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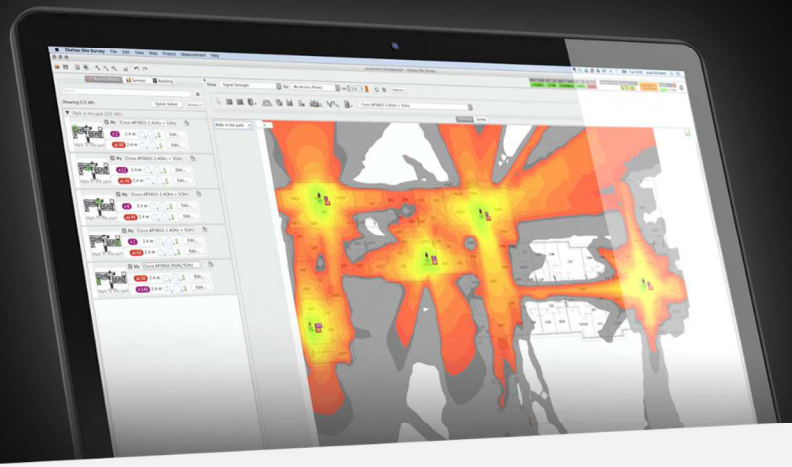
WIRELESS DESIGN

Understanding the Intricacies of Hospitality Wi-Fi Design



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LigoWave Newtorks, Inc.

@EmperorWiFi

Understanding the Intricacies of Hospitality Wi-Fi Design
About The Presenter

- Veteran in Hospitality Wi-Fi
  - Designed, deployed, and/or troubleshot several hospitality networks in the last 10 years, working for both service providers and AP manufacturers
  - Frequent traveler, so have to endure hospitality Wi-Fi both as a user and as a network administrator
- Current Role
  - Director of Business Development at LigoWave Networks, Inc., Canton, GA
  - LigoWave Wi-Fi APs readily support hospitality Wi-Fi

CWNE #171

Blog: http://emperorwifi.com

"My dear friend Leonato hath invited you all. I tell him we shall stay here at least a month; and he heartily prays that the Wi-Fi lasts that long. I dear swear he is no hypocrite, but prays from his heart." – Don Pedro, Much About Nothing {adapted}

Challenges of Hospitality Wi-Fi

- Client population (guests)
  - Client devices are changing every day
  - Multiple client devices per room
  - Taxing applications (e.g. Streaming Netflix)
- Expectation of performance ”like it is at home”
- Hotel Reviews: Wi-Fi connectivity more important than clean sheets and towels

The client device population of the guests literally changes on a nightly basis, so there is a constant barrage of new and unknown devices that are using the network.

Requirements of Hospitality Wi-Fi
Usage

- Guest access is primary (though not necessarily only) application
- Will still have modern ”2.4 GHz only” client devices
- Client isolation within and between access points
- Captive portal to control access
  (Free vs. Paid vs. Hybrid)
- Integration with Property Management Systems
- Other applications on the network
  - Staff network for internal operations
  - VoIP / VoWiFi
  - IPTV
  - Smart guest rooms
  - Staff panic buttons

http://convergentindia.com/assets/images/INDUSTRY/industry_slide/HOSPITALITY%202.jpg

Requirements of Hospitality Wi-Fi
Coverage

- Front of House (guest facing)
  - Guest rooms
  - Restaurants
  - Lobby
  - Banquet / conference facilities
- Back of House (staff facing)
  - Operations
  - Kitchens
  - Point of Sale

https://www.angliss.edu.au/images/700x300/future/hospitality.png

One generally does not want to provide guest access in the back-of-house areas, nor does one want to provide point-of-sale access on the guest room floors.

Requirements of Hospitality Wi-Fi
Capacity

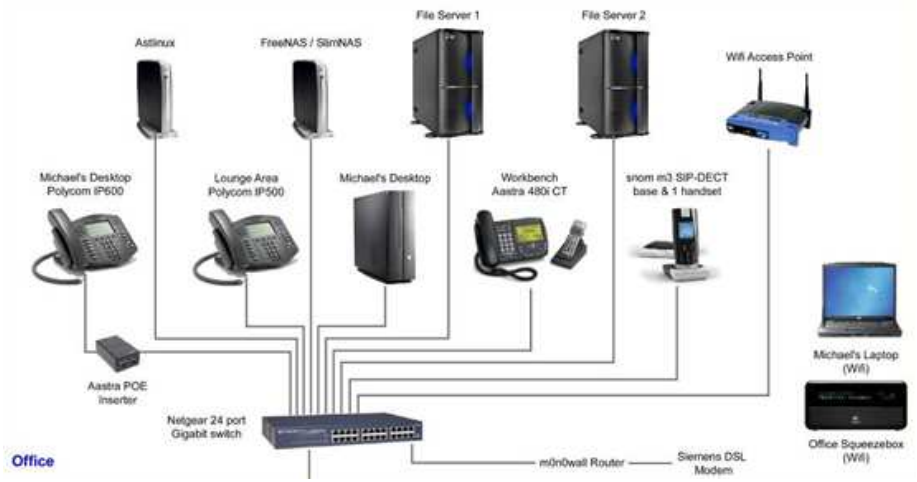
- Moderate to high bandwidth utilization by guests
  - In-rooom video streaming
  - Wi-Fi phone calls
- Conference centers / banquets
  - High usage during events

