Unleashing Wi-Fi 7: Four Essential Steps to Maximize Performance and Be Ready for Future Demands

Why now is the time to modernize your network architecture to be simple, scalable, and secure

JUNIPER NETWORKS

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Wi-Fi 7 is here. Are you ready?

Juniper helps enterprises successfully assess and upgrade their fast-growing wireless networks to Wi-Fi 7.

Learn how →

On the journey to Wi-Fi 7, NOW is the time to simplify with an AI-Native Network

As you and your team wrestle with complexity and struggle with how to cost-effectively accommodate soaring numbers of devices, new applications, and bandwidth demands, Wi-Fi 7 represents a transformative turning point. Hope is on the horizon.

Wi-Fi 7 offers unmatched efficiency, performance, and security for digital transformation. It's a matter of when, not if, you'll need to support next-gen user devices. The catch is, sticking with a legacy architecture—or going with the wrong one—will overwhelm your already overstretched team with added tuning and management challenges.

That's why now is the time to turn the corner on complexity and begin your architecture modernization journey. Given the typical two- to three-year lag between ratification of a new standard and widespread adoption, you still have time to get ahead of management challenges and even drive significant experience and efficiency improvements in your current network.

In this ebook, we'll explore the promise of Wi-Fi 7, take a look at why network modernization is imperative, and define the key steps you need to take along your journey to unlock exceptional user and IT experiences while minimizing OpEx.

Key Wi-Fi 7 breakthroughs

Wi-Fi 7 delivers next-gen performance across secure and resilient wireless connections, relying on a variety of new features to reduce latency, increase network capacity, and boost efficiency. It underpins faster connections and better user experiences in high-density environments and improves video streaming quality and AR/VR experiences. Key features and advancements include the following:

01

320 MHz super-wide channels

Available only in the 6 GHz band, 320 MHz channels provide twice the throughput of Wi-Fi 6, enabling multigigabit Wi-Fi device speeds

02

Multi-Link Operation (MLO)

Boosts throughput and link reliability by enabling clients to transmit on multiple frequency bands simultaneously

03

4K QAM

Achieves 20% higher transmission rates than Wi-Fi 6's 1024 QAM, offering greater efficiency

03 Business drivers

Business drivers: Rise of devices and traffic in high-density environments

With the continued shift to a mobile-first lifestyle, accelerating internet speeds, and the always growing global demand for instant access to data and services, Wi-Fi has become a de facto business-critical utility.

Wi-Fi 6 provided significant benefits for spectrum efficiency over Wi-Fi 5, such as OFDMA to improve voice data, WPA3 to enhance security and guest access privacy, and Target Wake Time to reduce traffic and extend battery life for IoT devices. Then, Wi-Fi 6E expanded into the 6 GHz band to boost capacity and performance. The availability of so many more channels in the 6 GHz band means less interference—and as a result, better performance.

Wi-Fi 7 builds on prior generations with added capacity for IoT devices while mitigating network congestion and Wi-Fi interference to deliver better connectivity in high-density and challenging RF environments. With its advancements, Wi-Fi 7 is set to usher in the next surge in mobile and IoT devices, application proliferation, and new use cases that demand multi-gigabit speeds, such as:

- High-definition video
- Hybrid work
- Industrial IoT
- Automotive
- Emergency Preparedness Communication Services (EPCS)

All this growth and change adds complexity in already difficult to manage network environments, making architecture modernization an imperative prior to or during Wi-Fi 7 adoption. But before we shift to the increasing importance of architecture in modern environments, let's first look at some key details about Wi-Fi 7.

73%

of enterprise organizations say their network environment has grown in complexity over the last two years[1]

Enterprise Strategy Group

04 Wi-Fi 7 scaling

Scaling to new heights with Wi-Fi 7

The benefits of Wi-Fi 7 include improved RF efficiency, faster data rates, higher density, improved throughput, scheduling efficiency, and performance. The scale increases are significant.

The progressions in spectrums and protocols from Wi-Fi 5 to Wi-Fi 7 have all shown improvements in scale and speed:

- Wi-Fi 5: 2.4 GHz and 5 GHz (802.11ac)
- Wi-Fi 6: 2.4 GHz and 5 GHz, plus features in 802.11ax (OFDMA, WPA3, Target Wake Time)
- Wi-Fi 6E: All the features of Wi-Fi 6 with the added support of operating in the 6 GHz band
- Wi-Fi 7: All the features of Wi-Fi 6E with the additional support of 320 MHz channels, 4K QAM, and MLO for higher throughput and lower latency to facilitate higher-quality streaming and video in high-density environments and more capacity for IoT devices

Learn more about Wi-Fi 7 features.

