IDC TECHNOLOGY SPOTLIGHT

Sponsored by: Ruckus Networks, an ARRIS company

Businesses rely on WiFi for connecting their employees and enabling new business opportunities. However, current WiFi technology struggles to meet the demands of today's modern use cases. This Technology Spotlight examines 802.11ax, a new WiFi standard that can solve these concerns and help enterprises create the networks they need.

Evaluating the New 802.11ax WiFi Standard and What It Will Mean for Enterprises

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Introduction: Why Enterprise WiFi Is Under Pressure

AT A GLANCE

WHAT'S IMPORTANT

802.11ax is a new WiFi standard that addresses many of the challenges posed by enterprises today.

KEY TAKEAWAY

To take full advantage of 802.11ax requires a trusted partner that can extend these technology advances to support new business needs.

WiFi is an integral part of nearly every business. The pervasive nature of mobile devices, combined with the ever-growing array of applications and services being accessed, puts tremendous strain on all organizations looking to deploy secure and scalable WiFi networks. Meanwhile, the demands businesses place on WiFi will only increase in the future. By 2020, there could be 30 billion connected devices; by 2025, that number is expected to reach 80 billion. Many of these devices will rely on WiFi, creating a growing need for expansive, secure, and robust service. IDC predicts worldwide sales of enterprise-class wireless LAN (WLAN) equipment will grow 5.5% over the next five years to reach $7.5 billion by 2022, as shown in Figure 1.

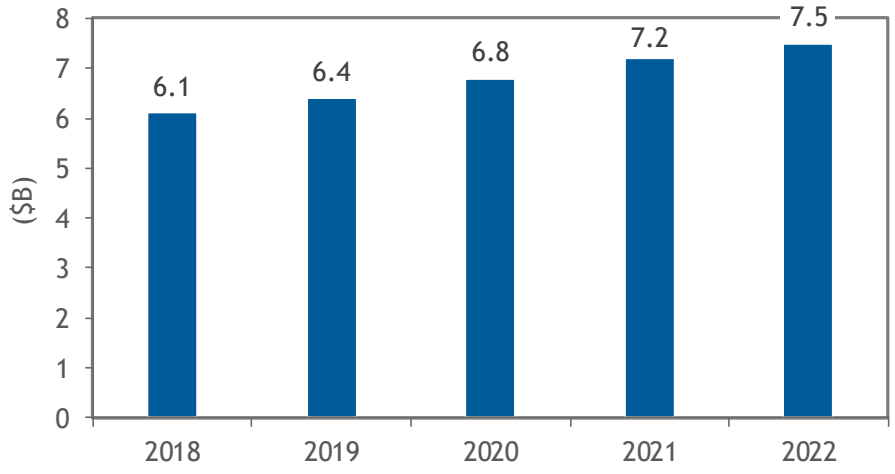
As WiFi has evolved, it has become about more than just connectivity. Organizations now rely on it every day to support how users — both internal and external — interact with their business. WiFi can be used to engage, reward, and impress guests through personalized applications and targeted marketing. WiFi is a platform for supporting new business opportunities by creating innovative ways of interacting with users. However, simply providing a WiFi network for the organization, users, and guests is not enough. The network must be a secure and reliable connection that can scale to support a wide range of new applications, devices, and use cases.

Deploying enterprise-grade WiFi that meets all the demands a business places on it is hard. WiFi users are literally mobile, which creates coverage challenges. Interference from structures or due to a high number of users in an area can disrupt radio frequency (RF) signals. Security is a paramount concern for any organization's WiFi deployments, but it is difficult for organizations to implement sufficiently. To address these evolving challenges, the Institute of Electrical and Electronics Engineers (IEEE) has ratified more than 15 iterations of protocols governing WiFi over the past 20 years. The most recent protocol was 802.11ac Wave 2, which broke the gigabit per second barrier for WiFi traffic and introduced advanced functionality for large enterprise environments. Despite these advancements, many organizations still find limitations around the number of channels and devices as well as the amount of capacity supported by 802.11ac Wave 2.

These limits are prevalent where a very high density of users exists, as in stadiums, convention centers, transportation hubs, and auditoriums. More users rely on WiFi in these locations, and they expect a reliable and fast connection even during peak usage times. Meanwhile, organizations managing these venues are realizing the new business opportunities that WiFi enables, which range from increased levels of customer engagement and satisfaction to marketing promotions and detailed analytics.

