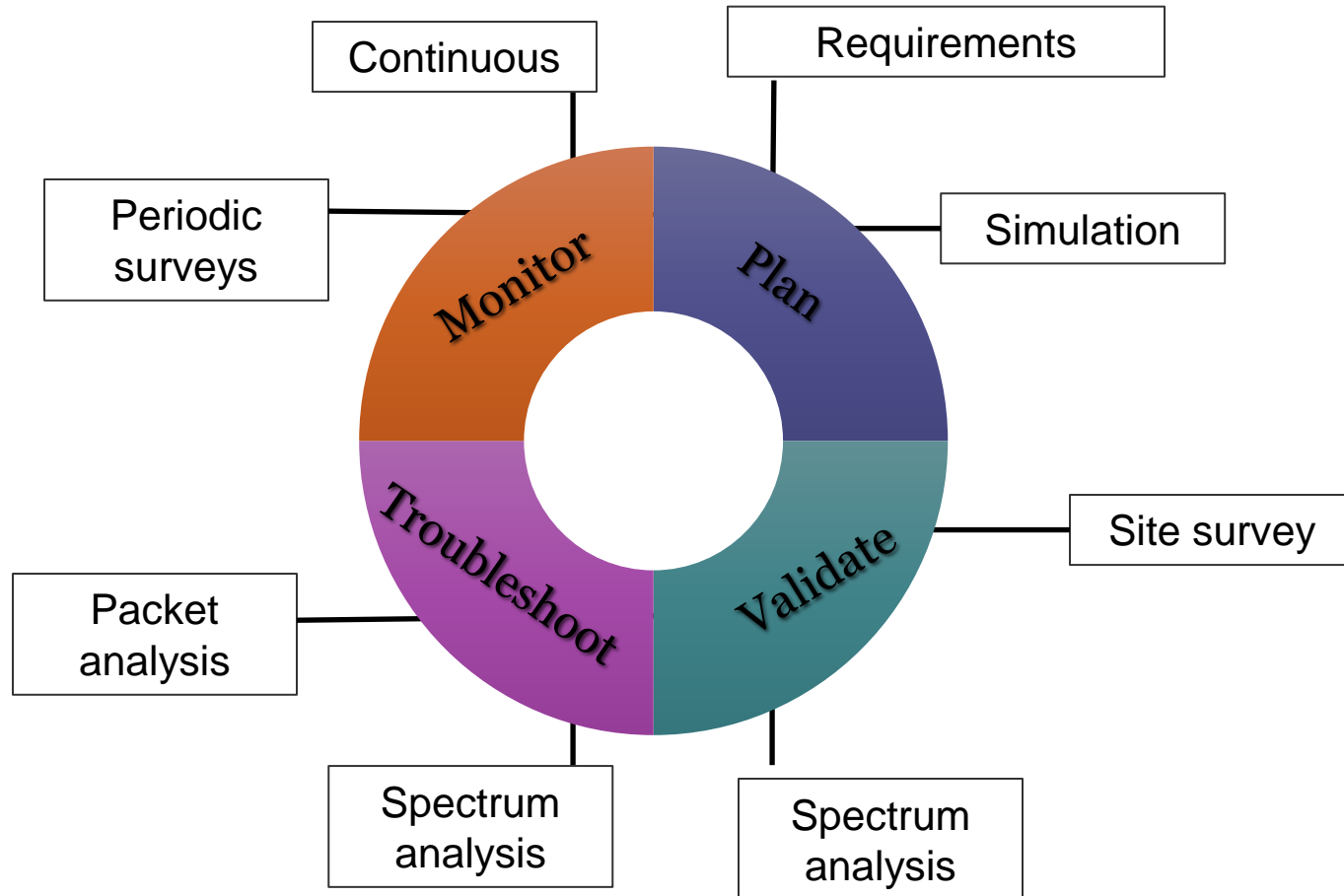


Lifecycle of a Wi-Fi Network



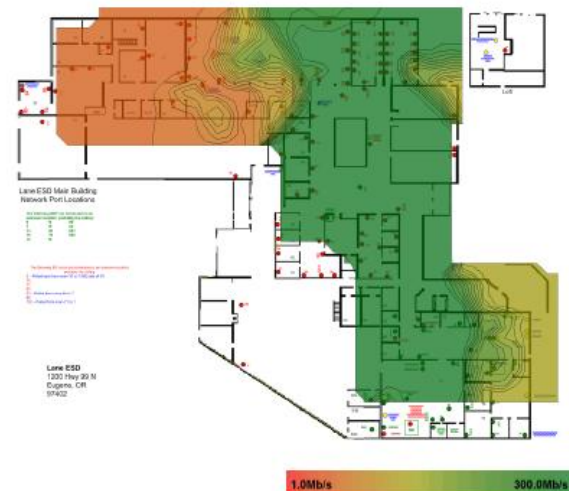
Types of Surveys

- **Active Survey** measure packets in two directions (send & receive). Used for packet loss, packet delay,...
- **Passive Survey** listen to probes & beacons passively. Used for coverage & SNR maps, etc.
- **Hybrid Survey** passive & active simultaneously



Ekahau Site Survey

1. Import map
2. Set scale, using a long wall
3. Choose your survey method - continuous or stop & go
4. Review data and create reports



Ekahau WiFi Planner

- Set your site requirements and capacity requirements.
- Create a template if you have a standard that will be used for multiple sites.

Requirement:

Criteria

<input type="checkbox"/>	Signal Strength	Min	<input type="text" value="-67"/>	dBm
<input type="checkbox"/>	Signal-to-noise Ratio	Min	<input type="text" value="20"/>	dB
<input type="checkbox"/>	Data rate	Min	<input type="text" value="20"/>	Mbps
<input type="checkbox"/>	Number of Access Points	Min	<input type="text" value="2"/>	at min. <input type="text" value="-75"/> dBm
<input type="checkbox"/>	Channel Overlap	Max	<input type="text" value="4"/>	at min. <input type="text" value="-80"/> dBm
<input type="checkbox"/>	Round Trip Time (RTT)	Max	<input type="text" value="200"/>	ms
<input type="checkbox"/>	Packet Loss	Max	<input type="text" value="2"/>	%

Edit WiFi Device

Adapter:

During 8 hours this device is used for

VoIP_G.711 50ps	<input type="text" value="1"/>	hours	<input type="text" value="0"/>	minutes	<input type="button" value="Delete"/>
