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Qualcomm ups Wi-Fi capacity via 802.11ac multi-user MIMO


Tommy Parker | Apr 2, 2014 9:12pm

Wave 2 of the 802.11ac Wi-Fi standard is finally on deck, and chipmaker Qualcomm (NASDAQ:QCOM) is rolling out an 802.11ac product ecosystem that enables access points and client devices to exploit multi-user MIMO (MU-MIMO) for greatly enhanced network efficiency and capacity.

Optional functions in 802.11ac Wave 2, which are certified by the Wi-Fi Alliance, include MU-MIMO, a fourth spatial stream and 160 MHz channels. MU-MIMO, which enables spatial reuse and is already employed in cellular networks, may carry the most widespread ramifications for Wi-Fi networks. Qualcomm's product announcements this week address only the first two new features: MU-MIMO and four-stream configurations.

Todd Antes, vice president of product management at Qualcomm Atheros, explained that in standard, single-user MIMO (SU-MIMO), client devices are served sequentially, limiting how much network capacity can actually be exploited. As growing numbers of clients compete for that capacity, overall throughput and performance per client falls.

"MU-MIMO breaks that constraint, so we can start to do more with the same amount of spectrum," Antes told *FierceWirelessTech*.

 Qualcomm single user MIMO

Source: Qualcomm Atheros

Qualcomm's approach to MU-MIMO enables dynamic client grouping. Beamforming then enables simultaneous transmission of a spatially diverse beam to each client within a group. That delivers more efficient use of available Wi-Fi network capacity and speeds up transmissions, according to Antes.

"In the same time that it took to serve one client in the single-user network we can now serve three at the same time in the multi-user MIMO network. We can squeeze more users onto the network and more data across the network at the same time," Antes said.

MU-MIMO is a feature that must be supported on both ends of a connection. Access points, routers and gateways are responsible for the MU beamforming computations, while the client devices feed channel information to the access point devices so they can make more precise calculations. However, the efficiencies gained by using MU-MIMO on a Wi-Fi network also improve the overall service to legacy SU devices on the network.

The folks at Qualcomm Atheros have been working on MU-MIMO for seven years. Antes noted the company authored the 802.11ac channel model that was adopted by IEEE.

Qualcomm Atheros' Vive-branded MU-MIMO products include the QCA9980 and QCA9982 three- and four-stream, single-chip solutions for networks, both of which should begin sampling this quarter.

MU-MIMO is now built into all of Qualcomm Atheros' latest 802.11ac client solutions and is supported on Qualcomm Snapdragon 801 and 805 mobile processors. "Customers already using those devices have a seamless upgrade via software update to add MU-MIMO to those products," Antes said.

New MU-MIMO devices announced today by Qualcomm include the Vive-branded QCA9378, a two-stream solution for connected TVs, set-top boxes and other entertainment devices, and the QCA6574, which is the first automotive solution to combine 2-stream 802.11ac and Bluetooth 4.1 for in-car communication, media infotainment and point-to-point connections.

Wave 1 802.11ac products included basic specifications and features such as 5 GHz-only operation, three-stream functionality and 80 MHz channels as well as power savings. Antes said he expects Wave 1 and Wave 2 products to coexist for some time, but optional Wave 2 features such as four-stream capability and MU-MIMO should eventually become the norm because they easily add needed efficiency and speed.

Regarding the 160 MHz channels enabled by Wave 2, however, he noted: "There is a good amount of debate over whether that makes sense or where that makes sense."



MU-MIMO retail networking gear, home routers and even client devices that are "draft 802.11ac-compliant" will likely be released before the test labs are Antes said

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