Hybrid Networks and the Rise of Wi-Fi 7

Solutions Guide

The Future is Hybrid

Traditional on-premises networks are often owned, operated and inside the perimeter of today's organizations. These legacy environments, typically managed by short-staffed and/or short-skilled internal IT teams, are generally easier to secure and control. But they're often too rigid to keep up with today's complex enterprise requirements and demands—or to support digital transformation efforts. That's why many organizations are not only outsourcing some or all of their network services, but they're also taking full advantage of hybrid networks.

What are Hybrid Networks? ›

What is Wi-Fi 7? ›

Importance of Hybrid Networks ›

Solutions to consider ›

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What are Hybrid Networks?

Hybrid networks are ideal for complex environments where one network alone cannot meet the needs of the organization. They combine "two or more different types of network topologies to leverage their respective strengths and mitigate their weaknesses. This versatile approach allows for the integration of various network...topologies into a single cohesive system."[1]

Put differently, a hybrid network integrates at least two kinds of network architectures. It uses a hybrid access point, typically a router, to connect both wired ports and wireless signals to the same network. Combining multiple networks enables your customer to optimize performance, reliability and scalability.

Enterprises typically deploy hybrid networks to have the flexibility needed to meet fast-changing business goals, such as:[2]

- The ability to deploy at scale without major redesign
- Guaranteed application performance
- Integration of disparate networks
- Using a single local connection to access private WAN and public internet

> *"[Wi-Fi 7] underscores our relentless commitment to delivering cutting-edge technology that redefines the way users experience Wi-Fi, providing faster speeds, improved efficiency and increased reliability which expand the horizons of what is possible through Wi-Fi"*
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Wi-Fi® CERTIFIED 7™ (Wi-Fi 7) meets growing user demands for immersive, interactive technology. Based on the IEEE 802.11be technology standard, Wi-Fi 7 enhances Wi-Fi performance in the 2.4 GHz, 5 GHz and 6 GHz bands, bringing cutting-edge capabilities to enable innovations that require high throughput, lower latency and greater reliability across home, enterprise and industrial environments. Key applications supported by Wi-Fi 7 include augmented, virtual and extended reality (AR/VR/XR), immersive 3D training, and ultra-high-definition video streaming. Wi-Fi 7 not only brings advanced Wi-Fi performance to the next era of connected devices, but it also enables worldwide interoperability and a robust device ecosystem.[3]

Wi-Fi CERTIFIED 7™:
Advanced performance for next generation Wi-Fi®

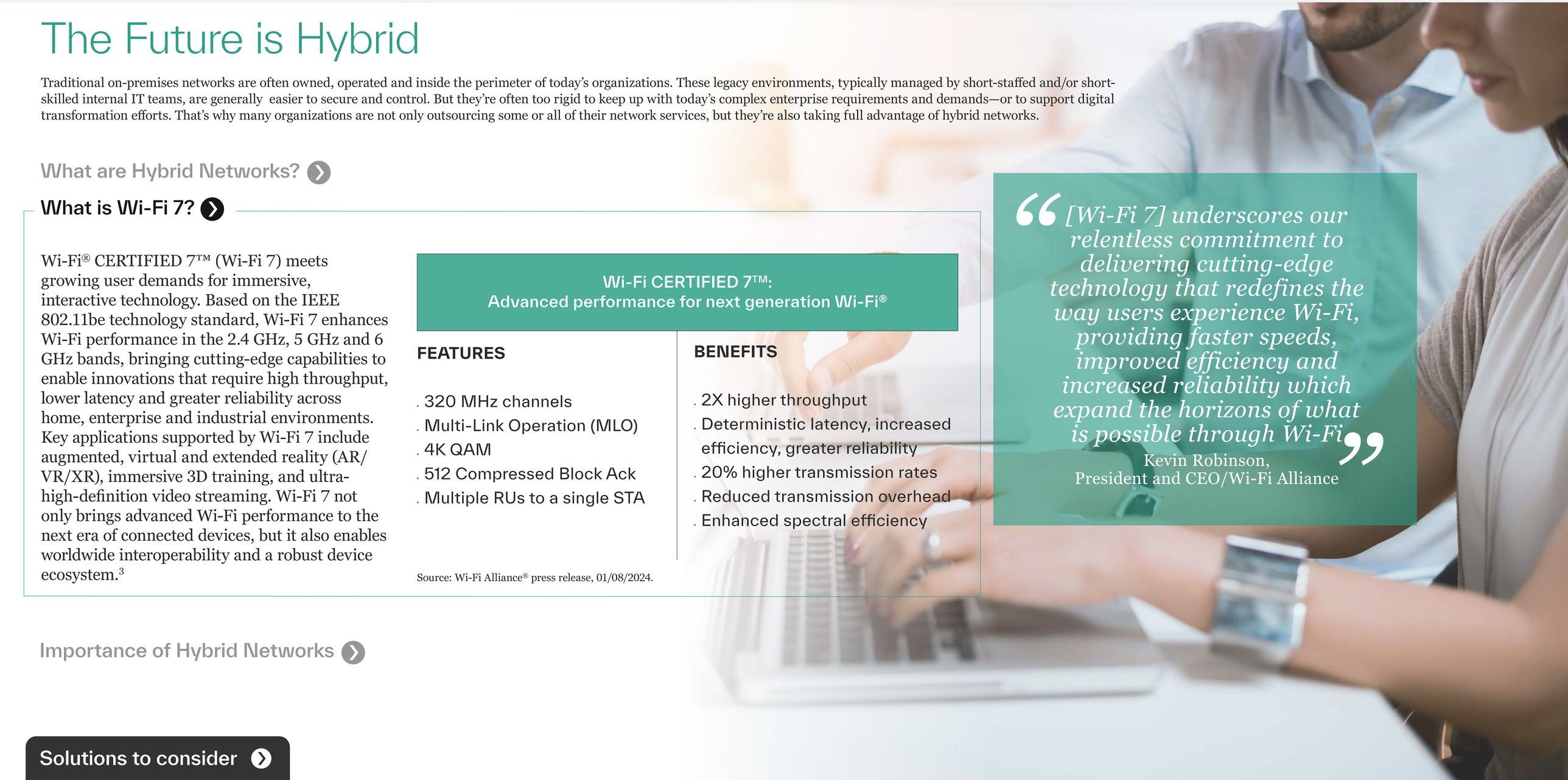
FEATURES

- 320 MHz channels
- Multi-Link Operation (MLO)
- 4K QAM
- 512 Compressed Block Ack
- Multiple RUs to a single STA

BENEFITS

- 2X higher throughput
- Deterministic latency, increased efficiency, greater reliability
- 20% higher transmission rates
- Reduced transmission overhead
- Enhanced spectral efficiency

Source: Wi-Fi Alliance® press release, 01/08/2024.



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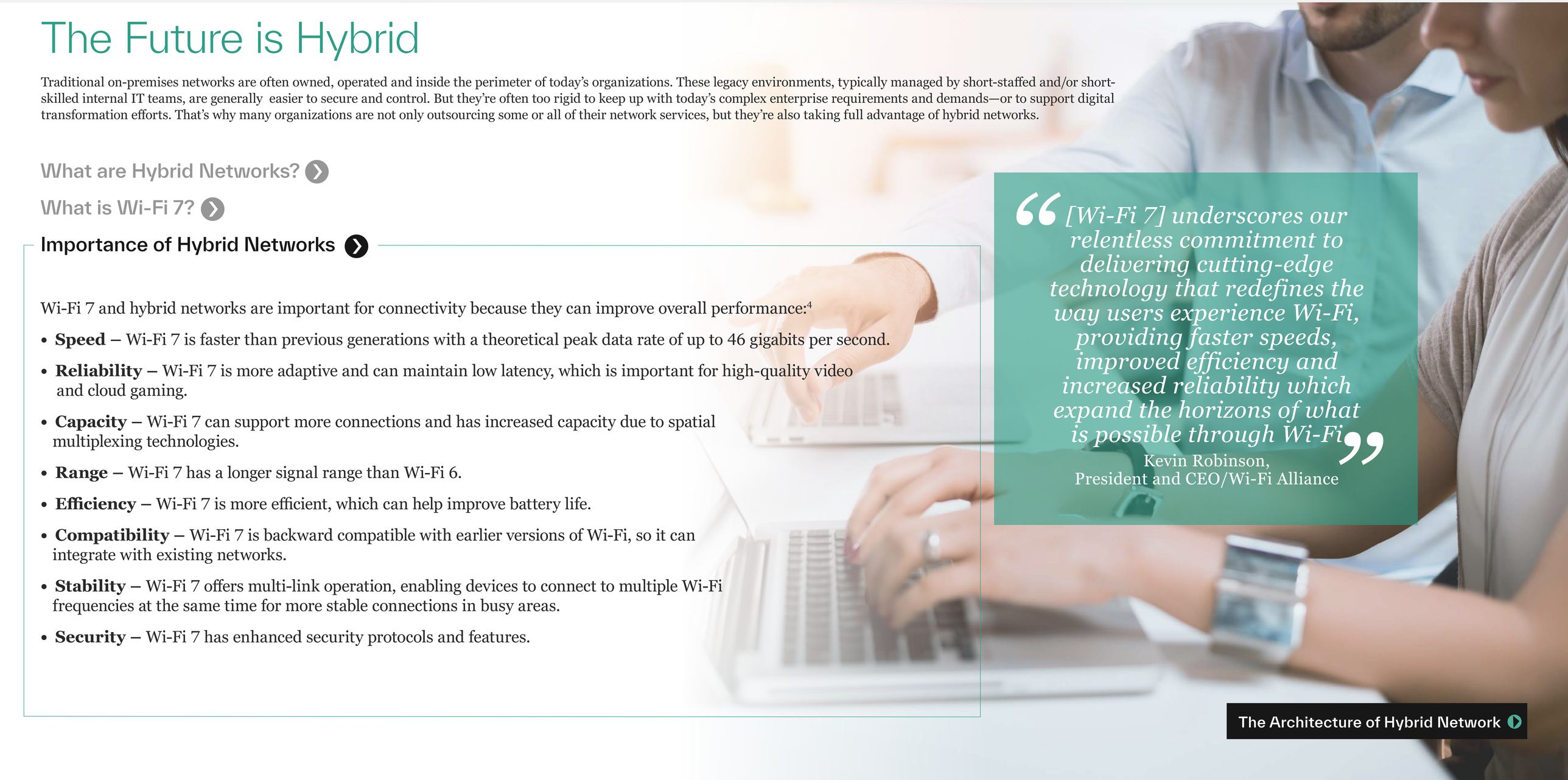
Wi-Fi 7 and hybrid networks are important for connectivity because they can improve overall performance:[4]

- **Speed –** Wi-Fi 7 is faster than previous generations with a theoretical peak data rate of up to 46 gigabits per second.
- **Reliability –** Wi-Fi 7 is more adaptive and can maintain low latency, which is important for high-quality video and cloud gaming.
- **Capacity –** Wi-Fi 7 can support more connections and has increased capacity due to spatial multiplexing technologies.
- **Range –** Wi-Fi 7 has a longer signal range than Wi-Fi 6.
- **Efficiency –** Wi-Fi 7 is more efficient, which can help improve battery life.
- **Compatibility –** Wi-Fi 7 is backward compatible with earlier versions of Wi-Fi, so it can integrate with existing networks.
- **Stability –** Wi-Fi 7 offers multi-link operation, enabling devices to connect to multiple Wi-Fi frequencies at the same time for more stable connections in busy areas.
- **Security –** Wi-Fi 7 has enhanced security protocols and features.



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The Architecture of Hybrid Network

The Architecture of Hybrid Networks

A Combination of Wired and Wireless Technologies

Integration of On-Premises and Cloud-Based Resources[6]

Overview of Hybrid Mesh Firewalls[7]

- At the end of 2023, there were 16.6 billion connected IoT devices, a year-over-year growth of 15%.[8]
- By the end of 2024, analysts expect 13% growth to 18.8 billion devices.[8]
- 51% of enterprise IoT adopters planned to increase their IoT budgets in 2024 and 22% expected a 10%+ budget increase over 2023.[8]
- By 2026, more than 60% of organizations will have more than one type of firewall deployment, which will prompt adoption of hybrid mesh firewalls.[9]

Solutions to consider

The Architecture of Hybrid Networks

A Combination of Wired and Wireless Technologies

The global IoT market is expected to grow from $217.5 billion in 2024 to $779.3 billion in 2031, a CAGR of 20%.[5] As organizations continue to adopt IoT, they'll do so knowing that their wired connections can be largely managed and secured in-house, while deploying wireless networks gives them greater flexibility in places where wired typically cannot go: across cities, on manufacturing floors and industrial plants, for use by mobile or field workforces, etc.

While rip-and-replace of wired networks is largely unfeasible due to performance, cost and security concerns, building hybrid wired/wireless networks provides the ultimate in flexibility. Business-critical applications—such as ERP, productivity, purchasing and others—can stay within centralized data centers where securing, processing and transporting massive datasets is critical. On the other hand, workers outside the four walls can quickly and easily download and access needed apps and data from a handheld or otherwise mobile device.

