6 GHZ & REGULATORY

An Indoor AP Needs a Phone to Know Where It Is

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An indoor access point cannot legally transmit at 6 GHz Standard Power in the US until an AFC system grants it spectrum, and no AFC system will answer until that access point reports where it is and how wrong that answer might be.

The FCC wrote a second path into the rule for when an access point doesn't have its own GPS, an access point may take its coordinates from an outside source. On an indoor job, the outside source can be a phone in a technician's hand, and that phone knows where it is largely because of Wi-Fi.

GPS on a smartphone: a 4.9 meter radius, under open sky. Accuracy worsens near buildings, bridges and trees, which is to say it worsens exactly where you work.

Wi-Fi read from a crowd-sourced database, measured on a phone in 2009: a median of 74 meters.

Wi-Fi ranging, which measures time of flight against the access points instead of looking them up: 1 to 2 meters, and only where the device can range against 3 or more access points that implement 802.11mc Fine Time Measurement. Indoors.

Before an AFC system will hand back a list of available frequencies and a maximum permitted power, the access point has to supply 5 things: its coordinates, its antenna height above ground level, a location uncertainty in meters at 95 percent confidence, its FCC identification number and its serial number.

The rule asks for a position, and next to it a number stating how wrong that position could be, at a stated confidence. Uncertainty is a separate mandatory field with its own arithmetic behind it. Everything downstream exists to keep that number honest.

When an access point takes its coordinates from something other than itself, the FCC requires, as a condition of certifying that device in the first place, that the uncertainty it reports account for two things: the accuracy of the source, and the distance between that source and the access point.

When using a phone to set the anchor access points position, every meter you stand away from that access point is a meter that has to be added to the uncertainty the access point reports.

You do not have to do every access point. 4 anchors is the minimum, and the rest of the estate gets located by the access points ranging to each other with 802.11mc Fine Time Measurement. Each access point has to be able to range to at least 3 others.

Follow the arc all the way. The phone learned to find itself with Wi-Fi. Now Wi-Fi helps the access point find itself.

An indoor access point has no sky. The FCC wrote one geolocation rule for a device class it clearly pictured on a rooftop, and that rule applies without modification to an access point hanging in the middle of a warehouse. A phone in somebody's hand is one way the industry closes that gap, and it works because indoors the Wi-Fi input outranks the satellite input.

What are your plans for indoor standard power?

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