

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of
Extreme Networks Request for Waiver of Section 15.403 of the Commission's Rules
ET Docket No. 23-282

ORDER

Adopted: December 5, 2024

Released: December 5, 2024

By the Acting Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this action, we grant Extreme Networks' (Extreme) request for a limited waiver of section 15.403 of the Commission's rules to permit Extreme to obtain certification for and market its unlicensed low-power indoor (LPI) access point devices—Sports Venue Indoor Access Points (APs or access points)—with a weatherized enclosure for use in the 6 GHz band (5.925-7.125 GHz) exclusively for indoor sports venues. For the reasons discussed below, we find that Extreme has demonstrated that its waiver request presents special circumstances that warrant a deviation from the rule prohibiting LPI devices from having weatherized enclosures, and that granting the waiver serves the public interest.

II. BACKGROUND

2. The Commission's rules permit several types of Unlicensed National Information Infrastructure (U-NII) devices to operate within the 6 GHz (5.925-7.125 GHz) band, including standard power devices, low-power indoor devices, and very low power devices. While standard power devices are limited to operating in only an 850 megahertz portion of the band and must use an automated frequency coordination (AFC) system to determine the available channels and the maximum permissible power in each frequency range at their geographic coordinates, and very low power devices are permitted to operate in the same 850 megahertz portion of the spectrum without using an AFC system, low-power access points may operate across the entire 1200 megahertz without using an AFC but are limited to indoor operation, are required to use a contention-based protocol, and are limited to lower power levels than standard power access points. The Commission adopted rules to ensure that low-power indoor devices only operate indoors so that incumbent operations would be protected from receiving harmful interference. Those rules

1 See Petition for Waiver of Section 15.403 of the Commission's Rules, ET Docket No. 23-282 (filed July 21, 2023), https://www.fcc.gov/ecfs/document/107211224907036/1 (Extreme Waiver Request); see also Addendum to Waiver Request, ET Docket No. 23-282 (filed June 14, 2024). For purposes of this Waiver Request, Extreme defines the term "indoor sports venue" to mean "enclosed buildings, rather than [those] having an open or retractable roof." Extreme Waiver Request at 4.

2 See 47 CFR § 1.3.

3 47 CFR §§ 15.401-15.407.

4 Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, Second Report and Order, Second Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order on Remand, FCC 23-86, at 10, 39, paras. 18, 67 (Nov. 1, 2023); Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852, 3860, 3862, 3888-90, paras. 17-18 & tbl. 3, 22, 99-103 (2020) (6 GHz Report and Order). Standard power access points, very low power access points, and their associated client devices are not restricted to indoor operation.

prohibit LPI devices from having a weatherized enclosure and being battery-powered, require LPI devices to have integrated antennas and prohibit them from being able to connect to other antennas.⁵ The Commission also imposes marketing and labeling requirements on low-power indoor access points.⁶

3. Extreme states that its Sports Venue Indoor Access Point device is needed to achieve “ubiquitous and high-quality coverage” in indoor sports venues and that “the number and size of available channels in the 6 GHz band under the low-power indoor rules is especially impactful.”⁷ Extreme also states that “[m]aximizing the coverage and availability of Wi-Fi 6E in these large indoor venues is important as demand for data continues to increase.”⁸ Extreme asserts that it needs a waiver so that it can deploy its low-power indoor devices with a weatherized enclosure to protect them from damage that could be caused by washing operations or beverage spills because to maximize coverage and capacity, the devices need to be installed “in close proximity to fan seating areas and often under the seats themselves.”⁹

4. The Office of Engineering and Technology issued a Public Notice on August 16, 2023, seeking comment on the Extreme Waiver Request.¹⁰ In response, three comments were filed in opposition, and fourteen comments supported the waiver. In addition to the comments, Extreme filed an addendum to the waiver request providing additional information and supporting facts for consideration, including how its devices would be controlled and tracked via its cloud-controlled operating system.¹¹ Extreme also explained in more detail why operating under the LPI rules is important for its use case, and to narrowly tailor the request only to cover large indoor stadiums and arenas that are used for professional teams or that have a seating capacity of more than 3,000 persons.¹²

III. DISCUSSION

5. We are authorized to grant a waiver under section 1.3 of the Commission's rules if the petitioner demonstrates “good cause” for such action.¹³ Good cause, in turn, may be found and a waiver granted “where particular facts would make strict compliance inconsistent with the public interest.”¹⁴ When examining a request for waiver of the Commission’s rules, we undertake a two-part analysis.¹⁵ A waiver of the Commission’s rules is appropriate when (1) “special circumstances warrant a deviation

⁵ 47 CFR § 15.403 (“Indoor Access Point” definition and “Subordinate Device” definition); *6 GHz Report and Order*, 35 FCC Rcd at 3891, para. 107.

⁶ 47 CFR § 15.403 (“Indoor access point devices must bear the following statement in a conspicuous location on the device and in the user’s manual: FCC regulations restrict operation of this device to indoor use only.”).

⁷ Extreme Waiver Request at 2, 5.

⁸ *Id.* at 5.

⁹ *Id.* at 2, 5.

¹⁰ *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, Public Notice, DA 23-707 (OET Aug. 16, 2023).

¹¹ Addendum to Waiver Request at 1-2.

¹² Letter from Paul Margie, Counsel to Extreme Networks Inc to Marlene H. Dortch, Secretary FCC, ET Docket No. 23-282, at 1 (filed July 19, 2024) (Extreme Networks *Ex Parte*).

¹³ 47 CFR §§ 0.31, 0.241, 1.3; *see also* *ICO Global Communications (Holdings) Ltd. v. FCC*, 428 F.3d 264, 269 (D.C. Cir. 2005); *Ne. Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153, 1157-59 (D.C. Cir. 1969).

