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Wi-Fi 6: Answering the call for better Wi-Fi performance

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Introduction

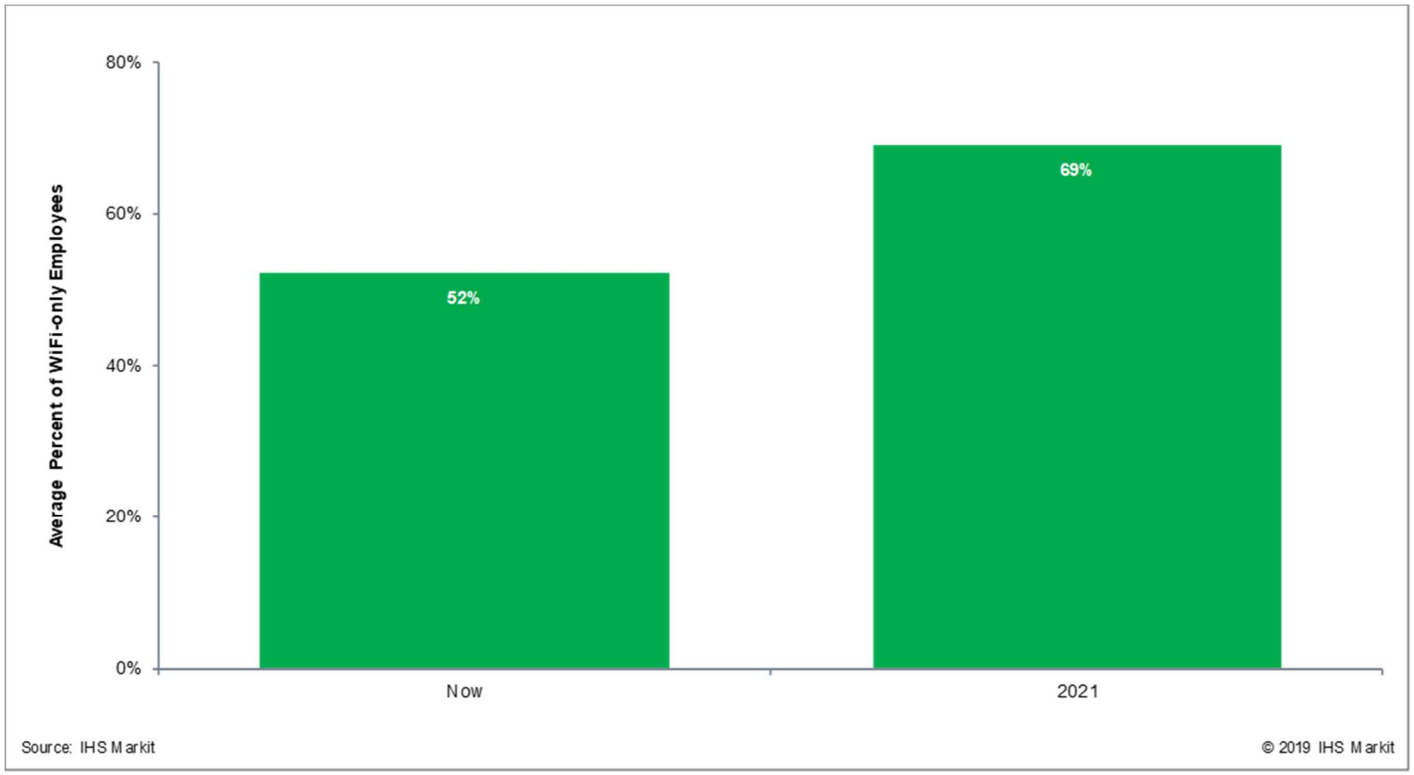
Wi-Fi has revolutionized the way we communicate and access information, freeing us from the limitations of wires and enabling us to connect to the network from almost anywhere. After 20 years in the market, Wi-Fi connectivity has become embedded in an ever-growing array of devices, from ubiquitous laptops and smartphones, to TVs and gaming consoles, and objects like light bulbs and appliances. Organizations of all types are incorporating these new types of devices into their business processes and are redesigning their workflows around mobility.

Wi-Fi is no longer a nice-to-have supplement to traditional wired enterprise access networks, but has become the primary method of accessing the network, supporting mission-critical business processes. Many new devices forego wired connectivity options altogether, and a new generation of users has never used anything but Wi-Fi to access the network. Companies that want to support their changing user population and take part in the digital transformation of their business need to incorporate wireless connectivity as a core component of their overall networking strategy.

