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**FEDERAL COMMUNICATIONS COMMISSION**

**47 CFR Part 15**

**[ET Docket No. 26-245; RM-11844; RM-12014; FCC 26-66; FR ID 372216]**

# Unleashing the Power of Unlicensed Ultra-Wideband Devices; Petition of Robert Bosch LLC for Amendment of the Part 15 Subpart F Ultra-Wideband Rules; and Petition of Alliance for Automative Innovation et al. to Amend Part 15 of the FCC's Rules to Permit the Operation of Certain Ultra-Wideband Devices

**AGENCY:** Federal Communications Commission.

**ACTION:** Proposed rule.

**SUMMARY:** The Federal Communications Commission (Commission or FCC) proposes to update its rules for Ultra-Wideband (UWB) devices to reflect significant technological developments since the rules were first adopted in 2002. UWB technology has matured into a widely used, low-power enabler that supports applications in tracking, automation, precision location, health monitoring, athletic performance, and public safety. As capabilities of UWB have expanded, the existing rules have not kept pace with the technological change, resulting in an increasing number of waiver requests received by the Commission to authorize modern devices. The Notice of Proposed Rulemaking seeks comment on revisions intended to modernize the UWB framework, provide greater flexibility for future applications, promote continued innovation, and ensure the protection of incumbent federal and non-federal spectrum users.

**DATES:** Comments are due on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]** and reply comments are due on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

**ADDRESSES:** Pursuant to §§ 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 in the DATES section. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). You may submit comments, identified by ET Docket No. 26-245, by any of the following methods:

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

- *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.

**FOR FURTHER INFORMATION CONTACT:** Syed S. Hasan of the Office of Engineering and Technology at Syed.Hasan@fcc.gov or (202) 418-2454.

**SUPPLEMENTARY INFORMATION:** This is a synopsis of the Commission's Notice of Proposed Rulemaking *(NPRM)*, in ET Docket No. 26-245, FCC 26-66, adopted on September 30, 2026, and released on October 1, 2026. The full text of this document is available for public inspection during regular business hours at Commission's headquarters 45 L Street, NE, Washington, DC 20554 or at the following Internet address: https://docs.fcc.gov/public/attachments/FCC-26-66A1.pdf.

*Paperwork Reduction Act Analysis*. This document contains proposed information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995,

Public Law 104-13. Public and agency comments are due **[INSERT 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology; and (e) way to further reduce the information collection burden on small business concerns with fewer than 25 employees. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. 3506(c)(4), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

*Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA), requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that "the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities." Accordingly, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning the potential impact of the rule and policy proposals in this document on small entities. The Commission invites the general public, particularly small businesses, to comment on the IRFA. Comments must be filed by the deadlines for comments on the Third Further Notice of Proposed Rulemaking indicated in the DATES section of this document and must have a separate and distinct heading designating them as responses to the IRFA.

*Ex Parte Presentations.* The proceeding this document initiates shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules. 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 the proceeding should familiarize themselves with the Commission's *ex parte* rules.

*Providing Accountability Through Transparency Act.* Consistent with the Providing Accountability Through Transparency Act, Public Law 1189-9, a summary of the *Notice of Proposed Rulemaking* will be available at https://www.fcc.gov/proposed-rulemakings.

*OPEN Government Data Act.* The OPEN Government Data Act requires agencies to make "public data assets" available under an open license and as "open Government data assets," i.e., in machine-readable, open format, unencumbered by use restrictions other than intellectual property rights, and based on an open standard that is maintained by a standards organization. This requirement is to be implemented "in accordance with guidance by the Director" of the OMB. The term "public data asset" means "a data asset, or part thereof, maintained by the Federal Government that has been, or may be, released to the public, including any data asset, or part thereof, subject to disclosure under [the Freedom of Information Act (FOIA)]." A "data asset" is "a collection of data elements or data sets that may be grouped together," and "data" is "recorded information, regardless of form or the media on which the data is recorded."