¹⁴ *Ne. Cellular*, 897 F.2d at 1166; *see* *WAIT Radio*, 418 F.2d at 1157-59.

¹⁵ 47 CFR § 1.3. *See also* *ICO Global Communications (Holdings) Limited v. FCC*, 428 F.3d 264 (D.C. Cir. 2005); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

from the general rule”; and (2) “such deviation will serve the public interest.”¹⁶ To meet the public interest part of the analysis, the requested waiver cannot undermine the purpose of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.¹⁷

6. Extreme requests a limited waiver of section 15.403 of the Commission’s rules to allow Extreme to obtain certification for and market its unlicensed low-power indoor access point devices with a weatherized enclosure for use in the 6 GHz band exclusively for indoor sports venues.¹⁸ We first consider whether special circumstances are presented that warrant deviating from the prohibition on weatherized enclosures for low-power indoor access point equipment in the 6 GHz band. For the reasons discussed below, we find such circumstances, as narrowed by the conditions we impose here, to be present.

7. The demand for data across Wi-Fi networks at sports venues has surged in recent years. Cisco expects Wi-Fi data generated during future Super Bowls to be nearly 40 terabytes, compared to 6.2 terabytes during the 2015 Super Bowl and 30 terabytes during the 2022 and 2023 Super Bowls.¹⁹ Ericsson similarly estimates a 67% increase in data usage at sports venues year over year.²⁰ To meet the growing demand for data, indoor sports venues require a large number of access points to provide ubiquitous Wi-Fi coverage to densely clustered users.²¹ Extreme’s low-power indoor access points will permit the full 1200 megahertz available in the 6 GHz band to be used to provide service within indoor sports venues, as compared to only up to the 850 megahertz available for standard power access points absent this waiver permitting the Sports Venue Indoor Access Points to have a weatherized enclosure.²²

8. Commenters supporting the waiver contend that wider channels will help networks in dense environments keep up with the increasing demand for data, especially as Wi-Fi 7 becomes available in the near future.²³ They argue that the additional channels that these devices can access (e.g., low-power indoor access points can use up to fourteen 80-megahertz channels, whereas standard power access points can only access nine 80-megahertz channels) will have a dramatic effect on overall wireless

¹⁶ *Northeast Cellular*, 897 F.2d at 1166; *see also ICO Global Communications*, 428 F.3d at 269 (quoting *Northeast Cellular*); *WAIT Radio*, 418 F.2d at 1157-59.

¹⁷ *See, e.g., WAIT Radio*, 418 F.2d at 1157 (stating that even though the overall objectives of a general rule have been adjudged to be in the public interest, it is possible that application of the rule to a specific case may not serve the public interest if an applicant’s proposal does not undermine the public interest policy served by the rule); *Ne. Cellular*, 897 F.2d at 1166 (stating that, in granting a waiver, an agency must explain why deviation from the general rule better serves the public interest than strict adherence to the rule).

¹⁸ Extreme Waiver Request at 1.

¹⁹ Cisco Comments at 2.

²⁰ Comments of Public Knowledge and Open Technology Institute at New America at 6 (citing Ericsson, “Connected Stadiums, Connected Fans,” <https://www.ericsson.com/en/small-cells/stadium> (last accessed Sept. 15, 2023)). As some parties note, these statistics reflect data consumption in open air and retractable roof venues. *See, e.g.,* FWCC Reply at 3-4; AT&T Reply at 5-6; UTC Reply at 3-4. We recognize these figures reflect data usage at locations other than indoor sports venues; however, we find this information to be illustrative and to act as a corollary to the growing demands placed on Wi-Fi networks at indoor sports venues.

²¹ Cisco Comments at 3. So-Fi Stadium required more than 2,500 new access points for its Super Bowl, while the State Farm Stadium Super Bowl upgrades required 1,600 new access points, including about 600 installed beneath seats. *Id.* Cisco’s partnership with the Spanish soccer team Real Madrid C.F. installed more than 1,200 new access points in Santiago Bernabéu Stadium. *Id.*

²² Dynamic Spectrum Alliance Comments at 2 (DSA Comments); Public Knowledge and Open Technology Institute at New America at 4-5.

²³ DSA Comments at 4; Comcast Comments at 4.

broadband capacity in stadiums and will make an enormous difference for the fan experience.²⁴ This waiver will enable fundamental fan interactions like ticketing, safety operations, retail experience, and mobile payment, but also enhance interactive fan experiences such as live sharing, reviewing, and participating with the venue and the event, and even specialized app interaction.²⁵ As expectations for having connectivity anywhere and anytime, including within indoor sports venues, continue to grow, we agree with commenters who suggest that standard power access points, which cannot access as much spectrum as low-power access points but, under the rules are permitted to have weatherized enclosures, is not an adequate alternative to the benefits to the public under the waiver we are granting.²⁶

9. Some parties suggest that Extreme has a reasonable alternative by using standard power equipment and waiting for the Commission to approve AFC systems for commercial operation in the 6 GHz band²⁷ and that Extreme and other manufacturers already market and have successfully deployed Wi-Fi equipment in various bands without prohibitions on weatherized enclosures.²⁸ AT&T claims that the 850 megahertz available to 6 GHz standard power access points would be more than sufficient, standing alone, to deliver that in-venue fan experience, given that venue owners have control over the networks used in their facilities.²⁹ AT&T points out that standard power APs can be configured to operate at lower power suitable for high-density re-use and that introducing existing standard power devices is likely faster than redesigning and recertifying new LPI APs under a waiver.³⁰ AT&T and UTC also suggest that spectrum available on an unlicensed or licensed-by-rule basis in other bands could supplement this 850 megahertz of spectrum (i.e., not that the other bands would have to deliver the in-venue fan experience on their own).³¹ Contrary to these claims, however, Comcast argues that deploying standard power access points at indoor sports venues may not adequately provide the necessary coverage as “[i]ndoor sports venues are environments of very dense data use and require high-speed connectivity.”³² Moreover, providing efficient spectrum use in such locations requires significant channel reuse, which, according to Broadcom, is achieved through using many access points covering small areas.³³ To that point, Extreme argues that channel reuse is the key to successful wireless deployments in dense environments.³⁴ It states that due to high data usage in stadiums and arenas, the venue operators

²⁴ DSA Comments at 4; *see* Comcast Comments at 4.