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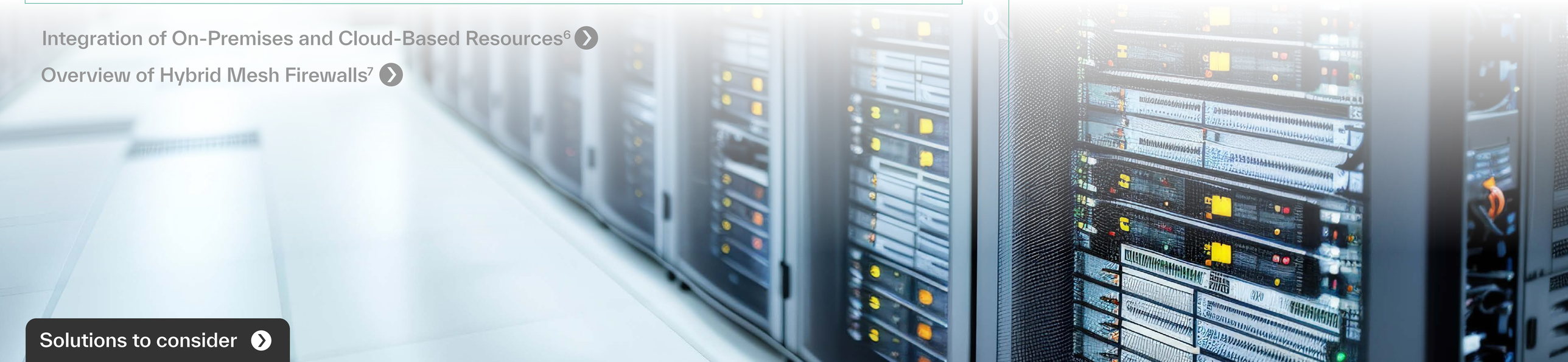

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Integration of On-Premises and Cloud-Based Resources[6]

Hybrid cloud architectures combine public and private clouds by a wide area network (WAN) or broadband connection, through which applications and data can be shared and managed as a single IT architecture. These private/public architectures, which are used by most organizations today, enable them to rely on private cloud for legacy infrastructures and mission-critical applications, while allowing them to scale from on-premises to public cloud resources to meet fluctuations in demand.

Many organizations use public Infrastructure-as-a-Service providers—such as Amazon Web Services (AWS) or Microsoft Azure—to process some workloads while retaining others in their private cloud, whether for flexibility, cost, regulatory compliance or technology reasons.

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Overview of Hybrid Mesh Firewalls[7]

Today's increasingly distributed and complex IT environments include corporate data centers, public and private clouds, remote employees, campuses, branches and operational facilities. The increase in cyber threats and expanding attack surface call for robust network security that protects it all.

Hybrid mesh firewalls are a comprehensive, typically single-vendor network security solution that delivers consistent security via a single management plane across all network segments. They simplify security architecture, while enabling consistent policy enforcement and centralized control with real-time threat intelligence sharing and automated responses. This approach streamlines management and allows for a more efficient allocation of IT resources, while reducing the complexity of managing multiple security stacks.

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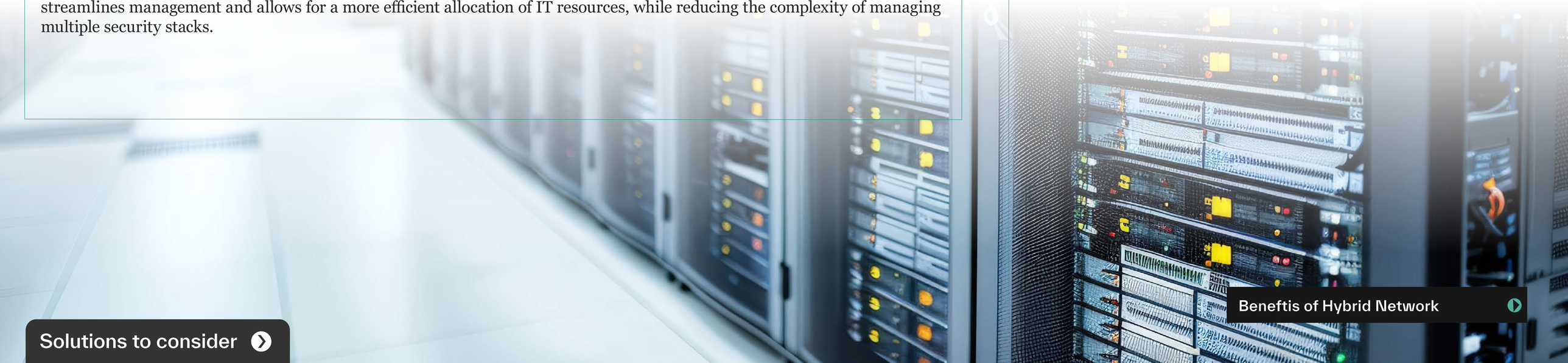

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Benefits of Hybrid Networks

Flexibility and Scalability

Redundancy and Resilience

Cost Optimization and Resource Allocation

- Digital transformation efforts are lagging due to technical debt (72%) and complex legacy IT infrastructure (51%).[10]
- 59% of CIOs said staff and skills shortages were inhibiting their implementation of strategic and innovative plans.[11]
- 32% of companies connect some/all sites to broadband only, 38% connect some/all sites to WAN only and 56% connect some/all sites to public and private networks.[2]

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Benefits of Hybrid Networks

Flexibility and Scalability

Hybrid networks offer infinitely more flexibility and scalability than traditional on-premises networks. First, your customer can choose from multiple cloud providers to get the services that users need without being locked into a single vendor. They can also combine multiple topologies for a tailored network design that meets their needs and incorporate additional topologies to expand their networks without disrupting the existing infrastructure. Your customer can also choose from a range of technologies to grow their networks to meet present and future needs and add or remove services to extend the network without disrupting users. Finally, scalability is critical to future-proofing the network. As bandwidth requirements fluctuate to meet demand, choosing scalable solutions upfront enables organizations to easily accommodate them—without disruptions or productivity impacts.

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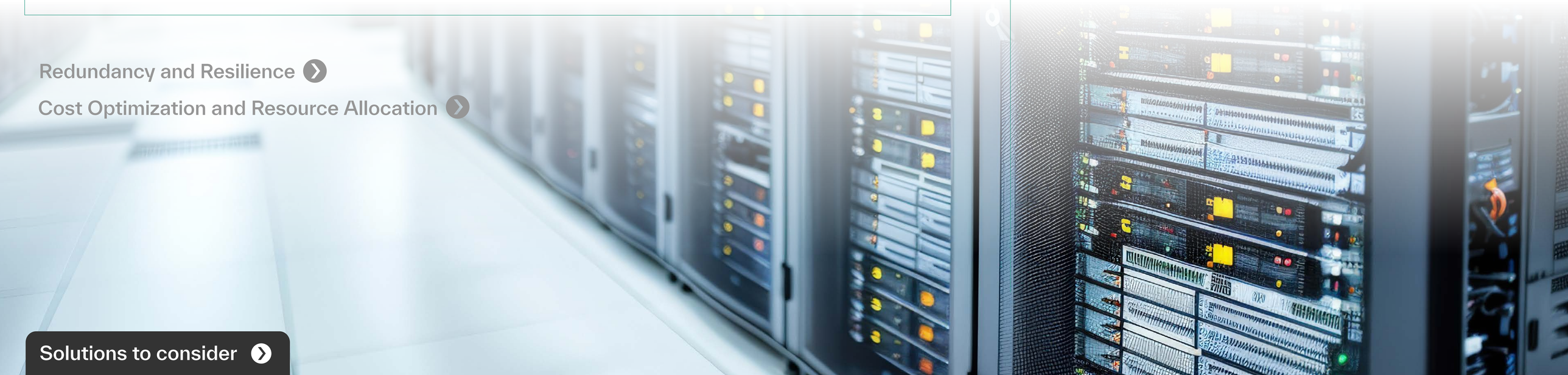

Redundancy and Resilience

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Benefits of Hybrid Networks

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In addition to reliable network equipment, high-speed internet enables fast data transfers with fewer bottlenecks and delays. A hybrid network is reliable and the failure of one node does not affect the functions of other computers in the network. Dependence on any single site or connection can be reduced by having multiple internet backbone access points across the organization for a secure and reliable network browsing experience. If one node is lost or experiences latency, jitter or packet loss, traffic can be diverted to another node to maintain application performance without any loss of quality. Troubleshooting network issues is also easy since central access points are relatively close to each other. If a connection node fails, it can be separated from the other network and fixed while the rest continues to function.

Privacy and ethical concerns

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Implementing a hybrid network can be more cost-effective than a single, expansive topology. Your customer can use existing infrastructure and only invest in new components where necessary. Using a hybrid network with private and public clouds enables them to better control costs, while exercising greater control over their data. When demand spikes, they can quickly view cloud usage, operational costs and costs of each workload or department cloud and either avoid hidden costs or relegate them to another business unit. By choosing a hybrid cloud network that meets their performance and price requirements, your customer can easily prioritize and allocate resources accordingly.

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Challenges of Hybrid Networks

Complexity of Integration and Management

Security and Compliance Concerns[12]

Performance and Latency Issues[13]

Solutions to consider

Challenges of Hybrid Networks

Complexity of Integration and Management

Your customers are continuously looking to efficiently and centrally manage their networks across wired and wireless environments, with increased visibility and analytics to boot. At the same time, they need to mitigate risk and reduce downtime. Integrating physical and virtual components into a unified hybrid network solution can be difficult. It requires data center network connectivity hardware to integrate with cloud's software defined networks. Your customer requires new toolsets, skills, processes and support to ensure they can meet their organizations' expectations for success. At the same time, their networking teams face both talent and skills shortages, and they may need third-party support to help them meet their technology, operational and business objectives.

Security and Compliance Concerns[12]

Performance and Latency Issues[13]

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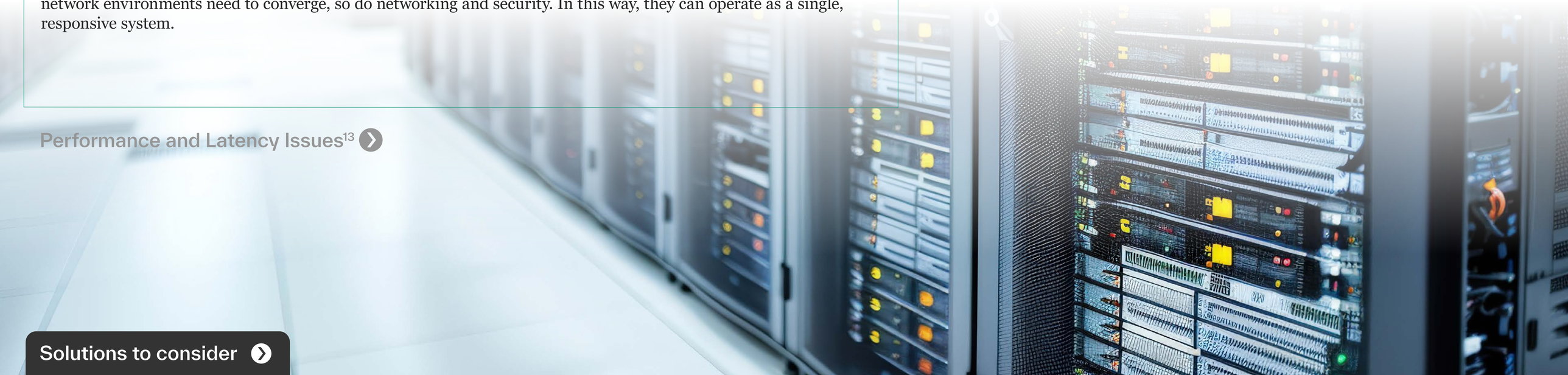
The fast transition to converged hybrid networks has stretched legacy security to the breaking point. Originally built around best-of-breed point solutions, these security solutions were designed to analyze and secure predictable data at fixed points in the network. They act as an overlay, almost entirely disconnected from the network they defend.

Creating hybrid networks with legacy security systems introduces new risks by practically inviting cybercriminals in and showing them where to find the gaps. Therefore, security vendors can no longer design—and organizations can no longer implement—standalone point products deployed as a network overlay. Instead, just as different network environments need to converge, so do networking and security. In this way, they can operate as a single, responsive system.

Performance and Latency Issues[13]



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While hybrid networks offer compelling reasons to converge campus and branch networks, as well other remote connectivity options, it does come without a downside. Because remote connections typically rely on wireless, it can mean potentially slower network performance and lag time. To mitigate this, your customer should consider tools that prioritize bandwidth for critical apps. This prioritization can ensure that remote workers can securely and efficiently collaborate and communicate, despite slower, less reliable network connections.

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The Evolution of Wi-Fi Standards

Overview of Previous Wi-Fi Generations

Wi-Fi Evolution

Key Improvements and Enhancements in Wi-Fi 7

Features and Capabilites of Wi-Fi 7

The key features of Wi-Fi 7, which deliver higher data throughputs and support deterministic latency for sophisticated use cases that demand first-rate reliability, include:[14]

Increased Throughput and Bandwidth
320 MHz super-wide channels that are only available in 6 GHz provide twice the throughput of Wi-Fi 6, enabling multigigabit Wi-Fi device speeds.

Improved Efficiency and Spectral Efficiency
4K QAM provides 20% higher transmission rates than Wi-Fi 6's 1024 QAM for greater efficiency and 512 Compressed Block Ack improves efficiency and reduces overhead. In addition, multiple RUs to a single STA improves flexibility for spectrum resource scheduling to enhance spectrum efficiency.

Enhanced Multi-User and Multi-Access Point Performance
Multi-link operation (MLO) supports more efficient load balancing of traffic among links, resulting in increased throughput and enhanced reliability.

Support for Emerging Use Cases
Key applications supported by Wi-Fi 7 include augmented, virtual and extended reality (AR/VR/XR), immersive 3D training and ultra high definition video streaming. Wi-Fi 7 will facilitate worldwide interoperability and a robust device ecosystem and bring advanced Wi-Fi performance to the next era of connected devices.

Solutions to consider

The Evolution of Wi-Fi Standards

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Before Wi-Fi's introduction in 1999, a complex web of Ethernet and dial-up cables connected people to online resources. We were essentially hostages to our desks (or wherever those cables were). Twenty five years later, it's clear that Wi-Fi's most important contribution is that it freed us from cables, enabling connections to be made "over the air" and giving us the ubiquitous (and untethered) connectivity that we enjoy today.

