

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

In the Matter of)
)
Vayyar Imaging Ltd.)
)
Request for Waiver of Section 15.255)
of the Commission’s Rules for Interactive)
Motion Sensing Devices)

To: Chief, Office of Engineering and Technology

REQUEST FOR LIMITED WAIVER

Pursuant to Section 1.3 of the Commission’s rules, Vayyar Imaging Ltd. (“Vayyar”) hereby requests a limited waiver of Section 15.255 for its V60G short-range 3D interactive motion-sensing technology (the “V60G”). Vayyar is the developer of a wide range of low-power radar devices used in consumer, automotive, industrial, and medical applications for radio frequency (RF) imaging, monitoring, sensing and testing.¹ Recently, Vayyar completed the development of its V60G family of devices that operate in the 57-64 GHz band for 3D interactive motion-sensing applications such as touchless control, medical/safety alerts, vital sign monitoring and environmental management.

Vayyar is aware of the Section 15.255 waiver granted by the Commission in December 2018, to Google LLC (“Google”)² for its Soli sensors, which also operate in the 57-64 GHz band

¹ Vayyar was established in 2011 in Israel with the mission to commercialize the microwave imaging technology to improve the safety, health, and quality of life of people. Vayyar develops its own multi-channel transceiver ASICs and its information processing expertise to address the product needs.

² See *In the Matter of Google LLC Request for Waiver of Section 15.255(c)(3) of the Commission’s Rules Applicable to Radars used for Short-Range Interactive Motion Sensing in the 57-64 GHz Frequency*

for interactive motion-sensing applications. The V60G interactive motion-sensing devices are designed to operate under the same technical parameters as the Soli sensor, will generate an identical “spectrum footprint” as these sensors and thus, will coexist with other spectrum users in the 57-64 GHz band in the same manner as the Soli sensor. Accordingly, the V60G fully qualifies for the same Section 15.255 waiver that was granted for the Soli sensor.

The Office of the Engineering and Technology (“OET”) is delegated authority to grant follow on (“me-too”) rule waivers for RF products that are technically and functionally equivalent to previously waived devices.³ Because the RF characteristics and spectrum impact of the Soli device have already been exhaustively studied and approved, Vayyar submits that the Notice-and-Comment process for this “me-too” waiver request should not be required. The elimination of a redundant Notice-and-Comment period for a Soli-like device will minimize the lengthy time delays inherent to the waiver review process and speed up the introduction of Vayyar’s V60G motion-sensing technology to commercial markets. For these and the other reasons set forth herein, Vayyar respectfully submits that the public interest will be served by the expeditious grant of this limited waiver request.

I. The Soli Waiver Order Addressed all the Same Interference Issues that Apply to the V60G Interactive Motion Sensing Devices

The Commission is authorized to grant a waiver of its rules if the petitioner can demonstrate good cause for such action.⁴ Good cause, in turn, may be found and a waiver granted, “where

Band, Order, ET Docket No. 18-70, DA 18-1308 (December 31, 2018) (“Soli Waiver Order”).

³ See 47 C.F.R. § 0.241.

⁴ See 47 C.F.R. § 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).

particular facts would make strict compliance inconsistent with the public interest.”⁵ To satisfy this public interest requirement, 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.⁶

In 2018, Google filed a request for a limited waiver of Section 15.255 for its 3D interactive motion sensing Soli device⁷ “to enable touchless control of device functions or features, which can benefit users with mobility, speech and tactile impairments.”⁸ OET issued a Public Notice on March 12, 2018, soliciting comments on the waiver request.⁹ Five parties filed comments, six parties filed replies, and five parties made ex parte presentations to the Commission.¹⁰ In response to requests from various commenters, Google submitted an extensive analysis of the interference potential of the Soli sensors to both licensed devices and WiGig short-range radio.¹¹ After careful

⁵ See *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.

⁶ 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).

