

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

In the Matter of)	
)	
Evolv Technologies, Inc.)	ET Docket No. 16-414
)	
Request for Waiver of Sections 15.31(c) and)	
15.35(b) of the Commission’s Rules to Permit the)	
Deployment of Security Screening Portal Devices)	
that Operate in the 24.0-28.8 GHz Range)	

ORDER

Adopted: November 3, 2017

Released: November 3, 2017

By the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this Order, we grant a request for waiver of certain Part 15 rules filed by Evolv Technologies, Inc. (Evolv) so it can apply for FCC certification to market its Edge system, which is a walk-through security screening system intended for use at airports and other indoor locations under supervised operation. For the reasons discussed below, we find that there is good cause to grant Evolv’s request for waiver.

II. BACKGROUND

2. The Edge system uses imaging technology to detect concealed metallic and non-metallic threats, such as firearms and explosives, on people as they pass through the system. The device is designed to scan a high volume of persons – upwards of 600 per hour. Each person is scanned, upon entry and exit, while walking between two upright columns. The device transmits a swept frequency signal over the range of 24.0 to 28.8 GHz from an array of antennas mounted in the columns. It is designed to capture 30 three-dimensional video frames per second of each person passing through it. The device analyzes the captured information and uses an indicator light to show whether any potential threats were detected.

3. On December 16, 2016, Evolv filed a request for waiver of the Commission’s Part 15 rules so it can obtain FCC certification to market the Edge screening device.¹ Evolv describes how its device produces signal levels that exceed the limits set forth in our rules for unlicensed devices, arguing that the signal levels are necessary for the device to achieve a sufficient signal-to-noise ratio for its operation and to permit it to scan 600 or more persons per hour. To account for the average and peak radiated power

¹ Request for Waiver of Sections 15.35(b) and 15.209(a) of the Commission’s Rules to Permit the Deployment of Security Screening Portal Devices Operating in the 24.0-28.8 GHz Range (filed Dec. 16, 2016) (Evolv Waiver Request). Operation under Part 15 is subject to the conditions that the operator of a device must accept any interference received and must correct any harmful interference caused. In the event a Part 15 device causes harmful interference, the operator is required to immediately correct the interference problem, even if correction requires ceasing operation of the Part 15 device causing the interference. 47 CFR § 15.5.

produced by the Edge device, Evolv sought a waiver of the emission limits in Sections 15.35(b) and 15.209(a) of the rules.²

4. Evolv has argued that its system has similar technical characteristics, e.g., power and operating frequency range, to a security screening system manufactured by L-3 Communications Security and Detection Systems, Inc. (L-3) for which the Commission granted a waiver of three Part 15 rules on November 22, 2016.³ In a supplement to its waiver request filed on June 21, 2017,⁴ Evolv states that when radiated emission measurements are performed on its device using the same procedures that L-3 used (i.e., with the frequency sweep active instead of stopped), both the peak and average emission levels are within one dB of those from the L-3 device. It claims that it would be able to obtain certification for its device if the Commission waived the measurement procedures in Section 15.31(c), in addition to the previously requested waiver of the peak emission limits in Section 15.35(b), which are the two rule waivers the Commission granted for the L-3 device.⁵ Evolv would not need a waiver of Section 15.209 as it originally requested if the device is measured with the frequency sweep active since the average radiated emission level would comply with the limit under this operating condition. Evolv also states that it would agree to limit operation of its device to indoor locations, as the Commission required for L-3.

5. In response to the Office of Engineering and Technology's public notice seeking comment on Evolv's waiver request,⁶ the Lincoln Center for the Performing Arts, the Pentagon Force Protection Agency, and American Airlines submitted brief filings describing their experiences during Evolv's device tests and expressing an interest in deploying such technologies in their facilities. No comments were filed raising any concerns or objections to Evolv's waiver request.

