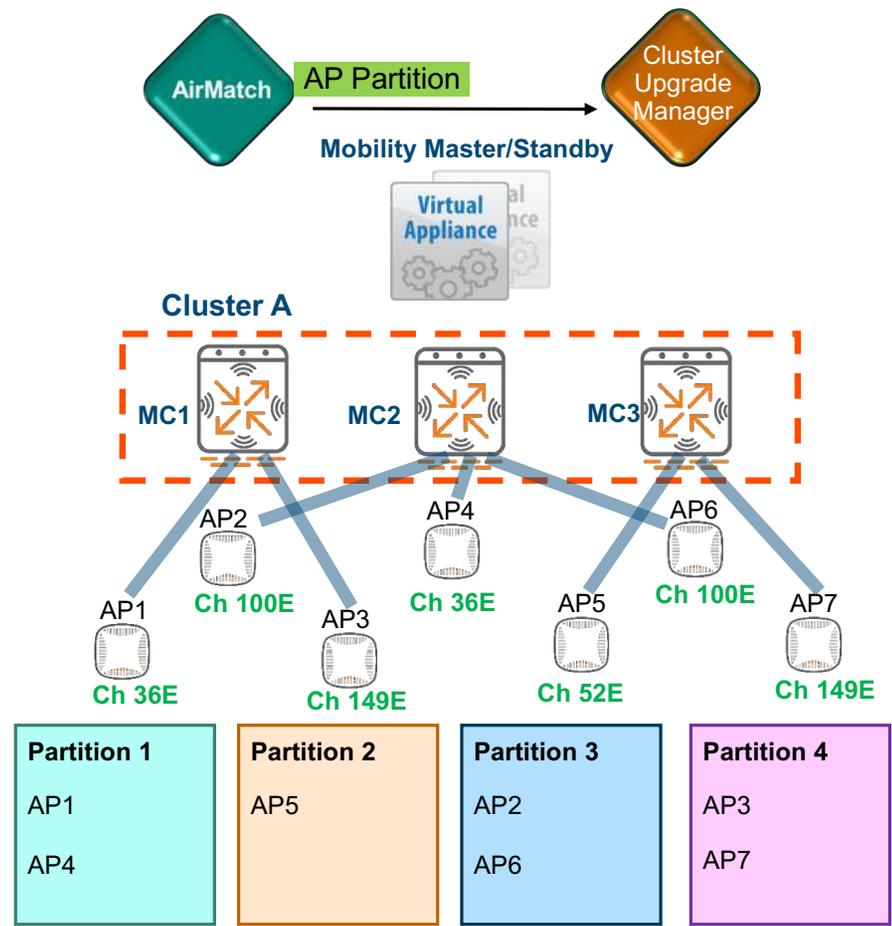
- 1.1 Cluster Upgrade Manager sends AP info to Airmatch
- 1.2 Airmatch creates logical groups of APs (Partitions) and update CUM\*

AP Upgrade Status

AP Name	MAC Address	IP Address	AP Group	Partition Id
ap225-1	18:64:72:cc:0b:b0	10.70.150.195	acme	1
ap224-4	18:64:72:c6:dd:58	10.70.150.196	acme	1
ap225-5	18:64:72:cc:0b:d4	10.70.150.193	acme	2
ap224-2	18:64:72:c6:dc:1e	10.70.150.194	acme	3
ap325-6	18:64:72:cf:e8:86	10.70.150.197	acme	3
ap224-3	18:64:72:c6:dd:ea	10.70.150.198	acme	4
ap225-7	18:64:72:cb:f9:b0	10.70.150.199	acme	4