⁷ See *In the Matter of Google LLC Request for Waiver of Section 15.255(c)(3) of the Commission’s Rules, Applicable to Radars used for Short-Range Interactive Motion Sensing in the 57-64 GHz Frequency Band*, Request for Waiver, ET Docket No. 18-70, DA 18-1308 (filed Mar. 7, 2018) (“Soli Waiver Request”).

⁸ *Id.* at ¶3.

⁹ See Public Notice, DA 18-236, 33 FCC Rcd 2206 (2018).

¹⁰ Facebook, Inc. (“Facebook”), IEEE 802 LAN/MAN Standards Committee (“IEEE 802”), Continental Automotive Systems, Inc. (“Continental”), the National Radio Astronomy Observatory (“NRAO”), and OmniPresense Corporation (“OmniPresense”) filed comments. Facebook, the National Academy of Sciences’ Committee on Radio Frequencies (“CORF”), the Computer and Communications Industry Association (“CCIA”), the Frequency Allocations in Remote Sensing Technical Committee of the IEEE Geoscience and Remote Sensing Society (“FARS”), the Internet and Television Association (“NCTA”), and Google filed reply comments. In addition, Facebook, Google, Infineon Technologies AG, the Consumer Technology Association (“CTA”), and Qualcomm Inc. (“Qualcomm”) made ex parte presentations.

¹¹ See *Soli Waiver Request*, Attachment, Assessing the Interference of Miniature Radar on Millimeter Wave 60 GHz Wi-Fi Simulation Study (filed Mar. 7, 2018); see also Letter from Megan Stull, Counsel, Google LLC to Marlene Dortch, Secretary FCC, ET Docket No. 18-70, Attachment A, Assessing the Interference of Miniature Radar on Millimeter Wave 60 GHz Wi-Fi – Supplemental Analysis, Attachment B, Measurement Study on Soli/802.11ad Coexistence, Attachment C, Compatibility between Earth

consideration, the Commission found that the Soli sensors, when operating under specified power and duty cycle conditions, posed no threat of harmful interference to other spectrum users.¹² In addition, the Commission found no threat of harmful interference from Soli sensors when operating on-board aircraft.¹³ Accordingly, the Commission granted Google’s request to operate its Soli sensor technology at higher power levels than allowed by the Part 15 rules (i.e. at +10 dBm conducted power, +13 dBm EIRP and +13 dBm/MHz spectral power density), provided they observed a maximum 10% duty cycle (i.e. transmissions no longer than 3.3ms in any 33ms time period).¹⁴

In this waiver request, Vayyar seeks a grant of the same Section 15.255 rules to permit its V60G devices to operate in the same spectrum, at the same power levels and on the same duty cycle as the Soli sensors. Vayyar also seeks a waiver of the rules to allow its V60G devices, like the Soli sensor, to operate on-board aircraft in view of not being part of a “closed, exclusive, on-board communication network.”¹⁵ And while the Google waiver petition described only one type of 3D interactive motion-sensing application – i.e. touchless control for hand-held mobile phones – the Soli Waiver Order determined conclusively that interactive motion sensors operating in compliance with the waived technical parameters pose no threat of harmful interference to other spectrum users regardless of application.

Exploration-Satellite Service Sensors and Airborne Use of Project Soli Devices at 57.5 to 63.5 GHz (filed Jun. 8, 2018); Letter from Megan Stull, Counsel, Google, LLC to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-70, Attachment A, Gesture classification performance estimate under regulatory limits, and Attachment B, Supplement to Measurement Study on Soli/802.11ad Coexistence (filed Oct. 12, 2018).

¹² See *Soli Waiver Order* at ¶¶1 and 8.

¹³ *Id.* at ¶8.

¹⁴ *Id.* at ¶14; see also Letter from Megan Anne Stull, Google LLC, and Pankaj Venugopal, Facebook, Inc., to Marlene Dortch, FCC, ET Docket No. 18-70 (filed Sept. 7, 2018) (“Google-Facebook Joint *ex parte* Filing”).

