# The 4x4 Advantage

In order to best understand why it's important to have 4x4 accompanying a Wave 2 access point, you should clearly understand what 4x4 and Wave 2 are; for more information, please see our "XAP-1610 Features & Benefits" documents.

Improvements in AP technology, generally speaking, should provide your client devices a better WiFi connection; so when a more advanced technology comes into play, taking full advantage of it is essential.

Aside from MU-MIMO, Wave 2 enables beamforming, which allows for much more effective communication from an access point to the client devices it's communicating with. This is accomplished by using multiple antennas to modify the signal pattern and focusing it toward a single client device (see 4x4 beamforming image).

With a 2x2 AP, beamforming isn't very beneficial, as with only two antennas, the AP cannot effectively modify the signal pattern and direct the signal toward the client (see 2x2 beamforming image). In fact, a difference in beamforming performance is hardly noticeable unless the AP has at least 4x4 technology, using four antennas.

So while Wave 2 is a powerful technology with a lot of WiFi benefits, it cannot be fully taken advantage of with anything less than a 4x4 access point.
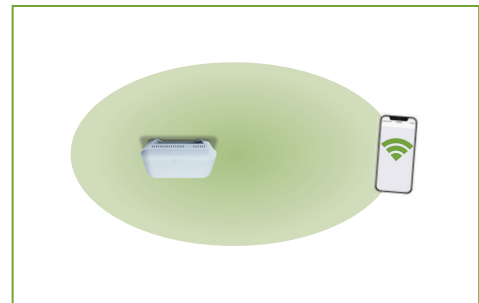
2x2 beamforming
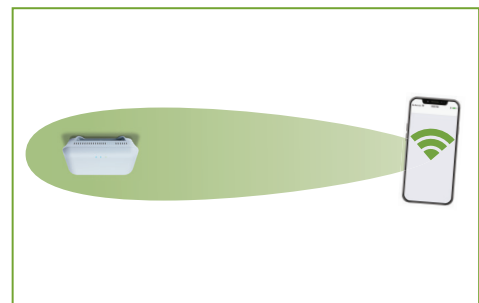
4x4 beamforming

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XAP-1610 Features & Benefits

Wave 2 and 4x4 technologies come together in the XAP-1610 to deliver a connection that is faster and more efficient than any other in the industry. For more information on why the XAP-1610 is the optimal choice for advanced WiFi coverage, see our "The 4x4 Advantage" document.
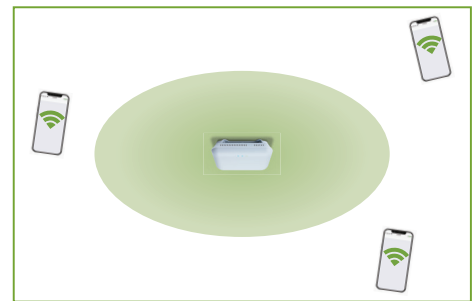
Wave 2

Beamforming

With beamforming, Wave 2 access points can effectively focus their wireless signal toward each individual client device, increasing signal strength and bandwidth. Because of this, Wave 2 beamforming can upgrade client devices with marginal connections to good and ones with good connections to great.

MU-MIMO

The XAP-1610 is built with MU-MIMO, or multi-user multiple input multiple output. With MU-MIMO, client devices no longer have to take turns communicating with the AP, as the AP is capable of communicating with multiple clients simultaneously. So the available throughput on the network increases drastically as each device spends less time waiting and can transmit more often. If you want more information on this technology, visit blog.luxul.com/2018/06/22/ipiq-mimo/

4x4

The XAP-1610 is built with 4x4 technology, which simply means it's capable of four simultaneous data streams—or four lines of communication. With this increased number of streams, the XAP-1610 can either communicate with more client devices at once or deliver more streams to an individual client for increased bandwidth and performance.

AP without beamforming

Wave 2 beamforming
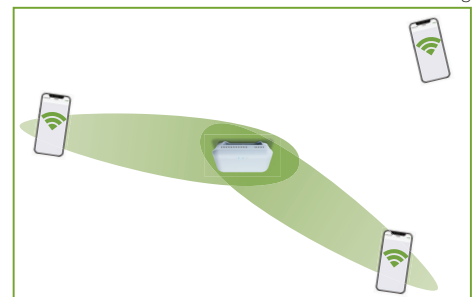
Wave 2 beamforming with MU-MIMO

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