■ 6. Amend § 2.911 by adding paragraph (d)(5) to read as follows:

§ 2.911 Application requirements.

* * * * *

(d) * * *

(5) The applicant shall provide a written and signed certification that, as of the date of the filing of the application, the equipment for which the applicant seeks equipment authorization through certification is not ''covered'' equipment on the Covered List established pursuant to § 1.50002 of this chapter.

* * * * *

■ 7. Amend § 2.1033 by revising paragraph (b)(1) to read as follows:

§ 2.1033 Application for certification.

* * * * *

(b) * * *

(1) The identification, by name, mailing address and telephone number or internet contact information, of the manufacturer of the device, the applicant for certification, and the responsible party as defined in § 2.909. The responsible party must be located within the United States.

* * * * *

[FR Doc. 2021–16085 Filed 8–18–21; 8:45 am]

BILLING CODE 6712–01–P

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 15

[ET Docket No. 21–264; FCC 21–83; FR ID 41217]

FCC Seeks To Enable State-of-the-Art Radar Sensors in 60 GHz Band

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Commission proposes to revise the Commission's rules to provide expanded operational flexibility to unlicensed field disturbance sensor (FDS) devices (*e.g.,* radars) that operate in the 57–64 GHz band (60 GHz band). The Commission's proposal recognizes the increasing practicality of using mobile radar devices in the 60 GHz band to perform innovative and life-saving functions, including gesture control, detection of unattended children in vehicles, and monitoring of vulnerable medical patients, and it is designed to stimulate the development of new products and services in a wide variety of areas to include, for example, personal safety, autonomous vehicles, home automation, environmental control, and healthcare monitoring, while also ensuring coexistence among unlicensed FDS devices and current and future unlicensed communications devices in the 60 GHz band.

DATES: Comments are due on or before September 20, 2021; reply comments are due on or before October 18, 2021.

ADDRESSES: You may submit comments, identified by ET Docket No. 21–264, by any of the following methods:

- *Electronic Filers:* Comments may be filed electronically using the internet by accessing the ECFS: *http://apps.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 commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 45 L Street NE, Washington, DC 20554
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID–19. See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy, Public Notice, DA 20–304 (March 19, 2020). *https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy.*

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an email to *fcc504@fcc.gov* or call the Consumer & Governmental Affairs Bureau at 202–418–0530 (voice), 202–418–0432 (TTY).

FOR FURTHER INFORMATION CONTACT: Anh Wride, Office of Engineering and Technology, 202–418–0577, *anh.wride@fcc.gov,* or Thomas Struble at 202–418–2470 or *Thomas.Struble@fcc.gov*

SUPPLEMENTARY INFORMATION: This is a summary of the Commission's Notice of Proposed Rulemaking (*NPRM*), in ET Docket No. 21–264, FCC 21–83, adopted on July 13, 2021 and released on July 14, 2021. The full text of this document is available for public inspection and can be downloaded at: *https://www.fcc.gov/document/fcc-seeks-enable-state-art-radar-sensors-60-ghz-band-0 or by using the search function for ET Docket No. 20–382 on the Commission's ECFS web page at www.fcc.gov/ecfs.*

Synopsis

Discussion. The Part 15 rules permit low-power intentional radiators (popularly known as ''unlicensed devices'') to operate without an individual license where such use is not anticipated to cause harmful interference to authorized users of the radio spectrum. Unlicensed devices in the 60 GHz band generally include indoor/outdoor communication devices such as WiGig wireless local area networking (WLAN) devices, outdoor fixed point-to-point communication links, and field disturbance sensors (FDS)—which includes radar operations. Unlicensed device users must account for the operations of authorized Federal and non-Federal users in the band, who operate under a variety of co-primary allocations. These allocations, which vary by band segment, consist of the Mobile, Fixed, Inter-Satellite, Earth-Exploration Satellite Service (EESS), Space Research, Mobile-Satellite, Radiolocation, Radionavigation, and Radionavigation-Satellite services.

Section 15.255 of the rules stipulates operational policies and technical parameters for the 60 GHz band. The rule limits FDS operations to fixed operation or when used as short-range devices for interactive motion sensing (SRIMS). Furthermore, a fixed FDS with an occupied bandwidth fully contained within the 61.0–61.5 GHz band may operate with average output power levels up to 40 dBm and peak output power levels up to 43 dBm, while all other FDS devices (including those being used for SRIMS) are limited to a maximum transmitter conducted output power not to exceed –10 dBm and a maximum EIRP level not to exceed 10 dBm.

When it first adopted § 15.255 in 1995, the Commission stated that its intent was to foster the potential of the 60 GHz band ''for allowing the development of short-range wireless radio systems with communications capabilities approaching those . . . achievable only with coaxial and optical fiber cable.'' When it finalized the rule by adopting a spectrum etiquette three years later, it also included a provision that permitted fixed FDS operation in the band.

In 2016, the Commission further expanded unlicensed device use in the

band to permit limited mobile radar operations and to extend the use of fixed field disturbance sensors to the 64–71 GHz band. At that time, the Commission recognized that wireless innovation included the development of gesture-recognition technology using short-range radars that would allow users to interact with devices without needing to touch them. It thus decided to permit SRIMS radars while also noting that the record before it was insufficient to allow for the unfettered operation of mobile radars in the band. Specifically, the Commission's decision permitted the ''narrow application of mobile radars for short-range interactive motion sensing'' at reduced power levels to ensure that they would successfully co-exist with co-channel communications devices already permitted to operate in the band. While the Commission did not adopt a specific definition for SRIMS, in permitting narrow use of short-range mobile radars it discussed the work of Google LLC (Google) in developing its ''Soli'' sensor technology, which envisioned that smartphones and other personal devices would be able to sense hand gestures when a user is located at a very short distance from the device to perform functions such as controlling web pages or answering phone calls. Furthermore, while the Commission specifically rejected comments calling on it to completely eliminate restrictions on FDS use, it also stated that it might consider allowing higher power levels in the future after it had acquired more experience with the devices it was permitting at that time.

Since the 2016 decision, there has been continued interest in developing mobile radar applications that use the 60 GHz band. To date, the Commission's Office of Engineering and Technology (OET) has granted focused waivers of the rules to support discrete applications. First, Google requested a waiver of the emission limits to allow Soli radar devices to operate at a higher output power level than what had been authorized in the rulemaking, arguing that it had determined that higher power levels were necessary for the radar sensor to provide sufficient resolution to engage in effective interactions. In its 2018 order granting that waiver, which was limited to use of the specific Soli sensor described in Google's request, OET found that allowing Google Soli sensors to operate at the requested power levels would not materially change the operating environment in the 57–64 GHz band from the perspective of the other users in the band. Specifically, it determined that the higher-power Google Soli device would be able to cooperatively share this spectrum with all users. The waiver permitted Google to deploy its Soli sensor technology at 10 dBm peak transmitter conducted output power, 13 dBm peak EIRP level, and 13 dBm/MHz power spectral density, with a maximum 10% duty cycle in any 33 milliseconds (ms) interval. This represented a lesser peak power limit than Google had originally sought, as it had revised its request following discussions with other parties who had interests in using the band for unlicensed operations, such as Facebook, in an effort to facilitate coexistence between unlicensed users in the band.