¹⁵ See Section 15.255(b). As with the Soli waiver, the V60G devices will comply with all other technical specifications applicable to operation under the Part 15 rules, including the prohibitions specified in Section 15.255(b)(2)(i) and (ii).

Consequently, the only express use-based limitation contained in the Soli Waiver Order was that it would not apply “generally to other field disturbance sensors,”¹⁶ a term that broadly encompasses many types of field sensing technology, from low-resolution 1D and 2D radars to high-resolution 3D interactive motion sensing radars.¹⁷ Thus, the scope of the Soli Waiver Order must be seen as applying not only to the touchless control applications of the Soli sensor, but also to other high-resolution 3D interactive motion sensing applications such as medical/safety alerts, vital sign monitoring and environmental management for which the V60G is designed.¹⁸ As such, the Soli Waiver Order supports a determination that a Section 15.255 waiver for the V60G devices will serve the public interest without undermining the policy of the rule in the same manner as was found in the case of the Soli sensor.

II. The V60G Provides Enhanced 3D Interactive Motion Sensing at the Same Coexistence Levels as the Soli Sensor

The V60G devices are MIMO radars with 20 transmit and 20 receive antenna arrays configured to provide azimuth and elevation resolution. The wideband signals provide distance resolution for 3D imaging capability, while Doppler processing identifies object motion and small displacements. The 20 by 20 antenna array in the V60G provides for up to 400 “resolvable” signal paths, allowing for greater signal sensitivity spatial resolution than the Soli sensor (which only has 8 resolvable paths) when operated at the same power levels.

¹⁶ See *Soli Waiver Order* at ¶14.

¹⁷ See Section 15.3(i). The term “interactive motion sensor” is not defined in the Part 15 rules but when the term was added to Section 15.255, it was intended to describe a subset of field disturbance sensors capable of determining an object’s location and movement in three-dimensional space.

¹⁸ If the Soli Waiver Order was intended to apply only to touchless control applications, there would have been no reason for the Commission to condition the waiver on compliance with Section 15.255(b)(i) and (ii), which deal with sensors mounted on the outside of an aircraft. Also, one of the principle justifications for the higher power levels was to harmonize with European standards (ETSI 305 550), which place no limitations on the types of motion sensing applications allowed.

Vayyar's V60G devices utilize a multi-channel transceiver (system on a chip or SoC) that attaches to the multiple transmit and receive antennas. The SoC is highly configurable so that the frequency sweep parameters can easily conform to the technical conditions of the Soli Waiver Order. For example, by configuring the device to scan the 57.5-63.5 GHz frequency range in 150 μ s, the cycle of scanning 20 transmit antennas is accomplished in 3 ms. By repeating this transmit sequence each 33.3 milliseconds, the device meets the Soli Waiver Order duty cycle conditions.

Google submitted extensive analysis of interference potential of the Soli sensors to other devices, simulations and measurement studies, with emphasis on the 802.11ad (WiGig) standard.¹⁹ In those presentations, the Soli sensor was described as a 57-64 GHz transmitter that sweeps through the frequency range within 600 μ s, passing through the WiGig (IEEE 802.11ad) channels:²⁰

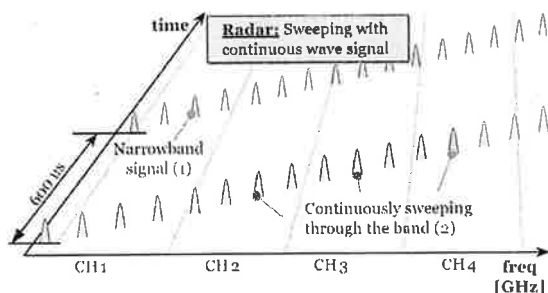


Figure 3: Interferer radio system, FMCW radar: The radar device sweeps continuously through the band of operation from 57GHz to 64GHz with a sweep time of 600us (indicated as (2) in the figure). The signal is a continuous wave narrowband signal (1) with much smaller bandwidth compared to the victim radio system's OFDM subcarrier bandwidth.

