



# AIRHEADS

## LAS VEGAS 2012

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Presented by Name  
Aruba Networks  
March 2012

# ROCKIN' VOICE AND VIDEO OVER WIFI!



# Agenda

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Multimedia over WLAN Challenges

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Generic Design Recommendations for Multimedia

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Aruba Enablers for Voice

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Aruba Enablers for Multicast Video

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Enterprise Application – Collaboration & VDI

# Understand Mobility Requirements

## Mobile Devices



## Multimedia



## Collaboration



## Virtual Desktops



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# Multimedia over WLAN



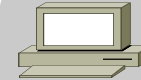
## Voice

- RF challenges
- End-to-End QoS
- Battery life & Roaming
- Scaling Challenges
- Bandwidth management (CAC)
- Mobility and Roaming



## Video

- RF Challenges
- End-to-End QoS
- Battery life & Roaming
- Scaling Challenges
- Unreliable protocol
- Low speed transmission



## Data

- RF Challenges
- Battery life & Roaming
- Scaling Challenges

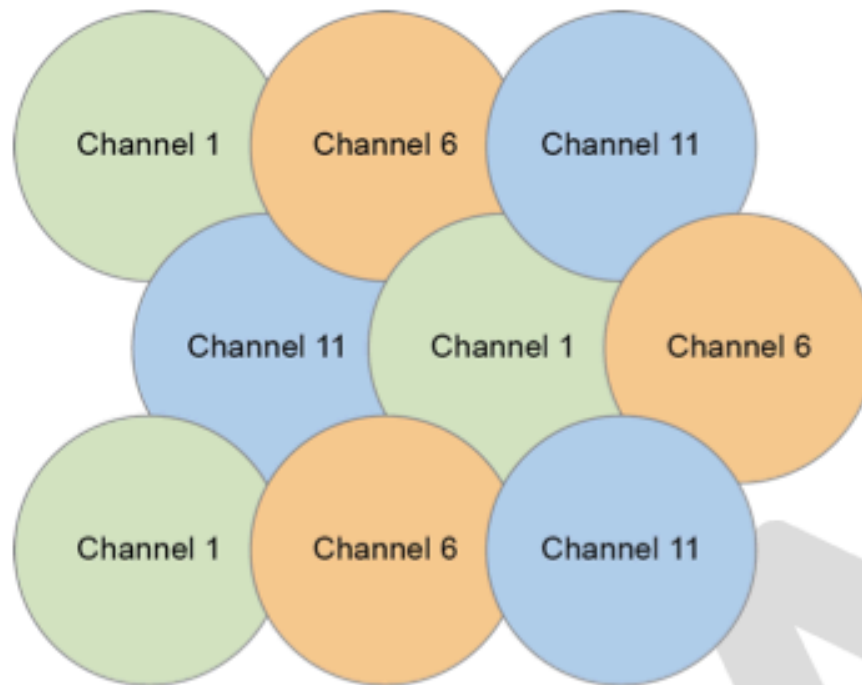
Voice + Video + Data???



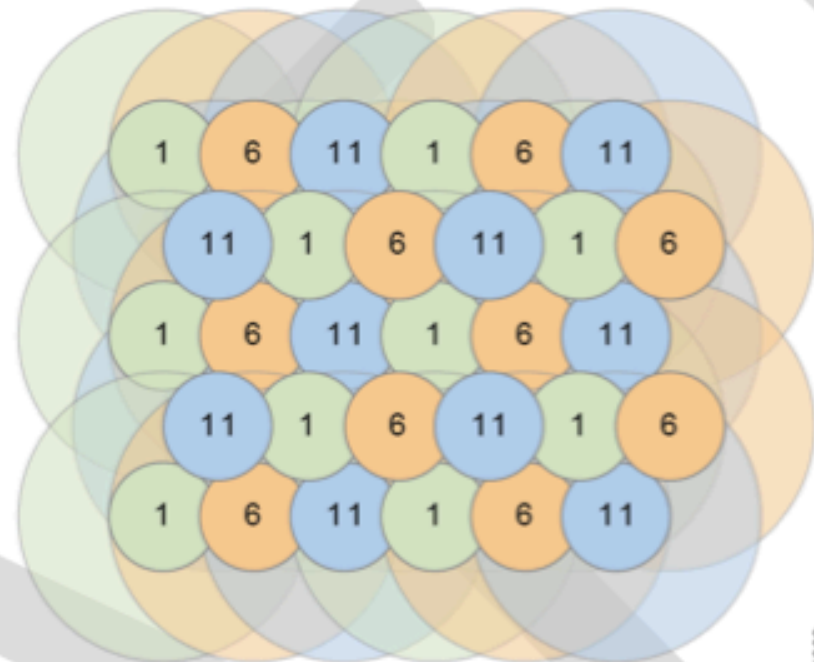
# General Design Considerations for enabling Multimedia



# RF Challenges: Plan for Capacity, not Coverage



Coverage design with 7.2 Mb/s cell edge



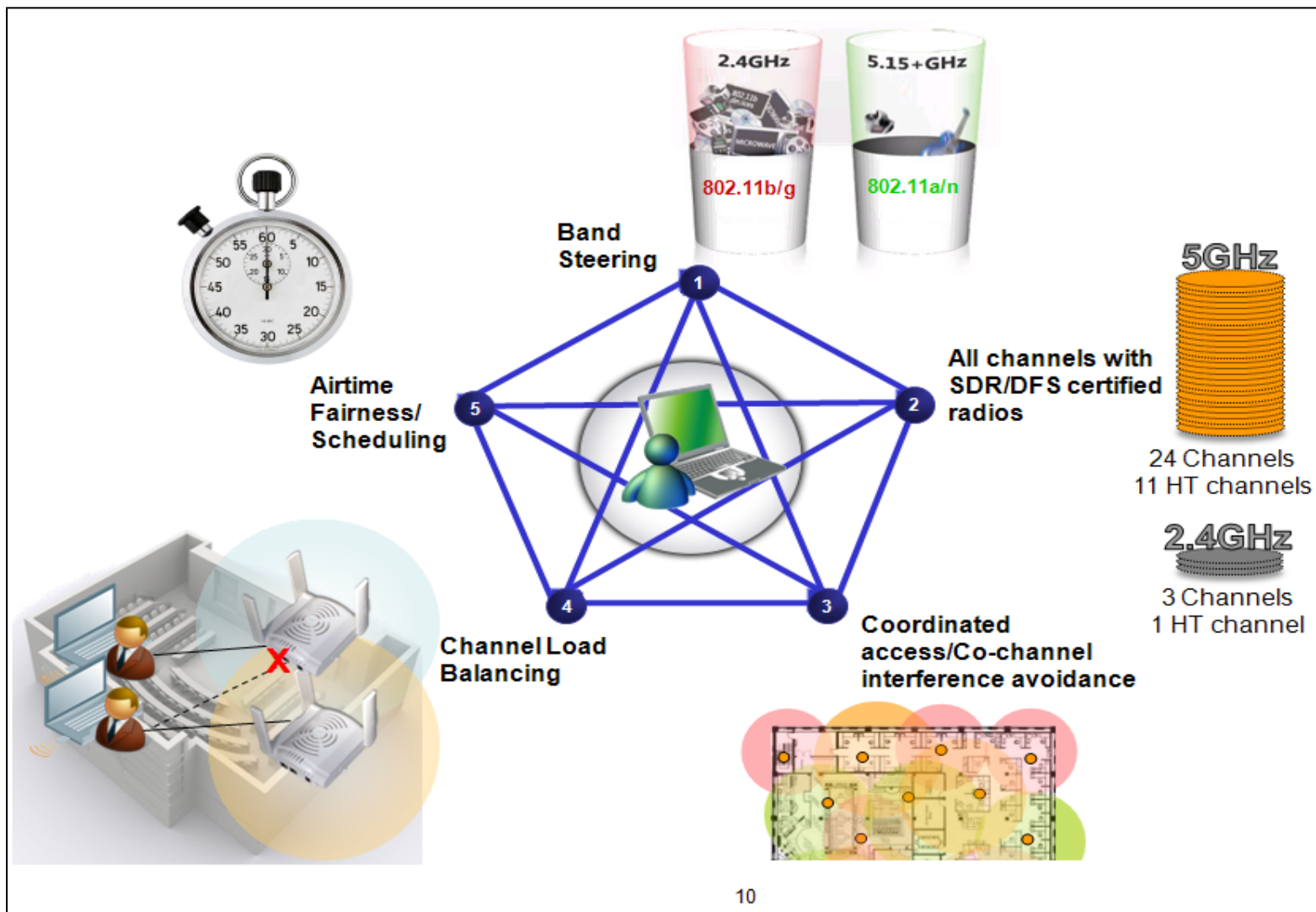
Capacity design with 216.7 Mb/s cell edge