WiFi is also increasingly used in Internet of Things (IoT) deployments to realize operational efficiencies by connecting equipment and devices. Network operators use WiFi for mobile data offloads while Smart City initiatives are rolling out public WiFi. In developing countries, WiFi can often be easier to set up than mobile networks, creating a range of new use cases. However, WiFi products based on previous-generation protocols will struggle to meet the diverse and demanding needs of these new use cases.

FIGURE 1: ***WORLDWIDE ENTERPRISE WLAN FORECAST, 2018–2022***

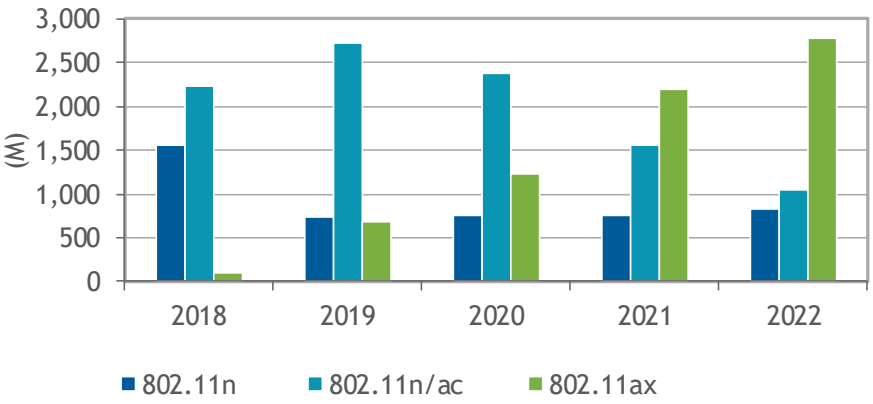


Source: IDC, 2018

802.11ax: The Future of WiFi

A new WiFi protocol has been developed to meet the previously mentioned challenges: 802.11ax. Sometimes called the High-Efficiency Wireless standard, it can support up to four times higher throughput than previous standards, and many of the advancements in the 802.11ax release are specifically designed for high-density areas. IDC predicts that 802.11ax usage will ramp up significantly in 2018 and 2019 in target areas and that 802.11ax will be a mainstream WiFi standard toward the end of 2019 and the dominant WiFi standard among enterprises by 2021, as shown in Figure 2.

FIGURE 2: ***WIFI CHIPSET SHIPMENT FORECAST BY STANDARD, 2018–2022***



Source: IDC, 2018

The new protocol comes with many benefits:

- **Orthogonal Frequency Division Multiple Access (OFDMA):** In WiFi's early days, each access point (AP) could speak with only one device at a time. In large-scale environments, this is untenable. OFDMA enables 802.11ax WiFi equipment to splice traffic frequencies between APs and devices into resource units. Doing so allows frequencies to be divided into subcarriers so that traffic can be coordinated to serve more packets from more devices, increasing the network's capacity.
- **Uplink multiuser, multiple input, multiple output (MU-MIMO):** Previous WiFi standards allowed for MU-MIMO, but only for downlink traffic. The 802.11ax protocol adds MU-MIMO support for simultaneous client data transmissions upstream to APs, another improvement for highly dense environments that will be particularly helpful for the client experience on WiFi networks.
- **Data speed:** Both 2.4GHz and 5GHz bands are supported by 802.11ax, and maximum physical (PHY) data transfer speeds increase from about 1GE in 802.11ac to 10GE.
- **1024 quadrature amplitude modulation (QAM):** QAM represents how data is transmitted within WiFi protocols. In the 802.11ax protocol, the scale of QAM methods has risen from 256 to 1024, which greatly increases the total throughput of 802.11ax WiFi.
- **Power efficiencies:** The newest standard allows for the coordination of transmit time to and from devices. This feature reduces the time that device radios need to be online, which improves power capacity.

» **Overlapping Basic Service Set (OBSS) coloring:** To support device-dense environments, APs are densely colocated, which increases co-channel interference and network performance degradation. The 802.11ax standard introduces an OBSS that allows for color-coded shared frequencies, ultimately increasing the network's capacity to concurrently transmit data to multiple devices in congested areas.

Use Cases for 802.11ax Technology

The advancements in 802.11ax will benefit a wide range of use cases but are particularly important for dense environments in which large numbers of users and devices are connecting to the network. Some scenarios that will benefit from advancements in the 802.11ax standard are as follows:

» **Large public venues (LPVs):** Stadiums and convention centers are common LPVs that increasingly offer WiFi to improve fan or attendee experiences, increase customer interactions, and create value-added services such as showing instant replays on fan devices or allowing attendees to order food from their seats. Stadiums and convention centers with tens of thousands of users all connecting to the WiFi at the same time pose unique scale and density challenges. The 802.11ax advancements around OFDMA, 1024 QAM, OBSS coloring, and the faster PHY rates will make it easier for LPV owners to create new business opportunities by offering enhanced services to guests.