¹⁹ See *Soli Waiver Request*, Attachment entitled Assessing the Interference of Miniature Radar on Millimeter Wave 60 GHz Wi-Fi Simulation Study (filed Mar. 7, 2018); see also Letter from Megan Stull, Counsel, Google LLC to Marlene Dortch, Secretary FCC, ET Docket No. 18-70, Attachment A, Assessing the Interference of Miniature Radar on Millimeter Wave 60 GHz Wi-Fi – Supplemental Analysis, Attachment B, Measurement Study on Soli/802.11ad Coexistence, Attachment C, Compatibility between Earth Exploration-Satellite Service Sensors and Airborne Use of Project Soli Devices at 57.5 to 63.5 GHz (filed Jun. 8, 2018); Letter from Megan Stull, Counsel, Google, LLC to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-70, Attachment A, Gesture classification performance estimate under regulatory limits, and Attachment B, Supplement to Measurement Study on Soli/802.11ad Coexistence (filed Oct. 12, 2018).

²⁰ See *Soli Waiver Request*, Attachment entitled Dr. Stefan Mangold, Lovefield Wireless GmbH, Assessing the Interference of Miniature Radar on Millimeter Wave 60 GHz Wi-Fi (Feb. 21, 2018) at 12.

The sweep duration parameter of 600 μ s plays no role in further analysis other than stating that the interference behaves as a CW signal on the timescale of each data symbol of 802.11ad (in both OFDM and single carrier mode). When analyzing the interference potential to Earth Exploration-Satellite Service (EESS), only the bandwidth is taken into account; therefore, all swept frequency radar systems occupying similar bandwidth will produce the same levels of interference.

The assumption that the radar operates only 10% of the time is important in the analysis performed by Google both in terms of aggregate interference and in terms of the fraction of time that the transmissions of the Soli sensor overlap with the channel bandwidth of the victim receivers. Therefore, to maintain compatibility with the analysis performed by Google, Vayyar will configure the duty cycle of the V60G so as not to exceed 10%.

The number of transmit antennas of the V60G device is of no consequence for the purpose of this interference analysis since all of the transmit antennas exhibit the same gain and directional characteristics. Thus, there is no difference whether the transmissions are cycled through two transmit antennas or through twenty transmit antennas.

The Commission found that the Soli sensors, when operating under the specified waiver conditions pose minimal potential of causing harmful interference to other spectrum users and uses of the 57-64 GHz frequency band.²¹ Unquestionably, this finding is also applicable to Vayyar's V60G devices, which will operate under the same spectrum terms and conditions as the Soli sensor. Moreover, many V60G applications will involve single sensor use at fixed locations

²¹ See *Soli Waiver Order* at ¶ 6, "We find that allowing Google Soli sensors to operate at the requested power levels will not materially change the operating environment in the 57-64 GHz band such that there would be an increase in potential harmful interference to other users in the band, and that the higher power Google Soli device will be able to cooperatively share this spectrum with all users."

(e.g. medical alert, vital sign monitoring, environmental controls), which will minimize the cumulative interference concerns that might be raised by the activation of ubiquitous touchless control applications on mobile phones.

Insofar as the extensive interference analysis performed by Google on its Soli sensor is entirely applicable to the V60G devices, it is clear that the V60G devices will coexist with other spectrum users in an identical manner as the Soli sensor.

III. Commission Precedent Supports Expediting Identical Waiver Requests

Under long standing Commission policy, a device that operates identically to a waived device is entitled to a grant of the same waiver conditions because all relevant interference issues have been studied and resolved. Fundamental fairness dictates that device manufacturers are treated equally under the rules so that the public will benefit from unfettered market competition. Thus, there is rarely any sound regulatory justification for delaying the grant of identical or “me-too” waivers, once the technical requirements have been established.

