HIGH CAPACITY Wi-Fi 101

ekahau
WIRELESS DESIGN

Wi-Fi ESSENTIALS AND REQUIREMENTS

WITH WI-FI, AIRTIME IS KING

On any channel, just one device (client or AP) talks at one time. Everybody else waits. Simple as that.

Airtime has two critical factors:

- Airtime within a cell - breakup clients into smaller groups to prevent saturation on a radio / channel.
- Airtime across cells - avoid co-channel interference (CCI) so airtime isn't shared between APs and clients

Maximize airtime by:

- Ensuring high SNR for each device
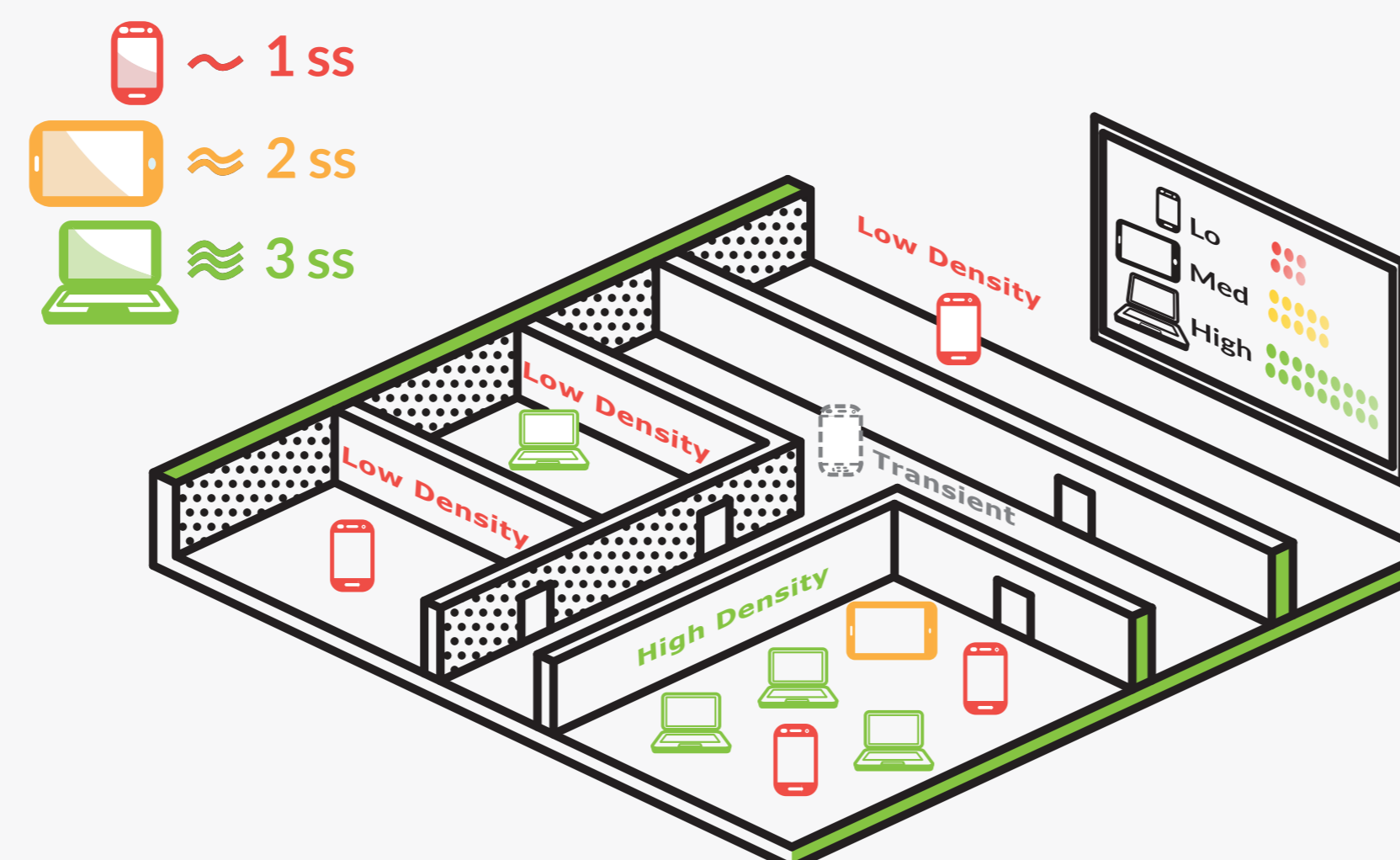- Minimizing the number of SSIDs
- Disabling low data rates
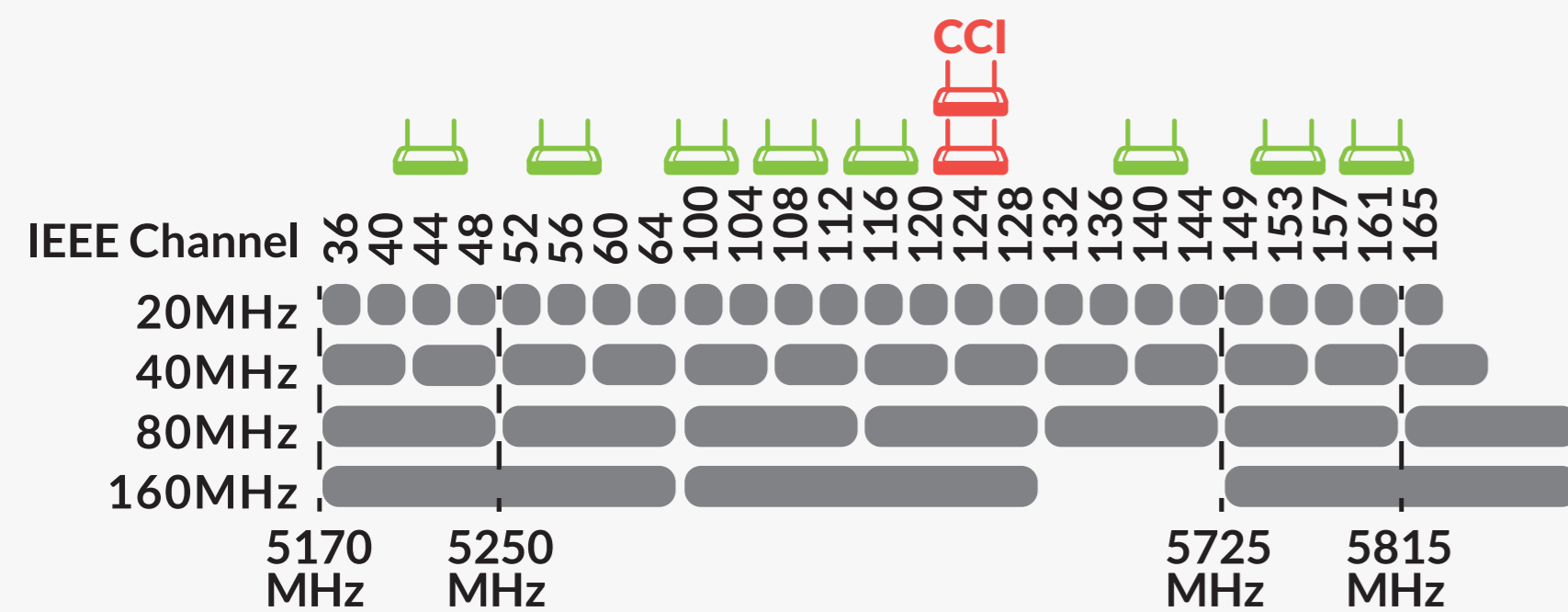
USE AS MANY CHANNELS AS POSSIBLE

