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

In the Matter of	)	
	)	
Rod Radar, Ltd	)	ET Docket No. 24-222
	)	
	)	
Request for Waiver of Sections 15.503(d), and15.521(d) of the Commission's Rules	)	
	)	

ORDER

Adopted: July 21, 2025 **Released: July 21, 2025**

By the Acting Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this Order, we grant a request by Rod Radar Ltd. (Rod Radar), for a waiver of our rules governing unlicensed ultra-wideband (UWB) devices to permit the newest version of its UWB Ground Penetrating Radar (GPR) to obtain certification and conduct marketing activities. We find that permitting Rod Radar to sell and operate its equipment will provide construction and utility professionals with enhanced live radar data capabilities in furtherance of the public interest. We also find that operating Rod Radar's device under the specified waiver conditions poses no greater risk of causing harmful interference to communication services than those devices already permitted under the existing rules.

II. BACKGROUND

2. Rod Radar is requesting the Commission to waive two part 15 Commission rules to obtain FCC equipment authorization for its device, the Live Dig Radar (LDR).[1] Rod Radar describes the LDR as the first-ever GPR integrated in an excavator digging bucket capable of informing bucket operators in real-time of underground utilities.[2] Rod Radar states that its LDR is designed to operate between 300.51 and 1103.51 MHz in 5.5 megahertz steps with a frequency step duration of 58 microseconds.[3]

3. Specifically, Rod Radar seeks waiver of Section 15.503(d) of the Commission's rules, which defines an ultra-wideband transmitter as an 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

[1] Rod Radar Ltd. Request for Waiver, filed Sept 21, 2022 (Waiver Request). It subsequently amended its request to reflect changes that it has made to the design of the LDR while continuing to seek a rule waiver under the terms of its original request. Rod Radar Ltd. Amendment to Request for Waiver, filed July 11, 2024 (Rod Radar Amendment).

[2] Waiver Request at 3.

[3] Waiver Request at 12. Rod Radar Amendment at 3.

MHz, regardless of the fractional bandwidth.[4] Doing so, it claims, will allow its LDR to be classified as a UWB device consistent with other GPR systems already permitted to operate in accordance to a waiver of this rule.[5] It also requests a waiver of Section 15.521(d) of the Commission's rules, which requires that radiated emission levels above 960 MHz are based on the RMS average measurement over a 1 megahertz resolution bandwidth.[6] Such a grant, it claims, would be consistent with stepped frequency device waivers that the Commission has granted in the past.[7]

4. In response to a Public Notice seeking comment on Rod Radar's request,[8] the Commission received one filing from the Department of Transportation (DOT), which was transmitted in conjunction with a cover letter from the National Telecommunications and Information Administration (NTIA).[9] While DOT does not oppose the specific waiver request, it seeks assurances that the Rod Radar system will not interfere with incumbent safety technologies in the band, which include aviation radionavigation radars and communications, and asks that Rod Radar exclude its devices from operating in the 328.6-335.4 MHz and 960-1103.51 MHz bands.[10] DOT further requests that the Live Dig GPR only be installed and operated as shown in the Waiver Request (i.e., transmitting only when the antenna aperture is touching the ground),[11] and, more generally, that the LDR continues to meet the previously established Section 15.205 rules, FCC part 15 UWB limits including minimum bandwidth requirements and low EIRP limits, and conditions agreed to by NTIA and the FCC.[12]

5. Initially, Rod Radar filed a document titled "Request for Extension of Time and Reply," objecting to DOT's request to refrain from operating in the 328.6-335.4 MHz and 960-1103.51 MHz bands claiming, inter alia, that DOT failed to justify its request and that the bands in question are already protected by the Commission's rules as evidenced by existing GPR operations in similar construction environments.[13] More recently, Rod Radar amended its waiver request and agreed to meet the DOT band emission requirements for its waivered devices.[14]

---

[4] 47 C.F.R. § 15.503(d).

[5] Waiver Request at 5 n.12-14 (citing previously granted section 15.503(d) waivers).

[6] 47 C.F.R. § 15.521(d).

[7] Waiver Request at 10 n. 30 (citing previously granted section 15.521(d) waiver orders).

[8] *Office of Engineering and Technology Seeks Comment on Rod Radar Ltd. Request for Waiver of Sections 15.503(D) and 15.521(D) of the Commission's Rules*, ET Docket No. 24-222, Public Notice, DA 24-713 (OET 2024).

