Six MUST DOs for a successful Wi-Fi 6/6E migration

eBook
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Wi-Fi 6/6E migration

Alcatel·Lucent
Enterprise

Overview

It was only a few short years ago that Wi-Fi 5 was at the top of network administrators' minds. Consumers, businesses, government centres, educational institutions, hospitals, the hospitality industry and mass transit systems such as airports and train stations, all welcomed higher speeds and the benefits of 802.11ac. While some were early adopters and chose to deploy Wave 1 access points (APs), others were a little more pragmatic and waited until 802.11ac Wave 2 was introduced.

The same has occurred with the latest Wi-Fi standard, 802.11ax, known as Wi-Fi 6. There are early adopters from the manufacturing sector and from consumers and businesses that want to capture the benefits of Wi-Fi 6 and get a jump on the market, while others may wait for the extended version of the 802.11ax standard, Wi-Fi 6E. However, Wi-Fi 6E requires specific licensing requirements and is therefore not yet adopted in all countries.

It is a reality that Wi-Fi 6 has been adopted more quickly than Wi-Fi 5, or any other Wi-Fi standard was because of the tangible features that it offers, such as the ability to:

- Differentiate between signals from one network to another through basic service set (BSS) coloring—increasing network efficiency and capacity
- Use spatial streams more efficiently with spatial re-use
- Benefit from Orthogonal Frequency-Division Multiple Access (OFDMA) and Multiple- User, Multiple Input, Multiple Output (MU-MIMO) both downstream and upstream
- Enjoy longer device battery life with Target Wake Time (TWT)

This combination of features provides all the essential elements to support bandwidth hungry applications, and clients in dense environments such as stadiums, college campuses, lecture halls, hotel lobbies, hospital waiting rooms, airports, train stations, conference centres and K-12 schools, as well as address enterprise business demands.

However, Wi-Fi 6/6E environments require more than just high-performance APs. All that wireless traffic must get dropped on a wire somewhere. So, the question is—how will you prepare your network to deliver exceptional Wi-Fi 6/6E performance?

Wi-Fi 6 or Wi-Fi 6E: What's the difference?