AP Entries: 7

\* CUM: Cluster Upgrade Manager



# Live Upgrade - Workflow

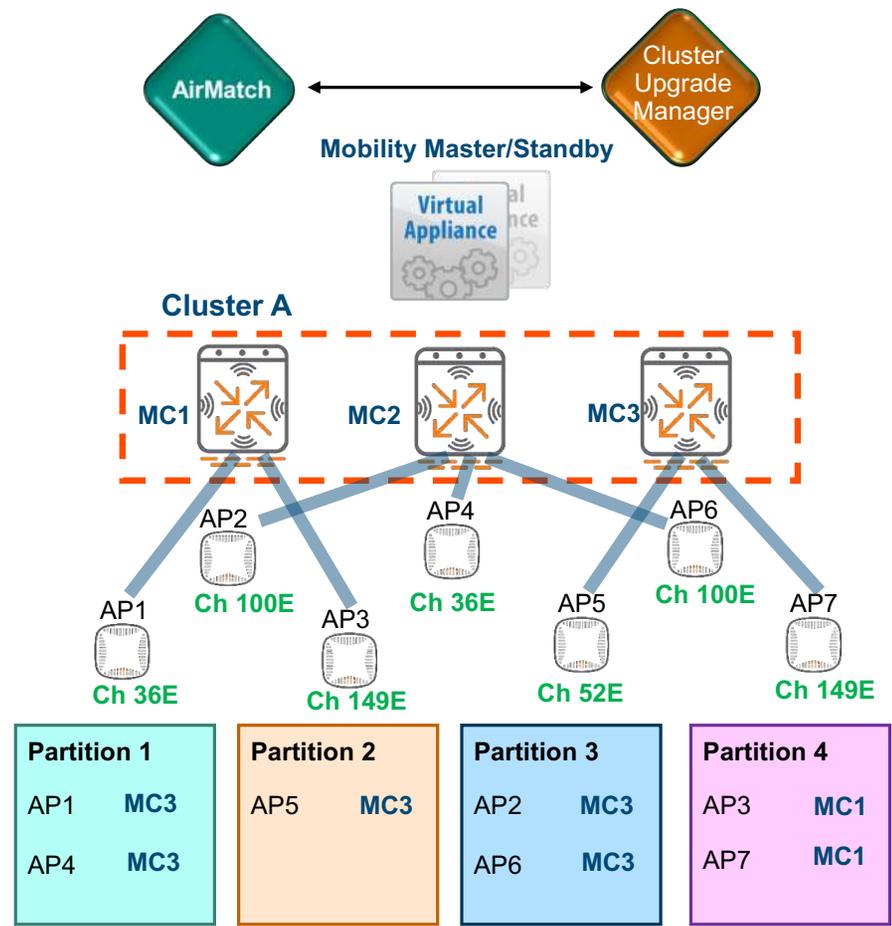
## Step 2: Target Controller Assignment

- 1.1 Cluster Upgrade Manager sends AP info to Airmatch
- 1.2 AirMatch creates logical groups of APs (Partitions) and update CUM
- 2 Target MC is assigned to all AP Partitions

AP Upgrade Status

AP Name	MAC Address	IP Address	AP Group	Partition Id	Target Controller
ap225-1	18:64:72:cc:0b:b0	10.70.150.195	acme	1	10.70.149.13
ap224-4	18:64:72:c6:dd:58	10.70.150.196	acme	1	10.70.149.13
ap225-5	18:64:72:cc:0b:d4	10.70.150.193	acme	2	10.70.149.13
ap224-2	18:64:72:c6:dc:1e	10.70.150.194	acme	3	10.70.149.13
ap325-6	18:64:72:cf:e8:86	10.70.150.197	acme	3	10.70.149.13
ap224-3	18:64:72:c6:dd:ea	10.70.150.198	acme	4	10.70.149.11
ap225-7	18:64:72:cb:f9:b0	10.70.150.199	acme	4	10.70.149.11

