Wireless Nets, Ltd.

Site Surveys for Location Applications

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Presenter

- **Jim Geier** – Principal Consultant, Wireless-Nets, Ltd.
  - Assists firms with the development and deployment of wireless networks
  - Has conducted wireless site surveys for design and verification purposes in many venues, such as hospitals, airports, warehouses, and cities
  - Author of a dozen books, including *Designing and Deploying 802.11n Wireless Networks* (Cisco Press) and *Implementing 802.1X Security Solutions* (Wiley)
  - Instructor: ***Wireless Network Design Workshop*** (sponsored by Fluke Networks) – learn how to design optimum 802.11n/ac networks with AirMagnet Survey for voice and location applications - details at *www.wireless-nets.com/workshop.pdf*
  - Contact Jim Geier at *jimgeier@wireless-nets.com*

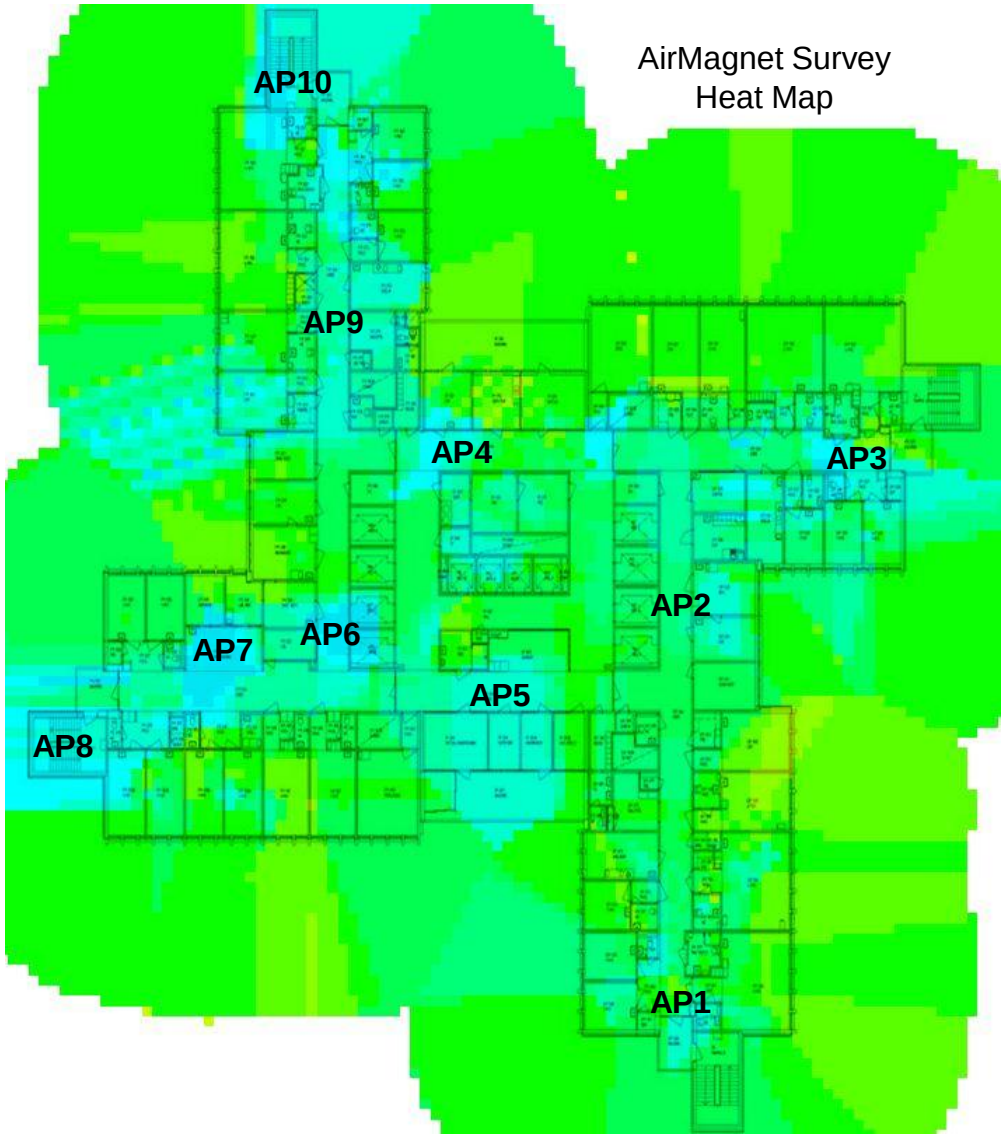
Overview

- Survey Fundamentals
- Technical Requirements
- Test Methods

Survey Fundamentals

What is a Design-Based Survey?

