

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of _____)
 _____)
 Request by Auspion Inc. _____)
 For Waiver of Section 18.107(c) _____) File No. _____
 of the Commission's Rules _____)

REQUEST FOR WAIVER

AUSPION INC.

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SUMMARY

Auspion seeks waiver of the Federal Communications Commission's ("FCC" or "Commission") rules for Industrial, Scientific, and Medical ("ISM") equipment to market a novel system for transmission of wireless power over distance ("WiPod"). The system operates in the millimeter Wave ("mmWave") frequency range, in the 24 GHz ISM band, which enables it to achieve greater power transfer efficiency at longer distances. The technology is able to aim energy at specifically defined power spots, and employs multiple, independently testable safeguards. Auspion seeks to market this system for industrial, retail, and enterprise applications, not for consumer or residential use.

The WiPod system complies with all applicable rules but one, from which it seeks this waiver. The Commission's Part 18 rules presently provide that to be categorized as ISM equipment, a technology must be designed to "generate and use locally" RF energy. To date, the Commission has not officially examined when a technology that transfers power over distance constitutes "local" use or how these technologies could fit into the Commission's regulatory scheme. Commission staff has interpreted "local" to mean no more than a certain distance – perhaps up to three feet – and under this interpretation the Auspion system does not satisfy the definition of ISM equipment. For this reason, Auspion requests this waiver.

Auspion's WiPod system powers devices over distance, but power is directed to very precise locations, called power spots, which is consistent with the intent of the Part 18 requirement of local use of RF as the energy transmission is limited to small, clearly defined areas. Grant of this waiver will allow Auspion to bring its system to market, initially in a limited way. This will provide the Commission with information on wireless power at a distance, aiding the establishment of rules governing these technologies.

Use of the WiPod system will be limited by a number of safeguards, meaning the Commission can be assured of its safety. The system will be installed only in stationary locations, by professional installers, and users will not be able to modify the location or operation of the system. The system will be labeled to provide notice of these use restrictions. Auspion will maintain a list of all locations of installation, which it will make available to Commission staff upon request. Additionally, Auspion will submit to the Commission technical details regarding the system's multiple, independently testable safeguards to seek guidance for frequency exposure review.

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REQUEST FOR WAIVER

Auspion Inc. (“Auspion”), pursuant to Section 1.3 of the Federal Communications Commission’s (“FCC” or “Commission”) rules,^{1/} hereby requests a waiver of Section 18.107(c),^{2/} which sets out the definition of Industrial, Scientific, and Medical (“ISM”) equipment.^{3/} Auspion requires grant of this waiver to market a system for wireless power over distance for industrial, retail, and enterprise applications. Grant of this request is consistent with the intent of the rule, and will make available to industrial, retail and enterprise facilities a system for wireless power over distance that will provide enhanced charging efficiency and reliability.

The Commission should act promptly on this request so that the U.S. can take the lead in establishing a regulatory framework for this important new technology. Grant of the waiver will allow Auspion to gain experience fielding wireless charging equipment, which will serve to inform the Commission on wireless charging over distance, in particular where systems are able

^{1/} 47 C.F.R. § 1.3.

^{2/} 47 C.F.R. § 18.107(c).

3/ To the extent necessary, Auspion additionally seeks waiver of Section 2.1 of the Commission's rules, which also defines ISM applications. *See* 47 C.F.R. § 2.1 (“*Industrial, Scientific and Medical (ISM) (of radio frequency energy) Applications*.”). Operation of equipment or appliances designed to generate and use locally radio-frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications (RR).”).

to transfer energy to defined power spots and employ multiple, independently testable safeguards. In this way, granting this waiver will promote U.S. leadership in a promising sector of next-generation technology. Absent this waiver, the Commission will leave an emerging technology with no regulatory path to enter the U.S. market.

BACKGROUND AND INTRODUCTION

Auspion is a venture capital funded technology start-up located in Pasadena, California. Auspion's founders originate from the California Institute of Technology ("Caltech") faculty and staff, and the company uses technologies developed at, and in some cases licensed from, Caltech. Auspion has spent more than five years researching and demonstrating its power over distance technologies, having designed custom phased array chips underlying such a system since 2012. The technology, now in its fourth generation, is mature enough to bring to market.

