Wi-Fi Enabled Healthcare

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Introductions

• My Background
• About You
  • How many of you work or have worked in Healthcare?
  • How many work for institutions that have dedicated Wi-Fi engineers?
Session objectives

• Importance of Wi-Fi in healthcare
• What makes healthcare environment unique
• Overview of Henry Ford Health System
• RF design considerations, and best practices
Why mobility is so important in Healthcare

- Focus on mobility can help decrease re-admissions
- Continuous and remote vital signs monitoring
- More efficient communication with staff
- Increased time at the bedside
- Desired end result is less expensive care, and improved clinical outcomes

Americans don’t live longer than people in countries that spend much less on health care.

Note: Data is from 2011 or nearest year. New Zealand numbers exclude insurance. Not all OECD countries are included.
Source: OECD Health Data 2013

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Typical Office
Typical Hospital
What makes Healthcare Unique

• Open to the public (patients and guests)
• Mission critical communications can correlate to Life/Death
• Dense pockets of fast moving mobile users
• Ubiquitous, Reliable, Easy to use, and High availability.
• Decentralized procurement budgets
• HIPAA and HITECH compliance and government mandates
• Application centric
• Vast variety of device types including medical devices
Henry Ford Health System Wi-Fi Network

- HFHS is a not-for-profit organization primarily located in Southeast Michigan.
- More than 23,000 total employees.
- 3.2 million outpatient visits and more than 88,800 surgical procedures (2013)
- 14 Wireless Controllers
- Over 4,400 wireless access points and sensors
- Overlay IPS/IDS
- Over 100 facilities and 8 million square feet of coverage.
- 6,000+ concurrent guests daily
- 12,000 concurrent Wi-Fi devices
Mobile landscape in Healthcare

- **Indoor Voice handsets (900-928 MHz; DECT 6.0 1.93GHz)**
- **Medical Body area networks (2360-2400 MHz)**
- **Bluetooth (2.4 -2.485 GHz)**
- **Cellular Distributed Antenna Systems (3G, 4G)**
- **Zigbee (2.4 GHz)**
- **Telemetry WMTS (608-614, 1395-1400, and 1429-1432 MHz)**
- **WLAN/Wi-Fi (2.4 GHz, and 5 GHz)**
Why focus on Wi-Fi? Interesting statistics

• There will be more than 7 billion new Wi-Fi enabled devices by 2017 (Sys-Con)

• 2/3 of US consumers prefer Wi-Fi to cellular (Deloitte)

• 71% of all mobile communication flows over Wi-Fi (Wi-Fi Alliance)

• By 2017 60% of carrier network traffic will be offloaded to Wi-Fi (Wireless Broadband Association)

• By 2020, the average mobile user could be downloading 1 terabyte of data annually—enough to access more than 1,000 feature films (IEEE Spectrum magazine)
Wi-Fi Devices In the hospital

- Guest Access
- Employee Devices
- Medical Devices
- VoWLAN Phones
- BYOD
- RTLS

2014 CWNP Wi-Fi Conference ~ 15 Years in Wireless
RF Design Best Practices

• Universal RF physics and limitations
• Design for actual devices and applications.
• Design for voice and video (-67dbm)
• High density and accounting for RTLS
• Traditional onsite site survey is recommended
• Scrutinize security requirements.
• Ongoing testing is crucial to success
• ITIL framework – capacity planning, continuous improvement and optimization.
Design Evolution

2014
Design For Dynamic Intelligence
-Dynamic traffic classification and prioritization

2010
Design For High Density
-Microcells, real time applications, and RTLS

2005
Basic RF Coverage
-Focus on Signal Strength and SNR
-Static Channel and Power plan

QoE
- Proper Design
- Clean RF
- Bandwidth
Focus On Clients

• Upwards of 80% of issues on our network are client related.
• Supported frequencies (2.4 GHz, 5GHz)
• Updated drivers (chipset & manufacturer)
• Roaming characteristics
• Security considerations
• Consumer grade devices
Wireless Medical device onboarding and certification process

- Started with less than 100 devices in 2006, and now up to 3000 WMDs at HFHS by end of 2014
- Standard onboarding and certification process
- AAMI IEC 80001 guidance
Real Time Location Services

• Much more than asset tracking
  • Hand Hygiene
  • Staff duress badge
  • Temperature monitoring
  • Patient and guest tracking
• Zone, Room Level, Sub-room level accuracy
• Wi-Fi based system vs. dedicated Infrastructure for RTLS
• Largest ROI when system is used to trend workflow, and drive improvements.
Guest Access

• Make no mistake about it...It is supported.
• Ease of access and use
• Stance on streaming applications
• Marketing platform
• Pay vs. free model
• Authentication and encryption
• Heaviest user count. The numbers don’t lie.
• HCAPS (Hospital Consumer Assessment of Healthcare Providers and Systems)
Wearables

• 90 Million Wearables projected to be shipped in 2014
  • Largest area of growth in mHealth
  • Consumer Devices
  • Fitness and adult tracking
  • Medical Devices

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<thead>
<tr>
<th>Wearable Computing Device Shipments by Category (Millions)</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Wearable Cameras</td>
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<tr>
<td>Smart Glasses</td>
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<td>Smart Watches</td>
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<tr>
<td>Healthcare</td>
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<tr>
<td>Sports/Activity Trackers</td>
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<tr>
<td>Wearable 3D Motion Trackers</td>
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<tr>
<td>Smart Clothing</td>
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Totals: 53.90 90.00 164.20

Source: Data from ABI Research World Market Forecast: 2013 to 2019
Clinical Engineering & IT

• Clinical device vs. IT knowledge
• Majority of medical devices are now Wi-Fi capable.
• Network architecture driven in part by medical devices.
• Medical device design engineers are not Wi-Fi engineers
• AAMI Wireless Strategy Task Force
Getting it Right

- Having the right people with the correct skillset is increasingly crucial
- Dedicated trained Wi-Fi engineers is key to your success
- All of HFHS Wireless Engineers are certified by CWNP.
- Mandatory requirement to have at least CWNA credential
- The right wireless toolset is equally important
  - Take the guess work out of designing
  - 802.11ac tools are already available
  - Don’t forget to test performance
The Future of Wi-Fi in hospitals

• Upgrades to 802.11 ac
• Real time location apps
• Mhealth
  • 2 years – Making data actionable
  • 5 years – Smaller or no tether
  • 10 years – More Neil Harbissons (Cyborgs)
Great References

• http://www.aami.org/hottopics/wireless/index.html
• www.cwnp.com
• http://www.revolutionwifi.net/
• http://www.mhealthnews.com/