- Performed before installation of access points
- Needed to optimize installation locations for access points
- Critical to achieve required performance and security
- Must satisfy special application needs and requirements
  - Data
  - Voice
  - ***RTLS***



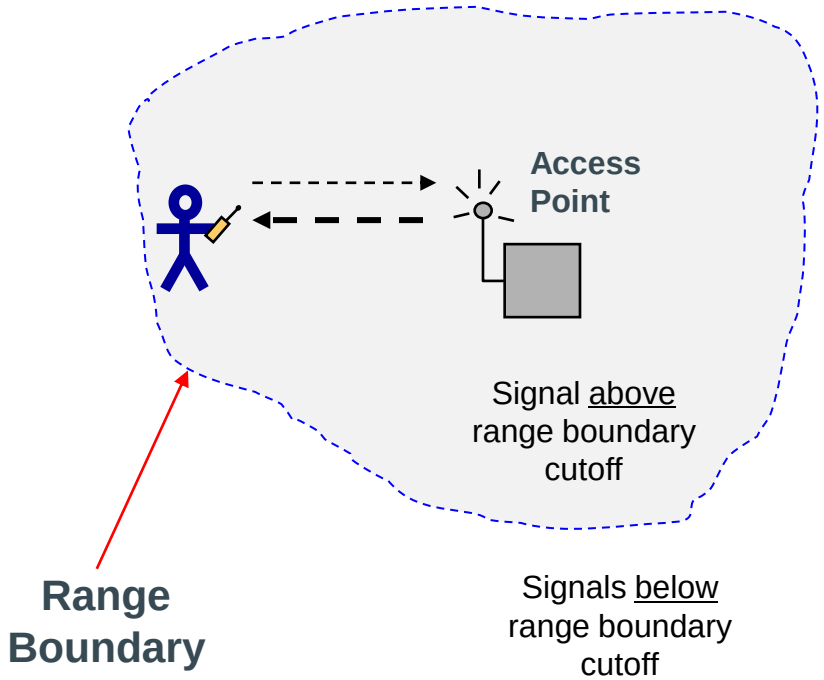
General Considerations

- Wireless requirements
  - Application type (e.g., ***voice***, RTLS)
  - Client devices
  - Signal coverage areas
  - Roaming
- Range boundary criteria
  - RSSI, SNR, and data rate cutoffs
- Test tools
  - Signal coverage and spectrum analysis
- Survey planning and coordination
  - Access to rooms
  - Schedule

AirMagnet Survey

Technical Requirements

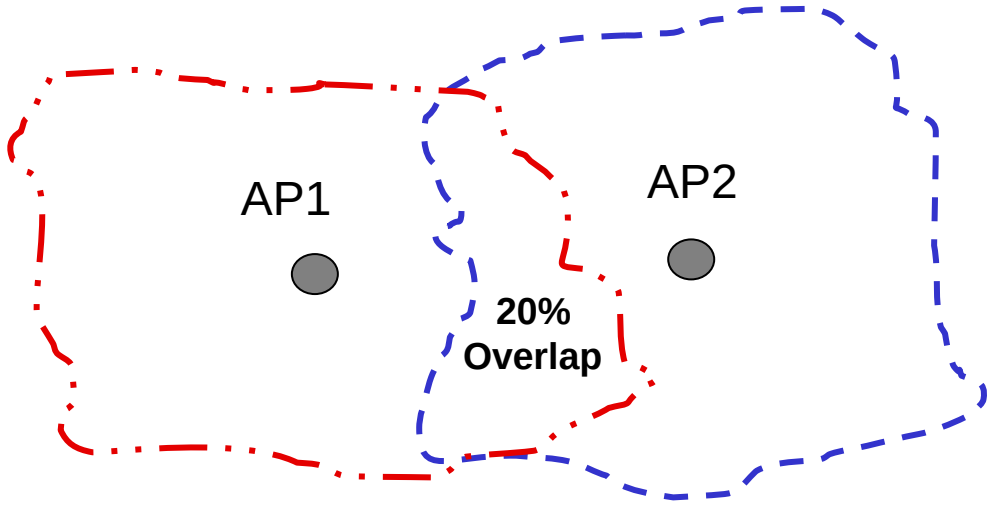
Range Boundary Criteria



- Typical voice criteria (all must be met)
  - RSSI: -67 dBm
  - SNR: 25 dB
  - Data rate: 24 Mbps
  - PER: 1% max