Learn more about Wi-Fi 6 features.

Wi-Fi 5	Wi-Fi 6E	Wi-Fi 7	Benefits of Wi-Fi 7
5 GHz	2.4, 5, 6 GHz	2.4, 5, 6 GHz	Increased capacity to support next-generation use cases
160 MHz 80 MHz 40 MHz & 20 MHz	160 MHz 80 MHz 40 MHz & 20 MHz	320 MHz 160 MHz 80 MHz 40 MHz & 20 MHz	Doubles the widest Wi-Fi 6 channel size and makes 160 MHz mandatory for high-speed use cases
3.5 Gbps	9.6 Gbps	36 Gbps (tri-link MLO) 23 Gbps (single link)	Over 3x higher throughput than Wi-Fi 6
	1K-QAM	4K-QAM	Improves spectral efficiency and boosts speed and support for devices in a confined area.

05 Channel capacity

More channel capacity for more users, devices, and apps

Wi-Fi 7 increases scalability with faster, more reliable networks designed for soaring device densities.

In practice, increased channel capacity means that Wi-Fi 7 can support several times more devices, users, and applications (Figure 1). It's a critical step forward for high-bandwidth applications, enabling users to stream videos, join video conferences, and host voice calls seamlessly.

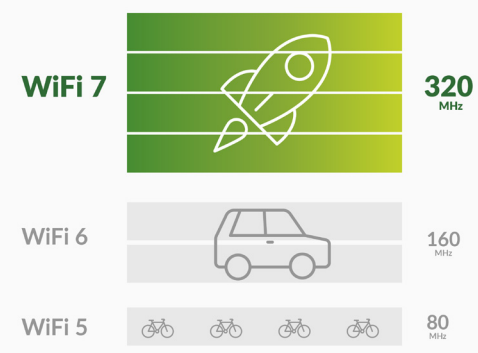


FIGURE 1

320 MHz Channels: 2X higher throughput

Wi-Fi 7 introduces ultrawide 320 MHz channels that are only available in the 6 GHz spectrum, effectively doubling throughput and significantly enhancing network speeds compared to previous Wi-Fi standards

However, not all this additional spectrum is available worldwide. For instance, the EU currently allows only the lower UNII 5 band—and only with low power (indoor) or very low power (indoor or outdoor)—as shown in Figure 2.

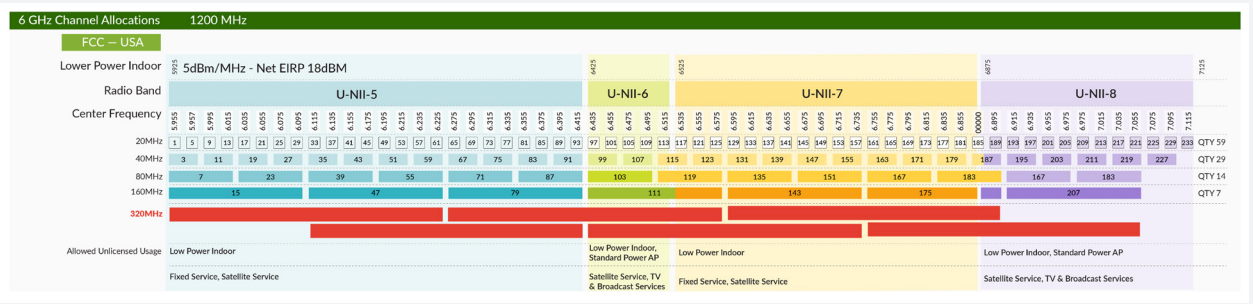


FIGURE 2

Wi-Fi 7 band allocations

Wi-Fi 7 introduces expanded 6 GHz channel allocations, offering up to 320 MHz bandwidth, enabling faster speeds and reduced latency. This includes multiple wide channels (20, 40, 80, 160, and 320 MHz) in the 6 GHz spectrum, optimizing for high-density environments and improved throughput in next-gen wireless networks.

Learn more: What is Wi-Fi 7?

06 Performance vs complexity

Greater performance, added complexity

While higher throughput and performance from Wi-Fi 7 access points (APs) will be crucial, they are only a small part of broader considerations.

Today's wired and wireless networks function as the nervous system of businesses and organizations, driving nearly every aspect of operations. Their seamless and efficient performance is essential to everything from employee productivity and customer experiences to overall operational efficiency. Given business requirements and resource and budget constraints, traditional architectures and reactive management approaches have become untenable.