**SYNOPSIS**

**I. BACKGROUND**

UWB is a unique and powerful technology in the arsenal of radio applications that operate on an unlicensed basis. Designed to operating at very low power, UWB uses extremely wide radio channels

(typically 500 megahertz or more) that can determine both distance and direction over a short range with more precise accuracy than narrowband unlicensed technologies, such as Wi-Fi and Bluetooth.

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. However, UWB devices are also permitted to 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.

Subpart F of the Commission's part 15 rules governs operation of UWB transmitters. 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, operational constraints, and radiated emission limits that may vary by induvial device categories. In addition, each type of device is subject to additional restrictions, such as limits on the types of operation permitted and the entities that are permitted to use the device. 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. 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 interference, and to limit an excessive proliferation of UWB devices that nearly a quarter century ago were considered to be new and novel.

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. Subsequent orders made further modifications to the rules but did not fundamentally alter the structure of part 15, subpart F nor abandon the cautious approach the Commission had taken when permitting the first UWB operations. Over the past two decades

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 that can transmit very short, low-power pulses. Modern devices can also use chirp signals that sweep rapidly across the band. They may also employ stepped frequency or swept band techniques that move across portions of the spectrum in quick succession. As a result, the Commission has received numerous requests for waivers of the UWB rules to support these types of devices and applications, that do not conform to the rules as they exist today.

On June 18, 2019, Robert Bosch LLC filed a Petition for Rulemaking requesting that the Commission modernize the UWB rules. 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. 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. The Bosch Petition also pointed to more flexible international UWB regulations and urged greater harmonization to support innovation and global manufacturing. Twenty-four parties filed comments and four parties made *ex parte* filings addressing the petition.

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 targeted updates to the UWB rules. 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. 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. The Commission placed the petition on Public Notice which resulted in eight parties filing comments and one party filing an *ex parte* comment.

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 petitions that the Commission have fielded to date, and considering the amount of time since the last comprehensively evaluated UWB rules, the Commission initiates the rulemaking proceeding.

## II. DISCUSSION

In this document, the Commission undertakes a comprehensive review of the UWB framework to ensure that the rules are optimized to keep pace with modern technologies, deployment environments, and advances in UWB modalities. Specifically, the Commission proposes 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, the Commission proposes 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. The Commission also explores whether to establish a new class for AI-enabled UWB sensing applications. Finally, the Commission examines all existing UWB device categories to determine whether their technical, operational, eligibility, labeling, and emission related provisions remain necessary, and the Commission seeks 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.

*Modernizing Technical Rules and Requirements – UWB Transmitter Definition.* The Commission's 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." 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 frequency hopping systems, noting that no measurement procedure had been proposed, nor had the interference potential of such devices been analyzed.

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. 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. 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. The Commission believes 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. The Commission specifically notes here that it has 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. Making this rule change will remove the requirement that has hindered the development and deployment of this technology. Therefore, the Commission tentatively concludes that it 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 devices, as well as to reduce the burdens associated with the existing waiver process necessary to authorize such devices. The Commission seeks comment on its 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 the Commission eliminates 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, the Commission requests technical analysis and coexistence studies that are in line with the Commission's goals of promoting efficient use of spectrum. In evaluating revisions to the UWB transmitter definition, the Commission emphasizes that any updated definitions or measurement procedures must include sufficient technical detail to support robust coexistence assessments with Federal systems. The Commission also expects 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, the Commission wants 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.

The Commission seeks 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. The Commission also seeks comment on how this updated UWB definition aligns with ongoing work in standards bodies, such as the IEEE, and whether those efforts should inform the approach. Finally, the Commission seeks comment on whether it would need to make any additional updates to the rules for purposes of clarity and conformity.

*Measurement Procedures.* Section 15.31(c) requires swept frequency devices to be measured with the frequency sweep stopped at the frequencies selected for reporting. Separately, § 15.521(d) requires that when pulse gating 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). 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.

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. 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, 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. When the rules were first adopted, the Commission noted that the test requirements of §§ 15.31(c) and 15.521(d) were optimized for pulse-based UWB signals only and different test configurations and methodologies would be necessary to measure bandwidth for other types of UWB emissions correctly. After two decades, modern UWB devices are often designed using stepped or swept frequency or frequency hopping techniques, and because of this reason the current measurement procedure for UWB rules is out of step with the changing technologies changes.

