

FCC FACT SHEET*

Unleashing the Power of Unlicensed Ultra-Wideband Devices

Notice of Proposed Rulemaking – ET Docket No. 26-245

Background: With its high data rates, precise location capabilities, and low-power operation across spectrum shared with other services, unlicensed UWB devices play an important role within the larger unlicensed device ecosystem. In addition to providing very high data rate communications, UWB devices also function as imaging systems providing ground penetrating radars for surveyors and construction companies, through-wall capabilities for public safety entities, and medical diagnostics for doctors. UWB devices also enable key fobs for locking and unlocking cars, provide secure access via UWB ranging for modern doors locks for homes and businesses, property tags used to track valuable items, and sports tags that track real-time location of all players and the ball at sporting events. While the scope and ubiquity of UWB devices have grown exponentially in the time since the rules were first adopted in 2002, the Commission has not, until now, undertaken a comprehensive review of these rules. This Notice of Proposed Rulemaking (NPRM) proposes changes that will modernize the UWB device rules to support uses that had not been anticipated nearly a quarter century ago, address matters that have been subject to recurring petitions for rule waiver and address pending requests from the UWB manufacturing community to revisit our UWB rules. The proposals in this NPRM are designed to spur further innovation and promote economic growth while continuing UWB’s longstanding legacy of protecting incumbent users and services.

What the Notice of Proposed Rulemaking Would Do:

- Propose to update the definition of an UWB transmitter to accommodate additional modulation types.
- Propose to modernize the UWB device measurement procedures.
- Propose a new UWB device category capable of supporting modern UWB use cases including factory automation, autonomous navigation, and AI-enabled sensing and seek comment on appropriate technical parameters.
- Propose to eliminate the written coordination requirement for UWB imaging systems.
- Seek comment on existing prohibitions on UWB use in toys, ships, aircraft, and satellites, including opportunities to facilitate UWB-based drone operations.
- Seek comment on updating rules pertaining to ground penetrating radar (GPR) devices.
- Seek comment on updating UWB technical requirements such as emission limits, duty cycle restrictions, and antenna requirements.
- Seek comment on modifying remote or manually controlled switch rules.
- Seek comment on removing or consolidating redundant rules, marketing, eligibility and labeling requirements.

* This document is being released as part of a “permit-but-disclose” proceeding. Any presentations or views on the subject expressed to the Commission or its staff, including by email, must be filed in ET Docket No. 26-245, which may be accessed via the Electronic Comment Filing System (<https://www.fcc.gov/ecfs/>). Before filing, participants should familiarize themselves with the Commission’s *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. See 47 CFR § 1.1200 *et seq.*

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

In the Matter of	
Unleashing the Power of Unlicensed Ultra-Wideband Devices	ET Docket No. 26-245
Petition of Robert Bosch LLC for Amendment of the Part 15 Subpart F Ultra-Wideband Rules	RM-11844
Petition of Alliance for Automotive Innovation et al. to Amend Part 15 of the FCC’s Rules to Permit the Operation of Certain Ultra-Wideband Devices	RM-12014

NOTICE OF PROPOSED RULEMAKING*

Adopted: [] Released: []

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Reply Comment Date: [60 days from publication in the Federal Register]

By the Commission:

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* This document has been circulated for tentative consideration by the Commission at its September 30, 2026 open meeting. The issues referenced in this document and the Commission’s ultimate resolutions of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public’s ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The Commission’s ex parte rules apply and presentations are subject to “permit-but-disclose” ex parte rules. See, e.g., 47 CFR §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission’s ex parte rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. See 47 CFR §§ 1.1200(a), 1.1203.

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I. INTRODUCTION

1. In the time since the first Ultra-Wideband (UWB) device rules were adopted in 2002, UWB technology has become entrenched in our day-to-day activities.¹ Its unique combination of wide bandwidth and very low power allows UWB devices to deliver high data rates across spectrum already used by other services—both federal and non-federal—without causing harmful interference. Since the U.S. adopted the first-of-its-kind UWB rules in 2002, its uses and applications have expanded far beyond what was originally envisioned. Today, businesses and consumers rely on UWB devices to tag and track property, enable factory and home automation, and provide keyless door entry and precision indoor navigation. Professional athletes use UWB devices to track performance and improve their game.² Medical professionals use UWB, including systems with AI-enhanced processing, for real-time, non-invasive health monitoring and to conduct unobtrusive patient assessment in both clinical and home settings.³ Finally, UWB devices enhance public safety by enabling through-wall imaging for tactical teams to visualize the interior of a room in real-time before entering it and for safety teams to conduct non-invasive structure inspections.

2. When the rules were first adopted, UWB was a nascent technology that has now flourished into an industry worth billions of dollars. However, as UWB evolved, the technology has outpaced our rules necessitating stream of waivers to enable the latest devices to perform functions that could not be envisioned in 2002. This surge in waiver requests was also documented by the Commerce Spectrum Management Advisory Committee (CSMAC) in its 2022 report.⁴ The time is now ripe to re-examine our rules to keep pace with industry developments, enable future improvements, and provide even greater flexibility for UWB operations. With this NPRM, we endeavor to further spur American innovation to pave the way for continued evolution of UWB technology for decades to come. We seek

¹ *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, First Report and Order, 17 FCC Rcd 7435 (2002) (*First R&O*).

² See FiRa Consortium, *How Ultrawideband is Tackling Sports*, (2024), <https://www.firaconsortium.org/resource-hub/blog/how-ultrawideband-is-tackling-sports> (describing how the National Football League uses UWB-enabled tags and a network of stadium receivers to track player and ball movement in real time with centimeter-level accuracy).

³ See *Massachusetts Institute of Technology Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 19-89, Order, 35 FCC Rcd 4389 (2020). See also, Gianluigi Tiberi et al., *Ultra-Wideband (UWB) Systems in Biomedical Sensing, Sensors*, vol. 22, no. 12, (2022) <https://www.mdpi.com/1424-8220/22/12/4403> (last visited May 20, 2026).

⁴ CSMAC is an advisory committee of the Commerce Department composed of outside experts from industry and academia. See CSMAC UWB Subcommittee Report at 11 (2022), [CSMAC UWB Subcommittee Findings and Actionable Recommendations](#).

comment on rule changes designed to unleash additional innovation and deliver more applications to benefit American businesses and consumers while continuing to protect incumbent spectrum users.

II. BACKGROUND

3. UWB is a unique and powerful technology in the arsenal of radio applications that operate on an unlicensed basis.⁵ Designed to operate at very low power, UWB uses extremely wide radio channels (typically 500 megahertz or more) and can determine both distance and direction over a short range with more precise accuracy than narrowband unlicensed technologies, such as Wi-Fi and Bluetooth.

4. Like all devices operating under the part 15 rules, UWB systems operate on a non-interference basis, i.e., they share radio spectrum with authorized radio services, may not cause harmful interference, and must accept any interference they receive.⁶ However, UWB devices can operate across restricted frequency bands that other unlicensed devices may not use. This is because UWB operates with a “light touch” on any particular frequency at any given time due to UWB’s combination of low power operation across wide swaths of bandwidth; this, in turn, mitigates the risk that UWB devices can cause harmful interference to incumbent users, including those providing critical services.⁷

5. Subpart F of our part 15 rules governs operation of UWB transmitters.⁸ Currently, the rules are structured to support specific categories of UWB operations—ground penetrating radars, wall imaging systems, through-wall imaging systems, surveillance systems, medical imaging systems, indoor UWB systems, and handheld UWB systems. For each of these applications, the rules specify technical requirements, including the frequency bands over which the UWB device may operate, any application-specific bandwidth limits, and radiated emission limits that vary by frequency band.⁹ In addition, each type of device is subject to operational restrictions, such as limits on the types of operation permitted and the entities that are permitted to use the device.¹⁰ UWB devices may not be operated on board aircraft, ships or satellites. The rules prohibit employment for the operation of toys, but do not provide any guidance on what qualifies as a toy.¹¹ The Commission codified these UWB rules in a deliberate and cautious manner to ensure that the framework supported what was known at that time about UWB device characteristics, to take extremely protective steps to guard incumbent operations against harmful

⁵ The Commission has maintained rules governing unlicensed operation of certain types of radiofrequency devices, such as receivers and low power transmitters, for more than 80 years. The first rules governing unlicensed operation of radiofrequency devices were established in 1938. *See Proposed Rules and Regulations Governing the Operation of Low Power Radio Frequency Devices*, Docket No. 5335, 3 Fed. Reg. 2999 (Dec. 14, 1938). This category of authorization is also referred to as “non-licensed” and, in other jurisdictions (e.g., Europe), as “license-exempt” use.

⁶ Part 15 establishes technical requirements for two main types of radiofrequency devices: intentional radiators, which deliberately generate and emit RF energy, and unintentional radiators, which generate RF energy as part of their operation but are not intended to emit it. 47 CFR § 15.3(o), (z). *See also*, 47 CFR § 15.503(d) (defining the term “Ultra-wideband (UWB) transmitter” as “[a]n intentional radiator”).

⁷ Due to this emission profile, UWB devices are not subject to the restricted band limits that apply to most other intentional radiators. 47 CFR § 15.205(d)(6). Thus, UWB devices can potentially operate over wider bandwidths than devices operating under the section 15.209 general emission limits for unlicensed intentional radiators.

⁸ 47 CFR pt. 15, subpt. F.

⁹ 47 CFR §§ 15.509-15.519.

¹⁰ For example, ground penetrating radars and wall imaging systems may only be operated for purposes associated with law enforcement, firefighting, emergency rescue, scientific research, commercial mining, or construction. 47 CFR § 15.509(b). In addition, parties that operate this equipment must be eligible for licensing under part 90 of the Commission’s rules, although no license is required to operate UWB equipment under part 15 of the rules.

¹¹ 47 CFR § 15.521(a).

interference, and to limit an excessive proliferation of UWB devices that nearly a quarter century ago were considered to be new and novel.¹²

6. The evolution of UWB spans decades, beginning with the Commission's 1998 Notice of Inquiry.¹³ Based on the robust record developed in response, the Commission issued a Notice of Proposed Rulemaking (NPRM) concluding that UWB devices offer substantial public interest benefits, while recognizing that additional testing and analysis were necessary to fully assess potential interference risks.¹⁴ The NPRM proposed establishing appropriate definitions, operating parameters, emission limits, and measurement procedures to enable low-power UWB systems to operate under Part 15 while ensuring protection of incumbent services. During the proceeding National Telecommunication and Information Administration (NTIA) and other federal agencies were concerned about the aggregate interference and the potential for raising the noise floor level stemming from the UWB operations. Joint testing by both the Commission and the NTIA were conducted to address those concerns that led to the adoption of the rules.¹⁵

7. The first UWB rules were adopted in February 2002, when the Commission permitted the marketing and operation of a range of UWB devices, including imaging systems, vehicular radars, and indoor and outdoor communication devices.¹⁶ Subsequent orders made further modifications to the rules, but did not fundamentally alter the structure of part 15, subpart F nor the cautious approach the Commission had taken when permitting the first UWB operations.¹⁷ Over the past 24 years,

¹² *First R&O*, 17 FCC Rcd at 7437, 7460, 7525, paras. 2, 67, 269.

¹³ *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Notice of Inquiry, 13 FCC Rcd 16376 (1998) (UWB NOI). The NOI recognized UWB's potential for high-precision radar, imaging, and low-power communications but noted that existing Part 15 technical limits and measurement procedures posed challenges for such wideband signals. The Commission sought comment on UWB applications, emission characteristics, regulatory treatment, measurement methods, and whether UWB operations could be accommodated in restricted or TV broadcast bands.

¹⁴ *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Notice of Proposed Rulemaking, 15 FCC Rcd 12086 (2000) (UWB NPRM). The record showed that the existing Part 15 framework created significant barriers, including prohibitions on emissions in restricted and TV bands and measurement procedures designed for narrowband systems rather than impulse-based waveforms. The Commission also received multiple waiver requests for early UWB systems, underscoring both interest in the technology and the need for a consistent regulatory approach.

¹⁵ NTIA Comments on the Revision of Part 15 of the Commission's Rules Regarding Ultrawideband Transmission Systems," ET Docket 98-153, Sept. 12, 2000 (available at [NTIA Comments on Revision of Part 15 of the Commission's Regarding Ultrawideband Transmission Systems | National Telecommunications and Information Administration](#)) and "Testimony of Michael D. Gallagher, Deputy Assistant Secretary for Communications and Information, National Telecommunications and Information Administrator, Department of Commerce," to the House Committee on Energy and Commerce, Subcommittee on Telecommunications and the Internet, June 5, 2002 (available at [Testimony of Deputy Assistant Secretary Gallagher on the FCC's UWB Proceeding: An Examination of the Government's Spectrum Management Process | National Telecommunications and Information Administration](#)).

¹⁶ *First R&O*, 17 FCC Rcd at 7436, 7437-38, paras. 1, 5. Imaging systems consist of ground penetrating radars (GPRs), wall imaging systems, through-wall imaging systems, surveillance systems, and medical imaging systems. See 47 CFR. § 15.503(e). GPRs are radar devices that are designed to obtain the images of buried objects or to determine the physical properties within the ground. 47 CFR. § 15.503(f). Wall imaging systems are functionally identical to GPRs except that they are used to detect these features within walls or ceilings. 47 CFR. § 15.503(h).

¹⁷ See, e.g., *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, Order, 17 FCC Rcd 13522, 13523-26, paras. 5-15 (OET 2002) (clarifying operator eligibility for UWB imaging systems, establishing a blanket waiver procedure governing GPRs and wall imaging systems purchased before Oct. 15, 2002, and establishing a coordination procedure); Second Report and Order and Second Memorandum Opinion and Order, 19 FCC Rcd 24558, 24559 and 24564, paras. 1 and 13 (2004) (expressly noting that it was amending the general part 15 rules, rather than the UWB-specific rules, because it was "reluctant to change the existing UWB rules until [it had] more experience with UWB devices." and stating that "UWB devices

manufacturers have developed new and innovative applications, and the technology has likewise evolved to incorporate a wider variety of waveforms than had been accounted for when the rules were first adopted. Today's UWB devices can be designed to employ a number of different modulation types. They can transmit very short, low-power pulses.¹⁸ They can also use chirp signals that sweep rapidly across the band.¹⁹ They may also employ stepped frequency or swept band techniques that move across portions of the spectrum in quick succession.²⁰ As a result, the Commission has received numerous requests for waivers of the UWB rules to support these types of devices and applications.²¹

8. On June 18, 2019, Robert Bosch LLC filed a Petition for Rulemaking requesting that the Commission modernize the UWB rules.²² Bosch argued that the 2002 framework had been intentionally conservative and no longer reflected how modern UWB devices were designed, measured, or used, resulting in most contemporary UWB products requiring waivers for certification.²³ It further stated that more than a decade of operational experience, the absence of interference complaints, and advances in mitigation techniques demonstrated that the rules could be updated while maintaining protection for federal and non-federal incumbents.²⁴ The Bosch Petition also pointed to more flexible international UWB regulations and urged greater harmonization to support innovation and global manufacturing.²⁵ Twenty-four parties filed comments and four parties made *ex parte* filings addressing the petition.²⁶

9. More recently, on December 18, 2025, the Alliance for Automotive Innovation, the Car Connectivity Consortium, the FiRa Consortium, Profibus & Profinet International / omlox, and the Ultra-Wideband Alliance (collectively, the Joint Petitioners) filed a Petition for Rulemaking seeking

for consumer applications have not yet been placed on the market and, thus, we still have not gained the desired experience with these devices that we believe is necessary before it would be appropriate to consider whether the standards should be relaxed"); Third Memorandum Opinion and Order and Memorandum Opinion and Order, 25 FCC Red 11390 paras. 29 and 45 (2010) (reaffirming the Commission's cautious approach).