» **Transportation hubs:** Public transportation stations are also offering public WiFi. Like stadiums, transportation hubs have high densities of people attempting to connect to the networks simultaneously. However, these hubs face the unique challenge posed by transient devices that are not connecting to the WiFi network but are still sending management traffic that congests it. The 802.11ax advancements with OFDMA and BSS coloring provide the tools to manage the challenge with these dense environments.

» **IoT and Smart City deployments:** These deployments face a wide variety of challenges. In some cases, there can be a high volume of devices all attempting to communicate simultaneously, such as at a manufacturing site. In others, a small number of devices could be idle and need to "phone home" once a day. Power efficiencies in 802.11ax can enable devices to go into deep sleep mode and turn on their transmitters at predefined intervals to prolong field time without maintenance.

» **Education:** College and university campuses have high densities of WiFi users in areas such as libraries, auditoriums, lecture halls, and student unions as well as at graduation and other campus events. Primary/K–12 education trends such as video-based learning, 1:1 computing, connected classrooms, and IoT are creating an airtime capacity crisis, which stresses network reliability.

Taking Advantage of 802.11ax Technology

The 802.11ax standard lays the groundwork for WiFi to support much higher concurrent device capacity. To leverage these advancements requires hardware and software functionality built upon the 802.11ax standard. Enterprises don't deploy standards; they buy products, such as APs, wireless controllers, and management centers for deploying WiFi. Networking vendors are expected to release 802.11ax-based equipment in the second half of 2018, with sales of 802.11ax products ramping up significantly in 2019 and 2020.

When evaluating WiFi vendors, enterprises should consider not only the latest standards but also the additional features and functionality enabled by the advancement in standards. By itself, 802.11ax does not address dynamic channel selection or other multi-AP network optimizations such as client load balancing. Just deploying the 802.11ax standard will not deliver benefits.

To fully take advantage of advancements in the 802.11ax standard requires hardware and software functionality built upon the latest WiFi technology.

Considering Ruckus 802.11ax Offerings

Ruckus Networks, an ARRIS company, provides enterprise-grade WiFi hardware and software equipment with a focus on developing RF technology for challenging and complex WiFi environments such as large public venues as well as IoT deployments and Smart City initiatives.

The company has a broad set of indoor, outdoor, and specialty APs, with the newest 802.11ax-based R730 access point designed specifically for high-density environments. The R730 includes 2.4GHz 4x4 and 5Ghz 8x8 radios as well as a 5GbE port, and it supports all six key attributes of 802.11ax: OFDMA, MU-MIMO, faster data speeds, increased QAM, power efficiencies, and OBSS coloring. Ruckus's R730 APs are also WiFi Protected Access (WPA3) compliant and IoT and CBRS/LTE ready.

Ruckus SmartZone network controllers can be used to manage large-scale R730 deployments and include Ruckus' Ultra-High Density Technology Suite. The latter is designed to improve network performance in ultra-high density environments using patented and patent-pending techniques beyond the 802.11ax standard.

Challenges

While Ruckus has a solid set of enterprise-grade wireless offerings, some inherent challenges come with the rollout of new networking technology. The company has done extensive field testing of its latest equipment, but these are newly developed products that will improve in functionality and features over time. Ruckus also has an opportunity to democratize its newest networking equipment to appeal beyond LPVs and into more traditional enterprise environments. To the extent it can broaden the appeal of its networking equipment, Ruckus should benefit from the advancements in WiFi technology.

Conclusion

WiFi has never been more important for businesses, but enterprise demands on the network continue to increase exponentially. There are myriad advancements in WiFi standards to support new use cases, but to take advantage of these technology enhancements requires WiFi hardware and software equipment optimized for these new standards. Ruckus is among the companies offering 802.11ax equipment to do just that. IDC believes the market for 802.11ax equipment will continue to grow, and to the extent that Ruckus can address the challenges described in this paper, the company has a significant opportunity for success.

About the analyst:

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Brandon Butler is a Senior Research Analyst with IDC's Network Infrastructure group covering Enterprise Networks. In this role, he is responsible for market and technology trends, forecasts and competitive analysis in Ethernet switching, routing, wireless LAN, and adjacent emerging segments such as SDN and SD-WAN.

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