Section 15.31(c) effectively blocks certification of swept-frequency UWB devices without a waiver because the rule was written for pulse-based systems. This issue first surfaced in 2004 when the Multi-band OFDM Alliance Special Interest Group (MBOA-SIG) requested a waiver, explaining that existing procedures did not apply to multiband OFDM systems. Through testing, MBOA-SIG showed that stepped or sequenced UWB systems posed no greater interference risk than impulse-based systems. The Commission granted the waiver and later reaffirmed that measuring such devices in their normal

operating mode does not increase interference potential, though the intended rule codification has never been completed.

In light of the Commission's intent since 2005 that the provisions of the MBOA-SIG waiver could be codified and the experience gained since that time, the Commission proposes 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.

The Commission proposes to update the UWB measurement procedures by making targeted changes to how they apply to UWB devices. First, the Commission proposes adding § 15.31(c) to the list of provisions in § 15.505(a) that do not apply to UWB devices. Because § 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 the Commission's procedures with the operation of contemporary swept-frequency UWB devices. Second, the Commission proposes modifying § 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. The Commission believes that these modifications would improve clarity, flexibility, and regulatory certainty for manufacturers, while maintaining appropriate protections for incumbent licensees and federal users.

The Commission seeks comment on whether exempting UWB devices from § 15.31(c) and allowing pulse-gated UWB devices to be measured in normal operating mode could negatively affect interference potential, including aggregate noise floor levels and coexistence with incumbent services. It also invites input on whether existing certification or technical standards, such as those from IEEE or other standards bodies, offer measurement methods that should inform its approach. The Commission asks whether alternative methods might better meet its objectives while protecting authorized services,

and how procedures should account for modern modulation techniques outside traditional UWB frameworks. Finally, it requests technical studies demonstrating that the proposed procedures would accurately evaluate device operation and ensure protection of federal systems.

*Scope of Use.* Section 15.521(a) provides that "UWB devices may not be employed for the operation of toys." In addition, "[o]peration onboard an aircraft, a ship or a satellite is prohibited." 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 the desire to proceed cautiously with the introduction of UWB devices." 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. In addition, the Commission adopted these provisions with the intention of being overly cautious while expecting that no harmful interference would occur based on the available technical analysis. 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 systems — all resulting in the same conclusion that the UWB operations will not negatively impact those systems. Given the time that has passed since these prohibitions were adopted, the Commission believes it is appropriate to revisit utility in today's UWB communications landscape.

It is clear from the steady stream of waiver requests that the Commission receives routinely and have granted in recent years that 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." 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. The Commission recognizes 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, the Commission seeks comment on technical justifications that support revising § 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, the Commission seeks 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, the Commission seeks comment on how such technical standards could vary with different UWB use cases. For example, where the Commission's rules currently prohibit UWB operation on ships, could it 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?

The Commission invites 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). The Commission notes 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 dimmish 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 the Commission implements any changes to its current UWB rules? If so, how can the Commission narrowly tailor any limitations on UWB use to account for such unique situations?

The Commission seeks comment on whether relaxing any or all its prohibitions of uses in § 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, the Commission seeks to fully understand whether and how any changes it might make to the rules would affect the ability for UWB to coexist with authorized services.

As an initial matter, the Commission notes that the term "toys" is not defined in the 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. The Commission is concerned that the lack of a clear definition may create uncertainty for manufacturers and could inadvertently discourage the development of useful UWB-enabled products. The Commission further recognizes 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. The Commission seeks comment on these observations. The Commission seeks comment on whether it 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. Were the Commission to retain a restriction on toys, are there steps it could take to limit any burdens associated with the existing prohibition? For example, should the Commission 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, the Commission seeks 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 (the center frequency of Channels 8 and 9 is 7488 MHz and 7987.2 MHz, respectively), 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 the Commission 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?