And over the past five years, we have continued to see Wi-Fi deliver significant increases in speed. Nowhere is this more evident than with this year's transition to Wi-Fi 7, which enables speeds up to 36 Gbit/s—or up to three times faster than Wi-Fi 6 and Wi-Fi 6E.

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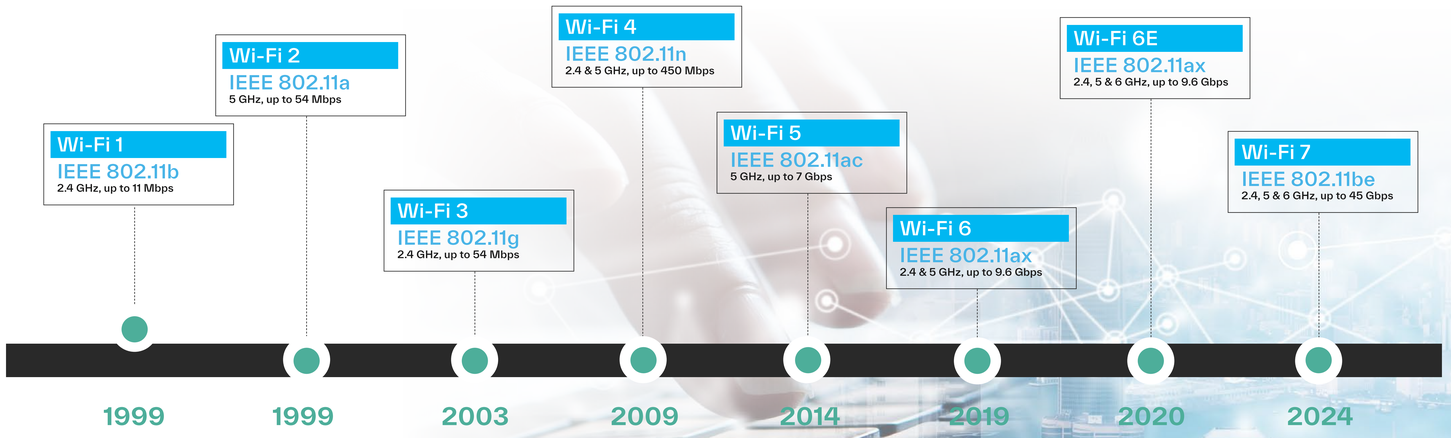

Source: “Redefining connectivity: Exploring Wi-Fi®’s 25 year journey,” Wi-Fi.org, 08/08/2024

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Key Improvements and Enhancements in Wi-Fi 7

Wi-Fi 7 supports advanced Wi-Fi performance for high bandwidth applications to ensure each connected device delivers the dependable experience users expect, even in dense environments like stadiums and large campuses.

Key benefits include:[14]

- Higher throughput
- Improved support for deterministic latency
- Enhanced efficiency, even in dense networks
- Increased robustness and reliability
- Reduced power consumption

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Advantages of Wi-Fi 7

- Higher Data Rates and Lower Latency
- Better Quality of Service (QoS) and Reliability
- Increased Capacity and Coverage
- Improved Battery Life for Wireless Devices

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Advantages of Wi-Fi 7

Higher Data Rates and Lower Latency

Wi-Fi 7 incorporates 4096-QAM to allow each symbol to convey 12 bits instead of 10 bits, resulting in a 20% increase in theoretical transmission rates compared to Wi-Fi 6 with 1024-QAM. The heightened transmission rate contributes to enhanced efficiency, enabling your customer to achieve superior data transmission. Implementing 4096-QAM marks a significant improvement, making streaming experiences—for example, smooth 4K/8K video viewing, lag-free gaming, livestreams from a home computer—even more remarkable.[15]

Better Quality of Service (QoS) and Reliability

Increased Capacity and Coverage

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Advantages of Wi-Fi 7

Higher Data Rates and Lower Latency

Better Quality of Service (QoS) and Reliability

Conventional Wi-Fi devices typically rely on a single link for data transmission. But with Wi-Fi 7, various MLO modes enable devices to employ multi-link aggregation for enhanced throughput, reduced latency and increased reliability. Devices can also use multi-link seamless dynamic switching to achieve effective load balancing and lower latency.[15]

Increased Capacity and Coverage

Improved Battery Life for Wireless Devices

Solutions to consider

Advantages of Wi-Fi 7

Higher Data Rates and Lower Latency

Better Quality of Service (QoS) and Reliability

Increased Capacity and Coverage

With Wi-Fi 7, networks can support a massive number of connected devices simultaneously, which is particularly favorable for IoT applications such as facilitating smart homes, smart cities and intelligent automation. It employs 16×16 Multi-User, Multiple Input, Multiple Output (MU-MIMO) technology to keep up with the rising demands of numerous Wi-Fi devices. Wi-Fi 7 doubles the number of spatial streams from eight to 16, effectively doubling the theoretical physical transmission rate when compared to Wi-Fi 6 and ensuring that each device enjoys ample bandwidth for smooth and efficient operation.[15]

Improved Battery Life for Wireless Devices

Advantages of Wi-Fi 7

Higher Data Rates and Lower Latency

Better Quality of Service (QoS) and Reliability

Increased Capacity and Coverage

Improved Battery Life for Wireless Devices

Wi-Fi 7 devices implement power-saving operations, such as Target Wake Time (TWT) and Enhanced Target Wake Time (eTWT), which allow devices to schedule their wake-up times, minimize unnecessary power consumption during idle periods, help conserve battery life, prolong device usage and reduce energy waste—which is especially beneficial for mobile, smart home and IoT devices.[16]

Advantages of Wi-Fi 7

- Higher Data Rates and Lower Latency
- Better Quality of Service (QoS) and Reliability
- Increased Capacity and Coverage
- Improved Battery Life for Wireless Devices

Solutions to consider

RUCKUS Networks

- **RUCKUS R770 Wi-Fi 7 Access Point –** Provide exceptional user experiences by delivering extreme speeds, low latency and increased capacity for advanced connected devices and demanding applications.
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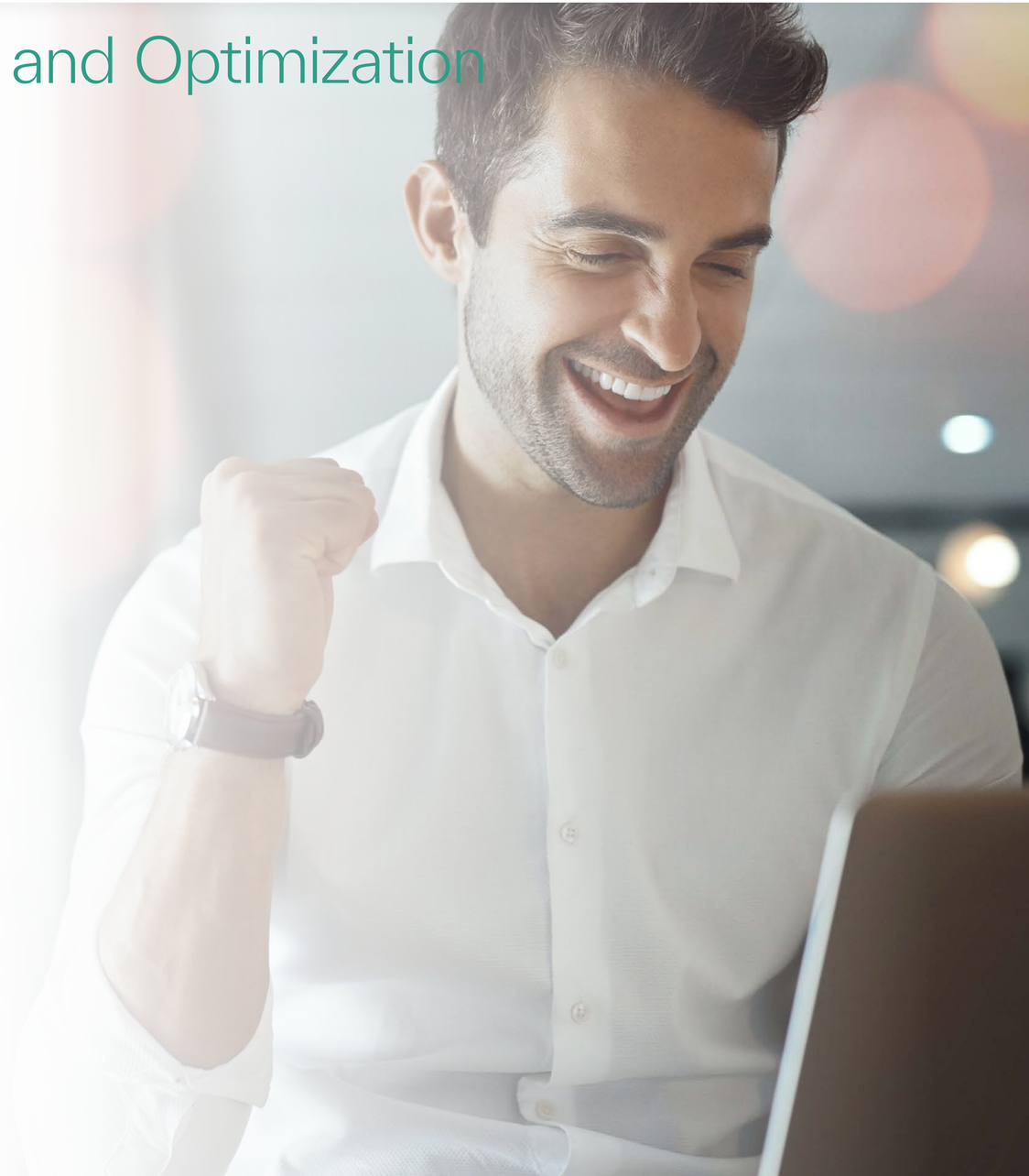
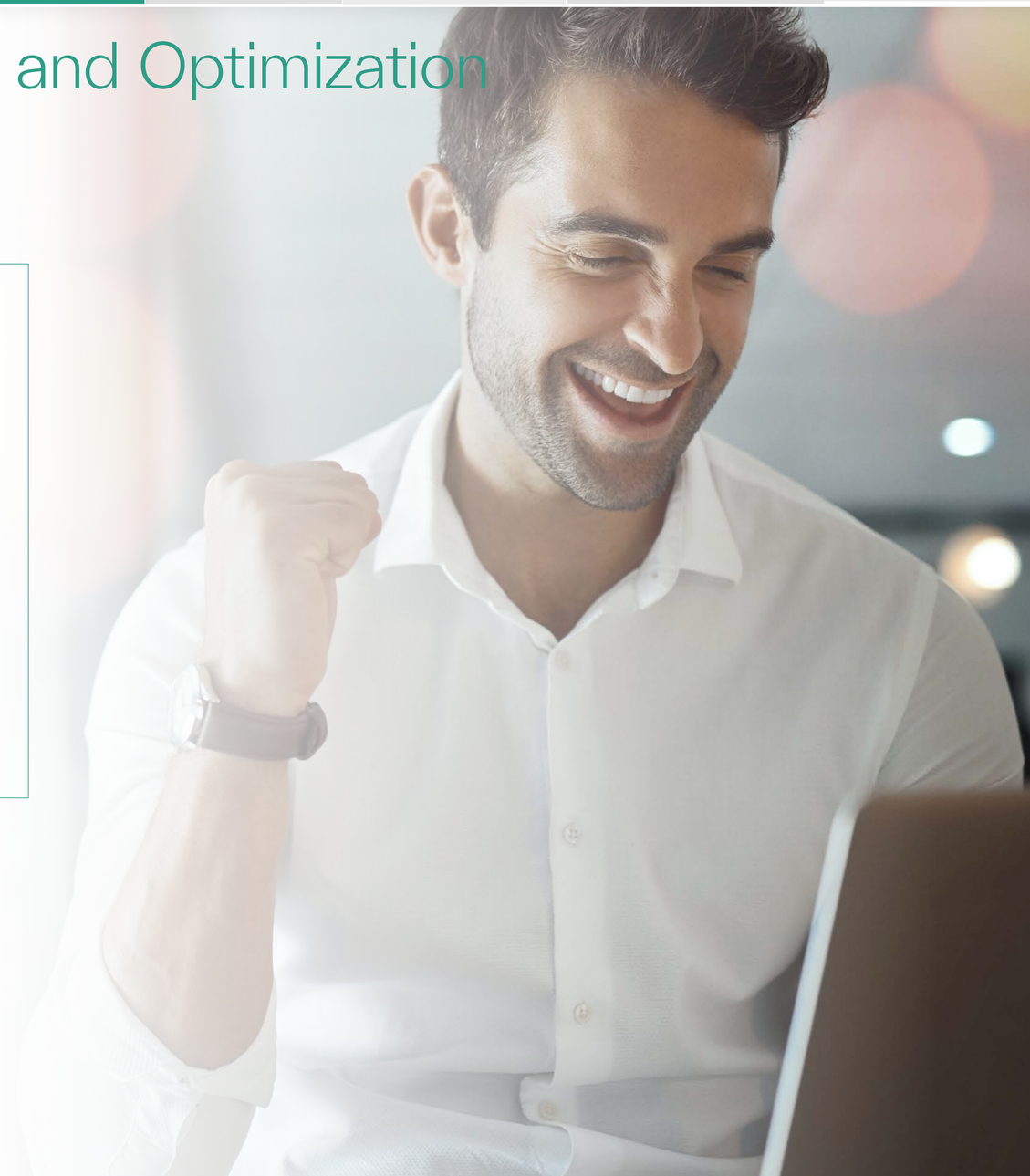
Opportunities for Hybrid Network Integration and Optimization

- Seamless Roaming and Load Balancing
- Dynamic Traffic Steering and Application Prioritization
- Unified Management and Orchestration of Network Resources