¹⁸ See, e.g., F. Sabath, E.L. Mokole & S.N. Samaddar, *Definition and Classification of Ultra-Wideband Signals and Devices*, Radio Science Bulletin, No. 313, at 12–26 (2005) (observing that UWB systems employ a range of waveform generation methods).

¹⁹ *Id.*

²⁰ *Id.*

²¹ See, e.g., *Petition of Alliance for Automotive Innovation et al. to Amend Part 15 of the FCC's Rules to Permit the Operation of Certain Ultra-Wideband Devices*, RM-12014, at 10 & n.23 (filed Dec. 18, 2025) (listing examples of waivers of the UWB part 15 rules) (Joint Petition); *Petition of Robert Bosch LLC for Amendment of the Part 15 Subpart F Ultra-Wideband Rules*, RM-11844, at 9–10, 25–26 (filed June 18, 2019) (Bosch Petition) (characterizing the Commission as regulating UWB devices primarily by waiver and noting that “[v]irtually all UWB devices” approved for sale have required individual waivers).

²² Bosch Petition. See also Consumer and Governmental Affairs Bureau, Reference Information Center, Petition for Rulemakings Filed, Report No. 3130 (CGB July 18, 2019) (inviting comment on the petition).

²³ Bosch Petition at 9–10.

²⁴ *Id.* at 4–6.

²⁵ *Id.* at 26–43 (proposing, *inter alia*, revisions to the minimum UWB bandwidth definition, updated measurement procedures to allow devices to be tested in their normal operating modes, expanded and modernized definitions for imaging, material-sensing, and surveillance systems, and more flexible provisions for outdoor, vehicular, industrial, and commercial UWB applications, and asserting that adopting such updates would reduce reliance on waivers, support the introduction of innovative UWB technologies, and align the Commission's rules with contemporary global standards).

²⁶ The Commission also received and denied a request to extend the filing date, although the applicant ultimately submitted timely filed comments. See *Amendment of Rules Governing Ultra-Wideband Devices and Systems*, Order, RM-11844, (OET 2019).

targeted updates to the UWB rules.²⁷ The Joint Petitioners asserted that the Commission's UWB framework, largely unchanged for more than two decades, no longer reflects current UWB technologies, deployment environments, or global regulatory developments.²⁸ They contended that outdated definitional, operational, and equipment-classification provisions routinely necessitated waivers for low-power UWB devices that operated similarly to existing authorized systems and posed no greater interference risk.²⁹ The Commission placed the petition on Public Notice which resulted in eight parties filing comments and one party filing an *ex parte* comment.³⁰

10. In consideration of the evolving uses for and importance of UWB applications, recognizing the rulemaking petitions that have been filed and the large portfolio of UWB waiver applications that we have fielded to date, and considering the amount of time since we last comprehensively evaluated our UWB rules, we initiate this rulemaking proceeding.

III. DISCUSSION

11. In this Notice of Proposed Rulemaking, we undertake a comprehensive review of our UWB framework to ensure that the rules are optimized to keep pace with modern technologies, deployment environments, and advances in UWB modalities. Specifically, we propose to modify technical rules and requirements that appear to be ill-suited for the expanded scope and breadth of today's UWB devices and that warrant a fresh look considering the long span of time since their adoption. Second, we propose to create a new UWB device category to enable certification of the emerging class of location-sensing devices that have heretofore only been brought to market after completing time-consuming and increasingly repetitive rule waiver proceedings. We also explore whether to establish a new class for AI-enabled UWB sensing applications. Finally, we examine all existing UWB device categories to determine whether their technical, operational, eligibility, labeling, and emission related provisions remain necessary, and we seek comment on potential updates, including consolidating, simplifying, or removing redundant rules to ensure that the UWB framework remains clear, technically justified, and capable of supporting future innovation while continuing to protect incumbent services.

A. Modernizing Technical Rules and Requirements

1. UWB Transmitter Definition

12. Our rules define a "UWB transmitter" as "[a]n intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth."³¹ In adopting the UWB rules in 2002, the Commission recognized that this definition was likely to preclude certain types of modulations, such as swept frequency (e.g., Frequency Modulated Continuous Wave (FMCW)), stepped frequency, or

²⁷ *Joint Petition* at 1. The Joint Petition requests that the Commission amend the part 15 UWB rules to: (1) remove the "at any point in time" language from the UWB transmitter definition in § 15.503(d); (2) add a definition of "fixed outdoor infrastructure" to clarify the types of UWB uses that are prohibited under § 15.519; (3) revise § 15.519 by replacing the term "hand held" with "short-range" to include non-fixed, affixed, and vehicle-mounted UWB devices; (4) allow a duty-cycle-based alternative to the ten-second acknowledgment requirement in § 15.519(a)(1); and (5) eliminate the prohibition on UWB in toys and permit UWB operation aboard vessels on inland waters. *Id.* at 7-8, Appx. B.

²⁸ *Id.* at 8-14.

²⁹ *See id.* at 5-6, 10-12.

³⁰ *See Office of Engineering and Technology Seeks Comment on Ultra-Wideband Device Petition for Rulemaking*, Public Notice, DA 25-1099 (OET 2025) (seeking comment on the petition).

³¹ 47 CFR §15.503(d). Fractional bandwidth is the ratio of a systems bandwidth to its center frequency. 47 CFR §15.503(c).

frequency hopping systems, noting that no measurement procedure had been proposed, nor had the interference potential of such devices been analyzed.³²

13. The Commission's original "at any point in time" bandwidth requirement no longer accurately reflects how modern UWB systems operate. Petitioners explain that although many modern UWB devices are designed to meet the underlying bandwidth requirement, they do not satisfy it at all points in time, which results in them failing to meet the UWB transmitter definition.³³ Moreover, devices that are purposely designed to improve the operational environment—such as a UWB device that is "notched" to avoid a particular frequency segment—might no longer comply with the "at any point in time" requirement.³⁴ As a result, devices that function like UWB systems in practice but that generate individual pulses that fall outside of the defined bandwidth requirement, even momentarily, are excluded from the UWB category and must seek a waiver of the Commission's rules to operate.³⁵ We believe that the "at any point in time" requirement serves as an unnecessary impediment to developing and deploying new UWB applications. As both the Joint Petitioners and Bosch note, the Commission has granted many such waivers, consistently finding that it would not undermine the purpose of the rule because waiving the "at any point in time" requirement for such devices has not been shown to increase the potential for harmful interference to authorized services.³⁶ We specifically note here that we have consistently found that stepped and swept frequency devices have a difficult time meeting the definition and other technical rules because the large bandwidth achieved by stepping or sweeping a narrow signal through the broader frequency range won't be instantaneously wide enough to meet the rules' specific requirements.³⁷ Making this rule change will remove the requirement that has hindered the development and deployment of this technology. Therefore, we tentatively conclude that we should update the UWB transmitter definition to remove the "at any point in time" requirement, essentially codifying the numerous granted waivers, to better accommodate popular UWB methodologies, such as frequency hopping, stepped frequency, swept frequency, and other time-varying waveforms that momentarily fall outside of the instantaneous bandwidth threshold — which is 500 MHz at all times ("at any point in time") for UWB

³² *First R&O*, 17 FCC Rcd at 7450, para. 32. When adopting this definition in 2002, the Commission considered alternatives, including different fractional bandwidths, relaxed minimum bandwidth, and eliminating restrictions on fractional and minimum bandwidth requirement altogether. *Id.* at 7446, para. 22 (describing how the Commission had proposed to define UWB as any device with a fractional bandwidth greater than 0.25 or occupying at least 1.5 GHz, using -10 dB emission points to calculate bandwidth because -20 dB measurements are often impractical for low-power part 15 devices).

³³ Joint Petition at 14; *see also* Bosch Petition at 19-33 (proposing modifications to the definitional language).

³⁴ *GPR, Inc. Request for Waiver of the Commission's Part 15 Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 19-241, Order, 38 FCC Rcd 10376, 10380-81, paras. 15-16 (OET 2023) (finding that a GPR device that incorporated a notch filter to block the 322-335.4 MHz portion of the 137-400 MHz band to reduce the likelihood of harmful interference to aeronautical and radio astronomy services resulted in an upper frequency segment that if considered independently would not comply with the rule's fractional bandwidth limit).

³⁵ Joint Petition at 14-15; *see also* Bosch Petition at 20-32.

³⁶ Joint Petition at 14-15; Bosch Petition at 14-24.

³⁷ *See, e.g., Liberty Defense Holdings, Ltd. d/b/a Liberty Defense Technologies*, Order ET Docket 19-217, 27 FCC Rcd 1241, 1243-44, paras. 7-8, fn 17 (OET 2022) (Liberty waiver); *Robert Bosh LLC Request for waiver of Section 15.503(d), 15.503(h), and 15.521(d) of the Commission's Rules*, ET Docket 20-268, 37 FCC Rcd 21 (OET 2022); *Curtiss-Wright Controls Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, DA 12-41 (OET 2012) (CWCI Waiver); *Proceq USA Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, DA 18-251 (OET 2018) (Proceq Waiver); *Kyma Medical Technologies Ltd., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*; *Request for Modification by Zoll Medical Israel Ltd.*, Letter Order, DA 19-742 (OET 2019); *Sensible Medical Innovations Ltd., Request for Waiver of Part 15 Ultra-Wideband Rules for a Medical Imaging System*, Order, DA 19-937 (OET 2019).

devices,³⁸ as well as to reduce the burdens associated with the existing waiver process necessary to authorize such devices. We seek comment on our tentative conclusion. Would removing this “at any point in time” requirement reduce or eliminate the need for the Commission to issue waivers for devices that demonstrate UWB-like performance and have low interference potential but do not satisfy the instantaneous bandwidth threshold under the existing definition? What are the impacts on device design and the ability of devices to avoid causing harmful interference if we eliminate the “any point in time” requirement? To ensure that the Commission has an adequate record for making decisions about the future of UWB devices, and to minimize the potential for harmful impact to incumbent licensees, we request technical analysis and coexistence studies that are in line with the Commission’s goals of promoting efficient use of spectrum.³⁹ In evaluating revisions to the UWB transmitter definition, we emphasize that any updated definitions or measurement procedures must include sufficient technical detail to support robust coexistence assessments with Federal systems. We also expect parties to provide technical studies explicitly showing that proposed methodologies will not increase the potential for harmful interference to Federal operations, and to ensure that certification processes preserve clear visibility into waveform characteristics essential for Federal compatibility analyses. Because modern UWB modulation techniques were not fully contemplated in 2002, we want to ensure that changes to the UWB definition or measurement framework may that alter emission characteristics are evaluated as part of this proceeding, including how such changes may correlate to instantaneous power, spectral density, temporal occupancy, aggregate emissions, and receiver susceptibility.⁴⁰

14. We seek comment on whether instantaneous bandwidths below 500 MHz could result in higher instantaneous power spectral density, and if so, whether concentrating power into a narrower bandwidth could affect incumbent service protections, including for the aeronautical radionavigation service (ARNS), radionavigation satellite service/global navigation satellite service (RNSS/GNSS), mobile satellite service (MSS), radar altimeters, and weather radars. Commenters are invited to propose related measurement procedures, as well as operational or technical limits that may be necessary to ensure continued compatibility with these authorized services. We also seek comment on how this updated UWB definition aligns with ongoing work in standards bodies, such as the IEEE, and whether those efforts should inform our approach. Finally, we seek comment on whether we would need to make any additional updates to the rules for purposes of clarity and conformity.

³⁸ Section 15.503(a) defines UWB bandwidth as the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. In addition, 15.503(d) defines a UWB transmitter as an intentional radiator with fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz. 47 CFR §15.503(a) and (d).

³⁹ See generally, *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services; Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, ET Docket Nos. 23-122 and 22-137, Policy Statement, 38 FCC Rcd 3682 (2023). The FCC’s Policy Statement outlines principles for managing spectrum more efficiently by considering both transmitters and receivers, recognizing their shared responsibility in preventing harmful interference. It emphasizes data-driven, realistic, and transparent coexistence analyses to support the introduction of new services in increasingly crowded spectrum environments. In the context of this proceeding, filings should be based on realistic operational scenarios rather than worst-case assumptions, be repeatable, reproducible, and transparent in nature, and employ appropriate quantitative models. Parties should clearly explain the implementation approach, reference link budget, and associated evaluations, with all inputs, operational considerations, technical assumptions, and parameters thoroughly defined and well described for the purpose of in-depth analysis.

⁴⁰ We note that the Institute for Telecommunication Sciences (ITS), the research and engineering arm of NTIA, is planning to test interference potentials from UWB devices to federal systems in the 7 GHz band.

2. Measurement Procedures

15. Section 15.31(c) requires swept frequency devices to be measured with the frequency sweep stopped at the frequencies selected for reporting.⁴¹ Separately, section 15.521(d) requires that when pulse gating⁴² is used, and where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval (i.e., the break between bursts is much longer than the time it takes to send the next pulse), then measurements shall be made with the pulse train gated on (i.e., ignoring the “off” period for measurement purposes).⁴³ Together, these provisions establish how UWB transmitters must be evaluated for compliance with the Commission’s radiated emission limits. Generally, devices that do not meet the radiated emission limits under the measurement procedures requirement also do not meet the UWB transmitter definition.⁴⁴

16. When the Commission adopted the UWB rules in 2002, it established technically neutral standards that allowed any modulation or technology so long as devices met the minimum bandwidth and emission limits.⁴⁵ But it also noted that no measurement procedures existed for stepped-frequency, frequency-hopping, or swept-frequency systems and that their interference characteristics had not been evaluated using measurements taken in normal operating mode.⁴⁶ In practical terms, these types of devices employ continuous, rapid transmission characteristics that make it technically difficult to stop the frequency sweep at a single point in time for measurement or to create a continuous pulse train without disrupting the device’s normal operation. In addition, the UWB devices have very low duty cycles and quickly sweep across wide swaths of frequency bands, which mitigates any potential harmful interference to licensed receivers that are designed to detect transmissions over much longer time periods. We also note that the test requirements of sections 15.31(c) and 15.521(d) are optimized for pulse-based UWB signals only. Different test configurations and methodologies are necessary to measure bandwidth for other types of UWB emissions correctly.⁴⁷ Because modern UWB devices are often designed using stepped or swept frequency or frequency hopping techniques, the current measurement procedure UWB rules have not kept up with changing technologies changes.