The Commission also seeks comment on the potential for expanded UWB use on ships, including operations on inland waters, as requested by the Joint Petitioners, 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, the Commission seeks comments on appropriate emission restrictions in the aeronautical and maritime bands to determine whether codifying expanded UWB operation in these environments is technically feasible and would adequately protect incumbent safety systems. Although the rules generally restrict UWB from operating on ships, the Commission also notes 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? The Commission also seeks comment whether any operational restrictions might be necessary for UWB systems to operate safely aboard vessels. For example, should the Commission 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. The Commission also seeks 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. The Commission also seeks comment on whether a blanket removal of the prohibition on UWB use on ships would be appropriate.

In addition, the Commission seeks comment on whether such operational restrictions tied to specific locations should be relaxed more broadly. The Commission 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. The Commission also seeks 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.

In addition, the Commission seeks comment on whether UWB-based autonomous drone navigation and landing systems should be permitted under the UWB rules. The Commission recognizes the emergence of commercial systems capable of high-precision, GNSS (Global Navigation Satellite System) 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 the Commission's current rules. The Commission seeks 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.

The Commission also seeks comment on expanded UWB use in aircraft and satellites. In particular, the Commission seeks comment on:

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

Commenters supporting expanded UWB use in these environments should provide detailed technical analyses, including propagation modeling, link budgets, and coexistence studies and analysis. The Commission also notes that the 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, the 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, the Commission seeks 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 § 15.521(a) in any of the ways discussed in this subsection.

*Advance Written Coordination Requirement.* Section 15.525 requires UWB imaging systems 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. 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. 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, the Commission is 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.

The Commission therefore proposes to eliminate the § 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. 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 coordination (to the extent there are any) outweigh the substantial burdens that the existing requirement creates?

*Ground Penetrating Radars.* 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* (67 FR 34852; May 16, 2002). Bosch details in its petition that virtually every significant GPR advancement has necessitated tailored relief because the rules' definitional, operational, and measurement provisions were incompatible with modern GPR designs. 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. The Commission continues to see that trend as evident by more recent waiver authorizations such as Rod Radar.

The Commission observes 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). 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.

The Commission seeks 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 technologies

*New UWB Device Category.* 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. 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. The Commission further recognizes 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.

The Commission therefore proposes to update and advance the rules by establishing a new UWB device category that reflects modern technology needs while providing a durable framework for future 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. 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, 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.

The Commission seeks 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, the Commission expects 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, the time the device is actively sending a signal represents an extremely small percentage of the day as a whole. For this reason, the Commission believes 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. The Commission seeks comment on this observation and the specific duty cycle that it should adopt. In addition, the Commission seeks 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). The Commission also seeks comment on appropriate emission limits. Should they match, exceed, or be more restrictive than the current UWB hand held device limits, and why? The Commission also seeks 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.

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; 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; Frequency Modulated Continuous Wave (FMCW) modulation used in radar and sensing applications; and stepped frequency waveforms that sequentially transmit discrete tones across a broad band. 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.

The Commission seeks 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. 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? The Commission also invites comment on whether uniform stepping, randomized stepping, or alternative optimized sweep patterns should be permitted, so long as emissions remain compliant to the rules, and whether testing must always be performed with the stepping or sweep function active to reflect real-world behavior. The Commission also seeks 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. The Commission seeks 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. The Commission also invites 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.

To the extent applicable to this proposed new device class, the Commission seeks comment on the technical parameters that Bosch proposed in 2019 for a more expansive imaging system (even though the Commission is proposing a different approach by way of the new device type). 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 location precision of 0.1 to 1 meter and a detection distance of 15-18 meters. The Commission seeks 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.

In addition, the Commission seeks 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. The Commission seeks 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, the Commission seeks comment on whether antenna requirements are necessary if duty cycle limits and emission limits alone are adopted that can adequately control interference. The Commission's goal is to ensure effective emission management while maximizing operational flexibility to support broader UWB deployment.

The Commission invites 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? The Commission also seeks comment on whether it 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?

Are there additional operational restrictions the Commission 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. Should the Commission 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? The Commission also asks whether it 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, the Commission seeks 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.

As the Commission explores ways to modernize the rules for the next generation of technology, the Commission finds 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. The Commission notes 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, the Commission also highlights that it 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. The Commission anticipates 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 the national security interest of the nation. The Commission seeks comment on these observations.