[9] Letter from Charles Cooper, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 24-222. Letter from Wanda Lynn Covington-Ragsdale, DOT Spectrum Lead, Office of the Secretary of Transportation, U.S. Department of Transportation, to Alan Frable, Acting Chairman/Executive Secretary, IRAC, ET Docket No. 24-222 (DOT filing).

[10] DOT filing at 1.

[11] *Id. See also* Waiver Request at Figure 1 (depicting the antenna aperture installed in the digging surface of the excavator bucket with the associated electronics and wiring routed into the surface of the bucket facing the boom (actuator arms)).

[12] DOT filing at 1. Section 15.205 ("Restricted bands of operation") sets forth operational limitations for unlicensed devices.

[13] Letter from Terry G. Mahn et. al., Counsel, Fish & Richardson P.C. to Marlene H Dortch, Secretary, FCC, ET Docket No. 24-222, (filed Oct. 14, 2024) (Rod Radar 2024 *Ex Parte*).

[14] Letter from Terry G. Mahn, Counsel, Fish & Richardson P.C. to Marlene H Dortch, Secretary, FCC, ET Docket No. 24-222, (filed Apr. 1, 2025) (Rod Radar 2025 *Ex Parte*).

III. DISCUSSION

6. We are authorized to grant a waiver under Section 1.3 of the Commission's rules if the petitioner demonstrates good cause for such action.[15] Good cause, in turn, may be found "where particular facts would make strict compliance inconsistent with the public interest."[16] To make this public interest determination, the waiver cannot undermine the purpose of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.[17] The UWB standards in part 15 were adopted to ensure that UWB devices, including ground penetrating radar, do not cause harmful interference to authorized radio services, including those operated by the Federal Government.[18] As discussed below, we find that, with appropriate operational and technical limitations, granting Rod Radar's request for waiver and permitting the LDR to operate poses no greater risk of causing harmful interference to radio communications services than any other ground penetrating radar operating under our rules or via waiver. In addition, we find that there is a stronger public interest benefit in granting this waiver than in strictly applying the rules. A waiver of the rules will benefit the public by providing new options for locating underground utilities and infrastructure in real-time. Because the LDR is installed on the excavator bucket and can detect various types of materials, including metallic and non-metallic objects, it can increase the accuracy, reliability, and timeliness of the information provided to construction workers. This, in turn, can increase digging operation efficiency and reduce the likelihood of catastrophic underground utility strikes. For these reasons, we find that the waiver standard has been met.

A. Waiver of the UWB definition in Section 15.503(d)

7. Rod Radar requests a waiver of Section 15.503(d) of the Commission rules to allow its LDR to be classified as a UWB device consistent with other GPR systems currently permitted to operate in accordance to a waiver of this rule. Section 15.503(d) defines an ultra-wideband transmitter as an 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 megahertz, regardless of the fractional bandwidth.[19] Rod Radar describes the LDR as using frequency-interrupted stepped frequency continuous wave emissions. The transmitted signal steps through the frequency range from 300.621 MHz and 1098.121 MHz. The frequency step duration is 58 microseconds and the frequency increment per step is 5.5 megahertz. With a total of 145 frequencies, a 12.5 MHz interruption frequency, and a 3.5 nanosecond interruption rise/fall time, the LDR has an overall bandwidth of 803 megahertz.[20] Each individual transmissions is less than 500 megahertz in bandwidth "at any point in time" and Rod Radar's device does not have a 0.20 or greater fractional bandwidth. Thus, even though the device operates over a

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

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

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

[18] *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket No. 98-153, First Report and Order, 17 FCC Rcd 7435 (2002) (*UWB First R&O*); *see also* 47 CFR §§ 15.501-15.525.

[19] 47 C.F.R. § 15.503(d).

[20] Waiver Request at 1 and 12.

frequency range that exceeds 500 megahertz, it does not meet the definitional requirement for operation under the UWB rules.[21]

8. The UWB imaging rules were designed to accommodate devices that emit impulsive or transient-like signals that are spread across a very wide bandwidth to produce an image of objects within the ground or other materials.[22] The main difference between the Rod Radar LDR and other UWB ground penetrating radars provided for in the rules is that the LDR does not transmit a single impulsive signal but instead transmits progressively in steps over a large swath of spectrum to gather all needed data. In the past, the Commission determined that frequency agile UWB devices may perform in a manner that is equivalent to non-frequency agile devices.[23] For example, in the CWCI Waiver, the Proceq Waiver, and the MIT Waiver, the Commission recognized that stepped frequency UWB devices are functionally equivalent to other UWB devices and that the interference risk from the associated devices would be no greater than from other UWB devices. Here, we find that the LDR device, operating in full contact with the ground, is functionally equivalent to other types of UWB ground penetrating radars in that it uses transient-like signals spread across a wide bandwidth to detect objects underground, or covered by concrete, asphalt and other construction materials.[24] The risk of interference, when so deployed, is comparable to that from other such UWB ground penetrating radars such that a waiver in this case will not undermine the intent of our rule.