²⁵ Comments of Anaheim Ducks at 1-2. The official Anaheim Ducks app allows fans to stream HD live game videos, watch highlights, and explore statistics and game updates. *Id.* They engage with fans actively during games on social media networks, using the hashtag #LetsGoDucks. *Id.* Fan posts using the #LetsGoDucks hashtag are displayed on the scoreboard during home games. *Id.*

²⁶ *See, e.g.*, Comcast Comments at 3-4.

²⁷ UTC Comments at 2; AT&T Reply Comments at 3-4; FWCC Reply at 5-6. Notwithstanding the efficacy and effectiveness of the 6 GHz AFC system as it pertains to this waiver request, we note that the Commission has already approved the applications of multiple parties to operate the AFC system in conformance with the Commission 6 GHz rules. *OET Announces Approval of Seven 6 GHz Band Automated Frequency Coordinators Systems for Commercial Operations and Seeks Comment on C3 Spectra’s Proposed AFC System*, ET Docket 21-352, Public Notice, DA 24-166 (OET Feb. 23, 2024).

²⁸ UTC Comments at 2 & n.12; AT&T Comments at 3 & n.10; FWCC Reply at 5 & n.15.

²⁹ AT&T Reply at 3.

³⁰ *Id.* at 4.

³¹ *Id.* at 3; UTC Reply at 2.

³² Comcast Comments at 3.

³³ Broadcom Comments at 7-8.

³⁴ Letter from Paul Margie, Counsel to Extreme Networks Inc to Marlene H. Dortch, Secretary FCC, ET Docket No. 23-282, at 1 (filed July 19, 2024) (Extreme Networks *Ex Parte*).

need access to as many different channels as possible so they can reuse the channels in different small cells within their venues.³⁵ In such deployment scenarios, typical Wi-Fi cells have a radius of only five 18-seat rows, covering approximately 90 total seats.³⁶ Secondly, using the LPI device enables access to the full 1200 megahertz of the band, which spans U-NII-5, -6, -7, and -8, compared to standard power devices, which are only permitted on the 850 megahertz in U-NII-5 and -7.³⁷ Because AFC-controlled standard-power APs that would operate indoors are not permitted to use U-NII-6 and U-NII-8, such use would substantially diminish the number of channels available, which in turn will negatively impact deployment and performance by reducing channel reuse by a factor of 33%.³⁸ In considering Extreme's claim regarding the need for as many channels as possible to enable a dense reuse scheme, we observe that many sports arenas encompass fan seating on multiple overlapping levels or tiers. Thus, while traditional reuse schemes (e.g., those used for mobile phone systems) are based on two-dimensional reuse patterns, sports arenas and other similar venues must consider reuse over three dimensions creating a much more challenging situation necessitating more available channels. Thus, we agree with Extreme that it is advantageous to maximize the number of Wi-Fi channels available by enabling the 1200 megahertz available for LPI devices to be used as opposed to the lesser 850 megahertz available for standard-power devices as that will enable Wi-Fi installations to attain the necessary connectivity to these fan areas. Relatedly, Extreme also adds that Standard Power APs will have more power than is appropriate for dense indoor arenas, and will be more expensive than the LPI APs, all the while having access to fewer channels.³⁹ Noting that to enable such efficient channel reuse, its devices will use even lower power than what is allowed under the LPI rules,⁴⁰ Extreme claims that it will be arbitrary to force arena owners to choose a less efficient and costlier deployment method just to accommodate unsupported arguments by the incumbents.⁴¹ Thus, while AT&T's points out that that Extreme can simply reconfigure standard-power devices to operate at lower power, such action would still not provide the same public benefits as can be provided by permitting Extreme's Sports Venue Indoor Access Points to access the full 1200 megahertz available in the 6 GHz band. As LPI devices can already be deployed in these indoor arena locations,⁴² albeit without the requested weatherized enclosures, and there is a public benefit in providing as much Wi-Fi capacity as possible, we agree with Extreme that the most advantageous installation scheme results from maximizing frequency reuse. Therefore, we find the arguments favoring LPI AP usage, as requested by Extreme, more persuasive than the comments arguing for the more spectrum limited standard-power APs that employ a more complex protection mechanism.

10. Extreme argues that the architectural characteristics of indoor sports venues create a challenging environment for non-weatherized Wi-Fi access points.⁴³ "Unlike office buildings, hospitals, and schools, indoor sports arenas have both densely clustered users and a relative lack of walls or rails that are located close enough to these users to allow effective AP positioning."⁴⁴ Broadcom states that the most effective means of "[a]chieving ubiquitous and high-quality coverage in these venues requires

³⁵ *Id.* at 2.

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.* Thirty-three percent is the difference between 29 channels at 40 MHz with LPI and 20 channels at 40 MHz with standard power, provided all the standard power channels are available.

³⁹ Waiver Request at 7-8.

⁴⁰ Extreme Networks *Ex Parte* at 2.

⁴¹ Waiver Request at 7-8.

⁴² 47 CFR §§ 15.401-15.407.