² Section 15.209(a) of the Commission's rules states that at frequencies above 960 MHz, the radiated emission limit is 500 microvolts per meter at a distance of three meters. 47 CFR § 15.209(a). Section 15.35(b) of the Commission's rules states that at frequencies above 1000 MHz, the emission limits are based on measurement instrumentation employing an average detector function. 47 CFR § 15.35(b). This section further states that the peak emission levels from a device operating above 1000 MHz may not exceed 20 dB above the average emission level. Thus, the emission limits that apply to the Edge device are 500 microvolts per meter (average) and 5,000 microvolts per meter (peak), both measured at a distance of three meters. Evolv states that the average radiated emission level from the device would exceed the limit by 15.4 dB and the peak radiated emission level would exceed the limit by 22.3 dB.

³ Evolv waiver request at 14-15. *L-3 Communications Security and Detection Systems, Inc. Request for Waiver of Sections 15.31(c), 15.35(b) and 15.205(a) of the Commission's Rules to Permit the Deployment of Security Screening Portal Devices that Operate in the 20-40 GHz Range*, Order, 31 FCC Rcd 12310 (2016) (*L-3 Waiver Order*). The Commission originally granted a waiver to SafeView, Inc. (now L-3) for a security screening device in 2006. *SafeView, Inc. Request for Waiver of Sections 15.31 and 15.35 of the Commission's Rules to Permit the Deployment of Security Screening Portal Devices that Operate in the 24.25-30 GHz Range*, Order, 21 FCC Rcd 8814 (2006). The device for which the Commission granted a waiver to L-3 in 2016 is the same as the earlier device, except that it has a wider operating bandwidth, with the swept frequency range increased from 24.25-30 GHz to 20-40 GHz.

⁴ Letter from Michael Litchfield, Chief Engineer, Evolv Technology, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 16-414 (filed Jun. 21, 2017).

⁵ 47 CFR §§ 15.31(c) and 15.35(b). Section 15.31(c) of the rules requires that radiated measurements on swept frequency devices be performed with the frequency sweep stopped at the frequencies chosen for measurement. As discussed above, Section 15.35(b) requires that when average radiated emissions limits are specified for a device, the peak radiated emission level may not exceed the average emission limit by more than 20 dB.

⁶ *Office of Engineering and Technology Declares Evolv Technologies, Inc. Request for Waiver of Sections 15.35(b) and 15.209(a) to be a "Permit-but-Disclose" Proceeding for Ex Parte Purposes and Requests Comment*, Public Notice, 32 FCC Rcd 959 (2017).

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.⁷ Good cause, in turn, may be found and a waiver granted “where particular facts would make strict compliance inconsistent with the public interest.”⁸ To make this public interest determination, the waiver cannot undermine the purposes of the rule, and there must be a stronger public interest benefit in granting the waiver than in applying the rule.⁹

7. As an initial matter, we look to the model provided by the existing L-3 waiver when considering Evolv's request. The L-3 and Evolv devices are similar in that both are swept frequency devices designed to perform security screening functions. Evaluating Evolv's suitability for a waiver of sections 15.31(c) and 15.35(b) of the rules (i.e., the same rules waived for L-3) allows us to draw on existing experience and precedent. As discussed in detail below, we determine that the waiver standard has been met for these two rules.

8. We find that the Edge device promises to deliver strong public interest benefits. It is designed to enable the rapid identification of concealed dangerous objects in places with high public foot traffic – including airports – where there is a strong interest in enhancing security and promoting safety of the public. Moreover, Evolv has described how the waiver will permit the use of signal levels that will enable the screening of people without requiring them to remove outerwear or items in their pockets as they are walking through the device, as well as how this system design will provide for a speedier process than existing technologies and will result in fewer false positives.¹⁰ Considering the vital importance of improving the safety of persons in public places and the potential for the Edge system to provide such improvements, we find that there is a stronger public interest benefit in granting the waiver than in applying the rule.

9. We also conclude that, with appropriate operational and technical restrictions to prevent harmful interference to authorized services, granting Evolv's request for waiver does not undermine the purpose of the rules, i.e., to prevent harmful interference to authorized services.

10. Evolv states in its June 21, 2017 filing that when radiated emission measurements are performed on its device with the frequency sweep active, both the peak and average emission levels are within one dB of those from the L-3 device. Specifically, it states that the average radiated emission level measured with the sweep active is -41.9 dBm/MHz, which is slightly less than that of the L-3 device.¹¹ Because the Edge's average emission level is less than the Section 15.209(a) limit, a waiver of that section is not required.¹² Evolv also states that the measured peak radiated emission is 42.3 dB above the average

⁷ 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).

