

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

In the Matter of
iRobot Corporation Request for Waiver of Section
15.250 of the Commission's Rules
ET Docket No. 15-30

ORDER

Adopted: August 12, 2015

Released: August 12, 2015

By the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this action, we grant a request by iRobot Corporation ("iRobot") to waive Section 15.250(c) of our rules. Specifically, we are waiving the prohibition on the use of fixed outdoor infrastructure to allow iRobot to obtain equipment certification for and market a robotic lawn mower ("RLM") that operates in the 6240-6740 MHz frequency range. We find that granting this waiver is in the public interest because it will enable iRobot to market its robotic lawn mower without posing a significant risk of harmful interference to authorized users of the radio spectrum.

II. BACKGROUND

2. Part 15 of the Commission's rules permits the operation of low power radio frequency devices without an individual license from the Commission or the need for frequency coordination. The technical standards contained in Part 15 are designed to ensure that there is a low probability that these unlicensed devices will cause harmful interference to other users of the radio spectrum. In 2004, the Commission adopted new Part 15 rules regarding the operation of wideband systems in the 5925-7250 MHz frequency band. These rules included Section 15.250(c), which provides that "[e]xcept for operation onboard a ship or terrestrial transportation vehicle, the use of a fixed outdoor infrastructure is

1 Request by iRobot Corporation for Waiver of Section 15.250(c) of the Commission's Rules, ET Docket 15-30 (filed Jan. 22, 2015) (Waiver Request).

2 See 47 C.F.R. § 15.250(c). In accordance with footnote US342, the 6650-6675.2 MHz portion of the band is used for radio astronomy spectral line observations.

3 Such devices are permitted to operate only after they have been verified to comply with existing operational restrictions. See 47 C.F.R. §§ 2.901 et seq. & 47 C.F.R. §§ 15.1 et seq.

4 In addition to technical constraints, one of the primary operating conditions under Part 15 is that the operator must accept whatever interference is received and must correct whatever interference is caused. Should harmful interference occur, the operator is required to immediately correct the interference problem, even if correction of the problem requires ceasing operation of the Part 15 system that is causing the interference. See 47 C.F.R. § 15.5.

5 Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket 87-153, Second Report and Order and Second Memorandum Opinion and Order, 19 FCC Rcd 24558, 24570-71 para. 27 (2004) (UWB Second R&O).

prohibited.”⁶ The rule further provides that a “fixed infrastructure includes antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole.”⁷

3. The iRobot RLM is a Part 15 device designed to operate in the 6240-6740 MHz frequency range.⁸ The RLM will be operated outdoors and will rely on stakes with attached transmitters that will be placed in the ground.⁹ The stakes, also referred to as beacons, will be no higher than 24 inches above ground level and will communicate with the RLM in the X-Y (horizontal) plane.¹⁰ iRobot estimates that a typical residential lawn will require the placement of four to nine stakes in the ground.¹¹ At setup, the stakes will communicate with each other to establish the lawn mowing area, but thereafter, the stakes will only communicate with the RLM.¹² Neither the stakes nor the RLM will communicate with any other devices.¹³ The operation of the iRobot RLM will be in compliance with all Commission rules except for Section 15.250(c).¹⁴

4. iRobot seeks a “waiver of Section 15.250(c), which prohibits the use of fixed wireless infrastructure, in order to obtain equipment certification for and market a robotic lawn mower.”¹⁵ The Commission issued a public notice soliciting comments on iRobot’s waiver request.¹⁶ Comments in opposition to the waiver were filed by National Radio Astronomy Observatory (“NRAO”).¹⁷ Reply comments in support of the waiver were filed by Mike Ciholas, President, Ciholas Inc.,¹⁸ and by iRobot.¹⁹

III. DISCUSSION

5. The Commission’s rules expressly provide that the Commission may waive any provision of its rules “if good cause therefor is shown.”²⁰ The Commission “may exercise its discretion to waive

⁶ 47 C.F.R. § 15.250(c).

⁷ *Id.*

⁸ Waiver Request at 7.

⁹ *Id.* at 2.