While wired and wireless networks are more business-critical than ever, they are also harder than ever to operate given the sheer number of mobile devices and IoT resources—not to mention the extensive variety of hardware, operating systems, and applications currently in use.

Traditional architectures, which are highly manual and network-centric, lack the scale, flexibility, and end-to-end visibility required to support today's users and the IT departments that manage them. And while Wi-Fi 7 increases performance with 320 MHz channels, MLO, and 4K QAM, it will also require more tuning and management, adding to the challenges.

Artificial intelligence for IT operations, or AIOps, holds the key to overcoming new and ongoing management challenges. For example, automation can 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.

That's why, before or during your transition to Wi-Fi 7, the most important steps to simplify operations and unlock efficiencies for your overburdened IT team are to:

01 Update your legacy network

02 Move to the right cloud

03 Harness AIOps capabilities

04 Secure users and devices

Let's take a quick look at key considerations along each step of the journey.

"AIOps platforms can be a powerful tool for overcoming enterprise networking challenges. Key fundamentals include being AI- and cloud-native, leveraging a platform-based approach that extends across wired and wireless, and having security natively built in. Recent enhancements to Juniper's AI-Native Networking Platform continue to make important advancements to AIOps capabilities for enterprise network management."

Brandon Butler *Research Manager, Enterprise Networks, IDC*

07 Legacy challenges

Update your legacy network

Digital transformation requires a modern network architecture that is scalable, reliable, and agile—delivering exceptional mobile experiences and operational efficiency to address increasingly complex network infrastructures.

Historically, the wireless controller architecture represented a key advancement in managing AP deployments. It was effective during an era when client devices were limited and connectivity was considered a convenience.

But today, the controller architecture is not equipped to handle modern mobility requirements. Today's environments demand secure and seamless connections from virtually anywhere. And legacy controllers, co-located data centers, and siloed technology stacks contribute to network complexity. They are difficult to manage and restrain visibility into user experiences.

Ultimately, traditional, highly-manual, and network-centric architectures lack not only the necessary scale and flexibility needed for modern operations, but also the end-to-end visibility required to optimize and secure the network effectively.

Key considerations for modernization include:

01 **Scalability and flexibility:** A platform that can accommodate growth and change across successive generations of Wi-Fi and wireless upgrades

02 **End-to-end visibility:** An integrated management platform that provides comprehensive visibility, enabling real-time monitoring and troubleshooting

03 **Cloud integration:** A solution that offers maximum agility for rollouts and updates with low overhead and seamless integration with other services (See page 13)

04 **Automation and AI:** Automation capabilities powered by AI to reduce manual interventions, streamline operations, and continually optimize performance (See page 14)

05 **Robust access control:** Identity-based network access control that reliably enforces zero-trust policies

06 **High-performance switches:** Invest in advanced switches equipped with Power over Ethernet (PoE) to support power-hungry devices, ensuring optimal connectivity, scalability, and efficiency for future network demands

08 Move to microservices cloud

Move to the right cloud

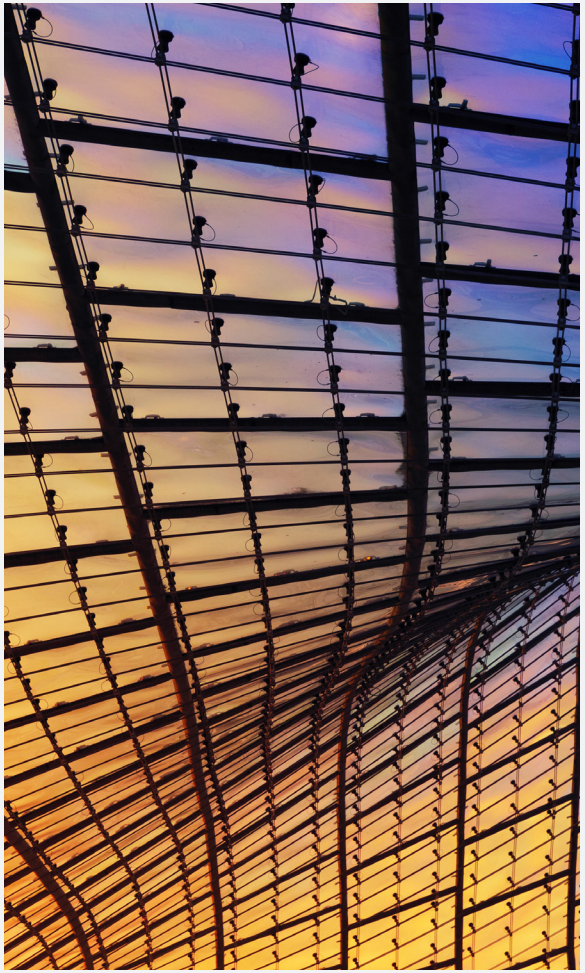
Understanding the differences in modern networking cloud solutions is critical to maximizing performance, enhancing scalability, increasing flexibility, and optimizing cost efficiency.

