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

In the Matter of	)
	)
Bluechiip Ltd. Tracking Solutions Request for	)
Waiver of Section 15.205(a) of the Commission's	)
Rules	)

ORDER

Adopted: March 9, 2011 **Released: March 9, 2011**

By the Chief, Office of Engineering and Technology:

I. INTRODUCTION

1. By this action, we grant a waiver of restricted band prohibitions contained in Section 15.205(a) of the Commission's rules to bluechiip Ltd. Tracking Solutions ("bluechiip") to allow operation of an inductive tracking device in the 1.5-4.2 MHz band.[1] We find that granting this waiver is in the public interest in that it will permit the use of radio frequency (RF) devices which can offer improvements in tracking of genetic, stem cell and other biological materials stored under extreme temperature conditions without resulting in harmful interference to authorized users in the 1.5-4.2 MHz band.

II. BACKGROUND

2. Part 15 of the Commission's rules permits the operation of low power radio frequency devices without an individual license from the Commission. The technical requirements contained in Part 15 are designed to ensure that there is a low probability that non-licensed devices will cause harmful interference to authorized users of the radio spectrum. The Part 15 requirements cover two general classes of devices: 1) unintentional radiators, such as computers and radio receivers, that intentionally generate but do not intentionally emit radiofrequency energy, and 2) intentional radiators, such as wireless networking equipment, cordless telephones and garage door openers, that intentionally generate and emit radio frequency energy, either by radiation or induction.[2] Operation of intentional radiators is permitted either under the low levels specified in Section 15.209 or at higher levels in specific frequency bands under other provisions in Part 15.[3]

3. Some frequency bands are designated as restricted to protect certain radio services from interference, such as those services that involve protection of safety-of-life or that are dependent on very low received signal levels, such as satellite downlinks or radio astronomy. These "restricted bands" are specified in Section 15.205.[4] Only spurious emissions are permitted from intentional radiators in the restricted bands.[5] The limits for spurious emissions in the restricted bands are the same as the radiated

[1] Bluechiip Ltd. Tracking Solutions, Request for Waiver of Section 15.205(a) of the Commission's Rules, filed November 12, 2010.

[2] *See* 47 C.F.R. §§ 15.3(z) and 15.3(o).

[3] *See* 47 C.F.R. § 15.209.

[4] *See* 47 C.F.R. § 15.205.

[5] *See* 47 C.F.R. § 2.1. Spurious emissions are defined as, "Emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation (continued….)

mission limits in Section 15.209.

4. Bluechiip manufactures an inductive tracking system that is designed for tracking and retrieving genetic, stem cell and biological materials stored at extremely cold temperatures in "biobanks." The bluechiip system consists of two components: an RF interrogator and non-electronic micro-electro-mechanical system (MEMS) tags that are capable of being molded into storage containers. Each tag contains a physical structure of 46 micro-beams in which each micro-beam is designed to resonate (vibrate) at a specific RF frequency when excited by a magnetic field generated by the interrogator. The interrogator detects the presence or absence of particular resonant frequencies from the micro-beam structure to identify a particular tag. The interrogator steps through 80 sub-bands of approximately 30 kilohertz each over the 1.5-4.2 MHz band. Each read pulse is 40-60 microseconds, and the total time required to read a tag is 200-400 milliseconds.

5. There are three restricted bands within the 1.5-4.2 MHz band: 2.1735-2.1905 MHz, 4.125-4.128 MHz, and 4.17725-4.17775 MHz.[6] Bluechiip requests a waiver of Section 15.205(a) to allow its tracking system to transmit in these restricted bands. In support of its waiver, bluechiip argues that its system requires the use of the 1.5-4.2 MHz band to perform reliably. It states that it investigated other frequency bands that are not restricted, but found that higher frequencies suffer from a lower signal-to-noise ratio, making tags difficult to read or prone to errors. Bluechiip also states that the manufacturing of MEMS chips that operate at higher frequencies is less reliable because the smaller micro-beams required at higher frequencies have greater variability in their resonant frequencies due to manufacturing tolerances. It further states that tags operating at frequencies below 1.5-4.2 MHz must be made larger to include more coils for inductive signaling, which affects container molding and increases chip impedance that, in turn, lowers the signal-to-noise ratio and reliability of reading the tag. It claims that the features which make this technology well suited for biobank applications—small tag size, reliability and low cost—dictate where in the spectrum the system must operate.

6. Bluechiip states that it is unclear whether the Commission's rule limiting emissions in the restricted bands to spurious emissions applies to induction devices, *e.g.,* devices that generate a magnetic field. It contends that radio receivers in the restricted bands are sensitive only to electric field emissions and not magnetic field emissions like those produced by its device. Bluechiip argues that all transmitted information from an induction device is in the magnetic field and none is in the electric field, so that all emissions that a receiver in a restricted band is capable of receiving could be reduced without affecting the transmission of information, and could therefore be considered to be spurious emissions as defined by our rules.

7. Nonetheless, bluechiip argues that, to the extent a waiver is necessary, its system will not adversely impact or be impacted by operations in the restricted bands, and therefore the Commission's policy goals underlying Section 15.205(a) will not be undermined. It states that its device is intended to transmit over a distance of millimeters and produces low emission levels. Bluechiip represents that all emissions in the restricted bands are below the Section 15.209 limits. It also claims that its system is immune to interference from high level radiated and magnetic fields in the 1.5-4.2 MHz bands.

