Designing User-Centric Wi-Fi Networks

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Contact info

Show recruiters you’re open to work — you control who sees this
Get started

About

Track record? Headed Ekahau’s Wi-Fi Design Tools from zero to industry standard with tens of thousands of customers, and eventually to what the VC called “their best exit ever”. That’s not a big deal per se, but the team enjoyed the journey very much: no compromises were made keeping the team happy and motivated... see more
Agenda

1. Business and Technical Requirements
2. Wi-Fi design
3. Deployment / configuration
4. The first live day / week
5. Ensuring the network delivers 24/7
6. The buzzwords: What’s hot in Wi-Fi right now
Business and Technical Requirements
Business Requirements

• What does the company do?
• What does this facility do?
• What main groups of people work here?
  – What do they do?
• How does IT support the goals?
  – What role does the network & wireless do?
Technical Requirements

• Floor plans!!
• Areas to be covered
• Number of people using Wi-Fi
  – Applications they use
  – Number of devices per person
  – Types of devices per person
• Same for IoT devices
Technical Requirements #2

- Acceptable time to connect to network
- Acceptable roaming time
- Desired throughput per user
- ...

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And Then There’s Security

• We won’t even go to that here...
• More than...
  – Do not use WEP or such
  – WPA2 minimum
  – WPA2/3 enterprise for all capable devices
Location Tracking, Anyone?

- Need to track employees or guests or devices?
- A whole another project
  - Different stakeholders
  - Different requirements
  - Different goals
- Start small. Use a trusted consultant.
Location Tracking Tags

People Visibility
- Card Tag CT18-3
- Bracelet Tag BT19-4

Asset Tracking
- Universal Tag UT19-1
- Asset Tag S18-3

More info on RTLS tags: kontakt.io, HID
Locations > Hospital

Search

Search by entity name, type, location in the last 4m

<table>
<thead>
<tr>
<th>Entity</th>
<th>Type</th>
<th>Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addison Montgomery</td>
<td>Hospital Employee</td>
<td>Entrance Hall</td>
</tr>
<tr>
<td>Alice Wong</td>
<td>Hospital Employee</td>
<td>Visitor Room</td>
</tr>
<tr>
<td>Allison Cameron</td>
<td>Hospital Employee</td>
<td>Admin Office</td>
</tr>
<tr>
<td>Allison Keener</td>
<td>Hospital Employee</td>
<td>Entrance Hall</td>
</tr>
<tr>
<td>Dr. Andrew Deluca</td>
<td>Hospital Employee</td>
<td>Entrance Hall</td>
</tr>
<tr>
<td>Dr. George O'Malley</td>
<td>Hospital Employee</td>
<td>Emergency Room</td>
</tr>
<tr>
<td>Dr. Lawrence Kutner</td>
<td>Hospital Employee</td>
<td>Hallway South-West</td>
</tr>
<tr>
<td>Dr. Mark Sloan</td>
<td>Hospital Employee</td>
<td>Entrance Hall</td>
</tr>
<tr>
<td>Dr. Owen Hunt</td>
<td>Hospital Employee</td>
<td>Hallway South-West</td>
</tr>
<tr>
<td>Dr. Robert Gale</td>
<td>Hospital Employee</td>
<td>Hallway South-West</td>
</tr>
<tr>
<td>Medical Fridge</td>
<td>Fridge</td>
<td>Emergency Room</td>
</tr>
<tr>
<td>Meredith Grey</td>
<td>Hospital Employee</td>
<td>Entrance Hall</td>
</tr>
</tbody>
</table>

Entity filters:
- Visitor
- Storage
- Patient
- Object
- Hospital Staff
- Hospital Employee
- Hospital Employee

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Conference & Exhibition

Bicsi
Today’s Wi-Fi Networks
Pay Attention to Choice of Wi-Fi Architecture

**Consider:**
- Cloud managed
- Simple architecture
  - Less boxes = better
- Rich in automation / API / AI
- Frequently updated

