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LAS VEGAS 2012

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MOBILE DEVICE FUNDAMENTALS

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Mobile Device Fundamentals Topics

Device Characteristics	• Portability • Applications • 802.11 support • Management	
WLAN Requirements	• Roaming • QOS and Access Control • Speed and capabilities • Security	
Aruba Design Pillars	• Device Configuration • Airtime Optimization • Roaming Optimization • IP Mobility Configuration • IP Multicast Optimization • Interference Resistance	

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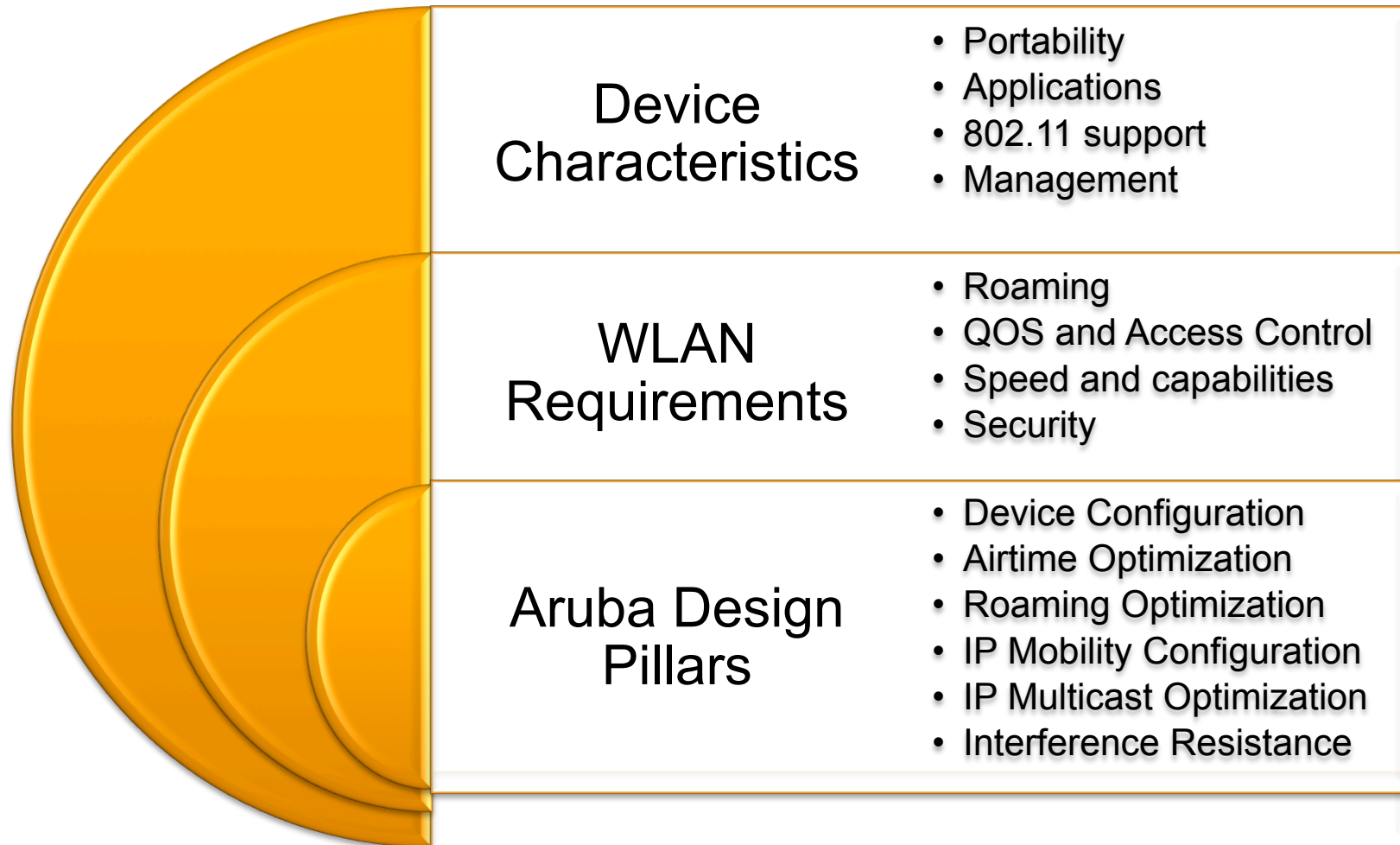
WLAN Requirements for mobile devices

Device Characteristic	Infrastructure Requirement
Portability	Roaming Support
Applications	QOS and Access Control
802.11 type	Speed and Capabilities
Management	Security

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What is roaming?