¹⁰ *Id.*

¹¹ *See id.*

¹² The iRobot RLM will use a two-way ranging communication protocol to determine the time of flight of a transmitted packet, with only one stake communicating with the robot at any given time. Waiver Request at 2. According to iRobot, during active mowing sessions, “the duty cycle will be 0.57% (1-5 transmissions per second) and during inactive periods the duty cycle will be 0.0038% (190 micro-seconds per every 5 seconds).” *Id.* at n.5.

¹³ *See id.* at 2.

¹⁴ *Id.* at 3.

¹⁵ *Id.* at 1.

¹⁶ Office of Engineering and Technology Declares the iRobot Request for a Waiver of Part 15 Rules to be A “Permit-But-Disclose” Proceeding for Ex Parte Purposes and Requests Comments, *Public Notice*, 30 FCC Red 1075, DA 15-165 (rel. Feb. 5, 2015).

¹⁷ NRAO Comments (filed March 6, 2015). NRAO filed reply comments in further opposition to the waiver on April 1, 2015.

¹⁸ Ciholas Inc., Reply Comments (filed March 25, 2015).

¹⁹ iRobot Reply Comments (filed March 25, 2015).

²⁰ 47 C.F.R. § 1.3.

a rule where particular facts would make strict compliance inconsistent with the public interest.”²¹ It is well established that the Commission will waive its rules in specific cases only if it determines, after careful consideration of all pertinent factors, that such a grant would serve the public interest without undermining the policy which the rule in question is intended to serve.²²

6. The underlying purpose of Section 15.250(c) is “to prevent the establishment of wide area communications systems” in the 5925-7250 MHz frequency band.²³ The iRobot RLM “will not (and cannot) create a wide area communications system or network.”²⁴ Instead, iRobot claims that its RLM device has the potential for reducing deaths and injuries, reducing emissions and noise pollution, and improving quality of life related to residential lawn mowing.²⁵ We find that waiver in this case will not undermine the policy which Section 15.250(c) is intended to serve, and therefore grant of this waiver is in the public interest. We also conclude that, with appropriate operational and technical restrictions, a waiver of the prohibition in Section 15.250(c) can be granted without increasing the potential for harmful interference to authorized services or adversely impacting other Part 15 operations, and therefore it is in the public interest to afford iRobot the opportunity to obtain equipment certification for and market its low power radio frequency device.

7. NRAO opposes the Waiver Request on the ground that the iRobot RLM poses a risk of harmful interference to radio astronomy operations in the 5925-6700 MHz frequency band—in particular, the 6650-6675.2 MHz band.²⁶ NRAO asserts that it operates telescopes “all of which observe at frequencies around 6.7 GHz and stand to be affected by grant of a waiver to iRobot.”²⁷ NRAO also asserts that “the method proposed by iRobot to protect radio astronomy operations does not nearly rise to the standard set by US342.”²⁸ NRAO urges that while “iRobot’s RLMs can certainly operate over most of this country without interfering with radio astronomy operations,” measures must be taken to prevent iRobot’s RLM operations from causing harmful interference to radio astronomy service (“RAS”).²⁹ NRAO suggests that such measures may include “exclusion zones based on geolocation; notching of the protected RAS band with the RLM operating band; relocation or narrowing of the RLM operating frequency band to avoid the protected RAS band.”³⁰ iRobot counters that its RLM system “would adequately protect radio astronomy’s use of the 6650-6675.2 MHz frequency band.”³¹ iRobot “closely considered the impact of its [RLM] system on all incumbents and users [of the

²¹ *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990), citing *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969) (*WAIT Radio*).

²² See *WAIT Radio*, 418 F.2d at 1157.

²³ *UWB Second R&O*, 19 FCC Rcd at 24571 (para. 27).

²⁴ Waiver Request at 4. See also Ciholas Reply Comments at 2; iRobot Reply Comments at 2.

²⁵ See Waiver Request at 6-7 (stating that the battery-powered iRobot RLM “will increase lawn mower safety,” “will benefit the environment,” and “will benefit elderly, disabled and many other consumers”). See also Ciholas Reply Comments at 1; iRobot Reply Comments at 3.

