



aruba

a Hewlett Packard
Enterprise company

Otel Kablosuz Ağları Aruba Vizyonu

Baha Dericiogulları
baha@hpe.com
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



top 5
favourite travel
accessories



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 of Istanbul showing locations: Uskudar, Fatih, Eminonu, Zeytinburnu, 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

5 stars

126 reviews

Nightly rate from \$99

Free WiFi expected speed: 22.8 Mbps

Confidence: 57.5%

Hilton Istanbul Bosphorus

Cumhuriyet Caddesi Haribye, Istanbul 34367, Turkey

Near Taksim Square Map

5 stars

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

5 stars

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

AOS 8

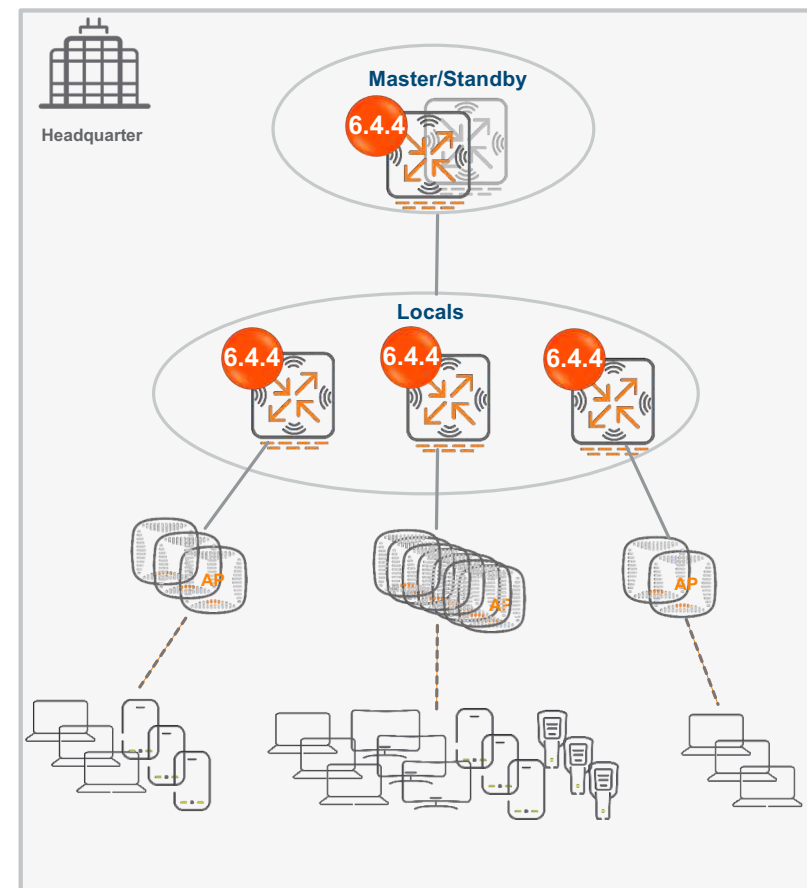
Master/Local Deployment in 6.x

- 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



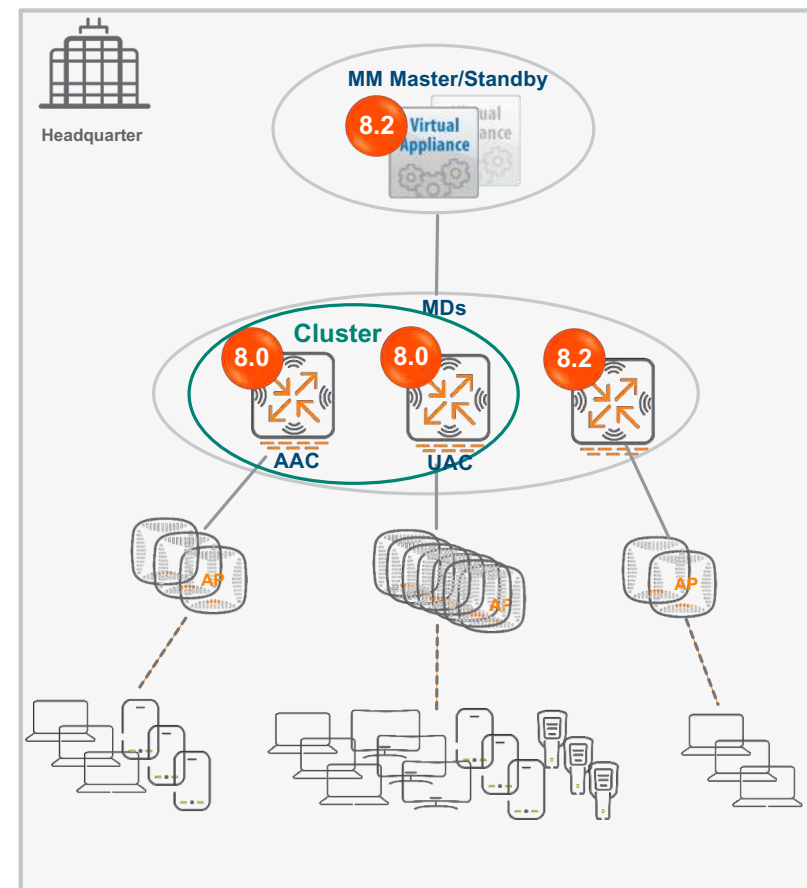
How Master/Local Deployment Looks like in 8.0

- 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

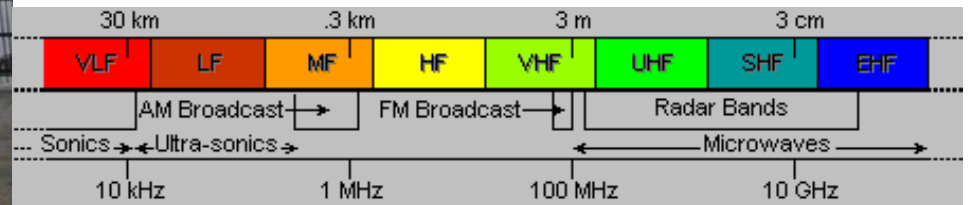
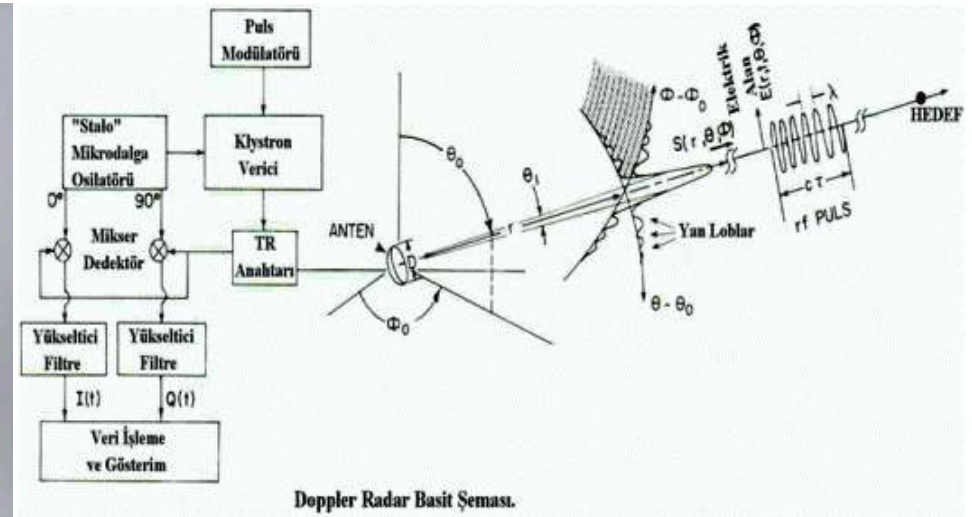
- All controllers configured as managed devices (MD) under MM
- Zero Touch Provision (ZTP) supported via Activate server
- Clustering supported for high availability and redundancy
- Multi-version supported