arun\_1008



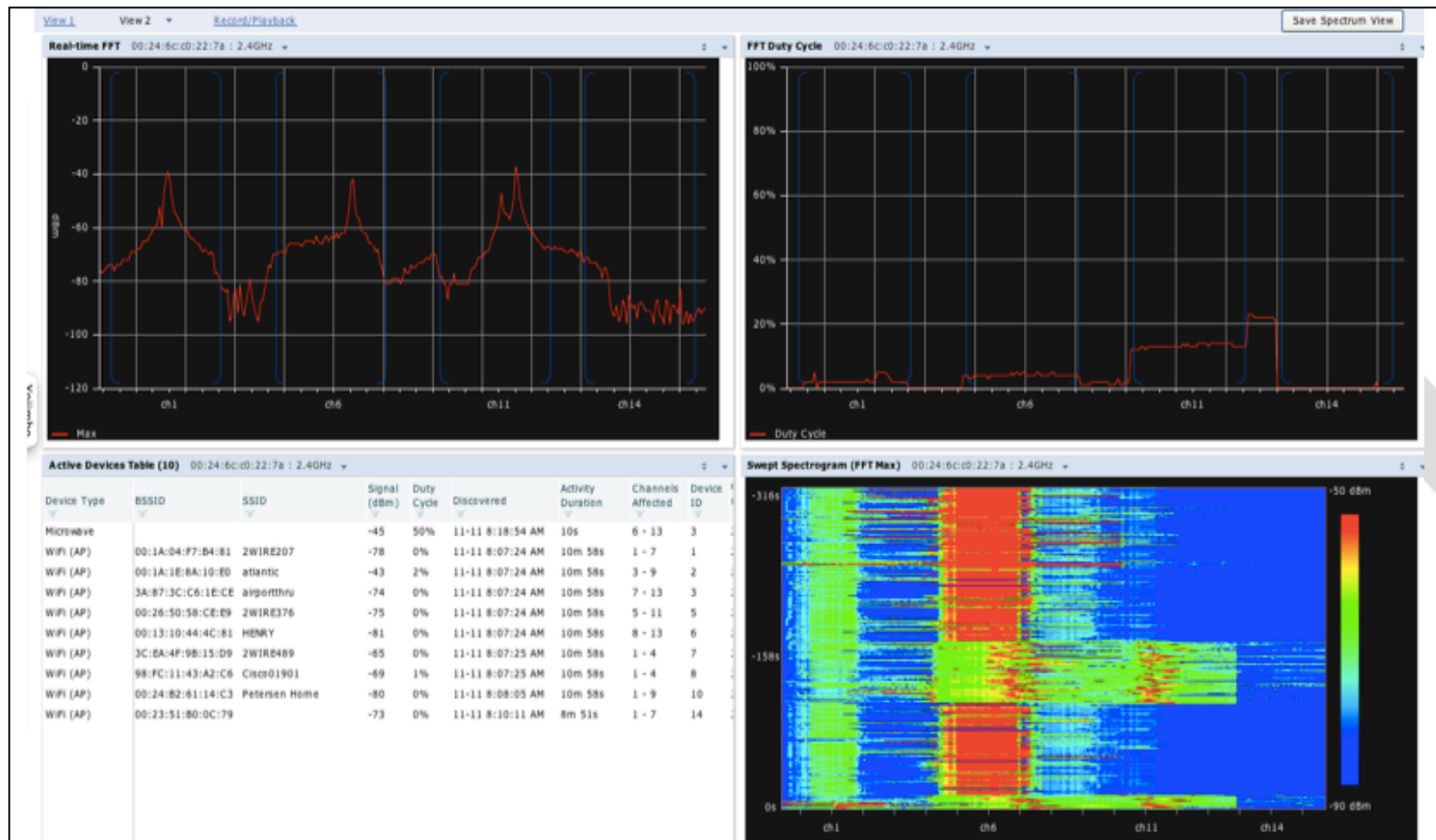


# RF Challenges: 802.11n + ARM -> Assured Bandwidth

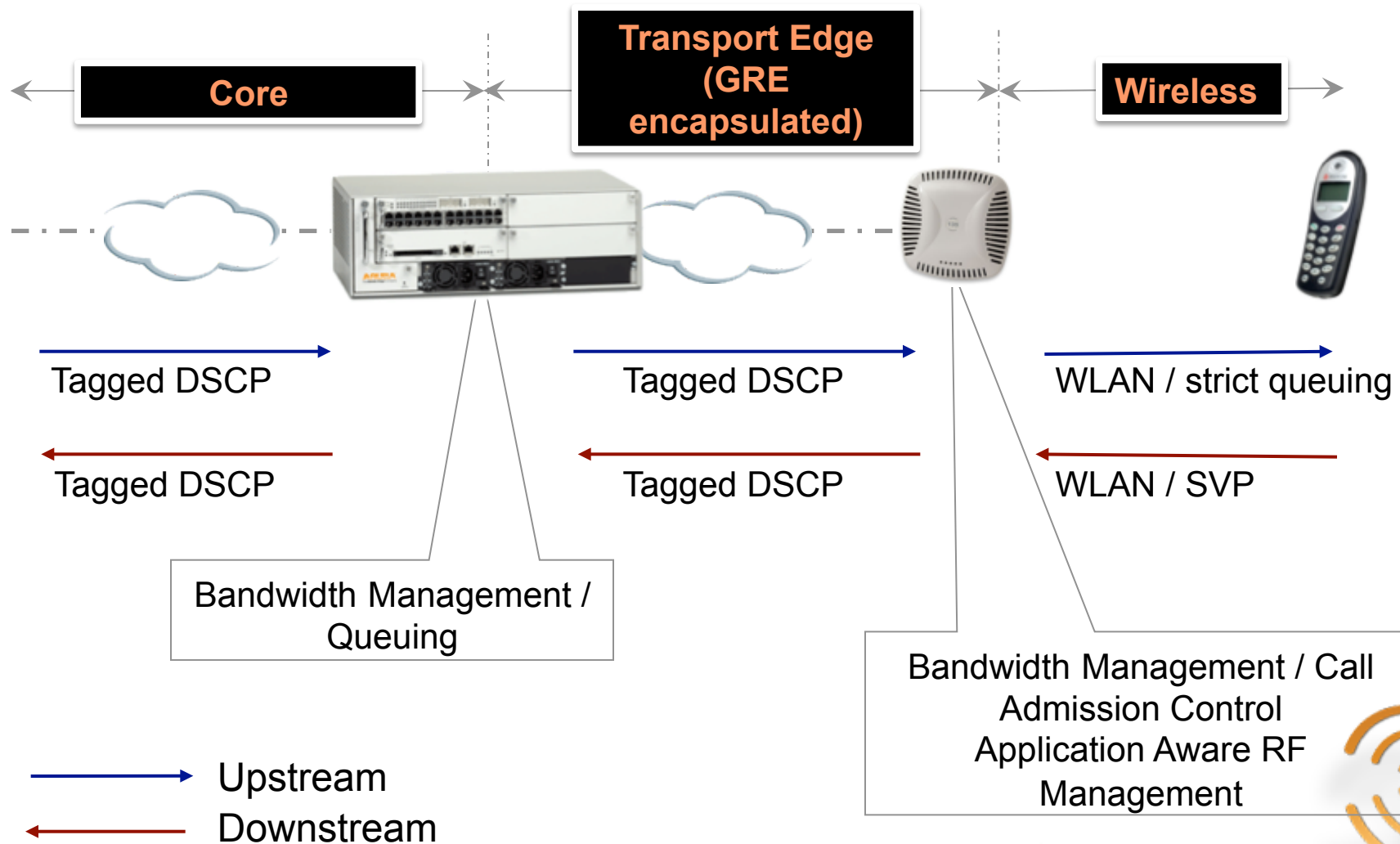




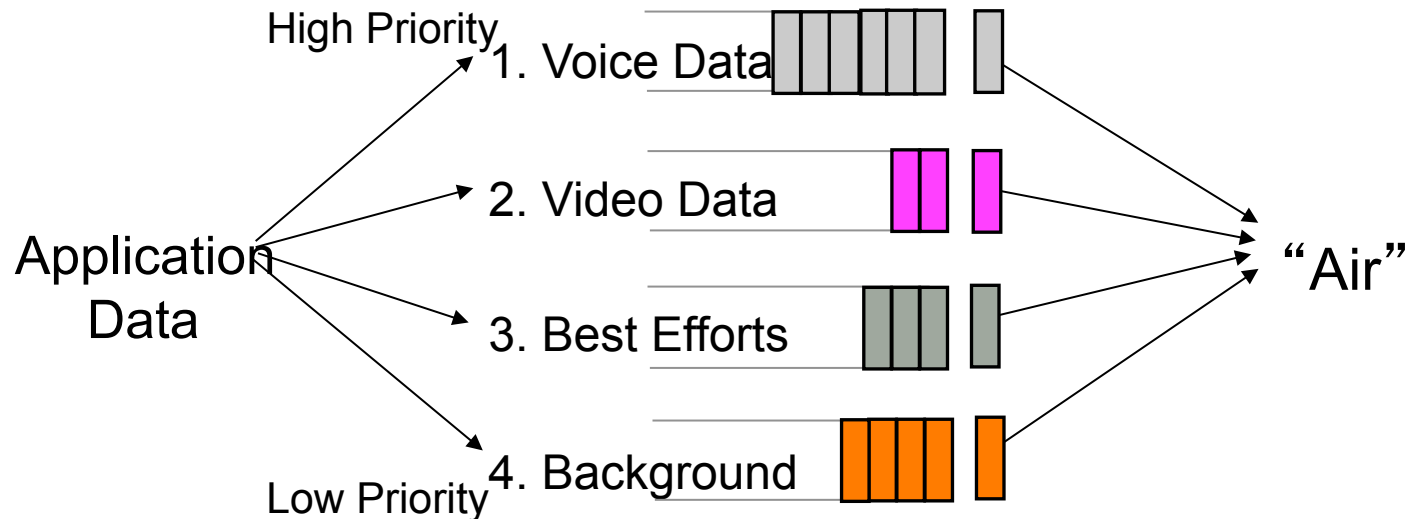
# RF Challenges: Interference Avoidance with Spectrum Analysis