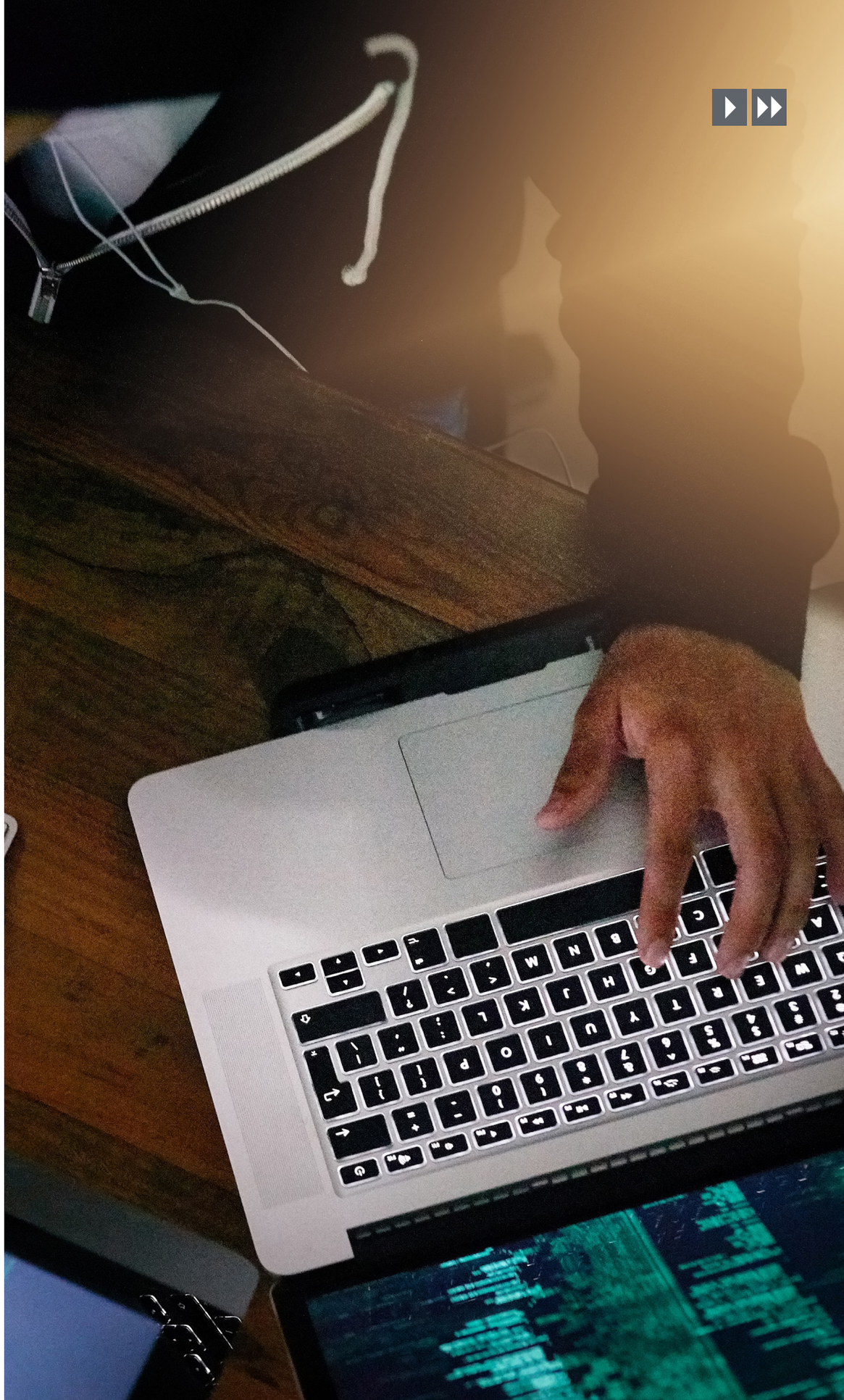
Wi-Fi 6 introduced several new features to increase wireless performance. These include orthogonal frequency-division multiplexing access (OFDMA), which enables routers and devices to use bandwidth more efficiently; Target Wake Time (TWT), which reduces power consumption and saves device battery life; and increases in speed, range and number of clients supported. It also provides better outdoor coverage and advanced security.

Additionally, Wi-Fi 6E includes mandatory Wi-Fi Protected Access 3 (WPA3) security controls, which is the highest Wi-Fi Alliance® security certification. This makes 6GHz Wi-Fi traffic more secure, and 6GHz networks more difficult to hack.

Wi-Fi 6E extends the features and capabilities of Wi-Fi 6 into the 6GHz unlicensed band and includes support for up to 14 80MHz channels or seven super-wide 160 MHz channels. This increases the available spectrum for Wi-Fi service and reduces overlap between networks in dense areas. And, only Wi-Fi 6E certified devices are permitted in the 6GHz band. This means getting rid of the overhead and traffic from legacy devices, and consequently, having better connectivity and less interference. In contrast, Wi-Fi 6 devices share the same spectrum with other legacy Wi-Fi 4, 5, and 6 devices.

What it all comes down to is the ability to support more bandwidth-intensive applications. More available high-bandwidth channels means more capacity for high-bandwidth, low-latency applications, such as high-definition video streaming, virtual reality gaming, and remote education and medical consultations and assisted surgeries.

Following are the six MUST Dos that we believe can help you navigate deployment and ready your network for Wi-Fi 6/6E.



Six Must Dos

1 Conduct an edge switch inventory to ensure your switches support PoE+ and Multi-Gig

Wi-Fi 6/6E APs require more power to unleash their full potential. These APs have added more capabilities and are more feature-rich, and they support 5Gbps and 10Gbps multigig uplinks, for which an additional power requirement is needed. Make sure your switches support 802.3at, PoE+ to deliver 30W per port, or even 802.3bt, Hi-PoE to deliver up to 100W per port, to ensure the Wi-Fi 6/6E APs are fully operational. If you have to install an access point on an 802.3af port, the AP will still work (in most cases), but at a reduced capacity. To fully benefit from supporting more spatial streams and higher speeds, it is recommended that PoE+ or Hi-PoE be available for the new APs. If you find your edge switching doesn't support PoE+ or Hi-PoE, it's a good time to replace your switches The additional dense client support and additional bandwidth is best used when operating at full capability, per the PoE+ and Hi-PoE recommendation.