Because many contemporary AI applications do not fit existing UWB categories, the Commission seeks 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, the Commission expects 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 the Commission 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? The Commission invites 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. The Commission also seeks 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. The Commission seeks 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 the Commission consider regarding potential rules for UWB intended for AI architectures?

*Comprehensive Review and Modernization of the UWB Regulatory Framework.* As part of this comprehensive review of the UWB framework, the Commission initiates 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.

*Eligibility.* The Commission's 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. 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. 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 the Commission gains experience with this new technology." In the intervening years, increasing numbers of UWB imaging devices have been authorized for an ever-widening variety of purposes, with no record of disruption to licensed and authorized radio services. The

Commission is 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.

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, the Commission now seeks comment on whether eligibility restrictions for UWB imaging systems remain relevant and necessary. Can the Commission 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 the Commission retains use restrictions, should it modify the list of eligible professional sectors? Could the Commission adopt a 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? The Commission encourages 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? The Commission also seeks comment on how existing certified devices and associated 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." To address cases where such restrictions may no longer be consistent with rules the Commission ultimately adopts and based on such devices meeting the new technical limits the Commission ends up adopting in the proceeding, should the Commission require responsible parties for equipment authorizations to request such grant notes 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 the Commission adopt an administrative rule to provide such flexibility? In such a case, how could already-certified devices that meet any new rules the Commission adopts be differentiated from devices that may not comply with any new rules?

*Marketing and Labeling Requirement.* 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 § 2.909 of the rules) to ensure that equipment is marketed only to eligible parties. 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.
- Surveillance systems must display a notice limiting use to law enforcement, fire and rescue officials, public utilities, and certain industrial entities.
- Indoor UWB systems must display a statement restricting operation to indoor use.

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.

The Commission seeks comment on whether the marketing restrictions in § 15.507 remain necessary given that eligibility limitations are already defined in § 15.503(l) and reiterated in the device-specific rules. The Commission further seeks comment on whether the labeling requirements in §§ 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 the Commission were to adopt a unified eligibility framework, as discussed, would that affect how the Commission should address marketing and labeling? The Commission also seeks comment on what mechanisms would best ensure continued protection of incumbent services if these requirements were streamlined or consolidated, including if the Commission were to create a new consumer-grade tier of UWB devices as discussed.

*Emission Limits.* 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 § 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. 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.

In addition, UWB devices are subject to more stringent OOBE 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. 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 the Commission considers proposals to modify UWB rules, it highlights that it is not proposing any changes to the GPS protection regime and expects no change to the emissions radiating in those bands.

Furthermore, UWB categories are also subject to a uniform 0 dBm EIRP peak-emission cap within a 50 MHz bandwidth under § 15.521. As an example, handheld systems operating under § 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.

Against this backdrop, the Commission seeks comment on whether it should revisit these long-standing emission limits. Adopted more than twenty years ago, when UWB technologies were new and the 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. Given the Commission's decades of experience with UWB deployments, during which UWB devices 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, the Commission seeks 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? The Commission also seeks 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, the Commission invites 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.

*Manual or Remote-Controlled Switches and the "Ten Second" Rule.* 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. 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.

The Commission seeks 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?

*Removing Redundant Rules.* In light of the Commission's broader initiative to eliminate obsolete rules and reduce unnecessary regulatory burdens, the Commission seeks comment on the continued relevance of these provisions in §§ 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:

- Section 15.521(b) (reminding manufacturers and users of the antenna provisions in §§ 15.203 and 15.204).
- 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).
- Section 15.521(f) (reiterating that imaging systems may be used only for the functions described in § 15.503, and restating prohibitions already contained in the device-specific rules).
- Section 15.521(j) (providing a reminder of cross-referenced requirements in § 15.505, including conducted-emission limits).
- 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).

The Commission seeks 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. The Commission encourages commenters to address whether any of the identified UWB rules serve any continuing regulatory purpose or otherwise 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 the Commission's rules? Are there any UWB rules that should be consolidated into other sections? Finally, the Commission invites broad comment on all aspects of the UWB rules. For example, are there other UWB rules that the Commission have not discussed that it should modernize, modify, or eliminate, and if so, why?