Recently, OET granted waivers to several parties to permit the operation of vehicle cabin-mounted radars as well as health-care related and other applications in the 57–64 GHz range at the same power levels as those granted to Google in 2018. These narrowly tailored waivers support an especially compelling public interest—using radar technology to monitor for children left in dangerous, hot cars and to trigger alerts that could save lives. While radars operating under these waivers must be installed within the vehicle cabin and have the primary function of preventing children from inadvertently being left unattended in rear car seats, they are also expected to provide additional passenger safety and theft prevention benefits. In addition, OET granted a waiver to Leica Geosystems AG in July 2020 that allows a limited number of radars to operate in the 60–64 GHz band on specialized unmanned aircraft for the specific purpose of avoiding collisions with structures, supporting wires, or other fixed objects during the visual inspection of structures.

Applications such as the use of in-cabin automotive radars represent one of the many uses that parties have identified as being well suited for development in the 57–71 GHz band if the § 15.255 rules were amended to permit expanded mobile radar use. The Commission has received additional waiver requests asking for permission, for example, to install a radar on the exterior of a vehicle to enable closure of a door by the detection of foot movement or hand gestures; to operate 60 GHz radars in robotic lawn mowers, or in personal safety wall-mount devices to detect changes in a person's gait or a fall, and in 3D imaging equipment in healthcare environments. In general, these requests have been consistent with the same technical parameters as the waiver granted to Google and are represented to occupy the same ''spectrum footprint'' as the Soli device. The increased interest in use of the band and accompanying breadth of potential applications that parties have identified is a relatively recent development, attributable at least in part, the Commission believes, to the availability of mass-produced chipsets that are capable of operating in the band, as well as the prospect of marketing and operating these mobile radar devices on a broad international scale.

To that end, the Commission notes that operation at higher power than specified in the Commission's rules has been allowed in Europe under general rules for short-range devices. A European Telecommunications Standards Institute (ETSI) standard, which has been in effect since 2014, permits short-range devices to operate in a portion of the 57–71 GHz band at power levels that exceed those for FDS—including those operating as SRIMS—under § 15.255 of the Commission's rules. Specifically, ETSI Standard EN 305 550 permits operation of short-range devices in the 57–64 GHz band at up to 20 dBm mean EIRP, while § 15.255(c)(3) presently specifies that the peak EIRP level for FDS devices shall not exceed 10 dBm. ETSI EN 305 550 also permits a maximum transmitter output power of 10 dBm, which is 20 dB greater than the level that § 15.255(c)(3) permits in this band. There are some additional differences between the US and European approaches. For example, the ETSI power limits are based on average measurements, whereas the Commission's limits are based on peak power measurements. In addition, ETSI EN 305 550 also requires short-range devices in the 57–64 GHz band to comply with a power spectral density (PSD) limit of 13 dBm/MHz, which the Commission's rules do not include. Finally, unlike the U.S, ETSI does not have a separate provision that allows for higher EIRP levels of up to 40 dBm for FDS in the 61.0–61.5 GHz band, nor does it provide for operation in the 64–71 GHz band.

The protocols for wireless systems operating in the 60 GHz band within the U.S. have been established by the Institute of Electrical and Electronics Engineers (IEEE) 802.11 Standards Committee. These protocols are often referred to as ''WiGig,'' named for the former Wireless Gigabit Alliance which advocated for their development. The current IEEE 802.11ad standard allows for channel sizes of up to 2.16 gigahertz in the 60 GHz band, which support a data rate of up to 8 gigabits per second and permits a total of six channels in the 57–71 GHz band available in the United States. Furthermore, there are

IEEE 802.11 working groups with ongoing activities to define the channel access protocols to enable the same 60 GHz system transmitting communication signals to transmit radar signals.

The ongoing interest in expanding the scope of permissible unlicensed operations in the 60 GHz band has prompted interested parties to form a 60 GHz Coexistence Study Group that has been looking into ways to accommodate both unlicensed communications device and FDS operations in the band. This group, which has attracted the active participation of many key members of the industry and meets on a regular basis, operates independently of the Commission. Members of this group, however, have submitted comments and *ex parte* filings in conjunction with many of the recent waiver proceedings. In general, these submissions have documented the parties' interest in 60 GHz unlicensed operations and have encouraged us to initiate a rulemaking proceeding to review § 15.255 of the Commission's rules with a goal of putting into place a new framework to promote further innovation in the 60 GHz band by both unlicensed communications and FDS operations.

Finally, the 2020 panel of the FCC's Technological Advisory Council (TAC) took notice of the 60 GHz Coexistence Study Group when its Future of Unlicensed Operations working group examined ways to improve regulations for the 60 GHz band. As part of the TAC's January 14, 2021 meeting, the working group recommended that the Commission initiate a rulemaking proceeding to examine the 60 GHz rules in § 15.255 to address issues raised by the numerous waiver requests that had been filed.

Discussion. The Commission believes that there are significant benefits in initiating this rulemaking proceeding, and the Commission agrees with the TAC and other parties that have urged us to comprehensively evaluate unlicensed operations under § 15.255 of the Commission's rules. The Commission realizes that past individual waivers have served as an important ''relief valve'' that allow for unique types of operations that have important public interest benefits and that do not result in harmful interference to incumbent licensed users or jeopardize coexistence with other unlicensed users but do not comply with the Commission's rules. However, they are an inappropriate mechanism for providing the type of broad-based relief that the Commission considers here. Together, the overwhelming interest in FDS operations in the 60 GHz band, the breadth of deployments that parties have identified, and the opportunities for innovation that will be made possible by the availability of relatively inexpensive application-agnostic FDS-capable chipsets make the Commission's initiation of a rulemaking proceeding both timely and appropriate. In recognition that unencumbered unlicensed operation has proven to be an especially powerful engine for innovation and economic growth, the Commission's proposals are designed to expand the opportunities for unlicensed FDS operations in the band to the greatest extent possible. At the same time, the Commission's proposals are also designed to provide assurance that the unlicensed communications devices that have been permitted to use the band since it was first made available for unlicensed operations will be able to coexist with these new unlicensed operations. And, in all cases, the Commission's proposals remain true to the bedrock principle that unlicensed devices, regardless of type, must not cause harmful interference to authorized users of the band.

In this NPRM, the Commission proposes targeted changes to § 15.255 of the Commission's rules to expand unlicensed FDS device operations in the 60 GHz band. First, the Commission proposes that all FDS devices that limit their operating frequencies to the 57–64 GHz portion of the band would be permitted to transmit at a maximum of 20 dBm average EIRP, 13 dBm/MHz average EIRP power spectral density, and 10 dBm transmitter conducted output power, along with a maximum 10% duty cycle restriction within any 33 ms interval. FDS devices will be able to continue to operate across the entire 57–71 GHz band at the 10 dBm EIRP and –10 dBm conducted output power limits specified in the Commission's existing rules. By streamlining the Commission's rules in this manner, the Commission would no longer need the special provisions for short-range interactive motion-sensing mobile radars (*i.e.* SRIMS) that are contained in the Commission's existing rules. Second, the Commission also proposes to retain and potentially to expand on the provision of § 15.255(c)(2) allowing fixed FDS devices that contain their operating bandwidth to the 61.0–61.5 GHz band to transmit at 40 dBm average EIRP and 43 dBm peak EIRP. Finally, the Commission seeks comment on methods to enhance coexistence (*e.g.,* listen-before-talk or other spectrum sensing/contention avoidance capabilities) that could be used to allow the same power level for FDS devices as is currently permitted for 60 GHz communication devices (up to 40 dBm EIRP) across the entire 57–71 GHz band. The Commission is not proposing any rule revisions for existing unlicensed communication devices such as WiGig WLAN or fixed point-to-point wireless links that currently operate in the 57–71 GHz band. However, the Commission seek comment on whether there are particular provisions that the Commission is proposing for FDS operation, such as an antenna gain limit instead of a conducted power limit and requiring use of a spectrum sensing mechanism, that should be more broadly applied to all Part 15 devices operating in the 57–71 GHz band.