Wireless power transfer is the transfer of energy for the purpose of powering or charging an electrical or electronic device without a cord or other physical link. This can be accomplished through several techniques. Power can be transferred over extremely short distances, sometimes referred to as the "near field," which is utilized by charging pads available today that charge smartphones and tablets set upon the pads. While physical contact between the device and the pad is not required for most systems, the range of power transfer is extremely small, meaning physical contact is functionally necessary. Another form of wireless power transfer is sometimes referred to as wireless power over distance, which involves a transfer of power through the air, at a distance of several feet or further.

Auspion is designing technology that provides wireless power over distance – in particular, highly programmable and localized power transfer. The technology contains multiple active and passive functionalities, such as location determination and sensing, that allow it to sense and react to the presence of people and other objects in a highly accurate manner. It

operates in the mmWave frequency range (24 GHz), where transmissions use significantly smaller wavelengths as compared to the low- or mid-range frequency bands. The benefit of operating at 24 GHz is that the system, with antenna steering and other technologies, can tightly focus the energy to a much more precise and limited area of very small power spots.^{4/} The combination of tight focal spots of power achievable with mmWave frequencies and the system's capability to actively monitor people in the vicinity of the devices being charged will ensure that the power transfer beams will avoid people.^{5/} This allows Auspion to achieve higher power transfer efficiency at longer distances while maintaining exposure safety. Simply put, Auspion can provide intelligent power transfer – providing power where it is needed, when it is needed, as much as needed – all while controlling for safety.

Auspion's non-consumer wireless power over distance ("WiPod") system will be marketed for industrial, retail, and enterprise applications. Auspion envisions a number of potential uses for its WiPod system. One possible use case could be a ceiling-mounted system placed over conference room tables that would enable the charging of smartphones and tablets located on the tables. Another use case could be the charging of security cameras located at industrial or office settings via systems located on or near ceiling height, installed in locations where wired power is unavailable. Similarly, the system could be used in retail settings to charge fixed, mounted wireless retail display panels or tablets, providing flexibility to locate these in the ideal locations without needing to run power to them. Additionally, the system could be used to charge industrial robots located in warehouses or manufacturing facilities *via* systems installed

^{4/} More precisely, the system confines the power density field locally to these power spots.

^{5/} The nature of the technology is that the apparatus that performs the beam forming will have the ability to actively track and avoid illumination of people in the vicinity of the devices being charged.

on a wall or ceiling, charging those robots without having to maneuver them into pre-defined locations.

Auspion's WiPod system only transfers energy when: 1) the device being charged has requested a power transfer; 2) when no person is wearing or holding the device being charged; and 3) when no person is detected in the vicinity of the power path. Auspion agrees to make use of these features as a condition of its waiver.

In all use cases, the WiPod system would be installed in stationary locations, by professional installers, to ensure that the placement and set up is appropriate to ensure safe operations.^{6/} Additionally, systems set up in certain locations accessible to the general public, such as retail stores, could be programmed to operate only outside regular business hours. This could allow the systems to operate at higher power levels when the locations are free of people in order to maximize charging. All use will be non-consumer, as defined in Part 18, and therefore will be subject to the Part 18 rules for non-consumer equipment.^{7/} The system will not be marketed or sold to consumers and will not be installed in residential environments. The system will be labeled with the following information:

Device shall be used in non-residential environments only. Use in residential environments is prohibited. Device shall be installed only by professional installers and shall not be moved except by professional installers.^{8/}

^{6/} Auspion agrees to professional installation being a condition of the Commission's grant of this waiver.

^{7/} See 47 C.F.R. § 18.107(g) (defining Consumer ISM equipment as that "used or intended to be used by the general public in a residential environment, notwithstanding use in others areas."). The WiPod system also will have Part 15 communications functionality and Auspion will seek certification for the system under Part 15, in addition to the Part 18 operations. The Part 15 use will be fully-compliant with FCC rules and no waiver is needed for that aspect of the system.

^{8/} Auspion will agree as a condition of the waiver that it will place this label on the charging equipment to indicate that the equipment should not be removed from its location and should not be used in residential environments.

This information will also be included in any marketing materials for systems operating under this waiver.

Auspion's WiPod system operates in the 24 GHz ISM frequency band. This mmWave spectrum allows Auspion to achieve higher power transfer efficiency at longer distances while maintaining exposure safety. The WiPod system utilizes the lowest power necessary to fully charge the devices (within a reasonable time). Auspion expects that transmit power in most situations will be in the range of no more than 40-50 watts, with the higher end of this power range necessary only for charging industrial robots. In most cases, much less power would be required, or the use of higher power would occur only on an irregular and non-continuous basis. The power will be confined within a narrow beam that has multiple shut off mechanisms. Auspion estimates that the average charging distance will be around three to five meters, though the charging of security cameras may necessitate a longer distance. The operating parameters will not be adjustable by the user.