Solutions to consider

Opportunities for Hybrid Network Integration and Optimization



Seamless Roaming and Load Balancing

Seamless Wi-Fi roaming enhances user experience by enabling automatic connection to the strongest signal, minimizing disruptions during handovers and eliminating the need for manual network switching. This provides consistent and reliable internet access, reducing connection dropouts and enhancing user satisfaction. [17]

MLO enables seamless roaming and load balancing across wired and wireless networks. For seamless roaming, it uses the 802.11be standards to automatically switch between bands to provide the best signal quality. Devices can roam between access points without losing connectivity. If a device is far from an AP, MLO may use the 2.4 GHz band, while closer devices may switch to the 5 GHz or 6 GHz bands.[17] In terms of load balancing, MLO uses its packet-level aggregation and flow-level routing optimization features to improve latency and throughput. Packet-level aggregation allows packets with the same Traffic Identifier (TID) to be sent on multiple radios.[18]

Dynamic Traffic Steering and Application Prioritization

Unified Management and Orchestration of Network Resources

Solutions to consider

Opportunities for Hybrid Network Integration and Optimization

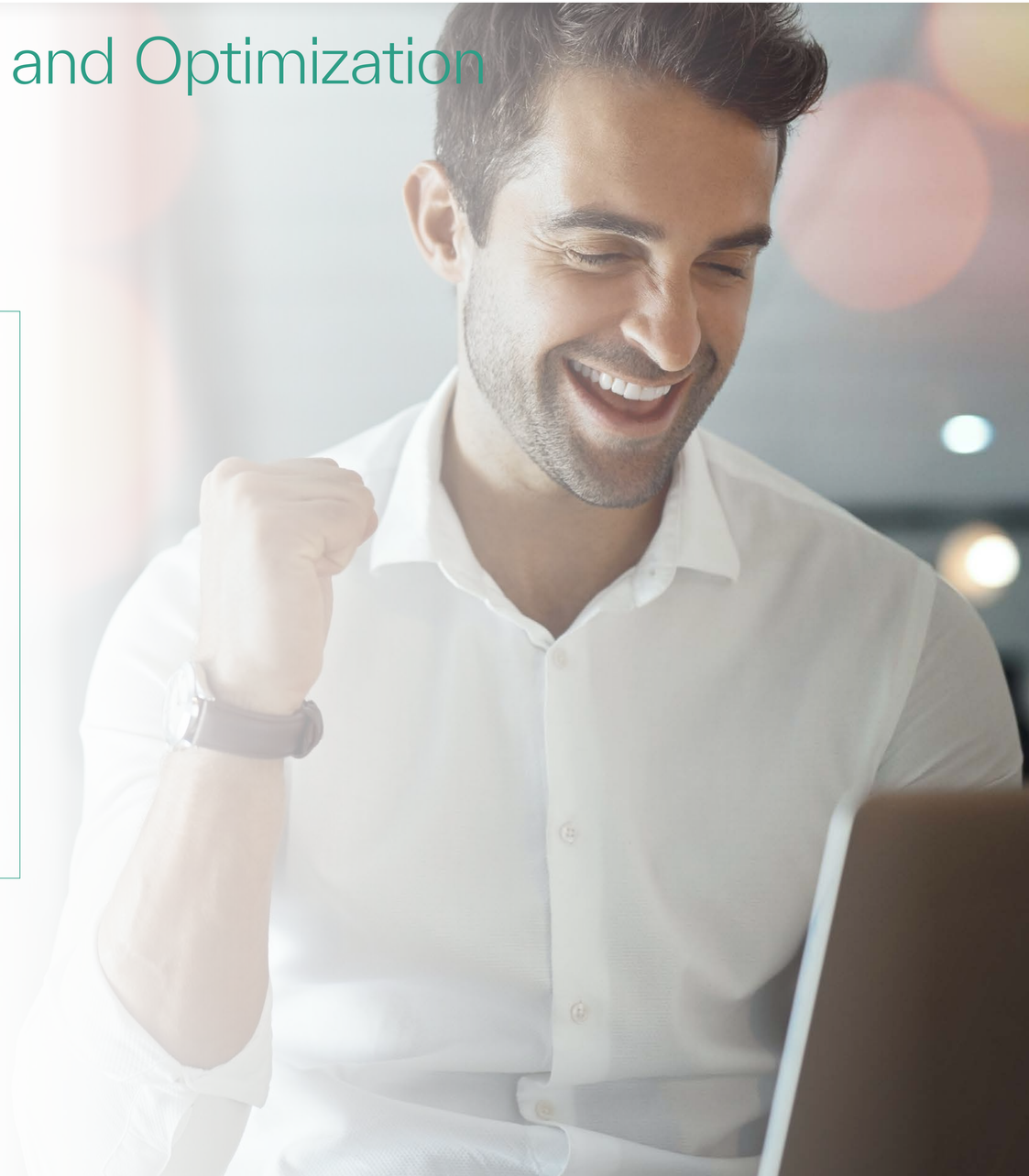
Seamless Roaming and Load Balancing

Dynamic Traffic Steering and Application Prioritization

The MLO feature also helps with traffic steering by allowing devices to send and receive data across multiple radio bands simultaneously. Benefits include:

- **Improved throughput –** Increases throughput and reliability by aggregating traffic across multiple bands.[19]
- **Reduced latency –** Helps reduce latency by dynamically switching traffic between bands to avoid interference.[20]
- **Better load balancing –** Provides more efficient load balance of traffic among links.[19]
- **Improved performance –** Helps devices perform more efficiently.[21]
- **Seamless connectivity –** Ensures seamless connectivity as you move around MLO by mitigating the short range of the 6 GHz band.[21]

Unified Management and Orchestration of Network Resources



Solutions to consider

Opportunities for Hybrid Network Integration and Optimization

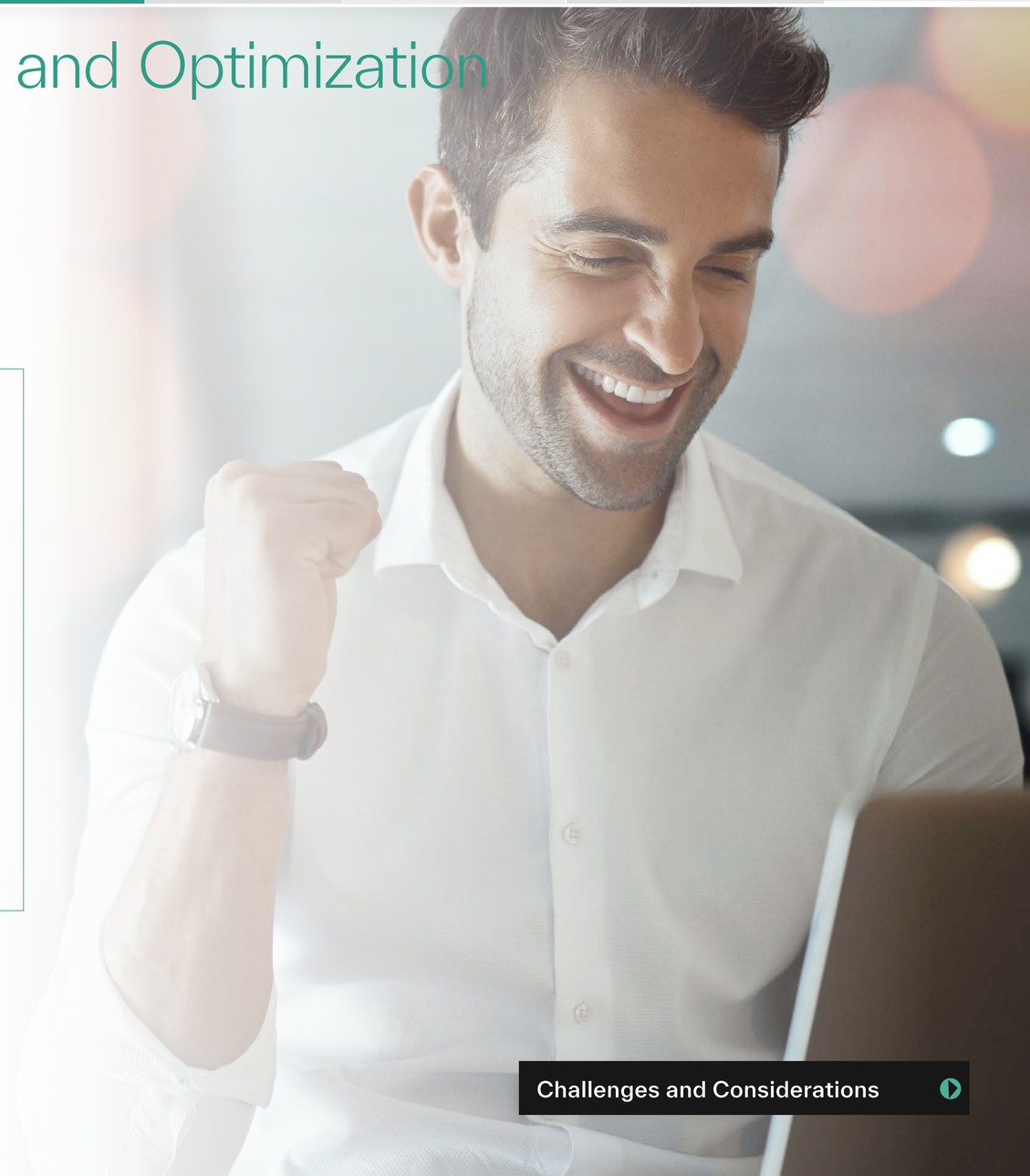
Seamless Roaming and Load Balancing

Dynamic Traffic Steering and Application Prioritization

Unified Management and Orchestration of Network Resources

Wi-Fi 7 has several features that can help manage network resources, including:

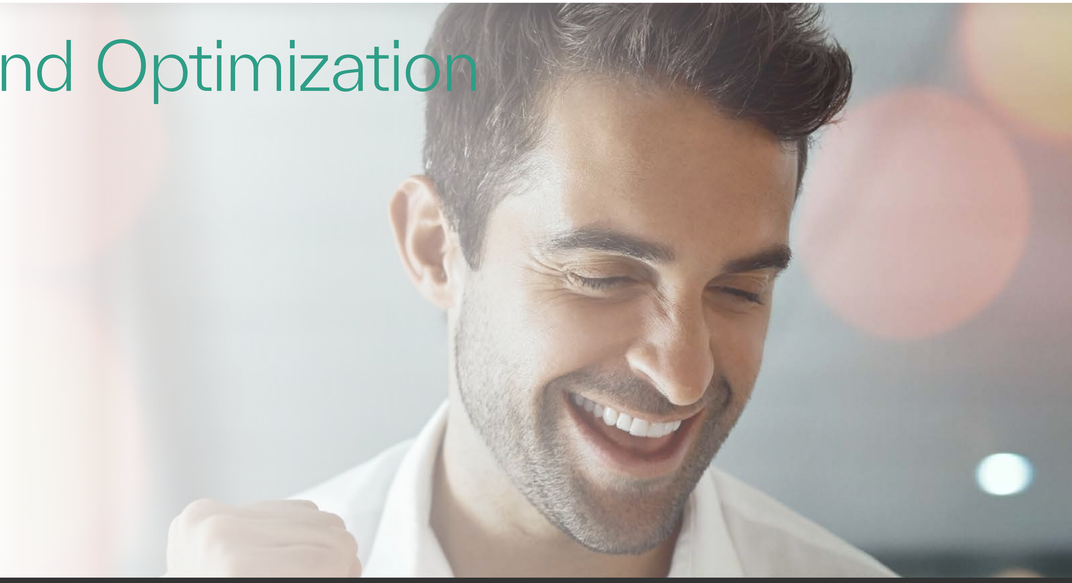
- **4K QAM –** Increases the amount of data that can be transmitted in each radio-frequency wave, resulting in higher throughput and capacity.[16]
- **MLO –** Enables Wi-Fi devices to send and receive data across multiple channels and frequency bands simultaneously for improved load balancing and reliability.[19]
- **Restricted Target Wake Time (rTWT) –** Allows routers to reserve bandwidth for specific types of data traffic, ensuring that real-time data streams are given priority.[19]
- **512 Compressed Block Ack –** Compresses networking data to reduce overhead and transmit more usable data.[19]



Challenges and Considerations

Solutions to consider

Opportunities for Hybrid Network Integration and Optimization



Seamless Roaming and Load Balancing

Dynamic Traffic Steering and Application Prioritization

Unified Management and Orchestration of Network Resources

Solutions to consider

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Challenges and Considerations When Integrating

- Compatibility and Interoperability Issues
- Security and Privacy Concerns
- Performance Tuning and Optimization Across Hybrid Infrastructure

73% of enterprise organizations say their network environment has grown in complexity over the last two years.[27]

Solutions to consider

Challenges and Considerations When Integrating

Compatibility and Interoperability Issues

Even though Wi-Fi 7 is backward compatible and should work with most wireless devices, there are still compatibility and interoperability challenges with existing hardware and software. Therefore, careful planning and testing are required to ensure seamless integration and optimal performance in your customer's environment.

Here are some things to consider:

- **Hardware compatibility –** Check that your customer's access points, controllers, switches and client devices are compatible with Wi-Fi 7. You may need to update the firmware or upgrade the hardware to support Wi-Fi 7.[22]
- **Software integration –** Make sure your customer's network management software, configuration tools and security solutions are compatible with Wi-Fi 7. You should also check that software vendors provide updates and patches to support Wi-Fi 7.[22]
- **Legacy devices –** Some legacy devices might not be compatible with Wi-Fi 7. Try disabling Wi-Fi 7 or using the IoT network.[23]
- **Access switch power budget –** Wi-Fi 7 APs require different amounts of power depending on their configuration. You may need to upgrade your customer's access switches to support higher Ethernet capabilities.[24]
- **Regulatory requirements –** Wi-Fi 7 products must comply with standards set by the FCC in the U.S. In the European Union, products must comply with the Radio Equipment Directive (RED) regulations.