The Commission notes that the TAC's Future of Unlicensed Operations working group suggested the Commission seek comment on whether the rules should allow greater radiated power for radar applications, if the parameters of the Google Soli waiver should be incorporated into the rules, and whether there are changes to the conditions and technical requirements set forth in the recent waivers that would improve sharing with communications applications. It further suggested that the Commission ask whether the use of a contention-based protocol should be required, and whether 60 GHz band unlicensed radar applications should be allowed to use the same power levels as communications applications in the band if they incorporate listen-before-talk procedures. The Commission invites commenters to address these specific questions.

As an initial matter, given that the Commission refers to both FDS and radars extensively throughout this document, the Commission addresses the relationship between the two terms. Field disturbance sensors broadly include radar operations. Although § 15.3(l) of the Commission's rules provides a definition for ''field disturbance sensor,'' it does not provide a definition for ''radar,'' and instead parties must look to the radar definition contained in § 2.1 of the Commission's rules. The Commission seeks comment on whether the rules related to ''field disturbance sensors'' in § 15.255 are sufficiently broad and flexible to accommodate the class(es) of devices that parties anticipate will be developed to operate in the 57–71 GHz band. The Commission also seeks comment on whether the Commission should modify the definitions contained in Part 15 of the Commission's rules to provide greater clarity about the relationship between FDS and radars and, if so, how? Commenters that support modifying the

existing Part 15 definitions should also address whether such modifications would require adjustments elsewhere in the rules.

As noted above, a number of parties have been granted waiver of certain provisions of § 15.255 to permit operation of innovative radar devices in the 60 GHz band. To the extent the Commission modifies its rules in this proceeding to expand unlicensed FDS device operations in the 60 GHz band, the Commission expects that all future 60 GHz FDS operations would be conducted subject to the Commission's modified rules. Accordingly, the Commission proposes that if the Commission adopts such modifications to the Commission's rules in this proceeding, the previously granted 60 GHz FDS waivers would be terminated and FDS device manufacturers would be expected to conform their operations to the Commission's rules as revised. The Commission seeks comment on this proposal.

The Commission first proposes to modify § 15.255 of the Commission's rules to afford greater opportunities for fixed and mobile FDS devices operating in the 57–64 GHz portion of the 60 GHz band. The extensive analysis that has accompanied the multiple waiver requests that have been submitted to the Commission, the widespread consumer use of Google's Soli-equipped devices without reported cases of harmful interference and the ongoing efforts of the industry and standards groups to identify model coexistence practices for unlicensed users gives us confidence that there is now sufficient information for us to build a record to expand unlicensed mobile radar use beyond the toehold the Commission first provided in 2016 and the narrow waivers that have been issued to date. The Commission's baseline proposals draw from the technical and operating conditions incorporated into the waivers granted to Google for its Soli device and to automobile manufacturers and suppliers for in-cabin radars to detect children left in cars, with additional modifications to account for harmonization with international provisions governing operation in the band.

As discussed below, the Commission proposes to: Focus device operation to the 57–64 GHz portion of the 60 GHz band; allow operations at higher power levels than were permitted in the waivers but consistent with the well-established ETSI standards; and require a duty cycle that is consistent with what was established in the Google waiver, with the possibility of mandating a minimum off-time between cycles.

Based on the Commission's review of the multiple waiver requests that pertain to FDS use of the 60 GHz band, parties designing and manufacturing radars to operate in the 60 GHz band have proposed to restrict their spectrum usage to frequencies below 64 GHz (constituting the 60–64 GHz or 57–64 GHz band segments, depending on the filing), although § 15.255 permits operation across the 57–71 GHz band for fixed FDS and SRIMS devices such as the Google Soli. The Commission surmises that the requests seek to limit operation to the lower portion of the 57–71 GHz band to align operations and devices with international standards such as the European ETSI Harmonized Standard EN 305 550 that restrict short-range devices, *e.g.,* radars, to the 57–64 GHz band. The Commission seeks comment on this assumption.

The Commission notes that a proposal has been submitted to IEEE 802.11 to define a channel access protocol to enable the same 60 GHz systems to transmit signals that can be used both for communications and radar purposes to be decoded by a similar system at the receiving end. Equipment designs for 60 GHz transmitters are thus considering radar transmissions alongside communication transmissions in the same transmitter or chip. While the IEEE efforts in this area may be considering the entire 57–71 GHz band, the Commission proposes to limit operation of FDS devices operating under the Commission's proposed higher power limits (20 dBm EIRP) to the 57–64 GHz band. As discussed above, limiting the Commission's proposal in this way provides for devices that are consistent with the international standards, which only specify FDS operation in the 57–64 GHz band. The Commission seeks comment on this proposal. Would limiting operation of higher power FDS devices to the 57–64 GHz band benefit 60 GHz WLAN systems operating in close proximity to FDS devices by leaving the 64–71 GHz band clear of higher power FDS operations? The Commission seeks comment on whether, alternatively, the Commission should allow the proposed FDS operation across all of the 57–71 GHz band or some other segment of the band. If the Commission were to allow the proposed FDS operation across the entire 57–71 GHz frequency range under the proposed requirements discussed below—which include a duty cycle limit—should the Commission remove the current provision that permits operation in this band at 10 dBm EIRP with no duty cycle limit? Should the Commission modify the Commission's rules in any other respect? The Commission also seeks comment on the benefits or costs of these proposed changes with respect to 60 GHz authorized users. Parties that oppose these proposed rules should cite specific harms that they believe would result from changing the rules.

EIRP Limits. The current rules permit FDS devices to operate at a maximum 10 dBm EIRP. All of the waiver requests the Commission received requested a maximum of 13 dBm EIRP to provide greater accuracy and finer resolution imaging. Subsequent waiver requests to Google's waiver described the intended target detection to be either in the sub-millimeter range such as the breathing patterns of a child in a car seat, or as in the case of Leica Geosystems AG, thin cables as small as 2.5 mm in diameter; thus, requesters argue that 60 GHz FDS devices need higher power than specified in the rules, because the existing power levels do not allow the devices to provide the necessary accuracy in detection of small-size targets due to poor signal-to-noise ratio.

The Commission proposes to allow FDS devices to operate at no more than 20 dBm average EIRP. This proposed EIRP limit is higher than the level requested in the multiple waivers that the Commission received; however, it is consistent with ETSI EN 305 550. The Commission believes this EIRP level will promote additional growth for new FDS applications beyond those anticipated to be deployed under the Commission's issued and pending waiver requests. The Commission also believes that harmonization with other regions will likely increase efficiency for American manufacturers by reducing design and manufacturing costs. The Commission further believes that this EIRP limit will not cause harmful interference to authorized services in the band. These radars will operate at a comparatively much lower EIRP level than what is already permitted for communication devices (indoors and outdoors) in the same frequency band. Communication devices such as 60 GHz WLAN devices can operate at up to 40 dBm EIRP, as compared to the 20 dBm EIRP limit that the Commission is proposing for radars. The Commission notes that a WLAN device may already have to operate in the presence of signals from neighboring WLAN devices and other Part 15 devices operating at similar power levels; thus the proposed lower EIRP limit for FDS devices should have little or no effect on the operational environment that WLAN devices can expect under the Commission's rules. The Commission also observes that 60 GHz WLAN

devices have operated at this EIRP limit (*i.e.,* 40 dBm average/43 dBm peak) for several years without causing harmful interference to other authorized services, such as the Passive EESS operating at 57–59.3 GHz. In addition, the IEEE 802.11 standards group's activity to define channel access protocols to allow transmission of radar signals alongside communication signals may allow coexistence of both signals in the 60 GHz band. The Commission seeks comment on the proposed EIRP level for FDS devices and on the Commission's tentative interference assessment. The Commission also seeks comment on the state of standards development — specifically, with respect to coexistence issues between radar signals and communications signals. Should the Commission specify any coexistence measures or requirements, such as listen-before-talk in its rules? Does the fact that many radars are mobile mean that they will not be used in close proximity to communication devices for extended periods of time, thus limiting any potential for causing interference to short durations? Further, the Commission seeks comment on the benefits or costs of the proposed change to the EIRP limit with respect to 60 GHz authorized users. How would this change, if adopted, benefit stakeholders, consumers and others? Parties that oppose these proposed rules should: Cite specific harms that they believe will result from changing the rules in the manner proposed, estimate the costs of such potential harms, and specify under what parameters they believe radar systems can coexist with communications systems in the band.