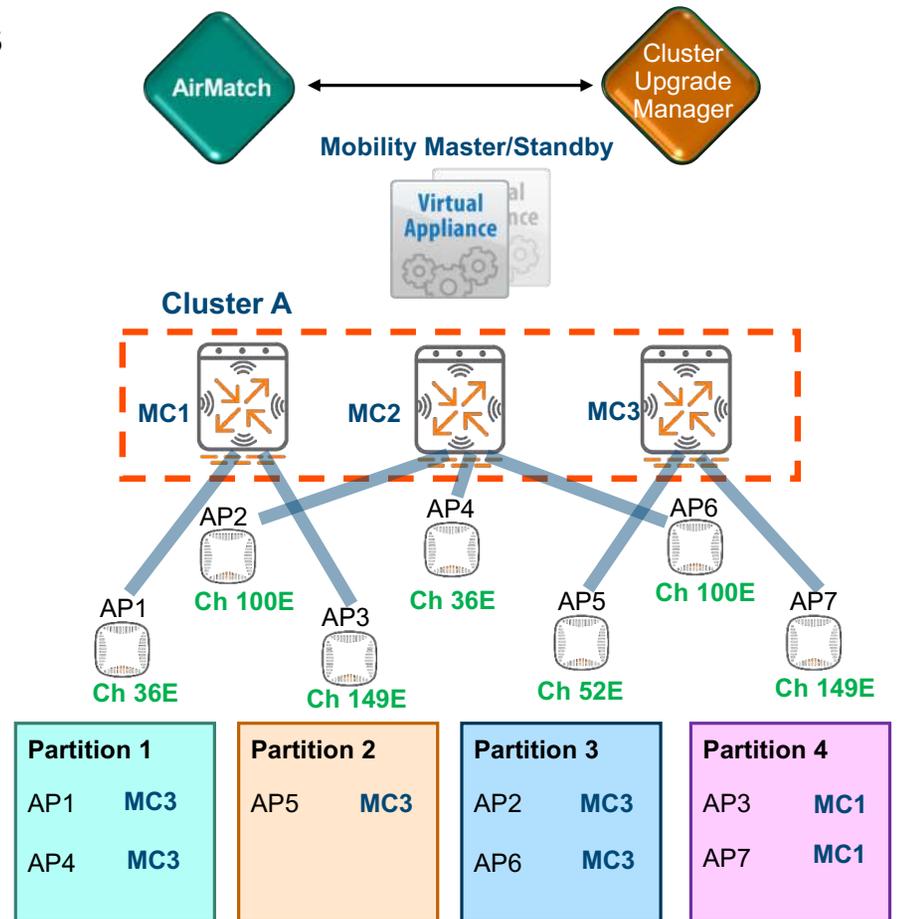
AP Entries: 7



# Live Upgrade - Workflow

## Step 3: New firmware download to controllers

- 1.1 Cluster Upgrade Manager sends AP info to AirMatch
- 1.2 AirMatch creates logical groups of APs (Partitions) and update CUM
- 2 Target MC is assigned to all AP Partitions
- 3 MCs download new AOS firmware sequentially (one at a time)



# Live Upgrade - Workflow

## Step 3: Lab Controllers download new firmware (WebUI)

1

Upgrade Status for 3 Controllers			
CONTROLLER NAME	CONTROLLER PATH	UPGRADE STATUS	STATUS DESCRIPTION
MC1	/md/Aruba-HQ/Oakmead	Not initialized	Not initialized
MC2	/md/Aruba-HQ/Oakmead	Not initialized	Not initialized
MC3	/md/Aruba-HQ/Oakmead	Download in-progress	64803472 bytes of ArubaOS_72xx_8.1.0.2_60686 copied

2

Upgrade Status for 3 Controllers			
CONTROLLER NAME	CONTROLLER PATH	UPGRADE STATUS	STATUS DESCRIPTION
MC1	/md/Aruba-HQ/Oakmead	Not initialized	Not initialized
MC2	/md/Aruba-HQ/Oakmead	Not initialized	Not initialized
MC3	/md/Aruba-HQ/Oakmead	Update in-progress	--

3

Upgrade Status for 3 Controllers			
CONTROLLER NAME	CONTROLLER PATH	UPGRADE STATUS	STATUS DESCRIPTION
MC1	/md/Aruba-HQ/Oakmead	Update in-progress	--
MC2	/md/Aruba-HQ/Oakmead	Not initialized	Not initialized
MC3	/md/Aruba-HQ/Oakmead	Update success	Successfully updated flash with ArubaOS_72xx_8.1.0.2_60686