Typical WWW page	<input type="text" value="3"/>	hours	<input type="text" value="0"/>	minutes	<input type="button" value="Delete"/>
Typical Email	<input type="text" value="8"/>	hours	<input type="text" value="0"/>	minutes	<input type="button" value="Delete"/>
HD 720p video stream	<input type="text" value="0"/>	hours	<input type="text" value="30"/>	minutes	<input type="button" value="Delete"/>
360p video stream	<input type="text" value="0"/>	hours	<input type="text" value="30"/>	minutes	<input type="button" value="Delete"/>
Chat application	<input type="text" value="1"/>	hours	<input type="text" value="30"/>	minutes	<input type="button" value="Delete"/>
Screen sharing	<input type="text" value="0"/>	hours	<input type="text" value="15"/>	minutes	<input type="button" value="Delete"/>
Internet radio stream	<input type="text" value="0"/>	hours	<input type="text" value="15"/>	minutes	<input type="button" value="Delete"/>
1Mbps FTP file transfer	<input type="text" value="0"/>	hours	<input type="text" value="10"/>	minutes	<input type="button" value="Delete"/>
1Mbps WWW download	<input type="text" value="0"/>	hours	<input type="text" value="20"/>	minutes	<input type="button" value="Delete"/>

Read: Wi-Fi Capacity Analysis for 802.11ac and 802.11n: Theory & Practice

Maps

- Import a quality map – jpeg will work and is typically fine when surveying, but CAD will save you time in the planning stage.
- If you don't have a CAD file, you will need to build walls and set scale.