⁴³ Waiver Request at 2-3, 5.

⁴⁴ Extreme Reply Comments at 3.

installation of access points in close proximity to fan seating areas [where they] are vulnerable to spilled beverages and venue washing operations.”⁴⁵ Thus, Cisco argues, it is essential that access points providing in-venue coverage be located in the fan seating areas to meet coverage and capacity requirements as they provide better coverage than higher power access points that would generally need to be located farther away from the fan seating area.⁴⁶ Cisco also notes that locating these low-powered indoor access points with a weatherized enclosure in the clutter of fan seating areas offers better Wi-Fi coverage—while protecting the device from liquid-related accidents and fan abuse while operating at a lower power—than standard power devices.⁴⁷

11. In addition to the unique placement needs, as described above, Extreme argues that waterproofing is also a prerequisite for Extreme’s device.⁴⁸ If not adequately protected via a weatherized enclosure, the power washing of the venues would damage the equipment.⁴⁹ This is because in a typical power-washing operation a power jet of specialized cleaning agents, which includes “not only water, but also various disinfectants and cleaning agents,” is directed at locations where the APs would typically be installed for maximum coverage, such as under the seats.⁵⁰ During a typical cleaning operation, water pressure can exceed 4,000 psi, with temperature variation of over 34° C.⁵¹ “All materials expand or contract with temperature changes[,] which means that the protection mechanism [i.e., the weatherized enclosure] must be able to handle the entire range of expansion or contraction without leaking. Because of this risk, stadiums and arenas will not install APs that are not waterproof.”⁵² Hence, “[t]he primary purpose of the weatherized enclosures is to protect the equipment from damage during venue cleaning, ensuring long-term reliability and performance.”⁵³ This claim is supported by the record. For example, the Florida Athletics Director notes that without weatherized enclosures, it would be nearly impossible to provide the consistent service fans expect, as access points regularly experience spills, kicks, and pressure washing that standard indoor enclosures do not protect against.⁵⁴ While UTC claims that stadiums surely have procedures in place to avoid washing a variety of equipment that could be damaged, they suggest no alternative to how fan seating areas can be cleaned without power washing.⁵⁵ Thus, devices installed close to the fans not only aid in Wi-Fi coverage but also need protection, as without the weatherized enclosure, the devices would not last long and would get routinely damaged.⁵⁶ In addition to just the

⁴⁵ Comments of Broadcom Inc. at 2 (internal quotation marks and brackets omitted); *see also Waiver Request* at 2-3. In these areas, there is a significant risk that fans may spill beverages that could damage the access point, and the access points will be subject to venue washing operations. *Extreme Reply* at 3-4.

⁴⁶ Cisco Comments at 2-3. With “thousands of users packed closely together in a large open space, channel reuse is often the most efficient method of spectrum management, necessitating the deployment of many low-powered access points covering portions of the venue rather than a few high-powered access points covering larger areas.” *Id.* at 3. “[T]he 6 GHz band provides the additional bandwidth needed to allow stadium operations and fans to fully utilize the same Wi-Fi network simultaneously.” *Id.*

⁴⁷ *Id.* at 2-3.

⁴⁸ *Extreme Networks Ex Parte* at 1-2.

⁴⁹ *Id.* at 1.

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.*

⁵³ Addendum to *Waiver Request* at 2.

⁵⁴ *Matt Vincent Comments* at 1; *see also Glenn Johnson Comments* at 1; *Comcast Comments* at 2.

⁵⁵ *UTC Comments* at 2-3.

⁵⁶ *Extreme Reply Comments* at 7 (“[G]enerally[,] the only practical place for APs is under seats, where they are susceptible to being stepped on, kicked, and having food and drinks spilled on them.”); *Chip Shuttles Comments* at 1

protection from power washing, the weatherized enclosure will also protect Extreme's equipment from the dangers of beverage spill risk, and to protect against physical abuse like fan kicks due to its close proximity to fan seating areas.⁵⁷ Furthermore, we believe that not granting the waiver may actually diminish the public benefit as access points, if installed to maximize capacity and coverage consistent with proponents' specified requirements to provide the necessary coverage and capacity, that are not protected by a weatherized enclosure would likely necessitate repeated repairs or replacement and experience outages, resulting in attendees losing connectivity. Based on the specific facts presented by Extreme and comments in the record,⁵⁸ we reject the arguments opposing a waiver. As explained above, permitting Sports Venue Indoor Access Points to operate under the 6 GHz low-power indoor device rules, except for the weatherized enclosure prohibition, is in the public interest and does not undermine the underlying purpose of the rule under the conditions we are applying to this waiver grant. We find that a waiver of Commission rules is justified in this case as it will permit devices to be deployed and used only in indoor sports venues where it would be impractical to install access points in locations sufficiently protected from moisture and physical abuse to not require a weatherized enclosure. Extreme, as well as supporting commenters, makes a compelling case that to satisfy the coverage and capacity requirements associated with very densely packed indoor sports venues, along with the architectural characteristics of those venues, which tend to be wide-open spaces lacking overhead physical structures on which to mount access points in locations close enough to attendees to maximize coverage and capacity, necessitates installing access points close to attendees, such as under seats where they could be subject to beverage spills and kicking as well as wear and tear associated with routine venue cleaning including pressure washing between events. While AT&T and UTC suggest the APs can be placed in locations other than under the seats to avoid damage from liquids,⁵⁹ we find this claim unconvincing as they suggest no alternate location. Given that stadiums typically have high ceilings and stadium seating areas lack walls, it is not apparent where the APs could be installed for such high-density deployments other than under the seats.