17. Section 15.31(c), as written, effectively prevents swept-frequency UWB devices from being certified absent a waiver, because the rule was developed with only pulse-based systems in mind. This issue first became apparent in 2004 when the Multi-band OFDM Alliance Special Interest Group (MBOA-SIG) petitioned for a waiver of the UWB measurement procedures for multiband OFDM

⁴¹ 47 CFR § 15.31(c). The rule acknowledges that different measurement procedures apply to devices operating under § 15.255 (57-71 GHz band operation) and § 15.256 (level probing radars). *Id.*

⁴² Pulse gating is a modulation technique in which transmissions are broken into short active bursts separated by a long inactive period. Gating refers to the use of burst transmissions where a transmitter is turned on and off for selected time intervals. The transmitter generally is turned off to listen for a response or to permit other transmitters to operate, such as through time division multiple access operations. *See generally* *Petition for Waiver of the Part 15 UWB Regulation Filed by the Multi-band OFDM Alliance Special Interest Group*, ET Docket No. 04-352, Order, 20 FCC Rcd 5528 (2005) (*MBOA-SIG Waiver Order 2005*).

⁴³ *See* 47 CFR § 15.521(d). Emission limits at and below 960 MHz are measured using a CISPR quasi-peak detector, while emissions above 960 MHz are measured using a Root Mean Square (RMS) average over a 1 MHz resolution bandwidth (RBW) and an averaging time of 1 millisecond or less. *Id.*

⁴⁴ *See* Bosch Petition at 28 (stating that the UWB definition requires that the minimum bandwidth be achieved ‘at any point in time’ and that pulsed emissions, frequency-hopped emissions, and swept- or stepped-frequency systems are precluded because they do not ‘at all times’ generate the required bandwidth).

⁴⁵ *See* 47 CFR § 15.503(d); *see also* *First R&O*, 17 FCC Rcd at 7450, para. 32 (stating that “as long as the transmission system complies with the fractional bandwidth or minimum bandwidth requirements at all times during its transmission, we agree that it should be permitted to operate under the UWB regulations”).

⁴⁶ *First R&O*, 17 FCC Rcd at 7450, para. 32.

⁴⁷ *See* Bosch Petition at 33.

(MB-OFDM) systems that employ a stepped or sequenced modulation operating across the 3.1–5.03 GHz and 5.65–10.6 GHz bands. MBOA-SIG explained that it was seeking relief because the existing test procedures did not apply to such a waveform, as they were designed for impulse-based UWB.⁴⁸ The MBOA-SIG demonstrated that the interference potential of frequency hopped, stepped or sequenced systems, measured in their normal operating modes, is less than that of a UWB transmitter employing impulse modulation.⁴⁹ Through simulated and real-world testing, MBOA-SIG demonstrated that MB-OFDM presented no greater interference potential than pulse-generated UWB under normal operating conditions, even with hopping or stepping active while showing compliance with the emission limits.⁵⁰ The Commission granted the requested waiver, allowing hopped, stepped, sequenced, and gated UWB devices to be measured in their normal operating mode, finding that this approach did not increase interference risk and would facilitate deployment of new UWB technologies, while also noting its intent to codify the provisions of this rulemaking “at an appropriate time in the future.”⁵¹ In subsequent proceedings, the Commission reaffirmed that decision and validated the reasoning underpinning the MBOA-SIG determination, concluding that any requirement to stop the frequency hopping, band sequencing, or system gating would only serve to add another unnecessary level of conservatism to already stringent UWB standards and that measuring stepped frequency systems with the stepping function active did not increase interference potential when all emission limits and technical requirements were met, while never codifying the rules as it always intended.⁵²

18. In light of the Commission’s intent since 2005 to codify the provisions of the MBOA-SIG waiver and the experience gained since that time, we propose to update the UWB rules to reflect the reality that modern UWB devices use a variety of waveforms that cannot easily be measured under the current procedures or where taking such measurements under those procedures would hinder the devices’ utility. The record of waivers spanning different UWB applications shows that applicants have repeatedly been able to demonstrate good cause for not applying the originally adopted measurement procedures and that, in doing so, applicants have shown that their devices do not undermine the purpose of the rule, i.e., to enable UWB devices to operate without causing harmful interference to authorized licensees.

19. We propose to update the UWB measurement procedures by making targeted changes to how they apply to UWB devices. First, we propose adding section 15.31(c) to the list of provisions in

⁴⁸ Request for Waiver of Measurement Procedures for OFDM Ultrawideband Devices, ET Docket No. 04-352, (filed Sept. 8, 2004), <https://www.fcc.gov/ecfs/document/5511636093/1> (*MBOA-SIG Petition for Waiver*). See also *MBOA-SIG Waiver Order 2005*, 20 FCC Rcd 5528 (2005) (describing the waiver request and providing additional background information). Impulse-Radio Ultra-Wideband technology operates by transmitting extremely short, very low-power pulses that spread across a wide range of frequencies. These pulses are characterized by sharp rise and fall times. See EverythingRF, *What Is Impulse Radio Ultra-Wideband (IR-UWB) Radar Technology*, www.everythingrf.com/community/what-is-impulse-radio-ultra-wideband-ir-uwband-radar-technology (last visited May 18, 2026). See also *Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems*, FCC 10-151, Third Memorandum Opinion and Order and Memorandum Opinion and Order, 25 FCC Rcd 11390, 11396 at para. 15, fn. 33 (UWB Third R&O) (stating that “[t]he MB-OFDM modulation employed by the MBOA-SIG equipment can be described interchangeably as hopped, stepped or sequenced”).

⁴⁹ *MBOA-SIG Waiver Order 2005*, 20 FCC Rcd at 5533-34 para. 13. (noting that “any requirement to stop the frequency hop or band sequencing or system gating serves only to add another unnecessary level of conservatism”).

⁵⁰ *Id.*, 20 FCC Rcd at 5529 and 5531-32, paras. 3 and 8-9. Actual testing was performed using a C-band earth station receiver for the Fixed Satellite Service (“FSS”). *Id.*, 20 FCC Rcd at 5533, para. 12 n. 38. Interference testing indicated that the MB-OFDM emitter had to be located within 20 feet of the C-band earth station antenna. See, e.g., *MBOA-SIG Petition for Waiver* at 8-9; Philips Comments at 13-14; and MBOA-SIG Reply Comments at 4-5, 9-10, Attachs. A, C (filed Oct. 21, 2004).

⁵¹ *MBOA-SIG Waiver Order 2005*, 20 FCC Rcd 5536, para. 19 (specifically noting an intent to codify the provisions of the waiver).

⁵² See, e.g., UWB Third R&O, 25 FCC Rcd at 11396, 11399, and 11400-01, paras. 15, 24, and 27–29; CWCI Waiver, 27 FCC Rcd at 242, para. 22; Liberty Waiver, 37 FCC Rcd at 1244, para. 10.

section 15.505(a) that do not apply to UWB devices. Because section 15.31(c) applies broadly to unlicensed part 15 devices, exempting UWB devices from this provision would reduce unnecessary waiver requests, improve regulatory certainty, and better align our procedures with the operation of contemporary swept-frequency UWB devices. Second, we propose modifying section 15.521(d) to specify that, if pulse gating is employed, measurements may be made in normal operating mode, thereby eliminating the need for the hop, step, or sequenced function to be stopped. This will similarly enable these frequency modulation devices to be certified without requiring a waiver. We believe that these modifications would improve clarity, flexibility, and regulatory certainty for manufacturers, while maintaining appropriate protections for incumbent licensees and federal users.

20. We seek comment on these proposals. Would any of the approaches, i.e. exempting UWB devices from requiring compliance with section 15.31(c) and measuring UWB devices employing pulse gating in their normal operating mode during compliance testing, undesirably alter the interference potential of UWB devices such as by increasing the aggregate noise floor levels and affecting coexistence with incumbent services? We seek comment on whether any current certification and technical standards, such as those developed by IEEE or other standards bodies, provide measurement methodologies that should inform our approach. We also seek comment on whether there may be alternative approaches the Commission should consider that would better achieve these objectives while maintaining appropriate protections for authorized services. Additionally, we seek comment on how the Commission's measurement procedures should account for modern modulation techniques that fall outside the traditional UWB framework, and whether we should adopt a more modulation-agnostic measurement methodology that better aligns with the diverse range of contemporary UWB architectures while ensuring the continued protection of authorized services. Lastly, we request parties to provide technical studies demonstrating that the proposed measurement procedures would accurately and comprehensively assess the operational conditions of the device and reliably provide protection to Federal systems.

3. Scope of Use

21. Section 15.521(a) provides that "UWB devices may not be employed for the operation of toys."⁵³ In addition, "[o]peration onboard an aircraft, a ship or a satellite is prohibited."⁵⁴ When adopting the prohibition on the use of UWB devices for the operation of toys in the 2002 UWB First Report and Order, the Commission explained that the prohibition was intended to "further limit the proliferation of these products" and was "consistent with our desire to proceed cautiously with the introduction of UWB devices."⁵⁵ The Commission acknowledged that the prohibition on the use of UWB devices for the operation of toys was precautionary in nature and stated that it may revisit the prohibition within six to twelve months, recognizing that the rule was conservative by design and based on the limited available technical data.⁵⁶ In addition, the Commission adopted certain provisions with the intention of being overly cautious while expecting that no harmful interference would occur based on the available technical analysis.⁵⁷ As part of the rulemaking, the Commission also analyzed technical studies to consider the effect that the operation of indoor and outdoor UWB devices would have on aviation, weather and defense related systems⁵⁸ — all resulting in the same conclusion that the UWB operations will not

⁵³ 47 CFR § 15.521(a).

⁵⁴ *Id.*

⁵⁵ *First R&O*, 17 FCC Rcd at 7503-04, paras. 199 & n.292.

⁵⁶ *Id.*

⁵⁷ *See id.*, 17 FCC Rcd at 7483-84, para. 138 (noting that "Only the level proposed for UWB indoor operation at 30 meters height exceeds the calculations for maritime radar," but further stating that "shipboard UWB operation is prohibited at the request of NTIA").

⁵⁸ *See, id.*, 17 FCC Rcd at 7470-85, paras. 124 and 144 (stating that NTIA investigated the potential interactions of proposed UWB systems on 15 U.S. Government systems operating between the frequencies of 960 and 5650 MHz, including the Distance Measuring Equipment (DME) interrogator airborne receiver, DME ground transponder

negatively impact those systems.⁵⁹ Given the time that has passed since these prohibitions were adopted, we believe it is appropriate to revisit their utility in today's UWB communications landscape.

22. It is clear from the steady stream of waiver requests we receive and have granted that our current rules do not adequately provide an effective avenue for manufacturers to quickly develop and bring to market new and innovative UWB device types. To address the gap between what the current rules allow and permitting the UWB market to organically develop and flourish, the Commission has been operating under "regulation by waiver."⁶⁰ Operation under these waivers and their associated conditions has shown that even with widespread growth, the risk of harmful interference to authorized licensees is minimal. We recognize the benefits of expanding permissible UWB uses, but remain mindful that the current prohibitions can only be removed after understanding how device proliferation may affect the aggregate noise floor, how ubiquitous UWB-enabled devices are likely to become in the absence of existing restrictions, and how many such devices could coexist in a given environment while continuing to minimize the potential of causing harmful interference to authorized users. Accordingly, we seek comment on technical justifications that support revising section 15.521(a) to remove the prohibition on the use of UWB devices in toys, as well as whether the longstanding prohibition on UWB operations aboard aircraft, ships, or satellites remains warranted. To that end, we seek comment on whether additional technical standards need to be considered when evaluating UWB operation in aeronautical or maritime environments such as the IEC 60533, IEC 60945, RTCM 13700.0, IEC 60533 Ed.4, or others as applicable. In particular, we seek comment on how such technical standards could vary with different UWB use cases. For example, where our rules currently prohibit UWB operation on ships, could we permit UWB surveillance system use for public safety purposes? What about other types of UWB devices? Would similar reasoning be applicable for aeronautical platforms? Are there other internationally recognized maritime, aeronautical, or ITU-R standards that could inform an appropriate emissions framework for these expanded operating scenarios?

23. We invite commenters to address whether the underlying assumptions that informed the Commission's 2002 precautionary framework remain valid considering advances in modern communication systems, such as the availability of ubiquitous high speed internet, Wi-Fi, and advanced mobile technologies like 5G, and 6G; broader adoption of technology by the public (e.g., mass adoption of smart phones and smart home applications); improved coexistence techniques such as listen-before-talk, dynamic frequency selection (DFS), adaptive frequency hopping (AFH), and Automatic Frequency Coordination (AFC). We note that all these aspects of today's communication landscape were neither available nor envisioned at the time the rules were first adopted. Taking this into account, what steps can the Commission take to provide more flexibility and expansion for UWB use cases while still ensuring that they do not cause harmful interference? For example, to the extent that modern communications technologies include advanced error detection and correction algorithms, and because UWB transmissions exhibit very low duty cycle and "bursty" in nature, does this further diminish the likelihood that UWB-related interference would result in the degrading, obstructing, or actual interruption of a radiocommunication service so as to rise to the level of being "harmful"? Are there particular bands or uses – such as frequencies used for space research or radio astronomy in which there is no communications protocol for which error detection and correction algorithms can be readily employed – that warrant additional considerations and that might affect how we implement any changes to our UWB

receiver, Air Traffic Control Radio Beacon System (ATCRBS) air transponder receiver, ATCRBS ground interrogator receiver, ARSR), Search and Rescue Satellite (SARSAT) ground station land user terminal, ASR, Next Generation Weather Radar (NEXRAD), Maritime Radar, Fixed Satellite Service (FSS) earth stations, CW and Pulsed Radar Altimeters, Microwave Landing Systems (MLS), and Terminal Doppler Weather Radar (TDWR)).

⁵⁹ See *First R&O*, 17 FCC Rcd at 7494, para. 172 (stating that, while the tests and analyses have provided valuable insight and illuminated the record, the regulations should not be based solely on worst-case assumptions, and concluding that the evidence had demonstrated that UWB devices can operate safely within appropriate standards without causing harmful interference to other systems).

⁶⁰ Bosch Petition at 25-26.

rules? If so, how can we narrowly tailor any limitations on UWB use to account for such unique situations?