⁸ *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.

⁹ 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).

¹⁰ Evolv Waiver Request at 12.

¹¹ The average emission level from the L-3 device was -41.3 dBm/MHz.

¹² 47 CFR § 15.209(a). The limit in this section is 500 microvolts per meter, measured at a distance of three meters, using equipment with a one megahertz measuring bandwidth. This limit corresponds to an EIRP of -41.3 dBm/MHz.

emission level, which exceeds the limit in Section 15.35(b) by 22.3 dB.¹³ This is approximately one dB greater than the peak emission level from the L-3 device.¹⁴ Thus, there are no significant differences between the power levels of the L-3 and Evolv devices. We previously determined that the L-3 device would have a low potential for causing harmful interference to authorized services, and expect that the Evolv device operating at similar power levels will have a similar low potential for causing harmful interference.

11. We further find that the Edge device when operated in fixed indoor locations would pose a negligible potential risk of harmful interference to licensed operations. At frequencies in the Edge's operating range, free space path loss is significant and nearby people and objects would further attenuate the signals.¹⁵ Moreover, the Evolv system, by its very nature, would be expected to focus its energy between the columns in order to reduce the possibility of false detections from persons that are located in other areas, as well as to reduce the potential for interference from other users of the spectrum.¹⁶ We observe that wireless services operating in this region of the spectrum also tend to employ directional signals, further reducing the likelihood that signals from the Evolv system and radio services will align in ways that are likely to result in harmful interference.¹⁷

12. The Edge device is designed to be used at security checkpoints in locations with large numbers of people that could be possible targets of attack. Evolv asserts that its system is capable of scanning persons to quickly detect concealed firearms, explosives, and other threats. We also observe that we are unaware of any instances of harmful interference caused by the L-3 device in the more than 10 years it has been in service in airports throughout the United States. Given the strong public interest benefits associated with promoting improved security and the apparent small likelihood of harmful interference to authorized radio services, we conclude that the public safety benefits outweigh the risk of harmful interference, subject to conditions that will further ensure against harmful interference.

13. We will impose operational and marketing conditions on operation of the Edge device.¹⁸ These conditions are intended to further limit the potential for harmful interference from the Edge device, while allowing broad deployment of the device, to enable an innovative new means for protecting the American public. Specifically, we will require Evolv to install its equipment indoors only, thereby

¹³ 47 CFR § 15.35(b). As noted above, this section requires that when average radiated emissions limits are specified for a device, the peak radiated emission level may not exceed the average emission limit by more than 20 dB.

¹⁴ While Evolv states that the emission levels from its device are within one dB of those from the L-3 device, we calculate that the peak emission level from the Evolv device is actually slightly more than one dB higher than the L-3 device. However, we do not believe that difference would result in any significantly higher interference potential for the Evolv device.

¹⁵ SafeView Waiver Order, DA 06-1589, para 24. In this Order, it was determined that at frequencies in the 24-30 GHz range, free space loss is significant and that factor added to building attenuation of one or more walls would prevent harmful interference to licensed devices operating outdoors from the SafeView device. It was also determined that if a SafeView device is collocated or in close proximity with an indoor licensed 24 GHz device, the potential for interference could be avoided by re-orienting the licensed antenna, putting a shielded partition between the two devices, or using one device over the other one in a specific location.

¹⁶ Evolv waiver request at 6 and Figure 1 at 7.

¹⁷ *Use of Spectrum Bands Above 25 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014 (2016) FCC 16-89 at para 65. Although in a different context (assessing whether there was a risk of interference to satellite operations), the Commission stated that mobile base stations in the 28 GHz band will probably use antenna systems that employ dynamic beamforming techniques to produce beams as narrow as 1.0 degree. User equipment will also employ antenna arrays to generate dynamic beamforming, varying both azimuth and elevation in order to maintain signal connections with their base stations.