# End-to-End QoS: Introduction

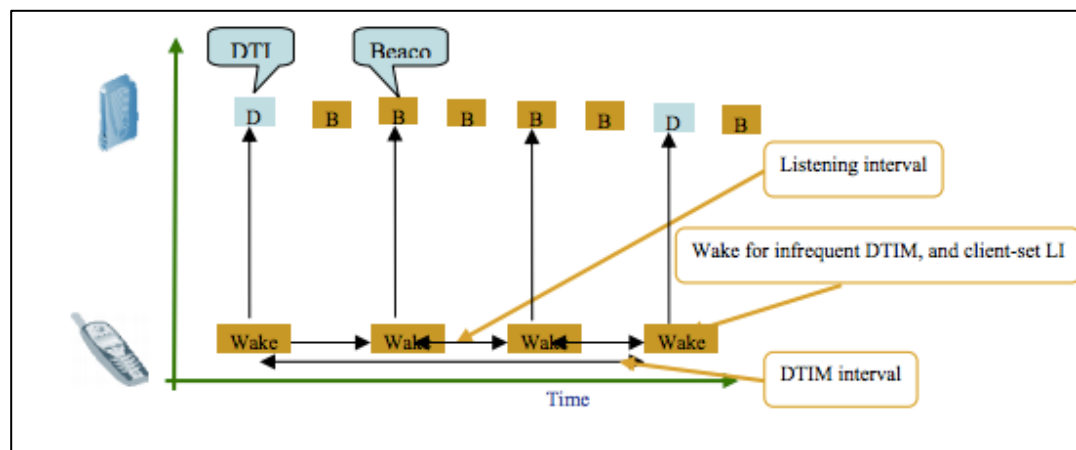
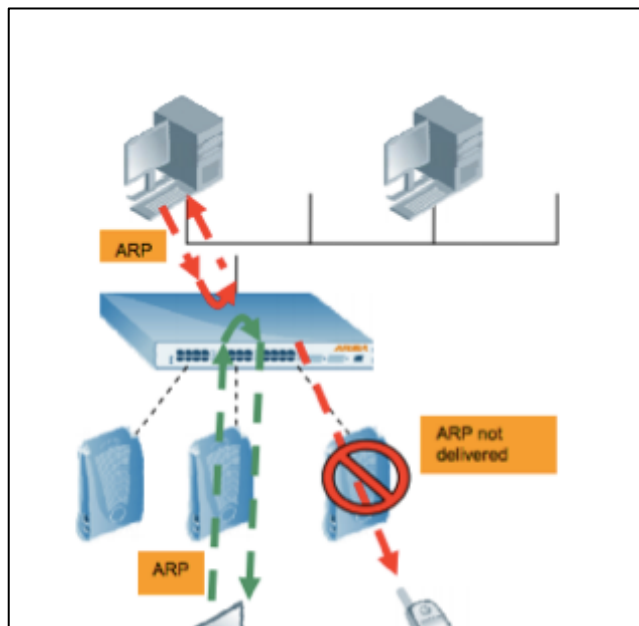


# End-to-End QoS: WMM Support



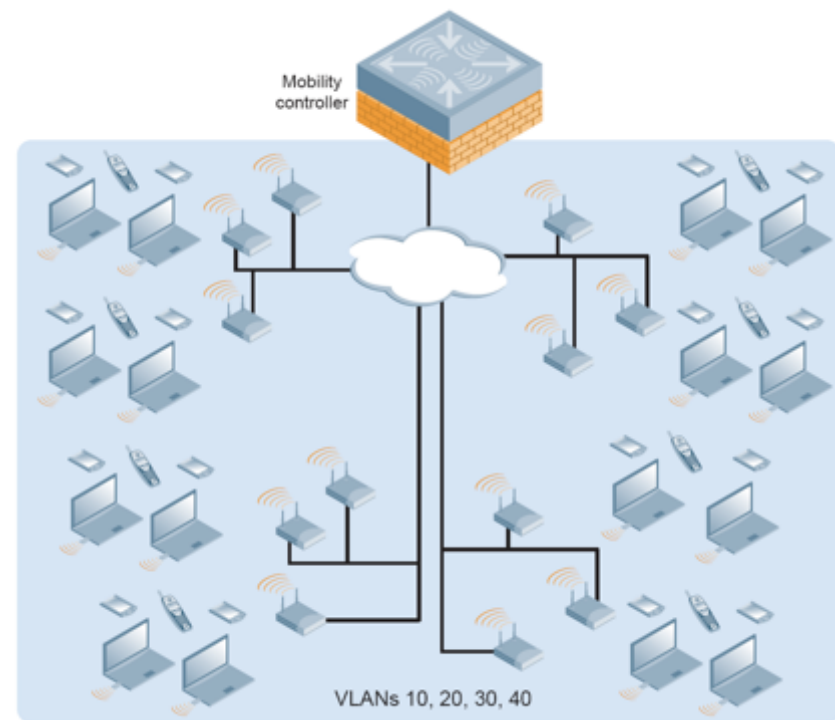
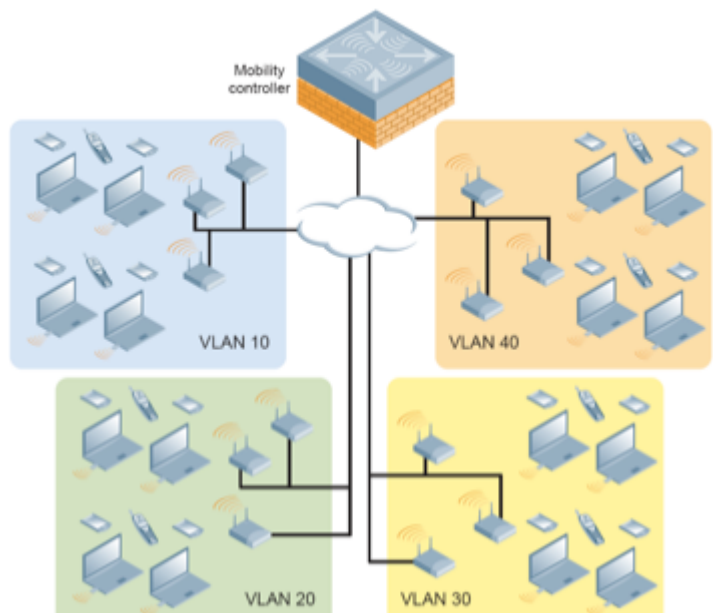
1. WMM Specifies how priority queues map to DSCP and dot1P tags
2. Different access categories, different contention parameters
3. 4 queues per radio; 8 queues total; supported on all APs
4. Voice and video gets priority over data

# Client Battery Life Challenges



1. WMM UAPSD support – increased power saving, increased cell capacity
2. Distribute TIM so that clients need not receive every beacon frame (~100 ms)
3. With Proxy ARP controller responds to ARP requests enabling clients to sleep longer
4. Traffic filtering at the AP to avoid extraneous multicast/broadcast frames

# Scaling Challenges: VLAN Pooling



1. Aruba VLAN Pooling allows a set of VLANs to be assigned to a designated group of users
2. Can use VLANs that already exist in the enterprise
3. Enables IP address and session persistence

# Bandwidth Management

## Implementation Rules

- Per role-based bandwidth contract
- Per user-based bandwidth contract

Bandwidth Contract	
Upstream: Not Enforced	<div><div></div><div>Change</div><div>Per Role</div></div>
Downstream: Not Enforced	<div><div></div><div>Change</div><div><div>✓ Per Role</div><div>Per User</div><div>Per AP Group</div></div></div>

- Per SSID-based bandwidth contract

Enable Shaping Policy	<input type="checkbox"/>	Voice Share	<input type="text" value="25"/>	%	
Video Share	<input type="text" value="25"/>	%	Best-effort Share	<input type="text" value="25"/>	%
Background Share	<input type="text" value="25"/>	%			