24. We seek comment on whether relaxing any or all of our use prohibitions in section 15.521(a) would pose any meaningful risk of harmful interference. For example, would any undesired changes in aggregate noise floor levels be expected? If the noise floor level were to change, would it do so to a degree that could increase the harmful interference risk or would it generally go unnoticed? Commenters should provide detailed technical analysis to support their positions. Similarly, how would device proliferation and operational density be expected to change? Would such changes affect the potential for harmful interference? How might geo-fencing be employed in these devices as a mitigation technique? In short, we seek to fully understand whether and how any changes we might make to our rules would affect the ability for UWB to coexist with authorized services.

25. As an initial matter, we note that the term “toys” is not defined in our rules and has become more ambiguous as the number and types of consumer-grade electronic devices have proliferated in the time since the Commission adopted the prohibition.⁶¹ We are concerned that the lack of a clear definition may create uncertainty for manufacturers and could inadvertently discourage the development of useful UWB-enabled products. We further recognize that the original caution underlying this restriction may no longer be necessary given UWB’s longstanding record of operating without causing harmful interference in other applications. We seek comment on these observations. We seek comment on whether we should remove the prohibition on toys incorporating UWB devices. The Joint Petitioners note that UWB often interacts with other wireless technologies, such as Bluetooth and Wi-Fi that are frequently leveraged by toys and that the distinction between personal devices and toys is increasingly blurred, as devices such as tablets and phones are often used for gaming. In seeking to remove this prohibition, the Joint Petitioners do not seek any changes in the general UWB technical rules or limits that would be applicable to such devices.⁶² Were we to retain a restriction on toys, are there steps we could take to limit any burdens associated with the existing prohibition? For example, should we adopt a definition for “toys”? If so, what would be critical elements for such a definition both in a qualitative and quantitative perspective? How would toys be described and what are the critical technical elements to capture, like bandwidth, duty cycle, emission limits, that are unique to toys? Noting that UWB operating specifically in toys would not alter the radiofrequency environment compared to other uses, we seek comment on whether UWB use in toys is likely to become widespread. And if so, would such use create aggregate interference concerns? Would restricting operation of UWB-equipped toys to certain channels, such as Channels 8 and 9,⁶³ or otherwise limiting operation on specific frequencies be an effective means of protecting the interests of authorized spectrum users, including Federal spectrum users? Are there other use characteristics we should consider? For example, is it reasonable to expect that most toys would be used indoors where building entry loss would protect many nearby licensed users? Would a use-based limitation on toys be an effective approach for providing any necessary protections?

26. We also seek comment on the potential for expanded UWB use on ships, including operations on inland waters, as requested by the Joint Petitioners,⁶⁴ and whether geofencing methods, further device level controls and features, or operational restrictions could reliably ensure compliance as ships move between inland and coastal environments. Because the original UWB rules prohibited operation aboard ships and aircraft, any expansion to these platforms will be best supported by a thorough, comprehensive technical analysis. Accordingly, we seek comments on appropriate emission restrictions in the aeronautical and maritime bands to determine whether codifying expanded UWB

⁶¹ For example, it is not obvious when a drone sold for consumer or hobbyist use is deployed in a manner that makes it more than a simple “toy.”

⁶² Joint Petition at 20-21.

⁶³ The center frequency of Channels 8 and 9 is 7488 MHz and 7987.2 MHz, respectively.

⁶⁴ Joint Petition at 20-21.

operation in these environments is technically feasible and would adequately protect incumbent safety systems. Although the rules, generally restrict UWB from operating on ships, we also note that most modern smartphones support UWB and such devices are not generally restricted from onboard use. As such UWB devices must meet the general 15.209 limits outside of the bands specified specifically for UWB use (e.g., in the HF and VHF maritime bands), would any additional technical restrictions be needed to protect these bands? How would the spectral environment in such bands differ from what is already experienced today? We also seek comments whether any operational restrictions might be necessary for UWB systems to operate safely aboard vessels. For example, should we restrict UWB operations to a certain distance from such a certain shipboard systems? In such cases, how could a required separation distance be enforced? Commenters advocating for relaxing or eliminating these prohibitions should provide details on what technical limits and operational controls, if any, that should be implemented for UWB devices and how such implementation can be achieved. How much detail should be in the rules and how much should be left to the standards-setting process? Commenters should provide detailed technical justifications for their positions. We also seek comment on whether the RF environment of inland waterways differs significantly from coastal or open water settings, and on whether propagation, clutter, usage density, or incumbent operations warrant distinct protections from UWB operations onboard ships. We also seek comment on whether a blanket removal of the prohibition on UWB use on ships would be appropriate.

27. In addition, we seek comment on whether such operational restrictions tied to specific locations should be relaxed more broadly. We would expect that the density of UWB devices on cruise ships or in other non-traditional operating environments such as offshore platforms, offshore energy facilities like oil rigs, research vessels, or other maritime or near-shore structures would be much less than the general case for non-controlled environments. In such cases, are any operational restrictions necessary for certain types of UWB devices? Would the resulting RF environment present any meaningful risk of harmful interference to authorized services? And what location based controls such as geofencing, automated disablement, or environmental sensing could ensure compliance as these platforms move between inland, coastal, and open ocean environments? Commenters supporting such relaxation should identify what controls would be required, how they could be implemented at the device or system level, and which elements should be specified in the rules. We also seek comment on whether the use of specific UWB channels, such as on Channels 8 and 9, would lessen the potential impact on Federal systems and whether adopting such a policy would minimize or mitigate the need for continued coordination.

28. In addition, we seek comment on whether UWB-based autonomous drone navigation and landing systems should be permitted under the UWB rules. We recognize the emergence of commercial systems capable of high-precision, GNSS independent positioning that support indoor and outdoor autonomous landing for multiple drones and landing stations, which even allow the use of mobile devices as UWB landing beacons, but that may not be permissible under our current rules.⁶⁵ We seek comment on what technical and operational conditions, such as indoor-only operation, confined outdoor areas, uses only in controlled facilities like industrial and manufacturing factories, altitude limits, power restrictions, and duty cycle limits, might be necessary to protect authorized services.

29. We also seek comment on expanded UWB use in aircraft and satellites. In particular, we seek comment on:

- whether expanded drone-based UWB operations could alter the coexistence dynamics in shared spectrum environments;

⁶⁵ Tracy Cozzens, *Belgium company Agilica offers UWB-based local positioning for UAVs*, GPS World (Feb. 20, 2026), www.gpsworld.com/belgium-company-agilica-offers-uwbbased-local-positioning-for-uavs/; *see also* Mobile Knowledge, *Enabling high precision and ease in drone autonomous landing*, www.themobileknowledge.com/knowledge-base/enabling-high-precision-and-ease-in-drone-autonomous-landing/ (last visited May 18, 2026).

- technical studies that model coexistence between systems and assess whether there might be any measurable effect on harmful interference risk to authorized users of the band;
- the potential use of UWB devices aboard aircraft and satellites;
- when using UWB aboard aircraft and satellites, what technical and operational safeguards such as geofencing, altitude based restrictions or other relevant restrictions would be required to prevent harmful interference to aeronautical and satellite services; and
- other technical rules that would promote compatibility for airborne use of UWB with other authorized users, such as emission limits and UWB channel restrictions.

30. Commenters supporting expanded UWB use in these environments should provide detailed technical analyses, including propagation modeling, link budgets, and coexistence studies and analysis. We also note that our intent here is not to make drastic or wholesale changes to the dynamics in satellite, air and space environment via the general expansion of an unlicensed regime. Instead, our intention is to make UWB devices accessible in these environments to enable technology innovators to better serve the American public by expanding UWB capabilities to aircraft and satellites. Finally, we seek comment on whether any corresponding rule changes would be needed for other classes of UWB devices if we were to alter the use restrictions in section 15.521(a) in any of the ways discussed in this subsection.

4. Advance Written Coordination Requirement

31. Section 15.525 requires UWB imaging systems⁶⁶ to undergo written coordination by submitting notice to OET prior to operating, including providing contact information, the device FCC ID, and the intended geographic operating area for subsequent FCC–NTIA review.⁶⁷ This process was originally established to prevent harmful interference to sensitive services such as the Global Positioning System (GPS), the personal communications service (PCS), radio astronomy, and satellite-based sensors, while still enabling the benefits of UWB imaging technologies.⁶⁸ Over time, however, coordination has proven administratively burdensome and no longer appears to be necessary given the absence of reported harmful interference and the maturity and the predictable nature of modern UWB devices. Notably, we are not aware of any instance where this written coordination information has been used to respond to an interference concern or has resulted in a follow-up investigation.

32. We therefore propose to eliminate the section 15.525 coordination requirement and seek comment on whether its removal would meaningfully affect interference risk, limit the ability to manage device proliferation, or otherwise reduce necessary safeguards.⁶⁹ To the extent parties believe that there is a need to retain a coordination requirement, they should give concrete examples of when and how the current process has provided for the identification and resolution of actual UWB-based interference. If there is a reason to retain a coordination requirement, could any part of coordination process be streamlined or simplified such as by removing the requirement that the notification be sent in writing to the Commission’s physical address? What are the most effective ways to ensure that the benefits of such

⁶⁶ 47 CFR §§ 15.503 (definitions for imaging systems, including ground-penetrating radar, wall-imaging, surveillance, medical imaging, and through-wall imaging devices), 15.509 (ground-penetrating radar and wall-imaging systems), 15.510 (through-wall imaging systems), 15.511 (surveillance systems), 15.513 (medical imaging systems), . These rules collectively establish the operational, technical, and eligibility criteria applicable to UWB imaging devices.

⁶⁷ 47 CFR § 15.525(a)-(b). Section 15.525 sets forth the coordination requirement for UWB imaging systems, directing operators to notify the Commission’s Office of Engineering and Technology (OET) prior to deployment so that OET may coordinate the operation with NTIA. *Id.* § 15.525.

⁶⁸ See *First R&O*, 17 FCC Rcd at 7498, para. 184.

⁶⁹ We also propose to remove the cross-references to this section embedded throughout the imaging system rules. See 47 CFR §§ 15.509(b)(2), 15.510(c)(2), 15.511(b)(2), and 15.513(b).

coordination (to the extent there are any) outweigh the substantial burdens that the existing requirement creates?

5. Ground Penetrating Radars

33. Over the past two decades, the Commission has repeatedly relied on case specific waivers to authorize Ground Penetrating Radar (GPR) and related ultrawideband sensing systems that could not conform to the conservative framework adopted in the 2002 *First Report and Order*. As Bosch details in its petition, virtually every significant GPR advancement has necessitated tailored relief because the rules' definitional, operational, and measurement provisions were incompatible with modern GPR designs.⁷⁰ The Commission has consistently justified these waivers based on the longstanding absence of harmful interference, the downward-directed and ground-coupled nature of GPR emissions, and the greater public interest benefits of infrastructure monitoring, construction safety, utility detection, and transportation applications. Collectively, these waiver grants demonstrate both the need and the opportunity to update these rules so that widely used and low-risk GPR technologies no longer depend on repeated, device specific waivers for market entry. We continue to see that trend as evident by more recent waiver authorizations such as Rod Radar.⁷¹

34. We observe that all of these waiver grants apply a consistent set of technical conditions tied to the same rule sections being waived namely §15.503(d), §15.31(c) and §15.521(d).⁷² Across the waivers, the Commission permits stepped-frequency and other frequency-agile GPR devices to operate by waiving these provisions and requires applicants to demonstrate compliance with emissions limits while the device operates in its normal stepping mode, rather than with the sweep disabled. The Commission limits dwell time on any individual frequency band to ensure the device cannot function as a narrowband transmitter, and it requires operation only in contact with the ground, consistent with part 15 subpart F's GPR definition, to ensure downward-directed energy and reduce harmful interference potential. In addition, the Commission requires that waiver recipients must suppress emissions within restricted bands through notching or equivalent attenuation, and each device must still comply with all other technical and operational UWB GPR requirements.⁷³

⁷⁰ Bosch Petition at 10-11 and 9-26. (stating that in 1999, before adopting formal UWB rules, the OET granted limited waivers to Time Domain (covert communications and through-wall rescue radar), U.S. Radar (detecting buried objects), and Zircon (locating utilities behind walls) to allow early UWB devices into the market while assessing their real-world interference impact, and further identifying the necessity for waivers to allow for stepped-frequency GPR, 3D radar systems, and fast-stepping continuous-wave GPR operations). *See also*, CWCI Waiver, 27 FCC Rcd 234; Proceq Waiver, 33 FCC Rcd 2258.

⁷¹ *Rod Radar, Ltd Request for Waiver of Section 15.503(d), and 15.521(d) of the Commission's Rules*, ET Docket No. 24-222, Order, 40 FCC Rcd 5130 (OET 2025).

⁷² §15.503(d) defines the minimum instantaneous bandwidth for UWB devices. §15.31(c) and §15.521(d), prescribes measurement procedures requiring the stepping or sweep function to be stopped during compliance testing.

⁷³ The Rod Radar waiver illustrates how these technical conditions are applied in practice. In granting relief under §§ 15.503(d), and 15.521(d), the Commission allowed the Live Dig Radar (LDR) system to be evaluated in its normal interrupted stepped-frequency mode and imposed specific safeguards consistent with prior GPR waivers. These included defining the device's operating parameters such as a 5.5-MHz frequency increment per step, operation across 145 stepped frequencies between 300.621–1098.121 MHz, a maximum 58-microsecond step duration, a 3.5-nanosecond rise/fall time, and a 12.5-MHz interruption frequency, to ensure that no single frequency is occupied long enough to function as a narrowband transmitter. The Commission also required that the LDR transmit only when in full contact with the ground, that certification measurements be taken with stepping active, and that the system fully comply with Part 15 Subpart F requirements. In addition, the device was required to notch the 328.6–335.4 MHz and 960–1103.51 MHz bands by at least 10 dB below the § 15.209(a) limits, and the waiver was limited solely to this device and prohibited from transfer under § 2.933. Collectively, these conditions demonstrate the Commission's consistent approach to authorizing stepped-frequency GPR devices while ensuring robust interference protections.

35. We seek comment on whether:

- the rules should incorporate recurring conditions reflected across prior GPR waivers and, if so, whether there is a specific waiver (e.g., Rod Radar, Proceq, or Curtiss-Wright) that should serve as the model;
- the rules should incorporate explicit technical parameters that have appeared consistently in those waivers, including reducing or limiting emissions over specific protected bands that are uniquely susceptible to harm if affected by UWB-based interference (for example, 328.6–335.4 MHz and 960–1103.51 MHz), defined dwell-time limits (such as the 58-microsecond maximum step duration or the 2-microsecond limit used in earlier waivers), and other provisions such as downward-directed emissions, ground-contact activation, and proximity- or motion-based interlocks;
- incorporating the recurring conditions from prior GPR waivers and tailoring them to device classes that routinely require waivers, including stepped-frequency GPR, continuous-wave GPR, vehicular or bucket-mounted systems, and infrastructure inspection radars would reduce regulatory uncertainty, streamline equipment authorization, and ensure consistent protection for authorized services.