**Avoid:**
- Legacy controller based systems
- Any extra on-prem / cloud boxes you manage
- “AI” without substance
- Sparse update schedule
Legacy Controller Architecture = Extensive Amount of “Boxes”
LIVE VIEW OF MY WIRELESS CONTROLLER UPGRADE
Cloud + Microservices Architecture

Microservices architecture
- RRM
- Location
- Assurance
- Mgmt
- Sensors
Wi-Fi Design
Wi-Fi Design: Pre-site Visit

• Up-front, on-site
  – Visit the site, perform a visual inspection, analyze the existing Wi-Fi network
    • Understand the RF attenuation and generally the existing RF environment
  – Most importantly: Talk to as many people as you can
New concept: Remote Pre-visit

- Talk with customers over video
- Customer can walk through as you talk, show facility and existing install on video
- Discuss infrastructure remotely using screen share (existing equipment, configs, floor plans)
- Send customer analysis software to diagnose Wi-Fi network
Customer Wi-Fi On-site Check REMOTELY

1. Share customer laptop screen
2. Install Wi-Fi Explorer Pro or Win-Fi on customer laptop
3. Analyze Wi-Fi installation
4. Walk to known problematic location, analyze Wi-Fi again
### Network Scan Results

<table>
<thead>
<tr>
<th>Network Name</th>
<th>Count</th>
<th>BSSID</th>
<th>Annotations</th>
<th>Vendor</th>
<th>Signal</th>
<th>Channel</th>
<th>Channel Width</th>
<th>Band</th>
<th>Mode</th>
<th>Generation</th>
<th>Max Rate</th>
<th>Security</th>
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<tbody>
<tr>
<td>DNA-WLAN-ASD</td>
<td>2</td>
<td>00:22:07:65:D7:83</td>
<td></td>
<td>Intenco Broadband</td>
<td>-70 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
<td>b/g/n</td>
<td>Wi-Fi 4</td>
<td>144.4 Mbps</td>
<td>WPA2 (PSK)</td>
</tr>
<tr>
<td>DNA-WLAN-9G</td>
<td>2</td>
<td>52:22:07:65:D7:80</td>
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<td>Intenco Broadband</td>
<td>-90 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
<td>b/g/n</td>
<td>Wi-Fi 4</td>
<td>144.4 Mbps</td>
<td>WPA2 (PSK)</td>
</tr>
<tr>
<td>HOME_WPA</td>
<td>2</td>
<td>52:98:2B:74:79:26</td>
<td></td>
<td>Sagemcom Broadband</td>
<td>-83 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
<td>b/g/n</td>
<td>Wi-Fi 4</td>
<td>216.7 Mbps</td>
<td>WPA2 (PSK)</td>
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<tr>
<td>TestNaka</td>
<td>1</td>
<td>10:00:00:00:00:00:00:00:00:0</td>
<td>&lt;Multiple Values&gt;</td>
<td>Mist Systems Inc.</td>
<td>-44 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
<td>b/g/n, ac/a</td>
<td>Wi-Fi 4, 5, 6</td>
<td>388.9 Mbps</td>
<td>WPA2 (PSK)</td>
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<tr>
<td>Nakatomi 1x</td>
<td>8</td>
<td>12:00:00:00:00:00:00:00:00:0</td>
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<tr>
<td>ASUS</td>
<td>2</td>
<td>2C:56:DC:87:91:08</td>
<td></td>
<td>ZTE Corp.</td>
<td>-44 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
<td>b/g/n</td>
<td>Wi-Fi 4</td>
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<tr>
<td>BackupAlt</td>
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<td>ZTE Corp.</td>
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<tr>
<td>Scenario</td>
<td>4</td>
<td>60:14:68:C0:5E:4F</td>
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<td>-84 dBm</td>
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<td>2.4 GHz</td>
<td>b/g/n</td>
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<td>&lt;Multiple Values&gt;</td>
<td>Mist Systems Inc.</td>
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<td>Nakatomi Plaza</td>
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<td>5C:3B:35:68:61:1D4</td>
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<td>-57 dBm</td>
<td>1</td>
<td>20 MHz</td>
<td>2.4 GHz</td>
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<td>Wi-Fi 5</td>
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### Network Details

- **Signal Strength**: -81 dBm is not a good signal strength. B is bad!
Where to Place the Access Points?