# Aruba Voice Enablers

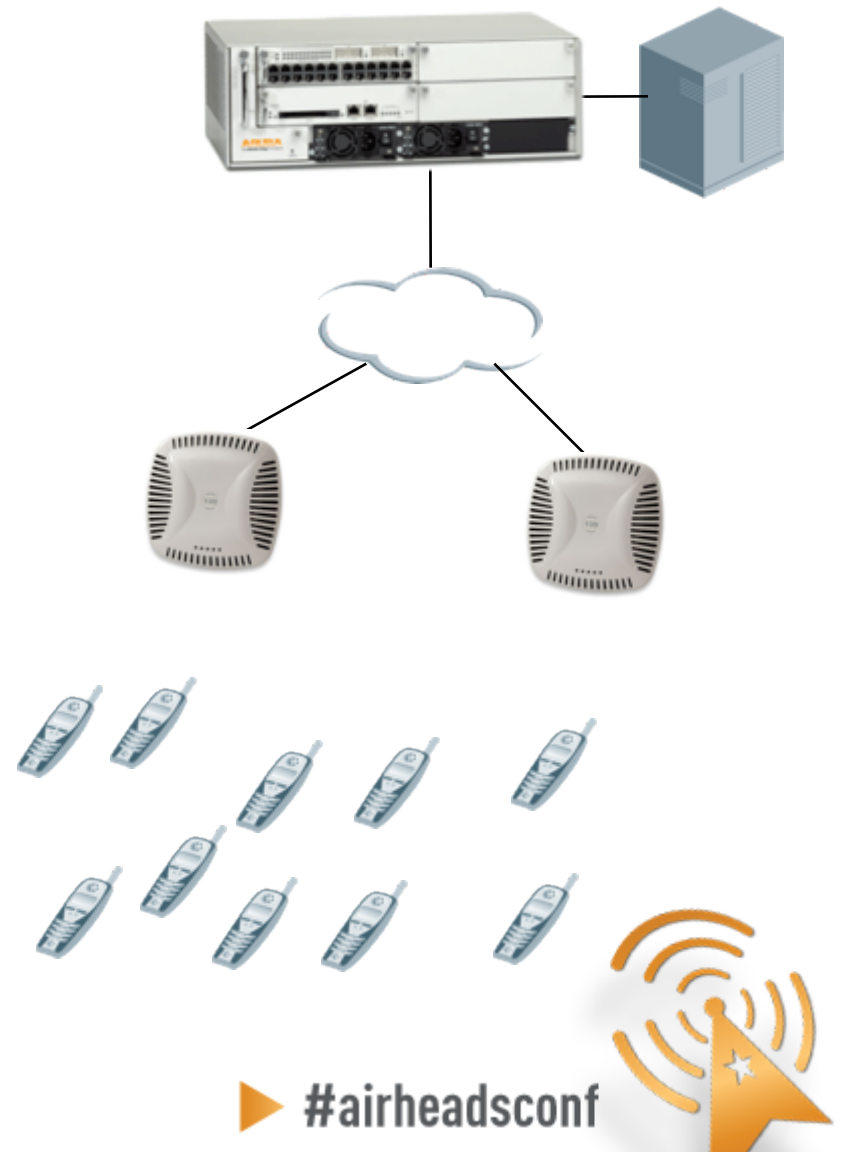
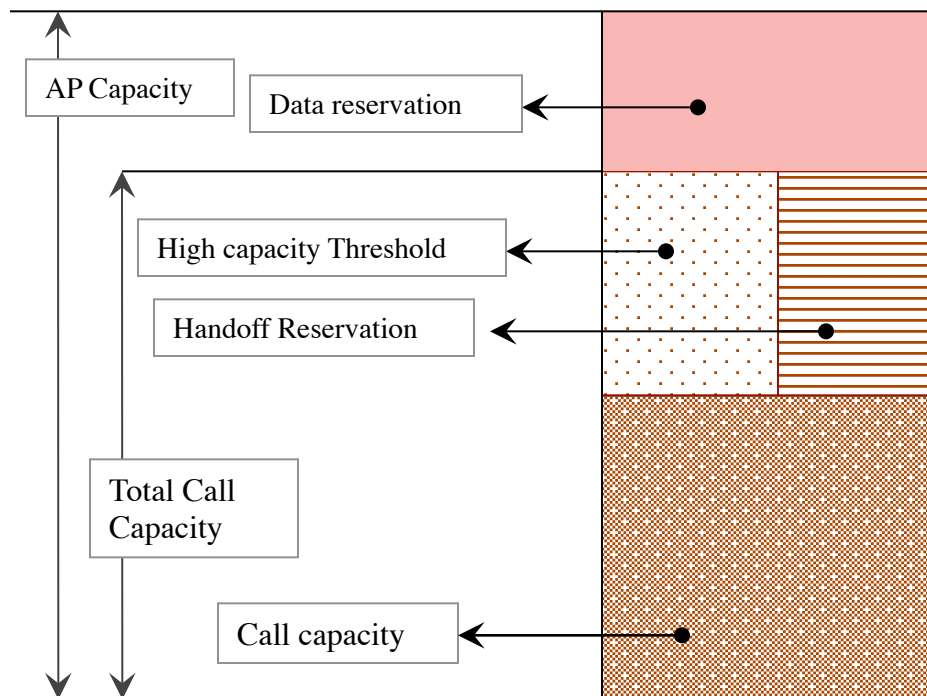


# Bandwidth Management: Call Admission Control

Example : Call Capacity = 6

High capacity threshold = 2

Handoff threshold = 2

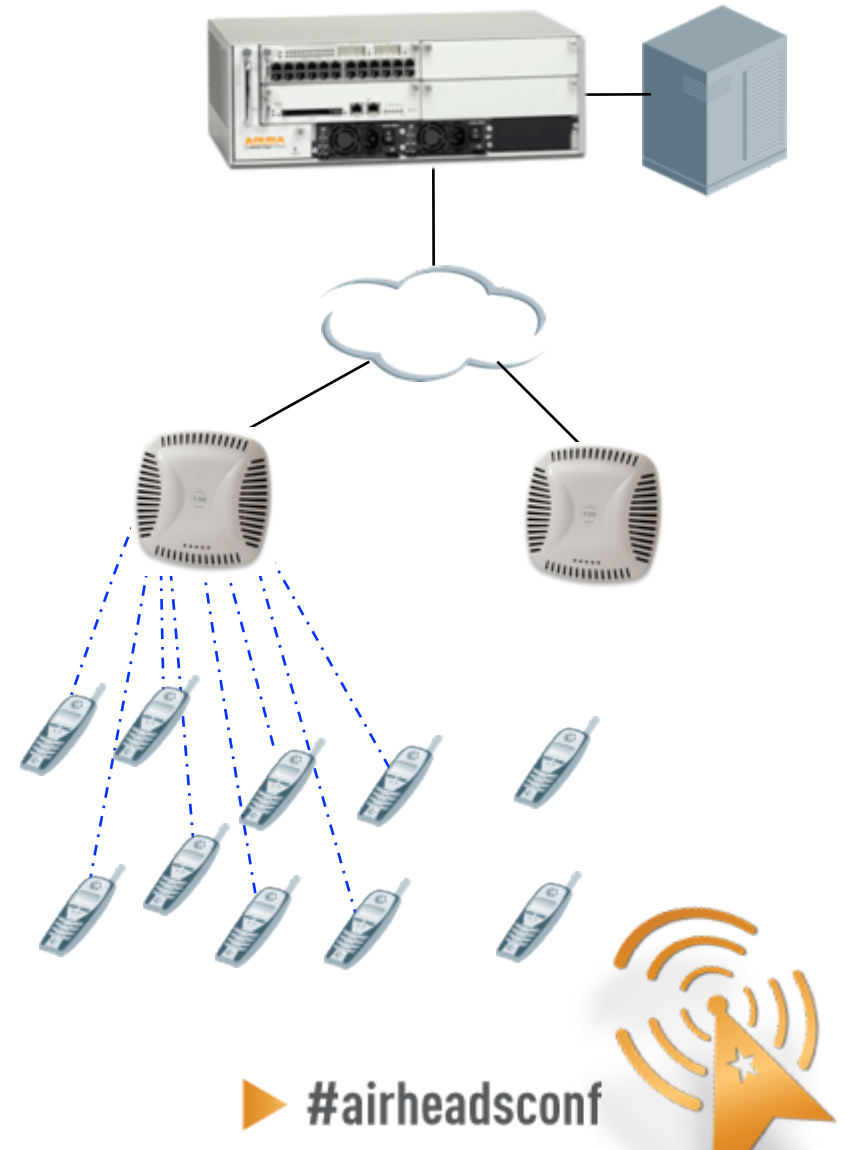
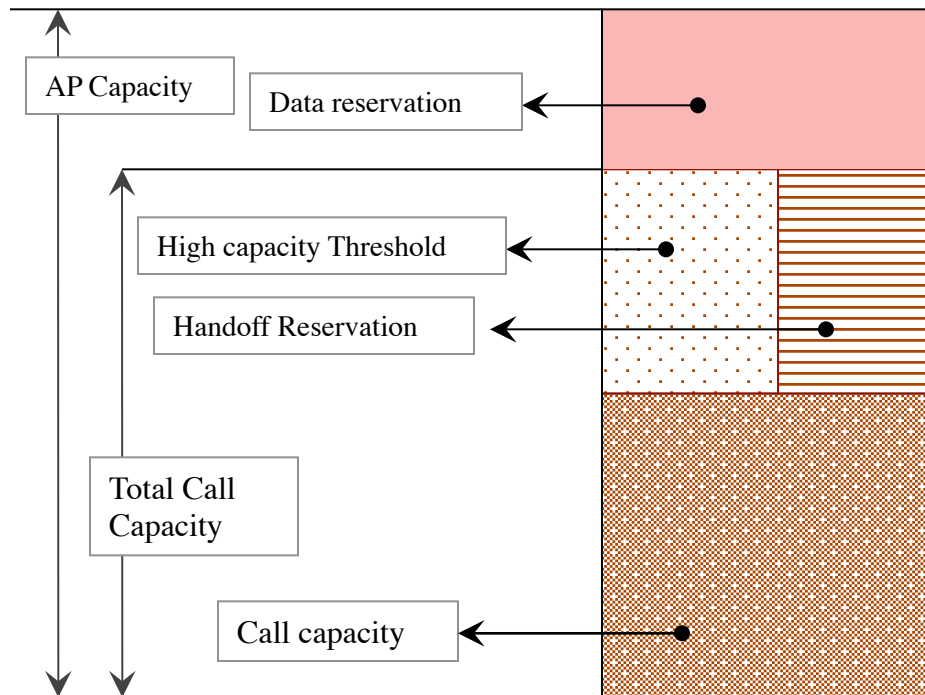