Because 60 GHz FDS devices will need to coexist with 60 GHz communications devices, the Commission also seeks comment on the state of development in the 60 GHz communications device ecosystem. What is the current state of deployment of 60 GHz communications systems? What use cases are supported by 60 GHz communications systems today, and what use cases are contemplated for these systems in the future? Do 60 GHz communications systems generally take advantage of the higher EIRP limits permitted under the Commission's rules? Facebook, Intel, and Qualcomm assert that the 60 GHz band will be used by unlicensed devices for latency-sensitive augmented reality/virtual reality/extended reality (AR/VR/XR) applications. Is this likely to be a widely-deployed use case in the 60 GHz band? Do AR/VR/XR applications present distinct interference scenarios or raise other considerations compared to other 60 GHz WLAN applications? Do 60 GHz unlicensed communications systems operate throughout the entirety of the 60 GHz band? Could these systems operate effectively in a subsection of the overall band, for example, the 64–71 GHz band segment?

Transmitter Conducted Output Power Limit. The rules currently permit FDS devices to operate at a maximum –10 dBm transmitter conducted output power, whereas 60 GHz WLAN devices are allowed up to 27 dBm. The Commission proposes to allow FDS devices to operate at a maximum 10 dBm conducted output power, consistent with the waivers the Commission has already granted in the band. The Commission notes that the ETSI standard specifies the conducted output power as a mean (average) limit, rather than a peak limit as the Commission's rules do. The Commission seeks input on whether the Commission should consider average transmitter conducted output power limit and what impact this would have on the different types of FDS devices (*e.g.,* FMCW, pulse, etc.). On the other hand, the Commission notes that for 60 GHz transmitters, including communications and radar devices, that are implemented at the chip level, access to the transmitter output port may not be available, rendering a demonstration of compliance to this requirement burdensome. The Commission seeks input on whether this requirement is necessary in view of the technological evolution of such system-on-chip devices. A 10 dBm transmitter conducted output power limit along with a 20 dBm EIRP limit implies a limit on transmit antenna gain. The Commission inquires as to whether the transmitter conducted output power limit instead should be replaced by an antenna gain limit. If so, what limit would be appropriate? Should an antenna gain limit be applied to all 60 GHz transmitters, including 60 GHz communication devices, since these devices also have transmitters implemented at the chip level, and thus would encounter the same measurement difficulties? The Commission also seeks comment on whether a transmitter conducted output limit is necessary for 60 GHz transmitters, including communications and radar devices. The Commission seeks input on this issue in order to develop a comprehensive record. The Commission also seeks comment on the benefits or costs of the proposed change to the transmitter conducted output power with respect to 60 GHz authorized users. Proponents of such a change should provide specific details regarding measurement difficulties than might be encountered for system-on-a-chip devices as well as details on what maximum antenna gain they believe should be specified and whether there are circumstances under which that gain can be exceeded (*e.g.,* with a corresponding EIRP reduction).

Power Spectral Density Limit. The existing rules do not restrict the power spectral density for 60 GHz devices. The Commission proposes to require a 13 dBm/MHz EIRP power spectral density on FDS devices, to be consistent with the ETSI limit. This is the same restriction the Commission placed on Google and other parties operating FDS devices pursuant to Commission issued waivers. The Commission seeks comment on the proposed power spectral density limit. Is there a need for a power spectral density limit, and if so, what is the appropriate limit and for which types of devices should it apply? For example, would a power spectral density limit be necessary for FDS devices using frequency-modulated continuous wave (FMCW), or pulse/impulse transmissions? Although the Commission is mindful of harmonizing the technical rules that the Commission adopts with the existing ETSI standards, the Commission seeks input and technical analyses on the utility of this proposed requirement. FMCW sensors generally modulate their transmission over a frequency band in order to obtain the necessary target resolution. At any given time, FMCW sensor emissions are limited to a small portion of the spectrum. As such, implementing a PSD limit appears to be an appropriate measure for spectrum sharing for these types of sensors. The Commission seeks comment on whether a PSD limit alone is a sufficient power limit to facilitate sharing between field disturbance sensors and communication devices. Are there other FDS modulation techniques that would benefit from a power spectral density limit? The Commission also seeks comment on the benefits or costs of the proposed power spectral density limit for FDS devices with respect to 60 GHz authorized users. If the Commission does not adopt a power spectral density limit, what are the ramifications if devices are permitted to operate with all of their energy concentrated in a narrow bandwidth? Parties that oppose these proposed rules should cite specific harms that they believe would result by imposing a power spectral density requirement.

The Commission notes that the EIRP, transmitter conducted output power, and power density limits proposed here

are consistent with those stipulated by the ETSI standard EN 305 550. This standard has been in existence since 2014, thus these limits have been tested and deployed in other geographic regions with similar spectrum allocations. In fact, ETSI released an updated draft of this standard in 2017 and did not recommend changes to the limits. Thus, it appears that these proposed power levels have been successful in providing an environment that supports robust sharing of the 60 GHz spectrum among various users as the Commission is proposing to allow here. The Commission seeks comment on this view. The Commission also seeks input on the development status of the draft 2017 ETSI EN 305 550 Standard with respect to the technical parameters the Commission is proposing herein. The Commission understands that ETSI is undertaking a major revision of EN 305 550 to address receiver performance parameters, which the 2014 Harmonized version did not address. The Commission seek comment on the status of this revision and what changes to the specification are anticipated. In light of this ongoing revision, are changes to the Commission's proposed rules warranted? To develop a comprehensive record, the Commission seeks input on current or planned standards, both domestic and international, regarding operation of FDS devices in the 57–71 GHz band, or any subset frequency band thereof. In addition, because radar resolution is generally dependent on bandwidth, the Commission seeks comment on whether the proposed rules will provide the sufficient resolution over the ranges needed for the applications envisioned for radars in the 60 GHz band.

Peak vs. Average Power Limits. The Commission notes that, except for fixed FDS devices that contain their operating bandwidth within the 61.0–61.5 GHz band, the existing rules for FDS devices do not specify an average power limit, but instead only a peak or maximum power limit, unlike the power limits for 60 GHz communications devices, where the Commission specifies both an average EIRP and a peak EIRP of 3 dB above the average limit. The Commission observes that 60 GHz FDS and radar devices will mostly use constant-amplitude continuous-wave (CW), frequency-modulated continuous wave (FMCW), or pulse/impulse transmissions. If the limits are applied only during active transmission (*i.e.,* only over the chirp or pulse duration), then the peak and the average signals will be equivalent. The Commission further notes that by specifying the limits only in terms of average power, potential measurement instrument desensitization phenomena can be avoided. The Commission proposes to define the power limits for FDS/radar devices in terms of average power and seek comment on the benefits of such a measurement. Are there consequences to specifying average power measurements rather than peak with respect to the potential to cause harmful interference to authorized users, or for unlicensed radar systems to coexist with unlicensed communications systems? Those who believe that such a change might result in harmful interference should estimate the costs of such interference. Would this change impact passive EESS users in the 57–59.3 GHz band? Are there are other possible FDS/radar modulation techniques that would make requiring a peak power limit necessary?