- **Client moving between APs in the same building**

- **Client associating to a new AP (BSS) using the same SSID**

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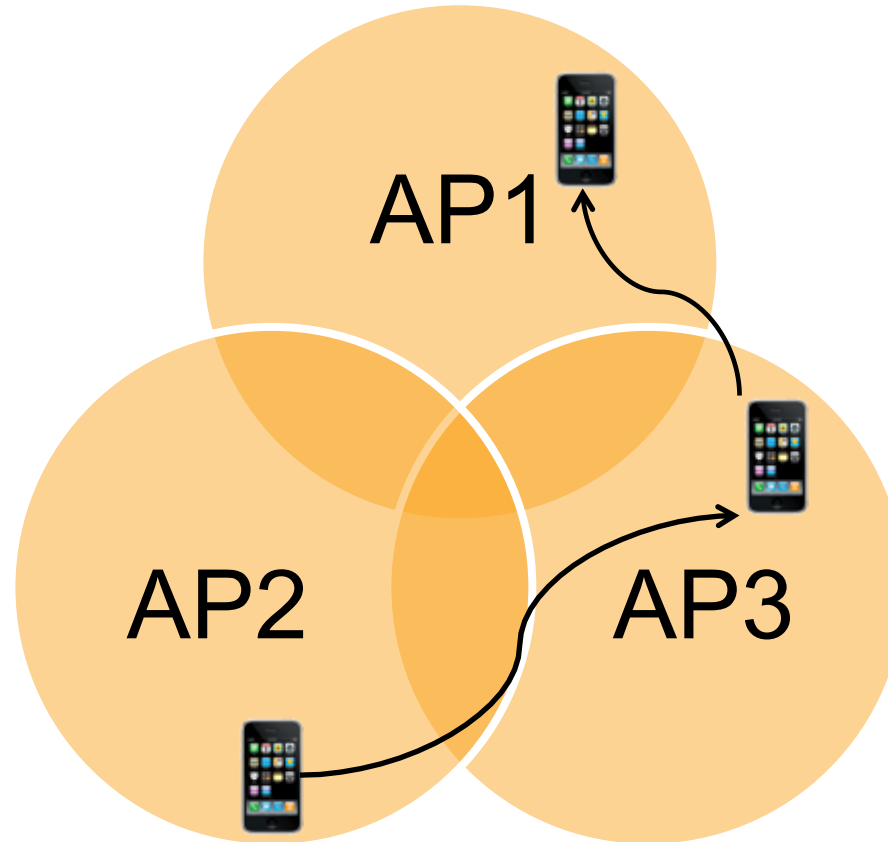
Mobile device types - Portability