B. Waiver of the measurement procedures in Sections 15.521(d) and 15.31(c)

9. Rod Radar also requests a waiver of Section 15.521(d) of the Commission's rules consistent with the other stepped frequency device waivers we have granted in the past.[25] Section 15.521(d) requires that radiated emission levels above 960 MHz are based on the RMS average measurement over a 1 megahertz resolution bandwidth. It also requires that "if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. Alternate measurement procedures may be considered by the Commission."[26] Rod Radar requests a waiver of this rule to allow the RMS measurements to be performed with the stepping function active, i.e. in the device's normal mode of

[21] Stepped frequency, swept frequency, and frequency hopped devices like Rod Radar's LDR have a difficult time meeting the rule's technical specifications because the large bandwidth is achieved by stepping or sweeping a narrow signal through the broader frequency range, and therefore is not instantaneously wide enough to meet the rule's specific requirements. *See also* Waiver Request at 9 (describing how Rod Radar believes that the rule creates uncertainty for a stepped frequency device such as the LDR because it does not identify the interval that should be considered when determining the bandwidth "at any point in time.")

[22] *See UWB First R&O*, 17 FCC Rcd at 7437-7440, 7450, 7476 and 7494.

[23] *See, e.g., Petition for Waiver of the Part 15 UWB Regulations Filed by the Multi-band OFDM Alliance Special Interest Group,* ET Docket No. 04-352, Order, 20 FCC Rcd 5528 (2005) (MBOA-SIG Waiver); *Curtiss-Wright Controls Inc. Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices,* ET Docket No. 10-167, Order, 27 FCC Rcd 234 (OET 2012) (CWCI Waiver), *Kyma Medical Technologies Ltd., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 15-119, Order, 31 FCC Rcd 9705 (OET 2016) (Kyma Waiver), *Proceq USA Inc. Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, DA 18-251, Order, 33 FCC Rcd 2258, (OET 2018) (Proceq Waiver), *Massachusetts Institute of Technology Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 19-89, Order, 35 FCC Rcd 4389 (OET 2020) (MIT Waiver).

[24] The LDR is designed to operate while the bucket is being pulled across the ground as opposed to during any excavating or other types of movements. Waiver Request at 13 (stating that "transmission only occurs with the bucket bottom surface and hence antenna aperture touching the ground, so that emitted energy is always ground directed.")

[25] *Id.* at 10 n. 30 (citing previously granted section 15.521(d) waiver orders).

[26] 47 C.F.R. § 15.521(d).

operation.[27] Without a waiver of this requirement, the measurements would be concentrated in a smaller portion of the spectrum, and therefore, emissions would need to be reduced to achieve compliance with the Commission's rules.

10. Rod Radar states that the Commission previously acknowledged that the UWB rules do not address stepped frequency transmitters and has waived the rule to permit measurements to take place under the normal transmission mode for other stepped frequency devices.[28] It claims that the LDR will meet all other emission limits and technical requirements under the UWB rules when measured with the stepping function active, and asserts that waiving the Section 15.521(d) measurement requirement will not increase the potential for harmful interference to authorized devices and would be consistent with past waiver decisions.[29] Additionally, we recognize from Rod Radar's filing that the LDR will also require a waiver of Section 15.31(c) of the Commission's rules,[30] which sets forth the measurement standards for unlicensed devices to demonstrate compliance with applicable emission limits. This rule requires that swept frequency equipment be made with the frequency sweep stopped and this requirement has been traditionally interpreted to also be applicable to stepped, hopped, and other frequency diverse modulations schemes. However, applying the requirement to stop the frequency step when performing compliance measurements results in a fundamental emission bandwidth measurement that does not comply with the UWB bandwidth requirements. We therefore consider waiver of this rule on our own motion.