8. Finally, bluechiip argues that grant of the requested waiver would be in the public interest. It

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products and frequency conversion products, but exclude out-of-band emissions." Necessary bandwidth is defined as, "…the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions."

[6] The 2.1735-2.1905 MHz band is used by the Federal Emergency Management Agency for high power emergency response; the 4.125-4.128 MHz band is used by the Global Maritime Distress Safety System for search and rescue activities; and the 4.17725-4.17775 MHz band is used for maritime search and rescue. In particular, the frequencies 2.182 MHz and 4.125 MHz are distress frequencies.

states that biobanks are a vital part of health care and biomedical research and that tracking of biological materials stored in biobanks will be more of a necessity as new uses are discovered and demand continues to skyrocket. It claims that recent studies indicate that hundreds of millions of samples are stored in U.S. biobanks and more than one billion are stored worldwide. Bluechiip argues that there are difficulties with present methods of tracking samples in biobanks, which store biologic material in liquid nitrogen at temperatures as low as -196 degrees Celsius. It states that barcodes are often obscured by frost and that barcode labels tend to lose adhesion at extremely cold temperatures. It further states that radio frequency identification (RFID) systems may be able to read through frost, but they cease functioning at extremely cold temperatures and the RFID tags cannot tolerate the gamma radiation used to sterilize containers. Bluechiip states that its technology produces a virtually indestructible "license plate" which has been field proven to survive autoclaving and gamma radiation sterilization, humidification, centrifugation and cryogenic storage.

III. DISCUSSION

9. 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] The prohibition on operation in the restricted bands listed Section 15.205(a) exists to ensure that Part 15 intentional radiators do not harmfully interfere with authorized radio services, including Federal Government services. As discussed below, a waiver of the frequency band restriction in Section 15.205(a) for operations as described by bluechiip can be granted without increasing the potential for harmful interference. Hence, granting this waiver will not undermine the purpose of the rules. Finally, there is a strong public interest benefit in granting this waiver because to do otherwise would prevent the availability of systems that would enable tracking of biological materials stored under extreme conditions that is important to the public well-being. Accordingly, we find good cause exists for granting a waiver of Section 15.205(a) for the bluechiip devices.

10. As an initial matter, we disagree with bluechiip's suggestion that Section 15.205(a), which limits emissions in the restricted bands to spurious emissions, may not be applicable to induction devices. Spurious emissions are by definition emissions that are outside the necessary transmit bandwidth of a device, whereas the emissions from the bluechiip system that fall within restricted bands are fundamental emissions.[10] The fact that the bluechiip system produces primarily magnetic emissions is not relevant to this determination, as the definition of spurious emissions does not distinguish between electric field and

[7] 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).

[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] *See supra* note 5.

magnetic field emissions. Thus, we find that a waiver of Section 15.205(a) is necessary for this device to operate in the 1.5-2.4 MHz band.

11. We believe that, based upon bluechiip's representations, grant of the requested waiver is in the public interest. As bluechiip describes, biobanks are a vital part of health care and biomedical research, and there are large number of biological samples stored in biobanks in the U.S. and worldwide. Existing tracking technologies such as RFID and optical barcodes may not function properly under the extremely low temperatures in biobanks or may not survive the high temperatures and/or radiation used to sterilize containers. Bluechiip indicates that its system can function under the low temperature conditions in biobanks and that its tags can survive the conditions used to sterilize equipment. Grant of the requested waiver will permit the introduction of these new tracking technologies that have benefits for the public, whereas application of the existing rule would deny these public benefits.

12. We also find that grant of the requested waiver will not cause harm to Federal Government systems or other operations in the 2.1735-2.1905 MHz, 4.125-4.128 MHz, and 4.17725-4.17775 MHz bands. As bluechiip describes, the device operates over extremely short distances; on the order of millimeters. Bluechiip represents that the device is capable of complying with the Section 15.209 radiated emission limits, and it is required to submit test data taken in accordance with the applicable measurement procedures to demonstrate compliance with these limits to obtain certification for the device.[11] Also, the device will be operated only indoors in biobank facilities where the walls will attenuate radiated emissions.[12] Additionally, the device does not transmit continuously, but rather steps through 80 frequencies and transmits on each particular frequency for only 40-60 microseconds during the 200-400 milliseconds required to read a tag, which corresponds to a transmit duty cycle of much less than 1%. Thus, the potential for the bluechiip system to cause interference to authorized services in the restricted bands is extremely low. Further, operation of this device will be subject to the Part 15 requirements that it may not cause harmful interference to authorized services and that it must cease operation in the event interference occurs.[13] Therefore, grant of a waiver of Section 15.205(a) will not undermine the purpose of this rule.

IV. ORDERING CLAUSE

13. Accordingly, pursuant to authority in Section 0.31, 0.241 and 1.3 of the Commission's rules, 47 C.F.R. sections 0.31, 0.241 and 1.3, and Sections 4(i), 302, 303(e), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 302, 303(e), and 303(r), IT IS ORDERED that the request for waiver of Section 15.205(a) filed by bluechiip Ltd. Tracking Solutions IS GRANTED. This action is effective upon release of this Order.

FEDERAL COMMUNICATIONS COMMISSION

Julius P. Knapp
Chief, Office of Engineering and Technology

[11] *See* Request for Waiver at 9, Attachment A at 10-11 and Attachment B at 6.

[12] *See* Request for Waiver at 9.

[13] *See* 47 C.F.R. § 15.5.