12. Moreover, the additional capacity associated with access to the 1200 megahertz available for 6 GHz low-power indoor devices is necessary to deliver the in-venue experience fans expect, which increasingly includes real-time data and video. This same capacity is not available using only the 5 GHz U-NII bands nor the spectrum available to 6 GHz standard power devices, which is 850 megahertz maximum; a difference of 350 megahertz or more, which equates to at least five additional 80-megahertz channels and nine additional 40-megahertz channels. These additional channels will serve to provide options for indoor sports venues to install more devices and more finely tailor coverage to maximize attendees' Wi-Fi access. In addition, Wi-Fi 6E which is uniquely available in the 6 GHz band provides benefits that Wi-Fi in other bands, such as the 5 GHz band cannot. While Wi-Fi 6 can also be provided in the 5 GHz band, the available spectrum in the 6 GHz band is particularly beneficial for dense deployments such as sports arenas. This is because uplink traffic generally exceeds downlink traffic as fans post and share photos and videos. The Wi-Fi 6 protocol accounts for this by implementing Uplink

("[T]hese weatherproof enclosures [must be] allowed to help us maintain and improve the connectivity in our venue for the future."); Rand Allision Comments at 1 ("[U]nder-seat implementations require rugged outdoor rated enclosures to stand up to the harshness of cleaning, fan abuse, etc."); Anaheim Ducks Hockey Club, LLC Comments at 2 ("Extreme's request for a waiver of the FCC's rule against waterproofing is necessary for installing 6 GHz Wi-Fi routers in arenas like the Honda Center."); Anaheim Arena Management, LLC Comments at 4 ("[U]nder-seat deployment remains one of the most compelling models for our fans. Wi-Fi equipment must be everywhere, hidden in plain sight, and operating flawlessly from the perspective of our guests. That means access points under handrails and under seats in many areas.").

⁵⁷ Waiver Request at 2; Extreme Reply at 3-4, 7; Addendum to Waiver at 1; Broadcom Comments at 2; Matt Vincent Comments at 1.

⁵⁸ See *supra* paras. 6-11.

⁵⁹ AT&T Comments at 3.

Multiple-Input, Multiple-Output (UL MU-MIMO), which allows simultaneous bidirectional communications, enabling a better experience for more simultaneous users due to the ability to prioritize and schedule traffic.⁶⁰ To take full advantage of this advancement, the full 1200 megahertz is needed (as explained above, this maximizes capacity through a dense reuse of the full slate of available channels).⁶¹ The facts pertaining to this waiver request are unique and specific, which bolster our decision.

13. We find the arguments supporting the need for using low-power indoor access points that can access spectrum across the entire 6 GHz band to provide greater channel availability and the requirement for locating those access points in areas subject to potential damage due to spillage, cleaning, and abuse are sufficiently special circumstances to meet the first prong of our analysis.

14. Having determined that special circumstances warrant deviating from the general rule, we consider whether such deviation serves the public interest. We find that the requested waiver will provide significant public benefits while fulfilling the purpose of the rule. Extreme's access points will enable expanded Wi-Fi coverage at indoor sports venues, thereby providing fans access to full capacity, low latency, and high-quality Wi-Fi networks.⁶² As noted above, there is skyrocketing demand for data at sporting events.⁶³ Permitting Extreme's access points is in the public interest as they will help meet this demand by permitting 6 GHz low-power indoor access points to be installed in indoor sports venues in locations where they can provide maximum coverage and capacity to event attendees. And with the conditions placed on Extreme to control and manage the supply chain and device installation, we are confident that the waiver will serve the public interest by ensuring that these devices will remain indoors, thus protecting incumbent services from harmful interference.

15. The intent of the Commission's rule prohibiting weatherized enclosures, among other restrictions, on indoor access points is to ensure that such access points cannot be used outdoors where the lack of a requirement to use an AFC would increase the potential of causing harmful interference to incumbent spectrum users.⁶⁴ The Commission previously determined that low-power indoor devices operating without an AFC mechanism across the entire 6 GHz band would have an insignificant potential for causing harmful interference to incumbent users of the band.⁶⁵ Issuing this waiver to Extreme will not undermine the purpose of this rule as the Sports Venue Indoor Access Points will only be installed indoors and, therefore, will not result in an increased potential for causing harmful interference to incumbent users of the band.

16. We are imposing several conditions on this waiver to ensure that the indoor installation requirement is met and that these devices do not get resold in a secondary market where less sophisticated users could install them in places inconsistent with these conditions. Among these conditions is a requirement that Extreme be responsible for manufacturing, distribution, and sales of the access points and ship these access points directly to the relevant venue.⁶⁶ Similarly, this waiver would not permit operations in any outdoor locations, such as the stands of the stadium with a retractable roof or any outdoor areas associated with an indoor stadium.⁶⁷ The waiver will also be limited to large professional

⁶⁰ Cisco Comments at 3 citing Matt Swartz, "Wi-Fi 6E: Changing the Game for Sports and Entertainment Venues" (Dec. 16, 2021), available at <https://blogs.cisco.com/networking/wi-fi-6e-changing-the-game-for-sportsand-entertainment-venues>.

⁶¹ See para. 9, *supra*.

⁶² See Comments of Public Knowledge and Open Technology Institute at New America at 2.

⁶³ See *supra* para. 7.

⁶⁴ 6 GHz Report and Order, 35 FCC Rcd at 3891, para. 107.

⁶⁵ 6 GHz Report and Order, 35 FCC Rcd at 3888, paras. 96-99.

⁶⁶ Waiver Request at 4; see Addendum to Waiver Request at 2.

