

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Office of Engineering and Technology)	ET Docket No. 23-282
Seeks Comment on Extreme Network's)	
Request for Waiver of Section 15.403)	
of the Commission's Rules)	
)	
Unlicensed Use of the 6 GHz Band)	ET Docket No. 18-295

**COMMENTS OF PUBLIC KNOWLEDGE AND
OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA**

Public Knowledge (“PK”) and Open Technology Institute at New America (“OTI”), submit these comments in response to the Federal Communications Commission’s (the “Commission” or “FCC”) August 16, 2023 Public Notice¹ seeking comment on Extreme Network's Request for Waiver of Section 15.403 of the Commission's Rules (the “Waiver”).² PK and OTI urge the Commission to grant the waiver request because Extreme Networks has clearly demonstrated “good cause” and that the public interest will be served by waiving what we believe is the least important of the multiple form factor requirements that govern the authorization of low-power, indoor-only (LPI) access points. The waiver is necessary for sports fans to benefit from the full capacity, low latency and higher quality that next generation Wi-Fi 7

¹ F.C.C., Public Notice, *In the Matter of Office of Engineering and Technology Seeks Comment on Extreme Network's Request for Waiver of Section 15.403 of the Commission's Rules*, ET Docket No. 23-282 (rel. Aug. 16, 2023), <https://docs.fcc.gov/public/attachments/DA-23-707A1.pdf>.

² Extreme Networks, *Request for Waiver of Section of 15.403 of Commission’s Rules*, ET Docket No. 18-295, ET Docket No. 23-282 (July 21, 2023), <https://www.fcc.gov/ecfs/document/107211224907036/1> (“Waiver Request”).

makes possible, as well as for lower costs, greater spectrum efficiency, and more competition in the market for indoor venue connectivity solutions. Extreme Networks' proposal also eliminates the risk that granting the waiver would result in its devices being used outdoors.

I. THE COMMISSION SHOULD GRANT EXTREME NETWORKS' WAIVER BECAUSE DOING SO SERVES THE PUBLIC INTEREST.

As an initial matter, contrary to AT&T's posture, the question that the Commission should consider is whether granting this waiver serves the public interest, not whether Extreme Networks can "guarantee" that their devices will not "find their way into the secondary market" to be used outdoors.³

The FCC's rules allow the Commission to grant a waiver "at any time...for good cause."⁴ The D.C. Circuit Court of Appeals has routinely held that "an agency's discretion to proceed in difficult areas through general rules is intimately linked to the existence of a safety valve procedure for consideration of an application for exemption based on special circumstances."⁵ In *WAIT Radio* the D.C. Circuit explained the importance of this safety valve:

...a general rule, deemed valid because its overall objectives are in the public interest, may not be in the public interest if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule, that has been adjudged in the public interest.⁶

Additionally, the Commission may grant a waiver of its rules if it finds that "particular facts would make strict compliance inconsistent with the public interest" and "clearly state[s] in the record its reasons for granting the waiver."⁷

³ AT&T, *Opposition of AT&T Service Inc.*, ET Docket No. 18-295, ET Docket No. 23-282, at 2 (July 31, 2023), <https://www.fcc.gov/ecfs/document/1073128307700/1> ("AT&T Oppo").

⁴ 47 C.F.R. § 1.3.

⁵ See e.g., *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969); *Keller Communs. v. FCC*, 130 F.3d 1073, 1076 (D.C. Cir 1997).

⁶ *WAIT Radio*, 413 F.2d 1157.

⁷ *Keller Communs.*, 130 F.3d 1076 (citing *Northeast Cellular Tel. Co. v. FCC*, 283 U.S. App. D.C. 142, 897 F.2d 1164, 1166 (D.C. Cir. 1990)).

Here, granting the waiver is appropriate because applying the Commission’s rules against weather-proofing to Extreme Networks’ Sports Venue Indoor Access Points does not serve the public interest. First, Extreme Networks has proposed a new service—a cloud-driven, end-to-end networking solution for indoor-only sports venues using WiFi 6E/7 connectivity.⁸ This service benefits the public interest by providing a competitive alternative for connectivity in indoor sporting venues. Second, this service does not undermine the policy of limiting LPI devices to indoor-only operation⁹ because Extreme Networks’ proposed conditions reasonably ensure that its water-resistant LPI devices will only be used in indoor venues. Therefore, the Commission should grant Extreme Networks’ waiver request.