- 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

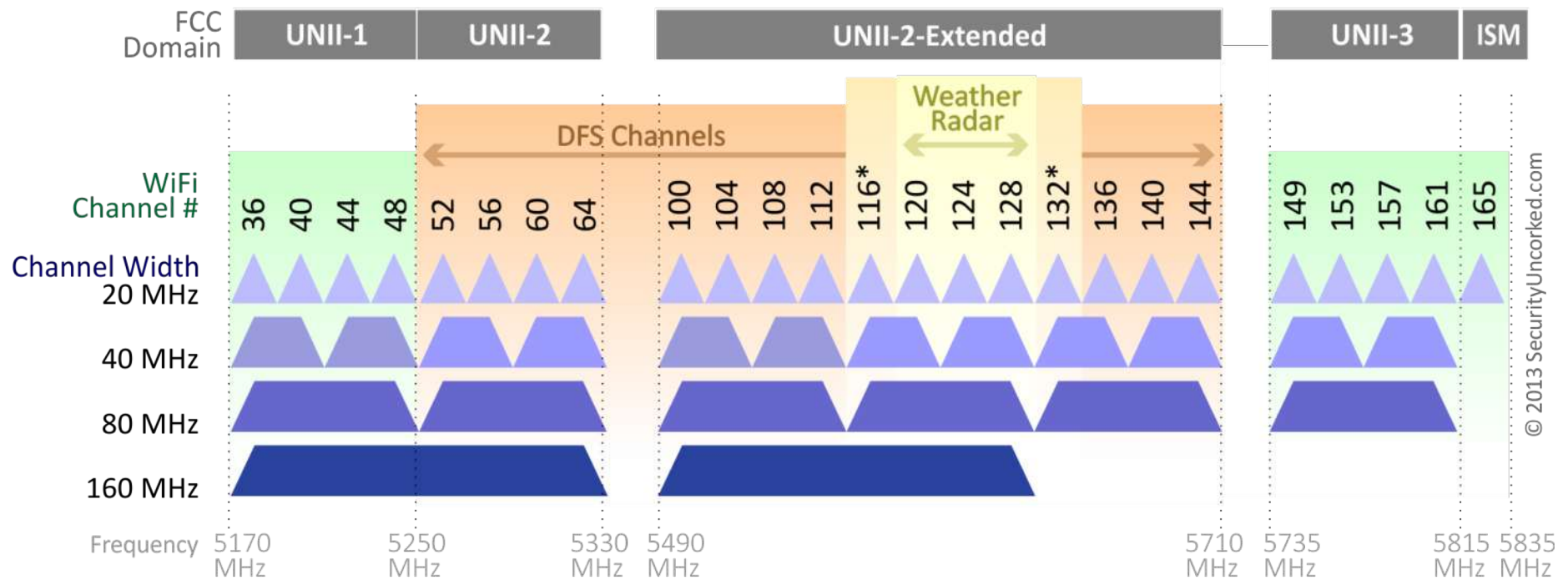






5GHz Spectrum

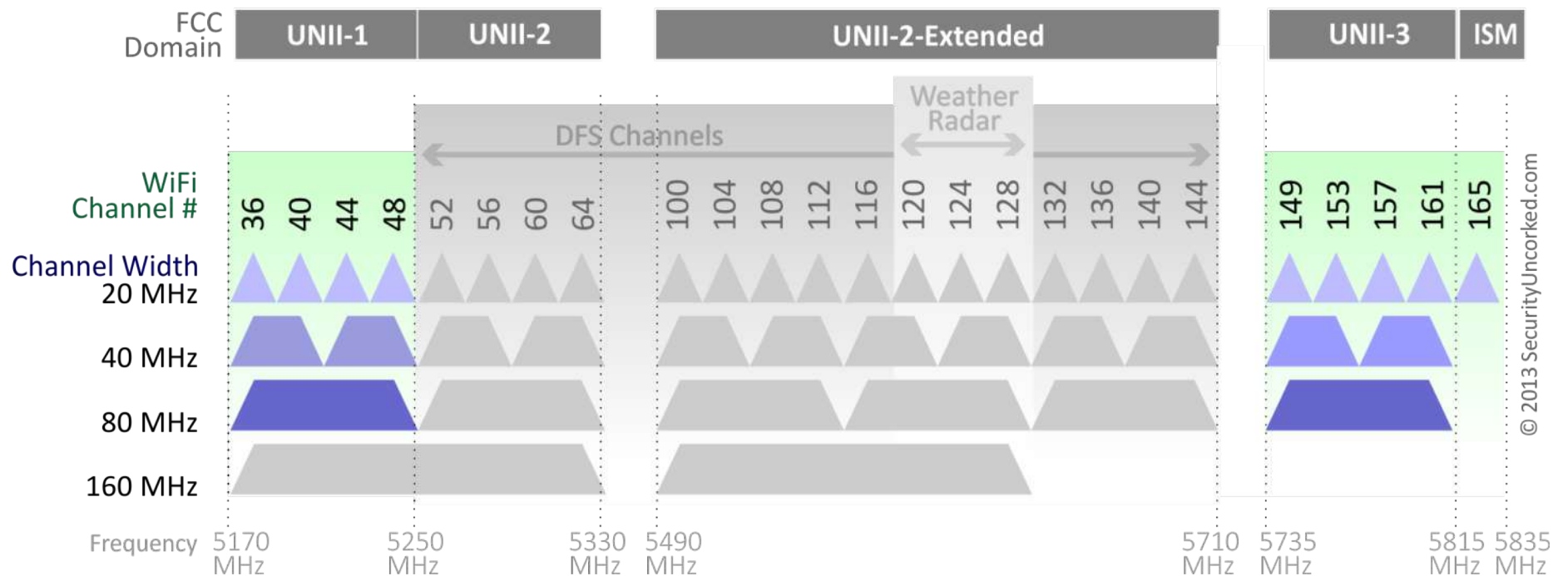
802.11ac Channel Allocation (N America)



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

5GHz spectrum excluding DFS channels

802.11ac Channel Allocation excluding DFS (N America)