https://ak3.picdn.net/shutterstock/videos/6371213/thumb/8.jpg

Peak usage times are usually evenings and weekends, when the guest rooms are occupied.

Requirements of Hospitality Wi-Fi
Monitoring and Control

- Outsourced to a *Wireless Internet Service Provider (WISP)*
- AP Vendor and WISP integrator is sometimes dictated to franchise by hotel chain
- Separate vendors for other network services, such as surveillance, VoIP, IPTV, back-of-house, PoS, etc.



https://www.mgraves.org/wp-content/uploads/2008/03/network-diagram-1024.jpg

Expect to need to deal with many different players relying on the same router, switch, and Wi-Fi infrastructure equipment.

Requirements of Hospitality Wi-Fi
Integration and Infrastructure

- May or may not have wired Ethernet ports in each room
- May or may not have dedicated IDF closets (sometimes retrofitted with maid closets)
- May or may not have cabling infrastructure connecting multiple buildings

http://www.korenix.com/upload/web/Automation/57/20090806_JetCon2502_hotel_application_02.jpg

The wireless network is only as good as the wired infrastructure that supports it.

Requirements of Hospitality Wi-Fi
Constraints

- Budget
- Aesthetics
- Mounting Restrictions
- Wiring Infrastructure
- External Interference

https://d315aorymr5rpf.cloudfront.net/wp-content/uploads/2017/02/Product-Constraints.jpg

Most hotels do not want to see the access points at all, irrespective of how that affects the actual functionality of the APs.

Designing for Hospitality Wi-Fi
AP Selection

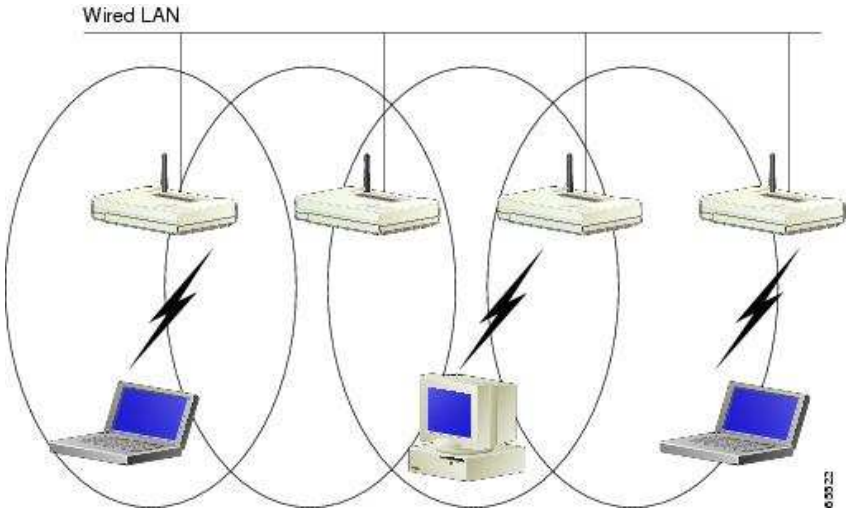
- Aesthetic contraints: indoor AP with internal antennas
- Wall-plate APs are useful if Ethernet wiring exists in guest room (don't necessarily need one per room)
- APs rated for SMB applications are generally sufficient; avoid large and recurring operational costs
- Understand your requirements and constraints before selecting your AP

https://www.bluetext.com/wp-content/uploads/2017/01/A-Guide-to-Choosing-the-Right-Business.png

Unfortunately, most WISPs tend to pick the AP vendor and models that they are most comfortable with, not necessarily the vendor and model that is most suitable to the application.

Designing for Hospitality Wi-Fi
AP Locations

- APs should be placed as close as possible to client devices, with no or few obstructions
- APs should be placed as far as possible from each other, with as many obstructions as possible
- In-room deployments are always better, but hallway deployments are sometimes unavoidable.



https://www.cisco.com/c/dam/en/us/td/i/000001-100000/65001-70000/65001-66000/65522.ps/_jcr_content/renditions/65522.jpg

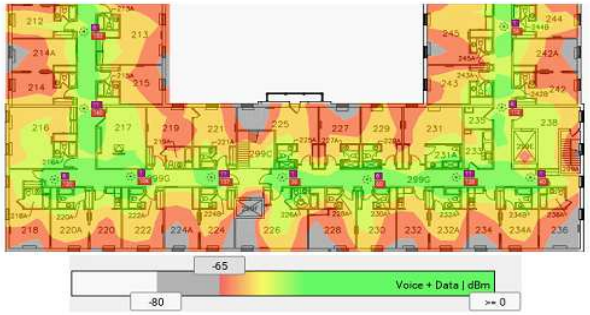
Most client devices tend to have much weaker transmitters than APs. The placement of the AP needs to be done so as to facilitate the client's ability to talk back to the AP, which is usually counterintuitive to most installers.