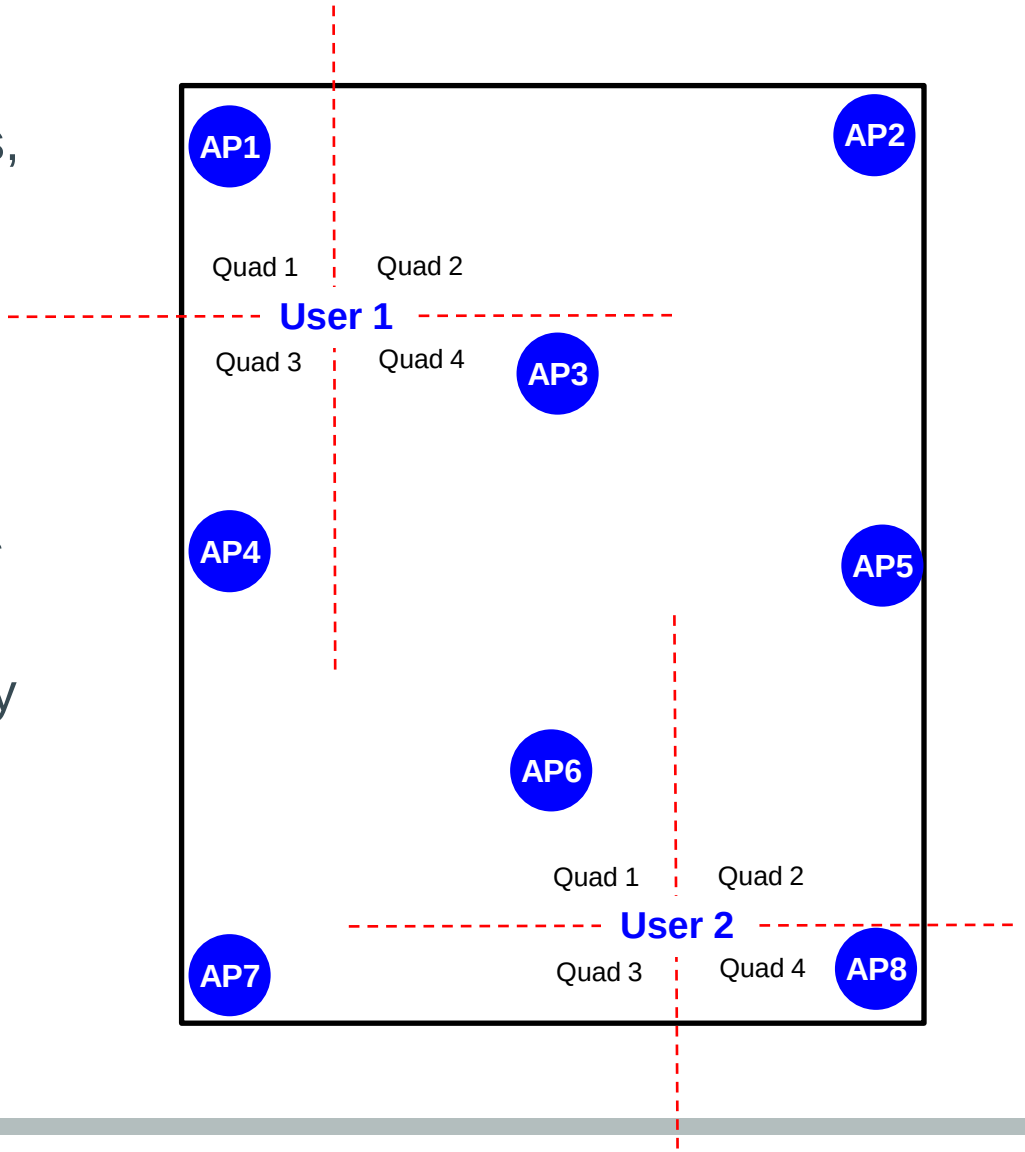
Roaming Considerations

- Critical for voice applications
- Need overlapping cells to support effective handoffs for roaming
  - from both access point and client perspective
- Strive for 20 percent overlap between adjacent radio cells



RTLS Technical Requirements

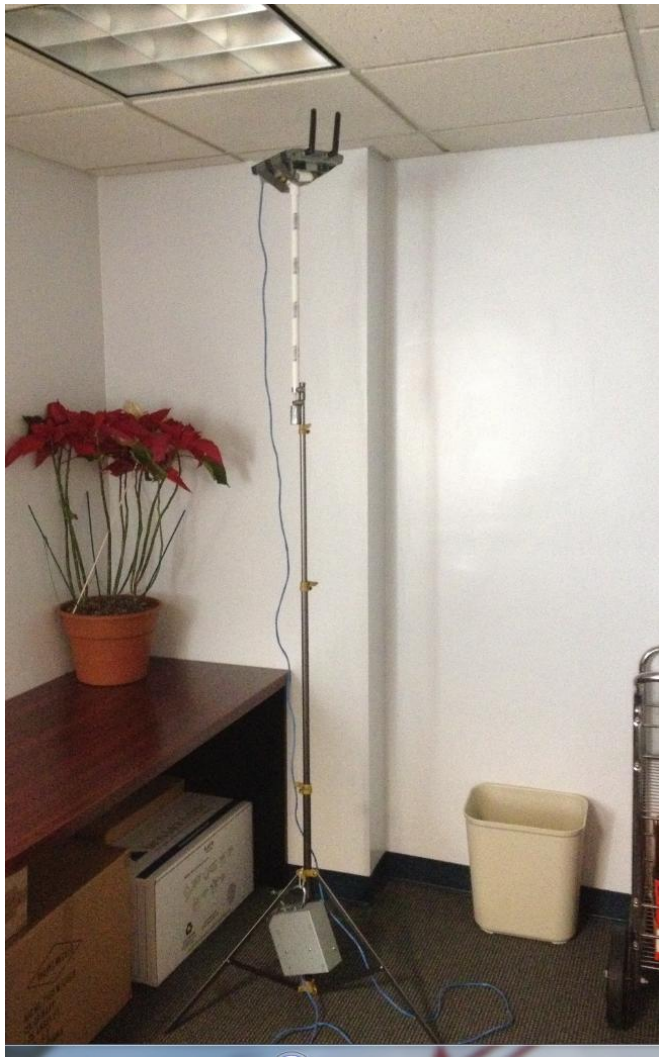
- Need access points in corners, around the perimeter, and fillers
- Triangulation is needed for location algorithms to work
- ***Minimum -75 dBm from at least three (3) access points in different quadrants***
- Generally requires significantly more access points than voice-only designs