A. Granting Extreme Network’s Waiver will Serve the Public Interest by Enabling far Greater Capacity and Higher Quality Connectivity for Sports Fans as Wi-Fi 7 and New High-Bandwidth Applications Become Available

The limited waiver requested by Extreme Networks is necessary to avoid frustrating the enormous public interest benefits that access to next generation Wi-Fi 7 across the full 1,200 megahertz of the band can bring to the fan experience at indoor arenas. Facilitating the operation of dense deployments of LPI access points in high-congestion, indoor environments advances the public interest for the same reasons that the Commission in 2020 authorized all 1,200 megahertz for low-power, indoor use without the cost of AFC coordination needed for standard power operations. As Wi-Fi 7 becomes commercially available next year, indoor venues will begin upgrading their Wi-Fi networks to take advantage of the tremendous new capabilities that will be enabled with access to 1,200 contiguous megahertz across the 6 GHz band and channels up to 320 megahertz in bandwidth. In a congested stadium environment where more and more fans

⁸ Waiver Request at 2.

⁹ Report & Order, *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz*, 35 FCC Rcd. 3852, ¶¶ 107-108 (2020) (“6 GHz R&O”).

will increasingly want to engage through social media, live action and multi-angle replays, augmented reality enhancements and other innovations, the failure to enable the full benefits of next generation Wi-Fi over 1,200 megahertz would be a great loss for consumers and the public interest.

A new report from the Wireless Broadband Association summarizes how Wi-Fi 7 – with access to 1,200 megahertz and multiple 360 megahertz wide channels – will deliver unprecedented capacity, low latency and more reliable, higher-quality connections to many more simultaneous users in congested indoor environments that include sporting venues, airport terminals and convention centers:

Wi-Fi 7's faster speeds, improved range, reduced congestion, and better security will lead to an improved public Wi-Fi hotspot experience in high-density venues. . . . With the ability to support more simultaneous connections, Wi-Fi 7 will employ multi-link operations. This will help reduce network congestion in high-density venues like airports and stadiums. This will help ensure users have a smooth, uninterrupted experience when accessing the public Wi-Fi network.¹⁰

AT&T and the utilities lobby cynically suggest that sports fans could make do with standard power (“SP”) access points, which they correctly note should be available by the end of this year when multiple AFCs are certified to coordinate their use. However, this is a very unappealing alternative from the perspective of sports fans and consumer advocates for several reasons. First, and most obviously, in LPI mode Wi-Fi has access to 1,200 megahertz of contiguous bandwidth, whereas in SP mode only 850 non-contiguous megahertz is available. Wi-Fi 7, which comes to market next year, can leverage channels as wide as 320 megahertz. But while there is only one such channel in SP mode, there will be at least three in LPI mode (and

¹⁰ Wireless Broadband Alliance, “Get Ready for Wi-Fi 7: Applying New Capabilities to the Key Use Cases,” report, at 39 (Sept. 2023), available at <https://wballiance.com/resource/get-ready-for-wi-fi-7-applying-new-capabilities-to-the-key-use-cases/>.

hopefully a fourth if 7125-7250 MHz is authorized for LPI sharing). Similarly, while SP operators can access four 160-megahertz channels, LPI users have seven (and perhaps eight in the future). This bandwidth boost makes an enormous difference in a congested venue (especially an indoor sports arena) where thousands and often tens of thousands of fans are trying to stream replays, post their own videos on social media, and soon will likely be using augmented reality glasses and other high-bandwidth innovations.

Second, AT&T and the utility incumbents ignore the tremendous spectrum re-use that becomes possible when a venue locates its Wi-Fi APs in the clutter of seating – rather than by mounting them high up on a limited number of pylons (or by adding poles, which would obstruct views). In the clutter, at seat level, each Wi-Fi AP can give dozens and (with Wi-Fi 7) potentially hundreds of fans enormous throughput and low latency; whereas a high site would limit the number of APs to avoid interference (and particularly so since the 6 GHz Order “require(s) that the indoor low-power devices, both access points and their associated client devices, employ a contention-based protocol”¹¹). As a result, indoor venues face an untenable trade-off that was simply not contemplated by the rules: They can either locate water-resistant APs within reach of the fans (and of the power-washing process, which is necessarily not dainty) and thereby deliver far more connectivity to consumers; or they can locate the non-resistant APs above the fans, undermining the potential of the Commission’s historic 1,200 megahertz framework and Wi-Fi 7 technology to deliver multi-gigabit, high-quality connectivity to everyone in a congested sporting venue.