Security and Privacy Concerns

Performance Tuning and Optimization Across Hybrid Infrastructure

73% of enterprise organizations say their network environment has grown in complexity over the last two years.[27]

Solutions to consider

Challenges and Considerations When Integrating

Compatibility and Interoperability Issues

Security and Privacy Concerns

While there isn't anything specific to Wi-Fi 7, security does play a tangential part in Wi-Fi 7 as it concerns WPA2™ and WPA3™. Networks can be configured to accept both WPA2 and WPA3 devices on the same SSID, but older devices may not be able to connect. That said, a single SSID can support both WPA3 and WPA2 devices using transition modes—which can limit network security.[25]

WPA3 is the required security protocol for Wi-Fi 7-certified devices and the Wi-Fi Alliance requires WPA3 or Enhanced Open as the minimum security mode for the 6 GHz band as it offers several improvements over WPA2:[25]

- It's more difficult for hackers to intercept traffic as each device on the network has its own encryption key.
- It addresses weaknesses in WPA2, such as the Key Reinstallation Attack (KRACK) vulnerability.
- It (WPA3-Personal) is more resilient to passwords that don't meet typical complexity recommendations.
- It (WPA3-Enterprise) requires protected management frames (PMF) on all WPA3 connections.

Performance Tuning and Optimization Across Hybrid Infrastructure

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Solutions to consider

Challenges and Considerations When Integrating

Compatibility and Interoperability Issues

Security and Privacy Concerns

Performance Tuning and Optimization Across Hybrid Infrastructure

Traditional architectures lack the scale, flexibility and end-to-end visibility needed to support today's organizations. Wi-Fi 7 increases performance with 320 MHz channels, MLO and 4K QAM, but it will also require more tuning and management, adding to these challenges. With AIOps, you can help your customer overcome these challenges. For example, automation can be used to optimize Wi-Fi settings, such as channel and power, to minimize interference. And machine learning can analyze real-time and historical data to identify root causes of issues and facilitate proactive troubleshooting, significantly streamlining operations. Before or during your customer's transition to Wi-Fi 7, you can help them simplify operations and unlock efficiencies by updating their legacy network, moving them to the right cloud, harnessing AIOps capabilities and securing users and devices.[26]

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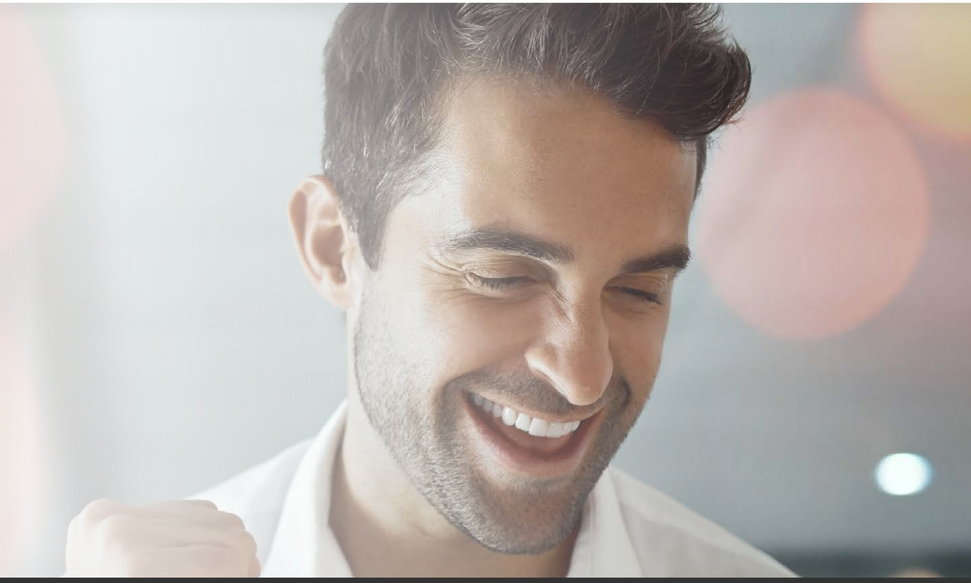
Solutions to consider

Challenges and Considerations When Integrating



Compatibility and Interoperability Issues

Security and Privacy Concerns

Performance Tuning and Optimization Across Hybrid Infrastructure

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Use Cases for Enterprise Networks

Hybrid Cloud Connectivity and Edge Computing

Wi-Fi Deployments for High-Density Environments

Solutions to consider

Use Cases for Enterprise Networks

Hybrid Cloud Connectivity and Edge Computing

With a vast array of hybrid cloud and edge services, moving the cloud closer to your customers and their data has never been easier. They can easily outsource their tech infrastructure, while enjoying fast, low-latency compute performance and complying with data-residency requirements. For example, edge computing can help reduce the risk of security threats by processing data locally and storing it offline. It can also help to reduce bandwidth costs and the load on cloud resources, allowing your customer to cost-effectively scale their services. Finally, combining edge and cloud computing can improve response times and make edge applications more efficient.

Wi-Fi Deployments for High-Density

Solutions to consider

Use Cases for Enterprise Networks

Hybrid Cloud Connectivity and Edge Computing

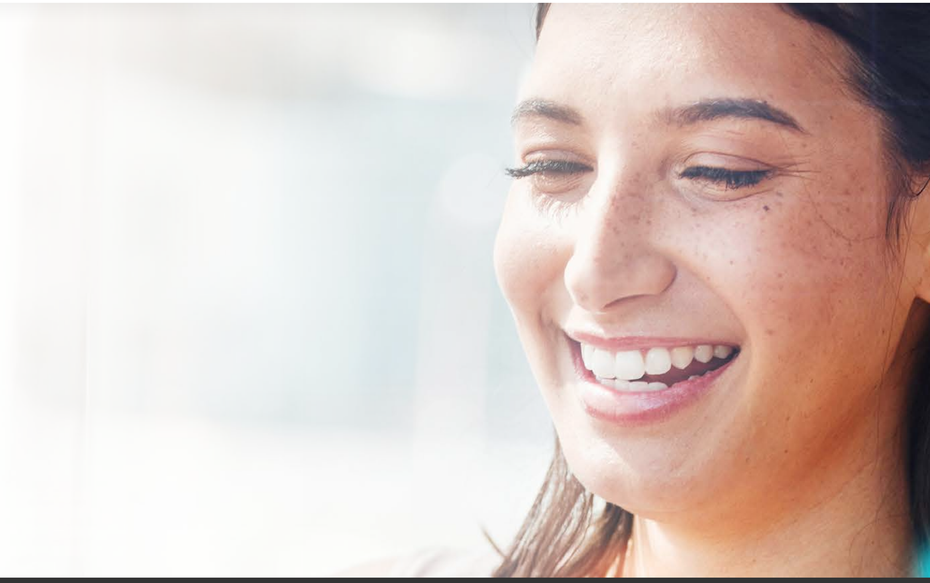
Wi-Fi Deployments for High-Density Environments

In crowded public venues and events (offices, stadiums, etc.), Wi-Fi 7's ability to handle many simultaneous connections is crucial. From stadiums and concert halls to convention centers and airports, Wi-Fi 7 ensures attendees can stay connected, access information and share experiences without network congestion. Because they have limited radio capacity and use omni-directional antennas, which can make radio frequency (RF) design more complicated, traditional wireless architectures may not scale well in high-density environments, like sports stadiums, convention centers and hotel meeting rooms. Wi-Fi 7 supports modern, large-scale IoT deployments, allowing for real-time data collection and analysis. A hybrid topology allows these organizations to optimize their internal and external communications effectively and provide reliable connectivity to a large number of clients in a small space.[28]

Industrial IOT Smart Manufacturing

Solutions to consider

Use Cases for Enterprise Networks



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Use Cases for Industrial IoT (IIoT) and Smart Manufacturing

Integration of Wired and Wireless Industrial Control Systems

Wi-Fi 7 Support for Low-Latency and High-Reliability Applications

Solutions to consider

Use Cases for Industrial IoT (IIoT) and Smart Manufacturing

Integration of Wired and Wireless Industrial Control Systems

The diverse components of an industrial control system (ICS) must communicate with other components of the ICS, which requires ICS systems to be connected. While wired connections have provided fairly reliable services over the years, the sheer number of Internet of Things (IoT) devices and the need to eliminate costly downtime require wired and wireless technologies to be integrated—which has been increasing at an accelerated pace. This integration of wired and wireless helps to (1) lower installation costs and maintenance, (2) deliver a secure, agile and threat-responsive deployment architecture and (3) provide redundancy.

Wi-Fi 7 Support for Low-Latency and High-Reliability Applications

Solutions to consider

Use Cases for Industrial IoT (IIoT) and Smart Manufacturing

Integration of Wired and Wireless Industrial Control Systems

Wi-Fi 7 Support for Low-Latency and High-Reliability Applications

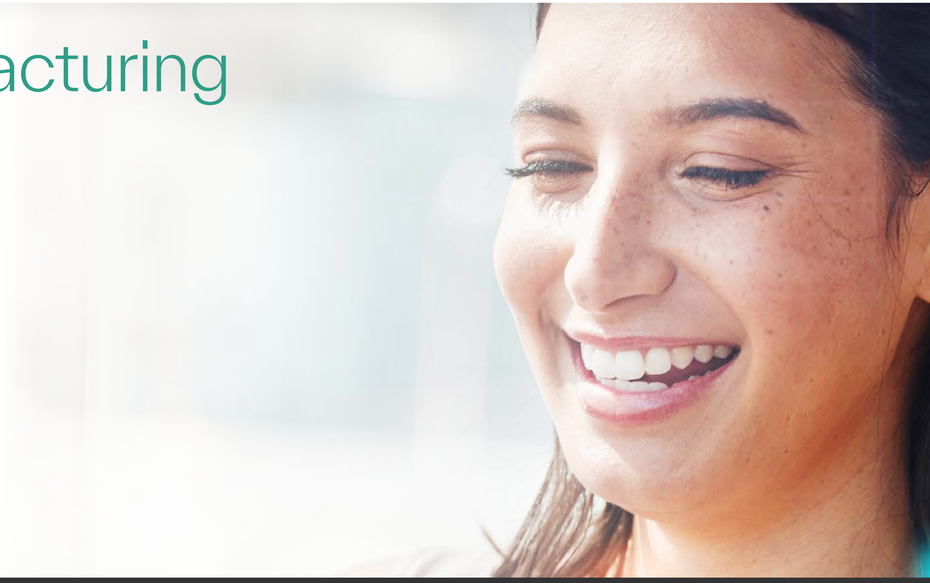
Manufacturing plants and industrial IoT operations seek robust and reliable connectivity to support the monitoring and management of manufacturing and process control systems. Potential applications for Wi-Fi 6/6E in the industrial IoT market, including those requiring determinism or strict latency, included autonomous mobile robots (AMRs), AMR video fusion, safety controls (such as programmable logic controllers (PLCs)), and augmented reality (AR)/virtual reality (VR)/extended reality (XR)-based operations.

With Wi-Fi 7, these capabilities will be expanded by refining scheduling mechanisms, such as stream classification service (SCS) quality of service (QoS) characteristics in conjunction with multi-link operation (MLO) capabilities. This feature enables classification and Wi-Fi QoS treatment of specific Internet provider (IP) flows, allowing sensitive traffic such as voice, video and gaming to be prioritized over bulk data traffic. Consequently, the Wi-Fi 7 SCS feature could facilitate the deterministic Wi-Fi behavior required for industrial applications. Using uplink-triggered access, Wi-Fi access can be deterministically scheduled for pre-identified equipment that has SCS enabled.[29]

Smart Cities Public Infrastructure

Solutions to consider

Use Cases for Industrial IoT (IIoT) and Smart Manufacturing



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Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

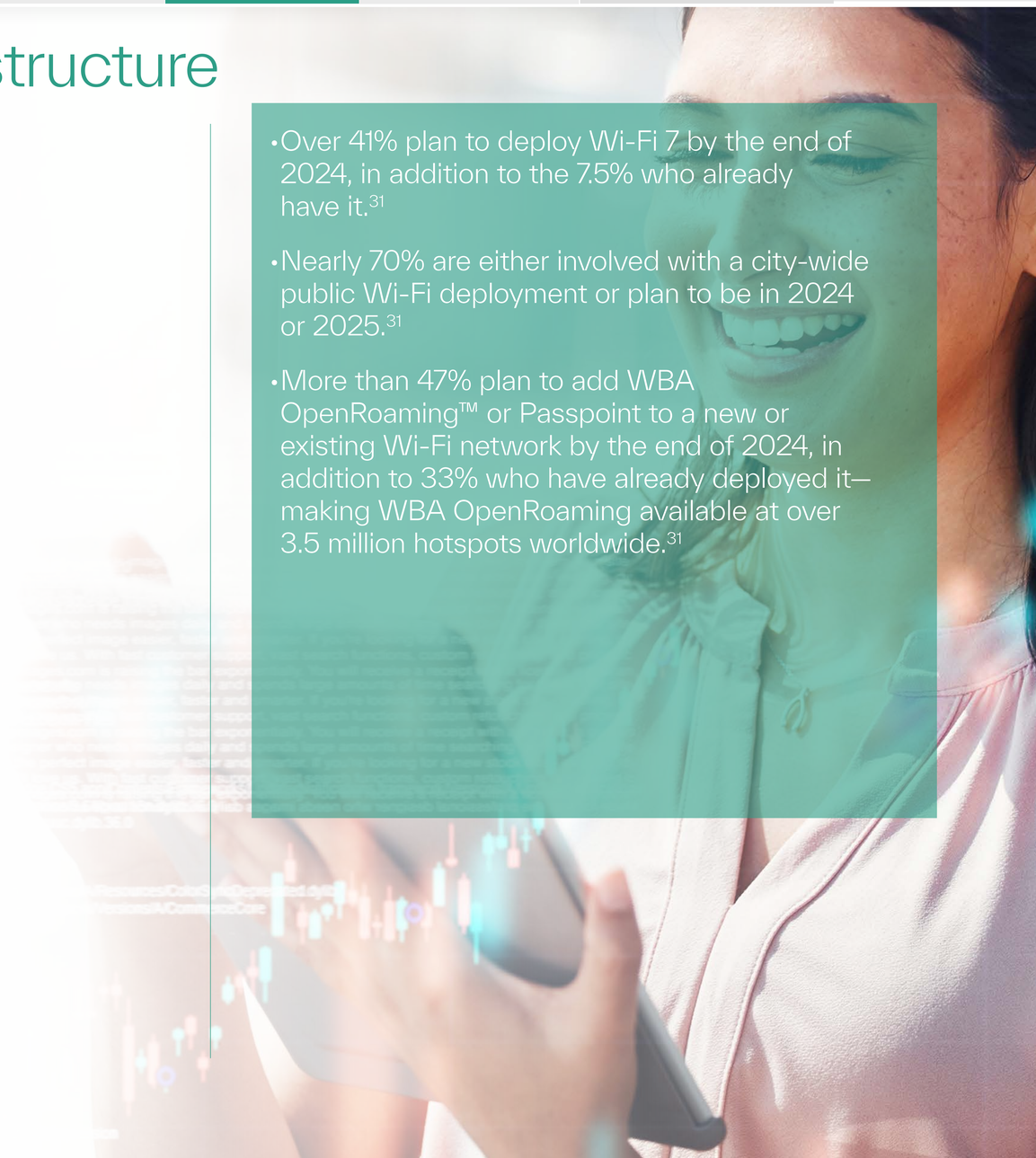
Enhanced Connectivity for Public Transportation