Test Methods

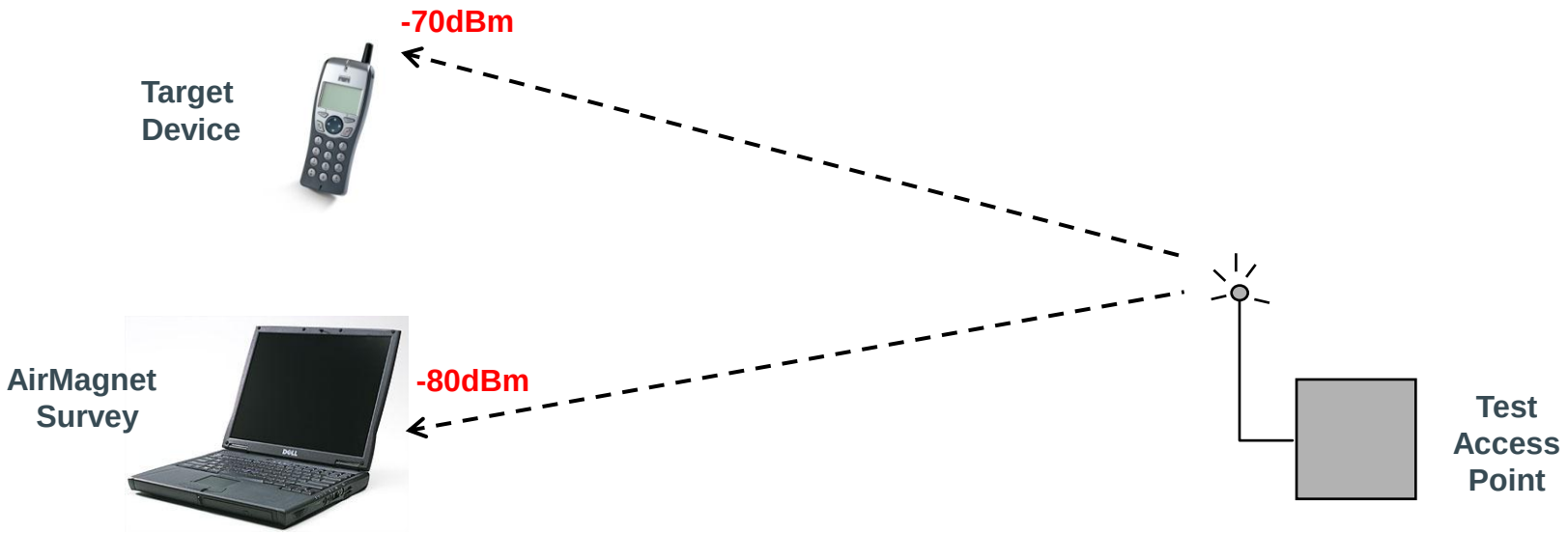
Test Access Point Test Configuration

- Use similar access point and antennas as being deployed
- Transmit power
  - Set to transmit power of weakest client (11 dBm?)
- RF channel
  - Use 5 GHz only?



Calibrate for Target Client Devices

- Perform survey based on target client device(s) RSSI
- RSSI varies among different client device radios
- Calibrate AirMagnet Survey to display same RSSI as target device(s)



AirMagnet Survey Configuration

- Use active survey mode
- Use typical client radio
- Propagation assessment: 10 feet
- Client radio transmit power: typical weakest client