Because of the additional bandwidth capacity supported by Wi-Fi 6/6E APs, you need to ensure your network is free of any bottlenecks, especially at the edge switches that connect to the APs. Many Wi-Fi 6 APs support 802.3bz to provide 2.5Gbps and 5Gbps speeds, or 802.3an to provide 10Gbps over Ethernet cabling. If your LAN connectivity is limited to 5Gbps, you can use Cat5e cabling, but Cat6 cabling is mandatory when 10Gbps connectivity is required. Therefore, you also need to check your cable infrastructure, and update if necessary, to ensure your APs and switches will perform correctly.

In addition to checking the edge switches and the Ethernet cabling installation, it is also necessary to identify any bottlenecks from the edge to the distribution switches, and all the way to the core. It is recommended that edge switches have at least 10Gbps uplinks to the distribution switches. However, if you need to purchase new switches, 25Gbps, 40Gbps or even 100Gbps uplinks to the distribution layer are recommended.

2 Ensure your network is loop-free and ready for fast service deployment

We have seen the worst of what spanning tree can do to a network. It can bring an enterprise to its knees and in complex networks it can take hours or days to find the issue. This can potentially cost a company thousands, if not hundreds of thousands of dollars, in lost productivity and revenue. It also makes for some very long days for the network team. Installing Shortest Path Bridging (SPB) capable switches will ensure your network performs without loops and has the efficiency and capacity to use all connected links. Unlike spanning tree, with SPB, all links are capable of forwarding traffic at the same time. It's like doubling your capacity without having to replace your cable infrastructure. You network team will benefit as well, because when you make a change to the network you only need to make it at the edge. This removes complexity, saves time, and frees your staff to focus on business-critical projects. If you haven't heard of SPB, it's a standard protocol, IEEE 802.1aq, and has a number of benefits including a distributed link-state protocol. The distributed architecture is an advantage on the LAN as well as on the WLAN.

3 Deploy a distributed wireless architecture

With a distributed wireless architecture, you save money because a controller is not required, as well, the associated maintenance is not required. Migrating your network to a standards-based architecture with SPB and Wi-Fi 6/6E distributed architecture access points can save time and money and improve efficiency.

However, the value of a distributed architecture is not only cost savings, but also knowing your APs are robust enough to make decisions about air-time fairness, band-steering, auto-channel selection, and auto-power selection. A distributed wireless architecture also eliminates a single point of failure, improves scalability, as well as data latency. There are no additional packets flowing through your network causing congestion or having to rely on a central controller to make all the wireless decisions.

Wi-Fi 6/6E APs are powerful enough to make adjustments as required and they offer rogue detection. And, with security at the forefront of our networks it is important to make sure your Wi-Fi 6/6E APs have a dedicated radio for scanning the network.

4 Employ a unified network management system

Ensure you have a network management system that can manage your wired and wireless infrastructure through a single screen. Unified management is essential for operational efficiency and to reduce IT workloads. It allows you to have a common interface to:

- Configure and push policies to wired and wireless devices
- Avoid duplication of work
- Minimise inconsistencies
- Have a centrally located device inventory
- Receive network performance alerts, analytics and heat maps, and real-time network status

5 Choose the right access points

In terms of AP selection, you need to figure out the best device for the job. Some things to consider include:

- Number of clients the AP will support
- What will the clients' access over the WLAN, for example: Specific applications, HTTP, HTTPS, Video, Voice
- Do you need outdoor access points or only indoor

In addition, following are some AP features you should consider:

- Support for the full range of Wi-Fi 6 capabilities, including OFDMA, UL-DL-MU-MIMO, TWT, up to 37 Rus, and BSS Coloring
- Support for new emergent applications with demanding requirements for high-bandwidth and low-latency, such as 8K Ultra-HD video, AR/VR, metaverse, among others, which will perform better in the 6GHz band
- A dedicated scanning radio for always-on threat monitoring and advanced analytics
- An AP model that you can standardise on that has both an internal antenna and external antenna for flexible deployment options
- Support for secure and simple IoT deployment
- Wi-Fi Alliance certification

The right APs should provide you with the flexibility to meet your WLAN objectives, whether you're a K-12 school district, college campus, hospital, government, transportation or a business.