*Initial Regulatory Impact Analysis – Need for Regulatory Action.* As discussed in this document, subpart F of the Commission's part 15 rules governs operation of UWB transmitters. Currently, the rules are structured to support specific categories of UWB operations. 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. 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. The UWB rules date to February 2002. Over the past 24 years, manufactures 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. As a result, the Commission has received numerous requests for waivers of the UWB rules to support these types of devices and applications. The rules that the Commission proposes in this document are necessary to account for the evolving uses for and importance of UWB applications that have emerged since the last comprehensive review of the UWB rules. The Commission's proposals recognize the rulemaking petitions that have been filed and the large portfolio of UWB waiver applications that have fielded to date and aim to improve and streamline regulatory processes, increase flexibility for stakeholders, and eliminate obsolete or redundant rules.

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 document and is consistent with Executive Order 12866. The Commission tentatively concludes that the rules being proposed will result in significant benefits and cost savings that outweigh associated costs, if any. The Commission also tentatively concludes that the actions being proposed are deregulatory under Executive Order 14192.

*Benefits and Costs.* This document 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, the Commission tentatively concludes 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, the Commission 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. The Commission seeks comment on these estimates.

The Commission notes 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 it 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 the comprehensive review and modernization of the UWB regulatory framework, including anticipated savings from consolidation, simplification, or removal of redundant rules. Finally, the Commission's 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. The Commission seeks comment on the assessment and, more broadly, of benefits, costs, and cost savings that may result from the proposed rules changes. The Commission encourages commenters to submit both qualitative and quantitative assessments of the potential changes to benefits and costs.

## III. INTIAL REGULATORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act of 1980, as amended (RFA), 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 DATES section of the document. In addition, the *NPRM* and IRFA (or summaries thereof) will be published in the *Federal Register*.

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

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.

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.

*Legal Basis*. 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 §§ 1.407 and 1.411 of the Commission's rules.

*Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply*. 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. The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction." In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act. 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. 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.

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. In general, a small business is an independent business having fewer than 500 employees. These types of small businesses represent 99.9% of all businesses in the United States, which translates to 34.75 million businesses. Next, "small organizations" are not-for-profit enterprises that are independently owned and operated and not dominant in their field. 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. Finally, "small governmental jurisdictions" are defined as cities, counties, towns, townships, villages, school districts, or special districts with populations of less than fifty thousand. 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.

The rules proposed in the *NPRM* will apply to small entities in the industries identified in the following tables: see, Table 1. 2022 U.S. Census Bureau Dada by NAICS Code and Table 2. Telecommunications Service Provider Data, by their six-digit North American Industry Classification System (NAICS) codes and corresponding SBA size standard. Additional information regarding the number of potentially affected entities in the industries is available at Appendix B of the following Internet address: https://docs.fcc.gov/public/attachments/FCC-26-66A1.pdf.

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

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 § 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. 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.

*Discussion of Significant Alternatives Considered that Minimize the Significant Economic Impact on Small Entities*. 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. 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."

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.

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

*Federal Rules that May Duplicate, overlap, or Conflict with the Proposed Rules*. None.

III. ORDERING CLAUSES

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 §§ 1.407 and 1.411 of the Commission's rules, 47 CFR 1.407, 1.411, that the *Notice of Proposed Rulemaking* IS HEREBY ADOPTED.

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

IT IS FURTHER ORDERED that, pursuant to applicable procedures set forth in §§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 **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, and replies on or before **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Comments and reply comments SHALL BE FILED in ET Docket No. 26-245.

**List of Subjects in 47 CFR Part 15**

Communications, Communications equipment, Electronic products, Telecommunications.

Federal Communications Commission.

**Marlene Dortch,**
*Secretary, Office of the Secretary.*

## Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend part 15 of Title 47 of the Code of Federal Regulations 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:

**§ 15.505 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.

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**§ 15.509 [Amended]**

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

**§ 15.510 [Amended]**

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

**§ 15.511 [Amended]**

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

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.

* * * * *

(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.

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**§ 15.525 [Removed and Reserved]**

9. Remove and reserve § 15.525.

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