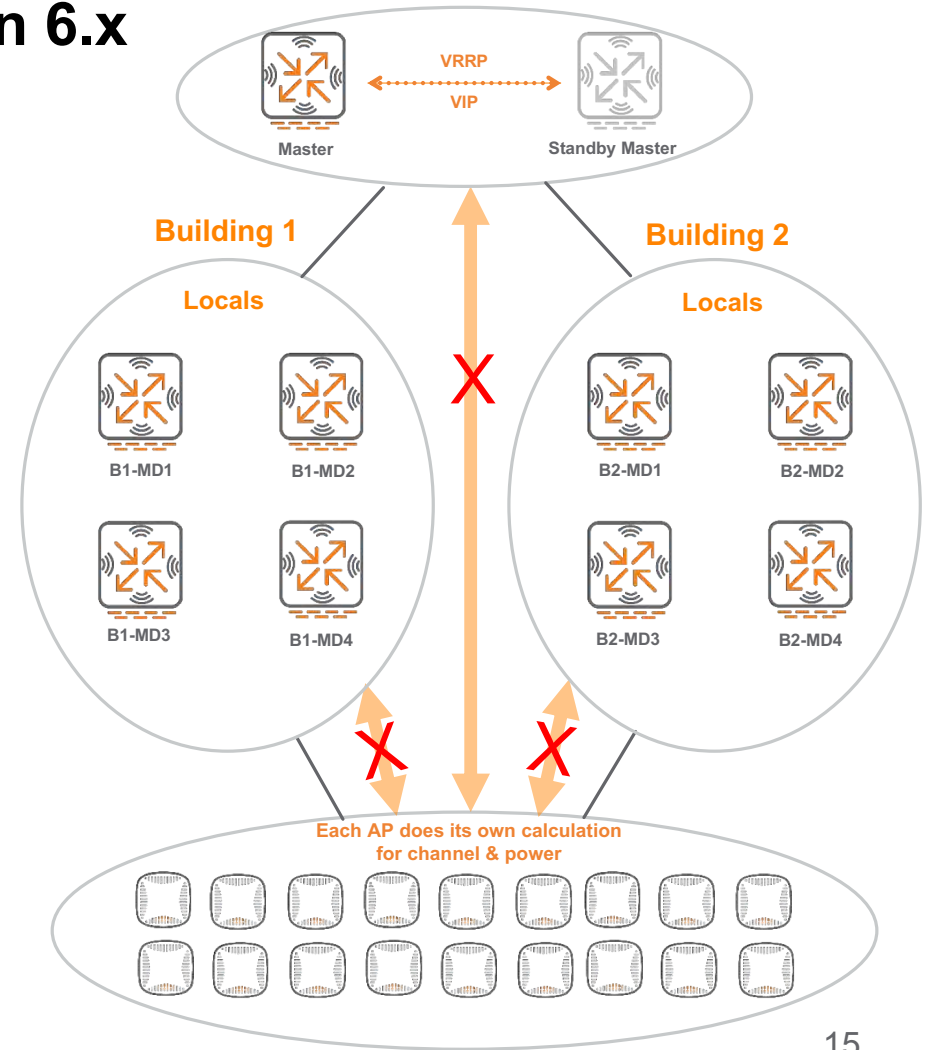


AP Channel & Power Assignment in 6.x

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

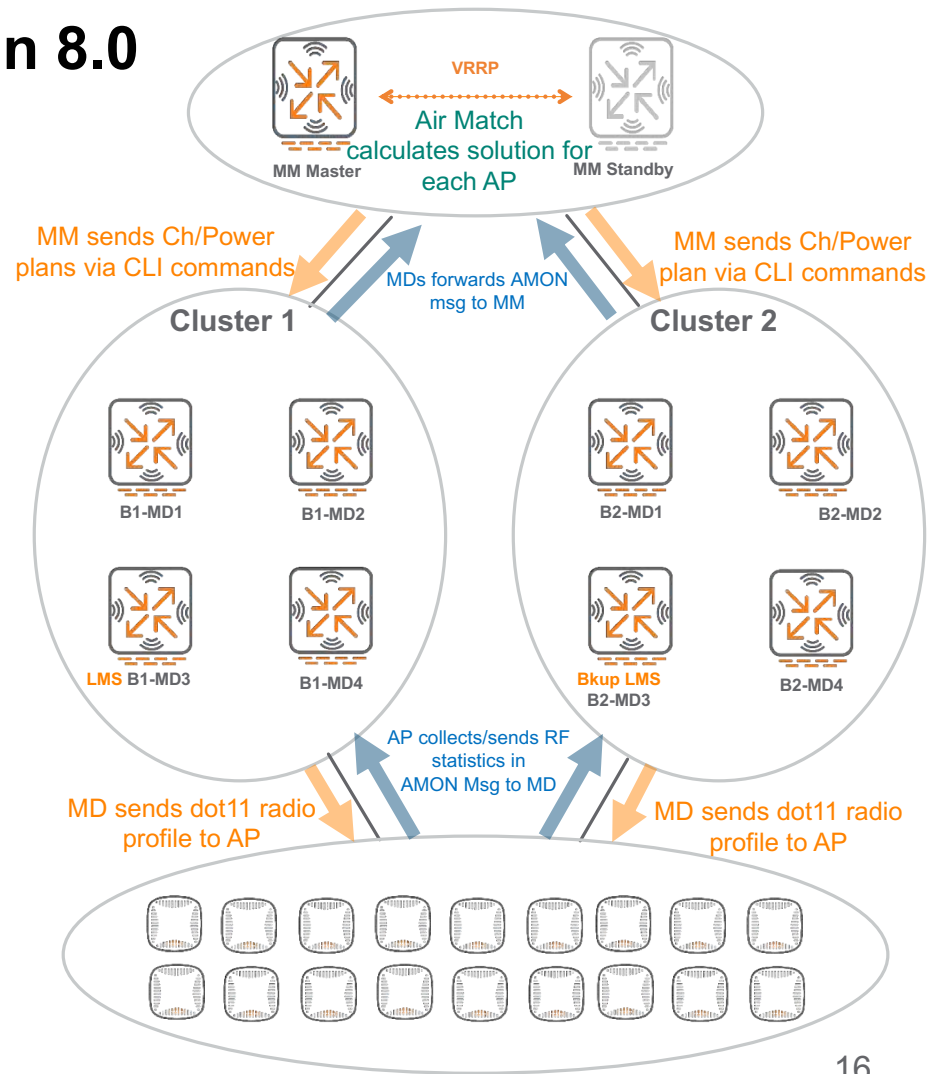
Communication for AP channel & power assignment