Stationary Devices

Wireless Scale

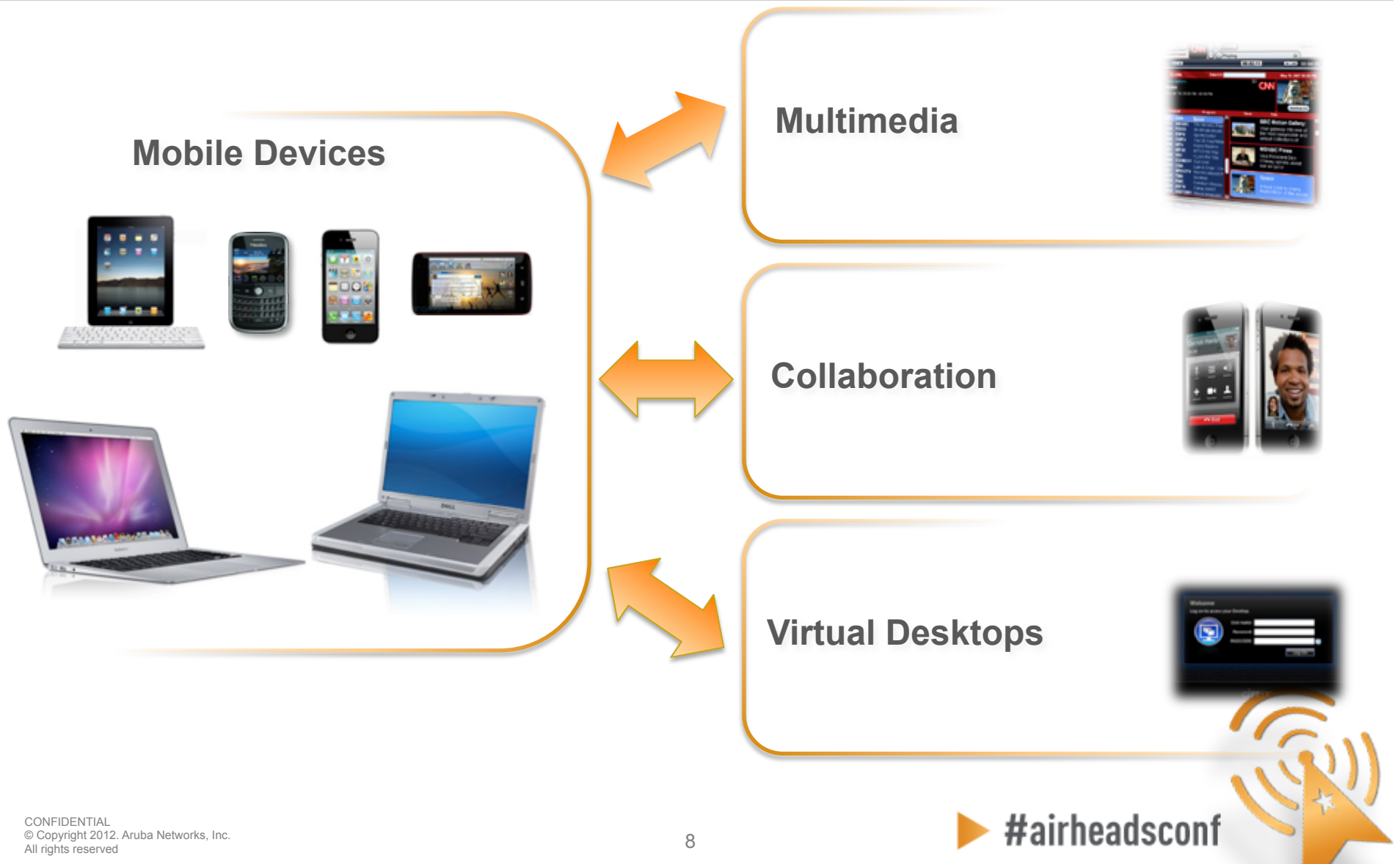Somewhat Mobile Devices (SMD)

Laptop

Highly Mobile Devices (HMD)

Increased need for Roaming Support

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HMD WLAN Roaming Challenges

- Continuous roaming
- Device is in use while roaming
- Roaming transitions should be undetectable to user
- APs must continually balance client load
- APs must provide consistent performance
- RF interference

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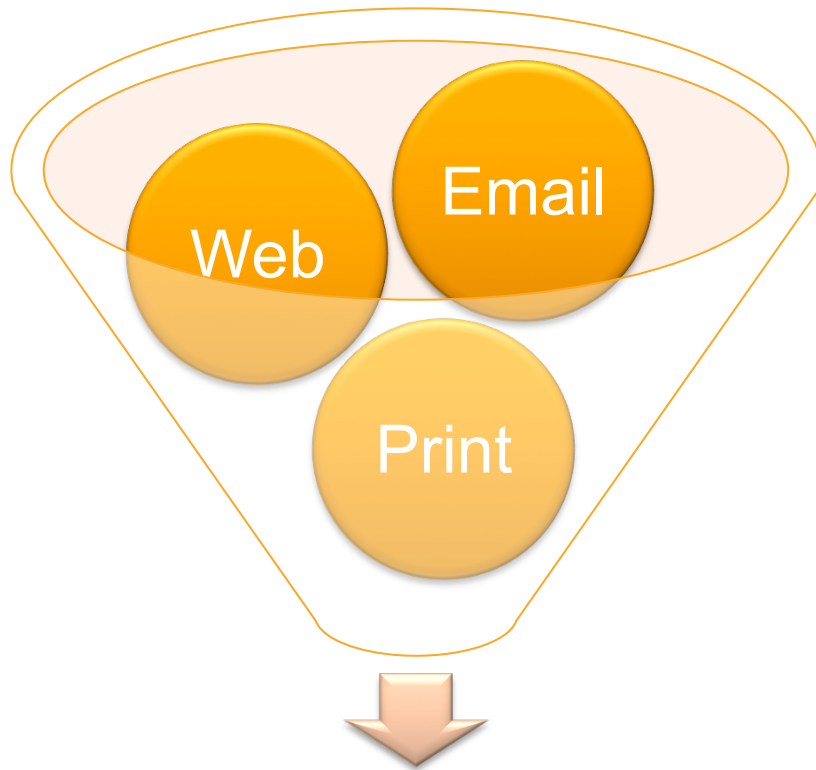# Use of mobile devices