The RF energy from the WiPod will be generated and locally absorbed within the narrow spot beams of energy within the charging distance. While this "local" area is not all adjacent to the device, it is a specifically defined area that is under the control of the system. More than 80%, and up to 100%, of the system's delivered power will be focused and contained in a small focal spot at the receiver device. Transmissions in 24 GHz are by their nature very narrowly focused and create smaller power spots for the same beam width as systems operating in lower frequencies. The power spot size generally will be around 10-20 centimeters, depending upon the application, though may be slightly larger for security camera charging. The Commission has observed:

While mmW bands feature short transmission paths and high propagation losses, those features can be useful in developing high-capacity networks because cells

can be placed close to each other without causing interference to each other. In addition, where longer paths are desired, the extremely short wavelengths of mmW signals make it feasible for very small antennas to concentrate signals into highly focused beams with enough gain to overcome propagation losses.^{9/}

These characteristics make the mmWave bands the ideal spectrum for WiPod. Watt for watt, operations at 24 GHz will produce a much greater amount of recovered power by the equipment than similar systems operating at lower frequencies, such as 900 MHz or 2.4 GHz. And, because of the much smaller wavelength of mmWave radiowaves, the radiated power levels are actually much lower than if the system were operating in UHF for the same amount of recoverable power.^{10/}

Auspion's WiPod system will employ multiple, independently testable safeguards that will ensure that the FCC's exposure requirements are met.^{11/} Examples of these are the ability to evaluate the orientation of the device being charged, including whether it is moving, fixed, or set on a stable surface; the ability to passively sense nearby movement and beam interruption; and the ability to detect Doppler signals from the device being charged or people that are moving. In this way, the distances between the beam, the charging device, and any people located in the vicinity can be calculated in milliseconds, ensuring that the power transfer will cease before a person enters the path of a beam.^{12/} These independent safety features are all native to the WiPod system, meaning that they are inherent in the function of the beam formation apparatus of the

^{9/} *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Second Report and Order, 32 FCC Rcd 10988 at ¶ 8 (2017).

^{10/} That is, for any given receiver size, transmitter size, and amount of power that needs to be delivered, a system at 24 GHz radiates much less power.

^{11/} Auspion recognizes that current Office of Engineering and Technology policy requires that responsible parties seeking to market devices for wireless power transfer should obtain guidance from the FCC for frequency exposure review. *See* KDB publication number 680106 (May 30, 2013). Prior to marketing under authority of this waiver request, Auspion will file an individual KDB request and obtain specific guidance for RF exposure compliance evaluation.

^{12/} The WiPod will shut off within 100 milliseconds when communication or power loss is detected.

system. Further, because these safeguards are not dependent on parallel systems, they provide reduced complexity and increased reliability.

No other technologies exist on the market that can provide reliable wireless power over distance at a level needed to fully charge the target devices at the distances required while maintaining safety margins. For these reasons, Auspion seeks a waiver to allow for limited marketing of its wireless power over distance system.

DISCUSSION

Auspion seeks waiver of the Section 18.107(c) definition of Industrial, Scientific, and Medical equipment, which requires that ISM devices “generate and use locally” RF energy. The underlying purpose of this rule – to control for electromagnetic compatibility (“EMC”) with regard to users of radio communications – would not be undermined upon grant of this request. There is good cause to grant the waiver, as doing so would be in the public interest.

Chairman Pai recently stated his viewpoints on the proper regulatory treatment of new technologies:

[W]hen dealing with emerging technologies, I believe that one of the foundational principles for government should be regulatory humility. History tells us that new technologies will evolve in ways that people don’t anticipate and that early intervention can forestall or even foreclose certain paths to innovation. This makes it foolish and counterproductive for government to micromanage—or more accurately, try to micromanage—the evolution of these technologies.^{13/}

Similarly, the Commission recently noted that Section 7 of the Communications Act “reflects clear Congressional intent to encourage and expedite provision of technological innovation that would serve the public interest.”^{14/}

^{13/} Ajit Pai, Chairman, FCC, Remarks at the FCC Forum on Artificial Intelligence and Machine Learning, Washington, DC (Nov. 30, 2018).