# Call Admission Control - Example

Example : Call Capacity = 6

High capacity threshold = 2

Handoff threshold = 2

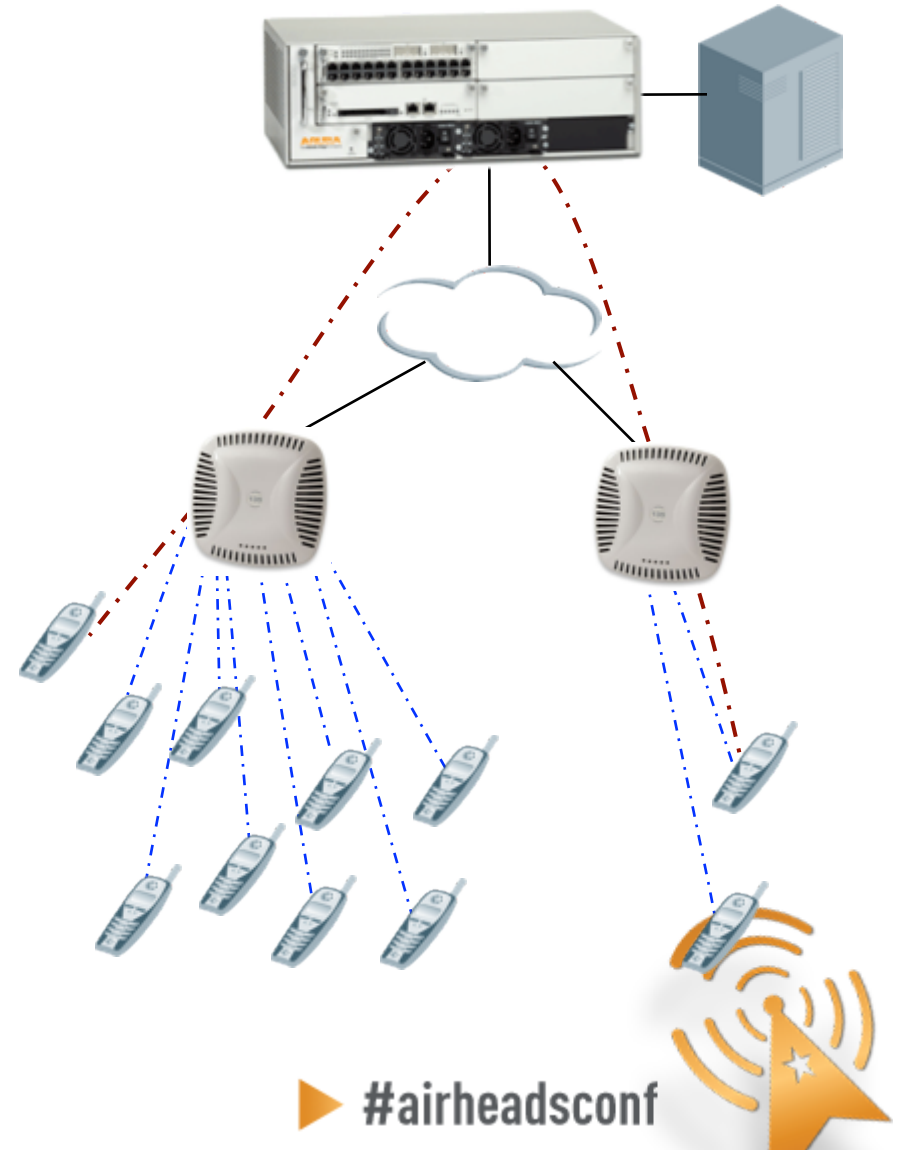
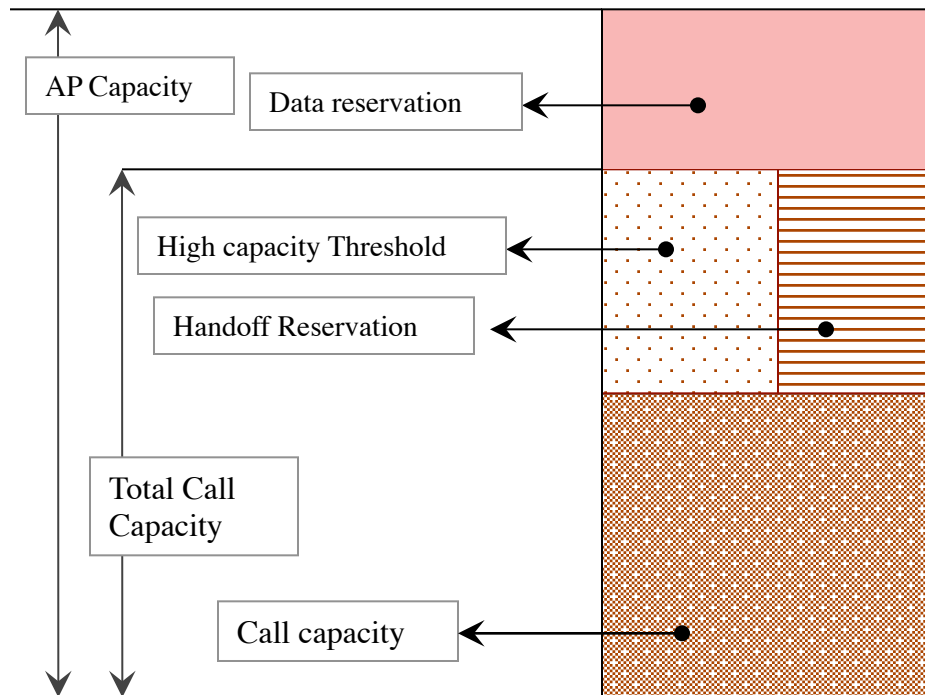


# Call Admission Control - Example

Example : Call Capacity = 6

High capacity threshold = 2

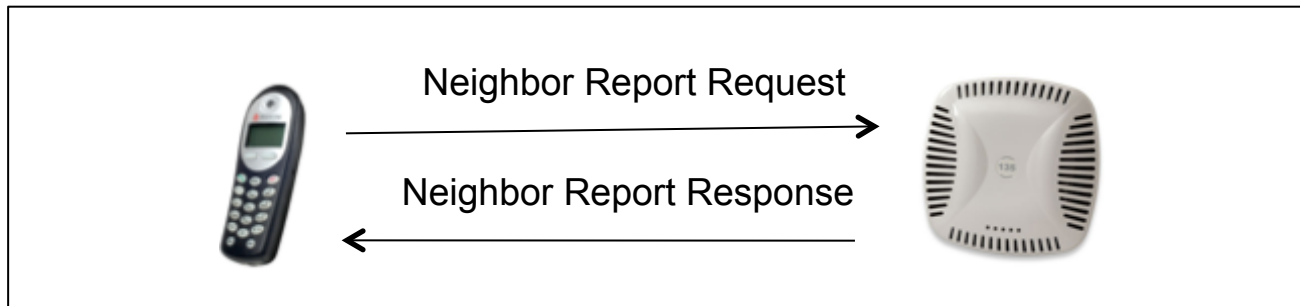
Handoff threshold = 2



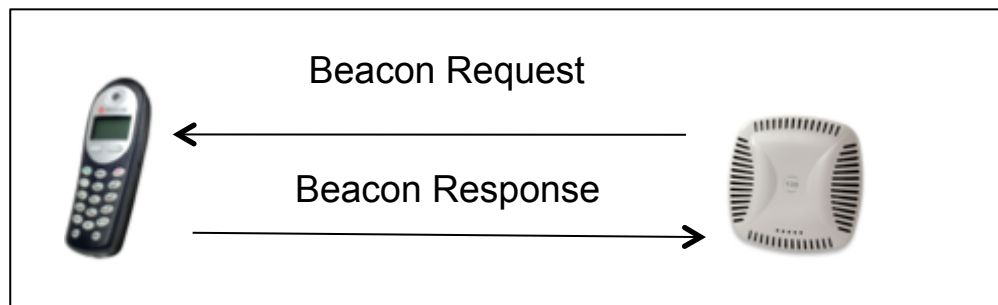
# Mobility & Roaming: Enterprise Voice Certification (Co-operative Client Control)