¹⁸ We imposed similar conditions on the L-3 device. *L-3 Waiver Order*, 31 FCC Rcd at 12314-15, para. 15.

ensuring that building attenuation will create additional isolation between the Edge device and licensed services operating outdoors. We are also limiting the allowable peak power level to no more than 22.3 dB above the peak emission limit in Section 15.35(b).¹⁹

14. In addition, we will require compliance with certain notification and recordkeeping requirements. Specifically, we will require Evolv to notify the Commission of any instances of interference that it is made aware of and how the interference was remedied. We will also require Evolv to create and maintain a record of installations of all devices operating under this waiver, including the identity of the customer, the type of installation, and street address and/or geographic coordinates. This information will assist Evolv, the Commission and NTIA should it become necessary to identify and investigate any patterns of harmful interference, should they occur. We will further require Evolv to inform purchasers of Edge imaging devices that they may only be operated on a non-interference basis to existing and future services with frequency allocations in the 24.0-28.8 GHz frequency bands, and that operators will be required to mitigate any instances of harmful interference that may occur. We also will require Evolv to inform purchasers that Edge imaging devices may not be resold to third parties for use at another installation in the United States unless appropriate arrangements are made to meet all the conditions of this waiver. This condition will ensure that equipment will continue to be listed in the Evolv database even if it is resold. Finally, we will require Evolv to obligate parties who purchase this device to operate them consistent with the terms of this Order.²⁰

15. Accordingly, pursuant to the delegated authority in Sections 0.31 and 0.241 of the Commission's rules, we waive the requirements of Sections 15.31(c) and 15.35(b) of our rules to permit the certification and marketing of the Edge device. This waiver is subject to the following conditions:

- 1) The Edge imaging device shall be certified by the Commission and must comply with the technical specifications applicable to operation under Part 15 of 47 C.F.R, except as permitted below.²¹ For this particular swept frequency device, the measurement requirement in 47 C.F.R. § 15.31(c) is waived to permit the Edge device to be tested with the frequency sweep active, rather than stopped, to demonstrate compliance with the maximum permitted average power in Section 15.209(a), and the requirement of §15.35(b) is relaxed to allow a total radiated peak power level up to 42.3 dB above the maximum permitted average power in Section 15.209(a) when measured under the procedure specified herein.
- 2) The intentional emissions generated by the Edge imaging device must be completely contained within the 24.0 to 28.8 GHz frequency range.
- 3) All installations of the Edge imaging devices operated under this waiver shall be restricted to supervised indoor use.
- 4) Evolv must notify the Commission of any instances of interference that it is made aware of and how the interference was remedied. Evolv shall create and maintain a record of installations of all devices operating under this waiver, including the identity of the customer, type of location (e.g., airport or government building), and street address and/or coordinates. This list shall be made available to the Commission and to NTIA upon request.
- 5) Evolv shall inform purchasers of Edge imaging devices that these devices may only be operated on a non-interference basis to existing and future authorized services in the 24.0 – 28.8 GHz

¹⁹ For frequencies above 960 MHz, the average radiated emission limit is 500 microvolts per meter, and the peak radiated emission limit is 5,000 microvolts per meter, both measured at a distance of three meters. *See supra* note 2.

²⁰ The provisions of 47 CFR §2.939(a) allow the Commission to revoke the certification grant if Evolv or any operator of these devices fails to comply with the obligations placed on them in accordance with the equipment authorization program.

²¹ Evolv shall include a copy of this waiver order with its application for certification of the Edge imaging device.

frequency bands, and operators of these devices will be required to mitigate any instances of harmful interference that may occur.

- 6) Evolv shall inform purchasers that Edge imaging devices may not be resold to third parties for use at another installation in the United States unless appropriate arrangements are made to meet all the conditions of this waiver.
- 7) This waiver shall apply to the Edge imaging device produced by Evolv as described herein and provided no major changes are made to the transmitter circuitry or to the housing and position of the antenna masts that would increase the devices peak and average radiated power or bandwidth.

IV. ORDERING CLAUSES

16. 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 Evolv Technologies, Inc. on December 16, 2016 as supplemented on June 21, 2017 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 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.

17. 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

Julius P. Knapp
Chief, Office of Engineering and Technology