Efficient Smart City Infrastructure

Enhanced Security and Privacy

Seamless Integration With 5G Networks

- Over 41% plan to deploy Wi-Fi 7 by the end of 2024, in addition to the 7.5% who already have it.[31]
- Nearly 70% are either involved with a city-wide public Wi-Fi deployment or plan to be in 2024 or 2025.[31]
- More than 47% plan to add WBA OpenRoaming™ or Passpoint to a new or existing Wi-Fi network by the end of 2024, in addition to 33% who have already deployed it—making WBA OpenRoaming available at over 3.5 million hotspots worldwide.[31]



Solutions to consider

Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

Wi-Fi 7 is immensely important for smart cities and public transportation due to its enhanced connectivity, efficiency, security and integration with 5G networks. With faster, more reliable and secure wireless connectivity, Wi-Fi 7 enhances the user experience, enables innovative applications and empowers smart cities to reach their full potential. Here's how:[30]

Enhanced Connectivity for Public Transportation

Efficient Smart City Infrastructure

Enhanced Security and Privacy

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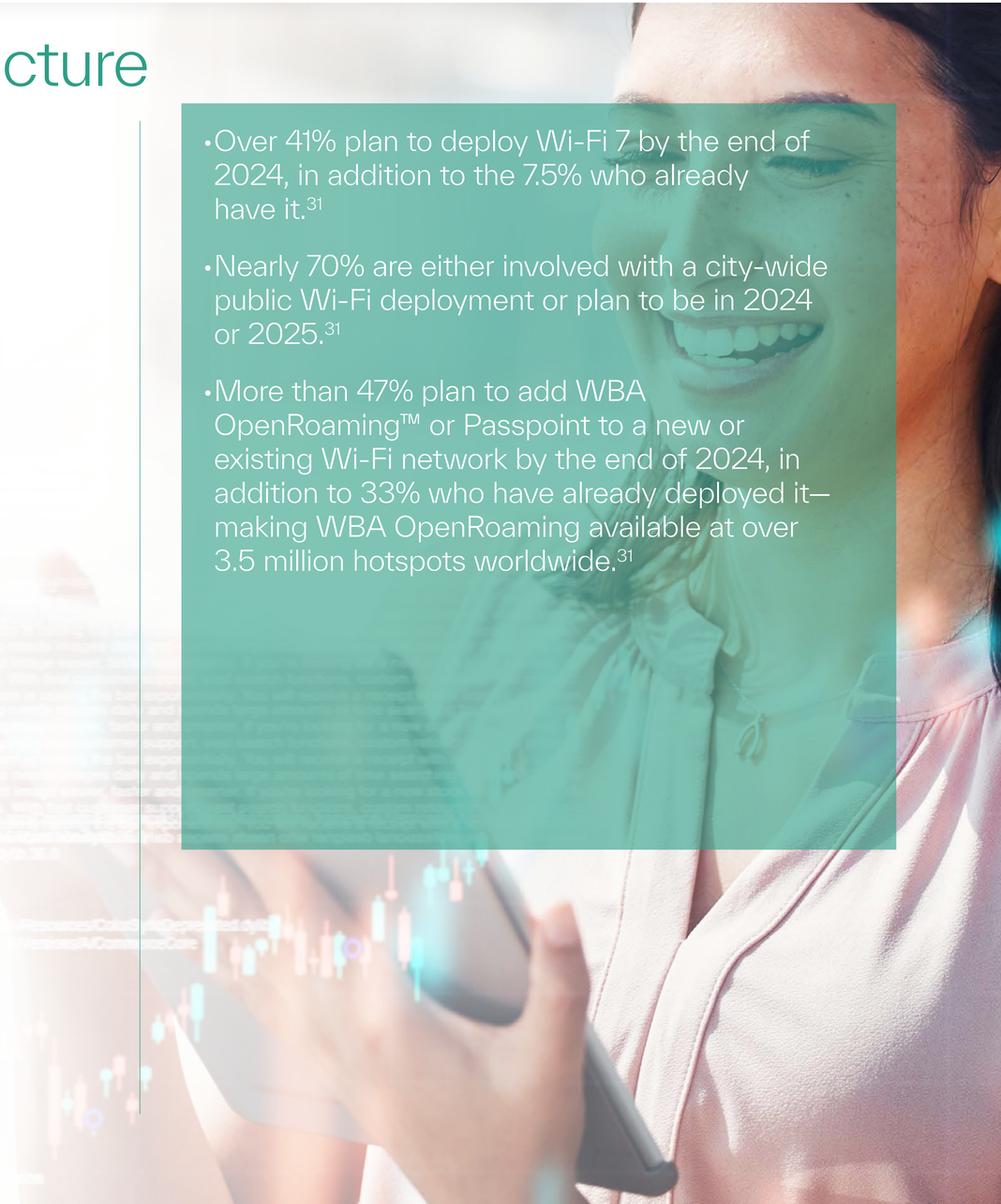

Solutions to consider

Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

Enhanced Connectivity for Public Transportation

Wi-Fi 7 provides faster, more reliable and high-capacity wireless connectivity on buses, trains, planes and rail. With seamless internet connectivity, passengers can surf the internet, stream videos, access online services and more. Not only does it improve the overall user experience, but it also invites new opportunities for service providers to offer additional services, such as real-time information, interactive entertainment and personalized ticketing.

Efficient Smart City Infrastructure

Enhanced Security and Privacy

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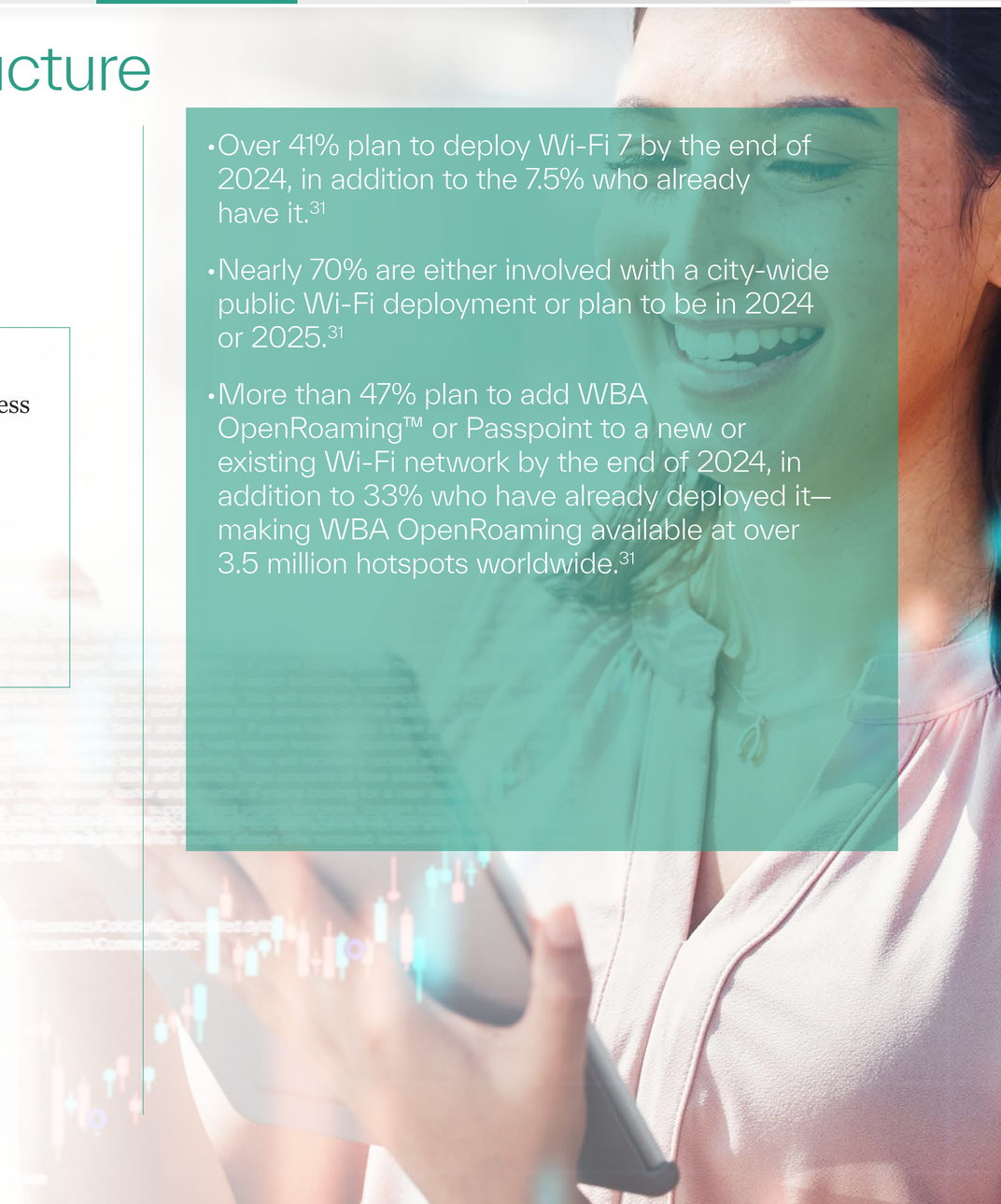

Solutions to consider

Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

Enhanced Connectivity for Public Transportation

Efficient Smart City Infrastructure

Smart city initiatives require robust, reliable internet connectivity. With its enhanced speed and capacity, Wi-Fi 7 enables efficient data transmission within smart cities—critical for applications such as intelligent transportation systems, smart energy management systems, smart waste management and public safety. Cities can capture and analyze vast amounts of data in real-time, enabling better decision-making and innovative solutions. Wi-Fi 7 also supports larger bandwidths and multiple data streams, making it ideal for IoT and other devices and applications, such as smart sensors, cameras and other IoT devices.

Enhanced Security and Privacy

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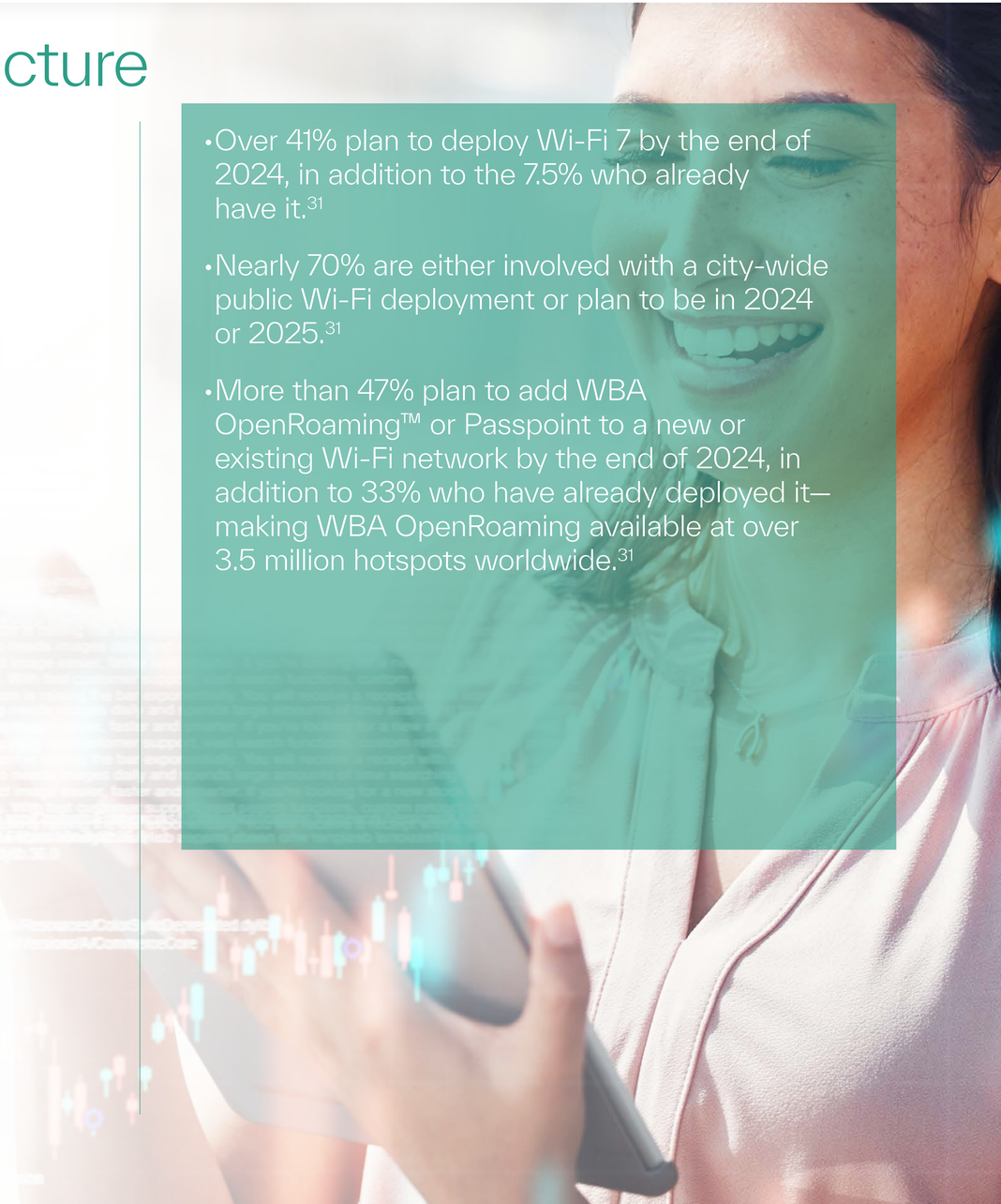

Solutions to consider

Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

Enhanced Connectivity for Public Transportation

Efficient Smart City Infrastructure

Enhanced Security and Privacy

Wi-Fi 7 offers advanced security features to protect the vast amounts of sensitive data generated by public transportation and smart city initiatives. Wi-Fi 7 allows your customer to establish secure and reliable connections to encrypt data at rest and in flight. Plus, advanced authentication and access control mechanisms ensure only authorized users can access the network.