Commenters should identify which conditions remain necessary, which may be outdated, and how these requirements should be modernized to support current and emerging GPR technologies⁷⁴

B. New UWB Device Category

36. Over the past several years, the Commission has seen a sharp increase in nearly identical UWB waiver requests, particularly for outdoor keyless entry/door lock systems, vehicle and rail safety ranging systems, and other precision tracking applications, seeking relief from the requirements that UWB devices in the hand-held category must be hand held and cannot use fixed outdoor infrastructure.⁷⁵ These waiver requests are characterized by similar technical characteristics and mitigation measures, typically generate little or no public comment, and have generated no reports of harmful interference. This consistent pattern suggests that the current rules are more restrictive than necessary and are no longer aligned with practical deployment needs.⁷⁶ We further recognize that UWB's fine-ranging accuracy, robust performance in multipath environments, and ability to operate across wide frequency ranges can enhance continuous spatial awareness, intent detection, multimodal sensor fusion, and autonomous navigation in emerging technologies, including AI-enabled applications.⁷⁷

37. We therefore propose to update and advance our rules by establishing a new UWB device category that reflects modern technology needs while providing a durable framework for future

⁷⁴ We note that we are not proposing to make any changes to our waiver process. To the extent that we modify the rules in this proceeding to eliminate the need for certain devices to obtain waivers, the same process as is used today will remain available in the event a UWB device may still need a waiver to operate.

⁷⁵ See, e.g., *Assa Abloy Group For Waiver of 15.519(a), and 15.519(a)(2) of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 21-267, Order, 37 FCC Rcd 12311 (OET 2022) (*Assa Abloy Waiver Order*); *Schlage Lock Company LLC's Request for Waiver of Section 15.519(a), and 15.519(a)(2) of the Commission's Rules*, ET Docket No. 22-248, Order, 38 FCC Rcd 4890 (OET 2023) (*Schlage Waiver Order*); *Piper Networks Inc. Request for Waiver of Section 15.519(a) and Section 15.519(a)(2) of the Commission's Rules*, ET Docket No. 19-246, Order, 35 FCC Rcd 12912 (OET 2020).

⁷⁶ See Bosch Petition at 10-13; Joint Petition at 11 (reiterating this point).

⁷⁷ See Qorvo, "Getting Back to Basics with Ultra-Wideband (UWB)," <https://www.qorvo.com/search?key=getting+back+to+basics&mode=1&search-value=1> (last visited May 20, 2026) (Qorvo White Paper) (explaining UWB as a secure, wide-band, time-of-flight-based technology delivering centimeter-level accuracy and strong interference resistance, while outlining its positioning methods and FCC regulatory constraints).

innovation. This category would support compact devices operating in either mobile or fixed configurations and that are capable of operating either indoors or outdoors. To protect authorized services, devices would be subject to practical physical safeguards, such as height limits, mounting restrictions, and requirements to direct emissions downward.⁷⁸ Technical limits would further mitigate interference potential by incorporating controls, such as duty cycle limits, power spectral density constraints, antenna directivity requirements, pulse repetition frequency restrictions, or relevant combinations of these measures. To ensure efficient spectrum use, these devices would be allowed to transmit only during active, event-driven communication sessions and must remain idle otherwise,⁷⁹ and be prohibited from forming wide-area networks. They would continue to operate at low power with duty cycles under one percent in any 24-hour period. Collectively, these safeguards would prevent continuous transmissions, minimize interference risks, reduce the need for waivers, and create a clear, technically grounded foundation for future UWB deployment.

38. We seek comment on these proposed technical requirements and whether and how they might alter the radiofrequency environment for users of authorized services. Because UWB is used sparingly in devices, we expect these devices to have low duty cycles. Using an example of a UWB-equipped door lock that is engaged up to ten times a day, with each ranging round lasting 660 microseconds,⁸⁰ the time the device is actively sending a signal represents an extremely small percentage of the day as a whole. For this reason, we believe that a duty cycle limit at or below one percent is not only appropriate to maintain interference-free operation, but also adequately supports expected future uses cases. We seek comment on this observation and the specific duty cycle that we should adopt. In addition, we seek comment on whether the duty cycle should be measured over a period of 24 hours or over a shorter interval (e.g., hourly or even on a per-minute basis). We also seek comment on appropriate emission limits. Should they match, exceed, or be more restrictive than our current UWB hand held device limits, and why? We also seek comment on what emission limits should be associated with particular frequency bands to provide maximum flexibility for UWB devices while ensuring coexistence with incumbent services.

39. To unlock the full breadth of benefits, UWB devices rely on specialized modulation to achieve the wide bandwidths required for UWB classification. Common UWB waveform types include: impulse-radio UWB (IR-UWB), which uses extremely short pulses for precise ranging and localization;⁸¹ Multi Band Orthogonal Frequency Division Multiplexing OFDM (MB-OFDM), which divides the spectrum into sub bands and employs frequency hopping for high-speed data transfer;⁸² Frequency

⁷⁸ The beam pattern in the azimuthal plane restricts emissions toward the ground and away from airborne or satellite receivers, ensuring that signal energy attenuates more rapidly with distance and remaining consistent with the underlying intent of our UWB rules. *First R&O*, 17 FCC Rcd at 7515, para. 234.

⁷⁹ See *Assa Abloy Waiver Order*, 37 FCC Rcd at 12316, para 20 (conditioning the grant of a waiver on, among other things, a requirement that “UWB sessions . . . only be initiated following the discovery process and successful realization of qualifying credentials via 2.4 GHz Bluetooth communication”).

⁸⁰ Letter from Hans-Juergen Pirch, Assa Abloy Group, to Office of Engineering and Technology, ET Docket No. 21-267, at 6 (filed Feb. 2, 2022).

⁸¹ See Qorvo White Paper at 4-7. Within this category, several key ranging and positioning topologies have recently emerged: Two-Way Ranging (TWR), Time Difference of Arrival (TDoA), Reverse TDoA, and Phase Difference of Arrival (PDoA). Each offers different mechanisms for determining distance, angle, or absolute position. These IR-UWB topologies are widely used in contemporary micro-location applications, including secure access control, indoor navigation, asset tracking, and device-to-device ranging, where centimeter-level accuracy, robustness to multipath, and low power consumption are essential. Together, they illustrate how modern impulse-based UWB systems support high-performance localization capabilities across consumer, industrial, automotive, and IoT environments.

⁸² In this mode, the MB-OFDM system transmits data sequentially in each nonoverlapping band, repeating the band sequence until the transmission is complete. *MBOA-SIG Petition for Waiver* at 1-2.

Modulated Continuous Wave (FMCW) modulation used in radar and sensing applications;⁸³ and stepped frequency waveforms that sequentially transmit discrete tones across a broad band.⁸⁴ Each modulation requires careful management of technical parameters, such as pulse repetition frequency, dwell time, sweep rate, and pulse shaping, to ensure efficient spectrum use, minimize interference, and comply with applicable emission limits.

40. We seek comment on appropriate modulation-related technical requirements for this new UWB device category, including whether dwell time limits should be more restrictive, more flexible, or aligned with those adopted in prior Commission waivers.⁸⁵ Are constraints on dwell time, number of activations per day, duration of each activation, or other operational parameters are appropriate for this new UWB device category? We also invite comment on whether uniform stepping, randomized stepping, or alternative optimized sweep patterns should be permitted, so long as emissions remain compliant to our rules, and whether testing must always be performed with the stepping or sweep function active to reflect real-world behavior. We also seek comment on appropriate pulse repetition frequency (PRF) or burst timing limits, including whether constraints similar to or distinct from proposals in past filings, such as Bosch's request for PRF less than 4 MHz for a different device class, would be suitable here.⁸⁶ We seek input on whether higher, lower, or comparable PRF limits should be adopted, and whether PRF should be tied to duty-cycle caps or minimum off-time requirements to ensure that the aggregate interference profile remains comparable to existing UWB imaging systems. We also invite comment on other UWB modulation methods and parameters that may be optimal for this new device category, aiming to maximize technological benefits while maintaining strong protections for existing services.

41. To the extent applicable to this proposed new device class, we seek comment on the technical parameters that Bosch proposed in 2019 for a more expansive imaging system (even though we are proposing a different approach by way of our new device type).⁸⁷ Bosch's proposed device class would have bandwidths up to 2.5 GHz within the 6-9 GHz range, have mean emission limits similar to UWB, and operate with low duty cycles of typically less than 1%, with a signal transmission on time of less than 2 nanoseconds. It also proposed an antenna gain of less than 4 dBi for its system with antenna patterns restricted to a 90-degree horizontal and vertical pattern, and an antenna tilted downward from the horizon with an installation height of 2-3 meters. It claimed that this would allow motion detection to be active 24 hours per day with no appreciable interference potential and enable its system to achieve a

⁸³ An FMCW radar transmits a continuous sinusoid signal (chirp) whose frequency changes linearly in time to sweep over a defined frequency band. *60 GHz R&O*, 38 FCC Rcd at 5243, para. 5. A collection of evenly spaced chirps constitutes an FMCW radar frame. *Id.*

⁸⁴ "Similar to linear FM pulse waveforms, stepped frequency waveforms are a popular pulse compression technique. Using this approach enables you to increase the range resolution of the radar without sacrificing target detection capability." MATLAB, *Stepped FM Pulse Waveforms*, <https://www.mathworks.com/help/phased/ug/stepped-fm-pulse-waveforms.html> (last visited May 16, 2023).

⁸⁵ See, e.g., *Proceq USA Inc.; Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, 33 FCC Rcd 2258, 2261, para. 11 (OET 2018) (requiring, for a stepped frequency ground penetrating radar (GPR) device that operates with 10–40 MHz steps across 200–4000 MHz, a maximum dwell time of 2 microseconds per step and a requirement that dwell time does not exceed 0.04% of the minimum scan/cycle rate); *Sensible Medical Innovations Ltd.; Request for Waiver of Part 15 Ultra-Wideband Rules for a Medical Imaging System*, ET Docket No. 18-39, Order, 34 FCC Rcd 8558, 8567, para. 34 (OET 2019) (permitting operation on at least 14 of 16 frequencies between 1005 and 1709 MHz, with a dwell time no greater than 4.5 milliseconds, no more than 20 activations per day, and a per-use limit of 90 seconds). We are aware of no complaints of harmful interference related to operations under these waivers.

⁸⁶ Bosch Petition at 35-36.

⁸⁷ *Id.* at 33-38. We note that the proposal was for a more expansive imaging system but nonetheless could apply to this new device category.

location precision of 0.1 to 1 meter and a detection distance of 15-18 meters.⁸⁸ We seek comment on whether some or all of these technical limits should apply to this device category, to the extent applicable, to maintain low interference potential while enabling 24-hour operation.

42. In addition, we seek comment on appropriate antenna pattern requirements, if any, for this new UWB device category. Historically, the previous UWB waivers have considered antenna designs that place nulls at the top and bottom of the device, concentrating emissions in the azimuthal plane to reduce radiation toward airborne and satellite receivers and to promote faster attenuation with distance.⁸⁹ We seek comment on whether similar constraints are sufficient for indoor, outdoor, and mobile use, or whether narrower beamwidth requirements, such as 30, 60, or 90 degrees, should be adopted. Alternatively, we seek comment on whether antenna requirements are necessary if duty cycle limits and emission limits alone are adopted that can adequately control interference. Our goal is to ensure effective emission management while maximizing operational flexibility to support broader UWB deployment.

43. We invite commenters to consider the appropriate interplay between duty cycle, power level, antenna pattern constraints, and waveform characteristics to ensure that these systems can operate flexibly while continuing to protect incumbent services. Because UWB emissions are shaped not only by average and peak power, but also by how frequently pulses are transmitted and how energy is directed spatially, would a combined framework, such as pairing low duty cycles with restrictive antenna patterns while allowing modest power increases, provide an appropriate and flexible pathway for this new category of devices? Should maximum permissible power limits vary based on antenna directivity, such as allowing slightly higher power for antennas that confine emissions to the azimuthal plane or employ narrow beamwidths (for example, ten degrees) when paired with very low duty cycles (e.g., less than 1% over 24 hours)? Alternatively, would establishing uniform limits regardless of beamwidth be more appropriate? We also seek comment on whether the Commission should specify additional waveform parameters, including limits on modulation dwell times (such as stepped-frequency continuous wave dwell times not exceeding 2 microseconds per frequency), FMCW sweep times, impulse radio pulse shaping characteristics, pulse repetition interval or other UWB signal characteristics to ensure predictable and stable rules consistent with incumbent service protection. Should such waveform requirements be paired with operational constraints that require devices to transmit only during active, event-driven communication sessions and remain idle otherwise, thereby reinforcing low average emission levels and promoting efficient spectrum use?

44. Are there additional operational restrictions we should consider? Possible examples include installation-related limits, such as maximum mounting heights, mandatory downward tilt, or similar measures to ensure emissions remain directed toward the ground.⁹⁰ Should we adopt more permissive limits, such as allowing installations up to 20 meters, to support low altitude drone operations and other potential new UWB applications? Should device deployments that qualify under these new rules be limited to controlled environments, such as industrial or manufacturing facilities or, alternatively, be restricted to residential, non-professional use only? We also ask whether we should not adopt any usage restrictions. Commenters should provide technical justification to support how any use restrictions or the absence thereof would enable coexistence and minimize the potential for harmful interference to occur. Finally, we seek comment on appropriate measurement procedures for demonstrating compliance with duty cycle, emission limits, and antenna pattern requirements, including any necessary modifications to existing part 15 or part 2 procedures and certification processes to capture worst-case emissions while reflecting realistic UWB device behavior.

⁸⁸ Bosch Petition. at 35-36.

⁸⁹ See, e.g., *Assa Abloy Waiver Order*, 37 FCC Rcd at 12314 para. 11. Assa Abloy describes this antenna design in further detail in its *Request for Waiver* in the docket.

⁹⁰ See, e.g., *Schlage Waiver Order*, 38 FCC Rcd at 4893, para. 11 & n.38 (granting a waiver for a door lock device intended to be mounted no more than 48 inches above the ground).

45. As we explore ways to modernize our rules for the next generation of technology, we find that AI is an area where updated UWB provisions may provide meaningful support. In a very short timeframe, AI has advanced through several distinct stages from generative AI, which creates text, images, code, and synthetic sensor data, to agentic AI, which can plan, reason, and take sequenced actions based on real-time environmental conditions, and is headed toward physical AI, where intelligence is embedded in robots, drones, autonomous vehicles, and other embodied systems that interact directly with the physical world.⁹¹ We note that the unique technical capabilities enabled by UWB such as precise ranging, spatial awareness, and reliable low-power operation position it to play a central role in supporting this transformation. In this connection, we also highlight that the Commission has been taking action to ensure that devices sold and operated in the U.S. do not pose an unacceptable risk to the national security of the United States and to the safety and security of U.S. persons. We anticipate that aside from purely technical provisions, equipment will continue to be examined under this umbrella, and the Commission will take actions as appropriate to ensure that UWB systems integrated with AI technologies are aligned with national security interest of the nation.⁹² We seek comment on these observations.