AP Channel & Power Assignment in 8.0

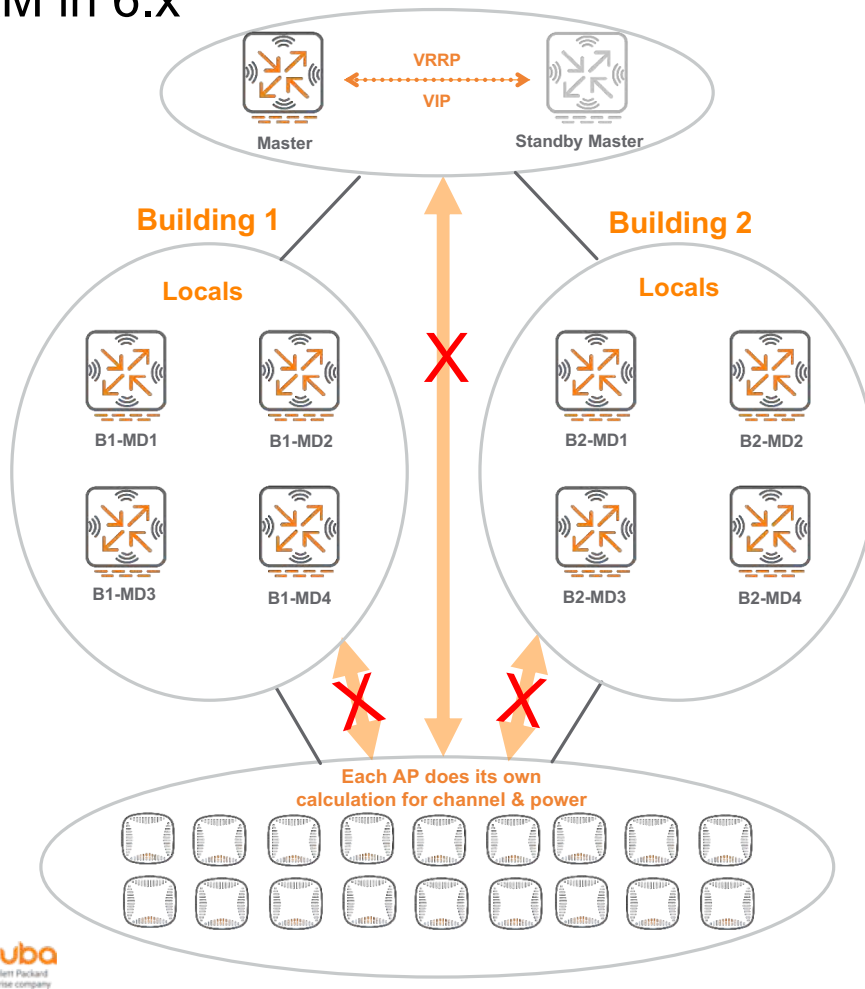
Air Match

- 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

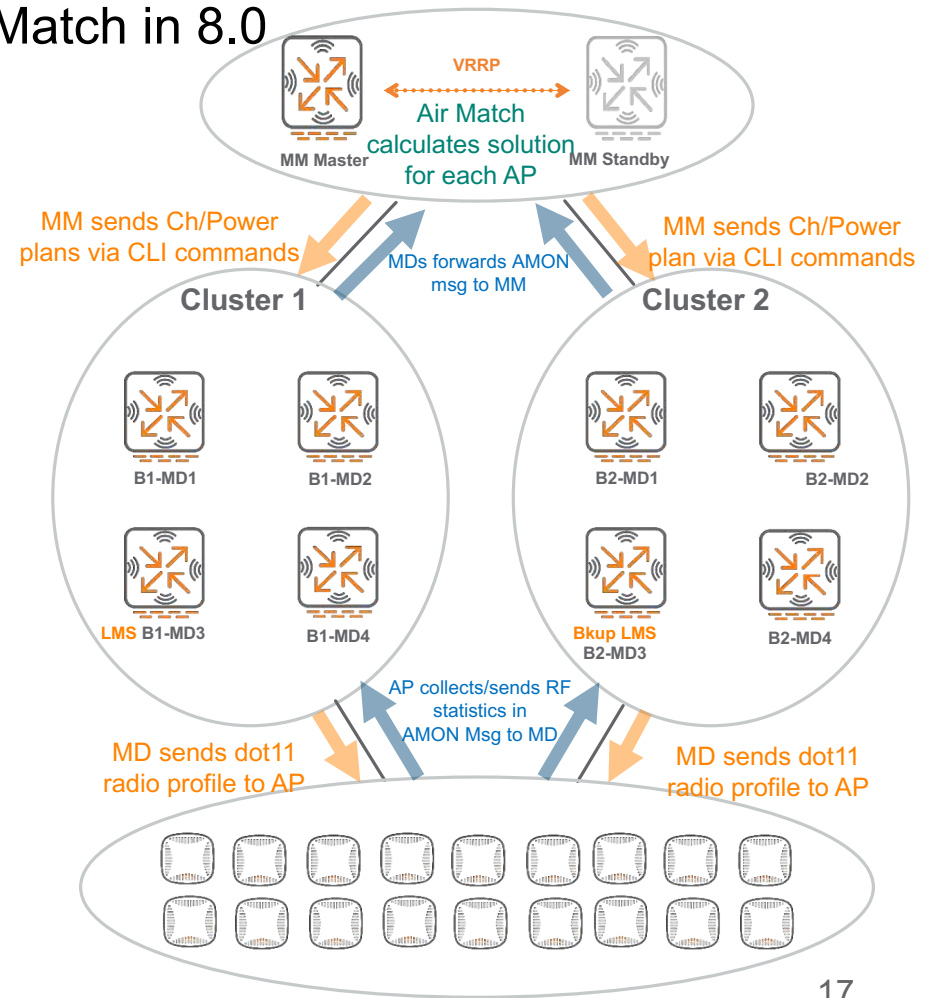


AP Channel & Power Assignment

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

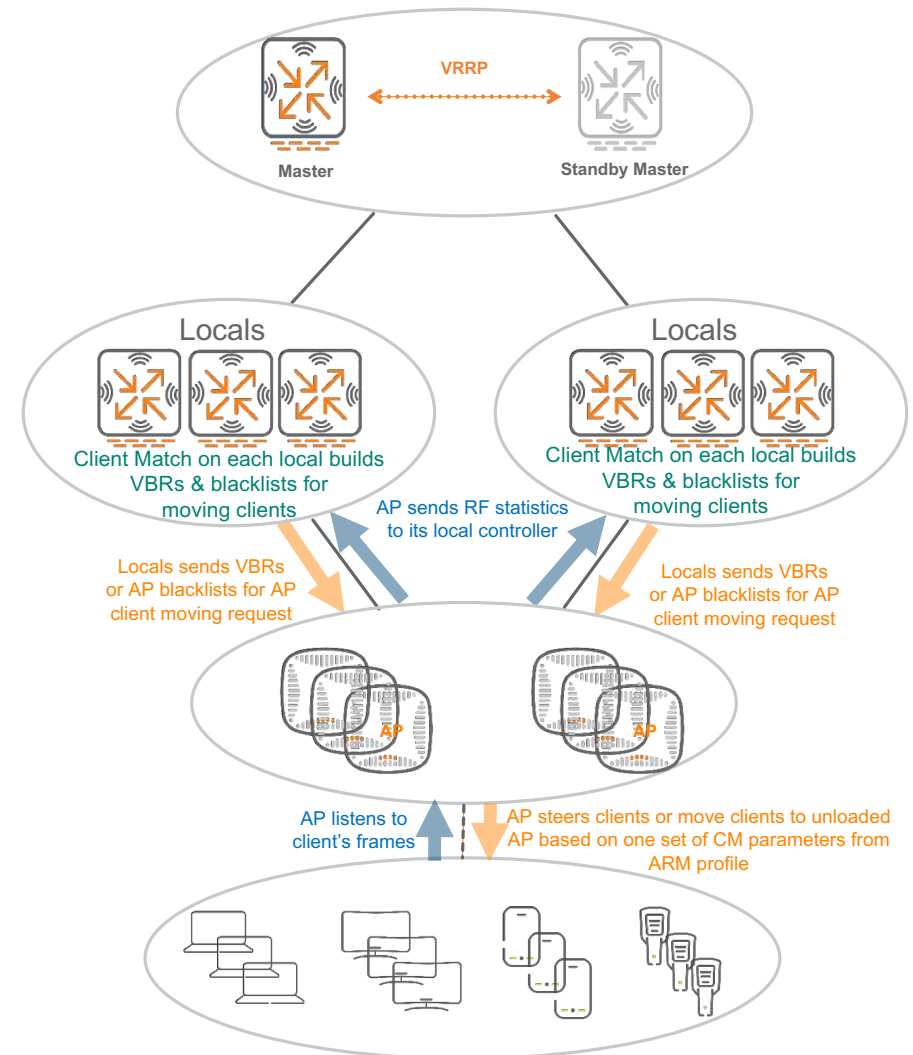
Only single set of CM configuration, all clients are treated alike