Seamless Integration With 5G Networks

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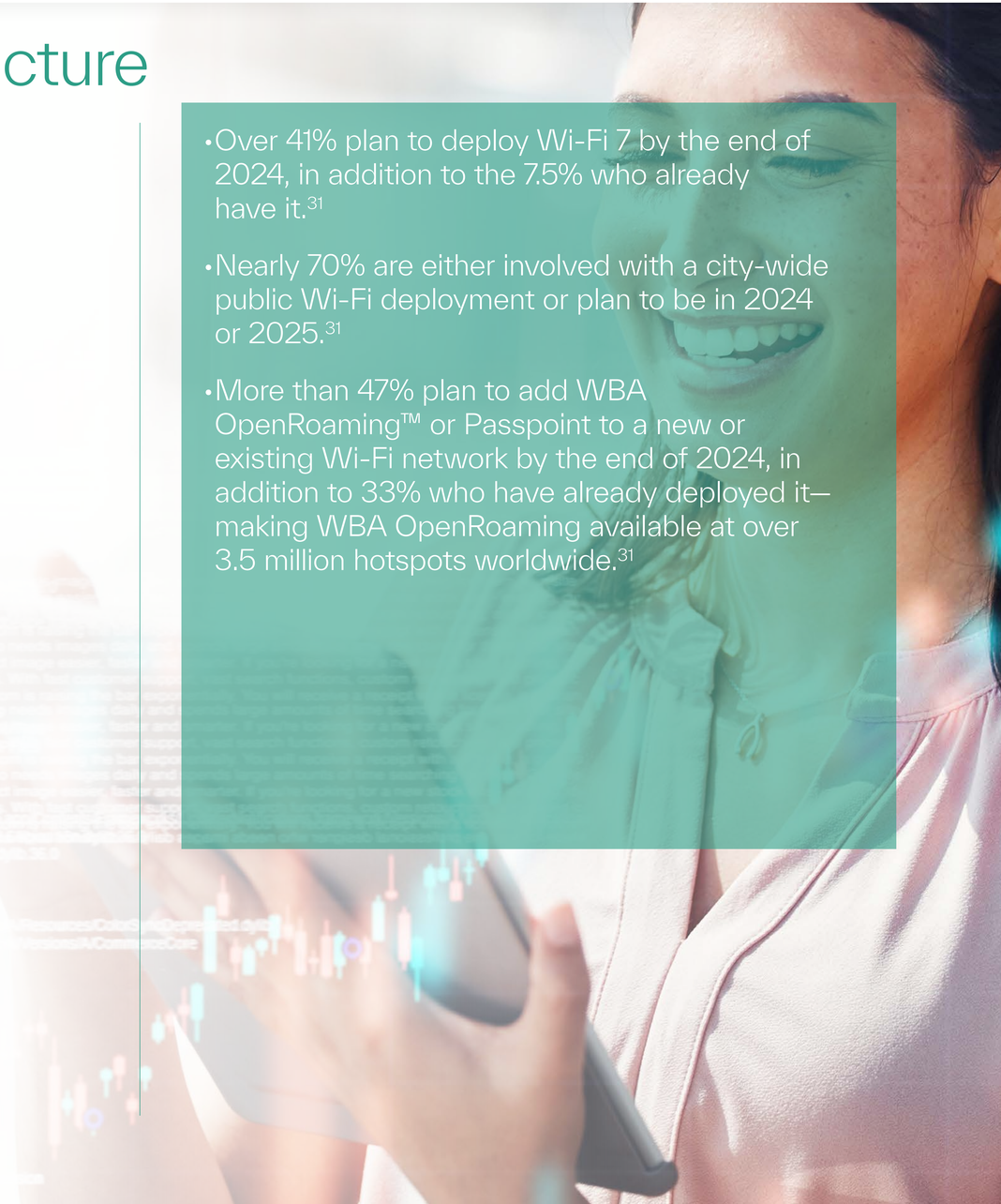

Solutions to consider

Use Cases for Smart Cities and Public Infrastructure

Wi-Fi 7-Enabled Public Wi-Fi Hotspots and Smart Transportation Systems

Enhanced Connectivity for Public Transportation

Efficient Smart City Infrastructure

Enhanced Security and Privacy

Seamless Integration With 5G Networks

Finally, Wi-Fi 7 is compatible with 5G networks, allowing for seamless integration and handovers between Wi-Fi 7 and 5G networks as passengers move freely (and surreptitiously) between them, for an uninterrupted connectivity experience. It also enables smart cities and public transportation to roll out 5G applications and services, as needed.

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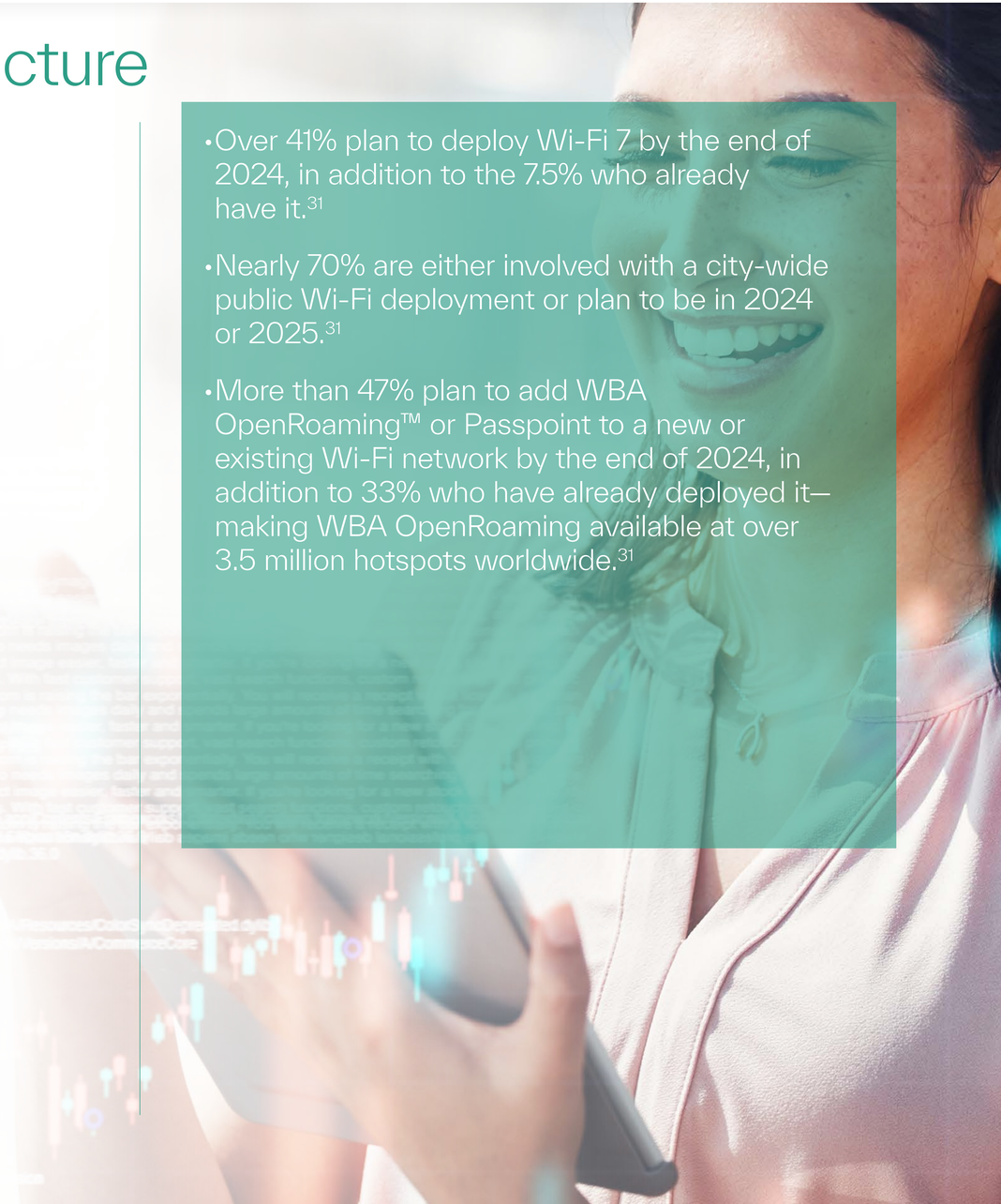

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Future Outlook and Trends

Wi-Fi 7 represents a significant leap forward in wireless connectivity, setting the stage for a more connected and technologically advanced future. Its speed, efficiency and reliability enhancements position it as a key player in shaping the future of connectivity, unlocking new possibilities for industries and individuals alike. As the standard continues to mature and find its way into more devices and applications, the possibilities for innovation and improved user experiences are nearly limitless. As we embrace this next generation of Wi-Fi, we can anticipate a more seamless and interconnected world.[32]

Adoption and Deployment of Hybrid Networks and Wi-Fi 7

Emerging Technologies and Standards (6G, Edge Computing, etc.)

Implications for Connectivity, Security and Digital Transformation Initiatives

Solutions to consider

Future Outlook and Trends

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Adoption and Deployment of Hybrid Networks and Wi-Fi 7

At more than 4x faster than Wi-Fi 6/6E and close to 6x faster than Wi-Fi 5, Wi-Fi 7 devices are picking up steam. A growing list of chip, access-point (AP) and router vendor makers have launched compliant products for enterprises and service providers. As mentioned earlier, access to the new 6 GHz frequency will be a game changer for organizations that are using Wi-Fi 6 and upgrading to Wi-Fi 7. Those making this upgrade should consider using artificial intelligence for IT operations (AIOps) to optimize radio resource management and minimize interference. Most Wi-Fi 7 APs should be certified, so that volume shipments can begin next year.[33]

Wi-Fi 7 also carries significant implications for network infrastructure and deployment strategies. Practical considerations must be taken into account:[34]

- Consider the timeline for global market adoption and device compatibility and develop a strategic approach to migration.
- Optimize existing Wi-Fi networks to maximize performance, ensuring seamless connectivity and improved user experience.
- Weigh the benefits of Wi-Fi 7 against practical considerations and determine whether optimizing existing Wi-Fi 6E networks may provide sufficient performance without needing to immediately adopt Wi-Fi 7.

Emerging Technologies and Standards (6G, Edge Computing, etc.)

Implications for Connectivity, Security and Digital Transformation Initiatives

Solutions to consider

Future Outlook and Trends

Wi-Fi 7 represents a significant leap forward in wireless connectivity, setting the stage for a more connected and technologically advanced future. Its speed, efficiency and reliability enhancements position it as a key player in shaping the future of connectivity, unlocking new possibilities for industries and individuals alike. As the standard continues to mature and find its way into more devices and applications, the possibilities for innovation and improved user experiences are nearly limitless. As we embrace this next generation of Wi-Fi, we can anticipate a more seamless and interconnected world.[32]

Adoption and Deployment of Hybrid Networks and Wi-Fi 7

Emerging Technologies and Standards (6G, Edge Computing, etc.)

According to the Institute of Electrical and Electronics Engineers (IEEE), the high-level vision for 6G "is to deepen the connection and integration between the digital, physical and human worlds."[35] Though its final form hasn't yet been determined, 6G will benefit from the backend changes made to mobile networks to power 5G. For example, virtualized networks are enabling things like specialized deployments and operators who have densified radio networks with more antennas. It's now easier to get a signal, especially indoors, while cloud technologies and edge computing mean data can be processed closer to users—even at scale—so latency is much lower. 6G will also be more efficient than its predecessor and consume less power.[35]

Implications for Connectivity, Security and Digital Transformation Initiatives

Solutions to consider

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Adoption and Deployment of Hybrid Networks and Wi-Fi 7

Emerging Technologies and Standards (6G, Edge Computing, etc.)