²⁶ NRAO Comments at 1 (para. 3). Although radio astronomy service has no allocation in the 6650-6675.2 MHz band, NRAO asserts that the “frequency band 5925-6700 is protected by footnote US 342 [of the Table of Frequency Allocations, 47 C.F.R. § 2.106],” which provides that “all practicable steps shall be taken to protect the radio astronomy service from harmful interference.” *Id.*

²⁷ NRAO Comments at 1 (para. 2).

²⁸ *Id.* (para. 4). See also NRAO Reply Comments at 3 (para. 10).

²⁹ NRAO Comments at 2 (para. 7).

³⁰ *Id.*

³¹ iRobot Reply Comments at 3.

radio spectrum], including radio astronomy” and “its calculations show that there is an exceedingly low practical risk that the iRobot RLM system would cause harmful interference.”³² As an added measure against causing interference, iRobot “will commit to placing a notice in the user manual and on the robot that states: “Consumer use only; use must be limited to residential areas.”³³

8. As discussed above, grant of this waiver does not frustrate Section 15.250(c)’s purpose of preventing the establishment of fixed wireless communications networks over wide areas.³⁴ We note that the interference concerns raised by NRAO do not address the Section 15.250(c) restriction on fixed outdoor infrastructure being considered in this waiver proceeding, or the Commission’s intent to prevent the establishment of wide area communications systems. However, we agree that iRobot’s system design – including the use of low-to-the-ground transmitters pointing horizontally - and its focus on marketing for non-commercial residential use – incorporates practical measures (*i.e.*, consistent with US342) appropriate for protecting the non-allocated radio astronomy service from harmful interference. Furthermore, because the NRAO analysis looked at line-of-sight separation distances, it has greatly overestimated the interference potential of transmitters that are located less than two feet above the ground. We find that when taking into account the variability in propagation characteristics due to terrain, low antenna heights and other propagation factors, grant of this waiver is very unlikely to increase the potential for harmful interference. As a condition for granting this waiver, and to promote the protection of radio astronomy operations, we will require iRobot to comply with the representations and commitments it made in the Waiver Request. Specifically, the iRobot systems operating under this waiver shall comply with the following conditions:

- 1) Operation under this waiver is limited to residential use only. iRobot will take appropriate steps (including device and instruction manual labeling) to convey this information to users, and will only market the device as a residential-use product.
- 2) Neither the RLMs nor the RLM beacons shall communicate with other devices pursuant to Section 15.250 of the Commission’s rules.
- 3) The RLM beacons shall be no higher than 24 inches from the ground level.
- 4) iRobot systems shall comply with the emission limits contained in Section 15.250 of the Commission’s rules, as well as the out-of band emission limits and other technical requirements for operation in the 5925-7250 MHz frequency band.

9. For the foregoing reasons, we conclude that harmful interference to authorized users of the radio spectrum is unlikely to occur. We find that grant of the requested waiver will not cause harm to other operations in the 5925-7250 MHz frequency band and that grant is in the public interest.

IV. ORDERING CLAUSES

10. Accordingly, by the authority delegated in Sections 0.31 and 0.241 of the Commission’s rules, and pursuant to Section 1.3 of the Commission’s rules, 47 C.F.R. § 1.3, and Sections 4(i), 302, 303(e), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, 303(e), and 303(r), IT IS ORDERED that the request for waiver of Section 15.250(c) of the Commission’s rules filed by iRobot Corporation IS GRANTED, subject to the conditions listed above.

³² iRobot Reply Comments at 3; *see also* Waiver Request at 7-8.

³³ Waiver Request at 8; *see also* iRobot Reply Comments at 3-4.

³⁴ *See UWB Second R&O*, 19 FCC Rcd at 24571 (para. 27).

11. IT IS FURTHER ORDERED that, pursuant to the authority contained in Sections 4(i), 4(j), and 303 of the Communications Act, as amended, 47 U.S.C. §§ 154(i), 154(j) and 303, that should no petitions for reconsideration or applications for review be timely filed, this proceeding IS TERMINATED and ET Docket No. 15-30 IS CLOSED.

12. IT IS FURTHER ORDERED that this action IS EFFECTIVE upon release of this Order.

FEDERAL COMMUNICATIONS COMMISSION

Julius P. Knapp
Chief, Office of Engineering and Technology