The existing rules do not place a duty cycle restriction on 60 GHz devices. Similarly, the ETSI EN 305 550 standard does not stipulate a duty cycle limit for 60 GHz short-range devices; however, the standard does specify requirements for 60 GHz receivers to ensure that they can adequately handle interferer signals. The Commission imposed a 10% duty cycle limit in the *Google Waiver Order* and subsequent waivers for 60 GHz FDS devices operating under higher emission limits than permitted in the rules. This 10% duty cycle is based on a maximum 3.3 ms transmission time in every 33 ms interval and was derived from Google's 2018 final agreement with stakeholders from the WLAN communications industry whose technology operates in the 60 GHz spectrum. The Commission proposes to require the same duty cycle restriction as that imposed in the multiple waivers.

However, the Commission notes that in some of the waiver requests, parties asked for a longer transmission time frame. The Commission further notes certain parties recommend modifying the duty cycle restriction adopted in the waivers to read that ''any radar off-time period between two successive radar pulses that is less than 2 ms shall be considered 'on time' for purposes of computing the duty cycle.'' These parties express concern that the duty cycle requirement in the waivers will not promote coexistence with communications applications, including AR/VR/XR communication devices which require very high data throughput and very low latency. They point out that the 10% duty cycle requirement could lead to certain radars transmitting very short bursts (in microsecond durations) followed by similarly short silent periods (also in the microsecond durations) during the entire total 33 ms interval. This would result in interspersed, non-contiguous microsecond short silent intervals during which 60 GHz AR/VR communication devices may have difficulty accessing the spectrum due to the briefness of the radars' quiet intervals; yet, when added together, the total amount of transmission time and silent intervals would comply with the ''10% on, 90% off'' definition of a 10% duty cycle.

On the other hand, other parties indicate that ''regulatory guarantees of such latency targets would substantially degrade performance of FMCW radars, which generally need to transmit frequent chirps (to prevent velocity aliasing) and span a sufficient burst time to enable good velocity resolution.'' These parties argue that a duty cycle rule restricting radars to ''guarantee that at least 99% of WiGig packets experience on-air latency of no more than a few milliseconds'' would be unnecessary due to ''radars' low transmission power, low potential to generate interference, and antenna directionality, as well as propagation loss in the 60 GHz band.'' A regulatory latency target will have a similar impact on pulse radars as well, as the radar's observable maximum velocity and velocity resolution both depend on the pulse repetition frequency. As such, should duty cycle be defined differently for radar systems with different modulation techniques (FMCW, pulse, etc.) operating on different time scales? On the other hand, in view of these apparent limitations with respect to maximum velocity and velocity resolution, is duty cycle a suitable parameter for regulation? Can limiting peak and average power within a defined band be a better approach than specifying a duty cycle? If regulating the duty cycle is necessary, then how should it be defined? The Commission seeks comment and technical input on appropriate parameters for regulation including definition/characterization of the duty cycle with respect to radar devices. The Commission seeks input on this issue to maximize the efficiency of both communications and radar operations without unduly degrading the operating environment for unlicensed users of the band or causing harmful interference to authorized users in the band. The Commission also seeks comment on whether radar signals could mimic the spectrum access protocols of communications devices to appear like any other communication signal thereby making a duty cycle restriction unnecessary. The

Commission seeks comment on whether the recent activities in the IEEE standards group examining channel access protocols that would enable the same 60 GHz system transmitting communication signals to transmit radar signals address this issue. Commenters should provide technical detail, studies and analyses supporting their position on how a duty cycle requirement for FDS devices should be specified.

The Commission notes that the 60 GHz Co-existence Study Group's activities have been geared toward developing ''a consensus approach'' to a framework for a potential Commission rulemaking, with discussions concerning duty cycles; transmission on- and off-times; operating bandwidth and channelization (*e.g.,* radar implementations with 2-gigahertz, 4-gigahertz, 7-gigahertz-bandwidth); contention-based protocols; transmit power; and antenna gain.'' Although representatives from the 60CSG recently informed us that the group has yet to achieve consensus on a recommended regulatory approach to accomplish coexistence among the diverse operations in the 60 GHz band, they also described several potential ''frameworks'' for further unlicensed development in this frequency range. These include establishing a single rule for radar operations in the 57–64 GHz portion of the 60 GHz band, establishing a rule based on average power and/or average PSD limits that draws from the ETSI EN 305 550 standard, taking a channelization approach to radars in the 60 GHz band, and amending the rules to reflect different categories of technologies that operate in the 60 GHz band, such as allowing for different operating parameters when operating in a vehicle, indoors, or outdoors, or between implementations that are fixed, mobile, or portable. The Commission seeks comment on the 60 GHz CSG filing. What are the technical trade-offs and cost/benefits for each framework? What parts of these four frameworks can the Commission incorporate into the Commission's final rules to optimize the benefits and minimize the costs to all authorized 60 GHz users, and help us achieve the Commission's objective of fostering a greater variety of unlicensed uses in the 60 GHz band? The Commission also seeks input on the work results of any other coexistence standards activities (international and domestic) and/or cooperative works between communications and FDS study groups that may have taken place, and how such work may inform the Commission's proposals to expand unlicensed use of the band.

Because the Commission is proposing to permit fixed and mobile radars to operate in the 60 GHz band, the Commission believes it is no longer necessary to qualify an application as SRIMS to operate as a mobile radar under § 15.255. The Commission therefore proposes to remove this designation from the rules and replace it with the general designation of FDS devices for both fixed and mobile radars. As indicated, when adopting the rule for SRIMS, the Commission stated that it intended it to be a narrow application of mobile radar use, while continuing to prohibit general mobile radar use in § 15.255. As such, the Commission did not adopt a definition for SRIMS. Over the last few years, there has been much confusion on which 60 GHz mobile and fixed radar applications should qualify under the SRIMS designation. The Commission also requested input in response to the multiple 60 GHz waiver requests but was not able to make a bright-line determination for certain applications. The Commission seeks comment on the proposal to remove the SRIMS exception from § 15.255 and replace it with general rules covering all FDS devices. The Commission also seeks comment on the benefits or costs of this proposal with respect to 60 GHz authorized users. Parties that oppose removing the SRIMS designation from the rules should cite specific harms that they believe would result from making this change to the rules.

The Commission next addresses § 15.255(c)(2) of its rules, which permits a fixed FDS device to operate at up to 40 dBm average EIRP and at up to 43 dBm peak EIRP in the 61.0–61.5 GHz band segment. Under this rule, a fixed FDS device's occupied bandwidth must be fully contained within the 500-megahertz bandwidth of the 61.0–61.5 GHz band; and it must attenuate its signals outside the 61.0–61.5 GHz band, but still within the 57–71 GHz band, to less than 10 dBm average EIRP and 13 dBm peak EIRP. The Commission believes that this rule is valuable insofar that it permits the operation of fixed FDS devices at power levels as high as communication devices, albeit restricted to a more narrow operating bandwidth, without being restricted to a specific duty cycle limit. As such, the Commission proposes to retain § 15.255(c)(2) but also seeks comment on whether the Commission should expand this provision to apply to both fixed and mobile FDS applications. The Commission seeks comment on how useful this 500-megahertz bandwidth provision has been in practice in facilitating FDS device deployment, given that radars typically achieve better resolution with a wider bandwidth. What FDS applications currently are being enabled using the higher power levels permitted in the 61.0–61.5 GHz band? Could the Commission expect that expanding § 15.255(c)(2) would result in new mobile FDS applications, and if so would they perform functions that otherwise would not be possible under the existing rules? How would expanding the rule affect the spectrum environment for all users of the band? What costs and benefits would be associated with such an action? In particular, the Commission seeks comment and technical analyses on these issues to develop a comprehensive record.