6 Conduct a wireless site survey

After you have identified the access points you require, it is highly recommended that you conduct a physical wireless survey, especially in challenging environments such as older buildings, school campuses, and critical environments like hospitals. The best way to ensure your wireless environment will meet your needs is to conduct a wireless site survey where you measure the actual RSSI and SNR of an AP, so you know the exact location of where you should mount the APs as well as the performance and coverage of the AP. This accomplishes a couple of things; roaming will be seamless, and your wireless network design will be based on actual data from your environment not predictions.

Additional considerations when moving to Wi-Fi 6E

Countries enabling Wi-Fi 6E

With connectivity demands growing steadily, many countries are making portions of the 6GHz band available for Wi-Fi. However, some countries and regions are more restrictive than others, and organisations need to be aware of the status of the regulations in their region before starting a Wi-Fi 6E project*.

- Countries, including the U.S., Canada and Brazil have already opened the entire spectrum for Wi-Fi 6E
- In the European Union and the U.K., only 500 MHz are available for Wi-Fi, while the other half of the spectrum is reserved for 5G
- Other countries, such as Argentina, Mexico and New Zealand are still considering their options, while many others haven't yet made an announcement regarding Wi-Fi 6E adoption

Certified Wi-Fi 6E devices

Only Wi-Fi 6E certified products will be able to use the 6GHz band. Organisations wanting to deploy a Wi-Fi 6E solution will need to consider the availability of certified access points and client devices to support their use cases.

There is a list of Wi-Fi 6E certified products already available in the market, including access points and other equipment from network vendors, as well as consumer devices, such as smartphones, tablets, laptops and home entertainment devices such as smart TVs. While the list is still limited, it is expected to continue to grow rapidly.

Outdoor coverage

In many markets, the 6GHz band is already used by incumbent mission-critical services, such as public safety and cellular backhaul, satellite services and TV broadcast services, which means Wi-Fi 6E interference must be avoided. Wi-Fi 6E identifies two types of devices with the objective of avoiding interference with the existing services:

1. Low power devices designed with limited transmission power. These include:
    - Low Power Indoor (LPI) access points, for indoor usage only. These devices cover typical indoor Wi-Fi installations, either enterprise-grade or residential.
    - Very Low Power (VLP) devices, which are portable and intended for personal wearables, either indoor or outdoor. This is a new category of personal devices, to be used anywhere, even in vehicles, for example virtual reality glasses, which are connected to a smartphone through Wi-Fi, to transmit larger amounts of data than Bluetooth®.
2. Standard power access points are intended for outdoor deployments where more transmission power is needed to support greater distances. To ensure that the 6GHz incumbents do not experience harmful interference from these Wi-Fi systems, the Wi-Fi Alliance in coordination with the FCC in the US, has designed the Automated Frequency Coordination system (AFC), which manages spectrum usage requests in outdoor environments. Qualcomm has recently announced their AFC solution for enhanced Wi-Fi performance in 6GHz. In other countries, systems and specifications are in various phases of development. In general, Wi-Fi 6E for outdoor environments is not yet mature.

*Check the up-to-date list of countries enabling Wi-Fi 6E and Wi-Fi 6E certified devices, published by the Wi-Fi Alliance®.

Summary

The key to success with most new technologies, including this latest generation Wi-Fi 6 6E is implementing it in the timeframe that makes sense for your organisation. We hope this step-by-step guide provides you with the information you need to install a robust, secure, adaptive, high-performing Wi-Fi 6/Wi-Fi 6E-enabled network.

ALE offers both indoor and outdoor ALcatel-Lucent OmniAccess® Stellar Wi-Fi 6/6E Access Points based on a distributed intelligence architecture and can be managed on premises with Alcatel-Lucent OmniVista®2500 Network Management System or in the cloud with Alcatel-Lucent OmniVista Cirrus Network Management as a Service.

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