46. Because many contemporary AI applications do not fit existing UWB categories, we seek comment on establishing a new device class for AI-based sensing systems. Will emerging forms of AI, including agentic AI and physical AI, require distinct technical or operational considerations when paired with UWB technologies? For example, as more businesses and consumers rely on smart devices, such as those that employ robotics or other designs that can operate with a degree of autonomy, we expect such devices will rely on UWB for sensing, spatial awareness, navigation, and positioning, given its ability for sub-centimeter accuracy. Are the requirements for such devices sufficiently different from other UWB devices that we should create an entire category for them, and, if so, how do the requirements differ from existing UWB devices and what rules are needed? Commenters should address how such functions should be defined, and what technical requirements should be adopted or measurement procedures codified to reflect UWB AI architectures that ensure devices can operate as intended and coexist with incumbent users. How should these devices be defined? Are there specific characteristics that should be codified to differentiate these devices or form factors from other UWB devices or platforms? We invite comment on appropriate technical and operational rules for AI enabled UWB systems, including whether existing power levels and emission limits are suitable for adaptive systems that have enhanced RF context awareness and onboard computing capabilities, or whether more flexible (or more restrictive) limits are warranted. We also seek comment on additional safeguards that could be implemented to minimize harmful interference, such as minimum duty cycle constraints, contention based protocols (e.g., listen before talk), or other interference-avoidance mechanisms that would be appropriate for AI-enabled devices. We seek comment on whether antenna-related restrictions (e.g., gain, directivity, orientation, placement) are necessary. As such devices are expected to be location-aware, could different limits be adopted for indoor versus outdoor use? Are there other categorical distinctions that could define various limits, such as industrial/manufacturing/enterprise environments versus broader use by the general public? Should there be eligibility restrictions to use certain classes of these devices, (e.g., based on rule part eligibility categories or other classification schemes)? What other factors should we consider regarding potential rules for UWB intended for AI architectures?

⁹¹ See NVIDIA, “Generative AI,” available at <https://www.nvidia.com/en-us/glossary/generative-ai/> (last visited May 7, 2026), Amazon Web Services, “What is Agentic AI?,” available at <https://aws.amazon.com/what-is/agentic-ai/> (last visited May 7, 2026), Databricks, “Agentic AI vs. Generative AI,” available at <https://www.databricks.com/blog/agentic-ai-vs-generative-ai> (last visited May 7, 2026), and James O’Donnell, “The evolution of AI: from AlphaGo to AI agents, physical AI, and beyond,” *MIT Technology Review* (Feb. 28, 2025), available at: <https://www.technologyreview.com/2025/02/28/1112530/the-evolution-of-ai-from-alphago-to-ai-agents-physical-ai-and-beyond/>.

⁹² See, e.g., *FCC’s Public Safety and Homeland Security Bureau Announces Addition of Foreign-Produced Power Inverters and Advanced Robotic Devices to FCC Covered List*, Public Notice, ET Docket 21-232, Public Notice, DA 26-786, (PSHSB July 28, 2026).

C. Comprehensive Review and Modernization of the UWB Regulatory Framework

47. As part of this comprehensive review of the UWB framework, we initiate a broad examination of whether the longstanding technical, operational, and eligibility requirements for all UWB device categories continue to be necessary. Many of these provisions were adopted more than two decades ago, reflect early-generation UWB technologies, and now form a fragmented and highly prescriptive structure that may no longer align with how modern UWB systems are designed, standardized, deployed, and used. In reassessing these rules, this proceeding presents an opportunity to modernize a framework originally crafted when UWB devices were nascent and less predictable, and to evaluate whether today's mature, well-characterized technologies warrant a more flexible, harmonized, and technologically neutral approach.

1. Eligibility

48. Our rules restrict eligibility for operating UWB imaging systems. Ground penetrating radar and wall imaging systems may be operated only by entities engaged in law enforcement, firefighting, emergency rescue, scientific research, commercial mining, or construction activities, and operators must also satisfy the part 90 eligibility requirements; through-wall imaging systems are further limited to law enforcement, emergency rescue, and firefighting organizations operating under state or local authority; and surveillance systems may be used only by law enforcement and fire and emergency rescue organizations, as well as certain eligible industrial entities under part 90.7 of the rules (i.e., manufacturers, petroleum, and power licensees), with operators required to meet part 90 licensing eligibility.⁹³ Medical imaging systems are subject to an additional layer of restriction, as they may be used only at the direction of, or under the supervision of, a licensed healthcare practitioner.⁹⁴ Collectively, these provisions demonstrate that UWB imaging devices are confined to tightly controlled professional sectors with explicitly defined eligibility requirements. The Commission adopted these operational restrictions in conjunction with the technical rules as part of its overall cautious approach to authorizing use of UWB, stating that “[the] combination of technical standards and operational restrictions will ensure that UWB devices coexist with the authorized radio services without the risk of harmful interference while we gain experience with this new technology.”⁹⁵ In the intervening years, increasing numbers of UWB imaging devices have been authorized for an ever-widening variety of purposes,⁹⁶ with no record of disruption to licensed and authorized radio services. We are also not aware of any situation where a UWB imaging device has caused harmful interference because it was not being used by or under the supervision of an eligible party.

49. Because the eligibility restrictions were adopted as part of an initial cautious approach to authorizing UWB and because the Commission intended to revisit them after UWB use had become more prevalent, we now seek comment on whether eligibility restrictions for UWB imaging systems remain relevant and necessary. Can we eliminate the eligibility restrictions altogether? If so, would that unleash new consumer-grade devices, and what would be the benefits and risks associated with that development? If we retain use restrictions, should we modify the list of eligible professional sectors? Could we adopt a

⁹³ 47 CFR §§ 15.509(b), 15.510(b), (d)(1), (2), and 15.511(b).

⁹⁴ 47 CFR § 15.513(b).

⁹⁵ *First R&O*, 17 FCC Rcd at 7437, para. 5. See also *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Order, 17 FCC Rcd 13522 (OET 2002) (acknowledging that some devices were not operated by the users listed in the regulations, and that it was necessary to view the operating restrictions in the “broadest of terms” that would allow such devices to “be operated for one of the purposes described in the regulations but need not be operated directly by one of the described parties”).

⁹⁶ See, e.g., *GPR, Inc. Request for Waiver of the Commission's Part 15 Rules Applicable to Ultra-Wideband Devices*, Order, 38 FCC Rcd 10376 (OET 2023) (granting a waiver of the rules to permit the marketing and operation of GPR's driver-assistance safety technology which uses ultra-wideband (UWB) ground penetrating radar to read subterranean information that is used to help keep vehicles in lane under different driving conditions).

consistent eligibility framework across all imaging system categories to broaden utility? Would consolidating the multiple imaging rule parts into a unified umbrella framework provide more clarity than just adjusting eligibility criteria? We encourage commenters to address technical or operational safeguards, such as coordination requirements, that would be necessary to ensure that any expanded access or streamlined framework continues to protect incumbent services. Alternatively, could there be a class of devices with different technical parameters that could be widely used by any party (i.e., with no use restrictions) without increasing the potential for harmful interference? If so, what would those parameters be? We also seek comment on how existing certified devices and their inventory should be treated upon adoption of any final rules. For example, many equipment certifications include grant notes specifying that the device, “may not be employed for the operation of toys” and that “operation onboard an aircraft, a ship or a satellite is prohibited.”⁹⁷ To address cases where such grants may no longer be consistent with rules we adopt in this proceeding and based on devices meeting any new technical limits we adopt in this proceeding, should we require responsible parties for equipment authorizations to request such grant notes or be removed from their certifications to permit already certified equipment to operate under more flexible conditions? Are there any other data or provisions associated with equipment certifications that may need to be modified? Could we adopt an administrative rule to provide such flexibility? In such a case, how could already-certified devices that meet any new rules we adopt be differentiated from devices that may not comply with any new rules?

2. Marketing and Labeling Requirements

50. Section 15.507 limits the marketing of certain UWB devices to parties eligible to operate them, such as law enforcement or fire and rescue organizations, and places responsibility on the “responsible party” (under section 2.909 of the rules) to ensure that equipment is marketed only to eligible parties.⁹⁸ In addition to marketing restrictions, several device-specific rules impose their own labeling requirements:

- Through-wall imaging systems must display a notice restricting operation to law enforcement, emergency rescue, and firefighter personnel.⁹⁹
- Surveillance systems must display a notice limiting use to law enforcement, fire and rescue officials, public utilities, and certain industrial entities.¹⁰⁰
- Indoor UWB systems must display a statement restricting operation to indoor use.¹⁰¹

These provisions impose a marketing limitation and a separate labeling restriction for UWB devices that is in addition to the eligibility requirements that govern who may use certain categories of devices. Furthermore, the multilayered marketing, labeling, and eligibility requirements are codified separately, making the UWB rule structure more complex.

51. We seek comment on whether the marketing restrictions in section 15.507 remain necessary given that eligibility limitations are already defined in section 15.503(l) and reiterated in the device-specific rules. We further seek comment on whether the labeling requirements in sections 15.510(e), 15.511(f), and 15.517(f), which impose differing and unharmonized statements, continue to serve a distinct purpose. Do they impose an overly restrictive and unnecessary burden on manufacturers in light of the broader part 15 and UWB framework that already govern device eligibility, usage, and marketing of UWB devices? Should these requirements be simplified, deleted, or replaced with a single standardized labeling statement? If we were to adopt a unified eligibility framework, as

⁹⁷ See, e.g., FCC ID 2ADAL-T7002 (grant of certification for a wearable athlete tracker).

⁹⁸ 47 CFR § 15.507.

⁹⁹ 47 CFR § 15.510(e).

¹⁰⁰ 47 CFR § 15.511(f).

¹⁰¹ 47 CFR § 15.517(f).

discussed above, would that affect how we should address marketing and labeling? We also seek comment on what mechanisms would best ensure continued protection of incumbent services if these requirements were streamlined or consolidated, including if we were to create a consumer-grade tier of UWB devices as discussed above.

3. Emission Limits

52. Across part 15, subpart F, each UWB device category is subject to its own set of frequency-dependent emission limits specified in the corresponding rule sections. In general, all UWB devices must meet the section 15.209 general radiated-emission limits at or below 960 MHz, while average emissions above 960 MHz are capped at levels that vary by device class and frequency band.¹⁰² These limits typically range from approximately -41.3 dBm to -75.3 dBm EIRP and are applied across bands, such as 960–1610 MHz, 1610–1990 MHz, 1990–3100 MHz, 3100–10,600 MHz, and above 10,600 MHz, with more stringent protections, down to -75.3 dBm or -85.3 dBm EIRP, applied in the 1164–1240 MHz and 1559–1610 MHz frequency bands.¹⁰³

53. In addition, UWB devices are subject to more stringent OOB requirements in the GPS bands, where emissions must be suppressed to no more than -75.3 dBm EIRP for most UWB categories and -85.3 dBm EIRP for indoor and handheld systems.¹⁰⁴ Because modern UWB systems operate at extremely low power and low duty cycles, spreading energy across wide bandwidths with minimal spectral density, decades of deployments have shown that properly compliant UWB devices do not pose a harmful interference risk to GPS or other GNSS services under the existing Part 15 framework. As we consider proposals to modify UWB rules, we highlight that we are not proposing any changes to the GPS protection regime, and expect no change to the emissions radiating in those bands.

54. Furthermore, UWB categories are also subject to a uniform 0 dBm EIRP peak-emission cap within a 50 MHz bandwidth under section 15.521.¹⁰⁵ As an example, handheld systems operating under section 15.519 must meet average limits ranging from -75.3 dBm to -41.3 dBm EIRP depending on frequency, with GNSS band limits of -85.3 dBm EIRP and the same 0 dBm EIRP peak requirement.¹⁰⁶

55. Against this backdrop, we seek comment on whether the Commission should revisit these long-standing emission limits. Adopted more than twenty years ago, when UWB technologies were new and their interference potential less well understood, the limits were intentionally conservative and tailored to the types of UWB waveforms and device architectures represented in the record at that time.¹⁰⁷ Given the Commission's decades of experience with UWB deployments, during which UWB devices

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ 47 CFR §§ 15.209, 15.509(d)-(e), 15.510(c)(4)-(c)(5), (d)(3)-(d)(4), 15.511(c)-(d), 15.513(d)-(e), 15.517(c)-(d), 15.519(c)-(d). These rules collectively establish additional band-specific average EIRP emission limits that apply to specific UWB device categories in their respective rule parts for GPR, through-wall imaging, surveillance, medical imaging, indoor, and hand-held systems. Our current rules specify -75.3 dBm EIRP for most imaging UWB categories (e.g., 47 CFR §§ 15.509(e), 15.510(c)(5), 15.513(e)), -63.3 dBm EIRP for surveillance (§ 15.511(d)), -56.3 dBm EIRP for certain through-wall modes (§ 15.510(d)(4)), -85.3 dBm EIRP for indoor and handheld UWB (§§ 15.517(d), 15.519(d)).

¹⁰⁵ *Id.* §§ 15.509(f), 15.510(d)(5), 15.511(e), 15.513(f), 15.517(e), 15.519(e), 15.521. The rules limit emissions within a 50 MHz bandwidth centered on the frequency of maximum emission to 0 dBm EIRP, with optional alternative measurement bandwidths under section 15.521. *Id.*

¹⁰⁶ 47 CFR § 15.519(c)-(e).

¹⁰⁷ See generally *First R&O* (discussing the technical submissions associated with the record). See also *id.*, 17 FCC Red at 7437 and 7459, paras. 2 (stating that “It is our belief that the standards contained in this Order are extremely conservative” and recognizing that “[t]hese standards may change in the future as we continue to collect data regarding UWB operations”) and 62 (characterizing the emission limits it was establishing for vehicular radar systems; indoor; and hand-held, short range, peer-to-peer systems as “very conservative”).

have operated on a non-interference basis without reported harmful impacts, and taking into account the substantial maturation, standardization, and increased predictability of contemporary UWB devices and standards, we seek comment on whether these emission limits remain appropriate today. Specifically, would it be beneficial to revisit the radiated emission limits and consider increasing average or peak power to support expanded functionality or new use cases? We also seek comment on whether any technical, interference, or coexistence analysis would be useful to support such adjustments, and how an increase in potential power could be implemented while maintaining or improving protections for incumbent services. Finally, we invite comment on whether harmonizing power limits across device classes or replacing the existing device-specific structure with a simplified unified emission limit framework would improve clarity, reduce compliance burdens, and more accurately reflect the capabilities of modern UWB systems.