^{14/} *Encouraging the Provision of New Technologies and Services to the Public*, Notice of Proposed Rulemaking, 33 FCC Rcd 2512 at ¶ 8 (2018)

Auspion agrees with these sentiments. Grant of this waiver will further this important objective of fostering innovation in service of the public interest by allowing technology for wireless power over distance to deploy and evolve, while protecting the use of radio spectrum.^{15/}

A. Request for Waiver

With the exception of the requested waiver, Auspion's WiPod system will be fully compliant with all of the Commission's rules. Section 18.107(c) requires that ISM equipment be "designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunication."^{16/} WiPod will not provide radio communications under Part 18 authority.

The Commission has never provided clear guidance on what constitutes "local" generation and use of RF energy. Interpretations by Commission staff view "local" in the context of power transfer to mean transmission within a set distance of perhaps up to three feet. Under this interpretation, the WiPod system would not be considered ISM equipment. While the WiPod system transmits power over distance of greater than three feet, because of the narrow beam it produces the transmissions only transmit to very small areas. Auspion therefore believes that the WiPod system complies with the intent of the Commission's requirement that ISM devices limit RF generation and use to a "local" area, and requests that the Commission waive Section 18.107(c) to allow marketing and deployment of its WiPod system.

The Part 18 rules are designed to allow for ISM equipment to operate while ensuring that there is no interference to radio communications.^{17/} In particular, ISM equipment that operates on

^{15/} 47 C.F.R. § 157 ("It shall be the policy of the United States to encourage the provision of new technologies and services to the public.").

^{16/} 47 C.F.R. § 18.107(c).

^{17/} *Conformance of FCC Regulations with International Standards for ISM Equipment*, Notice of Inquiry, 6 FCC Rcd 6501 at ¶ 2 (1991) ("ISM NOI").

dedicated ISM bands may operate without any restriction on the level of emissions, while ISM equipment that operates outside of the ISM bands must meet certain emission limits.^{18/} Any ISM equipment that causes harmful interference to radio communications outside of an ISM band must cease operations unless corrected.^{19/}

In 1985, the Commission revised the Section 18.107 definition of ISM equipment to read (in relevant part) “Equipment or appliances *designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes*, excluding applications in the field of telecommunications.”^{20/} Prior to this, the definition did not include the “generate and use locally” language, but read: “any device *operating above 10 kHz using radio waves for industrial, scientific, and medical or any other purposes including the transfer of energy by radio* and which are neither used nor intended for radio communication.”^{21/} The Commission modified the Part 18 definition to make it consistent with the Part 2 definition of ISM, which in turn was modified to conform to the ITU Radio Regulations.^{22/} The Commission has not opined on the meaning of “generate and use locally.”^{23/}

Further, the Commission has not provided guidance with regard to wireless power over distance technologies and what specific technologies or operations may qualify as Part 18 ISM

^{18/} 47 C.F.R. § 18.111; *see also* ISM NOI at ¶ 2.

^{19/} *Id.*

^{20/} *Overall Revision of the rules regarding industrial, scientific, and medical (ISM) equipment under Parts 0, 2, and 18*, Third Report and Order, 1985 FCC LEXIS 2750 (1985) (“ISM 3rd R&O”) (emphasis added).

^{21/} *See* 47 C.F.R. §§ 2.1 and 18.3 (1984); *Overall revision of Part 18 governing Industrial, Scientific, and Medical equipment*, Third Notice of Proposed Rulemaking, 99 F.C.C.2d 750, 750 (1984) (“ISM 3rd NPRM”) (emphasis added).

^{22/} ISM 3rd R&O at ¶ 3 (1985); *Implementation of the Final Acts of the World Administrative Radio Conference*, Geneva, 1979, Second Report and Order at ¶ 14-15, 49 FR 2368 (Jan. 19, 1984).