Mobile Devices

Multimedia

Collaboration

Virtual Desktops

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Mobile device types - Applications

| Device Mobility Categories			
	Stationary Devices (SDs)	**Somewhat Mobile Devices (SMDs)**	**Highly Mobile Devices (s)**
Multi-Purpose Device	• PC	• Laptop	• Workstation on wheels • Smartphones and Tablets
Single-Purpose Device	• Wireless scale • RFID reader	• Barcode scanner • Point of Sale device	• Handheld scanning terminal • Mobile printers • Vehicle-based data terminal • Robotic stock pickers • 802.11 RTLS Tag
Voice Device	• IP desk phone • IP video camera	• N/A	• 802.11 voice handset • 802.11 voice badge

Mobile Application Categories

Multipurpose device attributes affecting roaming

- Wireless Network Interface Card (NIC) chipset and radio
- NIC driver vendor and revision
- NIC antenna (single, dual, diversity)
- NIC wireless support (802.11a, b, g, n)
- Client Supplicant and WLAN software
- Operating system and network protocol stack

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Application based QOS

Best Effort

High Priority

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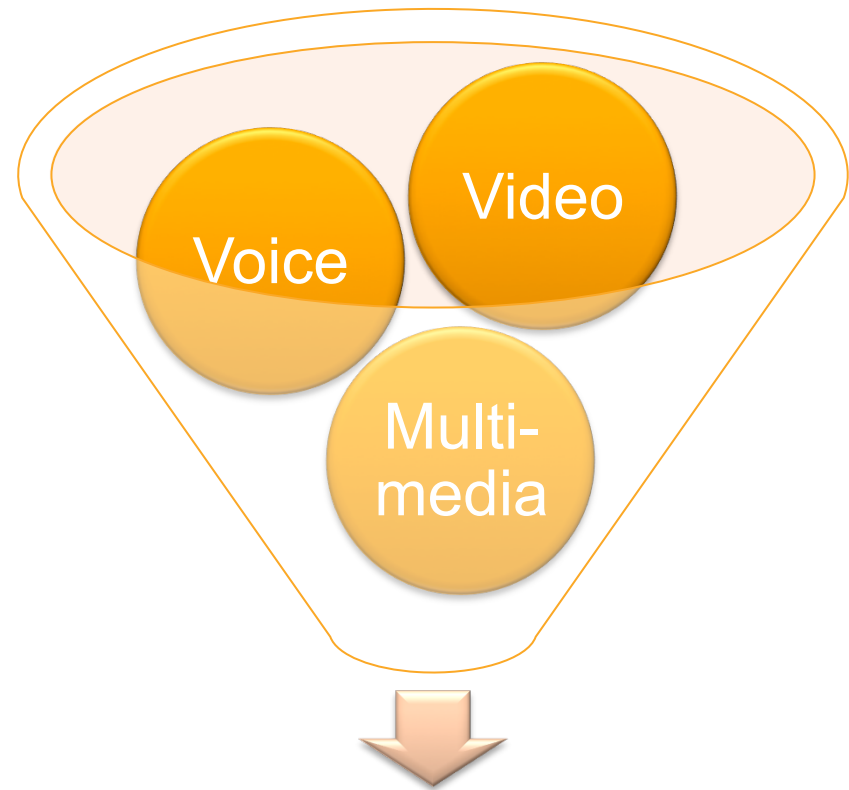
Mobile device 802.11 type

300 Mbps

2x2 MIMO:2

2x3 MIMO:2

54 Mbps

802.11a/g

3x3 MIMO:2

150 Mbps

1x2 MIMO:1

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Device management

Corporate Managed Device

Corporate Laptops

Non-Corporate Device

BYOD - Bring your own device

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Six Design Pillars

1. **Device Configuration**
   - Some device changes require corresponding changes to the WLAN infrastructure, e.g., basic rate support & DTIM.

2. **Airtime Optimization**
   - Roaming devices are sensitive to RF congestion and inefficiencies. Improve performance using load balancing across APs & channels.

3. **Roaming Optimization**
   - Roaming decisions can be influenced by optimizing data rates, output power, and retry thresholds.