- Spectrum inventory is the upper bound on capacity
- The more channels you use, the more bandwidth you will have
- More channels means less channel re-use and greater separations to avoid CCI
- In high density, use smaller channel widths and consider disabling some or all 2.4GHz radios
- Use DFS channels wherever possible

CCI

IEEE Channel: 36 40 44 48 52 56 60 64 100 104 108 112 116 120 124 128 132 136 140 144 149 153 157 161 165

20MHz
40MHz
80MHz
160MHz

5170 MHz   5250 MHz   5725 MHz   5815 MHz

CAPACITY IMPACT OF CLIENT DEVICES

- Client devices have different capabilities and consume airtime differently (spatial streams, channel width, antenna design)
- Understand the client mix in the environment (laptops, tablets, smarphone, others)
- Understand how many users and how many devices are in the environment
- Determine how much bandwidth is required per device for a good user experience? Generic estimates are often sufficient.
- Where are the users concentrated? High-density inflection points are critical to understand for capacity planning.

~ 1 ss
≈ 2 ss
≈ 3 ss

Low Density
Low Density
Low Density
Transient
High Density
Lo Med High

Wi-Fi PLANNING FOR CAPACITY

INFRASTRUCTURE SELECTION

Choose correct antennas to tailor the coverage for the intended area

Ensure APs are
Ch 140
DFS certified

Cat 5e/6/6a cabling tested and certified

Proper switch PoE type and power budget

INFRASTRUCTURE PLACEMENT AND CONFIGURATION

Consider dual-5 GHz to increase capacity
Disable 2.4G Hz radios where necessary
Ensure that clients have good signal strength and high SNR

Bad AP placement

Ensure AP placement meets your capacity needs
- Consider high capacity areas
- Monitor airtime utilization to ensure channels aren't saturated, indicating CCI or too many clients per-AP

Avoid hallways where eligible

Always account for facility construction (building walls, elevators, warehouse shelves, etc.)

Ch 40?   Ch 48?
Ch 42

Client makes the association decision. You can impact it with AP placement, Tx power adjustments and band steering.

DESIGNING WITH EKAHAU SOLUTION

Floor-to-floor planning

Automatic wall detection from CAD drawings

Low capacity areas

- Capacity analysis, airtime utilization heatmaps
- The impact of min data rates, SSIDs, band steering, DFS, ...

2.4G
Disabling 2.4GHz radios

Automatic AP placement based on capacity & coverage needs

High capacity areas

5   5
Using dual 5 GHz

Revolution ★ Wi-Fi
contributed to inforgraphic content.