^{23/} *See Id.*

equipment. In recent years, the FCC Laboratory staff has provided varying guidance through its Knowledge Database (“KDB”) system, but KDBs are considered supplemental guidance rather than formal rules, and are not binding on the Commission.^{24/} The current KDB regarding wireless charging provides that wireless power transfer devices are “subject to either Part 15 and/or Part 18 of the Commission’s rules (depending on how the device operates) and that the devices “require FCC guidance for frequency exposure review.”^{25/} The KDB provides additional direction on certain consumer wireless power transfer applications, stating that they may or may not meet the Section 18.107(c) requirement to generate and use RF energy locally, but does not further address non-consumer devices.^{26/}

Auspion’s WiPod system will not undermine the purpose of Section 18.107(c). The wireless power transfer beams will “use locally” the RF energy by employing phased arrays to focus the energy within a small volume of space at a defined location within a relatively short distance (approximately a few meters). The system will employ a narrow spot size (much narrower than if operating a comparable system below 1 GHz), so that more energy can be transferred in a safer manner than a system operating in the lower frequencies. As discussed above, the deployment and operation of the WiPod system will be controlled *via* professional installation so that the Commission can be assured that this technology will be deployed in a careful and safe manner. Further, devices will not be charged while being held or worn by

^{24/} See *Amendment of Parts 0, 1, 2, 15 and 18 of the Commission’s Rules regarding Authorization of Radiofrequency Equipment*, First Report and Order, 32 FCC Rcd 8746 at n. 232 (2017) (KDBs are “not binding on the Commission and will not preclude the Commission from making a different decision in any matter that comes to its attention for resolution.”).

^{25/} KDB Publication Number 680106, Wireless Power Transfer (WPT) (Apr. 9, 2018), <https://apps.fcc.gov/oetcf/kdb/forms/FTSSearchResultPage.cfm?switch=P&id=41701> (“KDB 680106”).

^{26/} KDB Publication Number 680106, Wireless Power Transfer (WPT), Attachment D01 RF Exposure Wireless Charging Apps v03 (Apr. 9, 2018).

people. Finally, the system will be used only in industrial, retail, and enterprise locations, and will not be marketed to consumers.

Auspion is aware that the Commission has considered updating its Part 18 rules to be more in line with present-day technologies. Should the Commission adopt new Part 18 rules that may be inconsistent with the terms of this waiver request, Auspion understands that it may need to modify its operations or grandfather its present system in order to comply with any new requirements established in any revisions to Part 18 in the future. Nonetheless, grant of this waiver request now will provide many public benefits, as detailed below.

B. Public Interest.

The Federal Communications Commission was established, in part “for the purpose of promoting safety of life and property through the use of wire and radio communications.”^{27/} Wireless power over distance is a hugely promising technology that will aid in fulfilling this mission by providing a more efficient and reliable means of charging important systems, including security systems. This waiver request is technology neutral in that it does not favor any particular technology and is not tied to any specific patents. Therefore, it is well calculated to enhance U.S. competitiveness in the area of wireless power charging at a distance, while providing multiple benefits.

Public Interest Benefits

Grant of the instant application would further the public interest by allowing the introduction of Auspion’s innovative WiPod system to the market, allowing it to offer substantial benefits to the public. The higher-power charging over distance offered by the WiPod system will allow faster charging at longer range, which will open up exciting new use cases across a

^{27/} 47 U.S.C. § 151.

variety of industries, just as Wi-Fi wireless Ethernet has done for wireless data in similar industrial, retail, and enterprise settings.

Most wireless charging systems available today use inductive charging, which eliminates the need to plug in a device but does not allow charging over distances greater than a few centimeters. Charging may only occur when the device and the power source are functionally in contact with one another, substantially limiting operational improvements.

Some systems previously approved by the Commission do allow charging over distance, but those distances are extremely short (a few feet), and the power levels are too low to allow the kind of power transfer necessary for industrial, retail, and enterprise devices. Auspion's system, in contrast, will be able to provide charging efficiency in a safe manner. Auspion's WiPod system will allow truly remote wireless charging that fully replaces wired or contact-wireless charging in important settings.

This dramatic improvement in charging will completely change the way devices are powered. For example, many electronic devices, such as service kiosks, security cameras or industrial "Internet of Things" devices, require constant and reliable power, but are often installed in locations that are far from accessible wired power sources. While battery-powered systems are available, there is an inherent tradeoff between power consumption, size, and accessibility: any device with significant power drain must have either a large battery or be frequently accessed by a person to be charged. True wireless charging over distance would enable the installation of even high-power devices wherever convenient and efficient. These devices could run on power drawn from a small battery during the day and be charged by Auspion's WiPod at night, for example, which would reduce costs across the board: in

installation (since wired power need not be run to each device); in manufacturing (because batteries are expensive^{28/}); and in operation (less human involvement).