Many network providers still rely on legacy IT architectures that are predominantly on-prem solutions with hybrid-cloud elements. These architectures fall short in terms of scalability and flexibility when compared to true cloud-native solutions.

A modern microservices cloud architecture breaks applications into smaller, independent services that communicate through APIs. This design allows for individual services to scale independently based on demand, optimizing resource use and reducing costs. It also enhances fault isolation, ensuring that issues in one service do not impact the entire application, thereby improving reliability. Additionally, the architecture supports seamless integration with new technologies and cloud-native tools, fostering rapid innovation and improved time-to-market.

Key considerations for a modern networking cloud include:

- Microservices architecture
- Enhanced fault isolation
- DevOps and CI/CD integration



09 Embrace AIOps

Harness AIOps capabilities

The true value of AIOps lies not just in enhancing current operations, but in managing the growing complexity of IT infrastructure, which exceeds what humans can handle alone, even with the best non-AI tools available.

AIOps are pivotal to taming the complexity of rapidly evolving IT networks. By leveraging automation and AI, AIOps simplifies Day 0 to 2+ networking operations, including onboarding, deployment, and troubleshooting.

Today's industry-leading AIOps platforms rely on years of reinforced learning to provide AI insights and automated actions for end-to-end service assurance, ensuring reliable, measurable, and secure network connections. They also increase efficiency and productivity for network operators by enabling rapid discovery, isolation, and resolution of issues across wired, wireless, SD-WAN, WAN edge, data center, and security domains.

Key questions you should be asking to understand the potential of a vendor's AIOps capabilities include:

- How do we ensure every user in every location across the full network stack is getting a great and consistent experience?
- Can the network adapt to fix issues before users even know they exist?
- How do we get services up and running quickly and flawlessly?
- How do we optimize Day 2 operations and reduce firefighting to free up teams to work on strategic business problems?
- Can we quickly discover and neutralize threats to minimize their impact on the business?

Learn more: Experience Juniper's AI-native Mist platform for campus and branch networks

Self-detecting

up to 90%

fewer trouble tickets

Self-healing

up to 80%

fewer truck rolls

Self-configuring

up to 9x

faster deployment time

10 Strengthen security

Secure Wi-Fi 7 with Access Assurance

While Wi-Fi 7 introduces numerous advancements and performance enhancements, it also significantly expands enterprise attack surfaces. To safeguard against evolving threats, it's important to reevaluate your security posture and be ready.

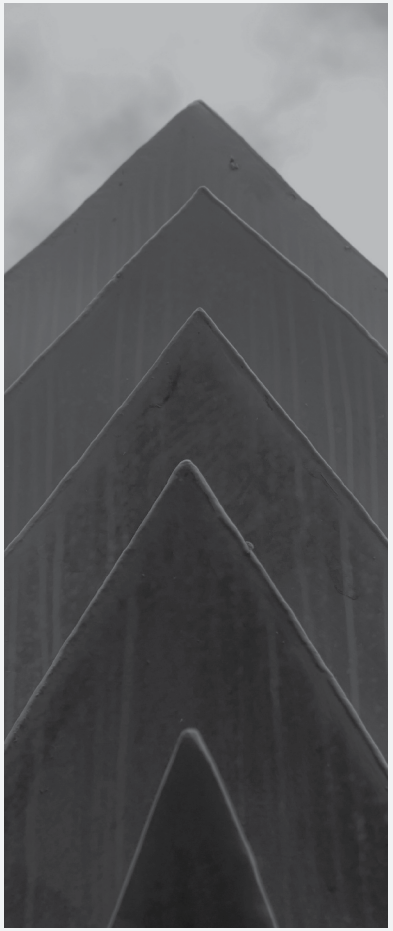
From complex configuration requirements to susceptibility to DoS attacks to an increase in device vulnerabilities due to the sheer number of devices connected to networks, Wi-Fi 7 introduces a host of security challenges.