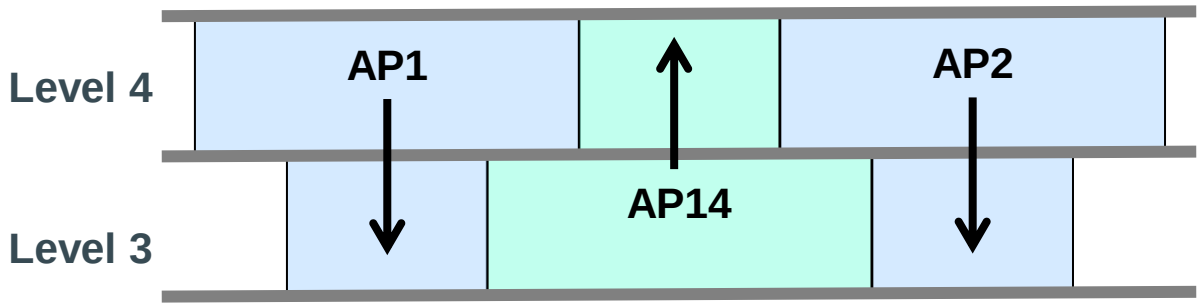
General Test Procedures

1. Perform initial walkthrough of the coverage areas
2. Perform RF spectrum testing
3. Configure test equipment based on requirements
4. Perform initial sample signal propagation testing
5. Test coverage of desired access point installation locations
   - Compare 2.4 GHz and 5 GHz propagation
   - Test inter-floor propagation
   - Test all proposed installation locations
     - Click sample points within 10-15 feet
     - Take readings until RSSI is below -80 dBm
6. Prepare site survey report

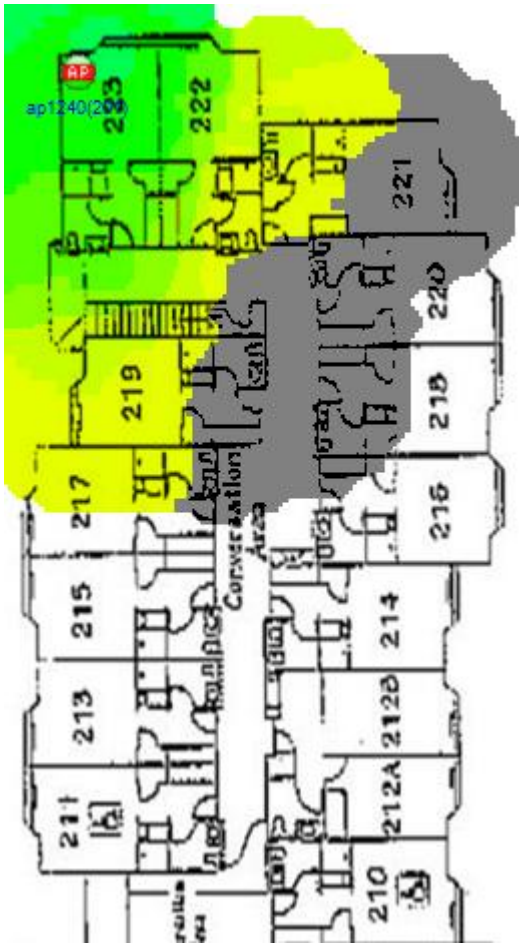
******Establish survey guidelines for consistency***

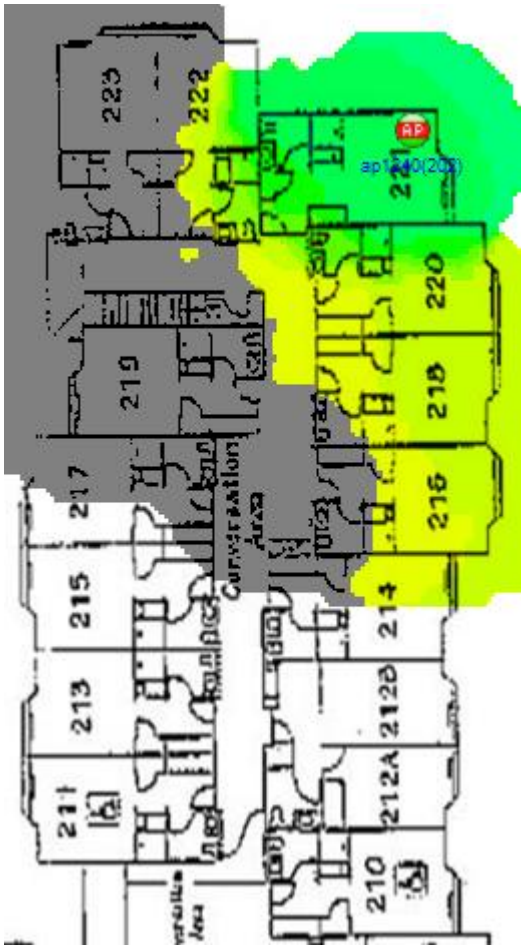
Access Point Location Tips

- For location-based surveys, place access points in all corners of the facility and along perimeters
- Locate access points next to elevators
  - Test inside the elevator
  - Higher gain antenna?
- Locate access point near stairwells (inside stairwells?)
- Stagger access points on adjacent floors if possible
  - Sample test inter-floor propagation on each floor