• Tons of ways to determine!
1. Uber-simplified: One AP per classroom (or sq ft)
2. Auto-Planner: Input requirements, output Wi-Fi plan
   1. Off-site, on-site or combo?
Deployment and Configuration
Configuration

- CLI is getting rarer
- Small / medium sites = one by one, web GUI
- Large multi-site environments: Automation
  - Templates
  - GUI rules
  - API
Auto-Provisioning

- Site Assignment
- AP Name Generation
- Profile Assignment

**Enabled** ☑ Disabled

**Source** (Device Profile name based on)

- AP Name

- Divide into segments separated by [Separator] and select the [1st] segment

- Ignore the first [1] characters and the last [characters]

- Select [10] first characters

- Add a prefix [Profile-]

- Add a suffix [Suffix]

Try various AP names to see the site assignment resulting from your selections

- AP name: ANakatomi-6

- Device Profile Name: Profile-Nakatomi-6

[OK] [Cancel]
Auto-Provisioning

- Site Assignment
- AP Name Generation
- Profile Assignment

- Enabled
- Disabled

Deriving AP Name from LLDP Port Description

- Divide into segments separated by [Separator] and select the [1st] segment

- Ignore the first 5 characters and the last 2 characters

- Select 12 first characters

Try various Port Description to see the name resulting from your selections

<table>
<thead>
<tr>
<th>LLDP Port Desc.</th>
<th>LLDP-Nakatomi-67</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP Name</td>
<td>Nakatomi-67</td>
</tr>
</tbody>
</table>
Deployment

• Take pictures as much as possible
  – Catch costly mistakes in time (APs placed wrong, antennas oriented wrong, cable issues, etc)

• Installer apps help reduce install time
  – Pics
  – AP placement
  – AP claiming, etc.
Wi-Fi Site Survey

• Just like you want all the cables checked
• You want someone to test the Wi-Fi
• Walk-through site survey
  – Before install?
  – After install – absolutely required
Pre-install Survey
Post Install Survey
The First Day / Week

- **WI-FI IS NOT A**
  "IT WORKED TODAY, SO IT’LL WORK FOREVER”
TECHNOLOGY
- Do not start the “ice age”
- Pay extra attention to site
- Follow key metrics closely
- Perform extra tests
More info on WiPerf sensors and WLAN Pi: wlanpi.com, wifinigel.blogspot.com
More info on Kubicon sensors: kubicon.io
Monitor

- **Wired Network**
- **Location**
- **Insights**

**Site**: Nakatomi Plaza  |  **Last 7 Days**

**Users**

**System changes**

**Success Rate**

- **Successful Connects** 96% success
- **Time to Connect** 88% success

**Values**

- **Authorization Association** 75%< 1%
- **DHCP** 25%< 1%
- **Association Authorization Internet Services** 92%< 1%
- **DHCP** 8%
Ensuring That the Network Delivers 24/7
Is Someone Continually Overseeing Your Network?

- Human? No.
- AI? Absolutely.
- However, nothing replaces human oversight of the network.
Demo: Network monitoring

Network task list

Query "what's wrong"
The Buzzwords:
What’s Hot With Wi-Fi Right Now
Wi-Fi 6: The New Standard.
Business as Usual, Just Better.

Read More:
Google “Mist Wi-Fi 6 Poster”
and WLAN Pros Wi-Fi 6
Wi-Fi 6E
More Everything,
But Not Today.
Consider Not Being the First to Jump.

Read More:
Google “Mist Wi-Fi 6E” and
“Wi-Fi Now Wi-Fi 6E”
5G: It’s Another G.

Read More:
Google “Mist Game over Wi-Fi said 5G webinar”
and Google “Dean Bubley 5G”
INDOOR LOCATION TRACKING: It’s becoming more popular. Knowledgeable, trusted partner is essential.

Read More:
Google “Mist Game over Wi-Fi said 5G webinar” and Google “Dean Bubley 5G”
Thank you!

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