# Live Upgrade - Workflow

## Step 4: First cluster member upgrade

### 4.1 MC3 reboots to upgrade to new AOS version

Controller Upgrade Status

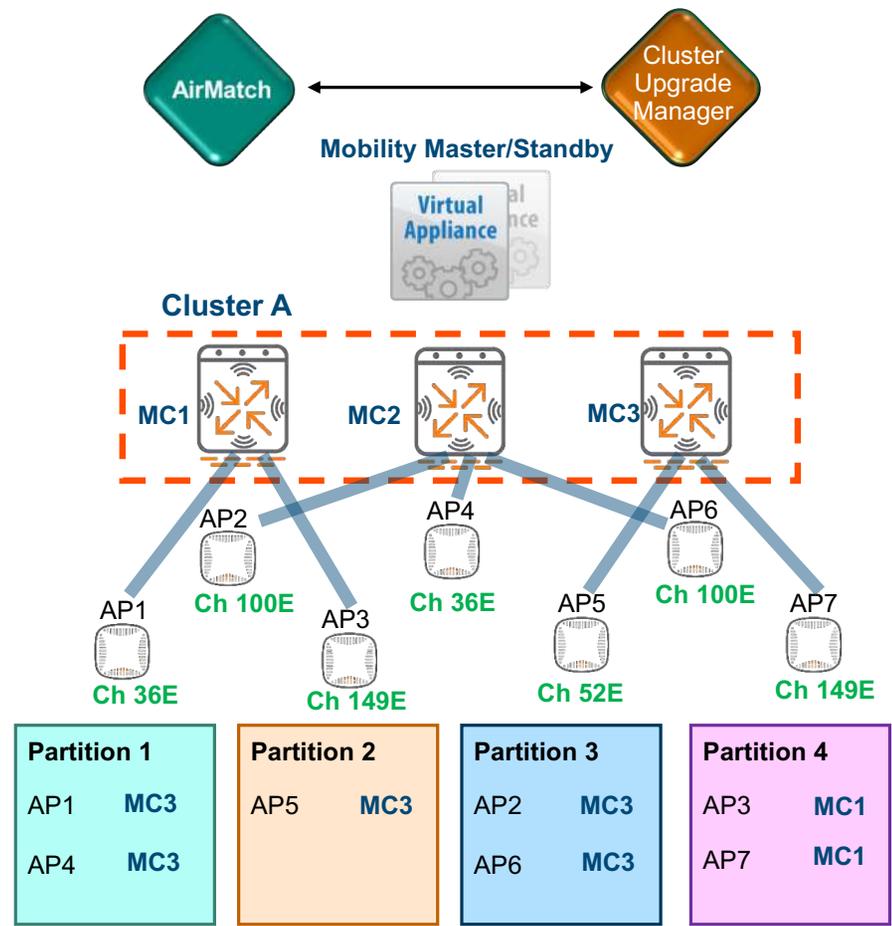
Hostname	MAC Address	IP Address	Boot Partition ID	Status
MC3	00:1a:1e:00:d2:b0	10.70.149.13	1	Reboot In Progress
MC1	00:1a:1e:00:a5:e8	10.70.149.11	0	Image Copy Success
MC2	00:1a:1e:01:a8:48	10.70.149.12	0	Image Copy Success

AP Upgrade Status

AP Name	MAC Address	IP Address	AP Group	Partition Id	Target Controller IP Address	Status
ap225-1	18:64:72:cc:0b:b0	10.70.150.195	acme	1	10.70.149.13	Not In Progress
ap224-4	18:64:72:c6:dd:58	10.70.150.196	acme	1	10.70.149.13	Not In Progress
ap225-5	18:64:72:cc:0b:d4	10.70.150.193	acme	2	10.70.149.13	Not In Progress
ap224-2	18:64:72:c6:dc:1e	10.70.150.194	acme	3	10.70.149.13	Not In Progress
ap325-6	18:64:72:cf:e8:86	10.70.150.197	acme	3	10.70.149.13	Not In Progress
ap224-3	18:64:72:c6:dd:ea	10.70.150.198	acme	4	10.70.149.11	Not In Progress
ap225-7	18:64:72:cb:f9:b0	10.70.150.199	acme	4	10.70.149.11	Not In Progress