4

No rule based CM support

5

Some clients' connectivity may be impacted



Client Match in 8.0

1

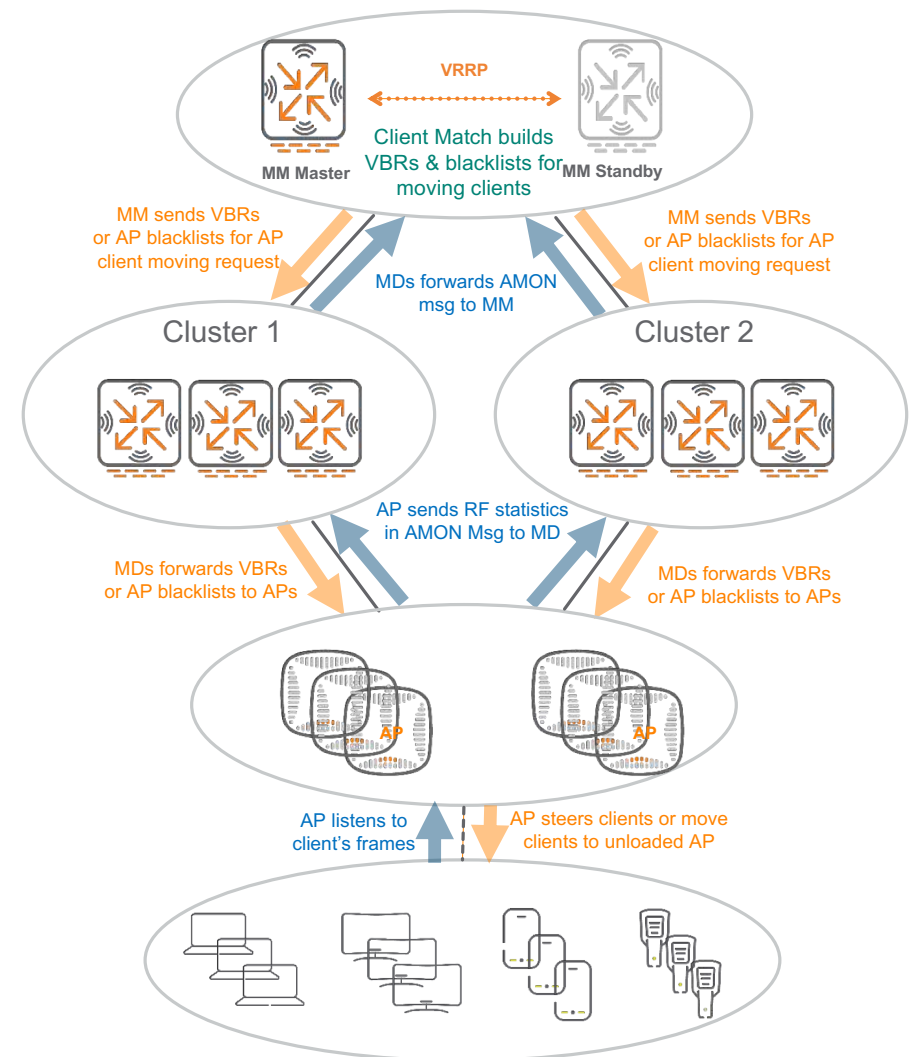
AP collects/sends RF info to MM via MD

2

One of LSM in MM and can be upgraded independently

3

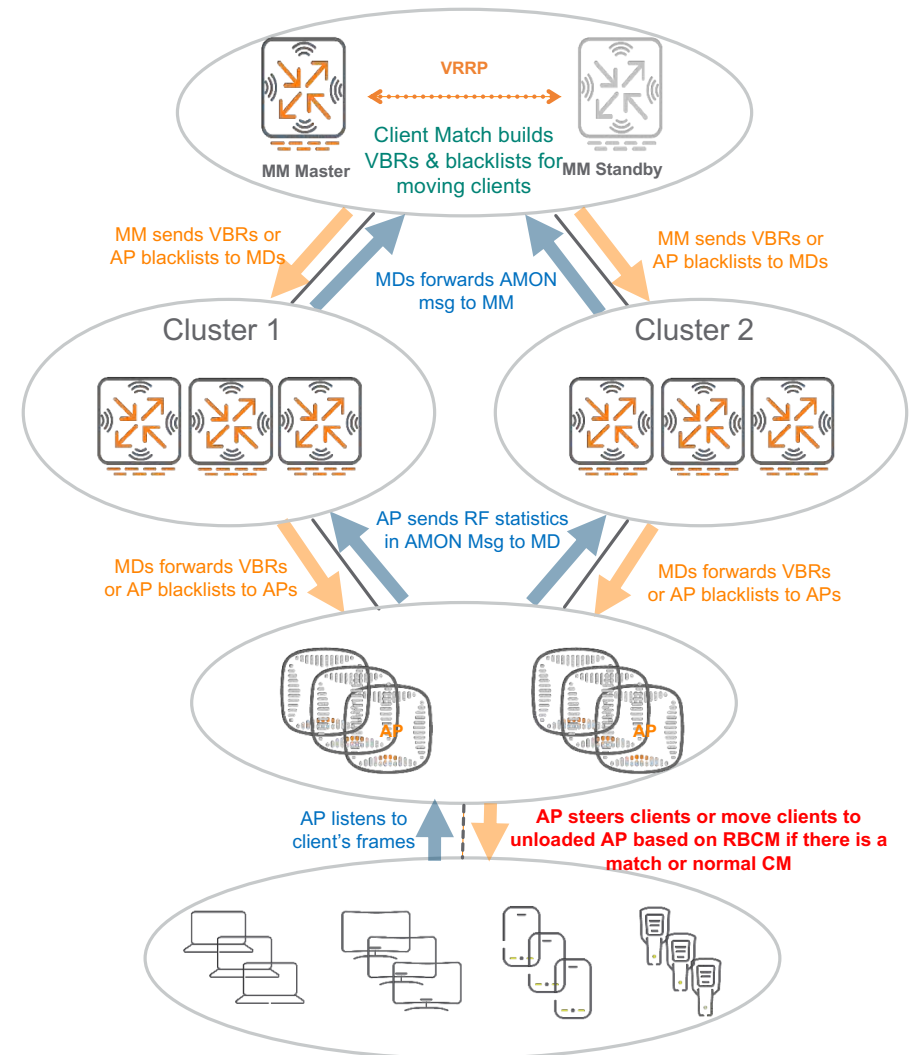
MM co-ordinates the client steering and load balancing



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



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



Introduction

Prerequisites

1

Stateful Failover

Cluster in L2-Connected state w/ Redundancy ON

2

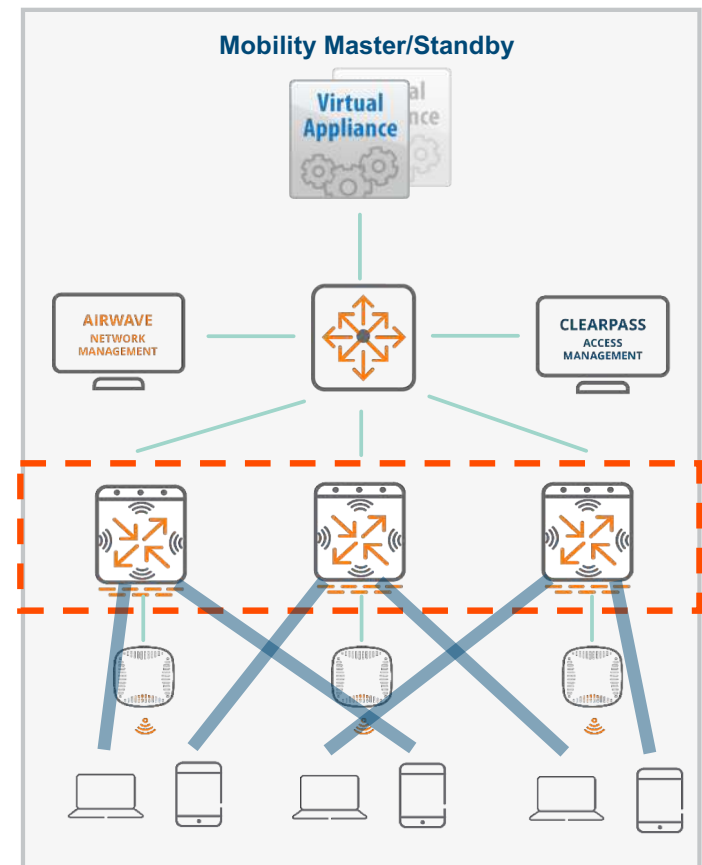
Centralized Image Upgrade

3

Airmatch (schedule enabled)

4

Aruba WLAN best practices (recommended)