Real time data collection with 802.11k

- Neighbor Report (What is the AP seeing over the air)

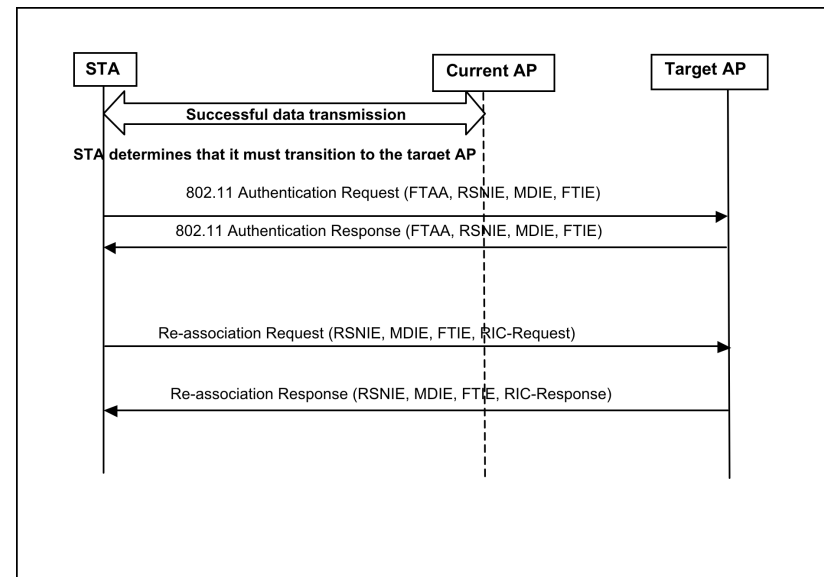
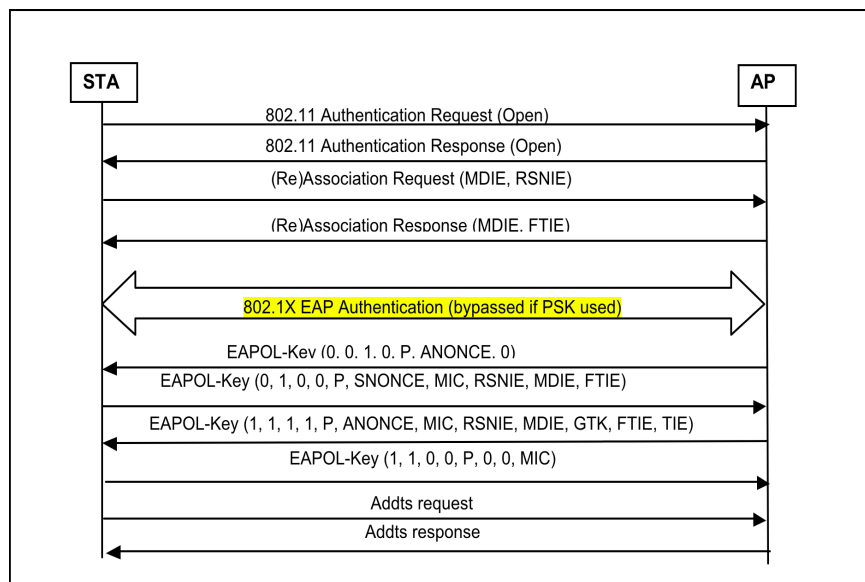


- Beacon Report (What is client seeing over the air)



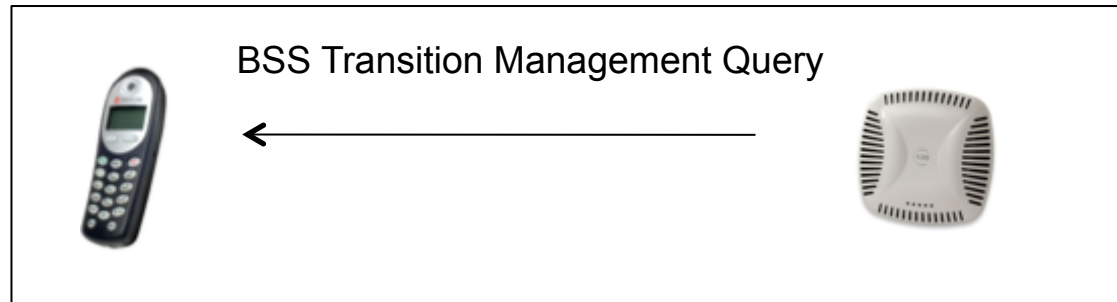
# Mobility & Roaming: Enterprise Voice Certification

***The handover delay from one AP to the other is reduced significantly; security and QoS states synchronized before roam***



1. Minimize delay in a clients transition from one BSS to another
2. Establishment of Security and QoS states at the target AP prior to/during association
3. Reduces handover delays to up to 50 ms, enhances voice performance
4. Requires support on the WLAN and the client side

# Mobility & Roaming: Enterprise Voice Certification



**With 802.11v, AP encourages clients to roam to the best AP utilizing information from 11k, 11r**

- Encouraging the AP to to a BSS transition
- Uses the system level view obtained by the beacon and neighbor reports from 11k
- Helps in admission control
- Requires WLAN and client support

# Mobility & Roaming: Fast Roaming Enablers

	PMK Cached				No PMK Cached		
	Intra-Controller Intra-VLAN	Intra-Controller Inter-VLAN	Inter-Controller Intra-VLAN	Inter-Controller Inter-VLAN	Intra-Controller Intra-VLAN	Intra-Controller Inter-VLAN	Inter-Controller Intra-VLAN
<b>Min.</b>	56 ms	62 ms	63 ms	56 ms	219 ms	223 ms	225 ms
<b>Max.</b>	86 ms	67 ms	70 ms	62 ms	257 ms	240 ms	240 ms
<b>Avg.</b>	68 ms	64 ms	66 ms	59 ms	231 ms	230 ms	233 ms

## 1. Security determines handover performance

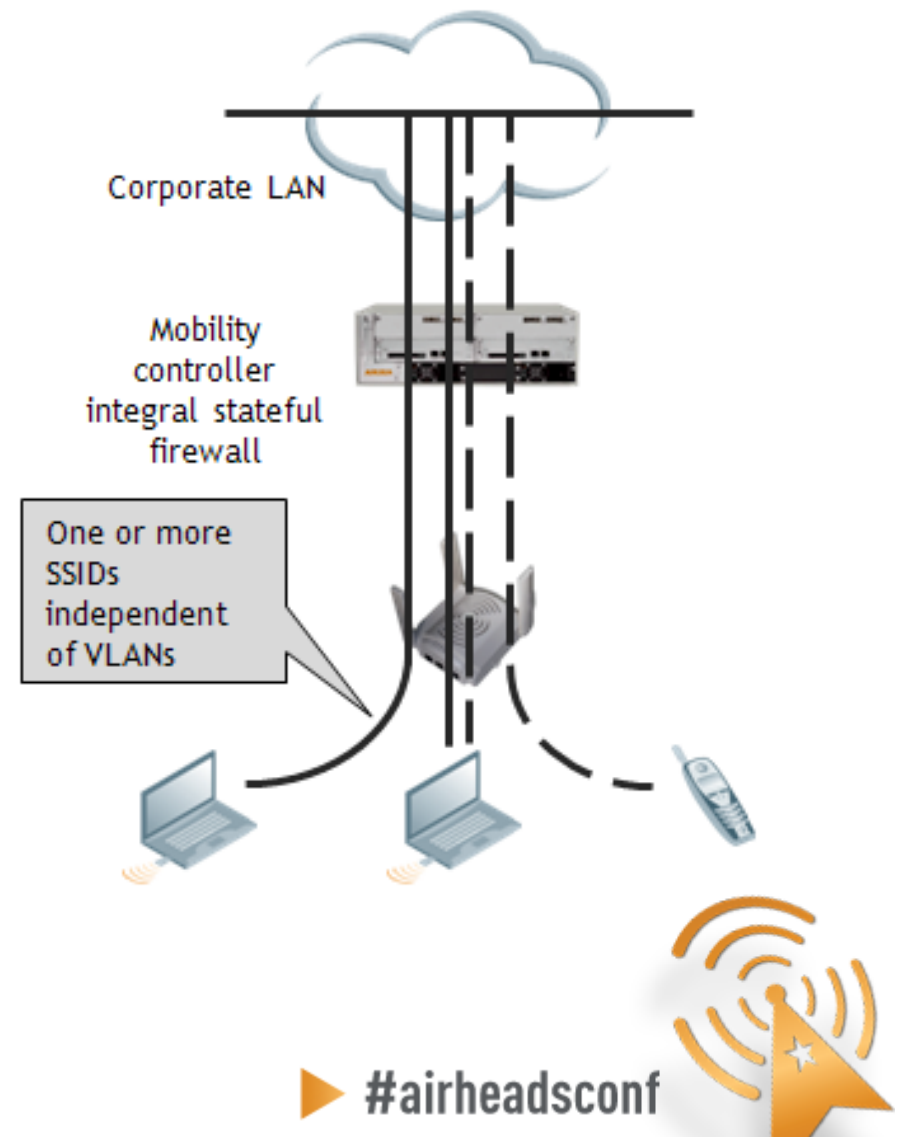
1. Need 802.1X security with PSK speed
2. Use WPA2 with 802.1X and opportunistic key caching (OKC) in centralized-controller WLAN; 11k/11r (future)