Finally, SP and particularly composite routers, which must be location aware and able to interface regularly with an AFC, are likely to cost more and to come with the additional cost of paying an automated frequency coordinator. It will also require that the individual access points

¹¹ 6 GHz R&O at ¶ 101.

are location aware, which could be problematic deep inside a thick concrete and often at least partially underground structure with many levels. While Extreme Networks may well provide an “all-in” product that incorporates these costs, it seems counterproductive for the Commission to impose higher costs – and end up with a far worse fan experience – unless absolutely necessary.

B. Granting Extreme Network’s Waiver Will Further Serve the Public Interest by Providing a Competitive Alternative for Connectivity in Indoor Sporting Venues.

At any sports event, the staff, fans, media, athletes, referees, judges, and anyone else in attendance expects (and often relies on) wireless connectivity. According to Ericsson, across the globe, “sports venues are seeing a 67% growth in data usage year over year.”¹² This makes sense, not only are fans more connected than ever, venues are too. A study from 2020 found that attendance across North American professional sports had declined by more than 10% over the previous decade.¹³ This decline is often attributed to the enhanced home-viewing experiences new technologies have made possible. In an effort to compete, venue operators are constantly seeking ways to improve and differentiate the in-stadium experience. Many of these efforts rely on enhanced connectivity within their venues. For example, automated management systems for ticketing, parking, concessions, and merchandise transactions provide “near real-time updates” that allow a venue’s operations team to better distribute staff and resources.¹⁴ This helps improve traffic entering and exiting a venue, reduces the amount of time spent waiting in lines, and

¹² See Ericsson, “Connected Stadiums, Connected Fans,” (last accessed Sept. 15, 2023) <https://www.ericsson.com/en/small-cells/stadium>.

¹³ Notably, this decline pre-dates the 2020 global pandemic that hit pause on practically all major in-person events. Grant Suneson, *Sports Teams Running Out of Fans*, 24/7 Wall St (July 9, 2019), <https://247wallst.com/special-report/2019/07/09/sports-teams-running-out-of-fans-3/>.

¹⁴ Thor Olavsrud, *Sports Venues Advance Goals, Enhance Fan Experience with Data Analytics*, CIO (Mar. 3, 2023), <https://www.cio.com/article/463586/sports-venues-advance-goals-enhance-fan-experience-with-data-analytics.html>.

overall makes for a more seamless experience—which serves the public interest.

Making sure that the public receives the benefits of these enhanced features, particularly during well-attended events, requires reliable access to high-throughput connectivity throughout the sporting venue. WiFi 6E/7 can provide an affordable and higher bandwidth alternative to the private 5G networks currently being marketed as the go-to wireless solution for sporting venues. But, next generation Wi-Fi can quickly lose its competitive potential if the equipment it requires is routinely disabled due to fairly common beverage spills and routine power washing (or, as AT&T suggests, is limited to the standard power device rules that require the inclusion of expensive external geo-location sources and AFC subscription payments).¹⁵ Moreover, indoor sports venues play a key role in developing the economies of scale for Wi-Fi 6E/7 that will make this new standard of WiFi an affordable connectivity option for all other use cases—including for use in schools and other locations that help close the digital divide.

The Commission has long recognized that enhancing competition, deploying new wireless services to the public are important public interest values. Additionally, the positive impact these deployments will have on the Wi-Fi 6E/7 ecosystem as a whole justify grant of the waiver.

II. Extreme Networks' Proposed Waiver Conditions and the Commission's Additional Design Requirements Will Prevent Outdoor Operations of Extreme Networks' LPI Access Points.

The Commission should disregard the entirely predictable and tiresome efforts by AT&T and utility incumbents to delay and undermine the enormous public interest benefits that sports fans, consumers, enterprise and others will receive with access to the full 1,200 megahertz of the

¹⁵ AT&T Oppo at 2. It should be noted that as a deployer of licensed 5G networks, AT&T is exactly the sort of provider which will face better competition – and therefore be compelled to offer lower prices and better service – by grant of the waiver.