Section 15.255(c)(2) requires the average power of any emission outside of the 61.0–61.5 GHz band, measured during the transmit interval, to be less than or equal to 10 dBm, and similarly the peak power of any emission to be less than or equal to 13 dBm. Because no measurement bandwidth is currently specified in the rule, the Commission seeks comment on whether this requirement is sufficiently specific. Should these limits be specified in terms of power spectral density (PSD)? If so, what are the required peak and average power densities outside of the 61.0–61.5 GHz band? The reference bandwidth that the Commission often uses for specification of the spurious domain emission levels for frequency bands above 1 GHz is 1 megahertz. The Commission seeks comment on the appropriate reference bandwidth for PSD for emission outside of the 61.0–61.5 GHz band. Are any other additional requirements necessary?

To the extent that the Commission retains provisions in § 15.255 that specifically permit fixed FDS operations, the Commission seeks comment on how the Commission should interpret ''fixed'' and whether the Commission should incorporate a specific definition for the term into the Commission's Part 15 rules. When OET granted the automotive waivers, it noted that the Commission did not specifically address whether the rule permits something that is inherently mobile (such as an automobile) to be treated as fixed in certain circumstances, and left any determination of what constitutes ''fixed'' and ''mobile'' operation under the rule for separate consideration. A review of the 1998 Report and Order that first permitted fixed FDS use in the band would suggest that the Commission was anticipating a narrow set of applications that would be used in industrial settings where the

equipment would rarely if ever be moved. However, in light of the wide range of potential FDS applications that now have been identified for the 60 GHz band and the Commission's general inclination to provide as expansive an opportunity for unlicensed operations in a particular band as is practical, the Commission tentatively concludes that a broader view is appropriate. The Commission tentatively concludes that the Commission should interpret fixed FDS operations as those instances where an FDS device is stationary and is operating at a discrete location for an indefinite—*i.e.,* more than mere transitory—period. The Commission envisions this interpretation would allow for a device that is used in a household and easily moved from room to room to operate in different parts of the residence, but that an automotive-mounted radar that operates when the car is stopped while the ignition is engaged would be too transitory to qualify. The Commission seeks comment on this proposal. Does it provide a sufficient bright-line rule for device operation? Will it provide other unlicensed and authorized users in the 60 GHz band with sufficient confidence that they will be able to identify and resolve any degradation of the operational environment caused by these fixed users? Are there other interpretations that are more appropriate for defining fixed FDS operations?

The Commission's third area of discussion relates to whether the Commission could permit FDS devices to operate at a higher power throughout the entire 57–71 GHz band. In its recommendation, the TAC suggests that the Commission explores the possibility of allowing radars that incorporate a sensing technology such as listen-before-talk (LBT) to operate at the same emission limits as WLAN devices in the band, *i.e.,* 40 dBm EIRP and 27 dBm transmitter conducted output power. The Commission seeks input regarding the effect such higher power levels would have on authorized users who are entitled to interference protection, as well as how those power levels would affect the ability of unlicensed radar systems to coexist with unlicensed communications systems. Are these EIRP and transmitter conducted output power levels appropriate for radar applications, given the implied high antenna gain/directivity? What antenna gain do radars need in various applications? Are mobile radar applications limited by power consumption such that they would not be able to leverage these higher emission limits? With spectrum sensing capabilities, would a duty cycle restriction be necessary? The Commission seeks input and feedback as well as recommendations on these issues. Commenters should provide technical details and/or studies to show that it is practical for radars to operate at up to 40 dBm EIRP without causing harmful interference to existing authorized services in the band. The Commission notes that the *2021 TAC Recommendation* only mentions the listen-before-talk technique. Are there other spectrum contention avoidance techniques that would serve the same purpose and how effective are they? What are the costs and benefits of such techniques? Have there been any completed or ongoing studies regarding coexistence between radars and authorized 60 GHz users and, if so, what are the results and recommendations? Should the same spectrum sensing technique be required for all devices operating in the 57–71 GHz band with the average power limit of 40 dBm EIRP? Have industry standards groups such as the 802.11 Standards Committee considered the use of spectrum sensing techniques for 60 GHz unlicensed devices? Will there be a need to regulate energy detection and observation time for LBT sensing? If so, what are the appropriate limits? Will usage of LBT provide higher aggregate capacity? If so, does it justify the higher complexity necessary to support LBT? The Commission solicits input on these issues to develop a comprehensive record on these matters.

The Commission does not propose to alter the existing restrictions relating to the use of 60 GHz band unlicensed devices on board aircraft which are contained in § 15.255(b) of its rules, but the Commission nevertheless seeks comment as to whether the Commission should expand the situations where such use is permissible. Currently, such operation is limited to when the aircraft is on the ground, and, for airborne use, only in closed exclusive communication networks within the aircraft. To account for the important interest in protecting passive EESS users that operate in the 57–59.3 GHz band, the rule limits this use to aircraft with a high RF attenuation body (*e.g.,* commercial airliners), and cannot be used in wireless avionics intra-communication applications where external structural sensors or external cameras are mounted on the outside of the aircraft structure.

The Commission does not believe that retaining the existing provisions regarding in-aircraft use of unlicensed devices would hinder the initial successful deployment of new applications and devices under the Commission's proposed rules. Many of the use opportunities that have been identified to date—such as inside and outside vehicles, and in personal safety, medical imaging, home automation, environmental control, and robotic appliances devices, for example—are not dependent on use on board an aircraft. Compliance options also exist for portable electronic devices that may be brought aboard airplanes. These could include, for example, activation of ''airplane mode'' during flight or the use of sensors to disable operations when the device is above a particular height above ground. The Commission seeks comment on this tentative determination.

Currently the Commission has only authorized 60 GHz radars to operate on board aircraft beyond the uses permitted in the rules via two limited situations. Both were in conjunction with waiver grants that carefully evaluated how specific devices would be deployed in well-defined use cases. Leica Geosystems AG may operate a 60–64 GHz radar on an unmanned aircraft, but with very restrictive conditions on the number of deployed devices. The Google Soli radar incorporated into a smartphone (*e.g.,* the Google Pixel) allows control of a smartphone via gestures without touching the phone, and is not intended to be part of the aircraft communication network.

Although the Commission proposes to retain the existing rule, the Commission nevertheless seeks comment on whether the Commission should allow for expanded use of 60 GHz radars on board aircraft and, if so, with what requirements and restrictions. Given that the Commission's fundamental consideration has been and remains how to ensure that passive EESS operations in the 57–59.3 GHz band continue to be protected from harmful interference that could be caused by airborne use of unlicensed 60 GHz devices, could airborne radar use be permitted above 59.3 GHz? The Commission is not aware of any reports of harmful interference being caused by Google Soli devices during airborne use. Could the Commission permit 60 GHz radars to operate on board aircraft for limited uses such as when incorporated into smartphones or similar portable electronic devices that may be carried by air travelers? Would the Commission need to limit such use to the power levels associated with the Google Soli waiver, which operates at lower power levels than those the Commission is proposing for 60 GHz radars? Are there other narrow use cases that the Commission should allow? For

example, could the Commission's rules be modified to allow an aircraft's entertainment system's in-seat display monitors to incorporate radars that could be controlled remotely by air travelers' gestures? Commenters addressing expanded airborne use should provide detailed technical analyses, research, studies, etc. supporting potential recommendations to address whether harmful interference to authorized users in the band would result or if such systems can coexist and under what conditions. Would any adverse effects be anticipated from 60 GHz radars operating on aircraft? Would the risk of harmful interference occurring to passive EESS be minimal from radars in aircraft with high RF attenuation characteristics? What are the cost and benefits of such use?