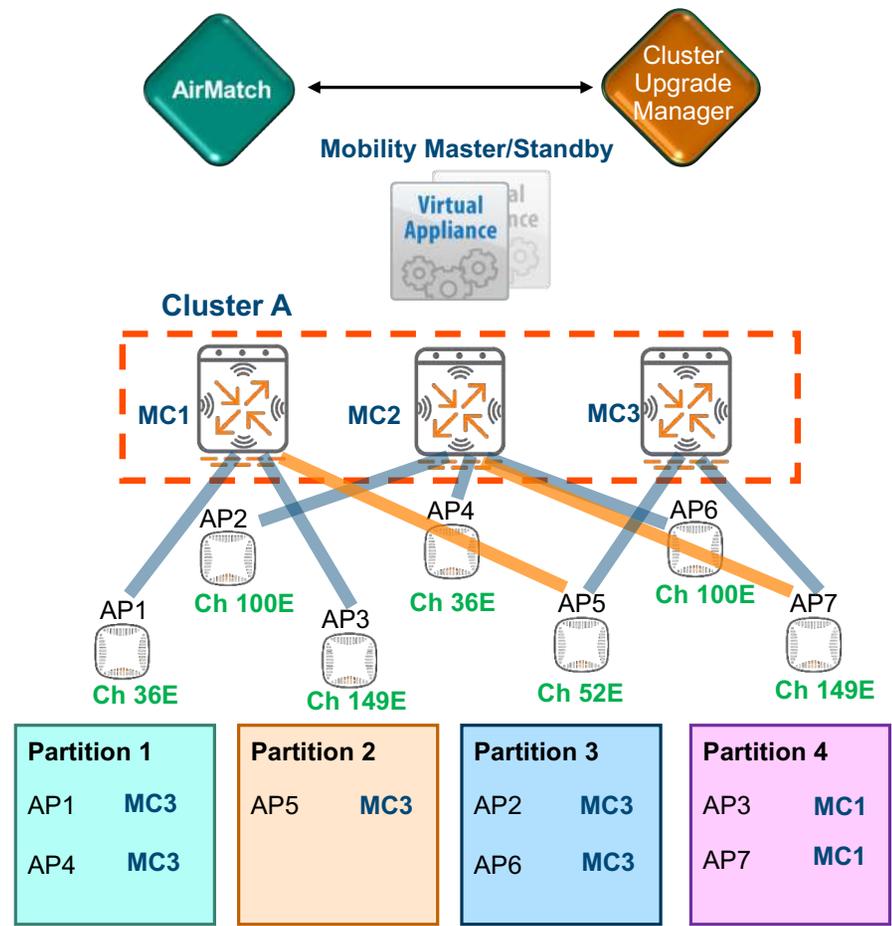
AP Entries: 7



# Live Upgrade - Workflow

## Step 4: First cluster member upgrade

- 4.1 MC3 reboots to upgrade to new AOS version
  - i Attached APs fail over to S-AAC
  - ii Attached users fail over to S-UAC