## 2. Session awareness for L3 roaming, voice aware dot1x rekeying



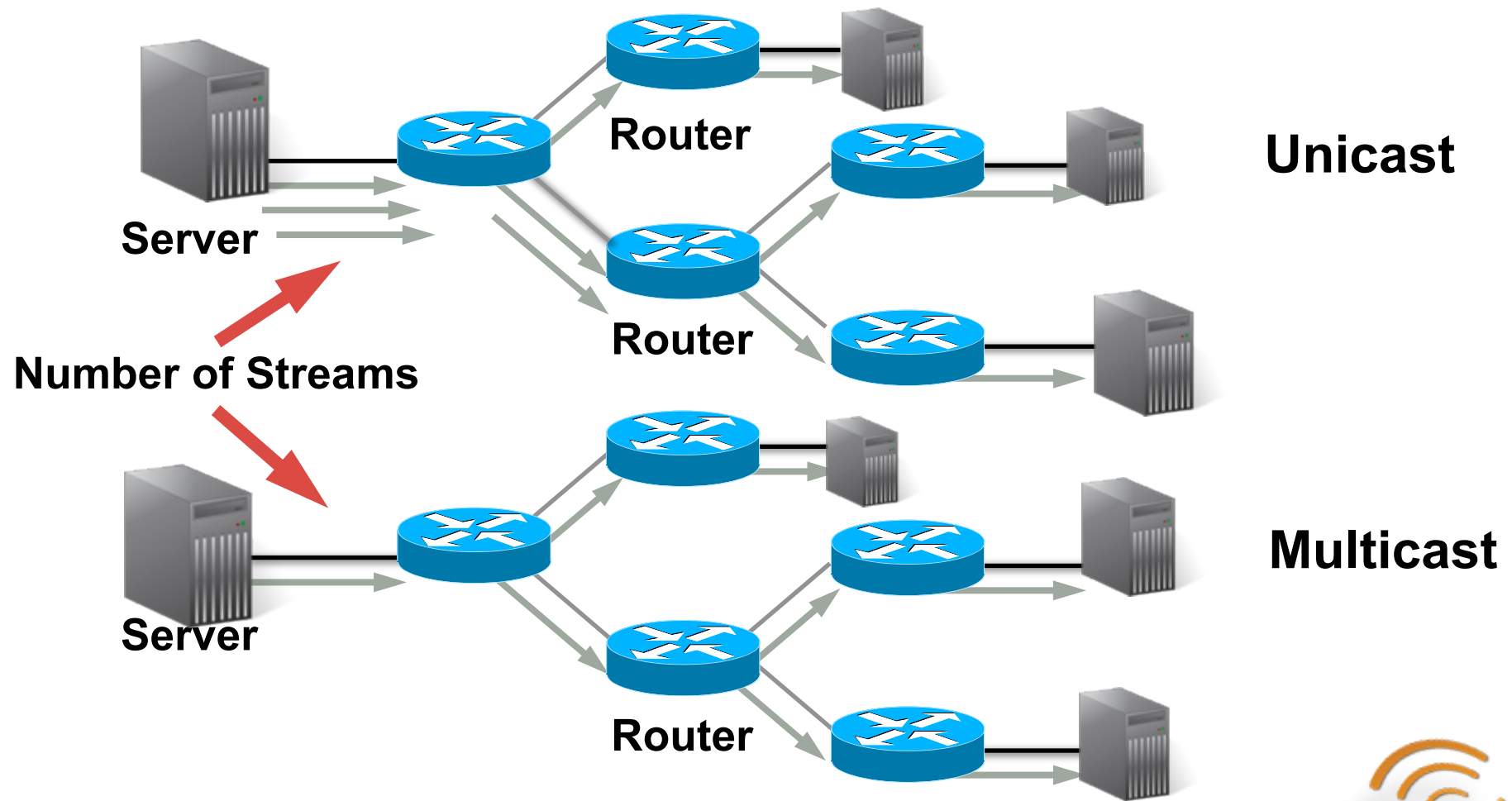
# ALGs: Voice Separation by Firewall

1. ALG support for most common voice protocols
2. ALGs include - SIP, SCCP, H323, NOE, Vocera etc.
3. Constantly adding newer ALGs



# Aruba Video Enablers

# Introduction: Multicast vs. Unicast



# Multicast – Why and Why not?

## Benifits



- ☐ Efficiency – reduced network traffic, reduced server and CPU load
- ☐ Performance – eliminates traffic redundancy
- ☐ Application – enabled distributed applications for different verticals

## Challenges



- ☐ Best effort Delivery, no QoS guarantees – poor quality, drops are to be expected
- ☐ No error correction – fire and forget
- ☐ Sent out at low control rates; 1 MB for b/g, 6 Mb for a

### ***Impact***

- ***Does not utilize 802.11 N High Throughput data rates***
- ***Heavy utilization of channel due to high rate of very slow packets***
- ***Video delivery is not reliable causing poor Quality of Experience***



# Cure to Video over WLAN Challenges

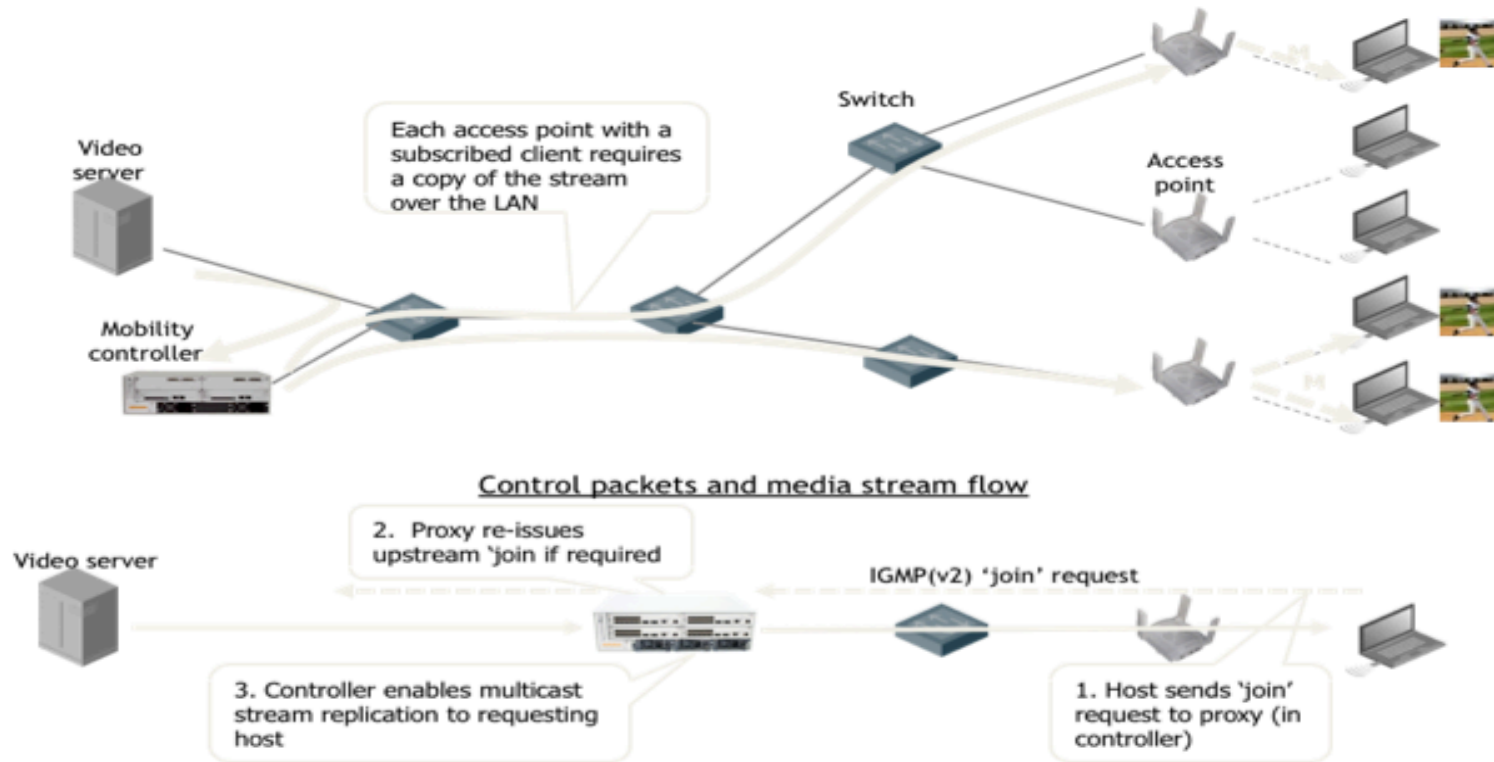
1. Wired Optimization
2. Wireless Optimization
3. Video Detection & Traffic Prioritization
4. Video Transport Optimization
5. Active Network and RF Client Control