11. We recognized in prior UWB transmitter measurement procedures waiver orders, where we permitted emissions to be measured with the transmitter operating in its normal transmission mode, that the interference aspects of a transmitter employing frequency hopping, frequency stepping, or gating are quite similar as viewed by a receiver.[31] That is because transmitters using these burst formats appear to the receiver to emit for a short period of time followed by a quiet period.[32] In these previous decisions, we concluded that "any requirement to stop the frequency hopping, band sequencing, or system gating serves only to add another unnecessary level of conservatism to already stringent UWB standards."[33] In conjunction with NTIA, we further determined that allowing stepped frequency devices to be measured with the stepping function on would not increase the device's interference potential above that of impulse UWB devices if all other emission limits and technical requirements are met.[34]

12. Rod Radar's request represents an analogous situation. Because waiving the measurement procedures in Sections 15.31(c) and 15.521(d) will not increase the potential for harmful interference to authorized services, permitting Rod Radar to demonstrate compliance with the UWB emission limits with the stepping function active will not undermine the purpose of the rule.[35] To ensure that the LDR device does not emit in any individual 5.5 megahertz step or narrow band continuously, we are conditioning this waiver so that the frequency step duration on any one step shall not exceed 58 microseconds, the interruption rise/fall time on any one step shall not exceed 3.5 nanoseconds, and the

[27] Waiver Request at 10.

[28] *Id.* at 11-12.

[29] *Id*.

[30] 47 C.F.R. § 15.31(c).

[31] *See, e.g.,* MBOA-SIG Waiver, Kyma Waiver and, Proceq Waiver, MIT Waiver.

[32] *See*, *e.g.*, CWCI Waiver, 27 FCC Rcd at 241.

[33] *Id*.

[34] *See* CWCI Waiver, 27 FCC Rcd at 242. *See also* MBOA-SIG Waiver, 20 FCC Rcd at 5533-5536.

[35] Our reliance on the MBOA-SIG Waiver and the CWCI Waiver decision in this instance is only relative to the measurement procedure in Section 15.521(d).

interruption frequency shall not exceed 12.5 megahertz.[36] In sum, we find that permitting Rod Radar to demonstrate compliance with the UWB wall imaging system emission limits under a waiver of the measurement procedures consistent with the conditions specified below poses no greater risk of causing harmful interference to radio communications services than any other UWB ground penetrating radar system operating under our rules or via waiver, and therefore will not undermine the purpose of these rules.

C. Positional Limitations and Frequency Notch

13. As previously mentioned, NTIA and DOT were the only parties (besides Rod Radar) that submitted filings in the docket. While NTIA and DOT do not oppose a waiver for Rod Radar, they make several requests in regard to the conditions that should be applied to LDR operations. This includes complying with all other provisions that other unlicensed UWB devices are required to meet, as well as including a "lockout" for the 328.6-335.4 MHz and 960-1103.51 MHz bands which are currently allocated for safety of life aviation radionavigation radars and communications.[37] Initially, Rod Radar objected to the NTIA DOT frequency "lockout" position, but subsequently agreed to operate under the same type of frequency use limitations that we previously required as a condition in the waiver grant to GPR, Inc.[38] There, we prescribed notching requirements for a vehicular-mounted ground penetrating radar in certain aviation bands to suppress emissions to 10 dB below the Section 15.209 limit.[39]

14. In keeping with previous precedent, and in recognition of Rod Radar's most recent filing, we grant a waiver on the condition that emissions from the LDR devices are suppressed by 10 dB below the Section 15.209 limit in the identified bands.[40] That is, emissions from within the associated bands that DOT and NTIA identified shall be limited to the following: In the 328-335.4 MHz band, emissions will be limited to 10 dB below the Section 15.209(a) limit. For the 960-1103.51 MHz band, emissions shall be 10 dB below the Section 15.209(a) limit.

15. We agree with DOT that Rod Radar should provide assurance that the LDR system will only be installed and deployed in a manner that it has depicted in its waiver request. That is, Rod Radar must ensure that the antenna aperture is designed to fit into the bottom of the bucket where it would face the ground that is to be measured, and that it only transmits when the antenna aperture in the bucket is

---

[36] Additional GPR functional constraints beyond those already designed into the system do not appear to be warranted. Rod Radar provides the frequency step duration transmission time for its GPR system on any one frequency (step) as 58 microseconds. Rod Radar also demonstrates that the other LDR signal parameters utilize 145 discrete frequency steps, a 3.5 nanosecond rise/fall time, a 12.5 megahertz interruption frequency, and a frequency range spanning 803 megahertz. *See* Rod Radar 2024 *Ex Parte*.