⁶⁷ Extreme Networks *Ex Parte* at 2.

indoor stadiums and arenas that are used for a professional team or that have a seating capacity of more than 3,000 persons.⁶⁸ In addition, to ensure that these devices can be easily tracked and identified, the Sports Venue Indoor Access Points must have a unique stock keeping unit (SKU) identifier to distinguish these devices from other Extreme access points that are not subject to this waiver.⁶⁹ Once deployed, each Access Point must be activated by Extreme Network via its cloud-based operating system.⁷⁰ The activation would be controlled by geo-location, which will allow Extreme to track an AP's exact location.⁷¹ Similarly, if an AP is removed or changed, it would be removed from the cloud and would cease to operate.⁷² Moreover, we will require Extreme to ensure that the Sports Venue Indoor Access Points are installed by a qualified professional trained by Extreme and that they are affixed in a manner reasonably calculated to prevent removal and reinstallation elsewhere, except by Extreme or its agent.⁷³ This combination requiring controlled sales, professional installation, and extensive record-keeping will ensure that these devices are installed appropriately and will remain indoors, supporting our rationale that this waiver grant does not undermine the intent of the rule that prevents harmful interference from occurring.⁷⁴ Finally, with these conditions in place, we believe that the Sports Venue Indoor Access Points would remain strictly indoors, with any outdoor operations impractical and unsuitable, while making it impossible for these devices to operate in the secondary market outside of Extreme's control. Thus, the conditions we impose on this waiver will protect incumbent spectrum users as well as the prohibition on weatherized enclosures.⁷⁵

17. We also include a requirement that Extreme maintain a point of contact to address and resolve, as appropriate, any issues that may arise at any venue where the Sports Venue Indoor Access Point is installed.⁷⁶ In addition, we expect Extreme to work with venue operators to modify or disable these devices, as necessary, to resolve any legitimate complaints regarding harmful interference.⁷⁷ Together, this will ensure that the intent of our rule remains intact to protect the licensed incumbents from harmful interference from the operation of these access points at indoor sports venues.

⁶⁸ *Id.*

⁶⁹ Addendum to Waiver Request at 2; Waiver Request at 4.

⁷⁰ Addendum to Waiver Request at 2.

⁷¹ *Id.*

⁷² *Id.*

⁷³ Waiver Request at 4.

⁷⁴ We note that these devices must also obtain equipment certification and comply with all other technical aspects associated with low-power indoor access points, including power spectral density limits, total power limits, and the requirement to incorporate a contention based protocol.

⁷⁵ *6 GHz Report and Order*, 35 FCC Rcd at 3891, para. 107.

⁷⁶ Extreme can be contacted via email at ComplianceRequest@extremenetworks.com, or by phone at 919-595-4928. *See also*, Extreme Request at 4.

⁷⁷ *See* Addendum to Waiver Request at 2; Waiver Request at 4; *see also* 47 CFR § 15.5(c) (“The operator of a radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected.”).

18. Several commenters oppose the Commission granting a waiver to Extreme for its Sports Venue Indoor Access Points.⁷⁸ Commenters argue that the waiver request is not in the public interest.⁷⁹ Additionally, commenters state that Extreme has failed to show that waiving the weatherized enclosure rule will ensure that low-power indoor access points remain indoors.⁸⁰ They claim that Extreme can protect its access points from damage caused by venue washing and fan beverage spill incidents without compromising network coverage by strategically placing its access points at the sports venue.⁸¹ Hence, fans will not be deprived of Internet access in these venues by denying the waiver request since solutions are already available in the market.⁸² They also state that the conditions proposed by Extreme are inadequate to ensure that the access points will stay indoors and guarantee incumbent protection.⁸³ FWCC also opposes the amendment offered by Extreme to narrow the scope of the waiver to large indoor stadiums only that seat at least 3,000 people; it states that even then the waiver will still cover every NBA and NHL arena and 87% of all NCAA Division I Men’s basketball arenas amongst other venues.⁸⁴ It also states that no limiting factor would prevent similar waiver requests from other concert venues, conference centers, and other similar facilities, and reiterates AT&T’s claim that no guarantees could be made that those devices would not find their way into secondary markets.⁸⁵ UTC complains that none of the waiver conditions suggested by Extreme provide any ability for the Commission to monitor or police violations and suggest additional conditions for the waiver.⁸⁶

19. Regarding opposing commenters’ contention that the conditions proposed by Extreme are inadequate to ensure that the access points will stay indoors and guarantee incumbent protection, we again disagree. As discussed above, section 15.403 of the Commission’s rules already allows the deployment and use of low-power indoor access points.⁸⁷ As noted above, and detailed below, we are imposing

⁷⁸ AT&T Opposition at 2 (contending that “[t]he *Waiver Request* should be denied because the form factor rules[, such as the prohibition on weatherized enclosures,] are a key component of the regulatory scheme protecting primary FS incumbents[,] and Extreme has not justified undermining those safeguards”); UTC Opposition at 1; Reply Comments of Fixed Wireless Communications Coalition at 1-2 (FWCC Reply) (“[T]he Extreme Waiver Request fails to meet any of the Commission’s standards for granting a waiver.”).

⁷⁹ AT&T Comments at 3; UTC Comments at 4; FWCC Reply at 5.

⁸⁰ AT&T Comments at 2 (“[N]one of the conditions Extreme proposes to follow would ‘make outdoor operations impractical and unsuitable.’” (quoting Extreme Waiver Request at 3-4)); FWCC Reply at 3 (“The FWCC agrees with AT&T that ‘no guarantee is or could be made that none of these devices would find their way into the secondary market used outdoors, protected from the weather.’” (quoting AT&T Opposition at 2)).