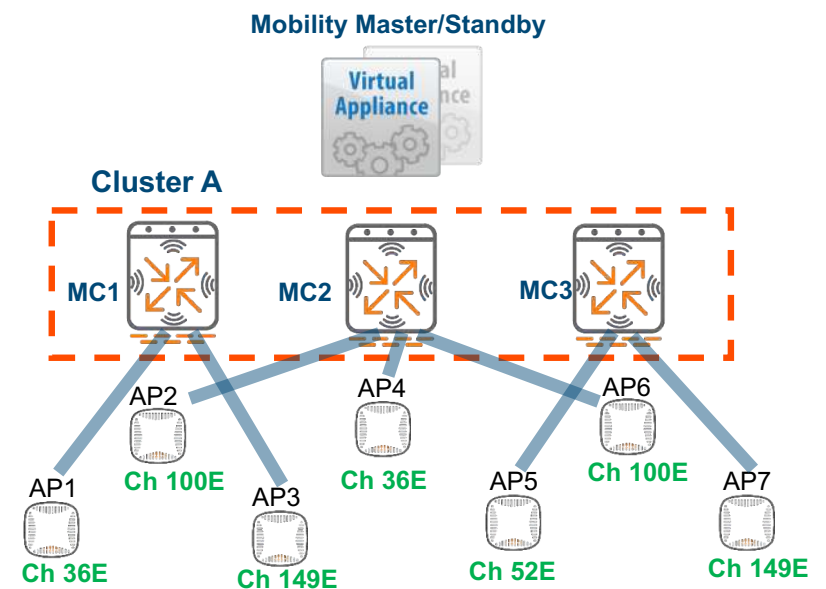


Live Upgrade Flow

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

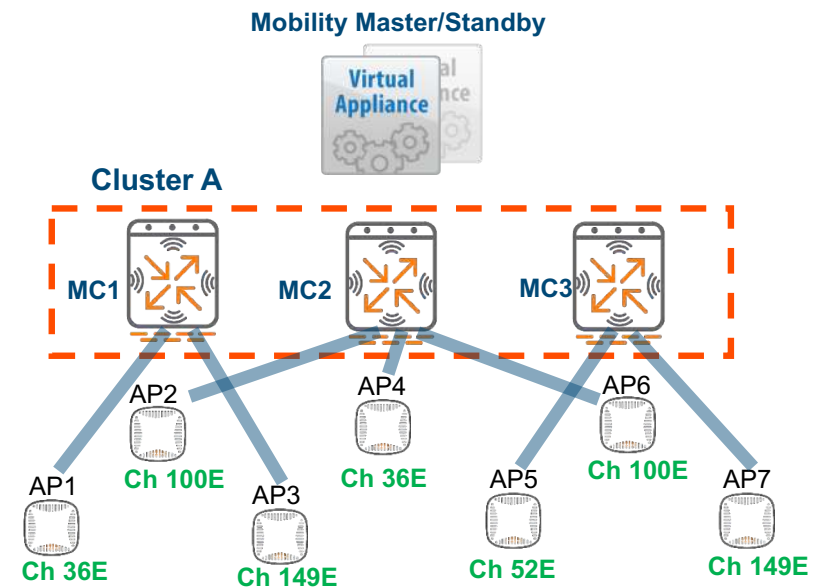
Initial Lab AP Distribution

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

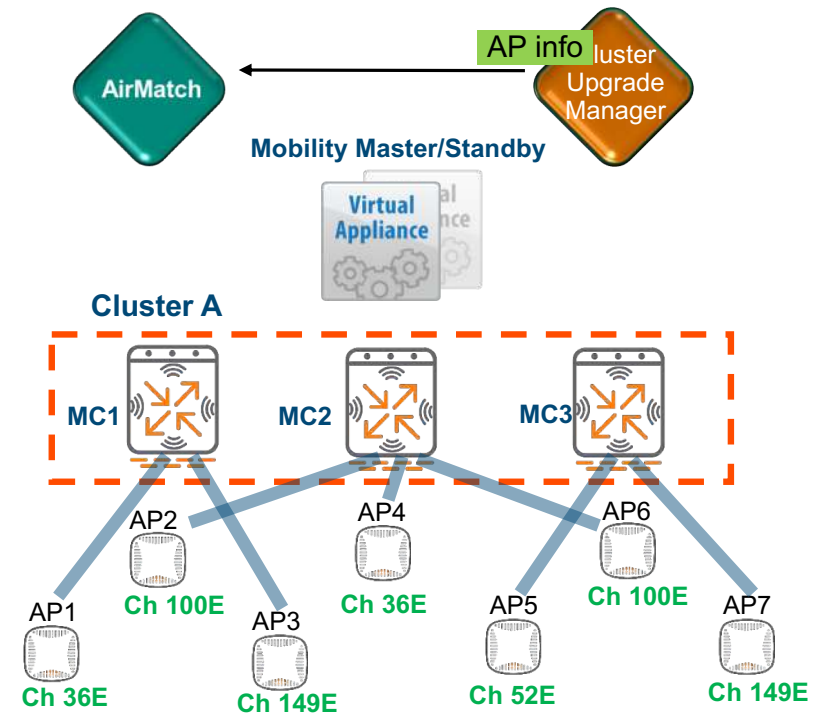


Live Upgrade - Workflow

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

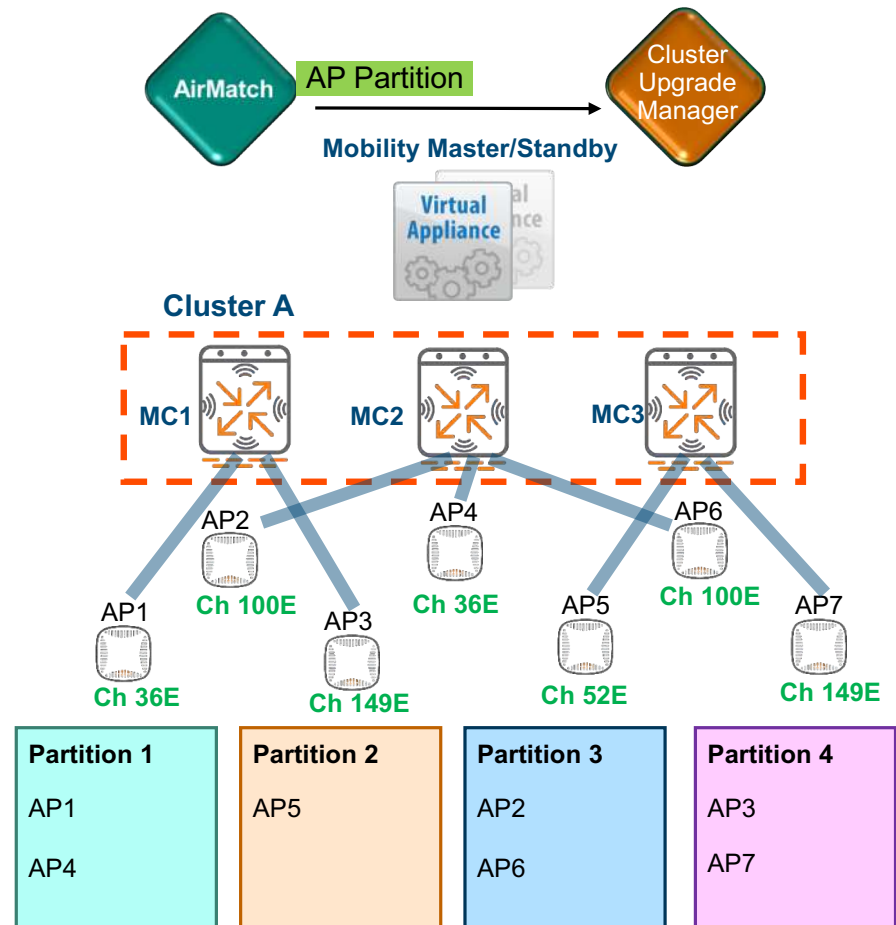
AirMatch creates logical groups of APs (Partitions) and update CUM*