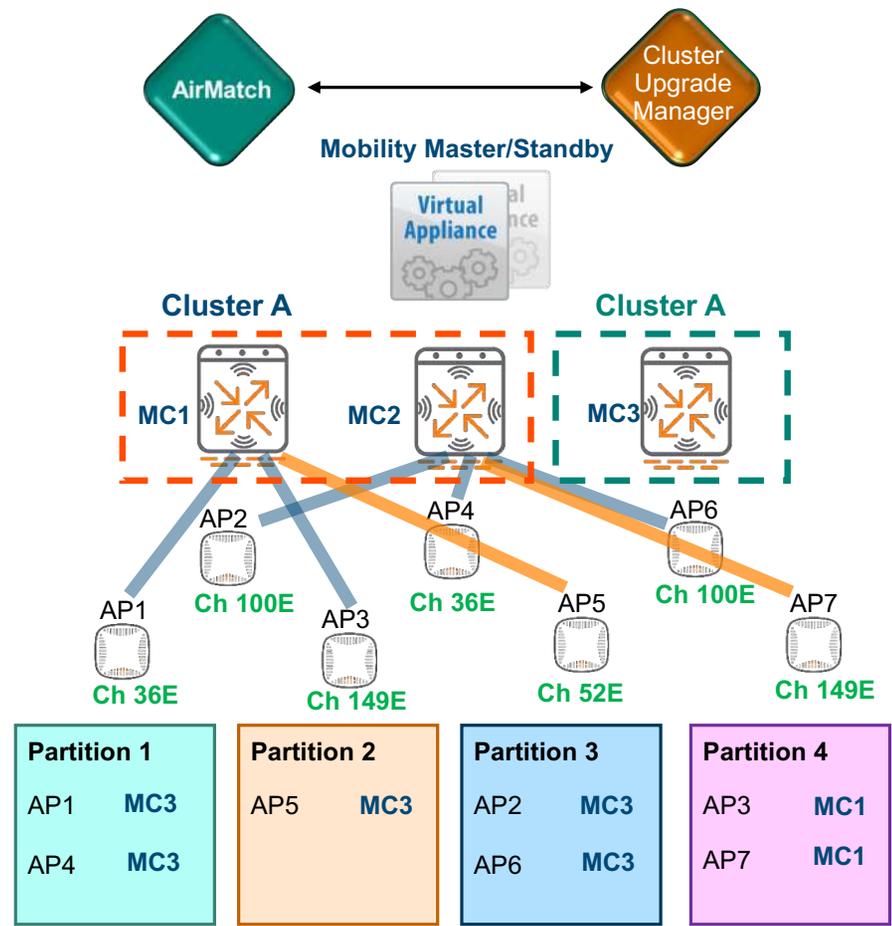


# Live Upgrade - Workflow

## Step 4: First cluster member upgrade

**4.1** MC3 reboots to upgrade to new AOS version

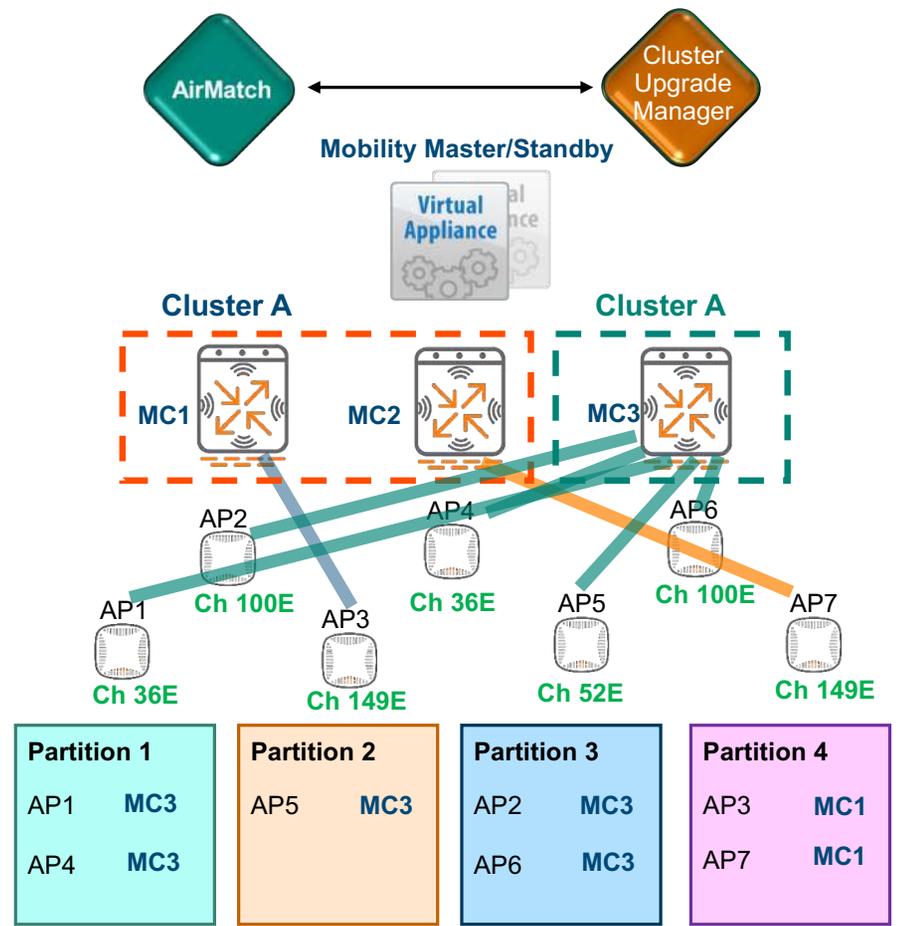
**4.2** MC3 comes up and forms a separate cluster (green Cluster A)



# Live Upgrade - Workflow

## Step 4: First cluster member upgrade

- 4.1 MC3 reboots to upgrade to new AOS version
- 4.2 MC3 comes up and forms a separate cluster (green Cluster A)
- 4.3 APs that have MC3 as target reboot & connect to MC3 as their AAC
  - i APs pre-load new firmware and reboot, one partition at a time
  - ii Clients forced to roam to nearby APs attached to 'red' Cluster A
  - iii Only 4-way dot1x handshake



## 802.11ax: The next big thing

- Adds OFDMA
  - Uplink and downlink
  - Extends and generalizes OFDM
  - Introduces the concept of Resource Units (RU)
- Massive Parallelism
- Uplink MU MIMO (optional)
- Likely multiple “waves”
- Targeting first products by first half CY2018

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**Teşekkürler**