The Commission has a long history of issuing “me-too” rule waivers for similarly situated manufacturers. In the area of ultra-wideband (UWB) radio, such rule waivers are routinely and quickly granted even when the UWB devices involve different applications. In 2005, for example, the Multi-band OFDM Alliance Special Interest Group successfully petitioned the Commission for a waiver of the Part 15 rules standards for UWB communications devices that employed fast stepping, rather than impulse, transmitters, and that relied on measurement procedures with “gating” on, rather than off.²² In 2010, a similar waiver was granted to Curtiss-Wright Controls

²² See *In the Matter of Multi-band OFDM Alliance Special Interest Group, Petition for Waiver of the Part 15 UWB Regulations*, Order, ET Docket No. 04-352, 20 FCC Rcd 5528 (2005).

Inc. for a UWB ground penetrating radar devices²³ and, in 2016, the same technical standards were waived for a UWB medical imaging device manufactured by Kyma Medical Technologies Ltd.²⁴ More recently, those same rules were waived for Proceq USA Inc.²⁵ for a ground penetrating radar device and for Sensible Medical Innovations Ltd.²⁶ for a medical imaging and diagnostic device.

The Commission also has a history of granting “me-too” waiver requests for certain rules that implement the Telephone Consumer Protection Act of 1991 (“TCPA”).²⁷ In 2014, the Commission granted waivers of the TCPA opt-out requirements to several petitioners and other “similarly situated parties” as a means of providing temporary relief from overdue obligation required by the rules.²⁸ A series of “me-too” waivers of the Universal Service Fund rules for high-cost filing deadlines were also waived to all “similarly situated” parties.²⁹

Insofar as the V60G devices firmly establish Vayyar as a “similarly situated” manufacturer to Google in terms of Soli waiver, a “me-too” waiver should promptly be granted to Vayyar. As

²³ See *In the Matter of Curtiss-Wright Controls Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, ET Docket No. 10-167, 27 FCC Rcd 234 (2010); *Curtiss-Wright Controls Inc., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Memorandum Opinion and Order, ET Docket No. 10-167 (rel. August 9, 2013) (“Curtiss-Wright MO&O”)

²⁴ See *In the Matter of Kyma Medical Technologies Ltd., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, ET Docket No. 15-119 (rel. September 6, 2016).

²⁵ See *In the Matter of Proceq USA Inc. Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices*, Order, DA 18-251 (rel. March 14, 2018).

²⁶ See *In the Matter of Sensible Medical Innovations Ltd., Request for Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices for a Medical Imaging System*, Order, DA 19-937 (rel. September 23, 2019).

²⁷ See *Petition for Declaratory Ruling, Waiver, and/or Rulemaking Regarding the Commission's Opt-Out Requirement for Faxes Sent with the Recipient's Prior Express Permission*, CG Docket Nos. 02-278, 05-338, 29 FCC Rcd 13998 (2014).

²⁸ *Id.*

²⁹ See, e.g., *In the Matter of the Federal-State Joint Board on Universal Service*, Order, CC Docket No. 96-45, DA 08-925 (2008) (granting a waiver of the Section 54.314(d) deadline to Farmers Mutual Telephone Company to permit a late-filed Idaho Public Utility Commission annual certification); see also *In the Matter of Petitions for Wavier of Universal Service high-Cost Filing Deadlines*, Order, WC Docket No. 08-71, CC Docket No. 96-45, DA 10-107 (2010) (granting a waiver of the Section 54.314(d) deadline to Hopi Telecommunications, Inc.).

demonstrated above, the V60G will operate under the same technical parameters as the waived Soli sensor and will be used only for similar 3D interactive motion-sensing applications. Accordingly, the public interest will be served by an expedited grant of a waiver for the Vayyar devices.