⁸¹ AT&T Comments at 3 (“Extreme could also deploy its APs under the low-power indoor rules and minimize ‘the significant risk that fans may spill beverages that could damage the [APs]’ by placing them in locations other than ‘under the seats.’” (quoting Extreme Waiver Request at 2)); UTC Comments at 2-3 (“[C]areful placement of non-weatherized low-power APs throughout the venue would lead to a very low probability that beverages would be spilled on enough APs to create an issue for fans and surely venues have procedures in place to avoid ‘washing’ a variety of equipment that could be damaged by that activity.”).

⁸² UTC Reply at 2 (“There already are multiple methods for delivering wireless fan experience via 2.4/5 GHz Wi-Fi and through nationwide carriers such as AT&T, Verizon, and T-Mobile.”); FWCC Reply at 5-6 (“Extreme and other parties interested in deploying wireless systems at sports venues have a wide variety of options already on the market.”); AT&T Comments at 3-4 (“The *Waiver Request* does not justify stripping [the form-factor] protection[s] away, especially when Extreme can meet the stated deployment needs in other ways.”).

⁸³ UTC Reply at 4-6; AT&T Comments at 2.

⁸⁴ Letter from Seth Williams, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary FCC, ET Docket No. 23-282, at 2-3 (filed Sept 9, 2024) (FWCC *Ex Parte*).

⁸⁵ *Id.* at 3.

⁸⁶ UTC Reply at 4-5.

⁸⁷ *See supra* para. 15; *see also* 47 CFR § 15.403.

several waiver conditions designed to ensure that Extreme keeps close control of its supply chain management for these devices, as well as require that only qualified professionals trained by Extreme be permitted to install and manage these devices. We are requiring that Extreme track the devices subject to this waiver by assigning a unique SKU to the access point model(s), to ship them directly to the venues where they will be installed, eliminating potential issues with devices being misrouted by a distributor to locations not covered under this waiver. We also require that the devices cease operating if they are removed from the indoor environment. Moreover, under existing rules, these devices are required to be labeled in a conspicuous location on the device with a statement that FCC regulations restrict the operation of the device to indoor use only.⁸⁸ These safeguards are being applied to prevent these access points from being installed outdoors and to ensure that these devices do not become publicly available in the marketplace. We note that many of the waiver conditions that we are imposing on Extreme overlap, in part, UTC's suggested conditions such as requiring a unique SKU for the access points and providing a point of contact for Extreme if any issues arise.⁸⁹ We do not believe UTC's other suggested conditions are necessary given that we are requiring that Extreme keep a record of the access point locations, that the access points be activated by Extreme's cloud-based operating system, and that the access points be disabled if they are removed from indoor sports venue where they operate. Given the conditions we are imposing, we see no reason to take the additional steps UTC suggests such as requiring Extreme to make the locations of installed devices and training material for installers available to the Commission or the public or rendering uninstalled equipment inoperable. We also do not see the utility in an explicit provision prohibiting the access points to repel inclement weather rather than requiring Extreme to place the access points in weatherproof enclosures.⁹⁰ Extreme did not ask for such relief and any such modification would violate our rules. We are also not convinced to deny the waiver by AT&T's claim that microwave licensees have no way to identify the source of interfering signals because the Commission has concluded that LPI devices operating indoors will not cause harmful interference and we believe the conditions we are imposing on this waiver will prevent these access points from being operated outdoors.⁹¹ Hence, we conclude that under this waiver with the imposed conditions, these devices will remain indoors, and incumbent operations will be sufficiently protected from harmful interference.

20. We also disagree with FWCC and AT&T that this matter should be addressed via rulemaking and not a waiver.⁹² They argue the requested waiver is too broad because the rationale would apply to all indoor sports venues rather than to an individual facility.⁹³ AT&T also contends that waivers of the weatherized-enclosure rule should be evaluated on a venue-by-venue basis because “[t]he circumstances that militate in favor—or against—grant of a waiver . . . are quintessentially venue specific” and suggests that venue-specific waivers would create a public record that would help incumbents in the 6 GHz band remediate any harmful interference.⁹⁴ The Commission has adopted rules

⁸⁸ 47 CFR § 15.403.

⁸⁹ UTC Reply at 4-5.

⁹⁰ *Id.*

⁹¹ AT&T Comments at 2; *6 GHz Report and Order*, 35 FCC Rcd at 3888-92, para. 96-111.

⁹² FWCC Reply at 1 (arguing that the Waiver Request should be denied because “Extreme’s request is a petition for rulemaking masquerading as a waiver request” and it “seeks wholesale changes to the underlying rule that would eviscerate the rule’s purpose”); *id.* at 3 (arguing that the Commission “cannot rewrite its rules now under the guise of a waiver request”); AT&T Reply at 4 (arguing that the Waiver Request “is so broad that the relief requested should be contemplated only in a rulemaking of general applicability and not in a waiver request”).

⁹³ AT&T Reply at 4-6; *see* FWCC Reply at 3 (noting the Waiver Request would possibly apply to numerous indoor sports venues). FWCC also notes that the rationale for the waiver could extend to other types of indoor venues (e.g., concert venues and conference centers). FWCC Reply at 3.

⁹⁴ AT&T Reply at 4-5.

to ensure that low-power indoor access points are only used indoors to protect fixed service incumbents in the 6 GHz band, which all parties opposing the waiver recognize.⁹⁵ The Commission's rules impose numerous technical requirements on low-power indoor access points to protect incumbent services.⁹⁶ These protections remain. This waiver is limited in scope to a single manufacturer and only permits Extreme to market weatherized low-power indoor access points that operate in the 6 GHz band to large indoor sports venues that are used for a professional team or that have a seating capacity of more than 3,000 persons. The waiver is also subject to various other conditions, which are specifically designed to ensure that these devices will remain indoors and that incumbent operations will be sufficiently protected from harmful interference. We do not waive any other Commission rules pertaining to low-power indoor access point devices. Save the provision we waive herein, all other rules remain and apply to Extreme's devices. As the Commission determined the technical parameters associated with low-power indoor access point devices operating in the 6 GHz band are sufficient to protect incumbent services,⁹⁷ we do not find merit that additional limitations on the deployment of low-power indoor access points for indoor sports venues is now appropriate. A waiver is appropriate in this instance as it is narrowly focused on specific devices to be installed at very specific locations and does not implicate the entire universe of low-power access points nor the entire universe of locations where such devices can be installed. Thus, under this limited scope, we believe that a waiver is the proper vehicle for permitting this use as opposed to permitting low-power indoor access points to be more generally protected by weatherized enclosures.