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

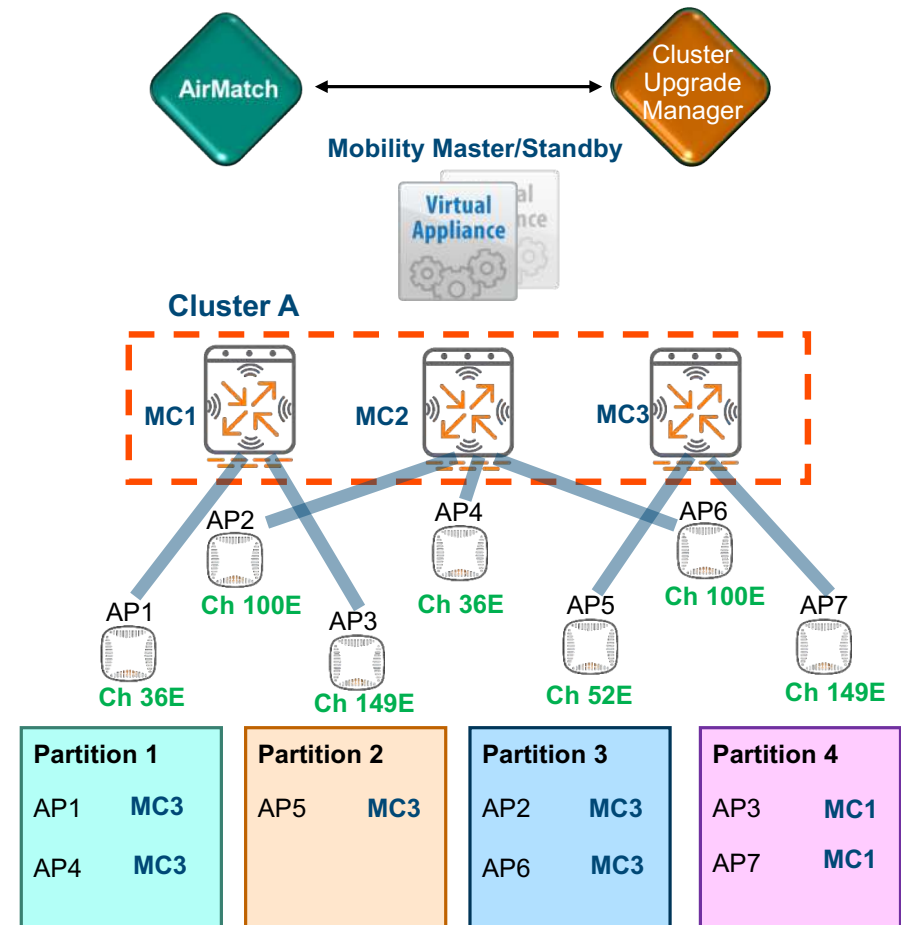
1.2 Airmatch creates logical groups of APs (Partitions) and update CUM

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

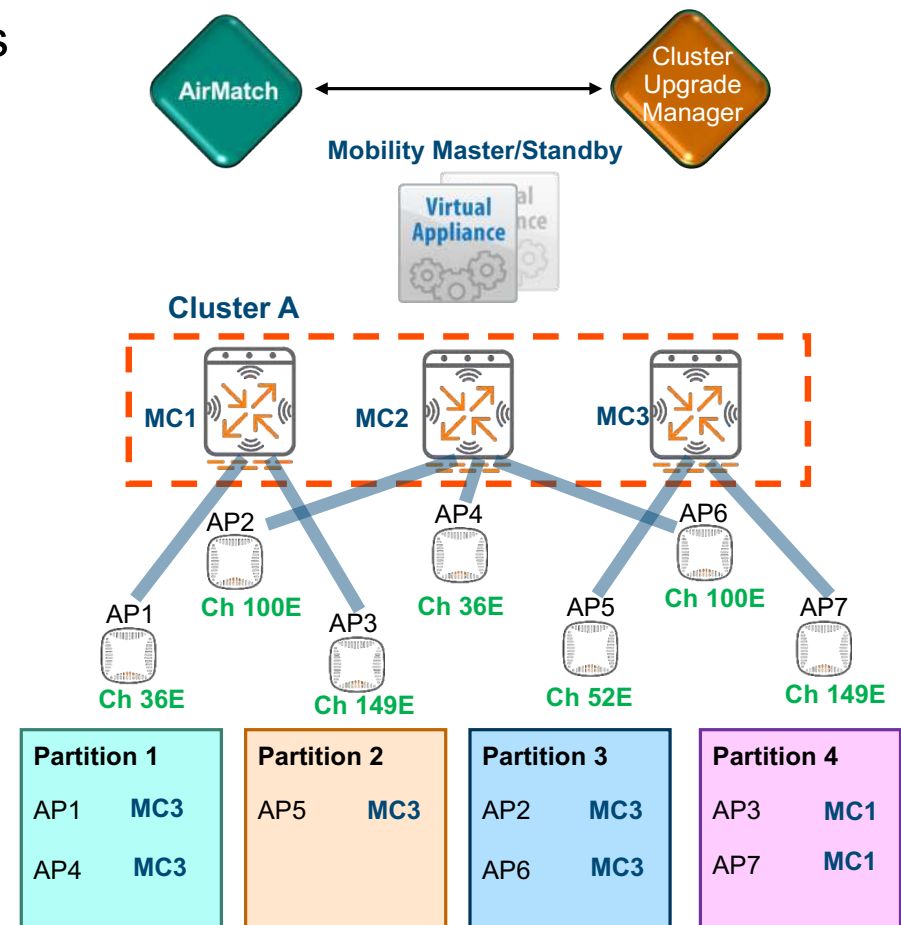
Step 3: New firmware download to controllers