Cord cutting gains steam

Initially, Wi-Fi networks were built in addition to wired networks, giving users another option to connect to the network. But now we're entering a new phase where Wi-Fi becomes the default (and often only) option to get on the network. In part, this cord cutting is fueled by the shift away from wired IP phones, which have propped up the wired LAN market for years. Now, users are embracing mobile devices and voice is just another feature in collaboration tools, evaporating the need for IP phones and, in turn, wired switch ports. We expect many companies will decommission wired access once equipment has reached the end of its useful life, and those that are building new networks will provide wired access only for certain high-bandwidth applications like high-end workstations, videoconferencing rooms, etc., while the typical user only gets Wi-Fi access. Our surveys of network managers show that already, over one-half of employees only use Wi-Fi to access the network today, and this trend is only going to strengthen in the coming years.

Exhibit 1: Wi-Fi-only users

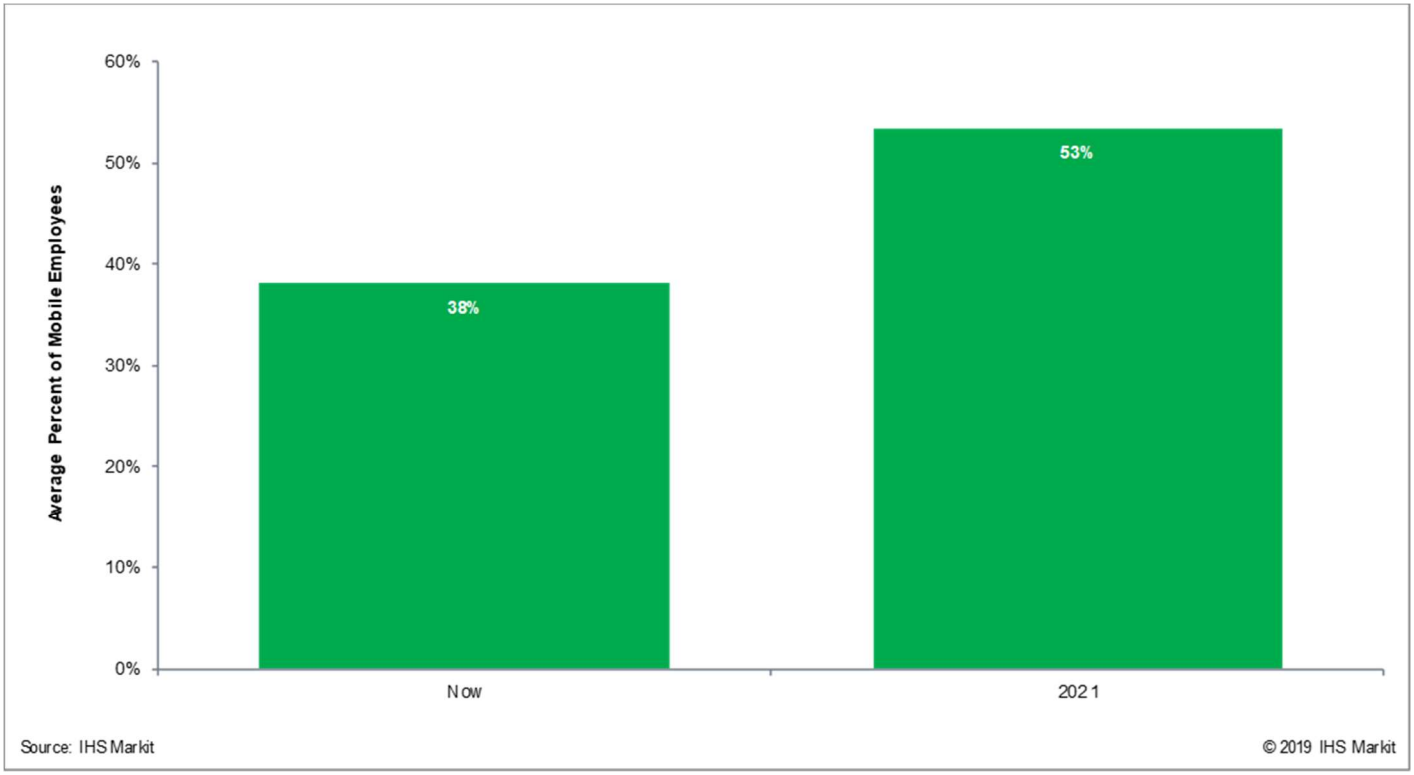


Source: IHS Markit | Technology, now a part of Informa Tech, WLAN Strategies and Vendor Leadership, N. American Enterprise Survey,2019

Mobility at the core of tomorrow's workplace

The trend toward cord cutting is in part fueled by new requirements for employee mobility. Our research shows that over half of employees will spend a majority of their time away from their primary workstation by 2021. The workplace of the future will not be in a single, fixed location, but is changing throughout the day, and this has profound implications on workplace design, real estate assets, and technology investments. To remain productive while on-the-go, employees will need access to communication tools and information stores wherever they are, and Wi-Fi will be a key enabling technology as companies seek to create work environments that are flexible and enable employee mobility. Mobility also drives changes in the types of devices users adopt, leaving behind deskphones and desktop computers and moving to laptops, smartphones, tablets, wearables, and more.