4. Manual or Remote-Controlled Switches and the “Ten Second” Rule

56. Several categories of UWB imaging systems, including ground penetrating radars, wall-imaging systems, through-wall imaging systems, and medical imaging systems, are required to incorporate a manual or remote-controlled switch that gives the operator direct control over when transmissions occur and requires that the devices cease UWB emissions within ten seconds after the operator releases the switch.¹⁰⁸ This requirement was adopted to prevent continuous or uncontrolled transmissions and to ensure that these systems operate only when intentionally activated by an authorized user.¹⁰⁹

57. We seek comment on eliminating, modifying, or replacing these rules. Is there any continued relevance of these transmitter control requirements in light of modern UWB device architectures, which now incorporate highly responsive digital controls, automated power management functions to conserve power, and enhanced sensing or activation mechanisms for modern devices? Is the fixed ten-second shutoff interval necessary or appropriate and, if so, should a shorter interval be considered? Or should the Commission move away from a prescribed timing requirement in favor of a more flexible, performance-based approach? More fundamentally, do contemporary UWB designs already provide sufficient safeguards to prevent unintended or continuous emissions? Would modernizing or removing manual or remote-controlled switch requirements simplify the rules and better align them with current technologies?

5. Removing Redundant Rules

58. In light of the Commission’s broader initiative to eliminate obsolete rules and reduce unnecessary regulatory burdens,¹¹⁰ we seek comment on the continued relevance of these provisions in sections 15.521 and 15.523 that appear to be less technically relevant, redundant, unnecessarily duplicative of other part 15 requirements, and otherwise do not impose any distinct technical or operational obligations on UWB devices:

¹⁰⁸ 47 CFR §§ 15.509(c), 15.510(c)(3), 15.513(c). These rules require that ground penetrating radars, wall imaging systems, through-wall imaging systems, and medical imaging systems be equipped with a manually operated switch that is accessible either directly or via remote control and that causes the transmitter to cease operation within 10 seconds of the switch being released. *Id.*

¹⁰⁹ See *First R&O*, 17 FCC Rcd at 7455, 7457, paras. 47, 57 (stating that this requirement is designed to ensure that GPRs and similar imaging systems only transmit when they are actively being used and directed at their intended target (e.g., the ground), minimizing the risk of unintended emissions and potential interference with other radio services).

¹¹⁰ See *In Re: Delete, Delete, Delete*, Public Notice, GN Docket No. 25-133, 40 FCC Rcd 1601 (2025) (seeking comment on “every rule, regulation, or guidance document that the FCC should eliminate for the purposes of alleviating unnecessary regulatory burden.”) The Commission has taken multiple subsequent actions to delete rules that it determined meet the criteria.

- Section 15.521(b) (reminding manufacturers and users of the antenna provisions in sections 15.203 and 15.204).¹¹¹
- Section 15.521(e) (stating that the frequency of maximum emission must fall within the UWB bandwidth, which is already inherent in the UWB definition and emission masks and codified in individual device rules).¹¹²
- Section 15.521(f) (reiterating that imaging systems may be used only for the functions described in section 15.503, and restating prohibitions already contained in the device-specific rules).¹¹³
- Section 15.521(j) (providing a reminder of cross-referenced requirements in section 15.505, including conducted-emission limits).¹¹⁴
- Section 15.523 (stating that measurements shall be made in accordance with the procedures defined by the Commission, which should be self-evident and is clearly set forth in part 2 of the rules).¹¹⁵

59. We seek comment on whether some or all of these provisions can be deleted, edited, or modernized to meet today's UWB environment without any undesired consequences for UWB device operations, authorization, or the protection of incumbent services. We encourage commenters to address whether any of the UWB rules we have identified serve any continuing regulatory purpose or otherwise are needed for preserving and highlighting the technical requirements applicable to UWB devices. Would removing any of these provisions reduce regulatory burdens or improve the clarity and usability of our rules? Are there any UWB rules that should be consolidated into other sections? Finally, we invite broad comment on all aspects of our UWB rules. For example, are there other UWB rules that we have not discussed that we should modernize, modify, or eliminate, and if so, why?

IV. INITIAL REGULATORY IMPACT ANALYSIS

1. Need for regulatory action

60. As discussed above, subpart F of our part 15 rules governs operation of UWB transmitters.¹¹⁶ Currently, the rules are structured to support specific categories of UWB operations.¹¹⁷ For each of these applications, the rules specify technical requirements including the frequency bands over which the UWB device may operate, any application-specific bandwidth limits, and radiated emission limits that vary by frequency band.¹¹⁸ Each type of device is subject to operational restrictions, such as limits on the types of operation permitted and the entities that are permitted to use the device.¹¹⁹ The UWB rules date to February 2002.¹²⁰ Over the past 24 years, manufactures have developed new and

¹¹¹ 47 CFR § 15.521(b).

¹¹² 47 CFR § 15.521(e). *See, e.g.*, 47 CFR § 15.503 (providing the relevant definitions), 47 CFR § 15.509 (restricting GPR and wall imaging systems' bandwidth to below 10.6 GHz) and 47 CFR § 15.510 (setting bandwidth restrictions and emission limits for through-wall imaging systems).

¹¹³ 47 CFR § 15.521(f).

¹¹⁴ 47 CFR § 15.521(j).

¹¹⁵ 47 CFR § 15.523.

¹¹⁶ 47 CFR part 15 subpart F.

¹¹⁷ 47 CFR §§ 15.509-15.519.

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ *First Report and Order* in ET Docket No. 98-153, 17 FCC Red. 7435 (2002) (*First R&O*).

innovative applications, and the technology has likewise evolved to incorporate a wider variety of waveforms than had been accounted for when the rules were first adopted. As a result, the Commission has received numerous requests for waivers of the UWB rules to support these types of devices and applications.¹²¹ The rules that we propose in this proceeding are necessary to account for the evolving uses for and importance of UWB applications that have emerged since the last comprehensive review of our UWB rules. Our proposals recognize the rulemaking petitions that have been filed and the large portfolio of UWB waiver applications that we have fielded to date and aim to improve and streamline regulatory processes, increase flexibility for stakeholders, and eliminate obsolete or redundant rules.

61. This initial regulatory impact analysis is submitted to the Office of Information and Regulatory Affairs (OIRA) for interagency review. The analysis presents an assessment of the costs and benefits, including regulatory compliance costs, associated with the proposals in this notice and is consistent with Executive Order 12866. We tentatively conclude that the rules being proposed will result in significant benefits and cost savings that outweigh associated costs, if any. We also tentatively conclude that the actions being proposed are deregulatory under Executive Order 14192.

2. Benefits and Costs

62. This Notice of Proposed Rulemaking re-examines the Commission's rules and seeks public comment on proposals to update and enhance the rules to provide greater flexibility for UWB operations. In doing so, the Notice proposes rules changes that will have an immediate cost-cutting impact on an important category of devices, while seeking comment on additional revisions that would optimize the UWB rules to keep pace with modern technologies, deployment environments, and advances in UWB modalities. Specifically, we tentatively conclude that by establishing a new UWB device category that reflects modern technology needs the Commission will be able to eliminate the need for time-consuming waivers for devices that meet the requisite technical specifications, while providing for rules that enable UWB devices to take advantage of technological innovations and still avoid harmful interference. Absent the proposed changes to the rules, assuming that the Commission would grant approximately five waivers per year on an ongoing basis, we estimate that this would save approximately \$44,000 per year in review costs for Commission staff and an additional approximately \$27,000 per year to industry participants in time saved from putting together and filing waivers with the Commission.¹²² We seek comment on these estimates.

¹²¹ *Petition of Robert Bosch LLC for Amendment of the Part 15 Subpart F Ultra-Wideband Rules*, RM-11844, at 9–10, 25–26 (filed June 18, 2019), (Bosh Petition). Bosch characterizes the Commission as regulating UWB devices primarily by waiver, noting that “virtually all UWB devices” approved for sale have required individual waivers. *Id.* at 9-10.

¹²² Based on staff analysis we anticipate that reviewing each waiver request takes approximately 80 hours, or 1/26 of a year, for a GS-12, Step 5 employee in the Washington-DC-Baltimore locality compensated at \$114,923. After adjusting to account for overhead and fringe benefits, we estimate the full annual compensation for such an employee to be approximately \$229,846. Conservatively assuming that going forward, the Commission would approve five UWB waiver requests per year, this represents $\$44,201 = \$229,846 \times 5 \text{ waivers} \times 1/26$, which we round to \$44,000. By adding a 100% overhead (including benefit) mark-up, we estimate the total compensation to be $\$114,923 \times (200\%) = \$229,846$. U.S. Department of Health and Human Services, Guidelines for Regulatory Impact Analysis 2016 at 30, https://aspe.hhs.gov/sites/default/files/migrated_legacy_files/171981/HHS_RIAGuidance.pdf.

We also suppose that a waiver request consumes an additional 40 hours of industry stakeholder time over and above a standard UWB application, split equally between a lawyer compensated at \$140.73 per hour and an engineering manager compensated at a base salary \$130.44 per hour. Therefore, industry cost savings represent $\$27,117 = (\$140.73 + \$130.44) \times 5 \text{ waivers} \times 20 \text{ hours}$, which we round to \$27,000. The Bureau of Labor Statistics reports May 2024 mean hourly wages for, respectively, telecommunications industry lawyers and architectural and engineering managers of \$96.39 per hour and \$89.34 per hour. Bureau of Labor Statistics (BLS), Occupational Employment and Wage Statistics Query System, <https://data.bls.gov/oes/#/industry/517000> (accessed May 12, 2026). According to the Bureau of Labor Statistics, as of December 2025, civilian wages and salaries averaged

63. We note that these cost savings are likely conservatively low. For example, these cost savings do not account for contemporary AI applications that do not fit existing UWB categories and a potential corresponding increase in the number of waiver applications that the Commission is likely to see if we were to maintain the current rules. Additionally, these cost savings do not account for potential additional savings that may arise from modernizing UWB technical requirements and from our comprehensive review and modernization of the UWB regulatory framework, including anticipated savings from consolidation, simplification, or removal of redundant rules. Finally, our estimates do not account for the likely benefits to innovation that are likely to result from regulations that are more up to date and in line with the current state of UWB technology. We seek comment on our assessment and, more broadly, of benefits, costs, and cost savings that may result from our proposed rules changes. We encourage commenters to submit both qualitative and quantitative assessments of the potential changes to benefits and costs.

V. PROCEDURAL MATTERS

64. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA),¹²³ requires that an agency prepare a regulatory flexibility analysis for notice-and-comment rulemaking proceedings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.”¹²⁴ Accordingly, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA), concerning potential rule and policy changes contained in this Notice of Proposed Rulemaking. The IRFA is set forth in Appendix B. The Commission invites the general public, in particular small businesses, to comment on the IRFA. Comments must be filed by the deadlines for comments on the Notice of Proposed Rulemaking indicated on the first page of this document, and must also have a separate and distinct heading designating them as responses to the IRFA.

65. *Paperwork Reduction Act Analysis.* This document contains proposed information collection(s) subject to the Paperwork Reduction Act of 1995 (PRA), 44 U.S.C. §§ 3501-3521. In addition, therefore, it does not contain any new or modified information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, 44 U.S.C. § 3506(c)(4).

66. *Providing Accountability Through Transparency Act.* Consistent with the Providing Accountability Through Transparency Act, Public Law 118-9, a summary of this document will be available on <https://www.fcc.gov/proposed-rulemakings>.¹²⁵

67. *Filing Requirements.* Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS).

- *Electronic Filers:* Comments may be filed electronically using the Internet by accessing the ECFS: <https://www.fcc.gov/ecfs>.

\$33.45/hour and benefits averaged \$15.33/hour. Using these figures, benefits constitute a markup of \$15.33/\$33.45 ~ 46%. Taking 46% for cost of benefits, we arrive at an mean hourly compensation above. See Press Release, Bureau of Labor Statistics, Employer Costs for Employee Compensation—December 2025 (March 20, 2025), <https://www.bls.gov/news.release/pdf/eccc.pdf>.

¹²³ 5 U.S.C. §§ 601 *et seq.*, as amended by the Small Business Regulatory Enforcement and Fairness Act (SBREFA), Pub. L. No. 104-121, 110 Stat. 847 (1996).

¹²⁴ *Id.* § 605(b).

¹²⁵ 5 U.S.C. § 553(b)(4). The Providing Accountability Through Transparency Act of 2023, Pub. L. No. 118-9 (2023), amended the Administrative Procedure Act to add a requirement to publish a short summary, in plain language, of each notice of proposed rulemaking.

- *Paper Filers:* Parties who choose to file by paper must file an original and one copy of each filing.
 - Filings can be sent by hand or messenger delivery, by commercial courier, or by the U.S. Postal Service. **All filings must be addressed to the Secretary, Federal Communications Commission.**
 - Hand-delivered or messenger-delivered paper filings for the Commission's Secretary are accepted between 8:00 a.m. and 4:00 p.m. by the FCC's mailing contractor at 9050 Junction Drive, Annapolis Junction, MD 20701. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
 - Commercial courier deliveries (any deliveries not by the U.S. Postal Service) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
 - Filings sent by U.S. Postal Service First-Class Mail, Priority Mail, and Priority Mail Express must be sent to 45 L Street NE, Washington, DC 20554.
- *People with Disabilities:* To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530.

68. *Ex Parte Rules.* The proceeding this Notice initiates shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.¹²⁶ Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

69. *Additional Information.* For additional information on this proceeding, contact Syed S. Hasan, Syed.Hasan@fcc.gov, (202) 418-2454.

VI. ORDERING CLAUSES

70. Accordingly, IT IS ORDERED, pursuant to sections 4(i), 301, 302, and 303 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 301, 302a, 303, and sections 1.407 and 1.411 of the Commission's Rules, 47 CFR §§ 1.407, 1.411, that this *Notice of Proposed Rulemaking* IS HEREBY ADOPTED.¹²⁷

71. IT IS FURTHER ORDERED that the Petition for Rulemaking filed by Robert Bosch LLC and the Petition for Rulemaking filed by Alliance for Automotive Innovation, Car Connectivity

¹²⁶ 47 CFR § 1.1200 *et seq.*

¹²⁷ Pursuant to Executive Order 14215, 90 Fed. Reg. 10447 (Feb. 24, 2025), this regulatory action has been determined to be significant under Executive Order 12866, 58 Fed. Reg. 51735 (Oct. 4, 1993).

Consortium, FiRa Consortium, PROFIBUS & PROFINET International / omlox, and the Ultra-Wideband Alliance ARE GRANTED.

72. IT IS FURTHER ORDERED that, pursuant to applicable procedures set forth in sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments on the Notice of Proposed Rulemaking on or before XX days following publication in the Federal Register, and replies on or before YY days following publication in the Federal Register. Comments and reply comments SHALL BE FILED in ET Docket No. 26-XX.

73. IT IS FURTHER ORDERED that the Commission's Office of the Secretary SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analyses, to the Chief Counsel for the Small Business Administration (SBA) Office of Advocacy.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

Appendix A

Proposed Rules

For the reasons set forth above, the Federal Communications Commission proposes to amend 47 CFR Part 15 as follows:

PART 15 – RADIO FREQUENCY DEVICES

1. The authority citation for Part 15 continues to read as follows:

AUTHORITY: 47 U.S.C. 154, 302a, 303, 304, 307, 336, 544a, and 549.