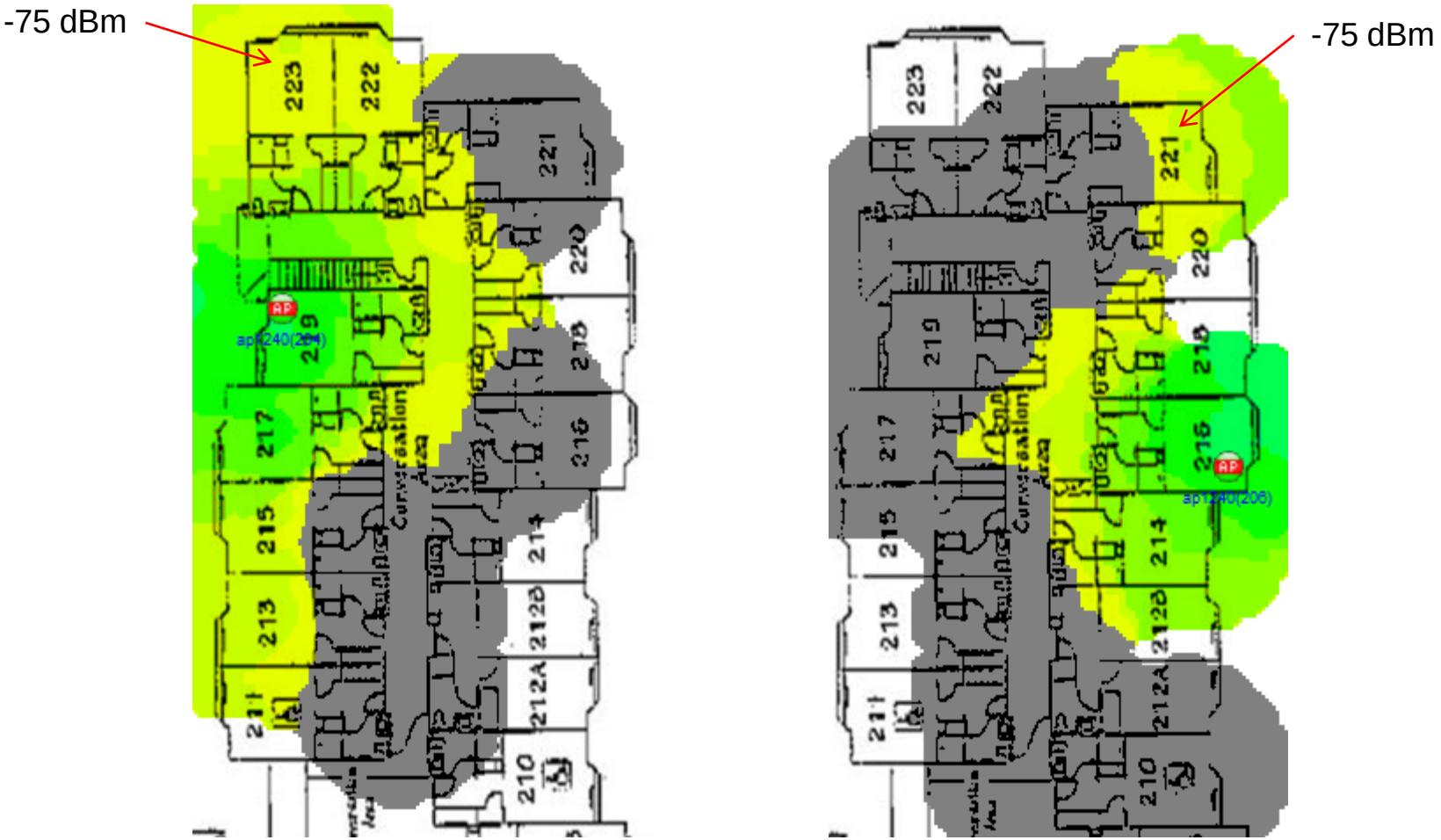


Example – Survey the Corners



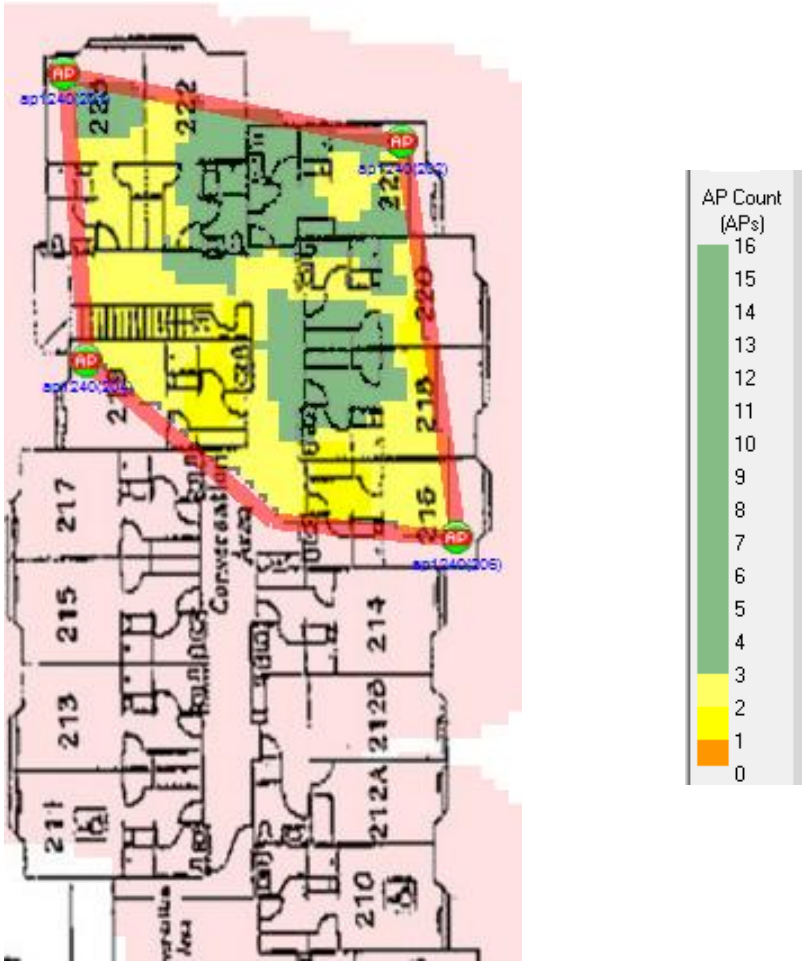


Example – Survey the Perimeter

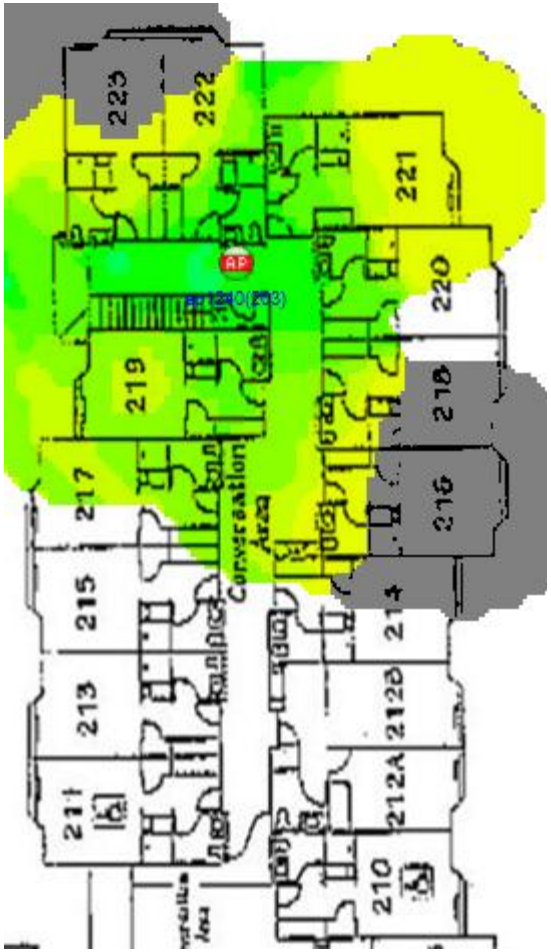


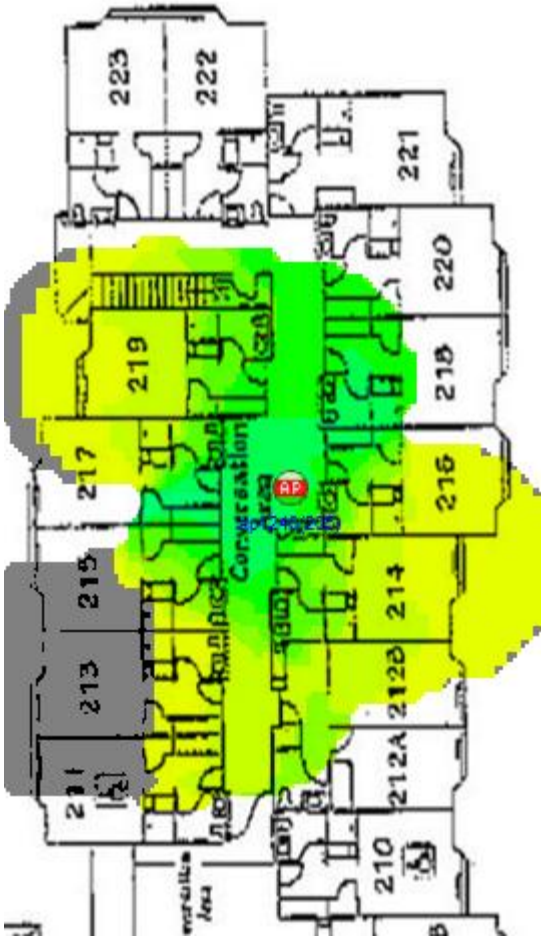
Example – Verify Location Requirements

- In AirWise, choose Cisco Location Service policy
- Or, edit policy as needed:
  - Number access points
  - Minimum RSSI
- Display coverage based on policy
- Verify whether location requirements are met