Similarly, commercial installation of systems designed to charge handheld devices is also an exciting possibility. Short battery life is a common smartphone user complaint, especially as devices become more and more powerful and feature larger, more power-hungry screens.^{29/} Efforts to expand battery capacity in the size-limited smartphone form factor can be risky.^{30/} This means that, despite continuing advances in battery technology, users must constantly recharge their phones to maintain peak performance throughout the day. Easing the burden of constant charging and use of cords in a business environment, such as a conference room, can have great potential for increased work efficiency, as well as user satisfaction. While not intended for consumer use, the Auspion WiPod system still holds promise in helping solve this problem. An installation in an out-of-the-way location in a commercial setting, such as above a conference room table, could offer easy charging without the disruption of plugging devices into an outlet or placing them on a charging mat.^{31/}

Perhaps the most exciting potential use of Auspion's WiPod is in the field of robotics. Commentators around the world have written extensively about changes coming to a variety of

^{28/} This corresponding reduction in battery size also offers substantial environmental benefits. The environmental toll of necessary lithium production, in particular, is stark. *See, e.g.,* Amit Katwala, *The Spiralling Environmental Cost of our Lithium Battery Addiction*, WIRED (Aug. 5, 2018), <https://www.wired.co.uk/article/lithium-batteries-environment-impact>.

^{29/} Paul Hiebert, *At Present, 41% of US Smartphones Users Say Longer Battery Life is the Design Feature they Want Most*, YOUTGOV (Feb. 20, 2018) <https://today.yougov.com/topics/technology/articles-reports/2018/02/20/smartphone-users-still-want-longer-battery-life>.

^{30/} News Release, Samsung, *Samsung Announces Cause of Galaxy Note 7 Incidents in Press Conference* (Jan. 22, 2017) <https://news.samsung.com/us/Samsung-Electronics-Announces-Cause-of-Galaxy-Note7-Incidents-in-Press-Conference>.

^{31/} Auspion's WiPod will automatically detect when a user's body is near the charging area and shut down nearby connections.

fields because of advances in robotics, and it is hard to imagine an industry involving interaction with the physical world that will not change as robotic technology advances.^{32/} Robots are already making factories, warehouses, construction sites, and many other locations safer, more productive, and more efficient. These changes will continue in these industries and spread to others as the technology advances and innovators dream up new use cases.

The fact remains, though, that robots need power. Supplying that power can be difficult, especially when mobility is the robot's key feature. The same power storage limitations that apply to smartphones apply to robots – even with advanced batteries, robots must be recharged frequently. Having to plug a robot in, or ensure it aligns perfectly with the induction coil used in contact-wireless charging systems, severely limits the autonomy with which these robots are designed to operate. Grant of this waiver will dramatically reduce the human involvement required in ensuring the continued operation of robots, and it will reduce operational costs by reducing battery size and increasing the number of robots each system can charge.^{33/}

^{32/} See, e.g., Sean Hinton, *How the Fourth Industrial Revolution is Impacting the Future of Work*, FORBES (Oct. 19, 2018), <https://www.forbes.com/sites/theyec/2018/10/19/how-the-fourth-industrial-revolution-is-impacting-the-future-of-work/#32a1daf965a7> (noting that technologies like robotics will “supersede any digital progress made in the past 60 years and create realities that we previously thought unthinkable”); Sanjit Dang, *The Robot Revolution is Just Beginning*, TECHCRUNCH, (June 3, 2018) <https://techcrunch.com/2018/06/03/the-robot-revolution-is-just-beginning/> (noting that a 2014 estimate of robotics becoming a \$67 billion market within a decade was revised *upward* by \$20 billion in 2017); Robotics Online, *Construction Robots Will Change the Industry Forever*, (Apr. 17, 2018) <https://www.robotics.org/blog-article.cfm/Construction-Robots-Will-Change-the-Industry-Forever/93> (describing a wide variety of innovative uses of robots in construction, from demolition to transport, to 3D printing); Kayla Matthews, *Robotics Will Definitely Change Manufacturing, But It Might Be for The Better*, MANUFACTURING.NET, (Mar. 7, 2018) <https://www.manufacturing.net/blog/2018/03/robotics-will-definitely-change-manufacturing-it-might-be-better> (noting that “smart factories” incorporating AI and robotics will soon become the norm).