2. Amend § 15.503 by revising paragraph (d) to read as follows:

§ 15.503 Definitions.

* * * * *

(d) ***Ultra-wideband (UWB) transmitter.*** An intentional radiator that has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

* * * * *

3. Amend § 15.505 by revising paragraph (a) to read as follows:

§ 15.05 Cross Reference.

(a) Except where specifically stated otherwise within this subpart, the provisions of subparts A and B and of §§ 15.201 through 15.204 and 15.207 of subpart C of this part apply to unlicensed UWB intentional radiators. The provisions of §§ 15.31(c), 15.35 (c) and 15.205 do not apply to devices operated under this subpart. The provisions of Footnote US 246 to the Table of Frequency Allocations contained in § 2.106 of this chapter does not apply to devices operated under this subpart.

* * * * *

4. Amend § 15.509 by removing and reserving paragraph (b)(2):

§ 15.509 Technical requirement for ground penetrating radar and wall imaging systems.

* * * * *

(b) * * *

(b)(2) [Reserved]

* * * * *

5. Amend § 15.510 by removing and reserving paragraph (c)(2):

§ 15.510 Technical requirement for through-wall imaging systems.

* * * * *

(c) * * *

(c)(2) [Reserved]

* * * * *

6. Amend § 15.511 by removing and reserving paragraph (b)(2):

§ 15.511 Technical requirement for surveillance systems.

* * * * *

(b) * * *

(b)(2) [Reserved]

* * * * *

7. Amend §15.513 by revising paragraph (b) to read as follows:

§ 15.513 Technical requirement for medical imaging systems.

* * * * *

(b) Operation under the provisions of this section is limited to medical imaging systems used at the direction of, or under the supervision of, a licensed health care practitioner.

* * * * *

8. Amend § 15.521 by revising paragraph (a) and (d) to read as follows:

§ 15.521 Technical requirements applicable to all UWB devices.

(a) Operation onboard an aircraft, a ship not within inland waters, or a satellite is prohibited.

(b) * * *

(d) Within the tables in §§ 15.509, 15.511, 15.513, 15.515, 15.517, and 15.519, the tighter emission limit applies at the band edges. Radiated emission levels at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz or 1KHz resolution bandwidth as applicable. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time.

* * * * *

9. Removed and reserved § 15.525:

§ 15.525 Coordination requirements [Removed and Reserved]

APPENDIX B

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ the Federal Communications Commission (Commission) has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the policies and rules proposed in the *Notice of Proposed Rulemaking (NPRM)* assessing the possible significant economic impact on a substantial number of small entities. The Commission requests written public comments on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments specified on the first page of the *NPRM*. The Commission will send a copy of the *NPRM*, including this IRFA, to the Chief Counsel for the Small Business Administration (SBA) Office of Advocacy.² In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the Federal Register.³

A. Need for, and Objectives of, the Proposed Rules

74. In the *NPRM*, the Commission proposes to comprehensively modernize its Ultra-Wideband (UWB) device rules that were adopted in 2002. The existing UWB rules were intentionally restrictive and based on the technological capabilities, use cases, and measurement techniques available at that time. Over the past two decades, however, UWB technology has matured significantly and is now widely used in consumer devices, industrial automation, automotive systems, commercial, precision ranging, asset tracking, and public safety applications. UWB devices continue to operate at a very low power on a non-interference basis, and the Commission is unaware of any substantiated reports of harmful interference.

75. Despite this robust track record of UWB use cases, it is increasingly obvious that the existing rules are outdated and overly restrictive. This has resulted in repeated waiver requests for devices that are low risk, technologically consistent with UWB operations, and similar to equipment already on the market. The *NPRM*'s proposed rule changes are intended to update definitions, modernize measurement procedures, evaluate and potentially eliminate outdated operating restrictions, remove coordination requirements, and examine technical parameters so that our rules can better match modern UWB technologies.

76. The *NPRM* also proposes a new UWB device category to support emerging applications—such as locations sensing technologies, industrial automation, mobility platforms, robotics, and AI—enabled sensing systems—that do not fit neatly within the legacy classifications. Additionally, the Commission seeks comment on whether to harmonize, consolidate, or remove prescriptive requirements across subpart F of the part 15 rules, which govern the operation of UWB transmitters. Collectively, these revisions are intended to ensure regulatory clarity, reduce unnecessary burdens, and support innovation while protecting incumbent licensees, some of which are small entities, and federal users.

B. Legal Basis

77. The proposed action is authorized pursuant to sections 4(i), 301, 302, and 303 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 201, 302a, 303, and Sections 1.407 and 1.411 of the Commission's Rules.

¹ 5 U.S.C. §§ 601 *et seq.*, as amended by the Small Business Regulatory Enforcement and Fairness Act (SBREFA), Pub. L. No. 104-121, 110 Stat. 847 (1996).

² *Id.* § 603(a).

³ *Id.*

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

78. The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁴ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁵ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.⁶ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁷ The SBA establishes small business size standards that agencies are required to use when promulgating regulations relating to small businesses; agencies may establish alternative size standards for use in such programs, but must consult and obtain approval from SBA before doing so.⁸

79. Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe three broad groups of small entities that could be directly affected by our actions.⁹ In general, a small business is an independent business having fewer than 500 employees.¹⁰ These types of small businesses represent 99.9% of all businesses in the United States, which translates to 34.75 million businesses.¹¹ Next, “small organizations” are not-for-profit enterprises that are independently owned and operated and not dominant in their field.¹² While we do not have data regarding the number of non-profits that meet that criteria, over 99 percent of nonprofits have fewer than 500 employees.¹³ Finally, “small governmental jurisdictions” are defined as cities, counties, towns, townships, villages, school districts, or special districts with populations of less than fifty thousand.¹⁴ Based on the 2022 U.S. Census of Governments data, we estimate that at least 48,724 out of 90,835 local government jurisdictions have a population of less than 50,000.¹⁵

⁴ 5 U.S.C. § 603(b)(3).

⁵ *Id.* § 601(6).

⁶ *Id.* § 601(3) (incorporating by reference the definition of “small-business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

⁷ 15 U.S.C. § 632.

⁸ 13 CFR 121.903.

⁹ 5 U.S.C. § 601(3)-(6).

¹⁰ See SBA, Office of Advocacy, *Frequently Asked Questions About Small Business* (July 23, 2024), https://advocacy.sba.gov/wp-content/uploads/2024/12/Frequently-Asked-Questions-About-Small-Business_2024-508.pdf.

¹¹ *Id.*

¹² 5 U.S.C. § 601(4).

¹³ See SBA, Office of Advocacy, *Small Business Facts, Spotlight on Nonprofits* (July 2019), <https://advocacy.sba.gov/2019/07/25/small-business-facts-spotlight-on-nonprofits/>.

¹⁴ 5 U.S.C. § 601(5).

¹⁵ See U.S. Census Bureau, 2022 Census of Governments –Organization, <https://www.census.gov/data/tables/2022/econ/gus/2022-governments.html>, tables 1-11.

80. The rules proposed in the *NPRM* will apply to small entities in the industries identified in the chart below by their six-digit North American Industry Classification System (NAICS)¹⁶ codes and corresponding SBA size standard.¹⁷ Where available, we also provide additional information regarding the number of potentially affected entities in the industries identified below.

Table 1. 2022 U.S. Census Bureau Data by NAICS Code

Regulated Industry (Footnotes specify potentially affected entities within a regulated industry where applicable)	NAICS Code	SBA Size Standard	Total Firms¹⁸	Total Small Firms¹⁹	% Small Firms
Other Electric Power Generation	221118	250 employees	46	4	8.70%
Radio and Television Broadcasting and Wireless Communications Equip Manufacturing ²⁰	334220	1,250 employees	155	136	87.74%
Other Communications Equipment Manufacturing ²¹	334290	800 employees	310	294	94.84%
Automobile and Light Duty Motor Vehicle Manufacturing	336110	1,500 employees	170	126	74.12%
Aircraft Manufacturing ²²	336411	1,500 employees	234	209	89.32%
Motion Picture and Video Production	512110	\$40 million	17,547	10,960	62.46%
Radio Broadcasting Stations ²³	516110	\$47 million	2,616	2,136	81.65%

¹⁶ The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. See www.census.gov/NAICS for further details regarding the NAICS codes identified in this chart.

¹⁷ The size standards in this chart are set forth in 13 CFR 121.201, by six digit North American Industrial Classification System (NAICS) code.

¹⁸ *U.S. Census Bureau, "Selected Sectors: Employment Size of Firms for the U.S.: 2022."* Economic Census, ECN Core Statistics Economic Census: Establishment and Firm Size Statistics for the U.S., Table EC2200SIZEEMPfirm, 2025, "Selected Sectors: Sales, Value of Shipments, or Revenue Size of Firms for the U.S.: 2022." Economic Census, ECN Core Statistics Economic Census: Establishment and Firm Size Statistics for the U.S., Table EC2200SIZEREVfirm, 2025.

¹⁹ *Id.*

²⁰ Affected Entities in this industry include Part 15 Handset Manufacturers, Radio Frequency Equipment Manufacturers and Uncrewed Aircraft Radio Equipment Manufacturers.

²¹ Affected Entities in this industry include Radio Frequency Equipment Manufacturers (Non-standard specialized equipment).

²² Affected Entities in this industry include Uncrewed Aircraft Radio Equipment Manufacturers.

²³ Affected Entities in this industry include Amateur Radio Service.

Wireless Telecommunications Carriers (except Satellite) ²⁴	517112	1,500 employees	1,184	1,081	91.30%
Satellite Telecommunications ²⁵	517410	\$44 million	332	195	58.73%
All Other Telecommunications ²⁶	517810	\$40 million	1,673	1,007	60.19%
Business Associations ²⁷	813910	\$15.5 million	14,599	13,134	89.97%

Table 2. Telecommunications Service Provider Data

2025 Universal Service Monitoring Report Telecommunications Service Provider Data ²⁸ (Data as of December 2024)	SBA Size Standard (1500 Employees)		
	Total # FCC Form 499A Filers	Small Firms	% Small Entities
Affected Entity			
Specialized Mobile Radio Licenses (SMR Dispatch)	83	83	100.00
Wireless Telecommunications Carriers (except Satellite) ²⁹	608	522	85.86
Wireless Telephony ³⁰	336	262	77.98

D. Description of Economic Impact and Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

81. The RFA directs agencies to describe the economic impact of proposed rules on small entities, as well as projected reporting, recordkeeping and other compliance requirements, including an

²⁴ Affected Entities in this industry include 1670–1675 MHz Services, 2.3 GHz Wireless Communications Services, 218-219 MHz Service, 220 MHz Radio Service – Phase I and Phase II, 3650-3700 MHz Band, 39 GHz Service, 600 MHz Band, Fixed Microwave Services, Future 24 GHz Licensees, Incumbent 24 GHz Licensees, Location and Monitoring Service (LMS), Lower 700 MHz Band Licenses, Specialized Mobile Radio Licenses and Upper 700 MHz Band Licenses.

²⁵ Affected Entities in this industry include Fixed Satellite Small Transmit/Receive Earth Stations, Fixed Satellite Very Small Aperture Terminal (VSAT) Systems and Mobile Satellite Earth Stations.

²⁶ Affected Entities in this industry include Earth Stations (except Satellite Telecommunications Carriers), Non Licensee Owners of Towers and Other Infrastructure, Radar Station Operations, Satellite Telemetry Operations, Satellite Tracking Stations, Telemetry and Tracking System Operations and VoIP Service Providers (via Client-Supplied Telecommunications Connections).

²⁷ Affected Entities in this industry include Frequency Coordinators.

²⁸ Federal-State Joint Board on Universal Service, Universal Service Monitoring Report at 25, Table 1.12 (2025), <https://docs.fcc.gov/public/attachments/DOC-418505A1.pdf>.

²⁹ Affected Entities in this industry include all reporting wireless carriers and service providers.

³⁰ Affected Entities in this industry include Cellular/PCS/SMR - Specialized Mobile Radio Licensees and SMR (Dispatch).

estimate of the classes of small entities which will be subject to the requirements and the type of professional skills necessary for preparation of the report or record.³¹

82. The *NPRM* does not propose any new reporting or recordkeeping requirements and it is unlikely that small entities will need to hire professionals to comply with the proposed rules. Instead, the proposals are expected to reduce existing compliance burdens by eliminating the section 15.525 coordination requirement for UWB imaging devices, streamlining or removing outdated measurement procedures, reducing the need for waiver requests through the combination of rule changes and the creation of a new UWB device category, and consolidating duplicative labeling and marketing requirements. For example, establishing a new UWB device category that reflects modern technology needs will enable the Commission to eliminate the need for time-consuming waivers for devices that meet the requisite technical specifications. Assuming the Commission would grant approximately five waivers per year on an ongoing basis, we estimate a potential savings of \$27,000 per year to small entities and other industry participants in time saved from putting together and filing waivers with the Commission.³² We seek comment from small entities on other areas in which regulatory costs and other compliance requirements can be reduced. To the extent commenters propose alternative approaches—such as modified certification tests or operational constraints—the Commission will evaluate the impact of those alternatives on small entities.

E. Discussion of Significant Alternatives Considered That Minimize the Significant Economic Impact on Small Entities

83. The RFA directs agencies to provide a description of any significant alternatives to the proposed rules that would accomplish the stated objectives of applicable statutes, and minimize any significant economic impact on small entities.³³ The discussion is required to include alternatives such as: “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.”³⁴

84. In the *NPRM*, the Commission seeks comment on multiple approaches to minimize burdens on small entities, including whether updated definitions and measurement procedures would reduce the need for waivers and lower equipment development costs; whether eliminating certain operating restrictions—such as prohibitions on use in toys or onboard particular platforms—would remove unnecessary constraints on product design; whether consolidating or simplifying the existing prescriptive UWB device categories would provide clearer and more flexible rules for small manufacturers; whether a unified or harmonized emission framework would streamline compliance across device classes; and whether removing duplicative labeling and marketing provisions would further reduce compliance obligations.

85. The Commission also invites comment on alternative technical or operational frameworks that could provide equal or greater flexibility for small entities while ensuring continued protection for incumbent spectrum services. Small entities are encouraged to identify any significant alternatives—such as different technical limits, operational safeguards, or administrative processes—that would minimize economic impacts while achieving the *NPRM*’s goals. The Commission’s evaluation of the comments filed in this proceeding will shape the final conclusions it reaches, the final alternatives it

³¹ 5 U.S.C. § 603(b)(4).

³² See *Supra* para 62-63.

³³ 5 U.S.C. § 603(c).

³⁴ *Id.* § 603(c)(1)-(4).

considers, and the actions it ultimately takes to minimize any significant economic impact that may occur on small entities resulting from the final rules.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

None.