4. **IP Mobility Configuration**
   - Good IP mobility design is critical to environments. Selection of layer-2 (L2) or layer-3 (L3) roaming requires careful planning.

5. **IP Multicast Optimization**
   - Reducing and optimizing multicast traffic over the air and on the wire is vital.

6. **Interference Resistance**
   - Devices are likely to encounter and by impacted by adverse RF conditions.

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Principle #1 – Device Configuration

- Optimal device settings
- Shared or dedicated SSIDs
- Enable 802.11h (DFS/TPC)
- Maximize battery life
- End-to-End QoS for voice devices
- Push-to-talk (PTT)
- Security and encryption
- Mobile device management (MDM)

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Principle #2 – Airtime Optimization

– RF Optimizations
- Band steering
- Spectrum load balancing
- Airtime fairness
- Mode-aware ARM
- Voice/Video-aware ARM
- Load-aware ARM
- PS-aware ARM

– Reducing broadcasts and multicasts

– Limiting "Chatty" protocols

– AP capacity planning (voice devices)

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Principle #3 – Roaming Optimization

- Ensuring complete Wi-Fi coverage

- VLAN pooling

- Fast roaming (802.11r & OKC)

- Device-specific roaming settings:

  - ARM power adjustments (match client and AP power)

  - Retry and failure settings (voice devices)

- PMK Caching results in 4x faster roaming speeds than Non-PMK Caching.

Roaming

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Principle #4 – IP Mobility Configuration

- ## Layer 2 mobility
  - Client maintains IP address as it roams and is assigned address from same IP subnet

- ## Layer 3 mobility
  - User roams from AP-Subnet A to an AP-Subnet B
  - Layer 3 network address must change to maintain L3 connectivity on Subnet B
  - Aruba L3 Mobility allows the roaming client to maintain the same IP address

L2 Mobility design
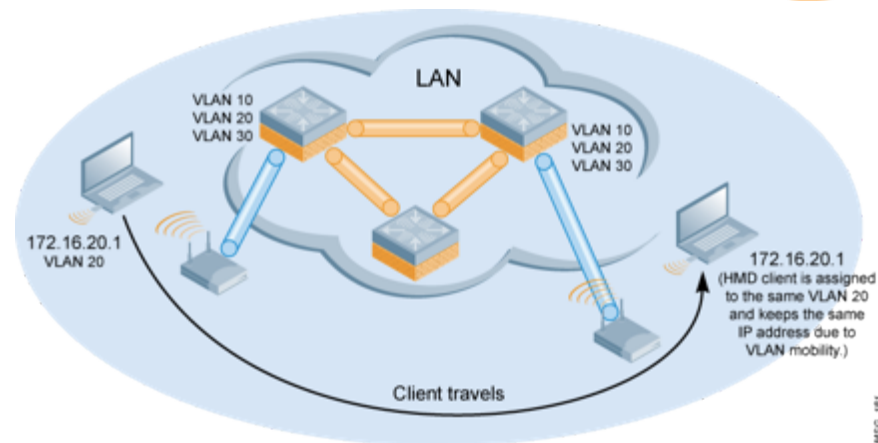
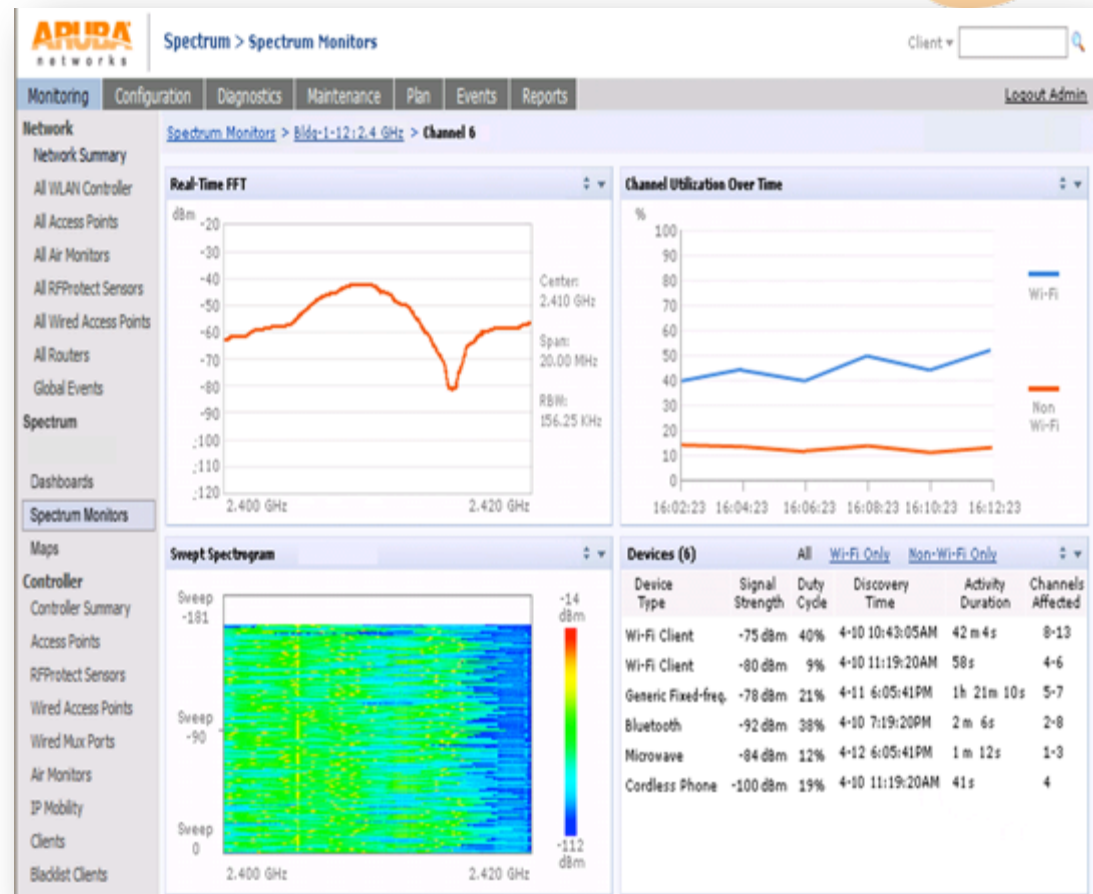