^{33/} Robots could themselves one day provide power to an even wider range of locations than would be possible with a stationary WiPod deployment. See Yi-Shiun Wu, Chi-Wei Chen, and Hooman Samani, “Development of Wireless Charging Robot for Indoor Environment Based on

Auspion's WiPod system may also facilitate innovation in unpredictable ways. By freeing devices from the need to move into close proximity with a power source in order to charge, innovators have far more flexibility in device and system design. Innovation is, by its very nature, unpredictable. Regulators can encourage it by allowing technologies that facilitate flexibility and that can be applied across devices and industries to reach the market quickly, and with minimal artificial limitations imposed on their use. For example, the infrastructure of Wi-Fi has made possible the development of the Internet of Things and smart building technologies. In a similar way, paving a regulatory path for wireless power over distance infrastructure will make possible new innovations, including the development of many new kinds of end points.

There is no question that Auspion's WiPod technology offers immense innovative potential across a number of different industries. While the exact uses are hard to predict, grant of this waiver would allow Auspion to move forward with the development and marketing of its WiPod system, which is undoubtedly in the public interest.

Negligible Risk of Interference to Others

Allowing deployment of Auspion's professionally installed WiPod poses negligible risk of interference to other users. The system will operate in the 24 GHz ISM band, which has been designated for ISM devices. ISM equipment is not used for communications purposes, and therefore interference between and among Part 18 users is generally not a concern. The 24 GHz ISM band in particular is not shared with any commercial communications devices and the only other users are amateur radio operators, which are required to accept harmful interference from ISM equipment when operating in the band.^{34/} The system will comply with other Part 18 rules

Probabilistic Roadmap," Interactive Collaborative Robotics, Lecture Notes v. 9812 (2016) https://link.springer.com/chapter/10.1007/978-3-319-43955-6_8#citeas.

^{34/} 47 C.F.R. § 2.106 note 5.150 and § 97.303(e).

that control for interference, including restrictions on spurious emissions.^{35/} These limits are designed to prevent interference to authorized radio services outside of the ISM bands.^{36/} Given the spectrum characteristics of mmWave frequencies such as 24 GHz, which have limited propagation, interference outside of the band is extremely unlikely in any event.^{37/}

Auspion recognizes that the Commission recently made a new allocation for mobile services on a primary basis in 24.25-24.45 GHz and 24.75-25.25 GHz, just above the 24 GHz ISM band. The WiPod system will meet the Part 18 out-of-band emission limits, which are designed to protect radio communications from interference. The power emitted by Auspion's system is not modulated and is limited to a small region around the active device targeted due to the precision of beam control available.^{38/} Propagation at these frequencies is poor, so therefore interference with devices not specifically targeted is exceedingly unlikely. Finally, if the receiving device is a mobile device that operates at these frequencies, easy-to-implement software features can ensure that mobile services are not interrupted.^{39/} Given these particulars, harmful interference would be exceedingly unlikely.

Finally, Auspion offers numerous conditions to this waiver:

- The WiPod system will not be marketed to consumers or for residential use;
- The system may only be installed by professional installers;
- Auspion will maintain a list of customer locations, to be made available to the FCC upon request;

^{35/} 47 C.F.R. § 18.305.

^{36/} See *ISM NOI*.

^{37/} OFFICE OF ENGINEERING AND TECH., FCC, MILLIMETER WAVE PROPAGATION: SPECTRUM MANAGEMENT IMPLICATIONS (1997)
https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet70/oet70a.pdf.

^{38/} Auspion's system operates in a point-to-point fashion.

^{39/} For example, should interference become a concern, the WiPod system could be programed to not charge while the mobile device is streaming data.

- Auspion will label the devices, as set out above, to make clear that the system is not for consumers or residential use and may only be installed and moved by professional installers;
- The system will use beamforming to direct RF energy to a defined and small location;
- Charging will occur only when the device being charged has requested it, when no person is wearing or holding a device, and when no person is detected to be in the vicinity of the device being charged; and
- Multiple, independently testable safeguards will be deployed.

These actions will ensure that operations will be controlled and “local,” and therefore the Commission should determine that it would not undermine the purpose of its rules to qualify the WiPod system as an ISM device. It should grant a waiver to allow the WiPod system to be marketed under the conditions proposed.

C. Legal Basis for Auspion’s Waiver Request

The Commission may grant a waiver for “good cause” shown, and in particular when facts would make strict compliance with the rules inconsistent with the public interest.^{40/} For example, in *WAIT Radio v. FCC*, the Court required the Commission to consider the applicant’s request to operate outside of the rules when doing so would nonetheless accomplish the purpose of the rules.^{41/} The Court explained:

[A] general rule, deemed valid because its overall objectives are in the public interest, may not be in the “public interest” if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule, that has been adjudged in the public interest.^{42/}

In other words, grant of a waiver is an appropriate form of relief when it furthers the public interest inherent in the underlying rules.