IV. The OET Chief Engineer has Delegated Authority to Grant this Waiver Request

Section 0.241 of the Commission's rules delegates certain activities to the OET Chief Engineer, including administering Parts 2 and 15 of the rules as well as the equipment authorization program. The Chief Engineer is directed to refer waiver requests to the Commission *en banc*, but only if those requests "contain new or novel arguments not previously considered by the Commission or present facts or arguments which appear to justify a change in Commission policy."³⁰

Here, there are no new or novel arguments that have not been fully vetted or considered by the Commission. The Soli Waiver Order sets forth the Commission's careful thinking and analysis of the very rule, Section 15.255, for which Vayyar now seeks a waiver. After considering the various comments, replies and *ex parte* presentations, the Commission concluded that a waiver of Sections 15.255(b)(2) and 15.255(c)(3) would be in the public interest.³¹ The Commission further noted that "any coexistence and interference concerns [were] adequately addressed with the updated operational parameters and the supporting studies and provide [the Commission] confidence that all users of the 57-64 GHz band will be able to operate without experiencing harmful interference."³² Given this clear and comprehensive administrative record, there can be

³⁰ See 47 C.F.R. § 0.241.

³¹ See *Soli Waiver Order* at ¶¶7-11.

³² See *id.* at ¶11.

no doubt that all relevant issues were reviewed and evaluated by the Commission; thus, the Chief Engineer has the requisite authority to promptly proceed with a grant of this limited waiver request.

Lastly, there is no requirement to solicit public comment on this petition, which will only delay the testing and certification of the Vayyar V60G devices. Waiver requests are not subject to the notice and comment procedures of the Administrative Procedures Act³³ and there is no applicable Commission rule requiring OET to seek public comment on this type of request. It is particularly unnecessary (due to the loss of time and expenditure of resources involved) for OET to solicit public comment in the instant case as the issues involved have been analyzed in detail.³⁴

V. The Requested Waiver Will Serve the Public Interest

The V60G devices are miniature motion sensors designed to interact with users in their immediate vicinity and over ranges of up to several meters. The extended range of these devices allows not only palm-level gestures for controlling portable devices from a short distance (similar to the Soli sensors), but also a variety of additional modes of interaction, such as hand-waving gestures for controlling appliances without the need to approach them, and detecting distress situations such as a fall or sleep apnea. These modes of interaction and detection benefit users with mobility, speech and tactile impairments, as well as benefiting the elderly and infants in situations of distress.

³³ See, e.g., *In the Matter of Petitions for Waiver of Section 64.702 of the Commission's Rules (Computer II) filed by Pacific Bell et al.*, Memorandum Opinion and Order, 100 F.C.C.2d 1057, 1070 (1985) (“The Administrative Procedures Act does not prescribe a specific procedural format for informal adjudicatory procedures such as this waiver proceeding.”). See also 47 C.F.R. § 1.925(c) (it is within the Commission’s discretion to give public notice of a waiver request).

³⁴ See, e.g., *In the Matter of Respiroics, Inc. Request for Waiver of Section 15.205 of the Commission's Rules to Permit the Marketing and Operation of Certain Medical Communications Devices that Operate in the 90-110 KHz Band*, Order, 22 FCC Rcd 21861, 21862 fn. 7 (2007) (explaining that the Chief, OET elected not to seek comment on the petitioner’s request for an extended waiver because it was similar to the petitioner’s prior request which had been placed on public notice and received few comments).

The grant of this waiver request will promote the public interest and “encourage the provision of new technologies and services to the public” consistent with Section 7 of the Communications Act of 1934.³⁵

VI. Conclusion

Vayyar’s V60G family of interactive motion sensing devices allows a wide range of applications, which are highly beneficial to the public. Allowing these sensors to operate at the same power levels and other operating conditions as the Google Soli sensor will not materially change the operating environment in the 57-64 GHz band or increase potential harmful interference to other users in the band. The V60G devices will cooperatively share this spectrum with other users. Based on the foregoing, therefore, Vayyar respectfully submits that the requested waiver will serve the public interest and should be granted expeditiously.

Respectfully submitted,



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³⁵ See 47 U.S.C. § 157(a).