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The Biggest Change in Wi-Fi Design: Designing for the Client

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The biggest change in Wi-Fi design across my career is that we stopped designing for the Access Point and started designing for the client.

25 years, 118 countries, CWNE #3. That number mostly means I got in early, not that I was smart. I have designed Wi-Fi from the top of the Empire State building to 800 meters underground in a mine, in refineries and stadiums and hospitals, in container yards, on trains and boats and planes, to millions of square meters worth of warehouses, and for over 4,000 K-12 classrooms. Nearly everything I believed at the start of that has since been replaced.

Four reversals, and none of them were gentle:

Design starts with requirements, not with AP placement. Early on we counted rooms and drew circles on a floor plan. The first question now is which application, at what data rate, for how many clients, on which device. If you do not know the design parameters your client stations require, your WLAN will NEVER meet them, because nobody ever wrote them down.

Signal stopped being the score. We spent years worshiping RSSI, because it was the easiest thing to measure and the easiest thing to color green. Green is not good. Green is just a number. Airtime is the currency, and Co-Channel Contention ruins more Wi-Fi than every other RF problem put together.

The design target moved from the 'Least Capable, Most Important' client (LCMI) to designing for a wide variety of clients that all have their own characteristics. The biggest thing I've learned here is you can design for RF being consistent... following rules of Physics. But clients are clearly all over the map. Same brand, same model, can vary up to +/- 10dB different from each other based on orientation, angle, and how rough they may have been handled. This is NOT a simple problem - the inconsistency I've measured is real and profound.

Validation went from optional to mandatory. A predictive design is a hypothesis. The validation survey is the experiment. You may want a predictive design, but you MUST do a post-installation validation survey. How else do you hand a network to a customer and KNOW that it meets their goals?

What has not changed in 25 years is the physics, and this: networks perform as designed. Every badly performing network I have walked into was performing exactly as it had been designed. The design was answering the wrong question. A 6 GHz radio obeys the same rules a 2.4 GHz radio did, and it still has to wait its turn.

I personally expect more reversals - perhaps the next may be to not trust our favorite tools now that we have working advanced features in the protocol that make our 'PCAP or it didn't happen' world turn on its head. When we can't trust our frame captures because our capture devices are not the target we are capturing for - will we have to abandon packet captures from anywhere but the access point?

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