^{40/} 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

^{41/} *WAIT Radio* operated an AM broadcast station limited to operating during daylight hours to afford protect “white areas” that had no local service. *WAIT Radio* requested the ability to transmit at night, using a directional antenna so to limit its signal in the white areas. *WAIT Radio v. FCC*, 418 F.2d at 1154-55.

^{42/} *WAIT Radio v. FCC*, 418 F.2d at 1157.

The Commission has granted waivers of the Part 18 rules “to allow prompt introduction of [] new technology into the marketplace and to permit the Commission to gain further experience with regard to potential interference from these devices.”^{43/} These include multiple waivers to allow for marketing of RF lighting equipment prior to a revision of Part 18 that provided a permanent regulatory structure for authorizing these devices.^{44/} In another case, the Commission determined that it would be willing to consider waiver of certain Part 18 technical limits for ultrasonic equipment on the condition that the equipment would meet certain RF emissions standards and until final rules to modify the emission rules could be promulgated.^{45/} In other words, the Commission has found good cause to waive Part 18 rules in a number of scenarios to allow new technologies into the marketplace pending revision of its rules.^{46/}

The waiver requested here is consistent with the above precedent and meets the *WAIT Radio* standard. As previously explained, the Part 18 rules are designed to “protect radiocommunication services from receiving interference from the operation of ISM equipment.”^{47/} Auspion’s WiPod system will provide for significant public benefits with no added risk of harmful interference to authorized users. Additionally, the proposed use would not undermine the purpose of the rule, which is to use RF in a defined manner, not for

^{43/} *Two Petitions filed by the National Electrical Manufacturers Association to Change the Requirements for Marketing RF Lighting Devices*, Memorandum Opinion and Order, 101 F.C.C.2d 813 at ¶ 4 (1985).

^{44/} *Id.*

^{45/} *Petition by Clairol, Inc. for Waiver of Section 2.805 of the FCC Rules*, Order, 84 F.C.C.2d 851 (1981).

^{46/} *Expansion of Waiver of Part 18 to Allow Full Production of General Electric’s Electronic Halarc Light Bulb*, 84 F.C.C.2d 870 at ¶ 5 (1981) (explaining that “[o]riginally adopted in 1948, the Part 18 rules were conceived to regulate RF devices used in industry and were not primarily aimed at consumer products such as the GE Halarc bulb.”).

^{47/} *Overall Revision of the rules regarding industrial, scientific, and medical (ISM) equipment under Parts 0, 2, and 18*, Third Report and Order, 58 Rad. Reg. 2d (P & F) 1096 (Aug. 21, 1985).

communications, while protecting users of radio communications. Indeed, the “within room” proposed use of the WiPod system is consistent with the original purpose of the Part 18 rules, which was to allow for the operation of diathermy and industrial heating equipment, which generate RF and create larger field intensities within defined locations, while protecting radio communications.^{48/} The requested waiver fits clearly within *WAIT Radio*.

The Commission’s wavier procedures are important:

The agency’s discretion to proceed in difficult areas through general rules is intimately linked to the existence of a safety valve procedure for consideration of an application for exemption based on special circumstances.^{49/}

Given this conclusion, the court in *WAIT* concluded that waiver requests made with supporting facts must be given a “hard look.”^{50/} Under this view, Auspion’s waiver request should be both given a “hard look,” and granted.^{51/} Auspion’s requested waiver provides many benefits to the public, and is a step towards providing a more certain regulatory approach for bringing wireless power over distance to market.

^{48/} See Thirteenth Annual Report of the Federal Communications Commission, pgs. 85-87 (Dec. 31, 1947).

^{49/} *WAIT Radio v. FCC*, 418 F.2d at 1157.

^{50/} *Id.* (citation footnote omitted).

^{51/} See, e.g., *Multispectral Solutions, Inc. Request for Waiver of Section 15.250 of the Commission’s Rules*, Order, 22 FCC Rcd 9831 (2007) (granting a waiver of the peak power limit provision of Section 15.250(d)(3) because doing so will serve the public interest in that it will help improve safety of life for personnel working in high risk industrial facilities).

CONCLUSION

For the foregoing reasons, Auspion respectfully requests that the Commission waive Section 18.107(c) of its rules so that it may market its non-consumer WiPod system.

Respectfully submitted,

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