Designing for Hospitality Wi-Fi
AP Locations: Why Hallway Deployments are Bad

- Hallway APs
  - Significant coverage problems
  - Significant self-interference of APs
  - Large impact on upstream traffic
- In-Room APs
  - Strong coverage where devices are used
  - Minimal self interference

APs Deployed in the Hallways

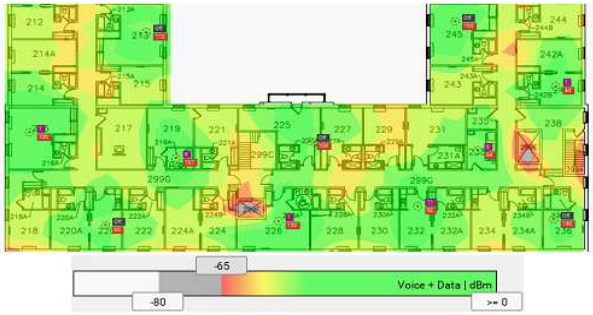
Wi-Fi Coverage – 2.4 & 5 GHz



Channel Overlap - 2.4 & 5 GHz

APs Deployed in Rooms

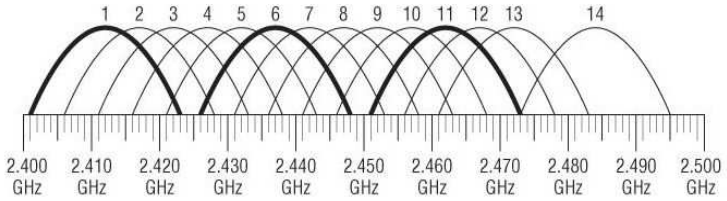
Wi-Fi Coverage - 2.4 & 5 GHz



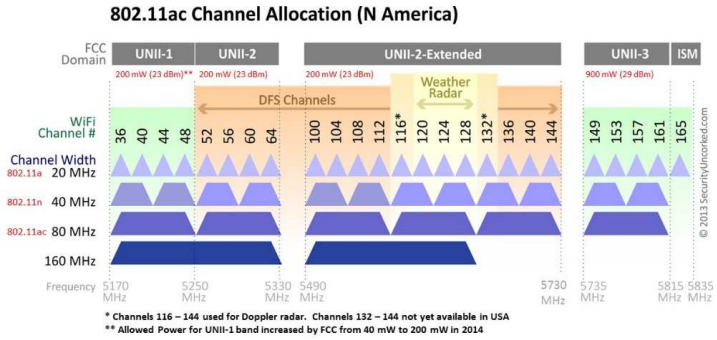
Channel Overlap - 2.4 & 5 GHz

Designing for Hospitality Wi-Fi
AP Channels

- Understand your throughput per user requirements
- Usually no need for larger channel sizes
  - Always avoid 40 MHz channels on 2.4 GHz
  - Generally advisable to use 20 MHz channels on 5 GHz
- To guarantee minimal self-interference, use static channel settings on both bands.



Coleman, D. and Westcott, D. CWNA Certified Wireless Network Administrator Official Study Guide: Exam CWNA-106. 4th edition. John Wiley & Sons, Inc., Indianapolis, IN. ISBN 978-1-118-89370-8. Copyright 2014.

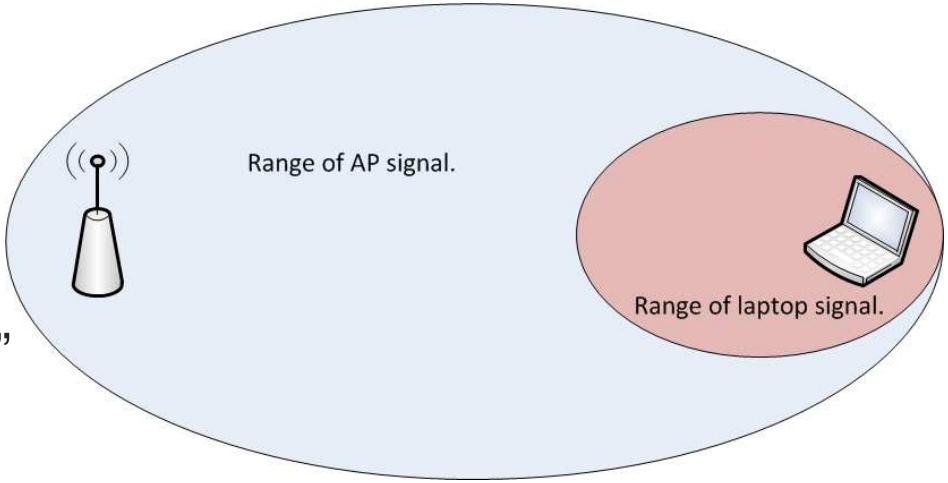


https://twimgs.com/networkcomputing/news/2013/10/graphic-80211-acChannels-all.png