Going forward, robust Network Access Control (NAC) will be critical to closing gaps in your security posture. NAC solutions enforce Zero Trust security policies by performing checks and validations before allowing access to the network, complementing a broader Zero Trust approach. Given the complexity of modern networks, a modern approach to NAC that simplifies and strengthens security for IT and users alike will be critical.

Key considerations for reliable access control include:

- Cloud based with machine learning and automation capabilities for elastic scale
- NAC integration with network connection visibility to continuously validate and secure the end user experience
- A single pane of glass that offers end-to-end visibility and policy enforcement for all parts of the network

Learn more: Accelerate zero trust network and security convergence



11 Maximize scale and agility

Maximize scale and agility by combining Wi-Fi 7 with Mist AI

Start your journey to Wi-fi 7 on the right foot. Unleash the power and scale of Wi-Fi 7 and streamline operations with the industry's only cloud-native AI-Native Networking Platform.

Juniper revolutionized the wireless space with the introduction of Mist AI and the first AI-Native wireless LAN (WLAN), which make Wi-Fi predictable, reliable, secure, and measurable with real-time visibility into the user experience and unique service-level expectation (SLE) metrics.

Proactive, AI-Native automation and a self-healing network replace time-consuming manual tasks and substantially lower Wi-Fi operational costs—all while delivering exceptional user and IT experiences. With the introduction of the Juniper® Wi-Fi 7 APs, the flagship AP47, performance-tier AP37, AP36, and ruggedized AP66, Marvis AI and microservices-cloud deliver a host of advantages across deployment and ongoing operations:

- Cloud-native, AI-Native microservices deliver unparalleled agility, scale, and resiliency to your network
- Data science insights that rely on large amounts of rich metadata collected by Juniper APs lower OpEx and offer unprecedented insights into network performance, behaviors, traffic patterns, and potential trouble spots
- Secure, client-to-cloud automation, insight, and AI-Native actions optimize operator and user experiences, increase compliance, and improve overall security posture

With Juniper's AI-Native Networking Platform, purpose-built to leverage AIOps, you can harness the faster speed, power, and performance of Wi-Fi 7 and assure an excellent experience for all users and devices and the best end-to-end operator experiences.

Best of all, AI-Native Network modernization efforts yield benefits across all generations of Wi-Fi, whether you are still relying on an earlier generation or considering future advancements.

An action guide for modernizing your Wi-Fi

Before or during your transition to Wi-Fi 7, it's important to take four critical steps to simplify operations and unlock efficiency for your IT team so you are ready to maximize your network's potential and deliver exceptional user experiences at the lowest OpEx.

01

Ditch your legacy network

Move beyond the controller architecture to an AI-Native Networking Platform.

02

Make the jump to the microservices cloud

Move networking operations to the most flexible, scalable cloud environment possible.

03

Embrace AI-Native AIOps

Adopt proven AI and automation capabilities that extend across wired, wireless, SD-WAN, WAN edge, data center, and security domains..

04

Reduce the attack surface and strengthen your security posture

Use NAC that leverages AI and machine learning to enhance network security by continuously monitoring and analyzing user behavior and network traffic and enforcing granular security policies.

Next steps

For more information and assistance in starting or continuing your Wi-Fi 7 journey, contact your Juniper account representative or inquire about managed service options through your trusted provider.

Connect with an expert

Ready to learn how Juniper Networks can guide you on the journey to Wi-Fi 7? Schedule a consultation with an expert.

Contact us →

Discover our capabilities

Take a self-guided Mist AI dashboard tour to see first-hand how Mist streamlines operations.

Start your Mist AI Test Drive →

See AI-Native in action

Check out Juniper's Weekly Mist AI Demo to see the AI-Native Networking Platform in action.

Register NOW →

Elevate your Wi-Fi

Discover how Juniper's high-performance Wi-Fi 7 solutions help you unleash the full potential of Wi-Fi 7.

Explore our solutions →

Why Juniper

Juniper Networks believes that connectivity is not the same as experiencing a great connection. Juniper's AI-Native Networking Platform is built from the ground up to leverage AI to deliver exceptional, highly secure, and sustainable user experiences from the edge to the data center and cloud. Additional information can be found at juniper.net or connect with Juniper on X (formerly Twitter), LinkedIn, and Facebook.

More information

To learn more about Juniper's Blueprint for AI-Native Acceleration, contact your Juniper representative or partner, or visit juniper.net.

Notes and references

01 AI-Native Requirements for Modern Networks, Enterprise Strategy Group, January 2024.

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