6 GHz band for LPI use in locations that pose insignificant (if any) risk to high-power fixed microwave links. Today AT&T and the utilities opposing this waiver use a tiny fraction of one percent of the band's capacity free of charge for their services. And yet at every turn they manufacture excuses to frustrate the interest of *the nation's entire population* to have faster, more affordable and more 5G-capable Wi-Fi connectivity everywhere possible.

The PK and OTI do not believe that the Sports Stadium Indoor APs proposed by Extreme Networks pose any greater risk of harmful interference considering the many protections that would be integral to this waiver. Specifically, conditions in the waiver can include requiring APs with plug-in power (no battery power), obtrusive labels prohibiting outdoor use, professional installation, enclosures bolted to the floor (or seat), and the simple fact they would operate inside enclosed buildings that have thicker concrete walls than almost all other structures.

When the Commission opened up the 6 GHz band for LPI unlicensed operations it adopted “three equipment-related hardware requirements that are *designed to keep these low-power access points indoors*.”¹⁶ Keeping LPI access points indoors is the underlying policy of the rule against weather-proofing that Extreme Networks seeks to waive. In this case, waiving this one element of the LPI form factor rule will not undermine this policy because the conditions Extreme Networks' proposes will reasonably ensure that its devices are only installed in indoor environments. The Commission's other two requirements designed to keep these LPI access points indoors will also prevent their re-installation for outdoor applications.

As an initial matter, stadiums have far thicker walls (typically cement walls) than the residential homes and offices that the LPI form factor rules primarily had in mind. This inherently limits the potential risk of interference from the LPI access points installed in indoor-only sports venues. Also, by strictly controlling the sales channel (e.g., a separate product

¹⁶ 6 GHz R&O at ¶107 (emphasis added).

SKU), imposing the proposed contractual conditions, and requiring the use of its own trained professional installers, Extreme Networks guarantees that its weather-proofed LPI access points will only be installed in indoor venues. This means that the only potential risk of one of its LPI access points operating outdoors would be a scenario where an untrained person, contrary to the venues agreements, uninstalls the LPI access point and re-installs it in a new outdoor location, where they would likely be further inhibited by a lack of wirelines power.

Perhaps AT&T and the utility incumbents believe that sports stadiums are planning to repurpose these special-purpose APs. However, it seems highly unlikely that a sophisticated indoor venue owner would hire Extreme Networks to install a more expensive, water-resistant indoor-only network, just to uninstall and reinstall it outdoors. But, even if that happened, two additional design limitations will remain in place to prevent outdoor operation of these devices. First, the Commission “require[s] that the low-power access points have integrated antennas and prohibit[s] the capability of connecting other antennas.”¹⁷ The Commission agreed with the WiFi Alliance that this rule “could make it ineffective to use low power indoor devices for those purposes” because “outdoor deployments typically rely on directional antennas to cover specific areas, such as restaurant patios, parking lots, and common areas.”¹⁸

Second, the Commission “prohibit[s] these low-power access points from operating on battery power.”¹⁹ As Extreme Networks notes, its weatherized LPI access points will still rely on “mains power”²⁰ which will significantly limit the viability of any outdoor use-cases (and potentially frustrate any illicit schemes to uninstall and reinstall a device outdoors).

Finally, since Extreme Networks will be the sole recipient of this waiver, the Commission

¹⁷ 6 GHz R&O at ¶107.

¹⁸ 6 GHz R&O ¶107, n. 267 (citing WiFi Alliance Comments at 18).

¹⁹ 6 GHz R&O ¶107.

²⁰ Waiver Request at 3.

can easily track any violation of the rules back to Extreme Networks and revoke the waiver if necessary.

III. CONCLUSION

Extreme has clearly demonstrated “good cause” and that the public interest will be served by waiving what we believe is the least important of the multiple form factor requirements that govern the authorization of low-power, indoor-only (LPI) access points. The waiver is necessary to avoid frustrating the enormous public interest benefits that access to next generation Wi-Fi 7 across the full 1,200 megahertz of the band can bring to the fan experience at indoor arenas. Accordingly, PK and OTI urge the Commission to grant Extreme Networks’ waiver request.

Respectfully Submitted,

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**Admitted to the Bar under D.C. App. R. 46-A (Emergency Examination Waiver)*

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