L3 Mobility design

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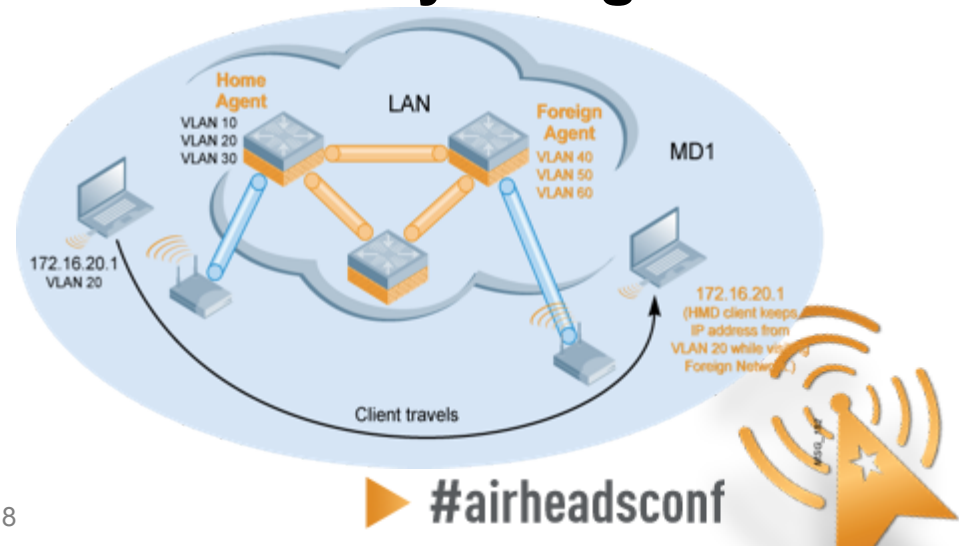
Principle #5 – IP Multicast Optimization

- Effects of multicast: reduce multicast traffic over the air and the wire to improve channel efficiency

- IGMP snooping/proxy to eliminate unnecessary data replication and controller processing

- Multicast rate optimization to increase lowest base rate

- Dynamic multicast optimization (DMO) to convert multicast frames with unicast headers

- Use of ToS/QoS on controller and wired infrastructure, port-based session ACL or user

- Block mDNS (if not required) with user roles

- Use bandwidth contracts to protect unicast traffic

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Principle #6 – Interference Resistance

- FHSS and non-802.11 interference
    - Noise immunity
- Fixed frequency interference
- 802.11 co-channel (CCI) and adjacent channel interference (ACI)
    - RX sensitivity channel reuse
- Aruba Spectrum Monitor

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THANK YOU!