Implications for Connectivity, Security and Digital Transformation Initiatives

Without the appropriate network structure, adequate communication and resource sharing among connected devices is impossible. The Internet of Things (IoT), cloud computing practices, artificial intelligence (AI) and machine learning (ML) applications, and virtual reality (VR) were a few of the factors that played a key role in increasing demand for strong network connectivity. Emerging technologies and applications soon drove the growing need for strong network connectivity from a single node to a single cable.

Solutions to consider

Future Outlook and Trends

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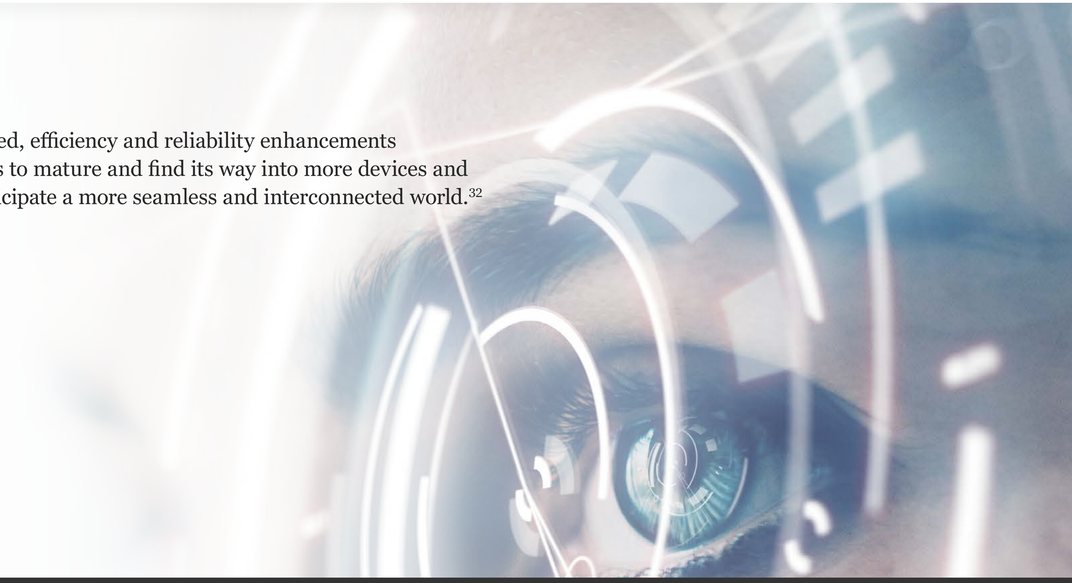

Adoption and Deployment of Hybrid Networks and Wi-Fi 7

Emerging Technologies and Standards (6G, Edge Computing, etc.)

Implications for Connectivity, Security and Digital Transformation Initiatives

Solutions to consider

RUCKUS Networks

- **RUCKUS R770 Wi-Fi 7 Access Point –** Provide exceptional user experiences by delivering extreme speeds, low latency and increased capacity for advanced connected devices and demanding applications.
- **RUCKUS One –** Reduce IT workloads and deliver exceptional insights for hybrid network environments with this full-service assurance platform with comprehensive network management and AI-driven feature analysis tools.
- **RUCKUS AI –** Leverage advanced analytics to optimize WLAN performance, ensuring better user experiences at the application level and enhancing the management of hybrid networks.

Solution Opportunities for MSPs and MSSPs

Your managed service provider (MSP) and managed security service provider (MSSP) customers require a new security approach as they seek to move from perimeter-based security to zero trust to help protect themselves against targeted threats and improve business performance. It can also mitigate supply chain risk and secure cloud environments.

Vendor Solutions for Hybrid Networks + Wi-Fi 7

- Network Segmentation
- Unified Threat Management (UTM)
- Next-Generation Firewalls (NGFW)
- Endpoint Detection and Response (EDR)
- Cloud Access Security Broker (CASB)
- Zero Trust Security Framework
- Network Access Control (NAC)
- Security Information and Event Management (SIEM)

Service Opportunities

Solutions to consider

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Service Opportunities for MSPs and MSSPs

Once your customer has the hardware and is ready to take their first steps into hybrid and Wi-Fi 7 optimization, follow up with them by offering a few key services that will make it even better:

- Building A Zero-Trust Roadmap
- Refining the Business Continuity Plan
- Assessing Their Environment

Solutions to consider

Service Opportunities for MSPs and MSSPs

Once your customer has the hardware and is ready to take their first steps into hybrid and Wi-Fi 7 optimization, follow up with them by offering a few key services that will make it even better:

Building A Zero-Trust Roadmap

Success starts with a comprehensive zero-trust roadmap that outlines the activities needed to implement your customer zero-trust strategy. This strategy document will provide a clear view of the deliverables, budget and business outcomes expected.

- **Determine a framework,** whether it's the NIST or CISA framework or a framework from Gartner, Forrester or others. TD SYNNEX can help you select the right vendors to craft a zero-trust vision.
- **Recruit business and IT stakeholders —** from IT operators to enterprise architects to business unit leaders to C-suite executives—who can help build your customer's zero-trust roadmap and evangelize the need for new or shifting investments or significant cultural and organizational change.
- **Identify interdependencies** between the zero-trust implementation and other IT and business projects.

Refining the Business Continuity Plan

Assessing Their Environment

Solutions to consider

Service Opportunities for MSPs and MSSPs

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Building A Zero-Trust Roadmap

Refining the Business Continuity Plan

Every organization today should have a business continuity plan that outlines what happens when (not if) they're attacked. The next step is to help them adopt or periodically stress test and refine their business continuity plan.

Then, put together an up-to-date inventory of systems and their criticality to make it easy to prioritize actions in case there's a threat or attack. Create playbooks, conduct tabletop exercises and test backups for critical assets.

The more you can help them prepare, the better off they'll be in the event of a cyberattack or other disaster.

Assessing Their Environment

Solutions to consider

Service Opportunities for MSPs and MSSPs

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Building A Zero-Trust Roadmap

Refining the Business Continuity Plan

Assessing Their Environment

Next, help your customer understand their unique risks by identifying vulnerabilities in their environment and providing recommendations. Take advantage of these assessments:

- **Security Maturity Assessment –** Get a complimentary 45-minute assessment of your customer's security practices and controls and provide a graded report with a customized action plan to improve their security posture.
- **Penetration Testing –** Show them how bad actors exploit their systems to access and disclose sensitive data, and how to best prioritize vulnerabilities for remediation.
- **Vulnerability Assessments –** Point out the pathways that attackers use to exploit their systems and provide a complete financial risk analysis with ways to re-allocate limited resources to ensure they're protected.
- **Additional Assessments –** Access additional assessment capabilities, including security risk assessments, physical security assessments, physical penetration testing, GDPR assessments and many others.

Comprehensive Services

Solutions to consider

Service Opportunities for MSPs and MSSPs

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Offering Additional Comprehensive Services

Once you have established essential services with your customer, you can expand into more advanced offerings depending on their skillsets and needs:

Advanced Management and Security Services

Training and Engagement

Offering Additional Comprehensive Services

Once you have established essential services with your customer, you can expand into more advanced offerings depending on their skillsets and needs:

Advanced Management and Security

- **Incident Response Services –** Comprehensive Incident Response (IR) services—including Plan Development, Readiness Review and Emergency Response—ensure they have the right capabilities to respond to and recover from threats.
- **Compliance Services –** Governance and compliance readiness services for HIPAA, HITRUST, PCI-DSS, NIST 801-171, ISO 27001, NERC-CIP, SOC 1&2, GDPR and others—ideal for businesses that face a high regulatory burden.
- **Implementation Services –** Services for new installations, integrations, patch services, configurations and staff augmentations to help you design the best solution for them.
- **Managed Security Services –** These managed services help you maximize limited resources:
    - **SOC-as-a-Service –** Have a bench of cyber experts who can monitor, analyze, manage and act on threats across your customer's business.
    - **Firewall Services –** Help your customer focus on their core business while you administer, monitor and maintain their firewall infrastructure.
    - **ISAO Threat Feed –** Join a very large community of companies, local governments and security professionals to collaborate, share intelligence and participate in training and conferences and leverage competent collaborative analysis.

Training and Engagement

Offering Additional Comprehensive Services

Once you have established essential services with your customer, you can expand into more advanced offerings depending on their skillsets and needs:

Advanced Management and Security Services

Training and Engagement

Engage your customer's team with numerous training and engagement experiences for both new and advanced users.

Training

- **Foundational –** Develop the foundational cybersecurity skills needed to advance to the next level through the Cyber Essentials Series.
- **Accelerated –** Access over 50 cloud-based, instructor-led classroom learning courses to prepare for cybersecurity careers and train on a hyper-realistic network within a cloud-hosted cyber range using the tools your team uses every day.
- **Virtual –** Choose from an extensive set of courses for new cybersecurity team members or, for more advanced users, an upgraded training program that includes the entire course library, 200+ Virtual Lab Environments, a guided mentor and industry certification practice tests.
- **Advanced threat training –** Learn how to contain threats, fix weaknesses and use the latest threat hunting tools via online, gamified training using real-world simulations within a protected environment.

Engagement

- **Demos –** Test and engage with leading cybersecurity offerings to see how they work in real time.
- **Cyber Range Experiences –** Offer "up close and personal" live cyber experience to test the responses of your customers' teams and/or environments in a cyber range.

Tips for Selling and Building

Tips for Selling and Building SASE and XDR into the Security Stack

According to Gartner, "By 2025, at least 60% of enterprises will have explicit strategies and timelines for SASE adoption encompassing user, branch and edge access, up from 10% in 2020."[36] Security leaders will also want to consolidate their products/vendors, be more proactive in their response to threats and drive greater efficiency—and they're increasingly turning to MSPs and MSSPs who truly understand their security challenges.

1 2 3 4 5 6

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1 Perform a Gap Analysis

2 3 4 5 6

Perform a gap analysis and establish a high-level SASE strategy and roadmap that's closely aligned with business goals and wider organizational strategic initiatives (such as cloud migration, cybersecurity policies and IT strategy plans). Ensure the plan leverages the customer's existing assets and enables them to transition to a SASE model over time.

Tips for Selling and Building SASE and XDR into the Security Stack

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1 | **2 Perform a Security and Network Analysis** | 3 | 4 | 5 | 6

Assess your client's current network and security environment, and the resources they have available, to determine which services they need, the processes to be used, what technologies will be deployed and the training required.

Tips for Selling and Building SASE and XDR into the Security Stack

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1 2 **3 Confirm if Your Customer Has SD-WAN** 4 5 6

If your customer already has an SD-WAN, they may only need SSE capabilities. If they don't, determine whether they can benefit from SASE now or whether SSE can be an on-ramp for SASE.

Tips for Selling and Building SASE and XDR into the Security Stack

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1 2 3 **4 Evaluate for Underutilized Functionalities** 5 6

Evaluate the point solutions your customer has and any underutilized functionality, as well as the level of automation and integration between them, and consider a consolidation strategy anchored with XDR.

Tips for Selling and Building SASE and XDR into the Security Stack

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1 2 3 4

5 Promote the Value of XDR Solutions

6

Help your customer understand the synergistic value offered by XDR—for example, underlying data lake foundation with lower-cost and flexible data storage, functional orchestration and automation and advanced security analytics—and not just in how you can pare down the number of solutions and/or vendors. You can also deliver XDR as a service to minimize maintenance for you and your customer.

Tips for Selling and Building SASE and XDR into the Security Stack

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1 2 3 4 5

6 Offer Vetted Solution Bundles

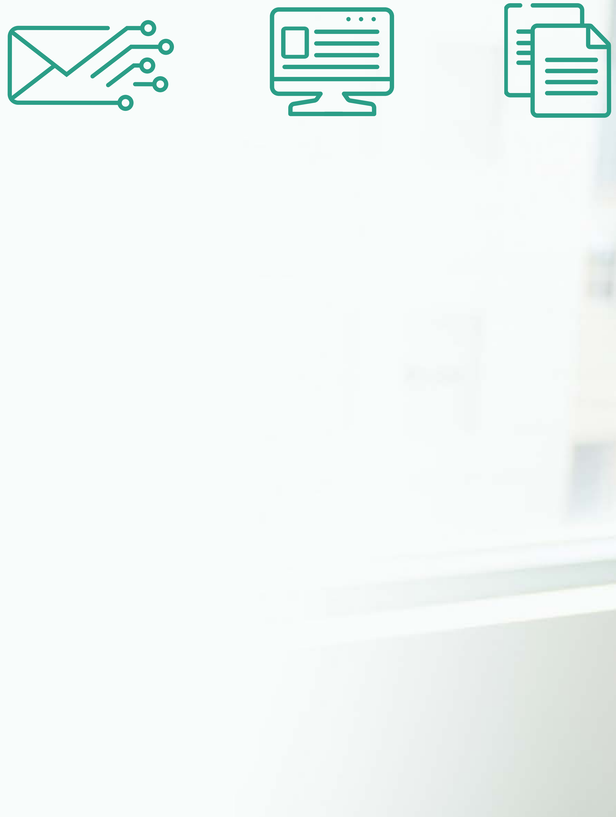
Cut time to sale by packaging up or bundling solutions you've already vetted—or provide a menu of pre-vetted vendor solutions from which to choose.

We're here to help

If your team is short on time, budget, or expertise, we can help. We're backed by a team of dedicated security consultants with the expertise and resources to ensure that your customer's environment is secure. Our solutions and services, extensive portfolio, and industry expertise help address your most critical cybersecurity needs.

Our sponsors are listed on the next page, along with contact information to reach a TD SYNNEX security professional. Contact us … we're here to help.

Contact the Team



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For more information on RUCKUS Networks solutions or other related security solutions and services at TD SYNNEX, contact our team on our website.

Contact us for more information at https://www.tdsynnex.com/na/us/cybersolv/ruckus/.

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