Exhibit 2: Mobile employees



Source: IHS Markit | Technology, now a part of Informa Tech, WLAN Strategies and Vendor Leadership, N. American Enterprise Survey,2019

Performance and security are top WLAN changes

When we ask enterprises about the top changes they plan to make to their WLANs, their attention tends to focus on three key areas: more capacity, better coverage, and better security.

Along with reliability, capacity factors into improving the performance of WLANs, which still lags behind LAN performance. As more and more users and devices only use wireless access, it's critical for organizations to deliver high Wi-Fi service levels, or user productivity will suffer.

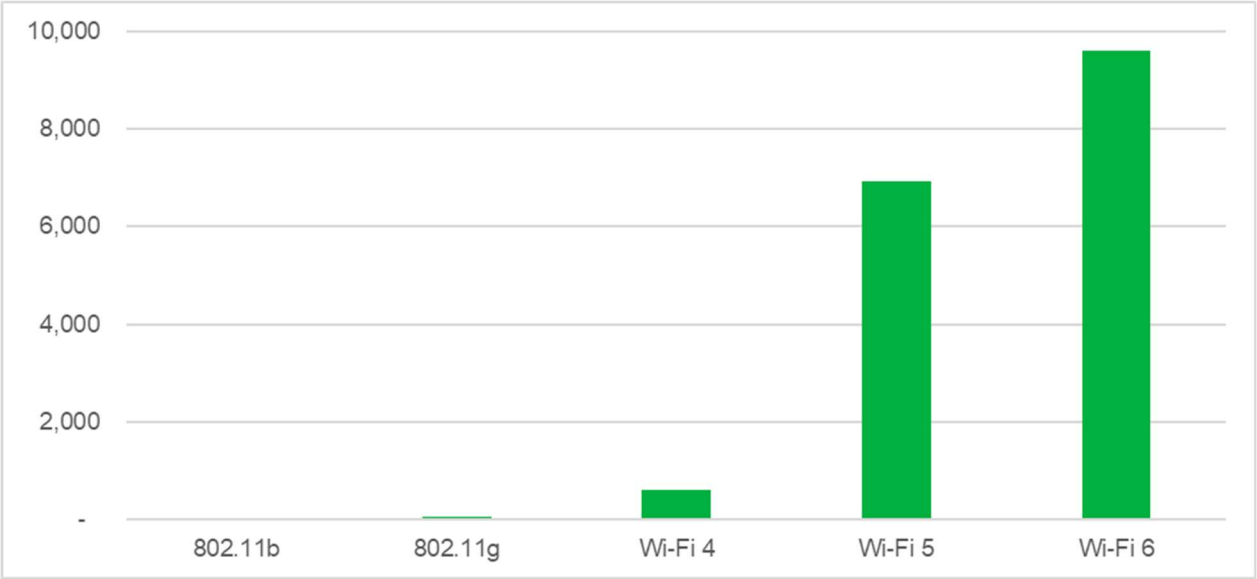
Security in general is a major concern for companies as hacking has evolved from a hobby into a multi-billion-dollar industry, and every week brings news of another major attack. Cybersecurity breaches require significant resources to remedy and can lead to loss of customer confidence, lost revenue, fines, and even bankruptcy. WLANs are a security concern because they could potentially give hackers access to the internal network and sensitive data.

And finally, by adding Wi-Fi coverage to new areas, the utility of the network and the applications running on it increases as employees can communicate and access information from more locations, supporting workflows that rely on mobility.

Each Wi-Fi generation brings new innovations

Since its inception in the late 90s, Wi-Fi technology has gone through a series of generations, with each new generation delivering significant improvements over the previous one. In the beginning, the focus was squarely on increasing the raw, theoretical data rate by using a variety of techniques, such as wider channels (e.g., 40MHz, 80MHz), advanced modulation techniques that carry more information (e.g., 64-QAM, 256-QAM), and transmitting on multiple channels simultaneously to a single user (multiple-input and multiple-output, or MIMO). The result is significant leaps in bandwidth between generations, in some cases over 10x, as can be seen in the chart below.