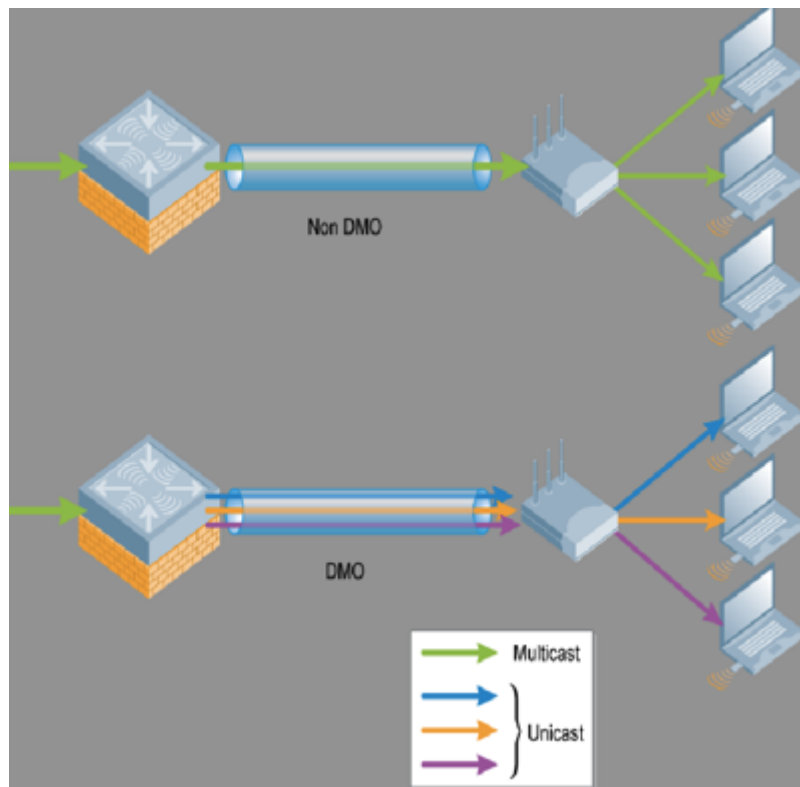
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# Wired Optimization with IGMP Proxy

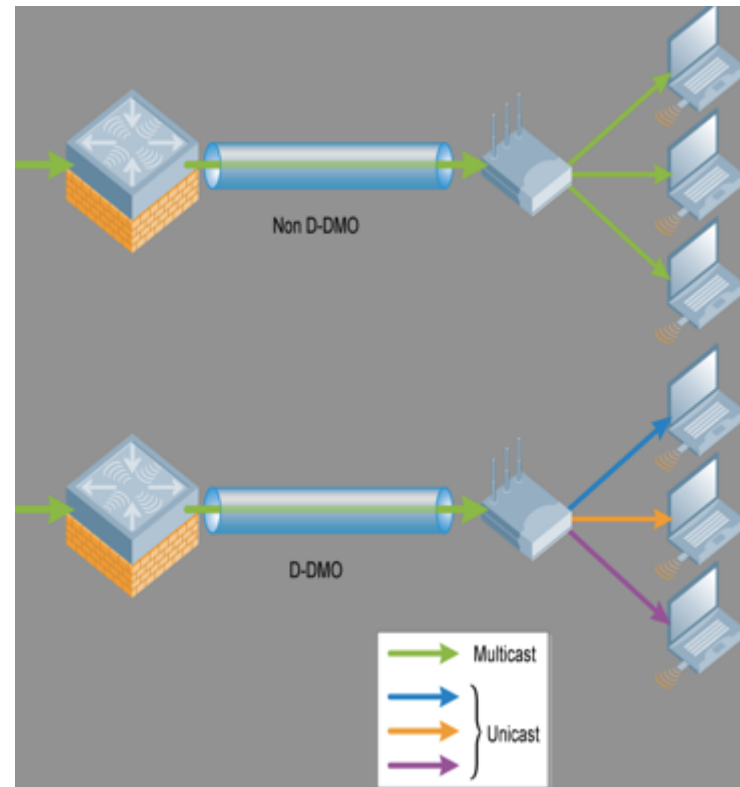
IGMP Proxy and Multicast Streams in a Centralized-Traffic WLAN



# Aruba Video Optimization – Multicast to Unicast Conversion



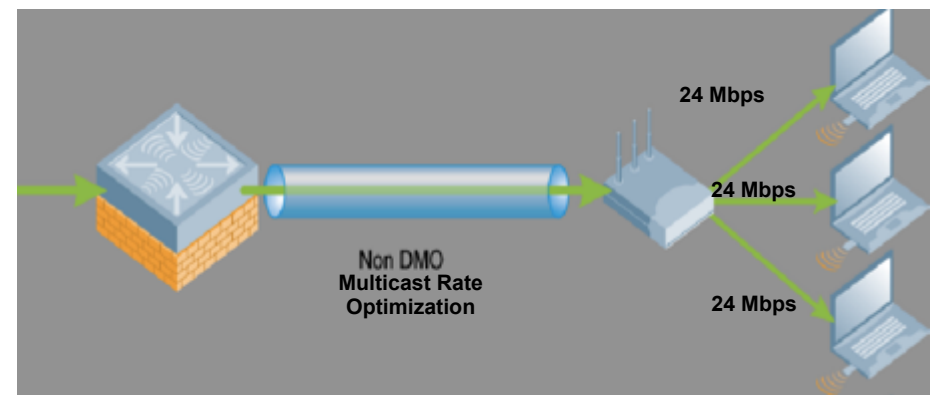
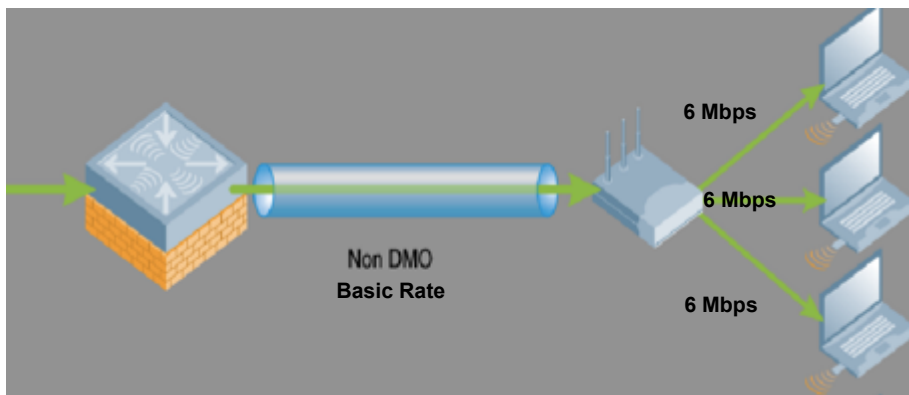
**Dynamic Multicast Optimization  
(Conversion at the WLAN Controller)**



**Distributed Dynamic Multicast Optimization  
(Conversion at the AP)**



# Aruba Video Optimization – Multicast Rate Optimization



Without any special tuning, multicast packet will be sent at either 'basic rate' or 'support rate' whichever is lower. For example, if I have the following:

802.11a Basic Rates  
802.11a Transmit Rates

18 24  
6 9 12 18 24 36 48 54

Multicast/Broadcast packet will be sent at 6 Mbps since it's the lowest of all rates. This applies to 'N' as well.

# Enterprise Apps: Collaboration and VDI



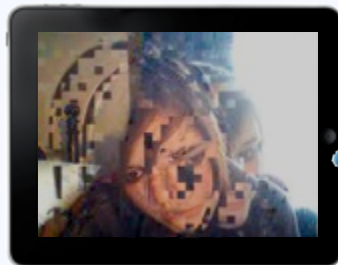
# Media Classification



- To detect a Media flow type where the Signaling is encrypted
- Methods developed for identifying voice and video for  
Microsoft OCS  
Apple FaceTime
- After classification apply appropriate service to flow
- When identified tag the frame for transport
- Media Classification assumes data immediately follows signaling

# Business Critical Apps: Citrix

**Before:** All traffic receives Static QoS



App: Unknown??  
QoS: Static

ICA

- Enforce QoS
- ICA Visibility

**After:** QoS based on traffic type



App: EMR  
QoS: Highest (VI)

App: Video  
QoS: High (VO)

App: File Sharing  
QoS: Low (BE)

ICA

- Classify ICA
- Tag QoS

WAN

Aruba  
Access  
Network

DATACENTER

NetScaler

XenDesktop  
XenApp  
Farm



**Coming Up:  
Tech Playground 12pm – 1:30pm**

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