In addition, the Commission seeks comment on the ramifications of permitting unlicensed 60 GHz radar operation on board aircraft with little or no RF attenuation characteristics, such as unmanned aerial systems (UAS)/drones and light and personal aircraft. The Commission has given a limited waiver to Leica Geosystems AG to operate a radar in the 60–64 GHz band on board a UAS to provide visual inspection of structures in engineering and scientific applications to prevent the UAS from colliding with the structure or other fixed objects that it is surveying. The Commission has also received informal inquiries indicating an interest in deploying unlicensed 60 GHz radar for applications involving, as an example, use on board crop-spraying aircraft. Commenters who support expanding the types of aircraft upon which unlicensed 60 GHz devices could be deployed should address how such use would not undermine the objective of preventing harmful interference to EESS operations in the 57–59.3 GHz portion of the band.

Compliance testing of modulated CW (*e.g.,* FMCW) and pulse/impulse-based radar devices can be complex and typically requires careful consideration to ensure the proper characterization of technical parameters such as transmit bandwidth, output power and unwanted emissions levels in the out-of-band and spurious domains. As such, the Commission seeks comment on methodologies for performing such tests to obtain the data necessary to demonstrate compliance with the specified technical requirements for the types of radars anticipated to operate under § 15.255 rules. For example, should transmission bandwidth be represented only by the chirp or pulse specifications or should it be expressed as a measured occupied bandwidth, 20-dB bandwidth, or other representation? Similarly, should peak power measurements be avoided to eliminate potential for inaccurate amplitude results due to measurement instrumentation desensitization? Measured power levels for radio frequency (RF) pulses that are frequency modulated (chirped) vary as a function of the bandwidth in which the measurement is performed; if chirped pulses cause RF interference, the power levels of the pulses in victim receivers will likewise vary as a function of receiver bandwidth. NTIA Technical Report TR–12–488 provides both heuristic and rigorous derivations of the relationships among chirped pulse parameters and the measured peak and average power levels of chirped pulses as a function of measurement bandwidth. These relationships may be best understood via a single graph (Figure 3) presented in this report. This report supplements NTIA Technical Reports TR–05–420, TR–10–465 and TR–10–466, in which the formula for minimum bandwidth needed for measurement of full peak power in chirped pulses is presented but not derived. The Commission seeks comment on NTIA's technical report and its applicability to measurements of chirped signals.

The Commission proposes to exempt FMCW and other similar swept-frequency radars from the § 15.31(c) requirement to stop the frequency sweep when measuring the relevant technical parameters. Stopping the sweep is physically impractical for most of these types of devices and can result in inaccurate measurements. In addition, the Commission proposes to remove the § 15.255(c)(4) requirement to use an RF detector with a detection bandwidth that encompasses the 57–71 GHz frequency range for performing peak power measurements. The Commission believes that this requirement is superseded by the more recent inclusion of § 15.255(i), which sets out a flexible approach toward measurement that can be adapted more effectively as the technology of devices and test instrumentation evolve. Finally, the Commission proposes to specify that the provision of § 15.35(c) that requires calculating average field strength over a complete pulse train or 100 milliseconds is not applicable to pulsed or burst radars that operate in the 60 GHz band. This measurement requirement was originally designed for low frequency pulse-code modulated devices such as garage door openers and the Commission believes it is not appropriate for high frequency radars. The Commission seeks comment on these proposals.

Initial Regulatory Flexibility Act. The Regulatory Flexibility Act of 1980, as amended (RFA), requires that a regulatory flexibility analysis be prepared for notice and comment rulemaking proceedings, unless the agency certifies that ''the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.'' Accordingly, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning potential rule and policy changes contained in this *Notice of Proposed Rulemaking.*

Initial Paperwork Reduction Act Analysis. This *Notice of Proposed Rulemaking* does not contain potential new or revised information collection requirements subject to the Paperwork Reduction Act of 1995, Public Law 104–13. In addition, therefore, it does not contain any proposed information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107–198, *see* 44 U.S.C. 3506(c)(4).

Ex Parte Rules—Permit-But-Disclose. This proceeding shall be treated as a ''permit-but-disclose'' proceeding in accordance with the Commission's *ex parte* rules. *Ex parte* presentations are permissible if disclosed in accordance with Commission rules, except during the Sunshine Agenda period when presentations, *ex parte* or otherwise, are generally prohibited. 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. Memoranda must contain a summary of the substance of the *ex parte* presentation and not merely a listing of the subjects discussed. More than a one or two sentence description of the views and arguments presented is generally required. 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 § 1.1206(b) of the rules. In proceedings governed by § 1.49(f) of the rules or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (*e.g.,* .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

Additional Information. For additional information on this proceeding, contact Anh T. Wride, *anh.wride@fcc.gov,* (202) 418–0577, Office of Engineering and Technology, Technical Rules Branch; or Thomas Struble at (202) 418–2470 or *Thomas.Struble@fcc.gov,* Office of Engineering and Technology, Office of the Chief Engineer.

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

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

The *NPRM* addresses issues raised in multiple waiver requests by various field disturbance sensor (FDS)/radar manufacturers and is partly in response to a recommendation from the Technical Advisory Committee (TAC) that the Commission modify the rules for unlicensed 60 GHz devices in a number of respects. The TAC recommends that the FCC initiates a rulemaking proceeding addressing potential areas of concern in the 60 GHz band by requesting comment and response to the following questions: (1) Should FCC rules allow greater radiated power for radar applications than currently permitted?; (2) Should the parameters for Google Soli, for which other entities have filed ''me-too'' requests, be included in the rules?; (3) What changes to the recent waiver parameters are needed to improve sharing with communications applications?; (4) Should the FCC require 60 GHz communication applications (and radar applications) to use a contention-based protocol?; and (5) Should radar applications that perform listen-before-talk be allowed to use the same power levels as communications applications in this band?

B. Legal Basis

The proposed action is taken pursuant to sections 4(i), 201, 302, and 303 of the Communications Act of 1934, as amended, 47 U.S.C. 154(i), 201, 302a, 303.

C. 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.[4] The RFA generally defines the term ''small entity'' as having the same meaning as the terms ''small business,'' ''small organization,'' and ''small governmental jurisdiction.'' [5] In addition, the term ''small business'' has the same meaning as the term ''small business concern'' under the Small Business Act.[6] A ''small business concern'' is one which: (1) Is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[7]

Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The proposed rules pertain to manufacturers of unlicensed communications devices. The appropriate small business size standard is that which the SBA has established for radio and television broadcasting and wireless communications equipment manufacturing. This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment.[8] Examples of products made by these establishments are: Transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.[9] The SBA has established a small business size standard for this industry of 1,250 employees or less.[10] U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year.[11] Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees.[12] Based on this data, we conclude that a majority of manufacturers in this industry are small.