[37] A frequency "lockout" prevents full power operations within the specified exclusion bands and can be accomplished by incorporating a filter or "notching" the bands to sufficiently suppress emissions within the band by a predetermined amount.

[38] Rod Radar 2024 *Ex Parte*; Rod Radar 2025 *Ex Parte.*

[39] *GPR, Inc. Request for Waive of the Commission's Part 15 Rules Applicable to Ultra-Wideband Devices*, ET Docket No. 19-241, Order, 38 FCC Rcd 10376 at 10378 and 10382 (2023); Letter from Michele C. Farquhar, Counsel to GPR,Inc., Hogan Lovells US LLP, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-241, (filed July 28, 2023) (describing discussions with NTIA and modifying its pending request accordingly).

[40] If Rod Radar had not filled the Rod Radar 2025 *Ex Parte* agreeing to the DOT request, we nevertheless would have had good reason based on the GPR precedent to conclude that we should protect the critical federal frequency bands identified by the DOT through a notching requirement. Also, to the extent that the NTIA and DOT submissions were filed outside the window to be considered timely filed comments (an additional issue previously raised by Rod Radar that appears to have been overcome by events), we note that they still would meet the requirements for valid *ex parte* communications and, because there is no reason to believe that Rod Radar or any other interested party was harmed, would treat them as such.

touching the ground. In addition, the radar transmission may only proceed after the equipment operator initiates the scan of the ground being measured. Based on the information Rod Radar provided about its system design, we are confident that it can successfully operate under these conditions.[41]

D. Waiver conditions

16. Based on the foregoing discussion, we find good cause to waive 1) the instantaneous bandwidth requirement in 47 CFR § 15.503(d) to permit the frequency-stepped UWB ground penetrating radar system to operate; and 2) the measurement requirements in 47 CFR §§ 15.31(c) and 15.521(d) to permit the LDR system to be tested with the frequency sweep, stepping, or frequency hopping function active, rather than stopped, to demonstrate compliance with the maximum permitted average power in 47 CFR § 15.509, subject to the following conditions:

1) The Rod Radar LDR system, for a single step, shall have a frequency increment per step of 5.5 megahertz.
2) The Rod Radar LDR shall operate with interrupted stepped frequency continuous wave modulation on 145 frequencies between 300.621 and 1098.121 MHz.
3) The LDR maximum frequency step duration shall be 58 microseconds, the interruption rise/fall time shall be 3.5 nanoseconds, and the interruption frequency of 12.5 megahertz.
4) The device shall include a feature to ensure that it will only transmit when placed in full contact with the ground being measured and/or evaluated.
5) For certification testing, the Rod Radar LDR emission measurements shall be conducted with the stepping function active.
6) The Rod Radar LDR system shall comply with all other technical and operational requirements applicable to UWB ground penetrating radar systems under Part 15, Subpart F of the Commission's rules.
7) Emissions from the Rod Radar LDR in the following bands shall not exceed the following limits, measured using CISPR quasi-peak detector as specified in Section 15.209(d):
    a. 328.6-335.4 MHz: 10 dB below the Section 15.209(a) limit.
    b. 960-1103.51 MHz: 10 dB below the Section 15.209(a) limit.
8) The waiver conditions granted herein are not transferable to any third party via § 2.933 or any other means of technology transfer.
9) This waiver and its conditions shall apply only to the UWB devices described herein and are not to be considered to apply generally to any other UWB operations where further analysis would be necessary to assess the potential for impact to other authorized users.
10) A copy of this Order shall be provided with the device's application for equipment certification.

IV. ORDERING CLAUSES

17. Accordingly, pursuant to authority delegated in Sections 0.31 and 0.241 of the Commission's rules, 47 CFR §§ 0.31, 0.241, and Section 1.3 of the Commission's rules, 47 CFR § 1.3, IT IS ORDERED that the Request for Waiver filed by Rod Radar, Ltd. on September 21, 2022, later amended on July 11, 2024, and supplemented by April 1, 2025 letter IS GRANTED consistent with the terms of this Order. This action is taken pursuant to Sections 4(i), 302, 303(e), and 303(r) of the

[41] *See Waiver Request* at 3-4 and 12-13.

Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, 303(e), and 303(r). This action is effective upon release of this Order.

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

FEDERAL COMMUNICATIONS COMMISSION

Ira Keltz
Acting Chief
Office of Engineering and Technology