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

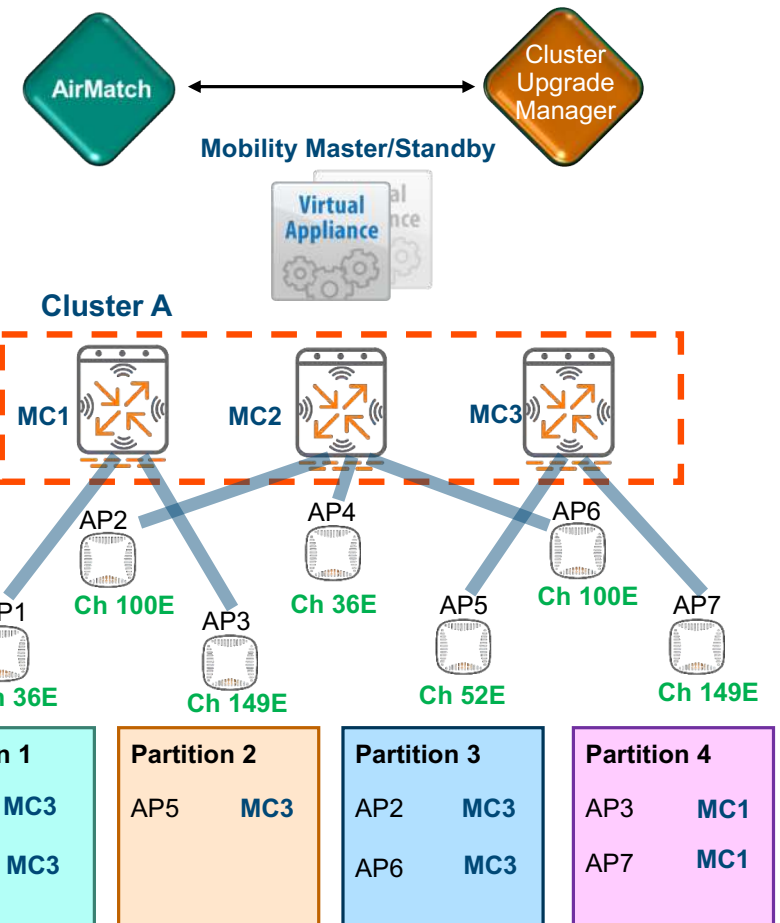
Controller Upgrade Status

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

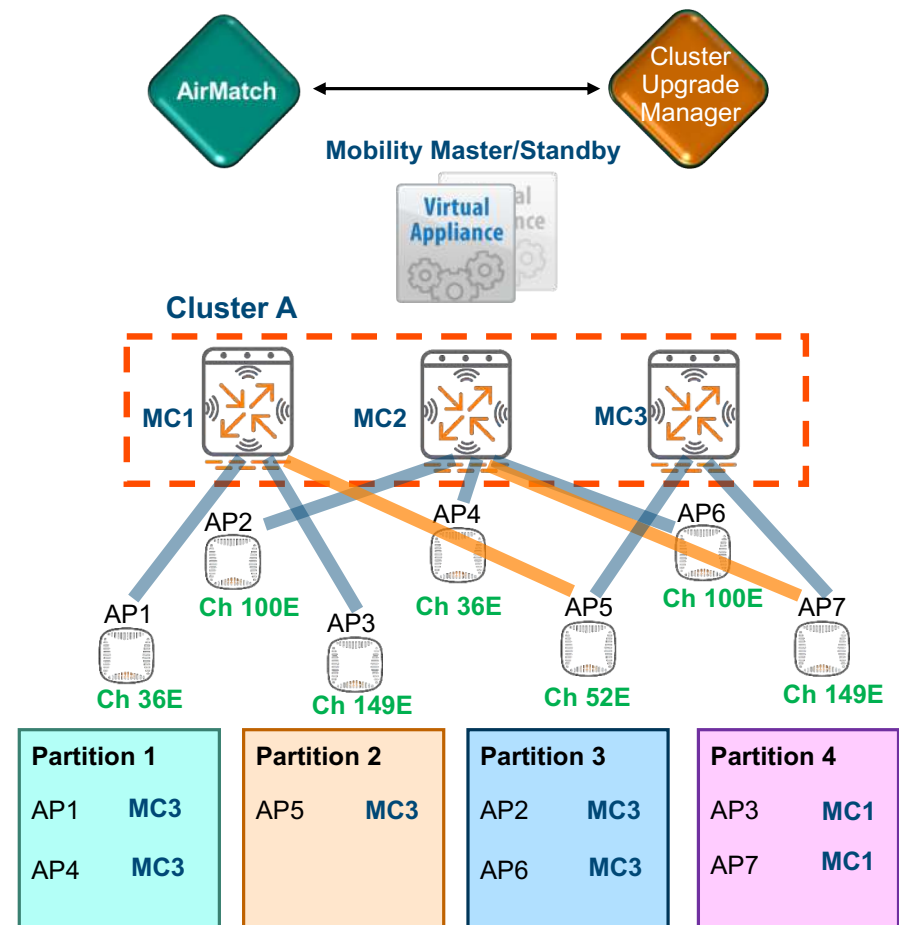
MC3 reboots to upgrade to new AOS version

i

Attached APs fail over to S-AAC

ii

Attached users fail over to S-UAC



Live Upgrade - Workflow

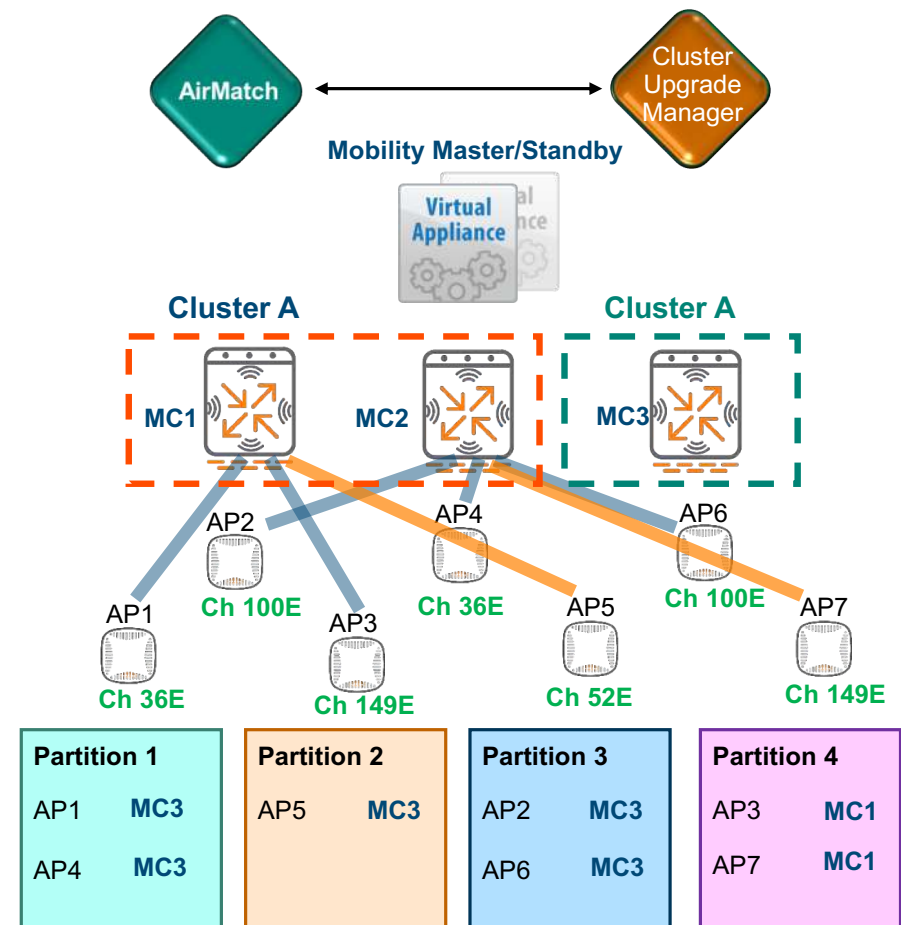
Step 4: First cluster member upgrade

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

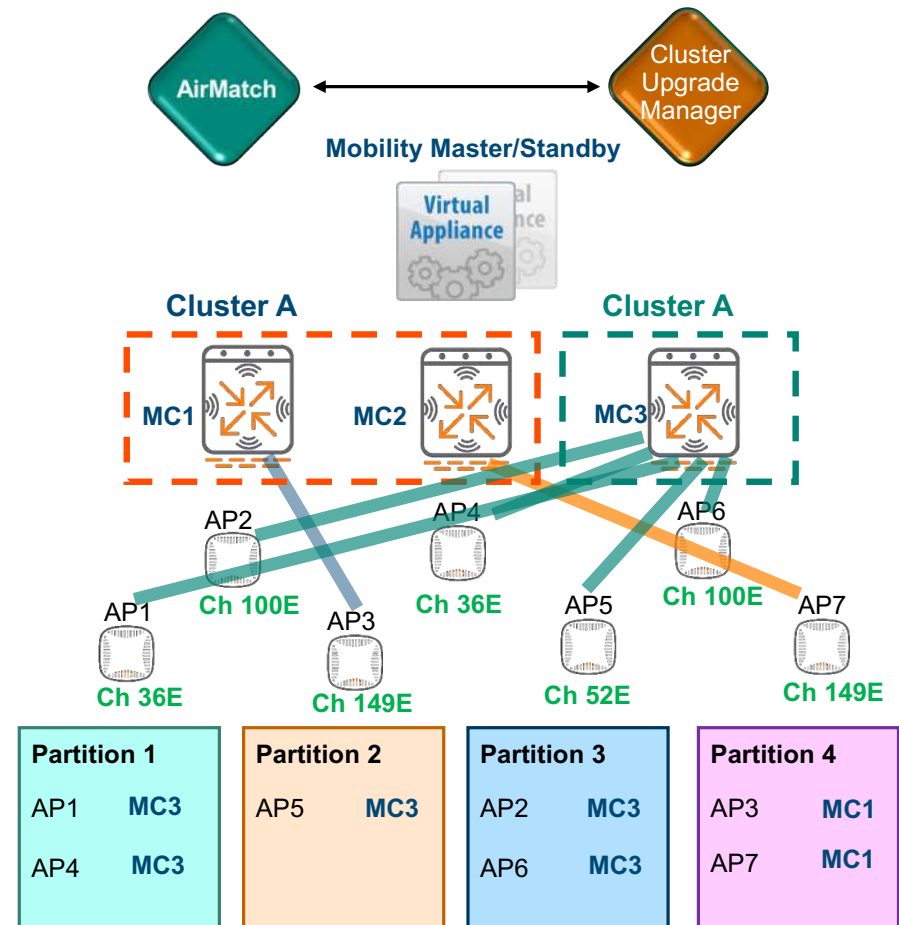
APs pre-load new firmware and reboot, one partition at a time

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



a Hewlett Packard
Enterprise company

Teşekkürler