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

Unlicensed 60 GHz devices operating in the 57–71 GHz frequency band are regulated under section 15.255 of the Commission's rules. The proposed rules in this *NPRM* pertain to field disturbance sensors (*i.e.,* radar devices) that may be fixed or mobile. The proposed rules increase the allowable transmitted power levels to promote

[1] 5 U.S.C. 603. The RFA, 5 U.S.C. 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Public Law 104–121, Title II, 110 Stat. 857 (1996).

[2] 5 U.S.C. 603(a).

[3] *Id.*

[4] 5 U.S.C. 603(b)(3).

[5] 5 U.S.C. 601(6).

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

[7] 15 U.S.C. 632.

[8] *See* U.S. Census Bureau, *2017 NAICS Definition, ''334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,'' https://www.census.gov/naics/?input=334220&year=2017&details=334220.*

[9] *Id.*

[10] *See* 13 CFR 121.201, NAICS Code 334220.

[11] *See* U.S. Census Bureau, *2012 Economic Census of the United States,* Table ID: EC1231SG2, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012,* NAICS Code 334220, *https://data.census.gov/cedsci/table?text=EC1231SG2&n=334220&tid=ECNSIZE2012.EC1231SG2&hidePreview=false.*

[12] *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

short-range radar applications without application restriction on operating environments, *i.e.,* they may operate indoors or outdoors, in fixed or mobile applications, and be incorporated into any device, *e.g.,* personal safety, industrial and consumer robotics, home/transportation automation (*e.g.,* autonomous vehicles), environmental control, health care monitoring. Specifically, the *NPRM:* (1) Proposes to permit field disturbance sensors in the 57–64 GHz band to operate with up to 20 dBm average EIRP, 10 dBm transmitter conducted output power, 13 dBm/MHz average EIRP power spectral density and a 10% duty cycle in every 33 millisecond (ms) interval; (2) investigates the potential for mobile FDS devices to operate in the 61.0–61.5 GHz band at the same 40 dBm EIRP at which fixed FDS devices currently are permitted to operate; (3) ask whether the Commission could permit radar devices that incorporate listen-before-talk, spectrum sensing, or other methods of co-existence, to operate across the entire 57–71 GHz band at the same power level (*i.e.,* 40 dBm EIRP) as currently is permitted for 60 GHz communication devices; and (4) ask whether any of the provisions proposed for FDS operation should be more broadly applied to all Part 15 devices operating in the 57–71 GHz band.

Most RF transmitting equipment, including 60 GHz devices, must be authorized through the certification procedure. Certification is an equipment authorization issued by a designated Telecommunication Certification Body (TCB) based on an application and test data submitted by the responsible party (*e.g.,* the manufacturer or importer).[13] Existing FDS devices operating under section 15.255 of the Commission's rules are already subject to the Certification procedure. The *NPRM* does not propose to change the authorization procedure for 60 GHz devices, but it does seek comment on methodologies for performing tests to obtain the data necessary to demonstrate compliance with the technical requirements for the types of radars anticipated to operate under the modified rules. In addition, the *NPRM* proposes to exempt frequency-modulated continuous wave and other swept frequency radars from the section 15.31(c) requirement to stop the frequency sweep when measuring the relevant technical parameters; [14] (2) remove the section 15.255(c)(4) requirement to use an RF detector with a detection bandwidth that encompasses the 57–71 GHz frequency range for performing peak power measurements; [15] and (3) not apply the provision of section 15.35(c) that requires calculating average field strength over a complete pulse train or 100 milliseconds to pulsed or burst radars that operate in the 60 GHz band.[16]

E. Steps Taken To Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): ''(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.'' [17]

The rule changes proposed in the *NPRM* for higher power to field disturbance sensors and radars would provide greater flexibility to 60 GHz device operations. As these proposed changes provide greater flexibility, the Commission does not believe they will have a significant negative impact on small entities. In fact, the proposed rules could benefit small entities. As operation of 60 GHz devices do not require a license, small entities are able to operate 60 GHz devices without the cost or inconvenience of obtaining a license. In addition, the proposed rules partly align the technical parameters for FDS/radar devices with international standards, which could save cost to small entities who would now be able to avoid having to create region-specific product designs.

F. Federal Rules That May Duplicate, Overlap, or Conflict With the Proposed Rules

None.

Ordering Clauses. It is ordered, pursuant to the authority found in sections 4(i), 201, 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, 47 CFR 1.407 and 1.411, that this Notice of Proposed Rulemaking *is adopted*, as set forth above.

It is further ordered that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, *shall send* a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR Part 15

Communications equipment.

Federal Communications Commission.

Marlene Dortch,

Secretary.

Proposed Rules

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR part 15 as follows:

PART 15—RADIO FREQUENCY DEVICES

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

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

■ 2. Section 15.31 is amended by revising paragraph (c) to read as follows:

§ 15.31 Measurement standards.

* * * * *

(c) Except as otherwise indicated in §§ 15.255 and 15.256, for swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

* * * * *

■ 3. Section 15.35 is amended by revising paragraph (c) to read as follows:

§ 15.35 Measurement detector functions and bandwidths.

* * * * *

(c) Unless otherwise specified, *e.g.,* §§ 15.255(c), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the

[13] 47 CFR 2.907. The Commission or a TCB may test a sample of a device to verify that it complies with the rules before granting approval for the equipment to be marketed. Examples of devices subject to certification include, but are not limited to, mobile phones; wireless local area networking equipment, remote control transmitters; land mobile radio transmitters; wireless medical telemetry transmitters; cordless telephones; and walkie-talkies.

[14] 47 CFR 15.31(c).

[15] 47 CFR 15.255(c)(4).

[16] 47 CFR 15.35(c).

[17] 5 U.S.C. 603(c)(1)–(c)(4).

transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Supplier's Declaration of Conformity.

■ 4. Section 15.255 is amended by revising the introductory text of paragraphs (a), (c), and (c)(1), revising paragraph (c)(3), removing paragraph (c)(4), paragraphs (e) introductory text and (e)(2) and adding paragraph (e)(4) to read as follows:

§ 15.255 Operation within the band 57–71 GHz.

(a) Operation under the provisions of this section is not permitted for equipment used on satellites.

* * * * *

(c) *Radiated Power Limits.* Within the 57–71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):

(1) Products other than field disturbance sensors shall comply with one of the following power limits, as measured during the transmit interval:

* * * * *

(3) Field disturbance sensors other than those operating under the provisions of paragraph (c)(2) of this section shall comply with the following, as measured during the transmit interval:

(i) For field disturbance sensors that limit their operation to the 57–64 GHz frequency band, the average power shall not exceed 20 dBm and the average power spectral density shall not exceed 13 dBm/MHz. The transmit duty cycle shall not exceed 10% during any 33 ms interval (*i.e.,* the device shall not transmit longer than a total of 3.3 ms).

(ii) For field disturbance sensors operating over the entire 57–71 GHz frequency band, the average power shall not exceed 10 dBm.

* * * * *

(e) *Limits on transmitter conducted output power.* Except as specified paragraph (e)(1) of this section, the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (c) of this section.

* * * * *

(2) Field disturbance sensors operating under the provisions of paragraph (c)(3) of this section shall comply with the following:

(i) For field disturbance sensors that limit their operation to the 57–64 GHz frequency band, the peak transmitter conducted output power shall not exceed 10 mW.

(ii) For field disturbance sensors operating over the entire 57–71 GHz frequency band, the peak transmitter conducted output power shall not exceed 0.1 mW.

* * * * *

(4) Compliance measurements of frequency-agile field disturbance sensors shall be performed with any related frequency sweep, step, or hop function activated.

* * * * *

[FR Doc. 2021–16637 Filed 8–18–21; 8:45 am]

BILLING CODE 6712–01–P