Exhibit 3: Max data rate by Wi-Fi generation



Source: IEEE

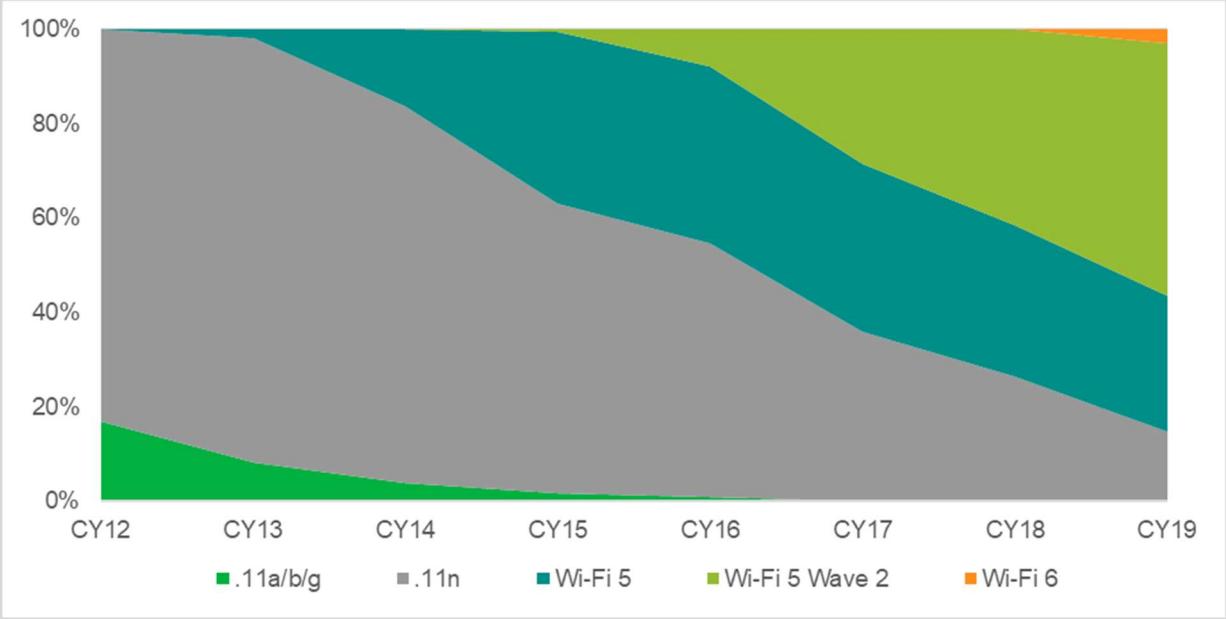
In more recent updates, the focus has also expanded to addressing some of the underlying inefficiencies of Wi-Fi, which have caused real-world performance to significantly lag behind theoretical maximums. For example, Wi-Fi 5 introduced the ability to transmit to multiple users concurrently (MU-MIMO) on the downlink, and Wi-Fi 6 extends that capability to the uplink, an important enhancement as traffic patterns become more bi-directional (e.g., for videoconferencing). Another improvement is the introduction of OFDMA (orthogonal frequency division multiple access), a technique borrowed from the cellular world, which slices existing Wi-Fi channels into smaller subcarriers that can then be accessed by multiple users at the same time. Previously, when a transmission required only a portion of the channel's total capacity, the remaining channel capacity would go unused. With OFDMA, the remaining portion can be assigned to other users, thereby fully utilizing the channel and increasing overall network throughput.

Enterprises rapidly adopt new Wi-Fi generations

Enterprises typically replace their APs every 4 ½ years, which corresponds well with the release of new Wi-Fi generations, about every 5 years. By the time enterprises are ready to replace old equipment, they will benefit from a new class of products that provide much-needed higher performance as enterprise requirements evolve rapidly.

- 802.11n was released in early 2009 and grew rapidly from niche product to 90% of all AP shipments by 2013.
- Wi-Fi 5 wave 1 began shipping in 2013 and ramped even faster thanks to a relatively small price premium. By 2018, 3 out of every 4 APs shipped were based on Wi-Fi 5. Wave 2 products became widely available in 2016 and surpassed wave 1 in 2018, accounting for 42% of all units in 2018.
- Initial Wi-Fi 6 shipments began in late 2018, and we expect volume shipments (i.e., 10%+ of units) by 2020; by CY23, nearly two-thirds of AP shipments will be Wi-Fi 6.

Exhibit 4: AP unit sales by generation



Source: IHS Markit | Technology, now a part of Informa Tech, WLAN Equipment Market Tracker, 2Q19

Bottom line

Wi-Fi has become a critical access technology in enterprise networks as users cut the cord and businesses implement mobility-centric workflows that depend on reliable Wi-Fi connectivity. The performance expectations of Wi-Fi have been raised, and the industry is answering this call by enhancing Wi-Fi technology. Not only does Wi-Fi 6 provide greater capacity than previous generations, but it also addresses some of the underlying inefficiencies of Wi-Fi, which will benefit more users and increase overall network throughput.

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a free webinar presented by IHS Markit | Technology, now a part of Informa Tech and

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LIVE: Tuesday, October 8, 2019
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REPLAY: Watch on-demand any time

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