Ekahau Tool Checkout!

- Send us an email to schedule a checkout
- Feel free to just request the tool to do surveys & planning on your own or request Lane ESD to do the surveys/planning and generate reports.

802.11ac

A decorative graphic consisting of a solid teal horizontal bar that transitions into a white background on the right. On the right side, there are several thin, parallel horizontal lines in shades of teal and white, creating a layered effect.

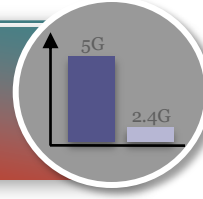
802.11ac: An Overview

Increased Speed



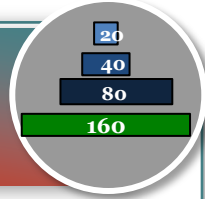
- Breaks “gigabit” barrier
- Max of 6.9 Gbps

5 GHz Only



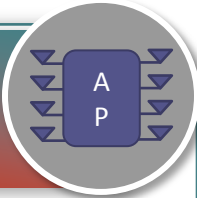
- Focuses on capacity-rich, low-interference spectrum
- Benefits entire Wi-Fi ecosystem

80/160 MHz channels



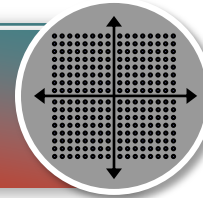
- Very wide channels
- One of the primary reasons for 11ac’s very high data rates

Up to 8 spatial streams



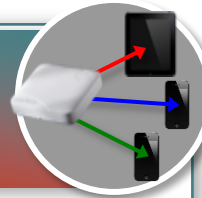
- N-fold efficiency improvement
- Requires client-side support
- Wave 2 only

256-QAM



- More efficient modulation
- 33% data rate gains
- Very short ranges only
- Requires 11ac clients

Multi-user MIMO (MU-MIMO)



- Simultaneous downlink Tx to single-stream clients
- Multiplies network capacity
- Key differentiator from 802.11n

802.11n > 802.11ac W1 > 802.11ac W2

	802.11n	802.11n IEEE Specification	802.11ac Wave 1 Today	802.11ac Wave2 WFA Certification Process Continues	802.11ac IEEE Specification
Band	2.4 GHz & 5 GHz	2.4 GHz & 5 GHz	5 GHz	5 GHz	5 GHz
MIMO	Single User (SU)	Single User (SU)	Single User (SU)	Multi User (MU)	Multi User (MU)
PHY Rate	450 Mbps	600 Mbps	1.3 Gbps	2.34 Gbps - 3.47 Gbps	6.9 Gbps
Channel Width	20 or 40 MHz	20 or 40 MHz	20, 40, 80 MHz	20, 40, 80, 80-80, 160 MHz	20, 40, 80, 80-80, 160 MHz
Modulation	64 QAM	64 QAM	256 QAM	256 QAM	256 QAM
Spatial Streams	3	4	3	3-4	8
MAC Throughput*	293 Mbps	390 Mbps	845 Mbps	1.52 Gbps- 2.26 Gbps	4.49 Gbps

* Assuming a 65% MAC efficiency with highest MCS

Ruckus Debuts First 802.11ac Wave 2 AP



- First AP to be able to service up to three concurrent streams to different users in what was a one-user-at-a-time paradigm for client access in 11ac Wave 1 and the earlier 11n standard.
- Supports dual 1 Gbps uplinks
- Ruckus claims that the R710 can go to 1,733 Mbps in 5 GHz (with 80 MHz channels and 256 QAM), and 800 Mbps in the 2.4 GHz spectrum

Implementing 802.11ac

- Use Ekahau Planner!
- Ensure minimum of 1 Gbps uplink ports available per AP.
- Consider two 1 Gbps uplink ports, some APs have two ports that support link aggregation for more bandwidth and redundancy
- Buy switches that support 802.3at (PoE+), some new ac APs may have limited functionality without it.
- Is your edge switch and the core 10Gbps?