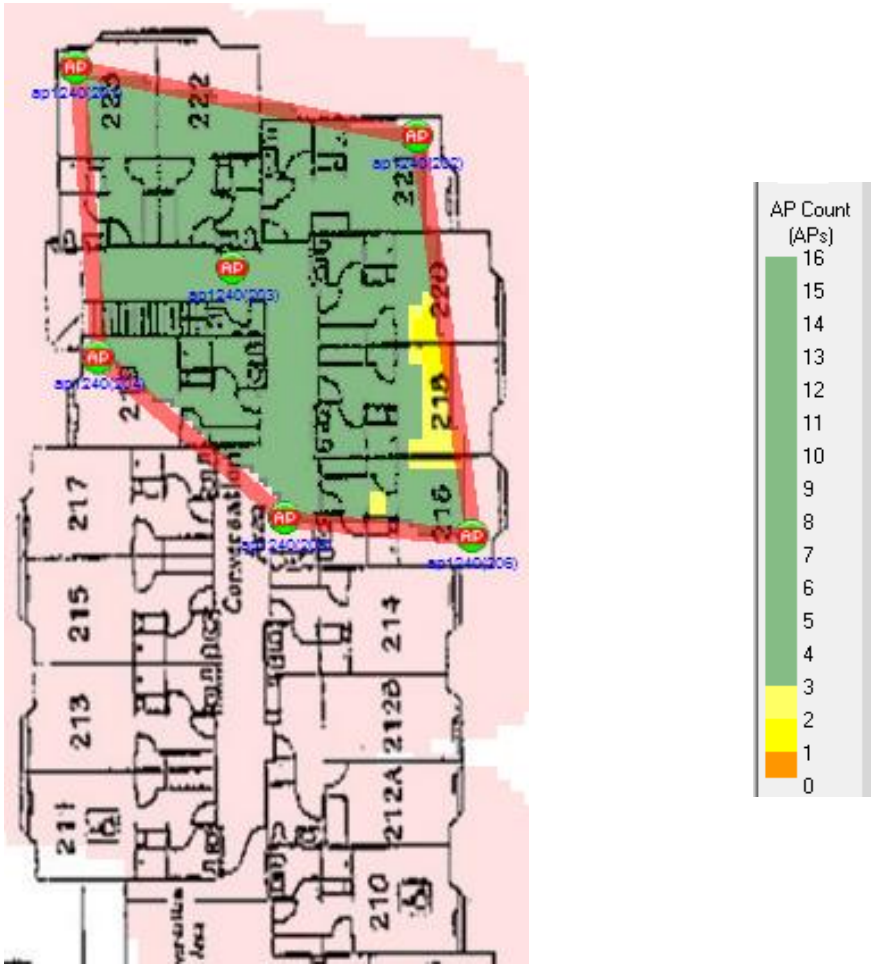
Example – Add Fillers





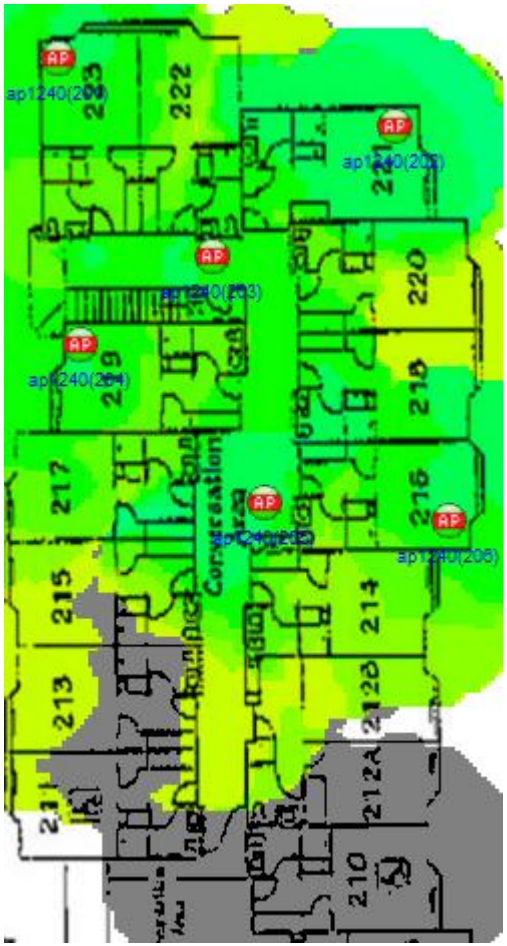
Example – Re-verify Location Requirements

- In AirWise, verify whether location requirements are met
- Move access points as needed
- Continue testing…



Example – Verify Overall Coverage

- Ensure overall signal criteria are met
- Move access points as needed
- Continue testing…



That's it…

Questions?

More Information…

- Discussions
  - www.airwisecommunity.com
- AirMagnet Product Information
  - http://airmagnet.flukenetworks.com/
  - info@airmagnet.com
- Wireless Network Design Workshop
  - Hands-on workshop steps you through designing optimum 802.11n/ac wireless networks for voice and location applications using AirMagnet Survey
  - For details, visit http://www.wireless-nets.com