21. We consider all waivers independently and on their individual merits on a case-by-case basis. Hence, this waiver is not recommended to be read as a pre-decided outcome for any other waiver request, as a blanket waiver, or to signal any policy shift for the future. Despite commenters' suggestion that by granting this waiver we would create an incentive for other manufacturers to seek additional low-power indoor APs to be weatherized,⁹⁸ non-existing, future waivers are not before us. We will continue to follow the well-established Commission procedures to address ongoing issues pertaining to the effective use of spectrum and other relevant spectrum-related issues. In granting this waiver, we are not making wholesale changes to the regulatory regime for low-power indoor access point devices.

22. In conclusion, approval of the waiver for low-power indoor access points in indoor sports venues presents the type of particular facts that would make strict compliance with the weatherized-enclosure rule inconsistent with the public interest. This waiver will protect these devices against damage from routine venue cleaning operations, including pressure washing, and spills and other wear and tear from sports fans while operating indoors in stadiums.⁹⁹ The access points must comply with all other relevant technical restrictions applicable to low-power indoor access points, including power limits, use of the contention-based protocol, employing integrated antennas, restriction to only operate indoors, and channel bandwidth limitations as required in section 15.407.¹⁰⁰ Extreme's access points will also comply with all the other requirements of section 15.403, which include the requirements for the access points to have integrated antennas and not use battery power.¹⁰¹ Therefore, we find that these devices will not increase the potential for harmful interference to 6 GHz band licensed users and grant this waiver subject to the following conditions:

⁹⁵ AT&T Comments at 1-2; UTC Reply 1-2; FWCC Reply at 2-3.

⁹⁶ *6 GHz Report and Order*, 35 FCC Rcd at [insert page numbers], paras. 96-173.

⁹⁷ *Id.*

⁹⁸ *See, e.g.*, AT&T Reply at 4.

⁹⁹ This grant is not a blanket waiver of the definition of indoor access points but rather a narrow waiver of the requirement of prohibition of weatherized enclosures for low-power indoor access points in indoor sports venues.

¹⁰⁰ 47 CFR § 15.407.

¹⁰¹ 47 CFR § 15.403.

- 1) Extreme's Sports Venue Indoor Access Point shall be certified by the Commission via an accredited Telecommunication Certification Body, and the certification application shall include a copy of this waiver order;
- 2) The Sports Venue Indoor Access Points shall bear a unique stock keeping unit (SKU) identifier to distinguish these devices from any other Extreme devices that are not subject to this waiver;
- 3) The Sports Venue Indoor Access Points shall be installed only within indoor sports venues¹⁰² and must otherwise operate pursuant to low-power access point rules and policies;
- 4) The Sports Venue Indoor Access Point shall not operate in any outdoor locations, such as in the stands of a stadium with a retractable roof, or in any outdoor areas associated with an indoor stadium;
- 5) The deployment of the Sports Venue Indoor Access Point is restricted to indoor sports venues that are used for a professional team or that have a seating capacity of more than 3,000 persons;
- 6) Once the Sports Venue Indoor Access Points are deployed, they must be activated by Extreme Networks via its cloud-based operating system;
- 7) If a Sports Venue Indoor Access Point is removed from the indoor sports venue, the Access Point shall cease to operate;
- 8) Extreme shall be responsible for the manufacturing, distribution, sales, and installation of Sports Venue Indoor Access Points, and Extreme shall ship each Sports Venue Indoor Access Point directly to the relevant venue;
- 9) The Sports Venue Indoor Access Point shall be installed by a qualified professional trained by Extreme, and it shall be affixed in a manner reasonably calculated to prevent removal and reinstallation elsewhere except by Extreme or its agent; and
- 10) Extreme shall keep a record of devices at each location where they are installed and maintain a point of contact to address and resolve, as appropriate, any issues that may arise at any venue where the Sports Venue Indoor Access Points are installed. Parties can contact Extreme at Compliancerequest@extremenetworks.com or 919-595-4928.

IV. ORDERING CLAUSES

23. Accordingly, IT IS ORDERED that, pursuant to sections 4(i), 302, 303(e), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 302a, 303(e), 303(r), and sections 0.31, 0.241, and 1.3 of the Commission's rules, 47 CFR §§ 0.31, 0.241, 1.3, the Request for Waiver filed by Extreme Networks IS GRANTED, consistent with the terms of this Order.

24. IT IS FURTHER ORDERED that, pursuant to section 1.102(b) of the Commission's rules, 47 CFR § 1.102(b), this Order SHALL BE EFFECTIVE upon release.

¹⁰² For the purposes of this waiver, indoor sports venues is defined as "enclosed buildings, rather than [those] having an open or retractable roof." Extreme Waiver Request at 4.

25. IT IS FURTHER ORDERED that, if no petitions for reconsideration or applications for review are timely filed, this proceeding SHALL BE TERMINATED and the docket CLOSED.

FEDERAL COMMUNICATIONS COMMISSION

Ira Keltz
Acting Chief
Office of Engineering and Technology