ROCKIN’ VOICE AND VIDEO OVER WIFI!
Agenda

Multimedia over WLAN Challenges

Generic Design Recommendations for Multimedia

Aruba Enablers for Voice

Aruba Enablers for Multicast Video

Enterprise Application – Collaboration & VDI
Understand Mobility Requirements

Mobile Devices

Multimedia

Collaboration

Virtual Desktops
Multimedia over WLAN

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

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

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

- 2.4GHz: 802.11b/g
- 5.15GHz: 802.11a/n

1. Band Steering
2. All channels with SDR/DFS certified radios
3. Coordinated access/Co-channel interference avoidance
4. Channel Load Balancing
5. Airtime Fairness/Scheduling
RF Challenges: Interference Avoidance with Spectrum Analysis
End-to-End QoS: Introduction

Transport Edge (GRE encapsulated)

Core

Wireless

Tagged DSCP

Bandwidth Management / Queuing

Upstream

Downstream

Bandwidth Management / Call Admission Control
Application Aware RF Management

WLAN / strict queuing

WLAN / SVP
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
- Per SSID-based bandwidth contract
Aruba Voice Enablers
Bandwidth Management: Call Admission Control

Example: Call Capacity = 6
High capacity threshold = 2
Handoff threshold = 2
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
Real time data collection with 802.11k

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

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

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 re-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

Server

Router

Unicast

Multicast

Server

Number of Streams

Router
Multicast – Why and Why not?

**Benefits**
- 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
Wired Optimization with IGMP Proxy
Aruba Video Optimization – Multicast to Unicast Conversion

Dynamic Multicast Optimization (Conversion at the WLAN Controller)

Distributed Dynamic Multicast Optimization (Conversion at the AP)
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:

<table>
<thead>
<tr>
<th>802.11a Basic Rates</th>
<th>18 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.11a Transmit Rates</td>
<td>6 9 12 18 24 36 48 54</td>
</tr>
</tbody>
</table>

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

After: QoS based on traffic type

App: Video QoS: High (VO)
App: EMR QoS: Highest (VI)
App: File Sharing QoS: Low (BE)
App: Unknown?? QoS: Static

WAN

Aruba Access Network

DATACENTER

NetScaler

XenDesktop XenApp Farm

• Classify ICA
• Tag QoS

• Enforce QoS
• ICA Visibility

#airheadsconf
Coming Up:
Tech Playground 12pm – 1:30pm