Successful Wi-Fi deployments require avoiding, or at least minimizing, self-interference between neighboring APs.

Designing for Hospitality Wi-Fi
AP Transmit Power

- If AP power is too high, can create a ”false sense of coverage”
  - AP is screaming → Client device can hear
  - Client is whispering → AP cannot hear
- 5 GHz attenuates faster, but want ”same” coverage area on both bands
  - Use a static offset of at least 6 dB



http://www.insearchoftech.com/wp-content/uploads/2015/01/AP-TransmitPowerProblem.png

Most smartphone, tablet, and appliances use relatively weak transmitters in order to preserve both space within the device and battery life. The effective coverage area is driven by the client devices.

Designing for Hospitality Wi-Fi
Captive Portal

- Layer 3 appliance, used on ”open networks” with no encryption for access control to network
- May be standalone or cloud-managed
- User gets splash page to acknowledge Terms of Service. May be free or paid.
- Devices without browsers can be problematic
- Most are expensive, difficult to configure, and complicate access for users

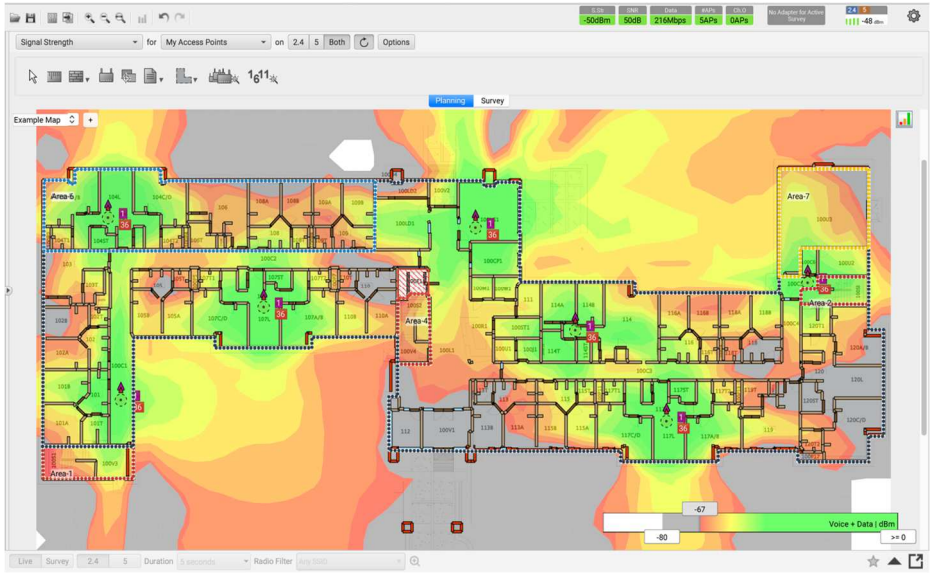
- Login options
  - Terms and Conditions
  - Username and Password *
  - Rotating User Code
  - Name and Room Number *
  - Social Media / Email
  - Advertisements
- Users are *MAC Authenticated* to allow direct access for limited time
- May constrain bandwidth per user

* May require integration with PMS

Captive portals are very common for regulating guest network access in hospitality deployments, and some captive portal appliances are specifically designed for the hospitality vertical.

Designing for Hospitality Wi-Fi
Deployment Considerations

- Wired network infrastructure
  - May require cabling, point-to-(multi)point links, or mesh networking
- AP Controller architecture depends on monitoring and control requirements
- Site Surveys / Modeling
  - Predictive Modeling
  - Pre-Deployment Survey (AP-on-a-Stick)
  - Post-Deployment Survey



Depending on the project size and scope, funding may not be available on a project to do all of these steps, though performing these surveys are highly recommended.

Conclusions

- Understand the key requirements and constraints of the hospitality environment
- Hospitality Wi-Fi is mostly, but not entirely, about the guest experience
- Select the right AP for the application; one size does NOT fit all
- There is a big difference vs. in-room vs. hallway deployments
- Design the network to maximize the performance of the client devices and minimize self-interference between APs
- Set your AP channels and transmit power levels appropriately
- Captive portals are still very typical in hospitality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